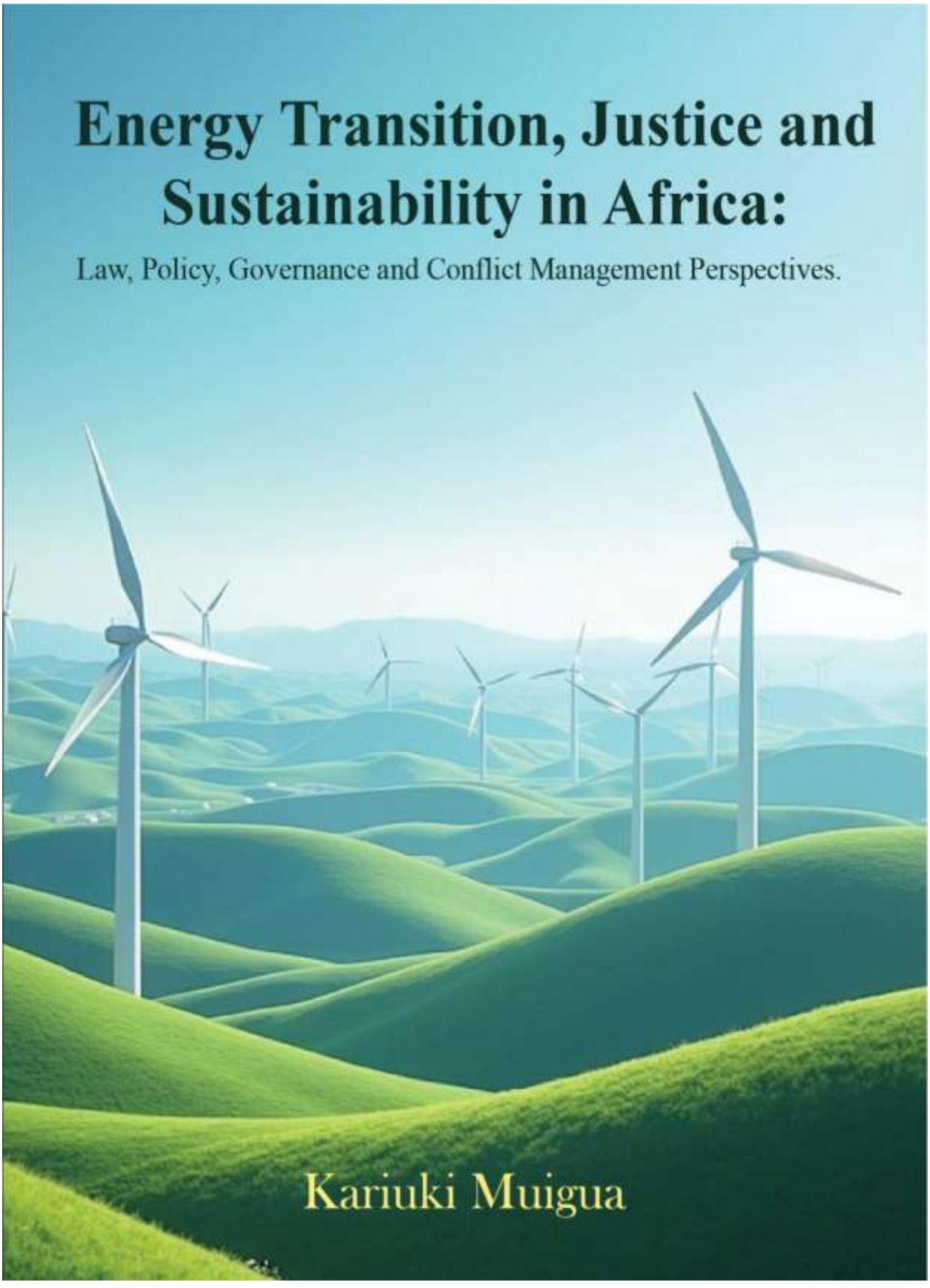
Energy Transition, Justice and Sustainability in Africa:

Law, Policy, Governance and Conflict Management Perspectives.



Kariuki Muigua

Energy Transition, Justice and Sustainability in Africa:

Law, Policy, Governance and Conflict Management Perspectives

Hon. Prof. Kariuki Muigua, Ph.D; FClArb; Ch.Arb; OGW, SC

Energy Transition, Justice and Sustainability in Africa:
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Author's Note

This book emerges from a sustained engagement with the intertwined challenges of energy transition, justice, and sustainability in Africa. As the continent confronts the urgent imperatives of climate change, energy poverty, and sustainable development, it is increasingly evident that technological solutions alone are insufficient. Equally critical are the legal, policy, governance, and conflict management frameworks that shape how energy resources are accessed, governed, and contested.

Energy Transition, Justice and Sustainability in Africa: Law, Policy, Governance and Conflict Management Perspectives is informed by interdisciplinary scholarship, practical experience and African realities.

The book reflects the conviction that Africa's energy transition must be context-sensitive, people-centred, and justice-oriented, recognising historical inequalities, socio-economic vulnerabilities and the rights and knowledge systems of local and indigenous communities. It also acknowledges the growing importance of renewable energy, critical raw materials, and green infrastructure in shaping Africa's development trajectory and its engagement with global climate action.

This book is structured as a collection of twenty-six stand-alone scholarly articles, each of which can be read independently while collectively contributing to a coherent and integrated understanding of Africa's energy transition landscape. The stand-alone nature of the chapters allows readers to engage with specific thematic, sectoral, or jurisdictional issues of interest, while the overall compilation offers a holistic perspective on the legal, policy, governance, and justice dimensions of energy transition across the continent.

A distinctive feature of this work is its emphasis on conflict management as a central pillar of sustainable energy governance. Energy projects and policies frequently generate disputes involving communities, investors, governments, and transnational actors.

This book therefore highlights the role of negotiation, mediation, arbitration, and hybrid alternative dispute resolution mechanisms in preventing and managing energy-related conflicts, safeguarding investments and promoting long-term sustainability.

The perspectives advanced in this volume are shaped by research, teaching, policy engagement, and dispute resolution practice across Kenya and the wider African region. While the analyses are grounded in legal and institutional frameworks, they are equally attentive to governance practice, implementation challenges, and emerging opportunities for reform.

It is my hope that this book will contribute meaningfully to scholarly debate, inform policy and legislative development, and support practitioners, students, and development partners working towards a just, inclusive, and sustainable energy future for Africa.

Hon. Prof. Kariuki Muigua, Ph.D; FClArb; Ch.Arb; OGW, SC
December, 2025.
Nairobi Kenya

Dedication

This book is dedicated to the people of Africa,
whose aspirations for dignity,
equity and sustainable development
continue to
inspire the pursuit of a just energy transition.

It is also dedicated to
scholars, practitioners, policymakers
and
community leaders working tirelessly to advance
energy justice, environmental protection,
and
peaceful conflict management across the continent.

Above all, this work honours present and
future generations of Africans,
whose wellbeing depends on
collective commitment
to inclusive, sustainable, and
conflict-sensitive energy governance.

Acknowledgements

I am grateful to all colleagues, institutions, and practitioners whose scholarship, professional engagement and encouragement contributed to the development of this book. I also thank students, researchers, and policy actors whose interactions and insights continually inform justice-oriented approaches to energy transition and sustainable development in Africa.

Special appreciation goes to Jack Liaduma, Mwati Muriithi, Anne Wairimu, Kelvin Kyalo, Victor Makau, and the entire staff at Kariuki Muigua & Co. Advocates for making this publication possible through their invaluable professional support, dedication and teamwork.

Finally, I sincerely acknowledge the support of my family whose encouragement sustained this work from conception to completion.

.

Above all, I give thanks to God for His grace, guidance and sustaining presence in every step of this journey.

List of Abbreviations

ADR – Alternative Dispute Resolution
BITs – Bilateral Investment Treaties
COMESA – Common Market for Eastern and Southern Africa
CRCICA – Cairo Regional Centre for International Commercial Arbitration
EAC – East African Community
ECOWAS – Economic Community of West African States
FPIC – Free, Prior and Informed Consent
GHGs – Greenhouse Gases
ICC – International Chamber of Commerce
IEA – International Energy Agency
KIAC – Kigali International Arbitration Centre
LCA – Lagos Court of Arbitration
LPG – Liquefied Petroleum Gas
MARC – Mediation and Arbitration Centre
PPP – Public Private Partnership
PPPs – Public Private Partnerships
SDGs – Sustainable Development Goals
SLO – Social Licence to Operate
SSA – Sub-Saharan Africa
UNCITRAL – United Nations Commission for International Trade Law
UNDP – United Nations Development Programme
UNEP – United Nations Environment Programme
UNFCCC – United Nations Framework Convention on Climate Change
UN-Habitat – United Nations Human Settlements Programme
WHO – World Health Organization

List of Statutes and International Instruments

Access to Information Act, No. 31 of 2016, Laws of Kenya

Climate Change Act., No. 11 of 2016., Laws of Kenya., Government Printer, Nairobi

Constitution of Kenya, 2010

Convention on the Settlement of Investment Disputes Between States and Nationals of Other States (ICSID), 575 UNTS 159

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Mui Coal Basin Local Community & 15 Others v Permanent Secretary, Ministry of Energy & 17 Others [2015] eKLR.

Robert N. Gakuru & Others v Governor Kiambu County & 3 Others [2014] eKLR.

PART I: FOUNDATIONS OF ENERGY TRANSITION, SECURITY AND SUSTAINABILITY IN AFRICA

Abstract

Part I establishes the conceptual foundations of energy transition, security and sustainability in Africa by examining persistent energy access challenges, climate vulnerability and development inequalities. It situates energy as a central pillar of sustainable development and social justice, while interrogating the tensions between expanding access, ensuring affordability and reliability, and transitioning away from fossil fuels. Through legal, policy and governance perspectives, the Part highlights Africa's renewable energy potential and the role of law in promoting equitable, secure and sustainable energy systems, providing a grounding framework for the analyses in subsequent parts of the book.

Chapter 1: Accelerating Energy Transition in East Africa

Abstract

Energy is a fundamental human right and a prerequisite for the attainment of almost all socio-economic rights. Access to energy can spur economic development and poverty eradication. However, despite the importance of energy access, most people especially in Sub-Saharan Africa lack access to affordable, reliable, and modern energy services. The energy sector is also the main cause of climate change due to burning of fossil fuels such as coal, oil and gas. Accelerating energy transition is crucial in addressing these challenges. This paper discusses the need to accelerate energy transition in East Africa. It conceptualizes energy transition and highlights its key components. The paper further examines the progress made towards achieving energy transition in East Africa. It also interrogates the prospects and challenges facing energy transition in East Africa and suggests measures towards accelerating this agenda.

1.0 Introduction

Energy is a fundamental human need and the driving force of human development[1]. It is a basic human need that has been equated to food, air and water[2]. Energy has the potential to spur economic development and poverty eradication[3]. It has correctly been noted that energy can accelerate the attainment of socioeconomic rights such as the right to food, the right to education, the right to health, the right to water among other fundamental human rights[4]. According to the International Energy Agency (IEA), modern energy services are crucial to human well-being and to a country's economic development[5]. IEA notes that access to modern energy is essential for the provision of clean water, sanitation and healthcare and for the provision of reliable and efficient lighting, heating, cooking, mechanical power, transport and telecommunications services which are vital elements of economic development[6]. Further, the United Nations asserts that our everyday life depends on reliable and affordable energy[7]. It further points out

[1] Guruswamy. L, 'Energy Justice and Sustainable Development' *Colorado Journal of International Environmental Law & Policy*, Volume 21, No. 2.

[2] Goldthau. A & Sovacool. B., 'The Uniqueness of the Energy Security, Justice and Governance Problem' *Energy Policy*, 41 (2012) 232-240

[3] Muigua. K., 'Access to Energy as a Constitutional Right in Kenya', available at http://kmco.co.ke/wp-content/uploads/2018/08/Access-to-Energy-as-a-Constitutional-Right-inKenya-NOVEMBER-2013.pdf (Accessed on 14/03/2024)

[4] The World Bank, 'Sustainable Development Goal on Energy (SDG7) and the World Bank Group, available at https://www.worldbank.org/en/topic/energy/brief/sustainable-development-goalonenergy-sdg7-and-the-world-bank-group (Accessed on 14/03/2024)

[5] International Energy Agency., 'Defining Energy Access: 2020 Methodology' Available at https://www.iea.org/articles/defining-energy-access-2020-methodology (Accessed on 14/03/2024)

[6] Ibid

[7] United Nations., 'Affordable and Clean Energy' Available at

that a well-established energy system supports all sectors: from businesses, medicine and education to agriculture, infrastructure, communications and high technology[8].

Due to its importance, access to energy has been described as a fundamental human right[9]. According to IEA, energy access entails a household having reliable and affordable access to both clean cooking facilities and to electricity, which is enough to supply a basic bundle of energy services initially, and then an increasing level of electricity over time to reach the regional average[10]. Energy access therefore entails the availability of affordable, reliable and modern energy services[11]. Access to energy drives industrialization, boosts productivity and economic growth, spurs human development, and is crucial to achieve almost all of the United Nations Sustainable Development Goals (SDGs)[12]. Further, access to energy has been described as a pre-condition for socio-economic development due to its potential to spur economic development and poverty eradication[13]. On the other hand, lack of access to energy contributes to poverty and deprivation and can contribute to economic decline[14]. It has been argued that no country in the recent past has been able to spur economic development and substantially reduce poverty levels without ensuring access to energy[15].

Several challenges hinder access to energy at the global, regional, and national levels[16]. It has been noted that many people across the world lack access to clean energy sources such as electricity and use polluting, inefficient fuels such as firewood for household chores such as cooking[17]. This challenge is especially prevalent in Sub-Saharan Africa

https://www.un.org/sustainabledevelopment/energy/ (Accessed on 14/03/2024)

[8] Ibid

[9] Muigua. K., 'Access to Energy as a Constitutional Right in Kenya', Op Cit

[10] International Energy Agency., 'Defining Energy Access: 2020 Methodology' Op Cit

[11] Ibid

[12] Muigua. K., 'Fostering Energy Justice in Africa' Available at https://kmco.co.ke/wp-content/uploads/2023/11/Fostering-Energy-Justice-in-Africa.pdf (Accessed on 14/03/2024)

[13] United Nations Development Programme., 'Energy Access.' Available at https://www.undp.org/energy/our-work-areas/energy-access (Accessed on 14/03/2024)

[14] Bradbrook. A., 'Access to Energy Services in a Human Rights Framework.' Available at https://www.un.org/esa/sustdev/sdissues/energy/op/parliamentarian_forum/bradbrook_hr.pdf (Accessed on 14/03/2024)

[15] Yoshida. T., & Zusman. E., 'Achieving the Multiple Benefits of a Sustainable Development Goal for Energy' Available at https://iges.or.jp/en/publication_documents/pub/bookchapter/en/4934/08_Ch8_Achieving_the_SDG (Accessed on 14/03/2024)

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[17] Ibid

where majority of the population lack access to clean and affordable energy and depend on traditional fuels[18]. According to the IEA, Sub-Saharan Africa which includes the East African Region accounts for approximately 80 per cent of people lacking electricity access[19]. Access to energy therefore represents one of Africa's greatest obstacles to social and economic development[20]. In addition, the energy sector is by far the main contributor to the global threat of climate change and accounts for approximately 73 percent of human caused greenhouse gases[21]. It has been noted that for many decades, fossil fuels such as coal, oil and gas have been major sources of electricity production, but burning these fuels produces large amounts of greenhouse gases which cause climate change and have harmful impacts on people's well-being and the environment[22]. In light of these concerns, it has been correctly noted that there is need accelerate energy transition at all levels[23].

This paper discusses the need to accelerate energy transition in East Africa. It conceptualizes energy transition and highlights its key components. The paper further examines the progress made towards achieving energy transition in East Africa. It also interrogates the prospects and challenges facing energy transition in East Africa and suggests measures towards accelerating this agenda.

2.0 Conceptualizing Energy Transition

Energy transition has been defined as the shift in the global energy sector from fossil-based systems of energy production and consumption including oil, natural gas and coal to renewable energy sources like wind and solar[24]. In addition, it has been noted that the energy transition concerns the shift from fossil fuels to renewable energy sources in an effort to reduce carbon dioxide emissions[25]. Energy transition therefore involves the long-

[18] Bildirici. M & Ozaksoy.F., 'Woody Biomass Energy Consumption and Economic Growth in SubSaharan Africa' *Procedia Economics and Finance* 38 (2016) 287 – 293

[19] International Energy Agency., 'Africa Energy Outlook 2022' Available at https://iea.blob.core.windows.net/assets/220b2862-33a6-47bd-81e900e586f4d384/AfricaEnergyOutlook2022.pdf (Accessed on 14/03/2024)

[20] Hafner. M., 'The Challenge of Energy Access in Africa.' Available at https://link.springer.com/chapter/10.1007/978-3-319-92219-5_1 (Accessed on 14/03/2024)

[21] United Nations., 'Affordable and Clean Energy' Op Cit

[22] Ibid

[23] Muigua. K., 'Accelerating Energy Transition in Kenya' Available at https://kmco.co.ke/wp-content/uploads/2023/09/Accelerating-Energy-Transition-in-Kenya.pdf (Accessed on 14/03/2024)

[24] S & P Global., 'What is Energy Transition?' Available at https://www.spglobal.com/en/researchinsights/articles/what-is-energy-transition (Accessed on 14/03/2024)

[25] Deloitte., 'The Energy Transition Explained.' Available at

term structural change to energy systems from fossil-fuel based systems to cleaner and sustainable systems such as renewable sources of energy[26]. It is a continuing process requiring long-term energy strategies and planning, with a country-tailored focus on applying appropriated energy technologies to reach net-zero emissions[27].

It has been noted that the idea of energy transition addresses how humankind uses energy for its needs and reconciles it with environmental, social, environmental, and economic interests[28]. Energy transition is not only concerned about the technology change from fossil fuels to renewables but also focuses on the social, economic, and environmental aspects of the development of clean energies[29]. As a result, it has been posited that energy transition should entail an integrated, people-centred approach, in which all available energy technologies play their important role in transforming local and national energy systems[30]. Further, there is need for a just energy transition which integrates increased action on governance, social protection and gender equality as nexus area to technological innovation and financial requirements[31].

It has been noted that several factors may stimulate the transition from reliance on one major energy resource to another[32]. These factors include the depletion or shortage of local or regional energy supplies and resources[33]; increase in costs of one energy source followed by a corresponding decrease in the cost of another energy sources[34]; adverse environmental and health impacts of one energy source such as air and water pollution creating the desirability of alternative sources of energy[35]; and technological change and innovation resulting in more efficient sources of energy[36]. Energy transition is therefore

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https://www2.deloitte.com/nl/nl/pages/energy-resources-industrials/articles/future-of-energyfaq.html (Accessed on 14/03/2024)

[26] Nalule. V., & Leal-Arcas. R., 'Energy Decentralization and Energy Transition in Poland.' *Electricity Decentralization in the European Union* 2nd Edition., 2023 pp 209-240

[27] United Nations Development Programme., 'Energy Transition' Available at https://www.undp.org/energy/our-work-areas/energy-transition#:~:text=Annual%20energy%2Drelated%20CO2%20emissions,90%25%20of%20the%20necessary%20reduction. (Accessed on 14/03/2024)

[28] Ibid

[29] Ibid

[30] Ibid

[31] Ibid

[32] Solomon. B., & Krishna. K., 'The Coming Sustainable Energy Transition: History, Strategies, and Outlook.' Energy Policy 39 (2011) 7422-7431

[33] Ibid

[34] Ibid

[35] Ibid

[36] Ibid

usually determined by factors such as the availability of energy resources, the costs of obtaining energy resources as well as their usefulness, and in recent years, by efforts to protect the climate[37].

The need for energy transition has in the recent past been necessitated by threat of climate change and increasing scarcity and expense of petroleum[38]. As a result, the world community is compelled to transition to sustainable energy systems as well as to better manage energy demand and supply[39]. According to IEA, energy transition offers many benefits including new industrial opportunities and jobs, greater energy security, cleaner air, universal energy access and a safer climate for everyone[40]. It is therefore necessary to accelerate energy transition for prosperity and a safer planet.

3.0 Legal Framework on Energy Transition

The need for energy transition at the global level is enshrined under the *United Nations Framework Convention on Climate Change (UNFCCC)*[41]. According to UNFCCC, countries whose economies are highly dependent on income generated from the production, processing and export, and/or on consumption of fossil fuels and associated energy intensive products are highly vulnerable to climate change[42] It urges all countries and especially developing countries which are still highly dependent on fossil fuels to explore the possibilities for achieving greater energy efficiency and for controlling greenhouse gas emissions in general, including through the application of new technologies in the energy sector such as *renewable energy* on terms which make such an application economically and socially beneficial[43]. UNFCCC therefore sets the global agenda for energy transition as part of the efforts towards confronting climate change.

[37] Nalule. V., & Leal-Arcas. R., 'Energy Decentralization and Energy Transition in Poland.' Op Cit

[38] Solomon. B., & Krishna. K., 'The Coming Sustainable Energy Transition: History, Strategies, and Outlook.' Op Cit

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[40] International Energy Agency., 'The Energy World is Set to Change Significantly by 2030, Based on Today's Policy Settings Alone' Available at https://www.iea.org/news/the-energy-world-is-set-to-change-significantly-by-2030-based-on-today-s-policy-settings-alone (Accessed on 14/03/2024)

[41] United Nations Framework Convention on Climate Change., United Nations 1992, Available at https://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf (Accessed on 14/03/2024)

[42] Ibid, article 4

[43] Ibid

The *Paris Agreement*[44] also embraces the idea of energy transition. This Agreement seeks to strengthen the global response to the threat of climate change, in the context of Sustainable Development and efforts to eradicate poverty, including by holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change[45]. In order to achieve its objectives, the Paris Agreement acknowledges the need to promote *universal access to sustainable energy* in developing countries, in particular in Africa, through the enhanced deployment *of renewable energy*[46]. The Paris Agreement therefore envisages the transition from fossil fuels to clean energy sources including renewable energy in order to reduce global greenhouse gas emissions and strengthen the global response on climate change[47]. Implementation of the Paris Agreement is necessary in accelerating global energy transition and shifting towards a net-zero emissions world[48].

Global energy transition is also envisioned under the United Nations *2030 agenda for Sustainable Development*[49]. SDG 7 seeks to ensure access to *affordable, reliable, sustainable and modern energy for all*[50]. Among the targets under SDG 7 include ensuring universal access to affordable, reliable and modern energy services[51]; substantially increasing the share of renewable energy in the global energy mix[52]; doubling the global rate of improvement in energy efficiency[53]; and enhancing international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology[54]. It has been noted that achieving the targets

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[44] Paris Agreement., United Nations, 2015., Available at https://unfccc.int/sites/default/files/english_paris_agreement.pdf (Accessed on 14/03/2024)
[45] Ibid, article 2 (1) (a)
[46] Ibid, Preamble
[47] Ibid
[48] United Nations., 'The Paris Agreement.' Available at https://www.un.org/en/climatechange/parisagreement (Accessed on 14/03/2024)
[49] United Nations General Assembly., 'Transforming Our World: the 2030 Agenda for Sustainable Development.' 21 October 2015, A/RES/70/1., Available at https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf (Accessed on 14/03/2024)
[50] Ibid
[51] Ibid
[52] Ibid
[53] Ibid
[54]Ibid

under SDG 7 means investing in clean energy sources such as solar, wind and thermal[55]. It also calls for expanding infrastructure and upgrading technology to provide clean energy in all developing countries which is a crucial goal that can both encourage economic development and environmental sustainability[56]. Realizing the targets under SDG 7 is therefore crucial in accelerating energy transition.

At the continental level, Africa Union's *Agenda 2063*[57] sets out the need for energy transition in Africa. According to Agenda 2063, the Continent faces enormous energy challenges which include low generation capacity and efficiency, high costs, unstable and unreliable energy supplies, low access to modern energy, insufficient energy infrastructure, and lack of institutional and technical capacity to harness huge resources partly due to dependence on fossil fuels for generation of electricity[58]. Among the aspirations under Agenda 2063 is to create environmentally sustainable and climate resilient economies and communities in Africa through measures such as the adoption of renewable sources of energy[59]. Agenda 2063 portrays the vision of a Continent where renewable energy including wind, solar, hydro, bioenergy, ocean tidal waves, geothermal and other renewables will claim more than half of the energy consumption for households, businesses and organizations[60]. It is necessary to implement the aspirations of Agenda 2063 in order to realize energy transition in Africa.

The *East African Community Climate Change Policy*[61] also seeks to foster energy transition with the East African Community (EAC). The policy acknowledges that energy is the driver of social and economic development in the EAC region[62]. It also notes that most of the EAC partner states depend on imported fossil based fuel (oil)[63]. The Policy further acknowledges that the use of fossil oil is unsustainable due to its high emission factor that is a major contributor to global warming and climate change[64]. As a result, the Policy

[55] United Nations., 'Affordable and Clean Energy' Op Cit
[56] Ibid
[57] Africa Union., 'Agenda 2063: The Africa we Want.' Available at https://au.int/sites/default/files/documents/33126-doc-framework_document_book.pdf (Accessed on 14/03/2024)
[58] Ibid
[59] Ibid
[60] Ibid
[61] East African Community., 'EAC Climate Change Policy Framework.' Available at https://www.eac.int/environment/climate-change/eac-climate-change-policy-framework (Accessed on 14/03/2024)
[62] Ibid
[63] Ibid
[64] Ibid

seeks to increase the *availability and accessibility* of *sustainable, reliable and affordable renewable energy resources* in the EAC and urges member states to embrace measures such as scaling up investment in renewable energy technologies to provide access to affordable cleaner energy; improving efficiency in use of biomass energy especially for rural communities; developing appropriate alternative energy sources, policies and measures to increase energy efficiency; devising a precautionary approach to the development of bio-fuels for mitigation and energy in view of food security issues; and improving energy efficiency and promoting clean energy technologies including hydropower, solar and wind[65]. Implementing the vision of this policy can therefore accelerate energy transition in East Africa.

At a national level, the *Energy Act*[66] of Kenya embraces the transition from fossil fuels to clean energy sources including renewable energy. The Act defines renewable energy as non-fossil energy generated from natural non-depleting resources including but not limited to solar energy, wind energy, biomass energy, biological waste energy, hydro energy, geothermal energy and ocean and tidal energy[67]. The Energy Act urges the state to develop, promote and manage the use of renewable sources of energy in Kenya and to this end it establishes the Rural Electrification and Renewable Energy Corporation which is tasked to fulfill that mandate[68]. In addition, the *National Energy Policy*[69] identifies key challenges in the energy sector in Kenya including reliance on fossil fuels which results in high electricity costs and environmental degradation as exemplified by increased local air pollution and acid precipitation from ever growing fossil fuel combustion[70]. The Policy also acknowledges that depletion of energy resources including fossil fuels is a major concern in the energy sector in Kenya[71]. It urges the country to transition towards renewable sources of energy[72]. The Policy correctly notes that renewable energy which derived from the naturally occurring resources including geothermal, hydro, solar, wind, ocean energy, biomass, biofuels, biogas and municipal waste can supply the country's energy needs and those of future generations in a sustainable way if effectively harnessed through careful planning and advanced technology[73]. Further, the Policy asserts that

[65] Ibid
[66] Energy Act., No. 1 of 2019., Laws of Kenya., Government Printer, Nairobi
[67] Ibid, S 2
[68] Ibid, S 43 & 44
[69] Ministry of Energy., 'National Energy Policy.' Available at https://kplc.co.ke/img/full/BL4PdOqKtxFT_National%20Energy%20Policy%20October%20%202018.pdf (Accessed on 14/03/2024)
[70] Ibid
[71] Ibid
[72] Ibid
[73] Ibid

renewable energy has potential to enhance energy security, mitigate climate change, generate income, create employment and generate foreign exchange savings[74]. The *Climate Change Act*[75] of Kenya also requires the state to embrace climate change response measures and actions such as enhancing energy conservation, efficiency and use of renewable energy in industrial, commercial, transport, domestic and other uses in order to strengthen the country's response to climate change[76]. There is need to accelerate energy transition in Kenya in order to reap from the immense opportunities offered by clean sources of energy including renewable energy.

4.0 Energy Transition in East Africa: Progress and Challenges

There has been some progress towards energy transition in East Africa. It has been noted that the greater Horn of Africa's region's power sector has doubled its output over the past decade, and is one of the world's most renewable systems today, with over eight five per cent of generation coming from renewables[77]. Further, large hydropower projects in countries including Ethiopia, Sudan, and Kenya dominate the power mix today[78]. According to IEA, rates of access to electricity in the greater Horn of Africa have improved considerably since 2000[79]. It points out that then, one in ten people had access to electricity, whereas today, it is one in two, which is comparable to the sub-Saharan Africa average (excluding South Africa)[80]. It has also been observed that East African countries including Kenya and Rwanda are on track to achieve full universal access to affordable electricity by 2030, offering success stories other countries can follow[81].

East African Countries are also undertaking to transition their energy sectors in their climate change commitments. For example, Kenya in its updated Nationally Determined Contribution (NDC) aims to foster a low carbon, climate resilient development pathway through measures such as enhancing access to clean, efficient and sustainable energy

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[74] Ibid

[75] Climate Change Act., No. 11 of 2016., Laws of Kenya., Government Printer, Nairobi

[76] Ibid, S 13 (3) (j)

[77] International Energy Agency., 'Clean Energy Transitions in the Greater Horn of Africa' Available at https://www.iea.org/reports/clean-energy-transitions-in-the-greater-horn-of-africa/executive-summary (Accessed on 15/03/2024)

[78] Ibid

[79] Ibid

[80] Ibid

[81] International Energy Agency., 'Africa Energy Outlook 2022' Available at https://iea.blob.core.windows.net/assets/220b2862-33a6-47bd-81e900e586f4d384/AfricaEnergyOutlook2022.pdf (Accessed on 15/03/2024)

technologies to reduce over-reliance on fossil and non-sustainable biomass fuels[82]. The NDC acknowledges that Kenya has abundant renewable energy resources such as geothermal, solar, wind and hydro for electricity generation which need to be developed in order to strengthen the country's response to climate change[83]. Further, Uganda in its updated NDC seeks to develop and promote a clean and resilient energy system[84]. Under the updated NDC, Uganda commits to achieve a climate-resilient energy sector through measures such as improving access and utilization of electricity from sustainable sources; promoting use of renewable energy sources and energy efficient technologies; and increasing access to clean energy cooking technologies[85]. It is necessary to achieve such targets in order to accelerate energy transition in East Africa.

Despite the foregoing efforts, it has been noted that there is still a long way to go to achieve universal electricity access in the greater Horn of Africa, with half its population still lacking access[86]. Further, disparities among countries in electricity access are wide[87]. For example, Kenya has an access rate of nearly eighty per cent, Eritrea and Ethiopia have access rates of fifty per cent, while South Sudan has an access rate of only ten per cent[88]. Further, most people in East Africa and the greater Horn of Africa region rely on traditional cooking fuels, with few countries having national clean cooking rates exceeding ten per cent[89]. In addition, it has been noted that frequent price spikes in liquefied petroleum gas (LPG) are pushing many households to return to cooking with polluting fuels like charcoal or other gathered traditional biomass[90].

Despite these challenges, there are immense opportunities for energy transition in East Africa. The region has massive yet under-utilised potential for solar, wind, and geothermal energy[91]. Further, it has been pointed out that in East Africa, solar irradiation levels are high due to proximity to the equator, wind speeds are some of the strongest on

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[82] Republic of Kenya., 'Updated Nationally Determined Contribution' Available at https://unfccc.int/sites/default/files/NDC/2022-06/Kenya%27s%20First%20%20NDC%20%28updated%20version%29.pdf (Accessed on 15/03/2024)
[83] Ibid
[84] Republic of Uganda., 'Updated Nationally Determined Contribution' Available at https://unfccc.int/sites/default/files/NDC/2022-09/Updated%20NDC%20_Uganda_2022%20Final.pdf (Accessed on 15/03/2024)
[85] Ibid
[86] International Energy Agency., 'Clean Energy Transitions in the Greater Horn of Africa' Op Cit
[87] Ibid
[88] Ibid
[89] International Energy Agency., 'Africa Energy Outlook 2022' Op Cit
[90] Ibid
[91] International Energy Agency., 'Clean Energy Transitions in the Greater Horn of Africa' Op Cit

the continent, hydropower resources are plentiful and the Great Rift Valley is a promising source for geothermal power[92]. It is therefore necessary to effectively harness these sources of energy in order to accelerate energy transition in East Africa.

5.0 Way Forward

In order to accelerate energy transition in East Africa, there is need for continuous adoption and investments in renewable sources of energy such as wind, solar, hydropower, geothermal and tidal energy[93]. The region has an abundance of renewable sources of energy including solar, wind, hydropower, and geothermal energy[94]. The economic, societal and environmental benefits of renewable sources of energy are numerous[95]. These sources of energy are available in abundance, cheaper and are a healthier option for people and the planet[96]. In addition, generating renewable energy creates far lower emissions than burning fossil fuels which is very vital in confronting climate change[97]. Transitioning from fossil fuels, which currently account for the lion's share of global greenhouse gas emissions, to renewable energy is key to addressing the climate crisis in East Africa and across the globe[98]. It is therefore necessary to embrace renewable energy in East Africa. Despite the vast potential of renewable energy in East Africa, it has been noted that current investments are insufficient to meet the region's energy access needs[99]. It is therefore necessary to enhance public and private investments in renewable energy in order to accelerate energy transition in East Africa[100]. Further, it is important to strengthen local financial institutions and instruments in order to catalyse resources for renewable energy projects[101].

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[92] Gordon. E., 'The Politics of Renewable Energy in East Africa' Available at https://www.oxfordenergy.org/publications/politics-renewable-energy-east-africa/ (Accessed on 15/03/2024)

[93] Muigua. K., 'Accelerating Energy Transition in Kenya' Op Cit

[94] Ibid

[95] Ibid

[96] United Nations., 'Climate Action.' Available at https://www.un.org/en/climatechange/howcommunities-are-embracing-renewable-energy (Accessed on 15/03/2024)

[97] United Nations., 'What is Renewable Energy?.' Available at https://www.un.org/en/climatechange/what-is-renewable-energy (Accessed on 15/03/2024)

[98] Ibid

[99] Organisation for Economic Co-operation and Development., 'Investing in Renewable Energies for East Africa's Sustainable Development' Available at https://www.oecd-ilibrary.org/sites/4479950d-en/index.html?itemId=/content/component/4479950d-en#:~:text=In%202021%2C%20renewable%20energy%20thus,bioenergy%2C%20wind%20and%20solar%20power. (Accessed on 15/03/2024)

[100] Ibid

[101] Ibid

In addition, it is vital to enhance access to electricity in East Africa[102]. It has been noted that nearly half of the population in the region lacks access to electricity[103]. Lack of electricity can have serious consequences for people's health and livelihoods in East Africa[104]. For example, food cannot be kept fresh in refrigerators while hospitals that lack electricity cannot power medical devices and to refrigerate vaccines[105]. It also also impacts learning[106]. Lack of access to electricity often results in households and institutions relying on generators which pollute the environment and can be costly to run[107]. It is therefore necessary to enhance access to electricity in the region through measures such as rural electrification programmes since a large majority of the population in East Africa lives in rural areas[108].

Further, in order to realize energy transition in East Africa, there is need to enhance energy efficiency and reliability[109]. The energy sector in the region is crippled with unreliable electricity supply that often results in frequent power cuts which last for days in some areas[110]. Such a situation forces most people to resort to alternative sources of energy including bioenergy and generators that are powered by oil products therefore polluting the environment and contributing to the threat of climate change[111]. According to IEA, providing access to electricity is essential, but access has to bring with it a reliable supply of electricity if households, businesses and public services are to reap the full benefits[112]. Therefore, in order to fully realize energy transition in East Africa, it is vital to ensure efficiency and reliability.

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[102] International Energy Agency., 'Clean Energy Transitions in the Greater Horn of Africa' Op Cit

[103] Ibid

[104] AFD., 'Boosting Access to Renewable Energy Across East Africa' Available at https://www.afd.fr/en/actualites/boosting-access-renewable-energy-across-east-africa (Accessed on 15/03/2024)

[105] Ibid

[106] Ibid

[107] Ibid

[108] Hansen. J.M., & Xydis. G., 'Rural Electrification in Kenya: A Useful Case for Remote Areas in Sub-Saharan Africa' *Energy Efficiency*, Volume 13, pp 257-272, (2020)

[109] Muigua. K., 'Delivering Clean and Affordable Energy for All' Available at https://kmco.co.ke/wp-content/uploads/2021/05/Delivering-Clean-and-Affordable-Energy-for-All-Kariuki-Muigua-Ph.D-24th-April-2021-1.pdf (Accessed on 15/03/2024)

[110] Mutiso. R., & Taneja. J., 'The Seven Major Threats to Kenya's Power Sector.' Available at https://energyforgrowth.org/article/the-seven-major-threats-to-kenyas-power-sector/ (Accessed on 15/03/2024)

[111] Ibid

[112] Ibid

It has also been noted that energy transition in East Africa can only be realized with enhanced access to clean cooking facilities[113]. Access to clean cooking remains a major problem in the region with a majority of the population especially that in rural areas relying on traditional fuels[114]. It has been noted that while some East African countries such as Kenya and Rwanda have made notable progress towards enhancing access to electricity, progress remains slow in promoting clean cooking facilities with bio-energy sources such as charcoal and wood fuel still being the most common source of energy for cooking especially among the rural population[115]. The environmental concerns raised by these sources of energy calls for the adoption of clean sources of energy for cooking[116]. Access to clean cooking in East Africa is also hindered by high costs of Liquefied Petroleum Gas which makes this source of energy out for reach for majority of citizens especially the poor rural population[117]. It has been noted that LPG is able to meet East Africa's clean cooking needs reliably and to scale[118]. It is therefore necessary for the region to unlock opportunities in driving the uptake of LPG through measures such as expanding the current distribution network, particularly in rural areas; and developing new financing schemes to offset high upfront costs for LPG equipment[119].

Finally, there is need to strengthen regional integration in the energy sector in order to accelerate energy transition in East Africa[120]. It has been posited that regional market and infrastructure reforms, coupled with industrial policies and innovative advancements, are preparatory to an increase in the deployment of renewable energy sources in East Africa, and for a subsequent stronger resilience and adaptation to climate change[121]. Regional energy systems integration has been identified as a key factor in accelerated development[122]. Energy integration across the borders can be a channel for

[113] International Energy Agency., 'Clean Energy Transitions in the Greater Horn of Africa' Op Cit
[114] Ibid
[115] Ibid
[116] Muigua. K., 'Muigua. K., 'Towards Energy Justice in Kenya.'
[117] The Exchange., 'East Africa Sets Sights on Becoming a Liquefied Petroleum Gas Hub from 2025' Available at https://theexchange.africa/investing/liquefied-petroleum-gas-hub/#:~:text=The%20role%20of%20LPG%20in,LPG%20uptake%20across%20East%20Africa. (Accessed on 15/03/2024)
[118] Ibid
[119] Ibid
[120] Organisation for Economic Co-operation and Development., 'Investing in Renewable Energies for East Africa's Sustainable Development' Op Cit
[121] Ibid
[122] Opeyemi. A et al., 'Regional Integration and Energy Sustainability in Africa: Exploring the Challenges and Prospects for ECOWAS' Available at https://www.econstor.eu/bitstream/10419/227959/1/1682193527.pdf (Accessed on 15/03/2024)

accelerating progress towards meeting the targets of SDG 7[123]. It can also be a major step towards relieving a number of the trans-border constraints on the energy sector development and further expand energy trade[124]. It is therefore necessary to deepen regional integration including through regional energy infrastructure projects in order to accelerate energy transition in East Africa[125].

6.0 Conclusion

Energy transition entails the shift in the global energy sector from fossil-based systems of energy production and consumption including oil, natural gas and coal to renewable energy sources like wind and solar[126]. Energy transition presents many benefits including new industrial opportunities and jobs, greater energy security, cleaner air, universal energy access and a safer climate for everyone[127]. There has been progress towards energy transition in East Africa with majority of the region's power generation coming from renewables[128]. However, the region is yet to fully realize the ideal of energy transition with half its population still lacking access to electricity and clean cooking facilities[129]. It is therefore necessary to accelerate energy transition in East Africa. This can be achieved through continuous adoption and investments in renewable sources of energy such as wind, solar, hydropower, geothermal and tidal energy[130]; enhancing access to electricity in East Africa[131]; fostering energy efficiency and reliability[132]; promoting access to clean cooking facilities[133]; and strengthening regional integration in the energy sector[134]. Accelerating energy transition in East Africa is an ideal we must achieve for Sustainable Development.

[123] Ibid
[124] Ibid
[125] Organisation for Economic Co-operation and Development., 'Investing in Renewable Energies for East Africa's Sustainable Development' Op Cit
[126] S & P Global., 'What is Energy Transition?' Op Cit
[127] International Energy Agency., 'The Energy World is Set to Change Significantly by 2030, Based on Today's Policy Settings Alone' Op Cit
[128] International Energy Agency., 'Clean Energy Transitions in the Greater Horn of Africa' Op Cit
[129] Ibid
[130] Muigua. K., 'Accelerating Energy Transition in Kenya' Op Cit
[131] International Energy Agency., 'Clean Energy Transitions in the Greater Horn of Africa' Op Cit
[132] Muigua. K., 'Delivering Clean and Affordable Energy for All' Op Cit
[133] International Energy Agency., 'Clean Energy Transitions in the Greater Horn of Africa' Op Cit
[134] Organisation for Economic Co-operation and Development., 'Investing in Renewable Energies for East Africa's Sustainable Development' Op Cit

Chapter 2: Achieving Energy Security for Sustainable Development in Africa

Abstract

This paper critically examines the need for energy security in Africa. The paper defines energy security and discusses its core elements. It argues that achieving energy security is vital towards Sustainable Development by ensuring the availability of affordable, reliable, sustainable and modern sources of energy. The paper further examines the status of energy security in Africa. It notes that achieving energy security remains a challenge for Africa undermining the continent's development agenda. The paper explores some of the factors hindering the quest towards energy security in Africa. Despite the obstacles undermining the quest towards energy security in Africa, the paper posits that the continent has immense potential to realise this ideal due to several favourable factors including the abundance of renewable sources of energy all over Africa. The paper proposes initiatives through which Africa can achieve energy security for Sustainable Development.

1.0 Introduction

Energy is a vital resource whose accessibility, reliability and affordability is necessary for human progress and Sustainable Development[1]. Access to affordable and clean energy has been identified as one of the main drivers of sustainable economic development[2]. It has been argued that energy is crucial for achieving almost all of the Sustainable Development Goals (SDGs), from its role in the eradicating poverty through advancements in health, education, agriculture, water supply and industrialization, to combating climate change through sustainable and modern sources of energy[3]. The United Nations correctly notes that our everyday life depends on reliable and affordable energy[4]. It points out that well-established energy systems support all sectors including businesses, healthcare, education, agriculture, infrastructure, transport, communications and high technology[5]. Access to energy is therefore crucial towards unlocking Sustainable Development.

The *2030 Agenda for Sustainable Development*[6] recognises the role of energy in the quest towards sustainability. SDG 7 seeks to ensure access to affordable, reliable, sustainable and modern energy

[1] United Nations Environment Programme., 'Goal 7: Affordable and Clean Energy' Available at https://www.unep.org/topics/sustainable-development-goals/why-do-sustainable-development-goals-matter/goal-7 (Accessed on 17/06/2025)

[2] United Nations., 'Energy for Sustainable Development' Available at https://www.un.org/esa/sustdev/sdissues/energy/elashry_presentation.pdf (Accessed on 17/06/2025)

[3] Energy and the Sustainable Development Goals., Available at https://energypedia.info/wiki/Energy_and_the_Sustainable_Development_Goals#:~:text=Energy%20is%20crucial%20for%20achieving,industrialization%2C%20to%20combating%20climate%20change. (Accessed on 17/06/2025)

[4] United Nations., 'Ensure access to affordable, reliable, sustainable and modern energy' Available at https://www.un.org/sustainabledevelopment/energy/ (Accessed on 17/06/2025)

[5] Ibid

[6] United Nations General Assembly., 'Transforming Our World: the 2030 Agenda for Sustainable Development.' 21 October 2015, A/RES/70/1., Available at

for all including through substantially increasing the share of renewable energy in the global energy mix, improving energy efficiency, and enhancing international cooperation and research on clean energy[7]. It has been correctly noted that realising the targets of SDG 7 is vital towards transitioning to clean energy which can unlock multiple benefits including sustainable economic development, human health and progress, reducing greenhouse gas emissions, improving air quality and mitigating the impacts of the triple planetary crisis of climate change, nature and biodiversity loss, and pollution and waste[8].

Despite the important role of energy in achieving Sustainable Development, it has been observed that millions of people globally lack access to affordable, reliable, sustainable and modern sources of energy[9]. Since energy-related services are highly interconnected with socio-economic development and human well-being, inadequate access to affordable and clean sources of energy impedes Sustainable Development[10]. This situation is worse especially in sub-Saharan Africa and Asia where lack of reliable energy affects key sectors including healthcare, agriculture, education and industrialization[11]. Achieving global energy security is therefore crucial towards realising the Sustainable Development agenda.

This paper critically examines the need for energy security in Africa. The paper defines energy security and discusses its core elements. It argues that achieving energy security is vital towards Sustainable Development by ensuring the availability of affordable, reliable, sustainable and modern sources of energy. The paper further examines the status of energy security in Africa. It notes that achieving energy security remains a challenge for Africa undermining the continent's development agenda. The paper explores some of the factors hindering the quest towards energy security in Africa. Despite the obstacles undermining the quest towards energy security in Africa, the paper posits that the continent has immense potential to realise this ideal due to several favourable factors including the abundance of renewable sources of energy all over Africa. The paper proposes initiatives through which Africa can achieve energy security for Sustainable Development.

https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf (Accessed on 17/06/2025)

[7] Ibid

[8] United Nations Environment Programme., 'Goal 7: Affordable and Clean Energy' Op Cit

[9] United Nations., 'Universal access to sustainable energy will remain elusive without addressing inequalities' Available at https://www.un.org/en/desa/universal-access-sustainable-energy-will-remain-elusive-without-addressing-inequalities (Accessed on 17/06/2025)

[10] World Resources Institute., 'Energy Access and Equitable Development' Available at https://www.wri.org/energy/energy-access (Accessed on 17/06/2025)

[11] Ibid

2.0 Defining Energy Security

The concept of energy security is associated with the continuous availability of energy in varied forms, in sufficient quantities, and at reasonable prices[12]. Energy security has also been defined as the capacity of countries to establish efficient, sustainable, reliable and affordable energy systems which meet the demands of people's lives and their daily activities[13]. It has been argued that energy security is a multi-faceted concept that involves various elements including the long-term physical availability of energy supply to meet the growing future demand for energy[14]. Energy security therefore covers the current and future availability of energy resources, the reliability of energy systems and supplies, the deliverability of energy through infrastructure development and the affordability of energy by consumers[15].

According to the International Energy Agency (IEA), energy security not only envisages having uninterrupted access to energy, but it also entails securing energy supplies at an affordable price[16]. IEA points out that energy security involves the uninterrupted availability of energy sources at an affordable price[17]. It has been pointed out that in order to achieve energy security, it is imperative to ensure availability, accessibility, environmental acceptability, and affordability[18]. Availability refers to the presence of various sources of energy including renewables such as wind, solar and geothermal energy and fossil fuels including oil and gas[19]. Accessibility is concerned with the economic, political, social and technological factors shaping the ability of a country and individuals to acquire and use available energy resources at the time they are needed[20]. Environmental acceptability refers to the sustainability of available and accessible sources of energy including their ability to tackle and respond to environmental pressures including pollution, climate change and biodiversity loss[21]. Affordability covers the costs and prices of various sources of energy and the ability of citizens to acquire energy at reasonable prices[22].

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[12] United Nations Development Programme., 'Energy Security' Available at https://www.undp.org/sites/g/files/zskgke326/files/publications/chapter4.pdf (Accessed on 17/06/2025)

[13] Understanding Energy Security., Available at https://safetyculture.com/topics/energy-security/ (Accessed on 17/06/2025)

[14] Kowalski. G., & Vilogorac. S., 'Energy Security Risks and Risk Mitigation: An Overview' Available at https://www.unisdr.org/files/8066_Pagesfromannualreport2008.pdf (Accessed on 17/06/2025)

[15] Ibid

[16] International Energy Agency., 'Energy security in energy transitions' Available at https://www.iea.org/reports/world-energy-outlook-2022/energy-security-in-energy-transitions (Accessed on 17/06/2025)

[17] International Energy Agency., 'Energy Security' Available at https://www.iea.org/topics/energy-security (Accessed on 17/06/2025)

[18] Energy Security., Available at https://dgap.org/en/research/glossary/climate-foreign-policy/energy-security (Accessed on 17/06/2025)

[19] Ibid

[20] Ibid

[21] Energy Security., Op Cit

[22] Ibid

Achieving energy security is vital in the quest towards Sustainable Development. This ideal ensures the availability, accessibility, reliability, deliverability and affordability of energy by consumers including individuals, households and businesses towards development[23]. According to IEA, achieving energy security is crucial towards fostering a just energy transition and building safer and more reliable and sustainable energy systems that are environmental- friendly, which reduce exposure to fuel price volatility and that bring down energy bills[24]. It has been argued that energy security affects the functioning of countries politically, economically, environmentally and socially and is therefore a vital component in Sustainable Development efforts[25]. This concept ensures that energy is easily accessible, affordable, and derived from dependable sources that can guarantee stable prices in the present and future without being susceptible to political, economic and environmental disruptions[26].

It is therefore evident that energy security is essential for Sustainable Development. Accessible, reliable, affordable and sustainable energy systems support vital services and industries including healthcare, agriculture, education, communications and transportation, which in turn foster economic growth, help attract investments and enhance efforts towards tackling poverty[27]. Achieving energy security is therefore necessary for Sustainable Development.

3.0 Examining the Status of Energy Security in Africa

Achieving energy security remains a challenge for Africa. For example, universal access to energy is yet to be realised in the continent[28]. It is estimated that over 600 million Africans still lack reliable access to electricity, which is nearly half the continent's population and more than 80 per cent of the global electricity access gap[29]. Further, it has been observed that Sub-Saharan Africa accounts for more than half of the world's population without access to electricity and nearly a quarter of the global population without access to clean sources of cooking[30]. Consequently, Africa has been described as the most energy-deficient continent in the world with universal access to electricity and clean cooking remaining an elusive goal for many countries in the

[23] Kowalski. G., & Vilogorac. S., 'Energy Security Risks and Risk Mitigation: An Overview' Op Cit
[24] International Energy Agency., 'Energy security in energy transitions' Op Cit
[25] Luty. L et al., 'Energy Security in Light of Sustainable Development Goals' *Energies* 2023, *16*(3),
[26] Hasselgren. P., & Tawaha. M., 'Energy Security for Sustainable Development' Available at https://www.diva-portal.org/smash/get/diva2:1777699/FULLTEXT01.pdf (Accessed on 17/06/2025)
[27] United Nations Development Programme., '3 ways to power Eswatini's path to energy security and sustainability' Available at https://climatepromise.undp.org/news-and-stories/3-ways-power-eswatinis-path-energy-security-and-sustainability (Accessed on 17/06/2025)
[28] United Nations Sustainable Development Group., 'Decoding Africa's Energy Journey: Three Key Numbers' Available at https://unsdg.un.org/latest/stories/decoding-africa%E2%80%99s-energy-journey-three-key-numbers (Accessed on 18/06/2025)
[29] Ibid
[30] World Bank Group., 'Energy Access in Eastern and Southern Africa' Available at https://www.worldbank.org/en/region/afr/brief/afe-energy (Accessed on 18/06/2025)

continent[31]. It has been observed that Africa consumes a disproportionately low amount of energy, accounting for less than 6 per cent of global energy consumption despite being home to nearly 18 percent of the world's population[32]. Lack of universal access to electricity and clean sources of cooking is therefore a major impediment in the quest towards energy security in Africa. Another major obstacle in the journey towards energy security in Africa is the reliability of energy systems in the continent. For example, it has been pointed out that the energy sector in most African countries is crippled with unreliable electricity supply that often results in frequent power cuts which last for days in some areas[33]. This situation forces most people to resort to alternative sources of energy including bioenergy and generators that are powered by oil products resulting in environmental concerns[34]. Weak, unreliable and aging infrastructure undermine energy transmission in the continent due to frequent breakdowns and maintenance problems which trigger widespread blackouts[35]. For instance, in Kenya, it has been pointed out that the Kenya Electricity Transmission Company Limited (KETRACO) is grappling with aging transmission infrastructure and insufficient investment in power transmission, a situation that has resulted in frequent power blackouts that have taken a toll on the economy[36]. According to IEA, providing access to electricity is essential, but access has to bring with it a reliable supply of electricity if households, businesses and public services are to reap full benefits[37].

Energy affordability is also a major concern undermining the ideal of energy security in Africa. It has been observed that energy affordability remains a challenge in most sub-Saharan African countries due to the high cost of power relative to income making energy sources such as electricity out of the reach of most people[38]. Frequent price hikes and high electricity bills undermine energy affordability in Africa especially for the poor citizens[39].

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[31] Center for Strategic & International Studies., 'Achieving Universal Energy Access in Africa amid Global Decarbonization' Available at https://www.csis.org/analysis/achieving-universal-energy-access-africa-amid-global-decarbonization (Accessed on 18/06/2025)

[32] Ibid

[33] Mutiso. R., & Taneja. J., 'The Seven Major Threats to Kenya's Power Sector.' Available at https://energyforgrowth.org/article/the-seven-major-threats-to-kenyas-power-sector/ (Accessed on 18/06/2025)

[34] Ibid

[35] Center for Strategic & International Studies., 'Achieving Universal Energy Access in Africa amid Global Decarbonization' Op Cit

[36] Kenya Electricity Transmission Company Limited., 'Statement on Privately Initiated Transmission Proposals (PIPs) and Public Private Partnership Energy Sector Projects' Available at https://www.ketraco.co.ke/information-center/media-center/news/statement-privately-initiated-transmission-proposals-pips-and (Accessed on 18/06/2025)

[37] International Energy Agency., 'Africa Energy Outlook 2019.' Available at https://iea.blob.core.windows.net/assets/2f7b6170-d616-4dd7-a7caa65a3a332fc1/Africa_Energy_Outlook_2019.pdf (Accessed on 18/06/2025)

[38] Moner-Girona. M et al, 'Decentralized Rural Electrification in Kenya: Speeding Up Universal Energy Access' *Energy for Sustainable Development*, Volume 52, October 2019, p 128-146.

[39] Ibid

In addition, ensuring the availability of modern, sustainable and environmental-friendly sources of energy is a goal that is yet be realised in Africa. Fossil fuels including coal, oil and natural gas still account for a significant share of the energy mix in Africa[40]. Despite their importance in global and regional energy supply, the extraction and burning of fossil fuels has serious environmental consequences including climate change and pollution[41]. It has been pointed out that when fossil fuels are burned, the stored carbon and other greenhouse gases are released into the atmosphere contributing to the climate crisis[42]. In addition, a majority of Africa's population relies on traditional biomass for preparing food[43]. Bio-energy sources such as charcoal, wood fuel and dung are the most common source of energy for cooking in Africa especially among the rural population[44]. However, use of these sources is associated with environmental challenges such as air and soil pollution and environmental degradation through deforestation[45]. Further, the use of bio-energy sources for cooking is linked to more than 500,000 annual deaths globally due to indoor pollution[46].

The quest towards energy security in Africa is therefore undermined by challenges relating to accessibility, reliability, affordability and sustainability of energy in the continent. It has been argued that lack of energy security manifests itself in hundreds of thousands of deaths annually due to the use of wood-burning stoves for cooking[47]; handicaps the operations of hospitals and emergency services[48]; compromises educational attainment[49]; and drives up the cost of doing business[50]. Lack of energy security is therefore a major challenge for Africa, with significant negative consequences for health, education, agriculture and economic growth[51]. As a result, it

[40] Mutezo. G., & Mulopo. J., 'A review of Africa's transition from fossil fuels to renewable energy using circular economy principles' *Renewable and Sustainable Energy Reviews*., Volume 137, March 2021

[41] Yildiz. I., 'Fossil Fuels.' *Comprehensive Energy Systems*., (2018), Volume 1., pp 521-567

[42] Environmental and Energy Study Institute., 'Fossil Fuels.' Available at https://www.eesi.org/topics/fossil-fuels/description (Accessed on 18/06/2025)

[43] United Nations., 'Advancing SDG 7 in Africa.' Available at https://sdgs.un.org/sites/default/files/2023-06/2023%20Advancing%20SDG7%20in%20the%20Africa-062923.pdf (Accessed on 18/06/2025)

[44] Muchiri. L., 'Gender and Equity in Bioenergy Access and Delivery in Kenya' Practical Action East Africa, 2008, available at https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=2ahUKEwiy2P29z6PnAhUEiFwKHQlyCLoQFjAAegQIBRAB&url=http%3A%2F%2Fwww.cas.ed.ac.uk%2F__data%2Fassets%2Fword_doc%2F0007%2F24793%2FGender_and_Equity_in_Bio_energy_Access_and_Delivery_in_Kenya_final.doc&usg=AOvVaw2AKp1mvTSC9tafkIKJ-36_ (Accessed on 18/06/2025)

[45] Muigua. K., 'Towards Energy Justice in Kenya.' Op Cit

[46] United Nations., 'Advancing SDG 7 in Africa.' Op Cit

[47] African Development Bank Group., 'Light Up and Power Africa – A New Deal on Energy for Africa' Available at https://www.afdb.org/en/the-high-5/light-up-and-power-africa-%E2%80%93-a-new-deal-on-energy-for-africa (Accessed on 18/06/2025)

[48] Ibid

[49] Ibid

[50] Ibid

[51] International Energy Forum., 'How can we tackle energy poverty in Africa?' Available at https://www.ief.org/news/how-can-we-tackle-energy-poverty-in-africa (Accessed on 18/06/2025)

has been argued that tackling energy poverty in Africa is critical for improving the quality of life for all citizens and for promoting economic growth across the continent[52]. Achieving this goal requires a just energy transition that puts emphasis on energy security and its core tenets of accessibility, reliability, affordability and sustainability[53].

4.0 Achieving Energy Security for Sustainable Development in Africa

It is imperative to foster energy security in Africa. Ensuring energy security in Africa is a prerequisite for the attainment of health and education outcomes, reducing the cost of doing business, unlocking the continent's economic potential and creating jobs[54]. It has been argued that access to affordable, reliable, modern and sustainable energy provides a lifeline for individuals and communities all over Africa[55]. This ideal transforms everyday life, especially in isolated and vulnerable areas[56]. Ensuring energy security in Africa through reliable, affordable, modern and sustainable energy systems can create quality jobs, protect livelihoods, boost security to bring durable peace and promote economic growth[57]. Achieving energy security is therefore vital if Africa is to achieve the Sustainable Development agenda.

Africa has immense potential to achieve energy security. For example, Africa is rich in renewable energy sources with wind, solar, hydro, bioenergy, ocean tidal waves, geothermal among other renewables being abundant throughout the continent[58]. Further, Africa is endowed with critical raw materials including cobalt, bauxite, chromium, copper, graphite, manganese, and rare earths[59]. It has been argued that the transition from fossil fuels to clean energy sources depends on the availability and sustainable use of critical raw materials[60]. These resources are essential components in many of today's rapidly growing clean energy technologies, from wind turbines and solar panels to electric vehicles[61]. Fossil fuels are also abundant in the continent with Africa being home to an estimated 8 per cent of the world's natural gas and 12 per cent of the world's

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[52] Ibid

[53] Ibid

[54] African Development Bank Group., 'Light Up and Power Africa – A New Deal on Energy for Africa' Op Cit

[55] United Nations Sustainable Development Group., 'Decoding Africa's Energy Journey: Three Key Numbers' Op Cit

[56] Ibid

[57] Ibid

[58] Africa Union., 'Agenda 2063: The Africa we Want.' Available at Available at https://au.int/sites/default/files/documents/33126-doc-framework_document_book.pdf (Accessed on 18/06/2025)

[59] Mo Ibrahim Foundation., 'Africa's Critical Minerals: Africa at the Heart of a Low-Carbon Future' Available at https://mo.ibrahim.foundation/sites/default/files/2022-11/minerals-resource-governance.pdf (Accessed on 18/06/2025)

[60] United Nations Environment Programme., 'Critical Energy Transition Minerals' Available at https://www.unep.org/topics/energy/renewable-energy/critical-energy-transition-minerals (Accessed on 18/06/2025)

[61] Ibid

oil reserves[62]. Harnessing Africa's vast energy sources is therefore necessary towards achieving energy security.

In order to realise the ideal of energy security in Africa, it is vital exploit the continent's untapped energy sources with focus on renewable sources of energy including wind, solar and geothermal energy[63]. It has been pointed out that Africa's energy potential, especially renewable energy, is enormous, yet only a fraction of it is being currently employed[64]. Without the ability to utilise Africa's vast renewable energy potential, the continent not only faces economic slowdowns but also the challenge of leaving millions in the dark[65]. It is therefore imperative to enhance investments and adoption of renewable sources of energy in Africa in order to realise energy security in the continent[66].

Renewable sources of energy provide several advantages in the quest towards energy security in Africa. For instance, it has been correctly noted that renewable energy sources have become increasingly important as the world faces the challenge of mitigating the negative impacts of climate change and reducing the dependence on finite and polluting fossil fuels[67]. These sources of energy are environmentally-friendly and readily available[68]. Harnessing renewable sources of energy in Africa can therefore ensure access to affordable, reliable and sustainable energy in Africa. It has been argued that Africa can leverage on its vast renewable energy potential to diversify its energy mix, reduce reliance on fossil fuels, promote energy justice and combat climate change[69].

Harnessing Africa's vast energy sources with focus on renewable energy can therefore enhance universal access to sustainable and modern sources of energy. Further, it has been noted that fossil fuels like coal, oil, and gas still have a crucial role to play in the continent's energy mix[70].

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[62] United Nations Environment Programme., 'Our work in Africa' Available at https://www.unep.org/regions/africa/our-work-africa#:~:text=The%20continent%20has%2040%20percent,internal%20renewable%20fresh%20water%20source. (Accessed on 18/06/2025)

[63] African Development Bank Group., 'Light Up and Power Africa – A New Deal on Energy for Africa' Op Cit

[64] Ibid

[65] United Nations Sustainable Development Group., 'Decoding Africa's Energy Journey: Three Key Numbers' Op Cit

[66] Ibid

[67] Verma. A., 'The Role of Renewable Energy Technologies in Sustainable Development.' Available at https://timesofindia.indiatimes.com/blogs/voices/the-role-of-renewable-energy-technologies-in-sustainable-development/ (Accessed on 18/06/2025)

[68] Ibid

[69] Ebatamehi. S., 'Top 10 African Countries Leading in Renewable Energy and Green Innovation in 2025' Available at https://www.africanexponent.com/top-10-african-countries-leading-in-renewable-energy-and-green-innovation-in-2025/ (Accessed on 18/06/2025)

[70] United Nations Sustainable Development Group., 'Decoding Africa's Energy Journey: Three Key Numbers' Op Cit

However, due to the environmental impacts of fossil fuels including climate change and pollution and global conflicts which cause significant volatility in global energy prices, it has been argued that renewable sources of energy provide an effective path towards energy transition in order to ensure that countries are energy secure[71]. Adopting renewable sources of energy is therefore key towards ensuring energy security in Africa.

In addition to enhancing universal access to sustainable energy in Africa through renewable sources, it is imperative to ensure that energy systems in the continent are reliable in order to achieve energy security. It has been argued that access to a reliable and quality energy supply is vital to the economic development of any country[72]. However, due to insufficient investments, most African countries are faced with the problem of weak, aging and unreliable energy systems leading to limited and unreliable electricity a situation which often affects socio-economic development[73]. It is therefore necessary to invest in modern and reliable energy infrastructure including power transmission lines[74]. Further, it has been argued that decentralization of the energy sector in Africa through measures such as distributed generation is able to provide enhanced energy and more democratized access, with improved reliability and efficiency[75]. It has been suggested by decentralizing the energy sector, security and resilience issues are easier to be addressed due to the local and reduced-order size of these schemes, while also encouraging equity, inclusivity, information, accountability, and adaptability of energy systems[76]. Decentralizing the energy sector in Africa is therefore a viable approach towards ensuring reliability and efficiency for energy security.

Further, in order to achieve energy security in Africa, there is need to make energy affordable for all Africans including the poor. It has been correctly noted that our everyday life depends on reliable and affordable energy[77]. However, high costs of energy in Africa means that many people still lack access to electricity for lighting while millions resort to polluting sources such as charcoal, wood fuel and dung for cooking especially among the rural population[78]. It is therefore necessary to address affordability issues through initiatives such as rural electrification

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[71] United Nations Environment Programme., 'Goal 7: Affordable and Clean Energy' Op Cit

[72] United Nations Conference on Trade and Development., 'Commodities at a Glance: Special Issue on Access to Energy in Sub-Saharan Africa.' Available at https://unctad.org/publication/commodities-glance-special-issue-access-energy-sub-saharan-africa#:~:text=Access%20to%20energy%20is%20defined,be%20scaled%20up%20over%20time (Accessed on 18/06/2025)

[73] Ibid

[74] Center for Strategic & International Studies., 'Achieving Universal Energy Access in Africa amid Global Decarbonization' Op Cit

[75] Lup. A., 'Sustainable Energy Technologies for the Global South: Challenges and Solutions Toward Achieving SDG 7.' *Environmental Science: Advances*., No. 2 of 2023., 570-585

[76] Ibid

[77] United Nations Environment Programme., 'Goal 7: Affordable and Clean Energy' Op Cit

[78] Muchiri. L., 'Gender and Equity in Bioenergy Access and Delivery in Kenya' Practical Action East Africa, 2008, Op Cit

programmes and developing new financing schemes to offset high upfront costs for Liquefied Petroleum Gas (LPG) equipment[79].

Through the foregoing, it is possible to achieve energy security for Sustainable Development in Africa.

5.0 Conclusion

Realising the ideal of energy security is crucial towards Sustainable Development in Africa. Energy security ensures accessible, reliable, affordable, modern and sustainable energy systems that can create quality jobs, protect livelihoods, boost peace and security and promote economic growth[80]. It is therefore vital to foster energy security in Africa by harnessing the continent's vast renewable energy potential to ensure universal access to modern and sustainable energy, building reliable and efficient energy systems in Africa and making energy affordable for all Africans[81]. Achieving energy security in Africa is therefore practical. It is imperative to realise this dream for Sustainable Development.

[79] Muigua. K., 'Accelerating Energy Transition in Kenya' Available at https://kmco.co.ke/wp-content/uploads/2023/09/Accelerating-Energy-Transition-in-Kenya.pdf (Accessed on 18/06/2025)

[80] United Nations Sustainable Development Group., 'Decoding Africa's Energy Journey: Three Key Numbers' Op Cit

[81] Ibid

Chapter 3: Delivering Clean and Affordable Energy for All

Abstract

Energy is considered to be an important component of social and economic needs of any society. Indeed, the integral role of energy is recognised under Sustainable Development Goal 7 of the United Nations 2030 Agenda for Sustainable Development Goals which seeks to 'ensure access to affordable, reliable, sustainable and modern energy for all'. The United Nations has observed that while 'energy is central to social and economic well-being, 1.1 billion people have no access to electricity, while 2.9 billion have to cook with polluting, inefficient fuels such as firewood'. This is despite the fact that Affordable and Clean Energy is seen as an important means towards achieving many of the SDGs – from poverty eradication via advancements in health, education, water supply, and industrialization to mitigating climate change'. Most of the people without access to affordable and clean energy are within the African continent. These people still rely on non-renewable sources of energy which are not only inefficient but also a danger to their health. This paper explores the ways through which the Government of Kenya can work with other stakeholders to ensure that there is a transition to cleaner and affordable energy sources for all its population, as a step towards achieving sustainable development agenda.

1.0 Introduction

It has been observed that energy and more precisely, access to energy—represents one of Africa's greatest obstacles to social and economic development.[1] Notably, the Continent is largely divided into three regions namely: North Africa, which is heavily dependent on oil and gas, South Africa, which depends on coal and the rest of Sub-Saharan Africa, which is largely reliant on biomass.[2] Kenya falls within the Sub-Saharan Africa which also means that most of its citizens especially within the rural regions rely mainly on biomass, (unprocessed wood, charcoal, agricultural residues and animal waste), with adverse effects on their health.[3] Thus, while the UN Secretary-General Ban Ki-Moon launched the Sustainable Energy for All Initiative (SE4All) in 2011 where he also declared 2012 the year for sustainable energy for all[4], this has largely remained a mirage especially for the African region.

The *Kenya Sustainable Energy for All (SE4All) Action Plan*, was launched by the Ministry of Energy and Petroleum as an Action Agenda (AA) with an energy sector-wide long-term vision spanning the period 2015 to 2030, which outlines how Kenya will achieve her SE4All goals of 100%

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[1] Hafner M, Tagliapietra S and de Strasser L, 'The Challenge of Energy Access in Africa' in Manfred Hafner, Simone Tagliapietra and Lucia de Strasser (eds), *Energy in Africa: Challenges and Opportunities* (Springer International Publishing 2018) <https://doi.org/10.1007/978-3-319-92219-5_1> accessed 19 April 2021.

[2] Karekezi, S., Kithyoma, W., & Energy Initiative, "Renewable energy development." In *workshop on African Energy Experts on Operationalizing the NEPAD Energy Initiative, June*, pp. 2-4. 2003, 2.

[3] See Christine W Njiru and Sammy C Letema, 'Energy Poverty and Its Implication on Standard of Living in Kirinyaga, Kenya' (2018) 2018 Journal of Energy.

[4] Republic of Kenya, *Kenya Sustainable Energy for All (SE4All) Action Plan*, January 2016< https://www.seforall.org/sites/default/files/Kenya_AA_EN_Released.pdf> accessed 18 April 2021.

universal access to modern energy services, increase the rate of energy efficiency and increase to 80% the share of renewable energy in her energy mix, by 2030.[5] In addition, the updated *Least cost power development plan 2017-2037* developed by the Ministry of Energy and Petroleum, which is an update of the 2015-2035 electricity Sector Master plan estimated peak demand for the period 2017-2037 ranges from 1,754MW to 6,638MW in the reference case scenario, 1,754MW to 9,790MW in the high case and between 1754MW in 2017 to 4,763MW in 2037 in the low case scenario.[6] The energy sources considered in the system expansion plan for the different cases in the report included: Geothermal, nuclear, Wind, Solar, Import, Petrol-thermal plants, Hydropower, Coal and Natural gas.[7] However, while Kenya has made significant steps towards increasing the power production, sustainability of some of these sources as well as affordability remains a challenge.[8] The challenges facing Kenya's energy sector have been summarized as including: low electrification rate, reliance on imported fossil fuels, transmission inefficiencies, frequent power outages, high cost of rural electrification, demand for electricity outstripping generation capacity, and inability of the power utility agency to connect all customers who apply for connection to the national grid.[9] It has been noted that the energy use of human societies has historically been marked by four broad trends: Rising consumption as societies industrialize, gain wealth and shift from traditional sources of energy (mostly biomass-based fuels such as wood, dung and charcoal) to commercial forms of energy (primarily fossil fuels); steady increases in both the power and efficiency of energy-producing and energy-using technologies; de-carbonization and diversification of fuels, especially for the production of electricity, throughout most of the 20th century; and a reduction in the quantities of conventional pollutants associated with energy use.[10] Arguably, Kenya's energy sector is still struggling with problems that hinder the smooth transition through the stated trends, thus exposing its people to poverty and the potential adverse health effects.

This paper explores how Kenya can fast-track its efforts towards ensuring that it achieves sustainable and affordable energy for all its people in line with the United Nations 2030 Agenda for Sustainable Development Goals (SDGs)[11] Goal 7 which is based on this. The paper thus mainly

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[5] Ibid.

[6] Republic of Kenya, *Least cost power development plan 2017-2037*, p. xv < http://gak.co.ke/wp-content/uploads/2019/02/Updated-Least-Cost-Power-Development-Plan-2017-2022-min.pdf> accessed 18 April 2021.

[7] Ibid.

[8] See Samoita D and others, 'Barriers and Solutions for Increasing the Integration of Solar Photovoltaic in Kenya's Electricity Mix' (2020) 13 Energies 5502.

[9] Christine W Njiru and Sammy C Letema, 'Energy Poverty and Its Implication on Standard of Living in Kirinyaga, Kenya' (2018) 2018 Journal of Energy, 2.

[10] Dilip Ahuja and Marika Tatsutani, 'Sustainable energy for developing countries' [2009] S.A.P.I.EN.S. Surveys and Perspectives Integrating Environment and Society <http://journals.openedition.org/sapiens/823> accessed 24 April 2021.

[11] UN General Assembly, *Transforming our world: the 2030 Agenda for Sustainable Development*, 21 October 2015, A/RES/70/1.

focuses on addressing these challenges and offer solutions to promote the uptake, access and use of sustainable and affordable renewable energy for the Kenyan people in line with SDG Goal 7.

2.0 Place of Clean and Affordable Energy in Sustainable Development Agenda

Right to energy is so important that some authors have argued that 'food and energy are the two essential resources to support the modern and civilized society of the mankind'.[12]

The United Nations 2030 Agenda for Sustainable Development Goals (SDGs) Goal 7 seeks to 'ensure access to affordable, reliable, sustainable and modern energy for all'. The associated targets that are meant to create action to ensure universal access to sustainable energy include: By 2030, ensure universal access to affordable, reliable and modern energy services; by 2030, increase substantially the share of renewable energy in the global energy mix; by 2030, double the global rate of improvement in energy efficiency; By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology; and by 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States and landlocked developing countries, in accordance with their respective programmes of support.[13] This goal was informed by the fact that 'the world has experienced a rapid demand of energy sources, both fossil fuels and renewables'.[14] In addition, 'as the population continues to grow, so will the demand for cheap energy, and an economy reliant on fossil fuels is creating drastic changes to our climate'.[15] Urbanization and ambitions of economic development will also demand more energy.[16]

The United Nations rightly points out that while 'energy is central to social and economic well-being, 1.1 billion people have no access to electricity, while 2.9 billion have to cook with polluting, inefficient fuels such as firewood'.[17] Some commentators have observed that 'SDG 7 Affordable

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[12] Tomabechi K, 'Energy Resources in the Future' *Energies* 2010, 3, 686-695, 686.

[13] 'Goal 7: Affordable and Clean Energy' (*The Global Goals*) <https://www.globalgoals.org/7-affordable-and-clean-energy> accessed 18 April 2021.

[14] Franco IB, Power C and Whereat J, 'SDG 7 Affordable and Clean Energy: EWisely: Exceptional Women in Sustainability Have Energy to Boost–Contribution of the Energy Sector to the Achievement of the SDGs'.

[15] 'Goal 7: Affordable and Clean Energy' (*UNDP*) <https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-7-affordable-and-clean-energy.html> accessed 18 April 2021.

[16] Hafner M, Tagliapietra S and de Strasser L, 'The Challenge of Energy Access in Africa' in Manfred Hafner, Simone Tagliapietra and Lucia de Strasser (eds), *Energy in Africa: Challenges and Opportunities* (Springer International Publishing 2018) <https://doi.org/10.1007/978-3-319-92219-5_1> accessed 19 April 2021

[17] Valencia M, 'Sustainable Energy for All Shifts Gear to Speed Delivery of Affordable, Clean Energy' (*United Nations Sustainable Development*) <https://www.un.org/sustainabledevelopment/blog/2016/06/sustainable-energy-for-all-shifts-gear-to-speed-delivery-of-affordable-clean-energy/> accessed 18 April 2021.

and Clean Energy ensures access to affordable, reliable, and sustainable energy and is crucial in achieving many of the SDGs – from poverty eradication via advancements in health, education, water supply, and industrialization to mitigating climate change'.[18]

Access to cleaner and affordable energy sources is thus an important part of the journey towards achieving the sustainable development goals.

3.0 Accessing Clean and Affordable Energy Needs for All: The Kenyan Experience

Most developing countries are struggling with growing population and it is expected that today's world population will increase 1.26 times to reach 9.7 billion in 2050 with most of the world's population which include 90% of the population growth belonging to the developing countries.[19] Kenya, just like many other developing countries in Africa, is dealing with the burden of a growing population, environmental pollution, poverty, corruption and legal and policy framework inadequacies, among others, which all affect the achievement of clean and sustainable energy for all.[20] In addition, cultural perceptions (including myths about the flavour of food cooked on traditional stoves and the relative safety and cost of clean alternatives) have also been identified as a significant barrier to wider uptake of clean cooking fuels.[21]

These challenges informed the drafting of the sustainable development goals and the related targets. As a result, the environment which is being increasingly polluted because of rapid industrialization and human work is critical in the sustainable development agenda where sustainable development mainly covers the use of renewable energy, energy security, energy pricing, energy policy, renewable energy applications and smart grid technologies.[22] The World Health Organization in a 2018 Household Energy Assessment Rapid Tool (HEART) developed in Kenya highlights human health issues from non-renewable energy sources where it points out that 'household air pollution (HAP) from inefficient fuel combustion is one of the most important global environmental health risks today' especially in low- and middle income countries such as

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[18] Franco IB, Power C and Whereat J, 'SDG 7 Affordable and Clean Energy: EWisely: Exceptional Women in Sustainability Have Energy to Boost–Contribution of the Energy Sector to the Achievement of the SDGs', 106.

[19] Salvarli MS and Salvarli H, *For Sustainable Development: Future Trends in Renewable Energy and Enabling Technologies* (IntechOpen 2020) <https://www.intechopen.com/books/renewable-energy-resources-challenges-and-applications/for-sustainable-development-future-trends-in-renewable-energy-and-enabling-technologies> accessed 19 April 2021.

[20] Painuly JP, 'Barriers to Renewable Energy Penetration; a Framework for Analysis' (2001) 24 Renewable energy 73.

[21] Ngeno G and others, 'Opportunities for Transition to Clean Household Energy in Kenya: Application of the Household Energy Assessment Rapid Tool (HEART)', *Opportunities for transition to clean household energy in Kenya: application of the household energy assessment rapid tool (HEART)* (2018), 1.

[22] Salvarli MS and Salvarli H, *For Sustainable Development: Future Trends in Renewable Energy and Enabling Technologies* (IntechOpen 2020) <https://www.intechopen.com/books/renewable-energy-resources-challenges-and-applications/for-sustainable-development-future-trends-in-renewable-energy-and-enabling-technologies> accessed 19 April 2021.

Kenya, where majority of the population still rely on solid fuels (wood, animal dung, charcoal, crop wastes and coal) burnt in inefficient, highly polluting stoves for cooking and heating.[23] Indeed, this trend is expected to go on for longer if the latest reports are anything to go by. It is reported that Kenyans are expected to pay higher for liquefied petroleum gas from 1st July 2021 following the reinstatement of value-added tax (VAT) on liquefied petroleum gas (LPG) through the Finance Act 2020, but the implementation of the charges was deferred to the second half of 2021 due to the Covid-19 crisis.[24] This is a retrogressive move by the Government from the earlier development where 'Kenyan households had since June 2016 been enjoying low cooking gas prices after the Treasury scrapped the tax on LPG to cut costs and boost uptake among the poor who rely on dirty kerosene and charcoal for cooking', a move that was in line with the country's commitment to achievement of SDG Goal 7.[25] With affordability being a key access barrier to clean cooking fuels, such as liquefied petroleum gas (LPG), this move is likely to erode the gains made in transitioning the country to cleaner technologies.[26]

It has been suggested that while many developing countries have been apparently trying to restructure their energy sectors it is difficult to realize innovations in the energy sector as they struggle with cost, market share and policy as the main barriers for the development of renewable energy.[27] This is especially important since the reserves of fossil fuels are naturally expected to come to an end.[28]

Kenya's major sources of energy for the main economic production are oil, geothermal and hydro resources for electricity production where oil-based electricity generation is environmentally harmful, expensive and a burden to the national trade balance; the rivers for hydropower and their tributaries are found in arid and semi-arid areas with erratic rainfall leading to problems of

[23] Ngeno G and others, 'Opportunities for Transition to Clean Household Energy in Kenya: Application of the Household Energy Assessment Rapid Tool (HEART)', *Opportunities for transition to clean household energy in Kenya: application of the household energy assessment rapid tool (HEART)* (2018), vi.

[24] April 23 2021 F, 'Cooking Gas Prices to Rise Sh350 on New Tax' (*Business Daily*) <https://www.businessdailyafrica.com/bd/economy/cooking-gas-prices-rise-sh350-on-new-tax-3373296> accessed 23 April 2021; Kerubo MJ and B, 'Higher Gas Costs: What You'll Pay to Refill Your Cylinders Beginning July' (*The Standard*) <https://www.standardmedia.co.ke/nairobi/article/2001410538/kenyans-to-pay-more-for-cooking-gas-beginning-july> accessed 23 April 2021.

[25] June 11 2020 T, 'Kenyans to Pay Sh300 More for Cooking Gas' (*Business Daily*) <https://www.businessdailyafrica.com/bd/economy/kenyans-to-pay-sh300-more-for-cooking-gas-2292630> accessed 23 April 2021.

[26] Shupler M and others, 'Pay-as-You-Go Liquefied Petroleum Gas Supports Sustainable Clean Cooking in Kenyan Informal Urban Settlement during COVID-19 Lockdown' [2021] Applied Energy 116769.

[27] Salvarli MS and Salvarli H, *For Sustainable Development: Future Trends in Renewable Energy and Enabling Technologies* (IntechOpen 2020) <https://www.intechopen.com/books/renewable-energy-resources-challenges-and-applications/for-sustainable-development-future-trends-in-renewable-energy-and-enabling-technologies> accessed 19 April 2021.

[28] Ibid.

supply security, and geothermal exploitation has cost and risk issues, amongst others.[29] The cost of electricity generation and supply is also affected by the overdependence on Hydroelectric Power (HEP) as the main source of renewable energy, which is weather dependent and the unpredictable weather, due to climate change has made power rationing a common phenomenon in a number of Sub-Saharan Africa countries during the dry seasons.[30] It has been observed that while 'Renewable Energy Technologies (RETs) provide attractive environmentally sound technology options for Africa's electricity industry, the success of RETs in the region has been limited by a combination of factors which include: poor institutional framework and infrastructure; inadequate RET planning policies; lack of co-ordination and linkage in the RET programme; pricing distortions which have placed renewable energy at a disadvantage; high initial capital costs; weak dissemination strategies; lack of skilled manpower; poor baseline information; and, weak maintenance service and infrastructure'.[31]

The challenges of energy cost and reliability in Kenya are made worse by the energy transmission and distribution virtual monopoly currently existing in Kenya.[32] Kenya Electricity Generating Company (KenGen), generates about 70% of Kenya's electricity.[33] On the same breadth, Kenya Power owns and operates most of the electricity transmission and distribution system in the country and sells electricity to over 8 million as at end of June 2020.[34] The Government of Kenya has a controlling stake at 50.1% of shareholding with private investors at 49.9%.[35] Lack of competition in the electricity generation and supply sector has been blamed for inefficiency and high costs of energy.[36]

The *Energy Act, 2019*[37] was enacted to consolidate the laws relating to energy, to provide for National and County Government functions in relation to energy, to provide for the establishment, powers and functions of the energy sector entities; promotion of renewable energy; exploration, recovery and commercial utilization of geothermal energy; regulation of

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[29] Samoita D and others, 'Barriers and Solutions for Increasing the Integration of Solar Photovoltaic in Kenya's Electricity Mix' (2020) 13 Energies 5502, 1.

[30] ISSAfrica.org, 'Monopoly on Electricity Supply Contributes to Deforestation' (*ISS Africa*, 9 March 2010) <https://issafrica.org/amp/iss-today/monopoly-on-electricity-supply-contributes-to-deforestation> accessed 22 April 2021.

[31] [31] Karekezi, S., Kithyoma, W., & Energy Initiative, "Renewable energy development." In *workshop on African Energy Experts on Operationalizing the NEPAD Energy Initiative, June*, pp. 2-4. 2003, 1.

[32] Owiro, D., Poquillon, G., Njonjo, K. S., & Oduor, C., 'Situational Analysis of Energy Industry, Policy and Strategy for Kenya' [2015] Institute of Economic Affairs.

[33] 'Who We Are' <https://www.kengen.co.ke/index.php/our-company/who-we-are.html> accessed 22 April 2021.

[34] 'Who We Are | Kplc.Co.Ke' <https://www.kplc.co.ke/content/item/14/about-kenya-power> accessed 22 April 2021.

[35] Ibid.

[36] ISSAfrica.org, 'Monopoly on Electricity Supply Contributes to Deforestation' (*ISS Africa*, 9 March 2010) <https://issafrica.org/amp/iss-today/monopoly-on-electricity-supply-contributes-to-deforestation> accessed 22 April 2021.

[37] Energy Act, No. 1 of 2019, Laws of Kenya.

midstream and downstream petroleum and coal activities; regulation, production, supply and use of electricity and other energy forms; and for connected purposes.[38] While the citizenry was hoping that the enactment of this law would liberalize the energy market in Kenya and eliminate Kenya Power's monopoly in transmission and distribution of electricity in the country through licensing of other companies, the Government seemed to only affirm the same.[39]

KenGen is among the companies that have been seeking to enter the retail market and sell electricity directly to consumers.[40] However, to the disappointment of many Kenyans, the Government declined to license other companies, as yet.[41]

In summary, therefore, Kenya's energy sector still suffers from consistent power outages especially during dry seasons, high electricity tariffs specially exacerbated by high poverty and employment rates, energy retail sector monopoly, and cultural issues and biases that affect uptake of cleaner energy technologies, among others.[42] Notably, as far as the use of clean energy is concerned, it is estimated that two-thirds of Kenya's energy currently comes from bioenergy.[43] In addition, as Kenya seeks to move from non-renewable energy sources to renewable energy sources as envisaged under the United Nations 2030 Agenda for Sustainable Development Goals, moving an economy which relies heavily on wood fuel and biomass as its largest energy source, to achieve sustainable energy use through the gradual increase in the use of renewable energy sources that are often expensive due to the technology deployed, in the face of oil and coal discoveries that could be more readily accessible in spite of its known effects on the environment is a great challenge.[44] This is mainly due to higher poverty levels in many households in developing countries, such as Kenya thus making it nearly impossible to afford the renewable

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[38] Ibid, Preamble.

[39] 'Now Government Reaffirms Kenya Power's Monopoly' (*The East African*) <https://www.theeastafrican.co.ke/tea/business/now-government-reaffirms-kenya-power-s-monopoly-1408382> accessed 22 April 2021.

[40] 'KenGen Moves to End Kenya Power's Monopoly by Selling Electricity Directly to Consumers' (*Sun-Connect East Africa News*, 26 November 2020) <https://sun-connect-ea.org/kengen-moves-to-end-kenya-powers-monopoly-by-selling-electricity-directly-to-consumers/> accessed 22 April 2021; Siele M, 'Kengen to Begin Direct Power Sales Ending KPLC Monopoly - Business Today Kenya' <https://businesstoday.co.ke/kengen-to-begin-direct-power-sales-ending-kplc-monopoly/> accessed 22 April 2021;

[41] 'Now Government Reaffirms Kenya Power's Monopoly' (*The East African*) <https://www.theeastafrican.co.ke/tea/business/now-government-reaffirms-kenya-power-s-monopoly-1408382> accessed 22 April 2021.

[42] Avila, N., Carvallo, J. P., Shaw, B., & Kammen, D. M., "The energy challenge in sub-Saharan Africa: A guide for advocates and policy makers." *Generating Energy for Sustainable and Equitable Development, Part* 1 (2017): 1-79.

[43] 'Kenya Energy Outlook – Analysis' (*IEA*) <https://www.iea.org/articles/kenya-energy-outlook> accessed 21 September 2020.

[44] Owiro, D., G. Poquillon, K. S. Njonjo, and C. Oduor. "Situational analysis of energy industry, policy and strategy for Kenya." *Institute of Economic Affairs* (2015), p. 7.

and cleaner energy sources.[45] This is what is also mainly referred to as energy poverty, which the World Economic Forum in 2010 defined as 'the lack of access to sustainable modern energy services and products'.[46] Related to this definition is the observation that 'it is not only a matter of sustainability: energy poverty can be found in all conditions where there is a lack of adequate, *affordable*, reliable, quality, safe and environmentally sound energy services to support development.(emphasis added).[47] The connection between energy poverty and socio-economic development is that 'insufficient energy usually translates into the impossibility to develop agriculture and manufacturing, thus keeping the poorest countries trapped in a vicious circle: they cannot afford the energy that can drive them out of poverty'.[48]

It is, therefore, possible to conclude that as the situation currently stands, majority of Kenyan population are suffering from energy poverty that needs to be addressed.

4.0 Delivering Clean and Affordable Energy for All: The Global Trends and the Lessons

While it has been argued that there is no "one size fits all" approach to successful clean household energy initiatives, some commentators have observed that a suite of options targeted to different sociocultural environments is likely to have wider acceptance.[49]

4.1 Transition to Cleaner Energy Models

It has been observed that 'one of the biggest limitations to achieving the SDGs is linked to the geography: the population in need is mostly located in rural areas, where there is no grid-electricity, and its expansion is often financially and logistically infeasible'.[50] In light of this, it has been suggested that 'off-grid power has been instrumental in addressing this problem, notably stand-alone solutions, such as solar panels, hydro mini-grids, biogas mini-grids, among others, all of which comes from renewable sources, and which makes it the perfect alternative to obtain a reliable and sustainable energy service, at a considerably low price'.[51] As such, 'off-grid renewables give developing countries the opportunity to erase the electricity gap without passing

[45] Karekezi, S., Kithyoma, W., & Energy Initiative, "Renewable energy development." In *workshop on African Energy Experts on Operationalizing the NEPAD Energy Initiative, June*, pp. 2-4. 2003; Christine W Njiru and Sammy C Letema, 'Energy Poverty and Its Implication on Standard of Living in Kirinyaga, Kenya' (2018) 2018 Journal of Energy.

[46] 'Energy Poverty' (*Habitat For Humanity*) <https://www.habitat.org/emea/about/what-we-do/residential-energy-efficiency-households/energy-poverty> accessed 23 April 2021.

[47] Ibid.

[48] Ibid.

[49] Ngeno G and others, 'Opportunities for Transition to Clean Household Energy in Kenya: Application of the Household Energy Assessment Rapid Tool (HEART)', *Opportunities for transition to clean household energy in Kenya: application of the household energy assessment rapid tool (HEART)* (2018), 1.

[50] 'Energy Poverty' (*Habitat For Humanity*) <https://www.habitat.org/emea/about/what-we-do/residential-energy-efficiency-households/energy-poverty> accessed 23 April 2021.

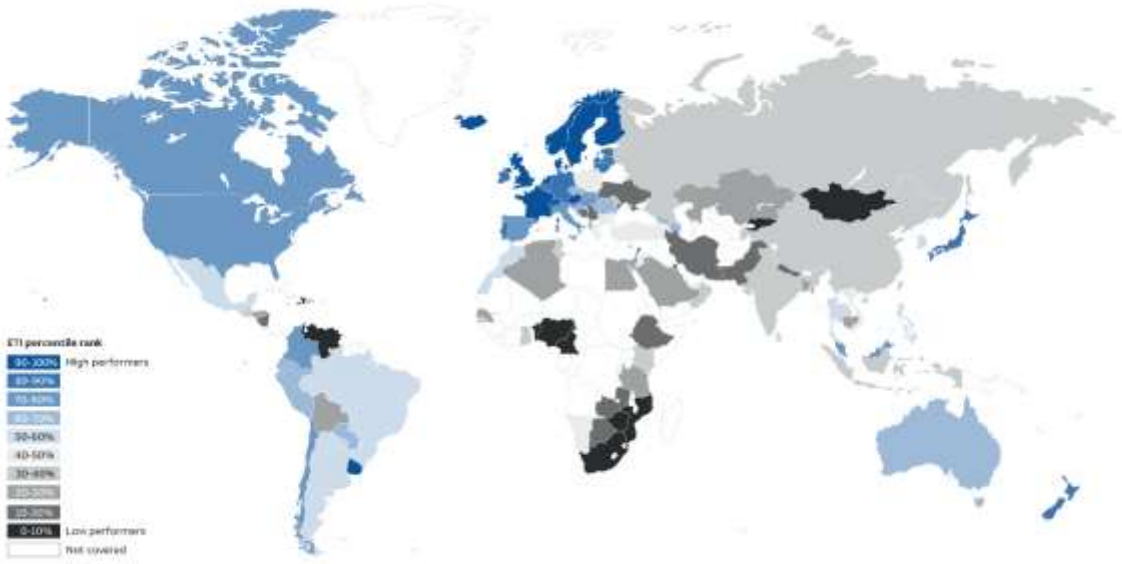
[51] Ibid.

through a phase of fossil fuels that would be hard to sustain in terms of cost, natural resources, and global environment'.[52]

There has been calls for 'pro-poor access to electricity measures that will ensure that there is access that provides poor people with energy services enabling poverty reduction, which services include, for example: light, information and communications technologies, mechanical power for productive uses, and refrigeration or water pumping, as their poverty impacts may consist of income generation, female empowerment, or better education and health'.[53] This can be achieved in what is referred to as 'energy transition', defined as the global energy sector's shift from fossil-based systems of energy production and consumption — including oil, natural gas and coal — to renewable energy sources like wind and solar, as well as lithium-ion batteries.[54]

Notably, Sweden was listed in 2020 Energy Translation Index (ETI) ranking for the third consecutive year as the country most ready to transition to clean energy, followed by Switzerland and Finland.[55] The ETI analyzes each country's readiness to adopt clean energy using three criteria: energy access and security; environmental sustainability; and economic development and growth.[56] Conspicuously, the top ten countries in the ranking were from the developed world, showing their readiness to transition.[57] Most African countries were ranked lowly or not considered at all, as demonstrated in the map below.

[52] Ibid.
[53] Pueyo, A., *Pro-poor access to green electricity in Kenya*. No. IDS Evidence Report; 135. IDS, 2015, 3.
[54] 'Global Energy Transition Index, 2020 and Its Highlights – Civilsdaily' <https://www.civilsdaily.com/news/global-energy-transition-index-2020-and-its-highlights/> accessed 19 April 2021.
[55] 'These Countries Are Leading the Transition to Sustainable Energy' (*EcoWatch*, 14 May 2020) <https://www.ecowatch.com/sustainable-energy-countries-2645997492.html> accessed 19 April 2021.
[56] Ibid.
[57] Ibid.



Source: World Economic Forum, Fostering Effective Energy Transition 2020[58]

Currently, Sweden boasts of about 54% energy that comes from renewable energy sources, with the country having attained the government's 2020 target of 50 per cent in 2012, while the power sector targeting to get to 100 per cent renewable electricity production by 2040.[59] Notably, Sweden's high share of renewable energy is attributed to hydropower (water) and bioenergy which are the top renewable sources in Sweden – hydropower mostly for electricity production and bioenergy for heating.[60] Sweden's success has been attributed to, inter alia, its market-based approach to energy policy, which is focused on creating well-functioning and competitive energy markets.[61] The Swedish energy policy agreement of 10 June 2016 set the path for the current success, based on reconciling: ecological sustainability; competitiveness; and security of supply.[62] In addition, the Policy was meant to create a basis for ensuring that 'Sweden achieves a robust electricity system with high reliability, low environmental impact and with

[58] 'Energy Transition Index 2020' <https://new.abb.com/news/detail/67960/energy-transition-index-2020> accessed 19 April 2021.
[59] 'Energy Use in Sweden' (*sweden.se*, 23 December 2015) <https://sweden.se/nature/energy-use-in-sweden/> accessed 19 April 2021.
[60] Ibid.
[61] International Energy Agency, *Energy Policies of IEA Countries: Sweden 2019 Review*< https://www.connaissancedesenergies.org/sites/default/files/pdf-actualites/Energy_Policies_of_IEA_Countries_Sweden_2019_Review.pdf> accessed 19 April 2021.
[62] Swedish Nuclear Society and Analysgruppen, *The Swedish energy policy agreement of 10June 2016 – unofficial English translation*< https://balticbrilliantproject.eu/onewebmedia/Swedish_political_energy_agreement_2016.pdf> accessed 19 April 2021.

access to electricity at competitive prices and also create long-term perspectives and clarity for market participants and bring new jobs and investments to Sweden.[63]

Kenya can learn a lot from the Swedish experience and it is high time that the stakeholders embark on the necessary steps to move the country towards consistent transition towards cleaner renewable energy sources for all.

4.2 Investing in Science, Technology and Innovation for Provision of Sustainable Energy for All

It has been agreed by many commentators that in order to meet the ever escalating energy needs of the growing population, energy solutions should be supported by utilizing renewable energy sources even though currently, the contribution of renewable energy to the world primary energy is not high to meet the primary energy and electricity supplies.[64]

It has been observed that 'energy markets across the world are in the middle of a revolution, triggered by the pursuit of decarbonization and fueled by innovation'.[65]

Some commentators have pointed out that 'new enabling technologies related to renewable energies will help to reduce environmental costs, and thus the energy systems will be operated as both securely and economically without environmental problems, making new renewable energy markets a necessity in both the wholesale and retail markets.[66]

Kenya has been making some commendable steps towards its transition to cleaner energy technologies since June 2016 when the Ministry of Finance zero-rated LPG gas to boost uptake by the poorer households. Notably, this has also seen the introduction of Pay-As-You-Go (PAYG) LPG smart meter technology in Kenya, enabling more Kenyans to embrace and enjoy the use of LPG for cooking and lighting as a cleaner and cheaper energy option.[67] Notably, across the world digitisation has driven and enabled the transformation of energy systems with many new companies entering the market with innovative products based on digital solutions, and

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[63] Ibid.

[64] Salvarli MS and Salvarli H, *For Sustainable Development: Future Trends in Renewable Energy and Enabling Technologies* (IntechOpen 2020) <https://www.intechopen.com/books/renewable-energy-resources-challenges-and-applications/for-sustainable-development-future-trends-in-renewable-energy-and-enabling-technologies> accessed 19 April 2021.

[65] Woodhouse S and Bradbury S, 'Chapter 2 - Innovation, Disruption, and the Survival of the Fittest' in Fereidoon P Sioshansi (ed), *Innovation and Disruption at the Grid's Edge* (Academic Press 2017) <https://www.sciencedirect.com/science/article/pii/B9780128117583000024> accessed 22 April 2021.

[66] Salvarli MS and Salvarli H, *For Sustainable Development: Future Trends in Renewable Energy and Enabling Technologies* (IntechOpen 2020) <https://www.intechopen.com/books/renewable-energy-resources-challenges-and-applications/for-sustainable-development-future-trends-in-renewable-energy-and-enabling-technologies> accessed 19 April 2021.

[67] Shupler M and others, 'Pay-as-You-Go Liquefied Petroleum Gas Supports Sustainable Clean Cooking in Kenyan Informal Urban Settlement during COVID-19 Lockdown' [2021] Applied Energy 116769.

companies from the information and communication sector and other companies from outside the industry increasingly driving the change.[68]

There is also a need for continued investment in fuel efficient cook stoves improvements in developing countries as part of efforts to reduce indoor pollution and improve cooking efficiency.[69] This calls for a greater role of the Government and private sector to encourage use of energy efficient stoves and other related innovations.[70]

Decarbonisation, decentralisation and digitalisation have been flaunted as part of the future of the global energy sector.[71] Decarbonisation is defined as the reduction of carbon dioxide emissions through the use of low carbon power sources, achieving a lower output of greenhouse gasses into the atmosphere.[72] Notably, decarbonisation involves increasing the prominence of low-carbon power generation, and a corresponding reduction in the use of fossil fuels which means increased use of renewable energy sources like wind power, solar power, and biomass.[73] Decarbonising the power sector is used to mean reducing its carbon intensity: that is, reducing the emissions per unit of electricity generated (often given in grams of carbon dioxide per kilowatt-hour).[74]

It is important to point out that the Paris Agreement was created to hold nations accountable in their efforts to decrease carbon emissions, with the central goal of ensuring that temperatures do not rise 2 degrees Celsius above pre-industrial level.[75] It has been observed that the growth of renewable sources of power, such as wind turbines, solar panels and coal-to-biomass upgrades

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[68] Johannes Giehl and others, 'Survey and Classification of Business Models for the Energy Transformation' (2020) 13 Energies 2981, 12.

[69] Manibog, Fernando R. "Improved cooking stoves in developing countries: problems and opportunities." *Annual Review of Energy* 9, no. 1 (1984): 199-227.

[70] 'The Livelihoods Carbon Fund Doubles Its Investment in an Energy Efficiency Project to Reach 600,000 People in Kenya – Livelihoods Funds' <https://livelihoods.eu/the-livelihoods-carbon-fund-doubles-its-investment-in-an-energy-efficiency-project-to-reach-600000-people-in-kenya/> accessed 24 April 2021; Lucy Stevens and others, 'Market Mapping for Improved Cookstoves: Barriers and Opportunities in East Africa' (2020) 30 Development in Practice 37; 'Improved Cookstoves, Kenya | Natural Capital Partners' <https://www.naturalcapitalpartners.com/projects/project/kenya-improved-cookstoves> accessed 24 April 2021.

[71] 'Decarbonisation, Decentralisation and Digitalisation: The Big Drivers at PowerGen 2017' <https://www.power-technology.com/features/featuredecarbonisation-decentralisation-and-digitalisation-the-big-drivers-at-powergen-2017-5856615/> accessed 23 April 2021.

[72] 'What Is Decarbonisation?' <https://www.twi-global.com/technical-knowledge/faqs/what-is-decarbonisation.aspx> accessed 24 April 2021.

[73] Ibid.

[74] 'What Is "Decarbonisation" of the Power Sector? Why Do We Need to Decarbonise the Power Sector in the UK?' (*Grantham Research Institute on climate change and the environment*) <https://www.lse.ac.uk/granthaminstitute/explainers/what-is-decarbonisation-of-the-power-sector-why-do-we-need-to-decarbonise-the-power-sector-in-the-uk/> accessed 24 April 2021.

[75] 'What Is Decarbonisation?' (*Drax*, 21 August 2020) <https://www.drax.com/sustainability/what-is-decarbonisation/> accessed 24 April 2021.

as well as other innovations, such as using batteries and allowing homes to generate and share their own power, can also lead to higher rates of decarbonisation.[76]

Arguably, new digital tools can promote sustainability, including satellites to verify greenhouse gas emissions and technologies to track air pollution at the neighbourhood level.[77] The digitalization of the power sector is associated with greater transparency into operations, which greatly increases efficiency and reliability while decreasing costs and consequently; consumers will not only see the benefits of digitalization through lower monthly utility bills but also reduced outages and faster response times.[78]

It has been observed that 'the digitalisation of the power sector has already begun, with block chain and smart meters becoming commonplace as well as there being a possibility of virtual power plants replacing traditional ones, interlinking small scale solar and wind with base load to create a reliable power system.[79]

The International Energy Agency recommends some policy actions that governments can take to prepare for digitalisation which include: Build digital expertise within their staff; ensure appropriate access to timely, robust, and verifiable data; build flexibility into policies to accommodate new technologies and developments; experiment, including through 'learning by doing' pilot projects; participate in broader inter-agency discussions on digitalisation; focus on the broader, overall system benefits; monitor the energy impacts of digitalisation on overall energy demand; incorporate digital resilience by design into research, development and product manufacturing; provide a level playing field to allow a variety of companies to compete and serve consumers better; and learn from others, including both positive case studies along with more cautionary tales.[80]

4.3 Newer Business Models in Energy Sector: Opening Up the Energy Sector

It has been argued that 'the ongoing energy system transformation across the world, and especially in developed world, and the growth of renewable energies are changing the structure and value creation of the energy industry with adopted business model classes showing that

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[76] Ibid.

[77] ESI Africa, 'How Digitalisation Is Reshaping the Energy Sector' (*ESI-Africa.com*, 30 July 2020) <https://www.esi-africa.com/smart-grids/how-digitalisation-is-reshaping-the-energy-sector/> accessed 23 April 2021.

[78] 'What Could Digitalization Achieve in the Power Sector?]' (*Alliance to Save Energy*, 10 December 2020) <https://www.ase.org/blog/what-could-digitalization-achieve-power-sector> accessed 23 April 2021.

[79] 'Decarbonisation, Decentralisation and Digitalisation: The Big Drivers at PowerGen 2017' <https://www.power-technology.com/features/featuredecarbonisation-decentralisation-and-digitalisation-the-big-drivers-at-powergen-2017-5856615/> accessed 23 April 2021.

[80] ESI Africa, 'How Digitalisation Is Reshaping the Energy Sector' (*ESI-Africa.com*, 30 July 2020) <https://www.esi-africa.com/smart-grids/how-digitalisation-is-reshaping-the-energy-sector/> accessed 23 April 2021.

traditional business models are affected by the decarbonisation, decentralisation and digitisation of the energy system in all segments and economic sectors.[81]

There is a need for the stakeholders in the energy sector to adopt business models that ensure that consumers get value, one that encourages consumers to pay for value, and one that converts those payments to profits.[82] Liberalization and energy system transformation can arguably significantly increase the pace of change and have impact on the business model landscape substantially.[83]

In many countries around the world, especially in the developed world, there has been a trend of liberalization, unbundling and deregulation of the energy sector in order to improve access to energy.[84] The liberalization of the energy market is defined to mean the opening of the electricity and gas market to free competition where existing monopolies are broken and the market is opened to more participants.[85]

Liberalization in regard to the energy markets and specifically electricity and gas mainly refers to "the opening up of an industry to more competition, often involving the relaxing of government restrictions to break up existing monopolies and open the market to more participants."[86] Liberalization has been characterized as involving the introduction of competition (via structural changes such as the removal of subsidies, vertical unbundling of integrated utilities to facilitate non-discriminatory access to monopoly networks and horizontal unbundling of incumbents to create viable competitors) and the establishment of independent energy sector regulators.[87] Expressed differently, in electricity and downstream gas supply, liberalization has often involved privatization (and/or the introduction of new private entrants) and structural reform of national industries to create competitive wholesale and retail markets with regulated non-discriminatory third party access to monopoly transmission and distribution networks.[88]

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[81] Johannes Giehl and others, 'Survey and Classification of Business Models for the Energy Transformation' (2020) 13 Energies 2981, 12.
[82] Fuentes-Bracamontes R, 'Is Unbundling Electricity Services the Way Forward for the Power Sector?' (2016) 9 The Electricity Journal 16.
[83] Giehl J and others, 'Survey and Classification of Business Models for the Energy Transformation' (2020) 13 Energies 2981.
[84] Fuentes-Bracamontes R, 'Is Unbundling Electricity Services the Way Forward for the Power Sector?' (2016) 29 The Electricity Journal 16.
[85] 'Liberalization & Unbundling of Energy Markets | Definition' (25 March 2020) <https://www.next-kraftwerke.com/knowledge/liberalization-energy-markets> accessed 22 April 2021.
[86] 'GRIN - Liberalisation of Energy Markets. Effects on Gas and Electricity Generation, Distribution and Supply' <https://www.grin.com/document/323337> accessed 23 April 2021.
[87] Michael G Pollitt, 'The Role of Policy in Energy Transitions: Lessons from the Energy Liberalisation Era' (2012) 50 Energy policy 128.
[88] Michael G Pollitt, 'The Role of Policy in Energy Transitions: Lessons from the Energy Liberalisation Era' (2012) 50 Energy policy 128, 3.

Where liberalization has been achieved such as the European Union energy markets, it was done to benefit consumers through; raising employment levels, increasing business efficiency and increasing a country's potential economic development and GDP growth.[89] Thus, "opening up these markets to competition allows consumers to benefit from lower prices and new services...more efficient and consumer-friendly than before" and consumers benefit because a breaking up of a monopoly and introducing competition will help give consumers savings in price but also choice of what service they demand.[90] It has also been argued that 'potential economic development and GDP growth is likely to occur as shown by the benefits to consumers, employment and efficiency because of increased employment which will cause more people to spend disposable income; an increase in companies also increases employment but also the reduction in market prices will result in consumers having more disposable income to be spent on other goods and services, and this will lead to economic development in other industries and businesses and is likely to increase GDP.[91] It has also been observed that 'the introduction of competition in downstream energy sectors, such as electricity and gas supply, facilitates competition in upstream gas and coal production sectors; while the general increase in energy trading facilitates the introduction of emissions markets'.[92]

Notably, while Kenya may have attained some milestone as far as unbundling (encouraging private generators of power, and separating generation from distribution) is concerned, the same cannot be said about liberalization (which is visibly missing from the Vision 2030). Notably, the electricity sector is unbundled and generation by independent power producers is permitted by law and is regulated, where as at 2018, it was estimated that the private sector produces 28% of Kenya's centralised electricity supply.[93] This was enabled through Feed-in tariffs (FITs) Regulations which were introduced in 2008 and revised in 2010 and 2012 to enable independent power producers to sell electricity to KPLC at a fixed price for a fixed term of 20 years.[94] Despite the commendable considerable success of this development, there has been challenges in uptake of this generated power. For instance, it is estimated that Kenya's Lake Turkana wind farm and its 365 turbines make for a generating capacity of more than 300MW, creating one of the most productive projects anywhere in the world.[95] Wind power has become a key contributor to the national grid to the extent that where there is interruption in its production, consumers have

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[89] 'GRIN - Liberalisation of Energy Markets. Effects on Gas and Electricity Generation, Distribution and Supply' <https://www.grin.com/document/323337> accessed 23 April 2021.
[90] Ibid.
[91] Ibid.
[92] Michael G Pollitt, 'The Role of Policy in Energy Transitions: Lessons from the Energy Liberalisation Era' (2012) 50 Energy policy 128, pp. 2-3.
[93] Kees Mokveld & Steven von Eije, *Final Energy report Kenya*, Commissioned by the Netherlands Enterprise Agency 2018, 13 < https://www.rvo.nl/sites/default/files/2019/01/Final-Energy-report-Kenya.pdf> accessed 19 April 2021.
[94] Ibid, 13.
[95] 'What's Driving Wind Power in Kenya and What Challenges Lie in Wait?' <https://www.nsenergybusiness.com/features/wind-power-kenya-challenges/> accessed 24 September 2020.

ended paying more for electricity in the country.[96] Notably, the Lake Turkana Wind Power (LTWP) has been allocated a maximum production quota of 210MW, against an installed capacity of 310MW.[97] While independent power producers have made considerable efforts to produce enough power to run the country, there have been problems with uptake of the same by the Kenya Power and Lighting Company Plc (KPLC). For instance, in the recent times and partly due to the Corona Virus (Covid-19) pandemic, there have been reports that measures to contain the pandemic have led to reduced demand for power especially among the commercial consumers who account for over 65% of the power use in the country.[98] Reports also indicate that KPLC has prioritized the uptake of geothermal at 39.5 per cent, hydro at 33.9 per cent, wind at 14 per cent, diesel at 9.7 per cent with other sources like solar, imports from Uganda and co-generation accounting for about three per cent.[99] This has thus left some of the producers with excess power.[100] This shows that Kenya's main consumers of electricity are commercial businesses and when these run into difficulties, the independent power producers are left stranded.[101] This happens while there are still reports that there are homes in Kenya still not connected to the grid despite the Government's best efforts to do so.[102] Thus, even as the Government looks for ways to produce cleaner power, there is also a need to address the disconnect between production and distribution of the power possibly through liberalization of the energy sector.[103]

While this has been attributed to the Covid-19 pandemic that afflicted almost the whole world in 2020, it raises a concern as to whether the power producers' major customers are only the

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[96] 'Consumers Pay the Price as Covid Electricity Cuts Hit Turkana Project - The East African' <https://www.theeastafrican.co.ke/tea/business/consumers-pay-the-price-as-covid-electricity-cuts-hit-turkana-project-1939124> accessed 19 April 2021.

[97] 'Consumers Pay the Price as Covid Electricity Cuts Hit Turkana Project - The East African' <https://www.theeastafrican.co.ke/tea/business/consumers-pay-the-price-as-covid-electricity-cuts-hit-turkana-project-1939124> accessed 1 October 2020.

[98] 'Consumers Pay the Price as Covid Electricity Cuts Hit Turkana Project - The East African' Monday September 14 2020 <https://www.theeastafrican.co.ke/tea/business/consumers-pay-the-price-as-covid-electricity-cuts-hit-turkana-project-1939124> accessed 1 October 2020.

[99] 'Consumers Pay the Price as Covid Electricity Cuts Hit Turkana Project - The East African' Monday September 14 2020 <https://www.theeastafrican.co.ke/tea/business/consumers-pay-the-price-as-covid-electricity-cuts-hit-turkana-project-1939124> accessed 1 October 2020.

[100] Ibid.

[101] "The Seven Major Threats to Kenya's Power Sector." *Energy For Growth*, https://www.energyforgrowth.org/memo/the-seven-major-threats-to-kenyas-power-sector/. Accessed 24 Apr. 2021; Avila, Nkiruka, Juan Pablo Carvallo, Brittany Shaw, and Daniel M. Kammen. "The energy challenge in sub-Saharan Africa: A guide for advocates and policy makers." *Generating Energy for Sustainable and Equitable Development, Part* 1 (2017): 1-79.

[102] *Kenya Energy Situation - Energypedia.Info*. https://energypedia.info/wiki/Kenya_Energy_Situation. Accessed 24 Apr. 2021.

[103] 'Liberalization & Unbundling of Energy Markets | Definition' (25 March 2020) <https://www.next-kraftwerke.com/knowledge/liberalization-energy-markets> accessed 22 April 2021.

commercial users.[104] This is because, it has already been pointed out that there are households in Kenya that still mainly rely on kerosene and biomass (firewood and charcoal) as their main source of energy for their inability to afford electricity.[105] Thus, even as we vouch for increased transition to renewable energy by way of increased production, this scenario points out the fact that there is more than availability of the renewable energy: the same must not only be made available but must also be made affordable to the local 'mwananchi' (citizen).Affordability of energy is key.

While the Energy Ministry had expressed optimism of introducing net metering for customer-sites generation (dependent on the enactment of the energy bill), establish regulations for mini-grids, and had started exploring the idea of local-currency-denominated tariffs in a bid to encourage local commercial banks to participate in energy projects,[106] this was however not achieved after the enactment of the Energy Act, 2019[107]. Liberalization of the sector would make all of these easier to actualize, for the benefit of consumers.

Arguably, the current unbundling structure has not achieved a lot for the Kenyan people as the high cost and unreliability of electricity supply in the country are still major issues, as these are greatly affected by state monopoly mainly through Kenya Power, a vertically integrated company.[108] Liberalization would ensure that for all forms of energy - gas, electricity, coal and oil - industrial and domestic consumers would be free to choose their supplier.[109] Kenya needs to borrow a leaf from some of the most successful countries in this sector such as Sweden and Singapore, among others.

In order to improve energy security and affordability, Singapore began to deregulate its electricity market since 2003, with the creation of the National Electricity Market of Singapore (NEMS) allowing for bid-ask offers to be made for the dispatch of electricity supply on the wholesale side and subsequently, the retail market liberalized in tranches, with 80% of electricity

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[104] The Seven Major Threats to Kenya's Power Sector." *Energy For Growth*, https://www.energyforgrowth.org/memo/the-seven-major-threats-to-kenyas-power-sector/. Accessed 24 Apr. 2021.

[105] *Kenya Energy Situation - Energypedia.Info*. https://energypedia.info/wiki/Kenya_Energy_Situation. Accessed 24 Apr. 2021.

[106] Kees Mokveld & Steven von Eije, *Final Energy report Kenya*, Commissioned by the Netherlands Enterprise Agency 2018, 13.

[107] Act No. 1 of 2019, Laws of Kenya.

[108] Tarver, Evan. "Horizontal vs. Vertical Integration: What's the Difference?" *Investopedia*, https://www.investopedia.com/ask/answers/051315/what-difference-between-horizontal-integration-and-vertical-integration.asp. Accessed 24 Apr. 2021.

[109] World Trade Organization, "The Social Effects of Energy Liberalisation: The UK Experience," *Launching a Common European Energy Market*, Lisbon 5/6 June 2000, 2 < https://www.wto.org/english/tratop_e/serv_e/symp_mar02_uk_social_effects_energy_lib_e.pdf> accessed 19 April 2021.

consumers currently already given an option to select their electricity retailers since late 2014.[110] As result, as at 2018, it was reported that 'supply competition and the retail liberalization efforts had possibly led to a combinatorial decrease in wholesale electricity prices by up to 9.11%, accounting for the influence of oil prices and volatility components'.[111] The country has also attracted investors in the sector making it more competitive for the retail consumer as far as choice of energy supplier is concerned.[112] Notably, 14 electricity providers participated in the pilot phase, including units of infrastructure companies.[113]

Kenya should follow in the footsteps of Singapore and other countries that have liberalized their energy markets in order to address the gap between generation, transmission and distribution of energy and particularly electricity and consequently ensure that all people in the country have access to cleaner, affordable energy.

4.4 Enhancing the Role of Private Sector in Renewable Energy Sector

Notably, *Energy Act, 2019* provides for the establishment of the Rural Electrification and Renewable Energy Corporation which is charged with, *inter alia,* harnessing opportunities offered under clean development mechanism and other mechanisms including, but not limited to, carbon credit trading to promote the development and exploitation of renewable energy sources.[114] The Nuclear Power and Energy Agency is also mandated to, *inter alia,* put in place mechanisms to attract private sector funding in research and human resource development for matters relating to energy.[115]

With introduction of market liberalization in Kenya's energy sector, a robust carbon credit trading system in Kenya could achieve the twin goals of raising funds and climate change mitigation in the energy sector.[116] According to the International Finance Corporation (IFC), the estimated total investment potential for the climate-smart needs of Côte d'Ivoire, Kenya, Nigeria, and South

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[110] Loi TSA and Jindal G, 'Electricity Market Deregulation in Singapore – Initial Assessment of Wholesale Prices' (2019) 127 Energy Policy 1.

[111] Ibid.

[112] 'Singapore Electricity Market Deregulation Attracts DBS, StarHub' (*Nikkei Asia*) <https://asia.nikkei.com/Business/Markets/Nikkei-Markets/Singapore-electricity-market-deregulation-attracts-DBS-StarHub> accessed 19 April 2021.

[113] Ibid.

[114] Sec. 44(1) (q), Energy Act, No. 1 of 2019, Laws of Kenya.

[115] Sec. 55(2) (k), Energy Act, No. 1 of 2019

[116] 'Kenyans Earn First Ever Carbon Credits From Sustainable Farming' (*World Bank*) <https://www.worldbank.org/en/news/press-release/2014/01/21/kenyans-earn-first-ever-carbon-credits-from-sustainable-farming> accessed 23 April 2021; Yiting Wang and Catherine Corson, 'The Making of a "charismatic" Carbon Credit: Clean Cookstoves and "Uncooperative" Women in Western Kenya' (2014) 0 Environment and Planning A 0; Kioko Nzuki Mwania, 'Carbon Trading In Kenya: A Critical Review'; Kanyinke Sena, 'Carbon Credit Schemes and Indigenous Peoples in Kenya: A Commentary' (2015) 32 Ariz. J. Int'l & Comp. L. 257.

Africa is $783 billion by 2030.[117] Sixteen percent of this potential is for renewable energy generation ($123 billion), while well over half ($499 billion) is for the transportation sector.[118] Regarding clean energy access in Sub-Saharan Africa, it is estimated that 600 million people in the region have no access to basic electricity services, and this number will increase with a projected 2.3 percent annual population growth, with only seven Sub-Saharan countries presently having electricity-access rates exceeding 50 percent; the rest have an average grid access rate of just 20 percent.[119] In addition, the annual investment in the Sub-Saharan African power system is currently estimated at around $8 billion per year, or 0.5 percent of GDP while electricity demand in Africa is projected to triple by 2030, representing huge potential for investment in renewable energy.[120] It is also estimated that Africa's power sector requires investments of $70 billion per year, on average, between now and 2030, which can be split into about $45 billion per year for generation capacity and $25 billion for transmission and distribution, creating a huge opportunity for investments.[121] Kenya would greatly benefit from this opportunity considering that it requires huge investments in the energy sector, especially in the area of renewables considering that Kenya's development blueprint, Vision 2030 which seeks to create "a globally competitive and prosperous country with a high quality of life by 2030" and it aims to transform Kenya into "a newly-industrialising, middle income country providing a high quality of life to all its citizens in a clean and secure environment".[122] Notably, one of the foundations for Kenya Vision 2030 upon which the economic, social and political pillars of Kenya Vision 2030 will be anchored on include energy where the 'the Government of Kenya committed to continued institutional reforms in the energy sector, including a strong regulatory framework, encouraging private generators of power, and separating generation from distribution, with new sources of energy will be found through exploitation of geothermal power, coal, renewable energy sources, and connecting Kenya to energy-surplus countries in the region.[123]

There is a need for the Government of Kenya to recognise and reach out to the private sector through creating a conducive legal and policy environment for investments in the country's energy sector in order to enable it achieve its objectives in the energy sector for achievement of

[117] International Finance Corporation, *Climate Investment Opportunities in Emerging Markets: An IFC Analysis*, 2016, 60.< https://www.ifc.org/wps/wcm/connect/59260145-ec2e-40de-97e6-3aa78b82b3c9/3503-IFC-Climate_Investment_Opportunity-Report-Dec-FINAL.pdf?MOD=AJPERES&CVID=lBLd6Xq> accessed 19 April 2021.
[118] International Finance Corporation, *Climate Investment Opportunities in Emerging Markets: An IFC Analysis*, 2016, 60.< https://www.ifc.org/wps/wcm/connect/59260145-ec2e-40de-97e6-3aa78b82b3c9/3503-IFC-Climate_Investment_Opportunity-Report-Dec-FINAL.pdf?MOD=AJPERES&CVID=lBLd6Xq> accessed 19 April 2021.
[119] Ibid, 61.
[120] Ibid, 61.
[121] Ibid, 61.
[122] Government of the Republic of Kenya, *Kenya Vision 2030: A Globally Competitive and Prosperous Kenya* (Government Printer Nairobi 2007).
[123] Ibid.

clean and affordable energy for its people.[124] This is because, as it has been suggested that 'that effective policies and institutions are the best way to enable developing countries, and the private sector operating in those countries, to attract private finance to drive sustained growth'.[125] Arguably, 'the private sector is critical to economic growth and poverty reduction, where sustainable and inclusive private sector-led growth can contribute to reducing poverty'.[126] In addition, 'partnerships between donors, partner governments and the private sector are being used to achieve private sector development objectives which enables governments to access private sector ideas, innovations and business models in search of solutions to intractable development problems'.[127]

4.5 Promoting Energy Efficiency in Kenya

While availability and affordability of energy is an important step towards attaining energy security for all, there is also a need to put equal emphasis on enhancing energy efficiency in the country.[128] Arguably, energy-efficiency or 'demand-side management' programs can provide a number of benefits in developing countries, including lower costs to customers, an fewer electrical supply problems, greater system reliability and a more moderate growth in demand.[129] Energy efficiency can be achieved through use of more energy efficient gadgets and appliances as well as employing everyday power saving practices especially in households.[130]

4.6 Addressing Barriers in Renewable Energy Uptake in Kenya

Renewable energy technologies (RETs) have been defined as energy-providing technologies that utilize energy sources in ways that do not deplete the Earth's natural resources and are as environmentally benign as possible.[131]

Some of the earliest barriers to embracing renewable energy technologies have been identified as cost-effectiveness, technical barriers, and market barriers such as inconsistent pricing structures, institutional, political and regulatory barriers, and social and environmental barriers

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[124] Tewes-Gradl, Christina, Anna Peters, Karin Vohla, and L. Lütjens-Schilling. "Inclusive Business Policies: How Governments can Engage Companies in Meeting Development Goals." *Endeva UG, Berlin* (2013).

[125] Tess ewton Cain, 'The Role of the Private Sector in Promoting Economic Growth and Reducing Poverty in the Indo-Pacific Region', 1.

[126] Ibid, 1.

[127] Ibid, 2.

[128] Patterson, Murray G. "What is energy efficiency?: Concepts, indicators and methodological issues." *Energy policy* 24, no. 5 (1996): 377-390.

[129] Dilip Ahuja and Marika Tatsutani, 'Sustainable energy for developing countries' [2009] S.A.P.I.EN.S. Surveys and Perspectives Integrating Environment and Society <http://journals.openedition.org/sapiens/823> accessed 24 April 2021.

[130] Attendant, An Automated, et al. *How You Can Help Reduce Greenhouse Gas Emissions at Home - Point Reyes National Seashore (U.S. National Park Service)*. https://www.nps.gov/pore/learn/nature/climatechange_action_home.htm. Accessed 24 Apr. 2021.

[131] Jim Watson, Oliver Johnson and Dong Wu, 'Renewable Energy Technologies for Rural Development' [2010] UNCTAD Current Studies on Science, Technology and Innovation.

where some may be specific to a technology, while others may be specific to a country or a region.[132]

Some of the barriers that are relevant to Kenya and ought to be taken up include: highly controlled energy sector where governmental monopoly of energy sector restricts private sector entry; monopoly of energy supplier and/ or distributor, electricity generation, transmission and distribution; controlled and lack of private sector investment.[133] There is also the problem of lack of involvement of stakeholders in decision leading to clash of interests where stakeholders' consultation culture is missing, stakeholders are dispersed, there is difficulty in communication, and there is fear of opposition.[134] Related to this and relevant to Kenya is the observation that there is also renewable energy technologies competing with conventional energy, leading to them being treated as a threat to utility dominance, threat to utility profit, powerful lobbies against renewable energy technologies, threat of transfer of control over energy, powerful lobbies for conventional energy and decoupling of investor–consumer interests.[135] It has been documented that while the government of Kenya has a history of welcoming private investment in the energy sector, the nature of the political system presents challenges –not least over corruption and access to land thus making investments carry higher risks for large, on-grid projects than they are for off-grid and micro-grid investments.[136]

While Kenya has made some impressive steps towards investing in renewable energy technologies such as wind power and geothermal, and which has seen electricity tariffs reduce during certain periods,[137] the reduction in prices has not been consistent.[138] There is a need for the

[132] Painuly JP, 'Barriers to Renewable Energy Penetration; a Framework for Analysis' (2001) 24 Renewable energy 73, 75.
[133] Ibid, 83.
[134] Ibid, 83.
[135] Ibid, 83.
[136] Gordon E, 'The Politics of Renewable Energy in East Africa' (2018), 15< https://www.oxfordenergy.org/wpcms/wp-content/uploads/2018/08/The-politics-of-renewable-energy-in-East-Africa-EL-29.pdf> accessed 19 April 2021.
[137] 'KENYA: 8% Reduction in Electricity Rates Thanks to Renewable Energies' (*Afrik 21*, 30 July 2018) <https://www.afrik21.africa/en/kenya-8-reduction-in-electricity-rates-thanks-to-renewable-energies/> accessed 22 April 2021; October 23 2020 F, 'Uhuru Tariff Cut Dims Kenya Power Revenue by Sh4.8bn' (*Business Daily*) <https://www.businessdailyafrica.com/bd/economy/uhuru-tariff-dims-kenya-power-revenue-by-sh4-8bn-2719632> accessed 22 April 2021; https://www.the-star.co.ke/authors/gilbertkoech. "Kenya Keen to Prioritise Clean, Renewable Energy." *The Star*, https://www.the-star.co.ke/sasa/technology/2020-04-24-kenya-keen-to-prioritise-clean-renewable-energy/. Accessed 24 Apr. 2021; Mactilda Mbenywe, "Uhuru addresses world forum, commits to mitigate climate change", Saturday Standard, 24 April 2021. < https://www.standardmedia.co.ke/kenya/article/2001410702/uhuru-commits-to-renewable-energy> 24 April 2021.
[138] November 05 2020 T, 'Regulator Agrees to Kenya Power 20pc Electricity Bill Increase' (*Business Daily*) <https://www.businessdailyafrica.com/bd/economy/regulator-kenya-power-20pc-electricity-bill-hike-2731164> accessed 22 April 2021; Theuri P, 'Rising Electricity Bills Push Manufacturers to the Wall' (*The*

country to continually invest in renewable sources of energy to boost reliability and hopefully reduce the cost of electricity due to reduction in production costs.[139] The legal, policy, institutional and technical barriers should be addressed to tap into the benefits of using renewable energy sources.[140] There is also a need for digitalization, liberalization, civic education and deregulation of energy sector, among others in order to address the above mentioned challenges.[141]

5.0 Conclusion

The United Nations Development Programme (UNDP) has rightly pointed out that 'investing in solar, wind and thermal power, improving energy productivity, and ensuring energy for all is vital if we are to achieve SDG 7 by 2030'. In addition, 'expanding infrastructure and upgrading technology to provide clean and more efficient energy in all countries will encourage growth and help the environment'.[142]

It has also been observed that 'policy and market design are vital to steering digitally enhanced energy systems onto an efficient, secure, accessible and sustainable path'.[143] It is time for the stakeholders and especially the Government to consider liberalization of the country's energy sector, especially in electricity generation, transmission and distribution. Liberalization of Kenya's energy sector also calls for 'a strong framework for regulation which is essential together with the benefits of a more efficient, innovative, and customer-focused industry'.[144] There is a need for rethinking the current approaches in energy generation, transmission and distribution if the goal and dream of cleaner and affordable energy sources for all Kenyans are to be achieved as part of realisation of the 2030 Agenda on SDGs as well as Kenya's Vision 2030. Without implementing radical changes in the sector, SDG Goal 7 will remain a mirage.

Delivering Clean and Affordable Energy for all is a noble dream that is achievable.

Standard) <https://www.standardmedia.co.ke/business/business-news/article/2001385332/rising-electricity-bills-push-manufacturers-to-the-wall> accessed 22 April 2021;

[139] une 15, and 2018 Lora Shinn. "Renewable Energy: The Clean Facts." *NRDC*, https://www.nrdc.org/stories/renewable-energy-clean-facts. Accessed 24 Apr. 2021.

[140] *Barriers to Renewable Energy Technologies | Union of Concerned Scientists*. https://ucsusa.org/resources/barriers-renewable-energy-technologies. Accessed 24 Apr. 2021.

[141] "The General Framework for Liberalization and Regulation of Public Utilities in Countries of Ex-Yugoslavia." *Florence School of Regulation*, 21 Mar. 2017, https://fsr.eui.eu/niq19-1-liberalization-ex-yugoslavia/.

[142] 'Goal 7: Affordable and Clean Energy' (*UNDP*) <https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-7-affordable-and-clean-energy.html> accessed 18 April 2021.

[143] ESI Africa, 'How Digitalisation Is Reshaping the Energy Sector' (*ESI-Africa.com*, 30 July 2020) <https://www.esi-africa.com/smart-grids/how-digitalisation-is-reshaping-the-energy-sector/> accessed 23 April 2021.

[144] 'How Strong Regulatory Frameworks Support Development' (*NARUC*) <https://www.naruc.org/international/news/how-strong-regulatory-frameworks-support-development/> accessed 24 April 2021.

Chapter 4: Transitioning from Fossil Fuels to Clean Energy

Abstract

This paper critically discusses the need to transition from fossil fuels to clean energy. It argues that energy transition has become an imperative in light of global challenges including climate change and scarce energy supplies. It examines the role of fossil fuels in the global threat of climate change. The paper further discusses the efficacy of initiatives adopted at national, regional, continental and global levels towards transitioning from fossil fuels to clean energy. It also highlights the challenges facing the global transition from fossil fuels to clean energy. The paper further proposes reforms aimed at accelerating the transition from fossil fuels to clean energy.

1.0 Introduction

Energy transition involves the long-term structural change to energy systems[1]. It refers to the change in the composition (structure) of primary energy supply, the gradual shift from a specific pattern of energy provision to a new state of an energy system[2]. Energy transition has also been described as the global energy sector's shift from fossil-based systems of energy production and consumption including oil, natural gas and coal to renewable energy sources like wind and solar, as well as lithium-ion batteries[3]. Energy transition can also refer to the shift from fossil fuels to renewable energy sources in an effort to reduce CO2 emissions[4].

Several factors may stimulate the transition from reliance on one major energy resource to another. These factors include the depletion or shortage of local or regional energy supplies and resources[5]; increase in costs of one energy source followed by a corresponding decrease in the cost of another energy sources[6]; adverse environmental and health impacts of one energy source such as air and water pollution creating the desirability of alternative sources of energy[7]; and technological change and innovation resulting in more efficient sources of energy[8]. Energy transition is therefore usually determined by factors such as the availability of energy resources, the costs of obtaining energy resources as well as their usefulness, and in recent years, by efforts

[1] Nalule. V., & Leal-Arcas. R., 'Chapter 8 - Energy Decentralization and Energy Transition in Poland.' *Electricity Decentralization in the European Union* (Second Edition)., 2023 pp209-240

[2] Mazzone. A., 'Energy Transition in Isolated Communities of the Brazilian Amazon.' *The Regulation and Policy Latin American Energy Transitions*., 2020., pp 319-330

[3] S & P Global., 'What is Energy Transition?' Available at https://www.spglobal.com/en/research-insights/articles/what-is-energy-transition (Accessed on 25/12/2023)

[4] Deloitte., 'The Energy Transition Explained.' Available at https://www2.deloitte.com/nl/nl/pages/energy-resources-industrials/articles/future-of-energy-faq.html (Accessed on 25/12/2023)

[5] Solomon. B., & Krishna. K., 'The Coming Sustainable Energy Transition: History, Strategies, and Outlook.' *Energy Policy* 39 (2011) 7422-7431

[6] Ibid

[7] Ibid

[8] Ibid

to protect the climate[9]. According to the United Nations Environment Programme (UNDP), the energy transition is a continuing process requiring long-term energy strategies and planning, with a country-tailored focus on applying appropriated energy technologies to reach net-zero emissions[10].

It has rightly been pointed out that facing global climate change and increasing scarcity and expense of petroleum, the world community is compelled to transition to sustainable energy systems as well as to better manage energy demand and supply[11]. Energy transition has therefore become an imperative in light of global challenges including climate change and scarce energy supplies[12].

This paper critically discusses the need to transition from fossil fuels to clean energy. It examines the role of fossil fuels in the global threat of climate change. The paper further discusses the efficacy of initiatives adopted at national, regional, continental and global levels towards transitioning from fossil fuels to clean energy. It also highlights the challenges facing the global transition from fossil fuels to clean energy. The paper further proposes reforms aimed at accelerating the transition from fossil fuels to clean energy.

2.0 Fossil Fuels and Climate Change

Fossil fuels is a generic term that refers to non-renewable energy sources such as coal, coal products, natural gas, derived gas, crude oil, petroleum products and non-renewable wastes[13]. These fuels originate from plants and animals that existed in the geological past[14]. Fossil fuels are made from decomposing plants and animals[15]. These fuels are found in Earth's crust and contain carbon and hydrogen, which can be burned for energy. Coal, oil, and natural gas are examples of fossil fuels[16].

Fossil fuels have been a major source of global energy supply for many decades. According to the International Energy Agency (IEA), fossil fuels including coal, oil and natural gas have accounted

[9] Nalule. V., & Leal-Arcas. R., 'Chapter 8 - Energy Decentralization and Energy Transition in Poland.' Op Cit

[10] United Nations Development Programme., 'Energy Transition.' Available at https://www.undp.org/energy/our-work-areas/energy-transition (Accessed on 25/12/2023)

[11] Solomon. B., & Krishna. K., 'The Coming Sustainable Energy Transition: History, Strategies, and Outlook.' Op Cit

[12] Ibid

[13] European Commission., 'Glossary:Fossil Fuel.' Available at https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Fossil_fuel (Accessed on 26/12/2023)

[14] Ibid

[15] National Geographic., 'Fossil Fuels.' Available at https://education.nationalgeographic.org/resource/fossil-fuels/ (Accessed on 26/12/2023)

[16] Ibid

for almost 80 per cent of global energy supply for many decades[17]. It has been asserted that fossil fuels including coal, oil, and natural gas have been powering economies for over 150 years, and currently supply about 80 percent of the world's energy[18]. It has correctly been pointed out that fossil fuels have always had the major share in the global primary energy consumption and will continue to hold the position in the foreseeable future as more unconventional fossil fuels are explored[19]. Fossil fuels therefore hold an important position in the global energy mix.

Despite their importance in global energy supply, the extraction and burning of fossil fuels has serious environmental consequences including climate change[20]. It has been pointed out that when fossil fuels are burned, the stored carbon and other greenhouse gases are released into the atmosphere[21]. An excess buildup of greenhouse gases in the atmosphere as a result of burning of fossil fuels has resulted in dramatic changes to Earth's climate—a trend that will worsen as more fossil fuels are burned[22]. It has been pointed out that the production and use of fossil fuel for electricity and transportation among other uses is not only contributing to climate change, but is also causing health problems, destroying natural ecosystems, and releasing toxins such as mercury and arsenic into communities[23].

It has been asserted that emissions from fossil fuels are the dominant cause of global warming and climate change[24]. The United Nations correctly opines that fossil fuels including coal, oil and natural gas are by far the largest contributor to global climate change, accounting for over 75 per cent of global greenhouse gas emissions and nearly 90 per cent of all carbon dioxide emissions[25]. It is therefore important to transition from fossil fuels to clean energy in order to confront climate change. It has been pointed out that increased production and use of fossil fuels is not compatible

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[17] International Energy Agency., 'World Energy Outlook: 2023.' Available at https://iea.blob.core.windows.net/assets/42b23c45-78bc-4482-b0f9-eb826ae2da3d/WorldEnergyOutlook2023.pdf (Accessed on 26/12/2023)

[18] Environmental and Energy Study Institute., 'Fossil Fuels.' Available at https://www.eesi.org/topics/fossil-fuels/description (Accessed on 26/12/2023)

[19] Yildiz. I., 'Fossil Fuels.' *Comprehensive Energy Systems*., (2018), Volume 1., pp 521-567

[20] Ibid

[21] Environmental and Energy Study Institute., 'Fossil Fuels.' Op Cit

[22] Ibid

[23] The National Wildlife Federation., 'Reducing Fossil Fuel Reliance.' Available at https://www.nwf.org/Home/Our-Work/Climate/Climate-Change/Fossil-Fuels (Accessed on 26/12/2023)

[24] Fossil fuels and Climate Change: The Facts., Available at https://www.clientearth.org/latest/news/fossil-fuels-and-climate-change-the-facts/#:~:text=What%20is%20the%20link%20between,temperature%20has%20increased%20by%201C (Accessed on 26/12/2023)

[25] United Nations., 'Causes and Effects of Climate Change.' Available at https://www.un.org/en/climatechange/science/causes-effects-climate-change (Accessed on 26/12/2023)

with a safe and liveable future[26]. As a result, it has been argued that in order to protect the health and lives of present and future generations, the world needs a rapid, equitable phase-out of fossil fuels[27].

3.0 Transitioning from Fossil Fuels to Clean Energy: Progress and Setbacks

The need to transition from fossil fuels to clean energy is acknowledged in several legal and policy instruments.

The *United Nations Framework Convention on Climate Change (UNFCCC)*[28] acknowledges the need to transition from fossil fuels to clean energy. The UNFCCC states that countries whose economies are highly dependent on income generated from the production, processing and export, and/or on consumption of *fossil fuels* and associated energy-intensive products are highly vulnerable to climate change[29]. The UNFCCC requires all countries and especially developing countries which are still highly dependent on fossil fuels to explore the possibilities for achieving greater energy efficiency and for controlling greenhouse gas emissions in general, including through the application of new technologies in the energy sector such as renewable energy on terms which make such an application economically and socially beneficial[30]. The UNFCCC therefore sets the stage for global transition from fossil fuels to clean energy.

The *Paris Agreement*[31] aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change[32]. It has been pointed out that though the phrase 'fossil fuels' does not appear in the Paris Agreement neither to the terms 'coal', 'oil' and 'natural gas' despite these resources being responsible for most greenhouse gas emissions, the omission reflects the decision by national governments, reinforced by industry lobbyists, to focus emissions reduction efforts on reducing the demand for fossil fuels, rather than limiting fossil fuel supply by discouraging or even prohibiting their extraction in the first

[26] Amnesty International., 'Global: Fossil Fuel Production will be Double the Level Needed to Limit Global Warming to 1.5°C.' Available at https://www.amnesty.org/en/latest/news/2023/11/global-fossil-fuel-production-will-be-double-the-level-needed-to-limit-global-warming-to-1-5c/ (Accessed on 26/12/2023)
[27] The Global Climate & Health Alliance., 'Health and Fossil Fuels: A Rapid and Just Transition.' Available at https://climateandhealthalliance.org/initiatives/fossil-fuel-phaseout/ (Accessed on 26/12/2023)
[28] United Nations Framework Convention on Climate Change., United Nations 1992, Available at https://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf (Accessed on 26/12/2023)
[29] Ibid, Article 4
[30] Ibid
[31] Paris Agreement., United Nations, 2015., Available at https://unfccc.int/sites/default/files/english_paris_agreement.pdf (Accessed on 26/12/2023)
[32] Ibid, Article 2 (1) (a)

place[33]. The Paris Agreement therefore envisages the transition from fossil fuels to clean energy in order to reduce global greenhouse gas emissions. Implementation of the Paris Agreement is necessary in shifting towards a net-zero emissions world[34].

The transition from fossil fuels is also envisioned under the *United Nations 2030 agenda for Sustainable Development*[35]. Sustainable Development Goal (SDG) 7 seeks to ensure access to affordable, reliable, sustainable and modern energy for all[36]. Among the targets under SDG 7 include ensuring universal access to affordable, reliable and modern energy services; substantially increasing the share of renewable energy in the global energy mix; doubling the global rate of improvement in energy efficiency; and enhancing international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology[37]. Achieving the targets under SDG 7 is necessary in transitioning from fossil fuels to clean energy including renewable sources of energy. In addition SDG 12 seeks to foster sustainable consumption and production patterns[38]. Among the targets under SDG 12 is to rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities[39]. Regulation of fossil fuel subsidies has been identified as key measure geared towards shifting from fossil fuels to clean energy[40]. Transitioning from fossil fuels to clean energy is therefore an essential part of the Sustainable Development agenda.

[33] Council on Foreign Relations., 'To Tackle Climate Change, Keep Fossil Fuels in the Ground.' Available at https://www.cfr.org/article/tackle-climate-change-keep-fossil-fuels-ground (Accessed on 26/12/2023)
[34] United Nations., 'The Paris Agreement.' Available at https://www.un.org/en/climatechange/paris-agreement (Accessed on 26/12/2023)
[35] United Nations General Assembly., 'Transforming Our World: the 2030 Agenda for Sustainable Development.' 21 October 2015, A/RES/70/1., Available at https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf (Accessed on 26/12/2023)
[36] Ibid, SDG 7
[37] Ibid
[38] Ibid, SDG 12
[39] Ibid, SDG 12.c
[40] World Resources Institute., '4 Ways to Shift from Fossil Fuels to Clean Energy.' Available at https://www.wri.org/insights/4-ways-shift-fossil-fuels-clean-energy (Accessed on 26/12/2023)

Transitioning from fossil fuels to clean energy is also an important agenda in Africa. Africa Union's *Agenda 2063*[41] posits that the Continent faces enormous energy challenges that include low generation capacity and efficiency, high costs, unstable and unreliable energy supplies, low access to modern energy, insufficient energy infrastructure, and lack of institutional and technical capacity to harness huge resources partly due to dependence on fossil fuels for generation of electricity[42]. Among the aspirations under Agenda 2063 is to create environmentally sustainable and climate resilient economies and communities in Africa through measures such as the adoption of renewable sources of energy[43]. Agenda 2063 portrays the vision of a Continent where renewable energy (wind, solar, hydro, bioenergy, ocean tidal waves, geothermal and other renewables) will claim more than half of the energy consumption for households, businesses and organizations[44]. Implementing Agenda 2063 is thus necessary in order to transition from fossil fuels to clean energy in Africa.

At the regional level, the *East African Community Climate Change Policy*[45] stipulates the importance of transitioning from fossil fuels to clean energy within the East African Community (EAC). According to the Policy, energy is the driver of social and economic development in the EAC region, and most of the EAC partner states depend on imported fossil based fuel (oil)[46]. The Policy acknowledges that the use of fossil oil is unsustainable due to its high emission factor that is a major contributor to global warming and climate change[47]. It further states that the search for alternative source of energy exacerbated by climate change usually leads to use of fossil based fuel to generate electricity for industrial needs that are also economically costly to the region[48]. The Policy seeks to increase the availability and accessibility of sustainable, reliable and affordable renewable energy resources in the EAC and urges member states to embrace measures such as scaling up investment in renewable energy technologies to provide access to affordable cleaner energy, improve efficiency in use of biomass energy especially for rural communities; developing appropriate alternative energy sources, policies and measures to increase energy efficiency; devising a precautionary approach to the development of bio-fuels for mitigation and energy in view of food security issues; and improving energy efficiency and promoting clean energy technologies including; hydropower, solar and wind[49]. It is necessary for member states

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[41] Africa Union., 'Agenda 2063: The Africa we Want.' Available at https://au.int/sites/default/files/documents/33126-doc-framework_document_book.pdf (Accessed on 26/12/2023)

[42] Ibid

[43] Ibid

[44] Ibid

[45] East African Community., 'EAC Climate Change Policy Framework.' Available at https://www.eac.int/environment/climate-change/eac-climate-change-policy-framework (Accessed on 26/12/2023)

[46] Ibid, Part 3.2.4 (i)

[47] Ibid

[48] Ibid

[49] Ibid

of the EAC to actualize the provisions of this Policy in order to transition from fossil fuels to clean energy.

At the national level, the *Energy Act*[50] of Kenya embraces the transition from fossil fuels to clean energy sources including renewable energy. The Act defines renewable energy as non-fossil energy generated from natural non-depleting resources including but not limited to solar energy, wind energy, biomass energy, biological waste energy, hydro energy, geothermal energy and ocean and tidal energy[51]. It urges the state to develop, promote and manage the use of renewable sources of energy in Kenya and establishes the Rural Electrification and Renewable Energy Corporation which is tasked to fulfill that mandate[52]. In addition, the *Climate Change Act*[53] requires the state to embrace climate change response measures and actions such as enhancing energy conservation, efficiency and use of renewable energy in industrial, commercial, transport, domestic and other uses[54]. Further, the *National Energy Policy*[55] identifies key challenges in the energy sector in Kenya including reliance on fossil fuels which results in high electricity costs[56]. It further acknowledges that there is increasing concern about spiraling degradation of the environment as exemplified by increased local air pollution and acid precipitation from ever growing fossil fuel combustion[57]. It also identifies the depletion of energy resources including fossil fuels as a major concern in the energy sector in Kenya[58]. The Policy urges the country to move towards renewable sources of energy. It correctly points out that renewable energy, derived from the naturally occurring resources including geothermal, hydro, solar, wind, ocean energy, biomass, biofuels, biogas and municipal waste can supply the country's energy needs and those of future generations in a sustainable way if effectively harnessed through careful planning and advanced technology[59]. In addition, the Policy asserts that renewable energy has potential to enhance energy security, mitigate climate change, generate income, create employment and generate foreign exchange savings[60]. It is thus imperative to transition from fossil fuels to clean energy including renewable energy in Kenya.

From the foregoing, it is evident that the need to transition from fossil fuels to clean energy is recognized at the global, continental, regional and national levels. There has been some progress towards transitioning from fossil fuels to clean energy. The IEA points out that although demand

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[50] Energy Act., No. 1 of 2019., Laws of Kenya., Government Printer, Nairobi
[51] Ibid, S 2
[52] Ibid, S 43 & 44
[53] Climate Change Act., No. 11 of 2016., Laws of Kenya., Government Printer, Nairobi
[54] Ibid, S 13 (3) (j)
[55] Ministry of Energy., 'National Energy Policy.' Available at https://kplc.co.ke/img/full/BL4PdOqKtxFT_National%20Energy%20Policy%20October%20%202018.pdf (Accessed on 26/12/2023)
[56] Ibid
[57] Ibid
[58] Ibid
[59] Ibid
[60] Ibid

for fossil fuels has been strong in recent years, there are signs of a change in direction[61]. According to the IEA, alongside the deployment of low-emissions alternatives, the rate at which new assets that use fossil fuels are being added to the energy system has slowed[62]. The IEA however warns that even as demand for fossil fuels falls, energy security challenges will remain since the process of adjustment to changing demand patterns will not necessarily be easy or smooth[63]. It is therefore important to ensure that the transition from fossil fuels to clean energy is done in manner that fosters energy security.

The transition from fossil fuels to clean energy recently received a major boost at the 2023 United Nations Climate Change Conference/ Conference of the Parties of the UNFCCC (COP 28) when states adopted the global stock take decision[64]. The COP 28 decision underlines the urgent need to address, in a comprehensive and synergetic manner, the interlinked global crises of climate change and biodiversity loss in the broader context of achieving the Sustainable Development Goals, as well as the vital importance of protecting, conserving, restoring and sustainably using nature and ecosystems for effective and sustainable climate action[65]. The decision affirms the commitment of member states to accelerate climate action in this critical decade on the basis of the best available science, reflecting equity and the principle of *common but differentiated responsibilities and respective capabilities* in the light of different national circumstances and in the context of Sustainable Development and efforts to eradicate poverty (Emphasis added)[66]. It further emphasizes that finance, capacity-building and technology transfer are critical enablers of climate action[67]. It requires states to embrace collective progress towards achieving the purpose and long-term goals of the Paris Agreement through measures such as transitioning away from fossil fuels in energy systems, in a just, orderly and equitable manner, accelerating action in this critical decade, so as to achieve net zero by 2050 in keeping with the science[68]. It also requires countries to phase out inefficient fossil fuel subsidies that do not address energy poverty or just transitions, as soon as possible towards strengthening climate action[69].

The cop 28 decision has been lauded as signaling the 'beginning of the end' of the fossil fuel era[70]. It has been asserted that the decision lays the ground for a swift, just and equitable transition,

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[61] International Energy Agency., 'World Energy Outlook: 2023.' Op Cit
[62] Ibid
[63] Ibid
[64] United Nations Climate Change., 'Decision -/CMA.5: Outcome of the First Global stocktake' Available at https://unfccc.int/documents/636584 (Accessed on 26/12/2023)
[65] Ibid
[66] Ibid
[67] Ibid
[68] Ibid
[69] Ibid
[70] United Nations Climate Change., 'COP28 Agreement Signals "Beginning of the End" of the Fossil Fuel Era.' Available at https://unfccc.int/news/cop28-agreement-signals-beginning-of-the-end-of-the-fossil-fuel-era (Accessed on 26/12/2023)

underpinned by deep emissions cuts and scaled-up finance[71]. The COP 28 decision urges all countries to take actions towards achieving, at a global scale, a tripling of renewable energy capacity and doubling energy efficiency improvements by 2030[72]. It further urges countries to accelerate efforts towards the phase-down of unabated coal power, phasing out inefficient fossil fuel subsidies, and other measures that drive the transition away from fossil fuels in energy systems, in a just, orderly and equitable manner, with developed countries continuing to take the lead[73]. The COP 28 outcome is a major milestone in transitioning away from fossil fuels and towards renewables and energy efficiency[74]. It is therefore necessary for all countries to implement the outcome of COP 28 in order to ensure that the transition from fossil fuels to clean energy is done in manner that fosters justice and equity[75].

Transitioning from fossil fuels to clean energy is therefore an important global agenda. However, this transition faces certain hurdles. It has been observed that fossil fuel subsidies provided to companies in the fossil fuel sector continue to encourage the production and use of these sources of energy[76]. In addition, developing countries continue to face challenges accessing technology and finance to invest in clean energy sources including renewable energy hence continued reliance on fossil fuels[77]. It is imperative to address these among other challenges in order to accelerate the global transition from fossil fuels to clean energy.

4.0 Way Forward

In order to transition from fossil fuels to clean energy, there is need to eliminate fossil fuel subsidies[78]. According to the United Nations Environment Programme (UNEP), the production and use of fossil fuels in many countries is encouraged through large subsidies[79]. These subsidies are undesirable since they contribute to air pollution and congestion, are a drain on national budgets, often do not reach the poorest households, crowd-out investment in clean energy, and encourage excessive energy consumption[80]. The IEA observes that the transition to clean energy alternatives remains a challenge in countries where fossil fuel subsidies have still not been phased

[71] Ibid
[72] Ibid
[73] Ibid
[74] European Parliament., 'COP28 Climate Talks Agree on Transitioning Away from Fossil Fuels.' Available at https://www.europarl.europa.eu/news/en/press-room/20231205IPR15686/cop28-climate-talks-agree-on-transitioning-away-from-fossil-fuels (Accessed on 26/12/2023)
[75] United Nations., 'Climate and Environment.' Available at https://news.un.org/en/story/2023/12/1144742 (Accessed on 26/12/2023)
[76] The National Wildlife Federation., 'Reducing Fossil Fuel Reliance.' Op Cit
[77] Muigua. K., 'Accelerating Energy Transition in Kenya.' Available at https://kmco.co.ke/wp-content/uploads/2023/09/Accelerating-Energy-Transition-in-Kenya.pdf (Accessed on 26/12/2023)
[78] World Resources Institute., '4 Ways to Shift from Fossil Fuels to Clean Energy.' Op Cit
[79] United Nations Environment Programme., 'Fossil Fuel Subsidy Reform.' Available at https://www.unep.org/explore-topics/green-economy/what-we-do/economic-and-fiscal-policy/fiscalpolicy/policy-analysis-3 (Accessed on 26/12/2023)
[80] Ibid

out[81]. Fossil fuel subsidies are also undesirable since they distort markets and are often ultimately paid by consumers through higher taxes or consumer prices, especially in importing regions[82]. Fossil fuel subsidies are therefore a major hindrance in the global transition towards clean energy. The COP 28 decision urges all countries to phase out inefficient fossil fuel subsidies that do not address energy poverty or just transitions, as soon as possible towards strengthening climate action[83]. It is therefore important for all countries to face out fossil fuel subsidies in order to embrace the transition towards clean energy.

In addition, it is necessary for all countries to scale up investments in clean energy including renewable sources of energy. It has correctly been opined that generating renewable energy creates far lower emissions than burning fossil fuels[84]. Transitioning from fossil fuels, which currently account for the lion's share of global greenhouse gas emissions, to renewable energy is key to addressing the climate crisis across the globe[85]. Countries should therefore transition towards renewable sources of energy such as wind, solar, hydropower, geothermal and tidal energy which are prevalent throughout the globe[86]. The economic, societal and environmental benefits of renewable sources of energy are numerous. Renewable sources of energy are available in abundance, cheaper and are a healthier option for people and the planet[87]. Countries should therefore enhance investments in renewable sources of energy due to their numerous advantages. It is also important for developed countries to support the transition to clean energy sources in developing countries through finance, technology development and transfer and capacity-building[88]. The COP 28 outcome emphasizes that finance, capacity-building and technology transfer are critical enablers of climate action across all sectors including energy transition[89]. The principle of '*common but differentiated responsibility and respective capabilities*' enshrined in global climate change instruments including the UNFCCC calls upon developed countries to take the lead in fostering climate action through initiatives such as climate finance and technology transfer to developing countries[90]. Developed countries should therefore enhance climate funding,

[81] International Energy Agency., 'World Energy Outlook: 2023.' Op Cit
[82] Ibid
[83] United Nations Climate Change., 'Decision -/CMA.5: Outcome of the First Global stocktake' Op Cit
[84] United Nations., 'What is Renewable Energy?.' Available at https://www.un.org/en/climatechange/what-is-renewable-energy (Accessed on 26/12/2023)
[85] Ibid
[86] Muigua. K., 'Adopting Green Energy for a Bright Tomorrow.' Available at https://kmco.co.ke/wp-content/uploads/2023/06/Adopting-Green-Energy-for-a-Bright-Tomorrow.pdf (Accessed on 26/12/2023)
[87] United Nations., 'Climate Action.' Available at https://www.un.org/en/climatechange/howcommunities-are-embracing-renewable-energy (Accessed on 26/12/2023)
[88] United Nations Climate Change., 'COP28 Agreement Signals "Beginning of the End" of the Fossil Fuel Era.' Op Cit
[89] United Nations Climate Change., 'Decision -/CMA.5: Outcome of the First Global stocktake' Op Cit
[90] United Nations Framework Convention on Climate Change., United Nations 1992., Op Cit

technology transfer and capacity building in developing countries geared towards transitioning from fossil fuels to clean energy.

Further, it is necessary to improve access to electricity and clean cooking[91]. It has been pointed out that household energy needs entail two components: access to clean cooking facilities and access to electricity[92]. However, access to electricity remains a challenge in many regions of the world especially Africa. The IEA estimates that nearly 600 million people or an equivalent of 43 per cent of the Continent's population lack access to electricity[93]. It further points out that less than a fifth of African countries have targets to reach universal electricity access by 2030[94]. It has further been pointed out that the Sub-Saharan region of Africa has the lowest rate of access to electricity with just nearly half of the population having access to electricity compared to the global access rate of nearly 90 per cent[95]. In addition, it has been noted that many people across the world lack access to clean energy sources such as electricity and use polluting, inefficient fuels such as firewood for household chores such as cooking[96]. Progress remains slow in promoting clean cooking facilities especially in Africa with bio-energy sources such as charcoal, wood fuel and dung being the most common source of energy in Kenya especially among the rural population[97]. Lack of access to electricity and clean cooking facilities encourages the use of fossil fuels a situation which contributes to environmental problems including climate change[98]. It is imperative for all countries to enhance access to electricity and clean cooking facilities through measures such as lowering electricity tariffs, promoting rural electrification and enhancing access to clean energy sources for purposes of cooking such as Liquefied Petroleum Gas (LPG)[99]. Fostering access to electricity and clean cooking facilities will enhance the transition from fossil fuels to clean energy.

Finally, it is important for all countries to achieve energy efficiency and security[100]. According to the IEA, energy efficiency is an essential component of energy transitions which provides some of the quickest and most cost-effective CO2 mitigation options while lowering energy bills and

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[91] World Resources Institute., '4 Ways to Shift from Fossil Fuels to Clean Energy.' Op Cit

[92] Muigua. K., 'Towards Energy Justice in Kenya.' Available at https://kmco.co.ke/wp-content/uploads/2020/02/Towards-Energy-Justice-in-Kenya-00000005.pdf (Accessed on 26/12/2023)

[93] International Energy Agency., 'Access to Electricity.' Available at https://www.iea.org/reports/sdg7-data-and-projections/access-to-electricity (Accessed on 26/12/2023)

[94] Ibid

[95] United Nations Conference on Trade and Development., 'Commodities at a Glance: Special Issue on Access to Energy in Sub-Saharan Africa.' Available at https://unctad.org/publication/commoditiesglance-special-issue-access-energy-sub-saharanafrica#:~:text=Access%20to%20energy%20is%20defined,be%20scaled%20up%20over%20time (Accessed on 26/11/2023)

[96] Muigua. K., 'Towards Energy Justice in Kenya.' Op Cit

[97] Ibid

[98] Ibid

[99] Muigua. K., 'Adopting Green Energy for a Bright Tomorrow.' Op Cit

[100] World Resources Institute., '4 Ways to Shift from Fossil Fuels to Clean Energy.' Op Cit

strengthening energy security[101]. The IEA further posits that energy efficiency is the single largest measure to avoid energy demand in the Net Zero Emissions by 2050 Scenario[102]. In addition, most efficiency measures result in cost savings to consumers, lowering energy bills and helping cushion the effects of unexpected price spikes, a situation that was witnessed after Russia's invasion of Ukraine[103]. Energy security on the other hand refers to the uninterrupted availability of energy sources at an affordable price[104]. Long-term energy security mainly deals with timely investments to supply energy in line with economic developments and environmental needs while short-term energy security focuses on the ability of the energy system to react promptly to sudden changes in the supply-demand balance[105]. Energy efficiency and energy security are vital components of global energy transition towards clean energy by ensuring the availability, affordability and security of energy sources[106]. In the absence of energy efficiency and security, the transition towards clean energy cannot be effectively realized a situation that could result in the continued use of fossil fuels[107]. It is therefore desirable for all countries to achieve energy efficiency and security in order to transition from fossil fuels to clean energy.

The foregoing among other measures are pertinent in transitioning from fossil fuels to clean energy.

5.0 Conclusion

The extraction and burning of fossil fuels has serious environmental consequences including climate change[108]. It has been observed that fossil fuels including coal, oil and natural gas are by far the largest contributors to global climate change, accounting for over 75 per cent of global greenhouse gas emissions and nearly 90 per cent of all carbon dioxide emissions[109]. It is therefore important to transition from fossil fuels to clean energy in order to confront climate change. There has been progress towards transitioning from fossil fuels to clean energy at the global, continental, regional and national levels through measures such as embracing renewable sources of energy.* These efforts received a major boost at COP 28 when countries committed to transition away from fossil fuels in energy systems, in a just, orderly and equitable manner and phase out inefficient fossil fuel subsidies that do not address energy poverty or just transitions, as soon as possible towards strengthening climate action[110]. However, the transition from fossil fuels to

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[101] International Energy Agency., 'Energy Efficiency.' Available at https://www.iea.org/energy-system/energy-efficiency-and-demand/energy-efficiency (Accessed on 26/12/2023)
[102] Ibid
[103] Ibid
[104] International Energy Agency., 'Energy Security.' Available at https://www.iea.org/topics/energy-security (Accessed on 26/11/2023)
[105] Ibid
[106] Ibid
[107] Ibid
[108] Yildiz. I., 'Fossil Fuels.' Op Cit
[109] United Nations., 'Causes and Effects of Climate Change.' Op Cit
[110] United Nations Climate Change., 'Decision -/CMA.5: Outcome of the First Global stocktake' Op Cit

clean energy is hindered by factors such as fossil fuel subsidies and inadequate resources and technology in developing countries[111]. In order to effectively transition from fossil fuels to clean energy there is need for all countries to eliminate fossil fuel subsidies[112]; scale up investments in clean energy including renewable sources of energy[113]; accelerate finance, technology development and transfer and capacity-building to developing countries[114]; improve access to electricity and clean cooking[115]; and foster energy efficiency and security[116]. Transitioning from fossil fuels to clean energy is an important agenda that needs to be fast-tracked for climate action and Sustainable Development.

[111] Muigua. K., 'Accelerating Energy Transition in Kenya.' Op Cit
[112] United Nations Environment Programme., 'Fossil Fuel Subsidy Reform.' Op Cit
[113] United Nations., 'What is Renewable Energy?.' Op Cit
[114] United Nations Climate Change., 'Decision -/CMA.5: Outcome of the First Global stocktake' Op Cit
[115] World Resources Institute., '4 Ways to Shift from Fossil Fuels to Clean Energy.' Op Cit
[116] [116] International Energy Agency., 'Energy Efficiency.' Op Cit

Chapter 5: Clean Energy for Sustainability in Africa: Removing Barriers and Harnessing Opportunities

Abstract

This paper critically examines how clean sources of energy can be harnessed in Africa for sustainability. The paper argues that transitioning to clean energy in Africa is a prerequisite for economic progress and environmental sustainability. It argues that Africa has immense potential to adopt clean sources of energy due to the abundance of renewables all over the continent. However, the paper also notes that Africa faces several barriers in adopting clean energy. The paper critically discusses the key challenges hindering the transition to clean energy in Africa. In light of these concerns, the paper examines how Africa can remove barriers and harness opportunities in order adopt clean energy for sustainability.

1.0 Introduction

Energy plays a crucial role in unlocking Sustainable Development. It has been described as a vital resource whose accessibility, reliability and affordability is necessary for human progress and Sustainable Development[1]. It has been argued that energy is crucial for achieving almost all of the Sustainable Development Goals (SDGs) from its role in eradicating poverty to advancements in health, education, water supply, industrialization and climate action among other key sectors[2]. Access to clean, modern, affordable, reliable and sustainable sources of energy is necessary for Sustainable Development by reducing greenhouse gas emissions, improving energy access and security, creating jobs, and stimulating socio-economic development across education, healthcare, transport and infrastructure, water and sanitation among other vital areas[3].

Access to clean, reliable and sustainable sources of energy has been identified as a pre-condition for socio-economic development due to its potential to spur economic development and poverty eradication[4]. On the other hand, lack of access to clean, reliable and sustainable energy contributes to poverty and deprivation and can contribute to economic decline[5]. It has been argued that no

[1] United Nations Environment Programme., 'Goal 7: Affordable and Clean Energy' Available at https://www.unep.org/topics/sustainable-development-goals/why-do-sustainable-development-goals-matter/goal-7 (Accessed on 25/08/2025)

[2] Energy and the Sustainable Development Goals., Available at https://energypedia.info/wiki/Energy_and_the_Sustainable_Development_Goals (Accessed on 25/08/2025)

[3] The role of renewable energy technologies in sustainable development., Available at https://timesofindia.indiatimes.com/blogs/voices/the-role-of-renewable-energy-technologies-in-sustainable-development/ (Accessed on 25/08/2025)

[4] United Nations Development Programme., 'Energy Access.' Available at https://www.undp.org/energy/our-work-areas/energy-access (Accessed on 25/08/2025)

[5] Bradbrook. A., 'Access to Energy Services in a Human Rights Framework.' Available at https://www.un.org/esa/sustdev/sdissues/energy/op/parliamentarian_forum/bradbrook_hr.pdf (Accessed on 25/08/2025)

country in the recent past has been able to spur economic development and substantially reduce poverty levels without ensuring access to energy[6].

Despite its role in ensuring Sustainable Development, the energy sector raises sustainability concerns. For example, it has been observed that the energy sector is by far the main contributor to the global threat of climate change and accounts for approximately 73 percent of human caused greenhouse gases[7]. For many decades, fossil fuels such as coal, oil and gas have been major sources of global energy supply[8]. However, burning fossil fuels produces large amounts of greenhouse gases which cause climate change and air pollution with harmful impacts on people and planet[9].

In light of the impacts of the energy sector on sustainability, there have been calls to accelerate energy transition. This ideal involves shifting the global energy sector from fossil fuel- based systems of energy production and consumption including oil, natural gas and coal to clean and renewable energy sources like wind, geothermal and solar energy[10]. Energy transition entails the shift from an energy mix based on fossil fuels to one that produces very limited, if not zero, carbon emissions, based on green and clean sources of energy such as renewable energy sources[11]. Energy transition has been described as a transformative shift in how energy is produced, distributed and consumed, aiming to move away from fossil fuels such as coal, oil and natural gas towards a system centred on renewable energy sources such as solar, wind, hydropower and geothermal[12]. It has been argued that the shift to clean and renewable sources of energy is critical to tackling the climate crisis, pollution and other environmental challenges since fossil fuels still account for more than 80 percent of global energy supply, releasing immense amounts of planet-warming gases, including carbon dioxide and methane, which have devastating impacts on people and planet[13]. Transition to clean sources of energy including renewables such as solar, wind, hydropower and geothermal is therefore key in ensuring sustainability.

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[6] Yoshida. T., & Zusman. E., 'Achieving the Multiple Benefits of a Sustainable Development Goal for Energy' Available at https://iges.or.jp/en/publication_documents/pub/bookchapter/en/4934/08_Ch8_Achieving_the_SDG (Accessed on 25/08/2025)

[7] United Nations., 'Affordable and Clean Energy' Available at https://www.un.org/sustainabledevelopment/energy/ (Accessed on 25/08/2025)

[8] Ibid

[9] Ibid

[10] S & P Global., 'What is Energy Transition?' Available at https://www.spglobal.com/en/researchinsights/articles/what-is-energy-transition (Accessed on 25/08/2025)

[11] The energy transition., Available at https://www.enelgreenpower.com/learning-hub/energy-transition (Accessed on 25/08/2025)

[12] United Nations Development Programme., 'What is the sustainable energy transition and why is it key to tackling climate change?' Available at https://climatepromise.undp.org/news-and-stories/what-sustainable-energy-transition-and-why-it-key-tackling-climate-change (Accessed on 25/08/2025)

[13] Ibid

This paper critically examines how clean sources of energy can be harnessed in Africa for sustainability. The paper argues that transitioning to clean energy in Africa is a prerequisite for economic progress and environmental sustainability. It argues that Africa has immense potential to adopt clean sources of energy due to the abundance of renewables all over the continent. However, the paper also notes that Africa faces several barriers in adopting clean energy. The paper critically discusses the key challenges hindering the transition to clean energy in Africa. In light of these concerns, the paper examines how Africa can remove barriers and harness opportunities in order adopt clean energy for sustainability.

2.0 The Need for Clean Energy in Africa

Access to clean, modern, reliable and sustainable sources of energy is a fundamental human right[14]. Energy is a basic human need that has been equated to food, air and water[15]. It has been argued that most human needs such as clean water, cooking and nourishment, adequate housing, modern healthcare, contemporary agriculture, communication, and transportation are all entirely dependent on access to affordable and reliable energy[16]. Consequently, it has been argued that energy is a human need and right in itself and a prerequisite for the realisation of other human needs and rights[17].

Despite being a fundamental human right, universal access to clean and sustainable energy is yet to be realised in Africa[18]. It is estimated that over 600 million Africans still lack reliable access to electricity, which is nearly half the continent's population and more than 80 per cent of the global electricity access gap[19]. Eastern and Southern Africa accounts for more than half of the world's unelectrified population and nearly a quarter of the global population without access to clean cooking facilities[20]. Africa has been described as the most energy-deficient continent in the world with universal access to electricity and clean cooking remaining an elusive goal for many countries in the continent[21].

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[14] Guruswamy. L, 'Energy Justice and Sustainable Development' *Colorado Journal of International Environmental Law & Policy*, Volume 21, No. 2

[15] Ibid

[16] Huhta. K., 'Conceptualising Energy Justice in the Context of Human Rights Law' Available at https://www.tandfonline.com/doi/full/10.1080/18918131.2023.2210443#abstract (Accessed on 25/08/2025)

[17] Ibid

[18] United Nations Sustainable Development Group., 'Decoding Africa's Energy Journey: Three Key Numbers' Available at https://unsdg.un.org/latest/stories/decoding-africa%E2%80%99s-energy-journey-three-key-numbers (Accessed on 25/08/2025)

[19] Ibid

[20] World Bank Group., 'Energy Access in Eastern and Southern Africa' Available at https://www.worldbank.org/en/region/afr/brief/afe-energy (Accessed on 25/08/2025)

[21] Center for Strategic & International Studies., 'Achieving Universal Energy Access in Africa amid Global Decarbonization' Available at https://www.csis.org/analysis/achieving-universal-energy-access-africa-amid-global-decarbonization (Accessed on 25/08/2025)

The energy sector in Africa is also fueling sustainability concerns. It has been observed that fossil fuels including coal, oil and natural gas still account for a significant share of the energy mix in Africa[22]. However, the extraction and burning of fossil fuels has serious environmental consequences including climate change and air pollution contributing to diseases and premature deaths[23]. When fossil fuels are burned, the stored carbon and other greenhouse gases are released into the atmosphere contributing to the climate crisis[24]. Further, it has been pointed out that most of the energy consumed in Sub-Saharan Africa is generated through inefficient combustion of solid biomass - mainly wood or charcoal - for cooking[25]. This is due to the fact that a majority of Africa's population relies on traditional biomass for preparing food[26]. Bio-energy sources such as charcoal, wood fuel and dung are the most common source of energy for cooking in Africa especially among the rural population[27]. The use of traditional fuels for cooking in Africa is fueling sustainability concerns including deforestation, destruction of habitats and biodiversity loss, and climate change[28]. The use of bio-energy sources for cooking is also linked to more than 500,000 annual deaths globally due to indoor pollution[29].

In light of these challenges, it is imperative to foster access to modern, affordable, reliable and sustainable energy in Africa by transitioning to clean energy. Africa has immense potential to adopt clean energy for sustainability. For example, Africa is rich in renewable energy sources with wind, solar, hydro, bioenergy, ocean tidal waves, geothermal among other renewables being abundant throughout the continent[30]. Africa experiences abundant sunlight and strong winds for most parts of the year creating suitable conditions for harnessing clean sources of energy

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[22] Mutezo. G., & Mulopo. J., 'A review of Africa's transition from fossil fuels to renewable energy using circular economy principles' *Renewable and Sustainable Energy Reviews*., Volume 137, March 2021

[23] Yildiz. I., 'Fossil Fuels.' *Comprehensive Energy Systems*., (2018), Volume 1., pp 521-567

[24] Environmental and Energy Study Institute., 'Fossil Fuels.' Available at https://www.eesi.org/topics/fossil-fuels/description (Accessed on 25/08/2025)

[25] Energy Access in Africa., Available at https://wwf.panda.org/discover/our_focus/climate_and_energy_practice/what_we_do/changing_energy_use/energy_access_africa/ (Accessed on 25/08/2025)

[26] United Nations., 'Advancing SDG 7 in Africa.' Available at https://sdgs.un.org/sites/default/files/2023-06/2023%20Advancing%20SDG7%20in%20the%20Africa-062923.pdf (Accessed on 25/08/2025)

[27] Muchiri. L., 'Gender and Equity in Bioenergy Access and Delivery in Kenya' Practical Action East Africa, 2008, available at https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=2ahUKEwiy2P29z6PnAhUEiFwKHQlyCLoQFjAAegQIBRAB&url=http%3A%2F%2Fwww.cas.ed.ac.uk%2F__data%2Fassets%2Fword_doc%2F0007%2F24793%2FGender_and_Equity_in_Bio_energy_Access_and_Delivery_in_Kenya_final.doc&usg=AOvVaw2AKp1mvTSC9tafkIKJ-36_ (Accessed on 25/08/2025)

[28] Energy Access in Africa., Op Cit

[29] United Nations., 'Advancing SDG 7 in Africa.' Op Cit

[30] African Union., 'Agenda 2063: The Africa we Want.' Available at Available at https://au.int/sites/default/files/documents/33126-doc-framework_document_book.pdf (Accessed on 25/08/2025)

including solar and wind energy[31]. In addition, Africa is also endowed with critical raw materials including cobalt, bauxite, chromium, copper, graphite, manganese, and rare earths[32]. These minerals are essential components in many of today's rapidly growing clean energy technologies, from wind turbines and solar panels to electric vehicles[33].

Africa therefore has immense potential and opportunities to transition to clean energy. However, it has been argued that despite Africa's enormous clean energy potential, especially in the renewable energy sector, only a fraction of this potential is being currently employed[34]. Inadequate investments in renewable energy, insufficient regulatory and policy environments and lack of adequate infrastructure and financing are some of the barriers undermining the quest towards clean energy in Africa[35]. In addition, unsustainable extraction of critical raw materials in Africa is fuelling sustainability concerns including human rights violations, environmental degradation and inequitable benefit-sharing undermining the quest towards clean energy in Africa[36].

Africa therefore has immense potential to adopt clean energy for sustainability. However, the continent also faces several barriers in adopting clean energy. It is therefore necessary to harness opportunities and remove barriers in order to foster universal access to clean energy in Africa towards sustainability.

3.0 Adopting Clean Energy for Sustainability in Africa

Clean energy is at the heart of sustainability both globally and in Africa. Clean energy also referred to as green, sustainable or renewable energy is energy that is derived from natural resources, such as sunlight, wind or water[37]. Clean energy is derived from renewable sources such as solar power, wind power, hydropower and geothermal energy[38]. Clean energy is sustainable since it emits little to no greenhouse gases and does not contribute to the pollution of

[31] AUDA-NEPAD., 'Empowering Africa: Enhancing Access To Electricity Through Renewable Energy' Available at https://www.nepad.org/blog/empowering-africa-enhancing-access-electricity-through-renewable-energy (Accessed on 25/08/2025)

[32] Mo Ibrahim Foundation., 'Africa's Critical Minerals: Africa at the Heart of a Low-Carbon Future' Available at https://mo.ibrahim.foundation/sites/default/files/2022-11/minerals-resource-governance.pdf (Accessed on 25/08/2025)

[33] United Nations Environment Programme., 'Critical Energy Transition Minerals' Available at https://www.unep.org/topics/energy/renewable-energy/critical-energy-transition-minerals (Accessed on 25/08/2025)

[34] African Development Bank Group., 'Light Up and Power Africa – A New Deal on Energy for Africa' Available at https://www.afdb.org/en/the-high-5/light-up-and-power-africa-%E2%80%93-a-new-deal-on-energy-for-africa (Accessed on 25/08/2025)

[35] Ibid

[36] Mo Ibrahim Foundation., 'Africa's Critical Minerals: Africa at the Heart of a Low-Carbon Future' Op Cit

[37] TWI Global., 'What is Green Energy? (Definition, Types and Examples).' Available at https://www.twi-global.com/technical-knowledge/faqs/what-is-green-energy (Accessed on 25/08/2025)

[38] Ibid

the environment[39]. Further, clean energy is renewable since it comes from the sources that are replenished continuously thus ensuring the security of energy supply[40]. Clean energy is therefore vital in ensuring sustainability since it has minimal impacts on the environment unlike fossil fuels which cause climate change and air pollution. Generating clean energy creates far lower emissions than traditional sources such as burning fossil fuels[41]. It has been argued that clean energy has the potential of replacing the negative effects of fossil fuels with more environmentally-friendly alternatives[42]. Since, it is derived from natural resources, clean energy is also often renewable and sustainable, meaning that it emits no or few greenhouse gases and is often readily available[43]. Transitioning from fossil fuels, which currently account for the lion's share of emissions, to clean sources such renewable energy is key to addressing the climate crisis, air pollution and fostering sustainability[44].

Africa has an immense clean energy potential. The continent has massive yet under-utilised potential for solar, wind, and geothermal energy[45]. For example, in the East African region, solar irradiation levels are high due to proximity to the equator, wind speeds are some of the strongest on the continent, hydropower resources are plentiful and the Great Rift Valley is a promising source for geothermal power[46]. It is therefore imperative to remove barriers and harness opportunities in order to adopt clean energy for sustainability in Africa.

Actualising the ideal of clean energy for sustainability in Africa involves harnessing the continent's immense renewable energy potential. Clean energy from renewable sources such as wind, solar, geothermal, and ocean and tidal waves is crucial in fostering effective climate action since its generation emits little to no greenhouse gases or pollutants into the air[47]. Clean energy sources are also available in abundance all over the continent and are cheaper and are a healthier option for people and planet[48]. It is therefore imperative to enhance investments in clean energy

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[39] Patil . P., Sarkar. D., & Sarkar. A., 'Clean energy production by microorganisms: A sustainable approach' Available at https://www.sciencedirect.com/science/article/abs/pii/B9780323899369000060 (Accessed on 25/08/2025)
[40] Ibid
[41] Mohtasham. J., 'Review Article: Renewable Energies' *Energy Procedia*, 74 (2015) 1289 – 1297
[42] TWI Global., 'What is Green Energy? (Definition, Types and Examples).' Op Cit
[43] Ibid
[44] Patil . P., Sarkar. D., & Sarkar. A., 'Clean energy production by microorganisms: A sustainable approach' Op Cit
[45] International Energy Agency., 'Clean Energy Transitions in the Greater Horn of Africa' Available at https://www.iea.org/reports/clean-energy-transitions-in-the-greater-horn-of-africa/executive-summary (Accessed on 25/08/2025)
[46] Gordon. E., 'The Politics of Renewable Energy in East Africa' Available at https://www.oxfordenergy.org/publications/politics-renewable-energy-east-africa/ (Accessed on 25/08/2025)
[47] AUDA-NEPAD., 'Empowering Africa: Enhancing Access To Electricity Through Renewable Energy' Op Cit
[48] United Nations., 'Climate Action.' Op Cit

sources such as solar, wind and geothermal energy in Africa[49]. Expanding infrastructure and upgrading technology to provide clean energy in all developing countries has been identified as a crucial goal that can both foster development and help strengthen environmental conservation by reducing reliance on polluting fossil fuels[50]. Enhancing investments in renewable sources of energy is key towards fostering access to clean and affordable energy which is a fundamental human right and a critical component of the Sustainable Development agenda[51]. For example, Sustainable Development Goal 7 under the 2030 Agenda for Sustainable Development seeks to ensure access to affordable, reliable, sustainable and modern energy for all by substantially increasing the share of renewable energy in the global energy mix [52]. Fostering investments in renewable energy is therefore key towards harnessing clean energy in Africa.

Creating conducive environments is also key in harnessing clean energy in Africa. For example, governments have a key role to play in fostering access to clean energy in Africa by ensuring access to funding and putting in place relevant and appropriate programs, policy measures and regulatory frameworks that support adequate investments and adoption of clean energy[53]. In addition, governments can foster access to clean energy by removing barriers which hinder its adoption. For example, it has been argued that transition to clean energy remains a challenge in countries where fossil fuel subsidies have still not been phased out[54]. Fossil fuel subsidies often crowd-out investment in clean energy, and encourage excessive energy consumption[55]. Governments therefore have a key role to play in eliminating fossil fuels in order to encourage the uptake of clean energy.

Fostering access to clean energy in Africa also involves harnessing the continent's critical raw materials in a sustainable manner[56]. Critical minerals including copper, lithium, nickel, cobalt, graphite and manganese are a vital component of clean energy technologies including solar

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[49] United Nations., 'Affordable and Clean Energy' Available at https://www.un.org/sustainabledevelopment/energy/ (Accessed on 25/08/2025)

[50] Ibid

[51] United Nations., 'Climate Action.' Available at https://www.un.org/en/climatechange/how-communities-are-embracing-renewable-energy (Accessed on 25/08/2025)

[52] United Nations General Assembly., 'Transforming Our World: the 2030 Agenda for Sustainable Development.' 21 October 2015, A/RES/70/1., Available at https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf (Accessed on 25/08/2025)

[53] Muigua. K., 'Access to Energy as a Constitutional Right in Kenya' Available at http://kmco.co.ke/wp-content/uploads/2018/08/Access-to-Energy-as-a-Constitutional-Right-in-Kenya-NOVEMBER-2013.pdf (Accessed on 25/08/2025)

[54] International Energy Agency., 'World Energy Outlook: 2023.' Available at https://iea.blob.core.windows.net/assets/42b23c45-78bc-4482-b0f9-eb826ae2da3d/WorldEnergyOutlook2023.pdf (Accessed on 25/08/2025)

[55] United Nations Environment Programme., 'Fossil Fuel Subsidy Reform.' Available at https://www.unep.org/explore-topics/green-economy/what-we-do/economic-and-fiscal-policy/fiscalpolicy/policy-analysis-3 (Accessed on 25/08/2025)

[56] Mo Ibrahim Foundation., 'Africa's Critical Minerals: Africa at the Heart of a Low-Carbon Future' Op Cit

panels, wind turbines, electric vehicles and electricity transmission networks[57]. Therefore, in order to fast-track the transition to clean energy, it is imperative to promote secure and resilient critical mineral supply chains including through prioritising human rights, environmental conservation and equitable benefit-sharing arrangements[58].

4.0 Conclusion

Clean energy is at the heart of sustainability in Africa. The continent has immense yet underutilized clean energy potential. It is therefore imperative to remove barriers and harness opportunities in order to adopt clean energy in Africa including through enhancing investments in renewable sources of energy, creating enabling policy and regulatory frameworks, phasing out fossil fuels subsidies and extracting critical raw materials in a sustainable manner[59]. Adopting clean energy in Africa is a vital agenda that can be achieved in the quest towards sustainability.

[57] United Nations Environment Programme., 'Critical Energy Transition Minerals' Op Cit

[58] International Energy Agency., 'Critical Minerals' Available at https://www.iea.org/topics/critical-minerals (Accessed on 25/08/2025)

[59] United Nations., 'Advancing SDG 7 in Africa.' Op Cit

PART II: POLICY, REGULATORY AND GOVERNANCE FRAMEWORKS FOR A JUST ENERGY TRANSITION

Abstract

This Part examines the role of law, policy and governance in advancing a just and equitable energy transition, with Kenya serving as a key reference point. It critically assesses the effectiveness of regulatory frameworks, institutional arrangements and policy instruments in delivering energy justice, inclusivity and climate-responsive governance. Emphasis is placed on translating policy commitments into tangible climate action while safeguarding social equity, accountability and the rule of law. The Part highlights the importance of coherent legal frameworks and appropriate dispute resolution in strengthening legitimacy and effectiveness in energy governance.

Chapter 6: Achieving Just Energy Transition: Examining the Efficacy of Kenya's Policy and Regulatory Approaches

Abstract

This paper discusses the progress made in achieving just energy transition by examining the policy and regulatory steps that Kenya has employed towards this. The author argues that while there is an urgent need to move towards cleaner energy sources in the country, the policy makers must also embrace the poor by putting in place measures that will ensure that they will not be left struggling with energy insecurity. The paper also makes a case for modernization of the use of biomass instead of getting rid of it completely as this may not be tenable due to other economic and social factors.

1.0 Introduction

One of the most important human endeavours that faces significant obstacles is producing the energy required for the world's expanding population, industrialization, and urbanization.[1] In underdeveloped nations, where there is currently insufficient and inadequate power supply, the issue is worse.[2] Unquestionably dependable economic boosters, fossil fuels (coal, natural gas, and oil) have detrimental effects on the environment and human health, including CO2 emissions and the degradation of natural resources.[3] A worldwide cry has been raised as a result for a sustainable energy system that is safe, sufficient, reasonably priced, and ecologically sound.[4]

Although one of the Sustainable Development Goals (SDG 7) is to achieve cheap and sustainable energy, the majority of developing economies continue to struggle with insufficient power supplies and a significant reliance on fossil fuels.[5] The foundations of this societal threat include fast population expansion, industrialization, modernization, among others.[6] These power sources

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[1] Ebhota, W.S., 2021. Leveraging on sustainable energy transition to change the energy narrative of the dark continent. *International Journal of Energy Economics and Policy*, *11*(3), pp.409-416.

[2] Ibid.; Ibrahim, H.A. *et al.* (2023) 'Sustainability of power generation for developing economies: A systematic review of power sources mix', *Energy Strategy Reviews*, 47, p. 101085. Available at: https://doi.org/10.1016/j.esr.2023.101085.

[3] Ibid.

[4] Ibid.

[5] Ibrahim, H.A. *et al.* (2023) 'Sustainability of power generation for developing economies: A systematic review of power sources mix', *Energy Strategy Reviews*, 47, p. 101085. Available at: https://doi.org/10.1016/j.esr.2023.101085.

[6] Ibrahim, H.A. *et al.* (2023) 'Sustainability of power generation for developing economies: A systematic review of power sources mix', *Energy Strategy Reviews*, 47, p. 101085. Available at: https://doi.org/10.1016/j.esr.2023.101085; Hafner, M., Tagliapietra, S. and de Strasser, L. (2018) 'The Challenge of Energy Access in Africa', in M. Hafner, S. Tagliapietra, and L. de Strasser (eds) *Energy in Africa: Challenges and Opportunities*. Cham: Springer International Publishing, pp. 1–21. Available at: https://doi.org/10.1007/978-3-319-92219-5_1; Ahuja, D. and Tatsutani, M. (2009) 'Sustainable energy for developing countries', *S.A.P.I.EN.S. Surveys and Perspectives Integrating Environment and Society* [Preprint], (2.1). Available at: https://journals.openedition.org/sapiens/823 (Accessed: 21 April 2024); *Improving energy access key to meeting development goals in Africa | UNCTAD* (2023). Available at:

are known to contribute significantly to environmental pollution, global warming, and health hazards, even if they seem far from being adequate.[7]

While the global population without access to electricity decreased from 1.14 billion in 2010 to 675 million in 2021, primarily due to Asia, where the deficit decreased from 516 million in 2010 to 69 million in 2021, Africa only saw a slight decrease in its unelectrified population, from 591 million to 586 million during the same period, likely due to its rapidly growing population.[8]

The transition in energy sources from fossil fuels to renewables is only one aspect of the change. It must also cover the social, economic, and environmental aspects of producing energy sustainably.[9] The global energy industry's shift from fossil fuel-based to zero-carbon energy is hence referred to as the "energy transition."[10] As the energy sector increasingly concentrates on the energy transition and the route to net zero, diversification into new markets and segments is also essential.[11] Many businesses understand the range of sectors in which their technology may be used.[12] Broadening the scope of oil and gas companies' primary fossil fuel business into new low-carbon energy markets and products is known as diversification in the context of the energy transition.[13]

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https://unctad.org/news/improving-energy-access-key-meeting-development-goals-africa (Accessed: 21 April 2024); Avtar, R. *et al.* (2019) 'Population–Urbanization–Energy Nexus: A Review', *Resources*, 8(3), p. 136. Available at: https://doi.org/10.3390/resources8030136; *Scaling Up Energy Access for Green, Resilient, and Inclusive Development in Western and Central Africa* (no date) *World Bank*. Available at: https://projects.worldbank.org/en/results/2023/11/17/scaling-up-energy-access-for-green-resilient-and-inclusive-development-in-western-and-central-africa (Accessed: 21 April 2024).

[7] Ibrahim, H.A. *et al.* (2023) 'Sustainability of power generation for developing economies: A systematic review of power sources mix', *Energy Strategy Reviews*, 47, p. 101085. Available at: https://doi.org/10.1016/j.esr.2023.101085; Dida, G.O. *et al.* (2022) 'Factors predisposing women and children to indoor air pollution in rural villages, Western Kenya', *Archives of Public Health*, 80, p. 46. Available at: https://doi.org/10.1186/s13690-022-00791-9; Shilenje, Z.W., Maloba, S. and Ongoma, V. (2022) 'A review on household air pollution and biomass use over Kenya', *Frontiers in Environmental Science*, 10. Available at: https://doi.org/10.3389/fenvs.2022.996038.

[8] *Sustainable Development Goal 7 (SDG7)* (no date) *Sustainable Energy for All | SEforALL*. Available at: https://www.seforall.org/our-work/sustainable-development-goal-7-sdg7 (Accessed: 20 April 2024).

[9] Ali, K. *et al.* (2023) 'Testing the role of digital financial inclusion in energy transition and diversification towards COP26 targets and sustainable development goals', *Gondwana Research*, 121, pp. 293–306. Available at: https://doi.org/10.1016/j.gr.2023.05.006.

[10] Ali, K. *et al.* (2023) 'Testing the role of digital financial inclusion in energy transition and diversification towards COP26 targets and sustainable development goals', *Gondwana Research*, 121, pp. 293–306. Available at: https://doi.org/10.1016/j.gr.2023.05.006.

[11] *World Energy Transitions Outlook 2023* (no date). Available at: https://www.irena.org/Digital-Report/World-Energy-Transitions-Outlook-2023 (Accessed: 21 April 2024).

[12] Ali, K. *et al.* (2023) 'Testing the role of digital financial inclusion in energy transition and diversification towards COP26 targets and sustainable development goals', *Gondwana Research*, 121, pp. 293–306. Available at: https://doi.org/10.1016/j.gr.2023.05.006.

[13] Ali, K. *et al.* (2023) 'Testing the role of digital financial inclusion in energy transition and diversification towards COP26 targets and sustainable development goals', *Gondwana Research*, 121, pp. 293–306. Available at: https://doi.org/10.1016/j.gr.2023.05.006.

Kenya and China signed a nuclear power cooperation agreement in 2015, allowing Kenya to receive technical assistance and expertise.[14] Kenya also signed cooperation agreements with Slovakia and Russia, as well as a collaboration arrangement with three South Korean nuclear power companies. Kenya and the US are both seeking a such cooperative pact.[15] All of this is in preparation for Kenya's goal of producing nuclear electricity by 2035. Kenya is collaborating with the International Atomic Energy Agency (IAEA) to increase its capabilities in order to achieve this.[16]

The majority of Kenya's energy needs, particularly those of rural households, are met by an excessive reliance on the ever-diminishing biomass energy resource, despite the country's resources also including petroleum, geothermal power, small hydropower, solar, wind, and biomass residue from the country's agricultural sector.[17] This high level of reliance is explained by the abundance of biomass found in forests, woods, and industrial and agricultural wastes. Sub-Saharan Africa's high reliance on biomass energy, however, is unlikely to change anytime soon due to the region's growing population, the scarcity of reasonably priced modern energy sources like electricity, kerosene, and LPG, and the growing trend towards bioeconomies as a means of addressing climate change in line with the objectives of the Paris Agreement.[18] In addition to being the primary fuel for cooking in most sub-Saharan homes, biomass is a vital source of energy for small- and medium-sized rural businesses and establishments, including bakeries, restaurants, hospitals, prisons, tea shops, tobacco curing, brick-making, and fish smoking.[19]

This paper critically appraises Kenya's journey towards achieving energy transition for sustainability. It discusses the current global status, challenges and prospects of Kenya in realising this dream into a reality for its people.

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[14] 75 (2022) *Kenya - Energy-Electrical Power Systems*. Available at: https://www.trade.gov/country-commercial-guides/kenya-energy-electrical-power-systems (Accessed: 21 April 2024).

[15] 75 (2022) *Kenya - Energy-Electrical Power Systems*. Available at: https://www.trade.gov/country-commercial-guides/kenya-energy-electrical-power-systems (Accessed: 21 April 2024).

[16] 75 (2022) *Kenya - Energy-Electrical Power Systems*. Available at: https://www.trade.gov/country-commercial-guides/kenya-energy-electrical-power-systems (Accessed: 21 April 2024).

[17] Kennedy S Muzee, "Low-carbon Africa: Kenya". *This report is one of six African country case studies commissioned by Christian Aid to support the report Low-Carbon Africa: Leapfrogging to a Green Future*. Available at: https://www.christianaid.org.uk/sites/default/files/2022-07/low-carbon-africa-kenya-november-2011.pdf (Accessed: 20 April 2024).

[18] *Kenya's charcoal bans have fuelled a smuggling problem | ISS Africa* (no date). Available at: https://issafrica.org/ (Accessed: 21 April 2024).

[19] Ibid.

2.0 Access to Energy and Sustainable Development

Increased energy consumption and CO2 emission restrictions are two of the world's main energy transitioning problems.[20] The energy sector plays a crucial role in accomplishing the Sustainable Development Goals and yet, among the infrastructure sectors, energy generation and distribution is also the largest emitter of greenhouse gas emissions, accounting for 37% of global emissions overall.[21] The Sustainable Development Goal 7 (SDG 7) aims to provide "affordable, reliable, sustainable, and modern energy for all" by 2030.[22] Its three main objectives are to guarantee that everyone has access to affordable, dependable, and modern energy services; significantly increase the proportion of renewable energy in the world's energy mix; and double the rate at which energy efficiency is improving globally.[23]

Similarly, SDG 12 requires countries to ensure sustainable consumption and production patterns. Target 12.c thereof requires countries to rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities.[24] Reconciling environmental deterioration with economic progress, and accomplishing more with less, is one of the world's biggest difficulties in integrating environmental sustainability with welfare and growth.[25] The shift to a greener and more socially inclusive global economy requires resource and impact decoupling in order to support sustainable patterns of production and consumption.[26]
The Sustainable Development Goal (SDG) number seven (SDG 7), which calls for universal access to affordable, modern, sustainable, and clean energy, is linked to a number of other objectives,

[20] Ali, K. *et al.* (2023) 'Testing the role of digital financial inclusion in energy transition and diversification towards COP26 targets and sustainable development goals', *Gondwana Research*, 121, pp. 293–306. Available at: https://doi.org/10.1016/j.gr.2023.05.006.
[21] Wernersson, L. *et al.* (2024) 'Mainstreaming systematic climate action in energy infrastructure to support the sustainable development goals', *npj Climate Action*, 3(1), pp. 1–12. Available at: https://doi.org/10.1038/s44168-024-00108-2.
[22] *Sustainable Development Goal 7 (SDG7)* (no date) *Sustainable Energy for All | SEforALL*. Available at: https://www.seforall.org/our-work/sustainable-development-goal-7-sdg7 (Accessed: 20 April 2024).
[23] *Sustainable Development Goal 7 (SDG7)* (no date) *Sustainable Energy for All | SEforALL*. Available at: https://www.seforall.org/our-work/sustainable-development-goal-7-sdg7 (Accessed: 20 April 2024).
[24] Ibid.; Martin (no date) 'Sustainable consumption and production', *United Nations Sustainable Development*. Available at: https://www.un.org/sustainabledevelopment/sustainable-consumption-production/ (Accessed: 21 April 2024).
[25] Environment, U.N. (2021) *GOAL 12: Sustainable consumption and production, UNEP - UN Environment Programme*. Available at: http://www.unep.org/explore-topics/sustainable-development-goals/why-do-sustainable-development-goals-matter/goal-12 (Accessed: 21 April 2024).
[26] Environment, U.N. (2021) *GOAL 12: Sustainable consumption and production, UNEP - UN Environment Programme*. Available at: http://www.unep.org/explore-topics/sustainable-development-goals/why-do-sustainable-development-goals-matter/goal-12 (Accessed: 21 April 2024).

including: ending world hunger, promoting economic growth and decent work; eliminating poverty; promoting health and well-being; providing clean water and sanitation; taking action against climate change; and encouraging responsible consumption and production.[27] Therefore, it may be argued that many of the SDGs' goals would be challenging to achieve for poor nations who are having trouble with access to energy.[28] A major component of the social, environmental, and developmental difficulties facing the globe today is the search for adequate energy to meet the growing demand.[29]

In order to achieve the goal of the SDGs and COP26 aims (direction towards energy transition and diversification) to obtain net zero emissions by 2050 and the (SDGs 7, 12, 11 and 13) by 2030, energy transition and diversification with policy frameworks are thus essential components.[30] Thus, in compliance with UN guidelines, contemporary energy systems should generate low to zero carbon dioxide emissions; balance capital-intensive investments for network expansions; influence local energy security and self-sufficiency; and promote social investment and inclusivity.[31]

3.0 Energy Transition: Examining Kenya's Policies and Energy Landscape

To build a more inclusive and clean energy economy, significant economic, political, and social connectivity across economies as well as an efficient domestic governance structure is essential.[32] In poor nations, an over dependence on biomass and other polluting fuels for cooking has added to the problem of global climate change.[33] One of the main issues with the energy access situation in underdeveloped nations has been the availability of clean cooking energy. Modern energy accessibility promotes clean energy development.[34]

According to the broad definition, a home is considered energy poor if it relies on traditional energy sources like biomass or cannot access contemporary energy sources like electricity and

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[27] Ebhota, W.S., 2021. Leveraging on sustainable energy transition to change the energy narrative of the dark continent. *International Journal of Energy Economics and Policy*, *11*(3), pp.409-416.
[28] Ibid., p.409.
[29] Ibid., p.409.
[30] Ali, K. *et al.* (2023) 'Testing the role of digital financial inclusion in energy transition and diversification towards COP26 targets and sustainable development goals', *Gondwana Research*, 121, pp. 293–306. Available at: https://doi.org/10.1016/j.gr.2023.05.006.
[31] Ibid., p.409.
[32] Acheampong, A.O., Opoku, E.E.O. and Dogah, K.E., 2023. The political economy of energy transition: the role of globalization and governance in the adoption of clean cooking fuels and technologies. *Technological Forecasting and Social Change*, *186*, p.122156.
[33] Acheampong, A.O., Opoku, E.E.O. and Dogah, K.E., 2023. The political economy of energy transition: the role of globalization and governance in the adoption of clean cooking fuels and technologies. *Technological Forecasting and Social Change*, *186*, p.122156; see also Namaswa, T. *et al.* (2022) 'Sustainable biomass energy production and utilization in sub-Saharan Africa: A case study of Kenya', *Journal of Horticulture and Forestry*, 14(4), pp. 56–67. Available at: https://doi.org/10.5897/JHF2022.0689.
[34] Ibid.

clean cooking fuels or technology for basic energy needs.[35] Indeed, research has shown that energy poverty is a precursor to other environmental and social issues, such as socioeconomic development and human health.[36] Kenya is one of the countries that have been suffering from this inadequate access to clean energy sources and over-reliance on biomass.[37] Biomass fuel sources include agricultural and industrial wastes, such as wood fuel (firewood and charcoal) and crop residues, as well as habitat systems such as enclosed forests, woods, bushlands, grasslands, farmlands, and plantations.[38] Charcoal is still a valuable resource, especially for people living in cities, nevertheless. On the other hand, increased rates of deforestation are associated with its expansion.[39] A little over 47% of Kenyan homes utilise charcoal as a fuel source; 82% of urban dwellings and 34% of rural homes do the same.[40] Currently Kenya is among the countries in the Sub-Saharan Africa (SSA) that are still in energy crisis and socio-economic deficit that cannot be disputed. Accessibility to modern and renewable energy for a long time has been considered to be a privileged in Kenya.[41] Despite Kenya's 75% power penetration rate, many individuals still find the cost of connection to be prohibitive.[42] Kerosene is now used by 92% of

[35] Ang'u, C. *et al.* (2023) 'Analysis of energy poverty in Kenya and its implications for human health', *Energy Policy*, 176, p. 113506. Available at: https://doi.org/10.1016/j.enpol.2023.113506.

[36] Ang'u, C. *et al.* (2023) 'Analysis of energy poverty in Kenya and its implications for human health', *Energy Policy*, 176, p. 113506. Available at: https://doi.org/10.1016/j.enpol.2023.113506.

[37] Ang'u, C. *et al.* (2023) 'Analysis of energy poverty in Kenya and its implications for human health', *Energy Policy*, 176, p. 113506. Available at: https://doi.org/10.1016/j.enpol.2023.113506.

[38] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

[39] *Charcoal value chains in Africa and their role for sustainable development* (2021) *SweDev*. Available at: https://www.swedev.dev/charcoal-value-chains-in-africa-and-their-role-for-sustainable-development/ (Accessed: 21 April 2024); Zorrilla-Miras, P. *et al.* (2018) 'Environmental Conservation and Social Benefits of Charcoal Production in Mozambique', *Ecological Economics*, 144, pp. 100–111. Available at: https://doi.org/10.1016/j.ecolecon.2017.07.028; Tassie, K. *et al.* (2021) 'Socioeconomic and Environmental Impacts of Charcoal Production Activities of Rural Households in Mecha District, Ethiopia', *Advances in Agriculture*, 2021, p. e6612720. Available at: https://doi.org/10.1155/2021/6612720; Igini, M. (2022) *Deforestation in Africa: Causes, Effects, and Solutions*, *Earth.Org*. Available at: https://earth.org/deforestation-in-africa/ (Accessed: 21 April 2024); Chidumayo, E. and Gumbo, D. (2013) 'The environmental impacts of charcoal production in tropical ecosystems of the world: A synthesis', *Energy for Sustainable Development*, 17, pp. 86–94. Available at: https://doi.org/10.1016/j.esd.2012.07.004; Wekesa, C. *et al.* (2023) 'Effects of charcoal ban on value chains and livelihoods in Kenyan coast – Stakeholders' perceptions', *Environmental Development*, 45, p. 100809. Available at: https://doi.org/10.1016/j.envdev.2023.100809.

[40] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

[41] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

[42] *Kenya's charcoal bans have fuelled a smuggling problem | ISS Africa* (no date). Available at: https://issafrica.org/ (Accessed: 21 April 2024).

all homes, of which 94% are in rural regions and 89% are in urban areas.[43] It is mostly used for lighting, and the majority of urban families use it to prepare food, which explains why urban use of kerosene is larger than that of rural households.[44]

Although 75% of Kenyans have access to electricity and the country is Africa's largest generator of geothermal energy, many still find the expense of access to be prohibitive.[45] Although the government has a plan to use subsidies and other measures to make liquefied petroleum gas the main fuel for cooking, the plan is not being implemented quickly enough.[46] Giving access to these substitutes priority would lessen reliance on charcoal.[47]

The primary obstacle to mitigating the uncontrolled utilisation of biomass has been the absence of efficacious policies and tactics to tackle the escalating difficulties in its cultivation and use. For example, Kenya passed Acts and policies such as the Energy Act 2019[48] that face a number of obstacles, such as stakeholders such as charcoal producer association organisations not cooperating with one another and a lack of persistent political will.[49] For instance, the government's 2018 ban on the production of charcoal is a poor policy strategy for ensuring sustainability because it encourages overexploitation in private companies, increases illegal tree harvesting and charcoal production, demoralizes the community from engaging in sustainable forest and tree management, and increases corruption as producers bribe law enforcement and the police.[50] The biomass energy industry has not received much investment due to inadequate legislation in Sub-Saharan Africa, as the majority of investments are in commercial energy sources, namely electricity and petroleum-based fuels.[51] Some authors have however observed that wood fuels have received little attention in global policy discussions on energy supply;

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[43] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

[44] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

[45] *Kenya's charcoal bans have fuelled a smuggling problem | ISS Africa* (no date). Available at: https://issafrica.org/ (Accessed: 21 April 2024).

[46] *Kenya's charcoal bans have fuelled a smuggling problem | ISS Africa* (no date). Available at: https://issafrica.org/ (Accessed: 21 April 2024).

[47] Ibid.

[48] Energy Act, No. 1 of 2019, Laws of Kenya.

[49] Namaswa, T. *et al.* (2022) 'Sustainable biomass energy production and utilization in sub-Saharan Africa: A case study of Kenya', *Journal of Horticulture and Forestry*, 14(4), pp. 56–67. Available at: https://doi.org/10.5897/JHF2022.0689.

[50] Ibid; see also *Kenya's charcoal bans have fuelled a smuggling problem | ISS Africa* (no date). Available at: https://issafrica.org/ (Accessed: 21 April 2024).

[51] Ibid.

instead, the emphasis has been on the need for the impoverished to have access to "modern" energy sources like kerosene, liquefied petroleum gas (LPG), and electricity.[52]

Kenya's commitment to reducing over-reliance on fossil fuels and non-sustainable biomass fuels may be met by implementing and promoting clean, efficient, and sustainable energy technology.[53] The country has selected major priority mitigation actions to achieve this goal. In order to achieve this, there has been a consistent shift towards clean cooking using liquefied petroleum gas (LPG), with a current penetration rate of around 19% (2.4 million) and a projected 100% changeover by 2028.[54] LPG costs have increased quickly in spite of government attempts to promote LPG use through tax incentives. With LPG at zero rating, costs were steady from 2016 to 2021 before sharply rising in July 2021 as a result of the reinstatement of VAT.[55] There was however a reversal of this in 2023 where there was removal of VAT on liquefied petroleum gas (LPG) – zero rated for VAT.[56] Thus, in reality, and with such uncertainties, most of the impoverished communities in Sub-Saharan Africa are unlikely to obtain their primary household energy needs from modern energy sources for several years to come.[57] This is because the number of rural poor populations that are unable to buy modern energy sources is growing, which causes the usage of biomass energy to rise.[58] Research and development of more advanced and effective technologies for producing and using biomass energy are required.[59] To ensure that the developed technologies are effective, inexpensive, straightforward, and easy to use, as well as to take into account user needs like cooking comfort, health concerns, and safety, this can be accomplished by strengthening research and development institutions and promoting multidisciplinary and multi-institutional research through bio-energy innovation platforms.[60] The Kenya Bioenergy Strategy 2020–2027 states that policies pertaining to biomass energy should be focused on

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[52] Namaswa, T. *et al.* (2022) 'Sustainable biomass energy production and utilization in sub-Saharan Africa: A case study of Kenya', *Journal of Horticulture and Forestry*, 14(4), pp. 56–67. Available at: https://doi.org/10.5897/JHF2022.0689.

[53] 'Promoting Clean Cooking in Kenya – KIPPRA' (no date). Available at: https://kippra.or.ke/promoting-clean-cooking-in-kenya/ (Accessed: 21 April 2024).

[54] Ibid.

[55] 'Promoting Clean Cooking in Kenya – KIPPRA' (no date). Available at: https://kippra.or.ke/promoting-clean-cooking-in-kenya/ (Accessed: 21 April 2024).

[56] *Key Highlights of the Finance Act 2023 - KRA* (no date). Available at: https://www.kra.go.ke/popular-links/key-highlights-of-the-finance-act-2023 (Accessed: 21 April 2024).

[57] Namaswa, T. *et al.* (2022) 'Sustainable biomass energy production and utilization in sub-Saharan Africa: A case study of Kenya', *Journal of Horticulture and Forestry*, 14(4), pp. 56–67. Available at: https://doi.org/10.5897/JHF2022.0689.

[58] Ibid; see also *Why Kenya cannot do away with charcoal* (no date). Available at: https://www.the-star.co.ke/sasa/lifestyle/2023-11-03-why-kenya-cannot-do-away-with-charcoal/ (Accessed: 21 April 2024).

[59] Ibid.

[60] Namaswa, T. *et al.* (2022) 'Sustainable biomass energy production and utilization in sub-Saharan Africa: A case study of Kenya', *Journal of Horticulture and Forestry*, 14(4), pp. 56–67. Available at: https://doi.org/10.5897/JHF2022.0689.

guaranteeing the sustainable, adequate, competitive, secure, and consistent supply of biomass energy to fulfil current demand while preserving and safeguarding the environment.[61]

Kenya's population is expanding, the economy is expanding, and energy demand is outpacing supply.[62] In an attempt to make Kenya's economy middle-income by 2030, the Kenyan Government's Vision 2030 programme has proposed aggressive goals for future economic growth.[63] The main issue the nation faces is its dependency on hydroelectric electricity and the lack of investment in power generation.[64] Companies in Kenya experience power interruptions, costing them an average of 6.3 million Kenyan shillings every month.[65]

In order to close the energy supply and demand imbalance, the Kenyan government launched an ambitious plan in 2013 to increase productive power output from 1664 MW to more than 5000 MW by the end of 2017.[66] The aim has not yet been fully attained. When completely implemented,

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[61] Ibid; see also now, business (2023) *Kenya fast tracking shift to clean energy*, *Business Now*. Available at: https://businessnow.co.ke/kenya-fast-tracking-shift-to-clean-energy/ (Accessed: 21 April 2024); *Fast and fair renewable energy for Africa: Lessons from Kenya* (no date) *Business & Human Rights Resource Centre*. Available at: https://www.business-humanrights.org/en/from-us/briefings/fast-and-fair-renewable-energy-for-africa-lessons-from-kenya/ (Accessed: 21 April 2024); User, S. (no date) *A Just Energy Transition for Africa*. Available at: https://www.acts-net.org/2018/index.php/blogs/foresight-africa-blog/a-just-energy-transition-for-africa (Accessed: 21 April 2024); *What does justice mean for the energy transition and how do we achieve it?* (2023). Available at: https://www.iied.org/what-does-justice-mean-for-energy-transition-how-do-we-achieve-it (Accessed: 21 April 2024).

[62] *Kenya Energy Outlook – Analysis* (no date) *IEA*. Available at: https://www.iea.org/articles/kenya-energy-outlook (Accessed: 21 April 2024); week, S. up to date on the editors' picks of the (2024) *Power demand could overtake generation by 2027*, *Business Daily*. Available at: https://www.businessdailyafrica.com/bd/economy/power-demand-could-overtake-generation-by-2027--4515164 (Accessed: 21 April 2024); Maket, I. (2021) 'Population dynamics and economic growth in Kenya', *Hungarian Statistical Review*, 4, pp. 18–33. Available at: https://doi.org/10.35618/hsr2021.02.en018; Baskaran, G. and Coste, S. (2024) 'Achieving Universal Energy Access in Africa amid Global Decarbonization'. Available at: https://www.csis.org/analysis/achieving-universal-energy-access-africa-amid-global-decarbonization (Accessed: 21 April 2024).

[63] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

[64] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015; *The Seven Major Threats to Kenya's Power Sector* (no date) *Energy for Growth Hub*. Available at: https://energyforgrowth.org/article/the-seven-major-threats-to-kenyas-power-sector/ (Accessed: 21 April 2024); Sai, R. and Lin, B. (2022) 'Productivity assessment of power generation in Kenya: What are the impacts?', *Energy*, 254, p. 124200. Available at: https://doi.org/10.1016/j.energy.2022.124200.

[65] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

[66] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

the percentage of power generated by renewable energy sources was predicted to drop from 66% in 2017 to less than 50%.[67] The remaining energy will be generated mostly by thermal, nuclear, and natural gas power plants.[68] Kenya's National Climate Action Strategy and its Plan of National Agreed Commitments (INDCs) were both in conflict with the programme. The program's objective was to enhance Kenya's power generation from wind, solar, and geothermal sources.[69]

Kenya Energy Transition & Investment Plan 2023-2050

Kenya's Ministry of Energy is in charge of developing and executing energy policies that regulate industry participants and guarantee efficiency and safety while conserving and using energy.[70] Kenya's Ministry of Energy and Petroleum launched the Kenya Energy Transition & Investment Plan 2023-2050 in 2023 whose main objectives are: to build an Energy Transition and Investment Plan (ETIP); help Kenya frame an energy transition agenda that will attract investment, while at the same time ensuring a just transition and fully supporting Kenya's rapid economic growth trajectory; and to help Kenya engage the global investment and climate finance community.[71]

The Kenya Energy Transition and Investment Plan outlines Kenya's commitment to combat climate change and achieve net-zero emissions by 2050.[72] With assistance from Sustainable Energy For All (SEforALL) and the UN, the Kenya Ministry of Energy and Petroleum developed the strategy, which intends to put Kenya in a position to attract investment, spur new business

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[67] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

[68] Ibid.; see also 75 (2022) *Kenya - Energy-Electrical Power Systems*. Available at: https://www.trade.gov/country-commercial-guides/kenya-energy-electrical-power-systems (Accessed: 21 April 2024); admin (2023) 'Kenya's Renewable Power Generation Hits 86pct Of Total Output', *Kenya Investment Authority (KenInvest)*, 11 January. Available at: https://www.invest.go.ke/2023/01/11/kenyas-renewable-power-generation-hits-86pct-total-output/ (Accessed: 21 April 2024); *Kenya - Electrical Power Systems | Privacy Shield* (no date). Available at: https://www.privacyshield.gov/ps/article?id=Kenya-electrical-power-systems (Accessed: 21 April 2024); Kihara, M. *et al.* (2024) 'Mid- to long-term capacity planning for a reliable power system in Kenya', *Energy Strategy Reviews*, 52, p. 101312. Available at: https://doi.org/10.1016/j.esr.2024.101312.

[69] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

[70] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

[71] Republic of Kenya, *Kenya Energy Transition & Investment Plan 2023 – 2050*, P. 1. Available at https://energy.go.ke/sites/default/files/KAWI/Kenya-ETIP-2050%202.pdf [Accessed on 19 April 2024]; See also *Sustainable Energy for All* (2024) *Sustainable Energy for All | SEforALL*. Available at: https://www.seforall.org/taxonomy/term/46 (Accessed: 21 April 2024).

[72] 'Kenya energy transition faces infrastructure, funding challenges' (no date) *Gas Outlook*. Available at: https://gasoutlook.com/analysis/kenya-energy-transition-faces-infrastructure-funding-challenges/ (Accessed: 20 April 2024).

ventures, and seize chances for green growth in the rapidly changing global environment.[73] The plan highlights the potential for investment opportunities and economic growth through the transition to clean energy.[74]

It identifies key technologies for decarbonization, such as renewable energy, green hydrogen, e-mobility, energy storage, and clean cooking.[75] The plan also emphasizes the importance of strong governance, supportive policies, and stakeholder collaboration.[76] It estimates that around $600 billion in capital investment is needed, with a focus on the power and transport sectors.[77] The plan envisions job creation, reduced fossil fuel consumption, and a transition to cleaner and more sustainable energy sources.[78]

Kenya intends to electrify its country in order to replace fossil fuels. According to the Plan, this will reduce overall CO2 emissions (a net zero scenario) and be powered by solar, wind, geothermal, and maybe nuclear energy in addition to energy storage and energy efficiency.[79]

4.0 Fast-tracking Just Energy Transition in Kenya for Sustainability

Reducing energy poverty and providing access to modern energy sources are top priorities for several governments throughout the globe.[80] The Sustainable Development Goals (SDGs) of the United Nations, among which Goal 7 is to "ensure access to affordable, reliable, sustainable and modern energy for all," are another important source of inspiration for them. In order to promote economic growth, enhance health, ensure food security, and strive towards the accomplishment

[73] Ibid.
[74] Ibid.
[75] Republic of Kenya, *Kenya Energy Transition & Investment Plan 2023 – 2050*, P. 1. Available at https://energy.go.ke/sites/default/files/KAWI/Kenya-ETIP-2050%202.pdf [Accessed on 19 April 2024].
[76] Republic of Kenya, *Kenya Energy Transition & Investment Plan 2023 – 2050*, P. 1. Available at https://energy.go.ke/sites/default/files/KAWI/Kenya-ETIP-2050%202.pdf [Accessed on 19 April 2024].
[77] Republic of Kenya, *Kenya Energy Transition & Investment Plan 2023 – 2050*, P. 1. Available at https://energy.go.ke/sites/default/files/KAWI/Kenya-ETIP-2050%202.pdf [Accessed on 19 April 2024].
[78] Republic of Kenya, *Kenya Energy Transition & Investment Plan 2023 – 2050*, P. 1. Available at https://energy.go.ke/sites/default/files/KAWI/Kenya-ETIP-2050%202.pdf [Accessed on 19 April 2024].
[79] 'Kenya energy transition faces infrastructure, funding challenges' (no date) *Gas Outlook*. Available at: https://gasoutlook.com/analysis/kenya-energy-transition-faces-infrastructure-funding-challenges/ (Accessed: 21 April 2024).
[80] Acheampong, A.O., Opoku, E.E.O. and Dogah, K.E., 2023. The political economy of energy transition: the role of globalization and governance in the adoption of clean cooking fuels and technologies. *Technological Forecasting and Social Change*, *186*, p.122156

of nearly all of the SDGs, access to modern energy is crucial.[81] Even though access to modern energy is crucial, many people in poor nations still view it as a privilege rather than a right.[82]

According to the national energy review, there is a significant reliance on biomass and wood as fuel, with wood accounting for 68% of total energy use (oil accounting for 22%, electricity for 9%, and others for 1%).[83] Considering the government's ambitious target of raising the number of power connections from 15% to at least 65% by 2022, Kenya's penetration of electricity remains low.[84]

Kenya is equipped with a 2.3 GW capacity. About 32% is thermal power, about 57% is hydropower, and the remainder is made up of geothermal and emergency thermal power.[85] The combined effect of wind and solar photovoltaic (PV) electricity is minimal, at most 1%.[86] Nevertheless, due to insufficient precipitation, the percentage of hydropower generated in the generating mix fluctuated from 38% to 76%.[87] To make up the difference, which varies from 16 to 33% of the mix, thermal energy sources are used. At the moment, Kenya is using 1429 MW of grid-connected energy. Fossil fuel and hydropower are the principal energy sources.[88]

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[81] Acheampong, A.O., Opoku, E.E.O. and Dogah, K.E., 2023. The political economy of energy transition: the role of globalization and governance in the adoption of clean cooking fuels and technologies. *Technological Forecasting and Social Change*, *186*, p.122156.

[82] Acheampong, A.O., Opoku, E.E.O. and Dogah, K.E., 2023. The political economy of energy transition: the role of globalization and governance in the adoption of clean cooking fuels and technologies. *Technological Forecasting and Social Change*, *186*, p.122156.

[83] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

[84] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

[85] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015; *Kenya steps up as global geothermal powerhouse | Reuters* (no date). Available at: https://www.reuters.com/markets/commodities/kenya-steps-up-global-geothermal-powerhouse-2023-10-05/ (Accessed: 21 April 2024); Gavin, J. (2022) *Kenya bets on renewables in hydro and geothermal push*, *African Business*. Available at: https://african.business/2022/07/energy-resources/kenya-seeks-to-maximise-benefits-from-baseload-renewables (Accessed: 21 April 2024).

[86] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015

[87] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

[88] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

By tackling climate change and environmental issues, renewable energy makes a beneficial contribution to society.[89] As an illustration, biodiesel has the ability to lower the quantity of greenhouse gases released into the environment.[90] This is as a result of greenhouse gas emissions being far lower than those of fossil fuels.[91] Additionally, the commercialization of some energy sources, like biodiesel, can help women become financially independent by releasing them from burdensome labour and economic obligations.[92] With technology for irrigation and water pumping, as well as for agricultural processing like milling and canning, energy can also significantly improve food security for the underprivileged.[93] There is a good chance that some of the low-income households' appropriate water pumping and irrigation technology will not only guarantee a year-round supply of food but will also generate additional income.[94]

Several factors have hindered the growth of renewable energy in the nation and the sub-Saharan region as a whole. These factors include high initial capital costs, a shortage of skilled labour, inadequate policy and legal frameworks, poor planning, a lack of coordination and linkages in renewable energy programmes, pricing distortions that disadvantage renewable energy, weak dissemination strategies, poor baseline information, and low maintenance capacity.[95] Policy and regulatory frameworks must seek to adequately address these challenges if renewable energy sector is to contribute more towards the transition to cleaner sources of energy for the Kenyan people. Research indicates that the adoption of clean fuels and cooking technologies is influenced

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[89] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

[90] Hanaki, K. and Portugal-Pereira, J. (2018) 'The Effect of Biofuel Production on Greenhouse Gas Emission Reductions', in K. Takeuchi et al. (eds) *Biofuels and Sustainability: Holistic Perspectives for Policy-making*. Tokyo: Springer Japan, pp. 53–71. Available at: https://doi.org/10.1007/978-4-431-54895-9_6; *Emissions from Biofuels - an overview | ScienceDirect Topics* (no date). Available at: https://www.sciencedirect.com/topics/engineering/emissions-from-biofuels (Accessed: 21 April 2024); Khanna, M., Crago, C.L. and Black, M. (2011) 'Can biofuels be a solution to climate change? The implications of land use change-related emissions for policy', *Interface Focus*, 1(2), pp. 233–247. Available at: https://doi.org/10.1098/rsfs.2010.0016.

[91] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

[92] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

[93] Kennedy S Muzee, "Low-carbon Africa: Kenya". *This report is one of six African country case studies commissioned by Christian Aid to support the report Low-Carbon Africa: Leapfrogging to a Green Future*. Available at: https://www.christianaid.org.uk/sites/default/files/2022-07/low-carbon-africa-kenya-november-2011.pdf (Accessed: 20 April 2024).

[94] Ibid.

[95] Kennedy S Muzee, "Low-carbon Africa: Kenya". *This report is one of six African country case studies commissioned by Christian Aid to support the report Low-Carbon Africa: Leapfrogging to a Green Future*. Available at: https://www.christianaid.org.uk/sites/default/files/2022-07/low-carbon-africa-kenya-november-2011.pdf (Accessed: 20 April 2024).

by globalization (economic, social, and political) and governance (efficiency of government, prevention of corruption, political stability, and rule of law).[96]

The inability to obtain advanced energy, the pressure on biomass supplies to increase, rising energy prices, the fact that the demand for electricity is greater than the capacity of new generation, and the dispersion of Kenya Power and Lighting Company (KPLC) make it difficult to connect all customers who would like to purchase a significant amount of rural electrification through grid development are some of the current challenges and weaknesses affecting Kenya's energy supply.[97] As the state and its allies recognise the need to protect and sustain the environment, they must work together to find solutions to these issues in order to ensure an adequate and affordable energy supply for economic development, which includes improving people's quality of life.[98]

Other factors that need to be taken into account include the costs of producing energy, capacity/availability issues, environmental effects, and choices made about the purchase of power.[99] The ability to create jobs for the expanding population and sustainability are two more important factors.[100] Given Kenya's abundance of geothermal resources, geothermal energy is anticipated to be the preferred source of contribution to the main load capacity. It is advantageous in terms of cost, high capacity/accessibility characteristics, and nearly zero emissions—primarily if traditional closed cycles are employed to re-inject water into the crust of the earth.[101]

In terms of hydroelectric resources, the competition for water supply from horticulture and other irrigation-dependent agricultural operations is growing exponentially, while population growth drives up the demand for water for residential and commercial applications.[102] Utilising river

[96] Acheampong, A.O., Opoku, E.E.O. and Dogah, K.E., 2023. The political economy of energy transition: the role of globalization and governance in the adoption of clean cooking fuels and technologies. *Technological Forecasting and Social Change*, *186*, p.122156.

[97] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015; Berg, L. (no date) *Powering Kenya's Progress: Support to GoK on the Energy Sector White Paper*, *Dalberg*. Available at: https://dalberg.com/our-ideas/powering-kenyas-progress-support-to-gok-on-the-energy-sector-white-paper/ (Accessed: 21 April 2024).

[98] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

[99] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

[100] Ibid.

[101] Ibid.

[102] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

flows as the main source of energy generation is risky since it essentially depends on unpredictable and often unexpected variations in the environment and weather.[103] For instance, it has been observed that the unchecked expansion of commercial and agricultural endeavours into the water catchment areas, such as the Cherangani Hills, Mount Kenya, Mount Elgon, and Mau Forest, seems to be increasing the susceptibility of hydropower development to the effects of drought and the unpredictable weather patterns common in Kenya and the Horn of Africa.[104] Therefore, it is necessary to protect the river water supplies, which includes keeping enough forests to safeguard runoff and installing soil erosion control technologies in catchment regions to lower the chance of dam siltation.[105]

In order to improve performance and lower indoor air pollution, additional funding must be allocated to the research and development of advanced biomass stoves.[106] Alternatively, by enacting strong anti-poor policies, it is crucial to increase accessibility to LPG as a substitute for biomass notwithstanding Kenya's significant lack of biomass.[107] Rather than imposing prohibitions, county governments should think about providing alternate means of subsistence to rural populations that produce charcoal.[108] Their reliance on charcoal as a source of revenue would decrease if agriculture-related activities were given more of a priority.[109]

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[103] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

[104] Kennedy S Muzee, "Low-carbon Africa: Kenya". *This report is one of six African country case studies commissioned by Christian Aid to support the report Low-Carbon Africa: Leapfrogging to a Green Future*. Available at: https://www.christianaid.org.uk/sites/default/files/2022-07/low-carbon-africa-kenya-november-2011.pdf (Accessed: 20 April 2024); Dept, I.M.F.A. (2024) 'Kenya: Staff Report for the 2023 Article IV Consultation, Sixth Reviews Under the Extended Fund Facility and Extended Credit Facility Arrangements, Requests for Augmentations of Access, Modification of Performance Criteria, Waiver of Nonobservance of Performance Criteria, Waiver of Applicability of Performance Criteria, and First Review Under the Resilience and Sustainability Facility Arrangement', *IMF Staff Country Reports*, 2024(013). Available at: https://doi.org/10.5089/9798400264177.002.A004.

[105] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

[106] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

[107] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

[108] *Kenya's charcoal bans have fuelled a smuggling problem | ISS Africa* (no date). Available at: https://issafrica.org/ (Accessed: 21 April 2024).

[109] Ibid; Owino, B., D.Asher and Mulwa, M. (2018) *Barriers to Uptake of Clean and Renewable Energy: Case of Bomet and Homa-Bay County*. Cuts Nairobi.

Environmental deterioration and climate change are significant worldwide issues that demand immediate attention from decision-makers, scholars, and other stakeholders.[110] Petroleum fuel remains the primary non-renewable source of energy use in Kenya. The usage of petroleum fuel raises greenhouse gas emissions, which contribute to climate change and global warming.[111] With the rate at which fossil fuels are being used up worldwide and the detrimental effects of greenhouse gas emissions, using sustainable and renewable energy sources is becoming more and more necessary.[112]

Kenya has used and continues to employ renewable energy, although very little of it is now used to generate electricity.[113] Kenya is endowed with the potential for renewable energy sources, such as geothermal, solar, biomass, wind, and hydropower, given its natural environment and geographical peculiarities.[114] To achieve sustainable development, all public sector players, non-governmental organisations, and citizens should make a concerted effort to support and encourage the use of renewable energy sources.[115] The encouragement of investments in renewable energy at the lowest level is not supported by a decentralised coordinating structure, which causes isolated initiatives in rural regions to lag behind.[116] The creation of this framework may serve as a significant platform for encouraging local communities to get involved in renewable energy technology initiatives including cogeneration, small hydro, and wind power

[110] Ali, K. *et al.* (2023) 'Testing the role of digital financial inclusion in energy transition and diversification towards COP26 targets and sustainable development goals', *Gondwana Research*, 121, pp. 293–306. Available at: https://doi.org/10.1016/j.gr.2023.05.006.

[111] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

[112] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

[113] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

[114] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015; See also Kennedy S Muzee, "Low-carbon Africa: Kenya". *This report is one of six African country case studies commissioned by Christian Aid to support the report Low-Carbon Africa: Leapfrogging to a Green Future*. Available at: https://www.christianaid.org.uk/sites/default/files/2022-07/low-carbon-africa-kenya-november-2011.pdf (Accessed: 20 April 2024).

[115] Takase, M., Kipkoech, R. and Essandoh, P.K. (2021) 'A comprehensive review of energy scenario and sustainable energy in Kenya', *Fuel Communications*, 7, p. 100015. Available at: https://doi.org/10.1016/j.jfueco.2021.100015.

[116] Kennedy S Muzee, "Low-carbon Africa: Kenya". *This report is one of six African country case studies commissioned by Christian Aid to support the report Low-Carbon Africa: Leapfrogging to a Green Future*. Available at: https://www.christianaid.org.uk/sites/default/files/2022-07/low-carbon-africa-kenya-november-2011.pdf (Accessed: 20 April 2024).

for water pumping.[117] There is need for more efforts coupled with real financial investment in initiatives as the Ministry of Energy and Petroleum's Strategy Paper dubbed "*Behaviour Change and Communication Strategy for Promoting Clean Cooking in Kenya 2022: Towards Ensuring Access to Affordable, Reliable, Sustainable and Modern Energy for All Kenyans*" which seeks to promote the following seven strategies: (1) Ideation, branding and rallying call[118], (2) Execution of an awareness and behaviour change strategy, (3) Focus on elements of behaviour change, (4) Media advocacy to enhance public awareness and understanding of clean cooking, (5) Partnerships and coalitions, (6) Special events to promote clean cooking, and (7) Engaging the private sector/ industry players in promoting clean cooking.[119] The Strategy Paper seeks to achieve this by focusing on the benefits of using improved cooking solutions, such as saving money and time, improving health, and positive environmental impacts especially targeting women living in rural, peri-urban, and informal settlements of Kenya as well as men, community networks, and private sector players, among others.[120] There is a need to actively employ these strategies especially in rural areas and urban areas as a way of changing the attitudes of people while also empowering them economically in order to promote a sustainable transition to cleaner energy sources in Kenya.

Kenya's green transformation programme can also be accelerated by innovative climate financing solutions that mobilise green investment, foster locally-led and domestically financed climate and economic resilience, and place the nation in a position to gain from sustainable economic growth.[121] The expansion of clean power capacity necessitates constant investment in order to scale up renewable energy in line with demand growth. The grid must be strengthened in tandem

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[117] Ibid.

[118] This is meant to coalesce all the relevant stakeholders around a common rallying call, "Upishi Bora, Afya Bora." (Republic of Kenya, 'Behaviour Change and Communication Strategy for Promoting Clean Cooking in Kenya 2022: Towards Ensuring Access to Affordable, Reliable, Sustainable and Modern Energy for All Kenyans' (Ministry of Energy, 2022). Available at: https://energy.go.ke/sites/default/files/KAWI/Other%20Downloads/BCC%20Strategy%20for%20Promoting%20Clean%20Cooking%20%20Kenya(1).pdf (Accessed: 21 April 2024), p. 21).

[119] Republic of Kenya, 'Behaviour Change and Communication Strategy for Promoting Clean Cooking in Kenya 2022: Towards Ensuring Access to Affordable, Reliable, Sustainable and Modern Energy for All Kenyans' (Ministry of Energy, 2022). Available at: https://energy.go.ke/sites/default/files/KAWI/Other%20Downloads/BCC%20Strategy%20for%20Promoting%20Clean%20Cooking%20%20Kenya(1).pdf (Accessed: 21 April 2024).

[120] Republic of Kenya, 'Behaviour Change and Communication Strategy for Promoting Clean Cooking in Kenya 2022: Towards Ensuring Access to Affordable, Reliable, Sustainable and Modern Energy for All Kenyans' (Ministry of Energy, 2022). Available at: https://repository.kippra.or.ke/handle/123456789/4722 (Accessed: 21 April 2024).

[121] 5iveafrica (2023) 'Kenya should stay the low carbon course for green economy growth', *FSD Africa*, 6 September. Available at: https://fsdafrica.org/news/kenya-should-stay-the-low-carbon-course-for-green-economy-growth/ (Accessed: 21 April 2024); *Climate Investment Funds Endorses Kenya's $70 million Plan for 100 percent Clean Energy | Climate Investment Funds* (no date). Available at: https://www.cif.org/news/climate-investment-funds-endorses-kenyas-70-million-plan-100-percent-clean-energy (Accessed: 21 April 2024).

with the growth of renewable energy sources to prevent transmission and distribution lines from filling up to capacity.[122]

It has been correctly asserted that the majority of barriers to the spread and uptake of sustainable energy technology originate at the government level.[123] These are matters of government intervention and policy. This means that when it comes to energy investment, development, and distribution, a nation's institutional structure and governance are crucial.[124] Some people argue that government participation is necessary due to the significant financial investment needed for energy infrastructure.[125] Governments in many developing (African) nations subsidize the cost of electricity so that it is affordable for everyone.[126] Since state-owned businesses make up a large portion of the energy industry in many of these nations, the efficiency of governance in general and government in particular are crucial to the smooth operation of these businesses.[127]

5.0 Conclusion

It has been noted correctly that the cost, dependability, and efficiency of renewable energy solutions are increasing daily. We must alter how we create and use energy because our present

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[122] *Kenya Power's Decarbonising the Energy Mix Initiative | NewClimate Institute* (no date). Available at: https://newclimate.org/resources/publications/kenya-powers-decarbonising-the-energy-mix-initiative (Accessed: 21 April 2024).

[123] Acheampong, A.O., Opoku, E.E.O. and Dogah, K.E. (2023) 'The political economy of energy transition: The role of globalization and governance in the adoption of clean cooking fuels and technologies', *Technological Forecasting and Social Change*, 186, p. 122156. Available at: https://doi.org/10.1016/j.techfore.2022.122156.

[124] Ibid.

[125] Ibid; *Chapter 4. Government's Role in the Electricity Sector* (no date). Available at: https://www.oas.org/dsd/publications/unit/oea79e/ch08.htm (Accessed: 21 April 2024); Hall, S., Foxon, T.J. and Bolton, R. (2016) 'Financing the civic energy sector: How financial institutions affect ownership models in Germany and the United Kingdom', *Energy Research & Social Science*, 12, pp. 5–15. Available at: https://doi.org/10.1016/j.erss.2015.11.004; SITNFlash (2012) 'Beyond the Debate: The role of government in renewable energy finance', *Science in the News*, 15 December. Available at: https://sitn.hms.harvard.edu/flash/2012/energy-finance/ (Accessed: 21 April 2024); *Public Sector Must Play Major Role in Catalyzing Private Climate Finance* (2022) *IMF*. Available at: https://www.imf.org/en/Blogs/Articles/2022/08/18/public-sector-must-play-major-role-in-catalyzing-private-climate-finance (Accessed: 21 April 2024); Bridge, G., Özkaynak, B. and Turhan, E. (2018) 'Energy infrastructure and the fate of the nation: Introduction to special issue', *Energy Research & Social Science*, 41, pp. 1–11. Available at: https://doi.org/10.1016/j.erss.2018.04.029; Song, Y., Shahzad, U. and Paramati, S.R. (2023) 'Impact of energy infrastructure investments on renewable electricity generation in major Asian developing economies', *Australian Economic Papers*, 62(1), pp. 1–23. Available at: https://doi.org/10.1111/1467-8454.12282; *Why Public Financing Needs to Be Centre Stage for Universal Energy Access* (2023). Available at: https://www.irena.org/News/expertinsights/2023/Sep/Why-Public-Financing-Needs-to-Be-Centre-Stage-for-Universal-Energy-Access (Accessed: 21 April 2024).

[126] Acheampong, A.O., Opoku, E.E.O. and Dogah, K.E. (2023) 'The political economy of energy transition: The role of globalization and governance in the adoption of clean cooking fuels and technologies', *Technological Forecasting and Social Change*, 186, p. 122156. Available at: https://doi.org/10.1016/j.techfore.2022.122156.

[127] Ibid.

reliance on fossil fuels is unsustainable and hazardous for the environment. To combat climate change, one of the greatest risks to human existence, it is imperative that these new energy alternatives be put into practice as soon as possible.[128]

The development of alternate energy sources to fossil fuels is now imperative, as energy is the driving force behind economic progress.[129] For the purpose of providing a sufficient, clean, and reasonably priced power supply, a change from the fossil fuel economy paradigm to a sustainable alternative energy idea has long been underway.[130] The success of this transition depends on a number of factors as discussed in this paper. There is a need to strike a balance between the competing factors of ensuring that both the poor communities' needs and interests as well as climate change mitigation are taken care of.[131] In order to expedite the advancement of sustainable energy solutions, it will be necessary to forge deeper political commitments, implement long-term energy planning strategies, and provide sufficient regulatory and scale incentives.[132] Controlling these intricate global energy dynamics is important and difficult for reducing energy poverty, ensuring energy security, and slowing down climate change.[133] Thus, managing this change together with contemporary power sector trends like decentralisation, digitalization, and decarbonisation is part of Sustainable Energy Transition (SET).[134]
Achieving just energy transition is possible. There must however be in place an efficacious policy and regulatory framework.

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[128] *Goal 7: Affordable and clean energy* (no date) *The Global Goals*. Available at: https://globalgoals.org/goals/7-affordable-and-clean-energy/ (Accessed: 20 April 2024); African Development Bank (2021), *Energy, Climate and Green Growth*, *African Development Bank Group*. African Development Bank Group. Available at: https://www.afdb.org/en/private-sector/what-we-invest/energy-climate-and-green-growth (Accessed: 21 April 2024).

[129] Ebhota, W.S., 2021. Leveraging on sustainable energy transition to change the energy narrative of the dark continent. *International Journal of Energy Economics and Policy*, *11*(3), pp.409-416.

[130] Ebhota, W.S., 2021. Leveraging on sustainable energy transition to change the energy narrative of the dark continent. *International Journal of Energy Economics and Policy*, *11*(3), pp.409-416.

[131] week, S. up to date on the editors' picks of the (2023) *People, planet and profit: Striking the right balance in energy transition*, *Business Daily*. Available at: https://www.businessdailyafrica.com/bd/opinion-analysis/columnists/people-planet-and-profit-striking-the-right-balance-in-energy-transition-4452854 (Accessed: 21 April 2024).

[132] *Report: Universal Access to Sustainable Energy Will Remain Elusive Without Addressing Inequalities* (no date) *World Bank*. Available at: https://www.worldbank.org/en/news/press-release/2021/06/07/report-universal-access-to-sustainable-energy-will-remain-elusive-without-addressing-inequalities (Accessed: 21 April 2024).

[133] Ebhota, W.S., 2021. Leveraging on sustainable energy transition to change the energy narrative of the dark continent. *International Journal of Energy Economics and Policy*, *11*(3), pp.409-416.

[134] Ebhota, W.S., 2021. Leveraging on sustainable energy transition to change the energy narrative of the dark continent. *International Journal of Energy Economics and Policy*, *11*(3), pp.409-416.

Chapter 7: Towards Energy Justice in Kenya

Abstract

Energy is increasingly being recognised as an essential human need. The importance of energy cannot be overemphasized. It is vital for economic development in any given country. This has seen massive investment being channelled in the energy sector across the globe and particularly in Kenya. However, despite the efforts made in the energy sector, injustices are still prevalent in areas such as access to energy, energy costs and energy governance. The paper discusses the concept of energy justice which is aimed at addressing such injustices. It begins by conceptualising energy justice and its components which are distributional justice, procedural justice and recognition justice. The paper then analyses the legal framework on energy in Kenya to determine whether it promotes energy justice in the country. The paper also discusses some of the energy justice concerns in Kenya and proposes reforms geared towards promoting energy justice in the country.

1.0 Introduction

Access to energy is a fundamental human need and the driving force of human development.[1] Energy is critical to economic development and poverty eradication.[2] Indeed there is growing evidence linking access to energy with the attainment of socio-economic rights such as the right to education, right to food and the right to health. [3] Reliable supply of electricity and adequate lighting can aid learners in their academic activities; further electricity can be utilised for farming activities such as irrigation. To this extent, it has been asserted that energy is "not just another commodity, but the precondition of all commodities, a basic factor equal with air and water.[4] Access to clean energy has been equated to a 'golden thread' which has the ability to stimulate development by connecting the Sustainable Development Goals and unlocking sustainable economic growth.[5] It has been pointed out that no country in the recent past has been able to substantially reduce poverty levels without an increase in energy services.[6]

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[1] Guruswamy. L, 'Energy Justice and Sustainable Development' Colorado Journal of International Environmental Law & Policy, Volume 21, No. 2

[2] Muigua. K., 'Access to Energy as a Constitutional Right in Kenya', available at http://kmco.co.ke/wp-content/uploads/2018/08/Access-to-Energy-as-a-Constitutional-Right-in-Kenya-NOVEMBER-2013.pdf (Accessed on 02/01/2020)

[3] The World Bank, 'Sustainable Development Goal on Energy (SDG7) and the World Bank Group, available at https://www.worldbank.org/en/topic/energy/brief/sustainable-development-goal-on-energy-sdg7-and-the-world-bank-group (Accessed on 03/01/2020)

[4] Goldthau. A & Sovacool. B., 'The Uniqueness of the Energy Security, Justice and Governance Problem' *Energy Policy*, 41 (2012) 232-240

[5] Ibid

[6] Yoshida. T., & Zusman. E., 'Achieving the Multiple Benefits of a Sustainable Development Goal for Energy' Available at https://iges.or.jp/en/publication_documents/pub/bookchapter/en/4934/08_Ch8_Achieving_the_SDGs_.pdf (Accessed on 18/12/2019)

The importance of energy has been given recognition at the global stage with sustainable development goal number 7 being geared towards ensuring access to affordable, reliable, sustainable and modern energy.[7] Energy is described as being central to every major opportunity and challenge that the world faces today as it connects with the other sustainable development goals.[8]

However, despite its importance, access to clean and affordable energy remains a challenge especially in Sub-Saharan Africa. Studies have shown that in these countries, nearly 83% of the population depends on traditional fuels while 74% lack access to electricity thus contributing to energy poverty.[9] Energy poverty in such countries is caused by a number of factors including low levels of electrification due to economic constraints and insufficient institutions.[10] In Kenya, despite attempts by the government to enhance electricity connectivity through measures such as subsidizing the costs, many households especially in rural areas cannot afford the initial connection charges thus have low access.[11] Further, the high costs of modern sources of energy such as Liquefied Petroleum Gas (LPG) also contribute to energy poverty.

2.0 Energy Justice

The inequalities witnessed in the energy sector has led to emergence of the concept of energy justice. Energy justice has been defined as a global energy system that fairly disseminates both the benefits and costs of energy services, and one that has representative and impartial energy decision-making.[12] It seeks to apply basic principles of justice and fairness to the inequalities witnessed in the availability, affordability, sustainability and due process in the energy sector.[13] Energy justice seeks to influence decision making in the energy sector by incorporating justice and ethical considerations in such decisions; for example, disconnecting electricity for citizens who fail to pay their bills on time could affect their day to day lives yet failing to do so could overburden other paying citizens.[14]

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[7] United Nations Development Programme, 'Sustainable Development Goals' available at https://www.undp.org/content/undp/en/home/sustainable-development-goals.html (Accessed on 23/01/20200

[8] United Nations Sustainable Development Goals, 'Goal No. 7: Ensure Access to Affordable, Reliable, Sustainable and Modern Energy' available at https://www.undp.org/content/undp/en/home/sustainable-development-goals.html (accessed on 23/01/2020

[9] Bildirici. M & Ozaksoy.F., 'Woody Biomass Energy Consumption and Economic Growth in Sub-Saharan Africa' *Procedia Economics and Finance* 38 (2016) 287 – 293

[10] Njiru. C.W & Letema. S.C., 'Energy Poverty and its Implication on Standard of Living in Kirinyaga, Kenya' *Journal of Energy*, 2018

[11] Ibid

[12] Benjamin K. Sovacool & Michael H.Dworkin, Global Energy Justice: Problems, Principles and Practices (Cambridge Univ. Press, 2014).

[13] Heffron. J.R.,& McCauley. D., 'The Concept of Energy Justice across the Disciplines' *Energy Policy* 105 (2017) 658-667

[14] Benjamin K. Sovacool & Michael H.Dworkin, Global Energy Justice: Problems, Principles and Practices, Op Cit

Energy justice thus poses a justice and ethical dilemma of allocating the benefits of scarce energy resources among citizens and between the present and future generations.[15] To this extent, energy justice forms a crucial component of the sustainable development agenda and the principles of intra and inter- generational equity. These principles as enunciated in the Rio Declaration on Environment and Development are aimed at achieving development that equitably meets developmental and environmental needs of both the present and future generations.[16] Through energy justice, affordability, sustainability and availability in the energy sector can be achieved thus promoting human and economic development.

There are three core tenets of energy justice; *distributional justice, recognition justice and procedural justice* (emphasis added). Distributional justice is aimed at establishing existing injustices in the energy sector and means of resolving them.[17] It assesses issues such as uneven distribution, production and consumption of energy. The location of energy production facilities such as wind power stations, dams and gas power stations could create inequalities in access to energy thus raising justice concerns. Recognition justice is aimed at determining the section of the population ignored or misrepresented in energy access in order to cure such ills.[18] Procedural justice is aimed at streamlining the decision making processes in the energy sector that engages all stakeholder to ensure inclusivity non-discrimination.[19] This can be achieved through measures such as public participation and Environmental Impact Assessment (EIA) in relation to energy projects. It has the ability to foster acceptance and ownership of such projects whilst promoting environmental conservation and sustainable development. The aim of energy justice is to apply these three tenets in the energy policy and systems so as to enhance availability, affordability, sustainability and due process in the energy sector.[20]

The concept of energy justice is paramount to Kenya which is at critical stage in defining its energy future.[21] The country faces a challenge to enable a 'just transition' to lower carbon economy that simultaneously delivers poverty reduction and climate change resilience.[22]

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[15] Sovacool. B.K., 'Energy Decisions Reframed as Justice and Ethical Concerns' *Energy Justice 1*, available at https://core.ac.uk/download/pdf/42579074.pdf (Accessed on 28/01/2020)

[16] The United Nations Conference on Environment and Development, 'Rio Declaration on Environment and Development' 1992, Principles 3 and 4

[17] Jenkins. K, et al, 'Energy Justice: A Conceptual Review' *Energy Research & Social Science* 11 (2016) 174-182

[18] Ibid

[19] Heffron. J.R.,& McCauley. D., 'The Concept of Energy Justice across the Disciplines' Op Cit

[20] Jenkins. K, et al, 'Energy Justice: A Conceptual Review' *Energy Research & Social Science* 11 (2016) 174-182, Op cit

[21] Newell. P., & Philips. J., 'Neoliberal Energy Transitions in the South: Kenyan Experience' *Geoforum*, 74 (2016) 39-48

[22] Ibid

3.0 Legal Framework on Energy Justice in Kenya

3.1 Constitution of Kenya, 2010

The Constitution enshrines economic and social rights including a right to the highest attainable standard of health, right to food, right to clean and safe water and right to education.[23] Access to energy is crucial for the realisation of most of these rights.[24] Furthermore, the Constitution recognises energy as part of natural resources.[25] Consequently, the state has an obligation to ensure sustainable exploitation, utilisation, management and conservation of the environment and natural resources including energy, and ensure the equitable sharing of the accruing benefits from such resources.[26] The Constitution further identifies sustainable development as one of the national values and principles that is to guide the development agenda in the country.[27] Sustainable exploitation and utilisation of energy as a natural resource will guarantee energy justice by achieving intra and inter-generational equity.

3.2 Energy Act, No. 1 of 2019

The Act mandates the government to facilitate the provision of affordable energy services to all persons in Kenya.[28] Part III of the Act establishes National Energy Entities which are the Energy and Petroleum Regulatory Authority, Energy and Petroleum Tribunal, Rural Electrification and Renewable Energy Corporation and Nuclear Power and Energy Agency. The Energy and Petroleum Regulatory Authority is mainly tasked with regulatory activities related to *inter alia* the generation, importation, exportation, distribution and supply of electric energy, petroleum and petroleum products, renewable energy and other forms of energy.[29] The Energy and Petroleum Tribunal is established for purposes of hearing and determining disputes and appeals relating to the energy and petroleum sector in accordance with the Act.[30] The Rural Electrification and Renewable Energy Corporation is tasked with overseeing the implementation of the rural electrification programme and promoting the use of renewable energy and technologies among other functions.[31] The Nuclear Power and Energy Agency is tasked with inter alia implementation of the nuclear energy programme and promoting the development of nuclear electricity generation in Kenya.[32]

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[23] Constitution of Kenya, 2010, Article 43, Government Printer, Nairobi
[24] Muigua. K., 'Access to Energy as a Constitutional Right in Kenya' Op Cit
[25] Constitution of Kenya, 2010, Article 260; 'natural resources' means the physical non-human factors and components, whether renewable or non-renewable, including *inter alia* rocks, minerals, fossil fuels and other sources of energy'
[26] Ibid, Article 69 (1) (a)
[27] Ibid, Article 10
[28] Energy Act, No.1 of 2019, S 7(1), Government Printer, Nairobi
[29] Ibid, S 10
[30] Ibid, S 25
[31] Ibid, S 44 (1)
[32] Ibid, S 56 (1)

Implementation of the Act is important in enhancing energy justice in Kenya. The National Energy Entities established under the Act have the ability to promote attainment of the right to energy in Kenya. Further, the Energy and Petroleum Tribunal can contribute to enhancing energy justice in Kenya through its decisions and pronouncements.

3.3 National Energy Policy, 2018[33]

The policy recognises energy as a critical component in the economy, standard of living and national security of a country.[34] It is geared towards achieving several objectives which include *inter alia* improving access to affordable, competitive and reliable energy services, promoting energy efficiency and conservation and promoting diversification of energy supply sources in Kenya to ensure security of supply.[35] It sets out several policies and strategies towards the use, development and conservation of energy sources in the country such as coal resources, renewable energy and electricity. The Policy also contains Energy efficiency and conservation measures aimed at reducing energy consumption without sacrificing productivity or increasing costs.[36]

It is an ambitious policy document that is central to the attainment of the national development blueprint, Kenya Vision 2030 and the Government's Big Four Agenda.[37] Effective implementation of the Policy may promote energy security and justice in the country.

4.0 Energy Justice Concerns in Kenya

4.1 Access to Energy

It has been reported that Kenya has witnessed one of the fastest growth in electrification within Sub-Saharan Africa with 75% of the population having access to electricity by the year 2018.[38] The National Electrification Strategy is geared towards achieving universal electricity access to all households and businesses by the year 2022. The country has also been hailed for making notable progress in deploying renewable sources of energy.[39] However, while the country has made great strides towards electrification, there exists a wide disparity in electrification between urban and rural areas with 84% of the population in rural areas not having electricity connection.[40] Further, it has been reported that a household in Nairobi is 36 times more likely to have electricity than a

[33] Ministry of Energy, National Energy Policy, 2018, Government Printer, Nairobi
[34] Ibid, S 1.1
[35] Ibid, S 1.2
[36] Ibid, S 5.0

[37] Government of Kenya, 'Towards 2030' available at https://vision2030.go.ke/towards-2030/ (Accessed on 28/01/2020)
[38] International Energy Agency, 'Africa Energy Outlook 2019' available at https://webstore.iea.org/download/direct/2892?fileName=Africa_Energy_Outlook_2019.pdf Accessed on (21/01/2020)
[39] Ibid
[40] Moner-Girona. M et al, 'Decentralized Rural Electrification in Kenya: Speeding Up Universal Energy Access' Energy for Sustainable Development, Volume 52, October 2019, P 128-146

household in Turkana or Tana River Counties.[41] Such disparity in access to energy creates energy justice concerns with the poor and rural areas being the most affected. With the essential importance of energy as human need, it is necessary to ensure equity and fairness in respect to energy access.

4.2 Energy Costs

Energy costs relate to the expenses of being connected and equipped with energy sources and the cost of the energy used. Energy affordability remains a challenge in most sub-Saharan African Countries due to the high cost of power relative to income.[42] Consequently, reports have shown that electricity prices in Kenya are higher than the global average at the rate of 0.224 U.S Dollar per kWh for households and 0.192 U.S Dollar for businesses against a global average of 0.15 U.S Dollar per kWh for households and 0.12 U.S Dollar for businesses.[43] Other sources of energy such as kerosene are affected by international prices thus unpredictable and unreliable especially among the poor.[44]

4.3 Disclosure and Public Participation in Energy Matters

The Constitution of Kenya 2010 guarantees the right of access to information.[45] However, some of the energy providers do not readily provide information on such matters as tariffs, pollution, real costs and other cost and affordability-related issues.[46] This hinders effective decision making for most people on the available sources of energy. Further, while undertaking energy projects, some of the stakeholders have violated the constitutional principle of public participation. Public participation has been defined as the process by which public concerns, needs and values are incorporated into governmental and corporate decision-making with the overall goal of better decisions that are supported by the public. [47] It is an important constitutional safeguard that ensures that the views of those who are likely to be affected by development projects are taken into account before such projects are implemented.[48] The importance of public participation was

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[41] World Health Organization, 'Opportunities for Transition to Clean Household Energy in Kenya: Application of the WHO Household Energy Assessment Rapid Tool (HEART)' available at https://apps.who.int/iris/bitstream/handle/10665/311281/9789241514989-eng.pdf (Accessed on 23/01/2020)

[42] International Energy Agency, 'Africa Energy Outlook 2019' (Op Cit)

[43] GlobalPetrolPrices.Com 'Kenya Electricity Prices' available at https://www.globalpetrolprices.com/Kenya/electricity_prices/ (Accessed on 23/01/2019)

[44] Morrissey.J., 'The Energy Challenge in Sub-Saharan Africa: A Guide for Advocates and Policy Makers' Oxfam, 2017, available at https://www.oxfamamerica.org/static/media/files/oxfam-RAEL-energySSA-pt2.pdf (Accessed on 28/01/2020)

[45] Constitution of Kenya, 2010, Article 35; See also the Access to Information Act, No. 31 of 2016

[46] Muigua. K., 'Access to Energy as a Constitutional Right in Kenya' Op Cit

[47] Muigua. K., Wamukoya. D., & Kariuki. F., 'Natural Resources and Environmental Justice in Kenya' Glenwood Publishers Limited (2015)

[48] For purposes of public participation, the court in *Mada Holdings Ltd t/a Fig Tree Camp v County Council of* Narok defined the public as 'the individual who has sufficient interest in the issue over which the public body is exercising discretion, or where the exercise of that discretion is likely to adversely affect the interests of the individual or even where it is shown that the individual has a legitimate expectation to be consulted

pronounced in the case of *Mui Coal Basin Local Community & 15 others v Permanent Secretary Ministry of Energy & 17 others*[49], where the Constitutional Court observed that:

'Public participation is a national value that is an expression of the sovereignty of the people as articulated under Article 1 of the Constitution. Article 10 makes public participation a national value as a form of expression of that sovereignty. Hence, public participation is an established right in Kenya; a justiciable one – indeed one of the corner stones of our new democracy. Our jurisprudence has firmly established that Courts will firmly strike down any laws or public acts or projects that do not meet the public participation threshold.'

The principle of public participation has also been upheld by the Supreme Court in *The Matter of the National Lands Commission* where it was observed that:

'The participation of the people is a constitutional safeguard, and a mechanism of accountability against State organs, the national and county governments, as well as commissions and independent offices. It is a device for promoting democracy, transparency, openness, integrity and effective service delivery.'[50]

Public participation in environmental governance is provided for under the Constitution which mandates the state to encourage public participation in the management, protection and conservation of the environment.[51] It is an essential principle in natural resources management.[52] Public participation in environmental governance is aimed at furthering environmental democracy which connotes the right of all whose daily lives are affected by the quality of the environment to participate in environmental decision-making.[53] Utilisation of the views of the

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before the discretionary power is exercised. Courts have also insisted on meaningful public participation. In *Robert N. Gakuru & Others v Governor Kiambu County & 3 others*, the court decided that 'public participation ought to be real and not illusory and ought not to be treated as a mere formality for the purposes of fulfilment of the Constitutional dictates.' The Public Participation, No. 2 Bill 2019 seeks to give effect to the constitutional principle of public participation. It defines public participation as the involvement and consultation of the public in the decision making processes of the relevant state organs and public offices. The bill sets out several guiding principles in conducting public participation including the need to provide timely access to relevant information. Further, it sets out several obligations in conducting public participation including establishing structures to facilitate effective participation and ensuring fair and equal access to the public participation processes for all persons. If enacted into law, the Act will enhance public participation in environmental decision making in Kenya.

[49] Constitutional Petition No. 305 of 2012 (2015) eKLR

[50] In the Matter of the National Land Commission, Supreme Court Advisory Reference No. 2 of 2014 (2015) eKLR

[51] Constitution of Kenya, 2010, Article 69 (1) (d)

[52] Muigua. K., Wamukoya. D & Kariuki. F., 'Natural Resources and Environmental Justice in Kenya' Op Cit

[53] Muigua. K & Musyimi. P.N, 'Enhancing Environmental Democracy in Kenya' available at http://kmco.co.ke/wp-content/uploads/2018/08/072_Envtal_Dem_Kenya.pdf (Accessed on 29/01/2020); See also Muigua. K., 'Realising Environmental Democracy in Kenya' available at http://kmco.co.ke/wp-content/uploads/2018/08/REALISING-ENVIRONMENTAL-DEMOCRACY-IN-KENYA-4th-May-2018-1-1.pdf (Accessed on 29/01/2020)

public in decision-making on environmental issues results in better implementation of the goals of environmental protection and sustainable development.[54] In the context of energy justice, public participation fosters procedural justice by engaging with all stakeholders and promoting inclusivity and non- discrimination.[55]

Further, with regard to environmental projects, the Environmental Management and Co-Ordination Act requires project proponents to undertake public participation in the process of preparing the Environmental Impact Assessment Study Report.[56] Lack of community engagement through public participation has often seen energy projects stall due to opposition by affected communities. This was vividly seen in the case of Kinangop Wind Park Limited which sought to erect a 60.8 Megawatt wind turbine farm to be in Kinangop, Nyandarua County. However, the project stalled due to community protests over lack of proper engagement, sensitization and compensation.[57]

In *Save Lamu & 5 others v National Environmental Management Authority (NEMA) & Another*, the National Environment Tribunal revoked an Environmental Impact Assessment License issued to Amu Power Company Limited to set up an intended 1050 MW coal fired power plant in Lamu for lack of effective public participation among other grounds. In its decision, the Tribunal noted that 'human beings are justifiably concerned about the environmental impacts of projects to their location and especially where those projects are novel in nature……..,being concerned about all these environmental effects of a project the people most affected by a project must therefore have a say on each and every aspect of the project and its impact.'[58]

Public participation is thus an essential principle in projects, including energy-related ones, which needs to be upheld in order to enhance energy justice.

[54] Ibid
[55] Jenkins. K, et al, 'Energy Justice: A Conceptual Review' *Energy Research & Social Science* 11 (2016) 174-182, Op Cit
[56] Environmental Management and Co-Ordination Act, No. 8 of 1999, S 59, Government Printer, Nairobi
[57] Business & Human Rights Resource Centre, 'Kinangop Wind Park's Suit Against Kenya Govt For Alleged Failure To Stop Local Community's Opposition To Project Dismissed' available at https://www.business-humanrights.org/en/kinangop-wind-parks-suit-against-kenya-govt-for-alleged-failure-to-stop-local-communitys-opposition-to-project-dismissed (Accessed on 29/01/2020)
[58] Save Lamu & 5 others v National Environmental Management Authority (NEMA) & another, Tribunal Appeal No. NET 196 of 2016, (2019) eKLR

5.0 Way Forward

5.1 Enhancing Access to Energy

Household energy needs entail two components: access to clean cooking facilities and access to electricity. While Kenya has made notable progress towards enhancing access to electricity through measures such as the rural electrification programme, progress remains slow in promoting clean cooking facilities. Bio-energy sources such as charcoal, woodfuel and dung remain the most common source of energy in Kenya especially among the rural population.[59] However use of these sources is associated with environmental challenges such as air and soil pollution and environmental degradation through deforestation. Further, it is estimated that almost 500, 000 premature deaths per year in Africa are related to household air pollution from the lack of access to clean cooking facilities, with women and children the worst affected.[60] There is thus an urgent need to enhance access to clean cooking facilities in Kenya. Liquefied Petroleum Gas (LPG) has been promoted as an alternative but its use is largely concentrated in urban areas due to its associated costs. Under the Energy Act, the government is mandated to facilitate provision of affordable energy services to all persons in Kenya.[61] Measures can be put in place to enhance access to clean energy sources such reducing the costs of LPG to promote its affordability. Further, costs related to electricity such as connection charges and billing costs should be made affordable for the benefit of all Kenyans especially those in rural areas.

5.2 Promoting Transparency and Accountability in Energy Governance

The country has in recent past witnesses several scandals in the energy sector that have threatened to derail progress towards energy efficiency and security in the country. Kenya Power, which owns and operates most of the electricity transmission and distribution system in the country, has been hit with fraud allegations through manipulation of power bills and electricity tokens that saw many Kenyans pay electricity bills up to five times than what they had consumed.[62] Further, the botched Mwananchi Gas Project by the Ministry of Petroleum that was aimed at providing LPG cylinders to Kenyans at subsidized costs saw taxpayers lose more than Kenya Shillings 870 million due to shortcomings in its implementations.[63] Effective

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[59] Muchiri. L., 'Gender and Equity in Bioenergy Access and Delivery in Kenya' Practical Action East Africa, 2008, available at https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=2ahUKEwiy2P29z6PnAhUEiFwKHQlyCLoQFjAAegQIBRAB&url=http%3A%2F%2Fwww.cas.ed.ac.uk%2F__data%2Fassets%2Fword_doc%2F0007%2F24793%2FGender_and_Equity_in_Bio_energy_Access_and_Delivery_in_Kenya_final.doc&usg=AOvVaw2AKp1mvTSC9tafkIKJ-36_ (Accessed on 23/01/2020)

[60] Ibid

[61] Energy Act, No. 1 of 2019, S 7 (1)

[62] Achuka. V., 'How Kenya Power Staff Stole Millions in Bills Scandal' Daily Nation, Tuesday, December 24, 2019

[63] Mutai. E, 'Taxpayers Lose Sh870 Million in Botched Cooking Gas Subsidy Plan' *Business Daily*, Monday, July 8, 2019

implementation of such a plan would have been crucial in enhancing access to clean cooking facilities in the country.

Such scandals have contributed to energy injustices in the country since they hinder the ability of citizens to access reliable and affordable energy services. There is need to strengthen accountability mechanisms in the energy sector and ensure that the perpetrators of such acts are held accountable for their misdeeds. Energy Service providers such as Kenya Power should also be transparent in their affairs and ensure that citizens are aware of their obligations and are billed according to the services they consume. The Energy Act mandates the Director of Public Prosecutions to appoint a public prosecutor for purposes of prosecuting offences under the Energy Act.[64] This is an important step in ensuring prosecution of perpetrators of energy injustices in the country with a view of promoting energy justice.

5.3 Facilitating Inclusivity and Public participation in the Energy Sector

The foregoing discussion has shown that stakeholder inclusivity through public participation is an important component of energy justice as it promotes procedural justice. Energy projects such oil extraction and coal mining have potential environmental and human effects since they can result in environmental degradation and displacement of citizens. Community consultation through meaningful public participation is important to ensure that there is public acceptance and cooperation with such projects.[65] This is in line with Principle 10 of the Rio Declaration, 1992 which acknowledges that environmental issues are best handled with the participation of all concerned citizens, at the relevant level.[66] Public participation has also been enshrined as one of the national values and principles under the Constitution.[67]

Through public participation, energy entities are able to put into consideration the views of those likely to be affected by energy projects in their implementation. The National Environment Management Authority (NEMA) should be satisfied that sufficient stakeholder engagement through public participation has been undertaken and reflected in the Environmental Impact Assessment (EIA) study reports before issuing an EIA Licence necessary for commencement of such projects.

5.4 Promoting Renewable Sources of Energy

The Energy Act defines renewable energy as 'non-fossil energy generated from natural non-depleting resources including but not limited to solar energy, wind energy, biomass energy, biological waste energy, hydro energy, geothermal energy and ocean and tidal energy.'[68] Renewable energy has been hailed for its advantages which include ensuring the security of

[64] Energy Act, No. 1 of 2019, S 220

[65] Muigua. K., 'Access to Energy as a Constitutional Right in Kenya' Op Cit

[66] The United Nations Conference on Environment and Development, 'Rio Declaration on Environment and Development' 1992

[67] Constitution of Kenya, 2010, Article 10 (2) (a)

[68] Energy Act, No. 1 of 2019, S 2

energy supply.[69] Energy security is an essential component of energy justice since it guarantees availability of energy necessary to fulfill basic human needs.[70] The Energy Act establishes the Rural Electrification and Renewable Energy Corporation whose functions include *inter alia* to develop, promote and manage in collaboration with other agencies, the use of renewable energy and technologies, including but not limited to biomass (biodiesel, bio-ethanol, charcoal, fuel-wood, biogas) municipal waste, solar, wind, tidal waves, small hydropower and co-generation but excluding geothermal.[71] The Corporation needs to further its efforts in promoting renewable sources of energy apart from biomass which still remains the most common source of energy in Kenya. This will be vital in promoting energy security which is an important element of energy justice.

6. Conclusion

The importance of energy as a human need necessary for fostering human development is not in doubt. However, inequalities are still witnessed in the energy sector globally and Kenya in particular in aspects such as energy access, energy costs and energy decision making. Energy Justice has emerged as a global concept aimed at dealing with such inequalities witnessed in the energy sector. It is aimed at promoting distributional, recognition and procedural justice in the energy sector by ensuring equality, fairness, transparency, accountability, participation and energy security. For Kenya to attain its development agenda, energy justice is of utmost importance due to the clear link between energy and development. Energy Justice as an ideal is attainable. There must however be a concerted effort by all stakeholders to move forward together towards energy justice in Kenya for sustainable development.

[69] Nizic. M.K., 'The Advantages and Disadvantages of Renewable Energy in the Tourist Destination' Conference Paper, available at https://www.researchgate.net/publication/320584990_The_Advantages_and_Disadvantages_of_Renewable_Energy_in_the_Tourist_Destination/link/59ef0c1c4585152de64db7cc/download (Accessed on 24/01/2020)

[70] Azzuni. A., and Breyer. C., 'Definitions and Dimensions of Energy Security: A Literature Review' available at https://onlinelibrary.wiley.com/doi/pdf/10.1002/wene.268 (Accessed on 24/01/2020)

[71] Energy Act, No. 1 of 2019, S 44 (1) (j)

Chapter 8: **Towards Equitable Energy Transition in Africa: Examining the Role of Appropriate Dispute Resolution**

Abstract

This paper critically discusses how Appropriate Dispute Resolution (ADR) can fast-track energy transition in Africa. The paper examines the need for energy transition in Africa. It argues that achieving energy transition in Africa is crucial in fostering Sustainable Development and the goals and aspirations of Agenda 2063. The paper notes that there has been progress towards promoting energy transition in the continent. However, it argues that the progress towards energy transition in Africa is being undermined by disputes in the energy sector including those involving renewable energy projects. The paper notes that such disputes are untenable since they impact the quest towards achieving energy transition in Africa. In light of this challenge, the paper discusses how Africa can harness ADR towards equitable energy transition for Sustainable Development.

1.0 Introduction

Energy is a vital resource in unlocking Sustainable Development. It has been identified as a key enabler for development[1]. It has been correctly noted that energy is crucial for achieving almost all of the Sustainable Development Goals (SDGs) from its role in eradicating poverty to advancements in health, education, water supply, industrialization and climate action[2]. Access to clean and sustainable sources of energy is necessary for Sustainable Development by reducing greenhouse gas emissions, improving energy access and security, creating jobs, and stimulating socio-economic development across education, healthcare, transport and infrastructure, water and sanitation among other vital areas[3].

Despite its immense potential in unlocking Sustainable Development, the global energy sector is dominated by fossil fuels including oil, gas, and coal which have devastating environmental and human health impacts[4]. For instance, fossil fuels are by far the largest contributor to global climate change, accounting for over 75 percent of global greenhouse gas emissions and nearly 90 percent of all carbon dioxide emissions[5]. In addition to fueling climate change, the burning of fossil fuels

[1] Energy and the Sustainable Development Goals., Available at https://energypedia.info/wiki/Energy_and_the_Sustainable_Development_Goals (Accessed on 27/04/2025)

[2] Ibid

[3] The role of renewable energy technologies in sustainable development., Available at https://timesofindia.indiatimes.com/blogs/voices/the-role-of-renewable-energy-technologies-in-sustainable-development/ (Accessed on 27/04/2025)

[4] United Nations Development Programme., 'Energy Transition' Available at https://www.undp.org/energy/our-work-areas/energy-transition#:~:text=Annual%20energy%2Drelated%20CO2%20emissions,90%25%20of%20the%20necessary%20reduction (Accessed on 27/04/2025)

[5] United Nations., 'Renewable Energy – Powering a Safer Future' Available at https://www.un.org/en/climatechange/raising-ambition/renewable-energy (Accessed on 27/04/2025)

also contributes to air pollution with devastating impacts on human health and the environment[6]. According to the United Nations, fossil fuels are a source of air pollutants that are harmful to human health[7]. For example, air pollutants from coal-fired power plants and diesel-fuelled vehicles can lead to respiratory and cardiovascular diseases, lung cancer, diabetes, neurological disorders, and adverse pregnancy outcomes[8]. Further, fossil fuels are non-renewable and can be depleted and thus placing too much reliance on them can affect global energy supply and security[9].

Due to their adverse environmental and human health impacts, it has become imperative for the global community to phase out fossil fuels by embracing energy transition. The ideal of energy transition involves shifting the global energy sector from fossil fuel- based systems of energy production and consumption including oil, natural gas and coal to renewable energy sources like wind and solar[10]. It entails the shift from an energy mix based on fossil fuels to one that produces very limited, if not zero, carbon emissions, based on green and clean sources of energy such as renewable energy sources[11]. The global quest for energy transition is envisioned under the United Nations *2030 agenda for Sustainable Development*[12]. SDG 7 seeks to ensure access to affordable, reliable, sustainable and modern energy for all including through substantially increasing the share of renewable energy in the global energy mix[13]. It has been correctly noted that achieving energy transition presents a unique opportunity to address key global challenges including climate change, energy access disparities, poverty, inequality, and health impacts of the energy sector therefore laying the foundation for a sustainable, inclusive and more resilient future[14].

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[6] Solomon. B., & Krishna. K., 'The Coming Sustainable Energy Transition: History, Strategies, and Outlook.' *Energy Policy* 39 (2011) 7422-7431

[7] United Nations., 'Taking action for the health of people and the planet' Available at https://www.un.org/en/climatechange/science/climate-issues/health (Accessed on 27/04/2025)

[8] Ibid

[9] Solomon. B., & Krishna. K., 'The Coming Sustainable Energy Transition: History, Strategies, and Outlook.' Op Cit

[10] S & P Global., 'What is Energy Transition?' Available at https://www.spglobal.com/en/researchinsights/articles/what-is-energy-transition (Accessed on 27/04/2025)

[11] The energy transition., Available at https://www.enelgreenpower.com/learning-hub/energy-transition (Accessed on 27/04/2025)

[12] United Nations General Assembly., 'Transforming Our World: the 2030 Agenda for Sustainable Development.' 21 October 2015, A/RES/70/1., Available at https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf (Accessed on 27/04/2025)

[13] Ibid

[14] United Nations Development Programme., 'What is the sustainable energy transition and why is it key to tackling climate change?' Available at https://climatepromise.undp.org/news-and-stories/what-sustainable-energy-transition-and-why-it-key-tackling-climate-change (Accessed on 27/04/2025)

The global quest towards achieving energy transition is being undermined by a high incidence of disputes especially those concerning renewable energy projects[15]. It has been correctly noted that energy disputes are undesirable since they can adversely impact the viability and success of energy projects therefore undermining energy transition[16]. Effective management of energy disputes is thus necessary to achieve energy transition for Sustainable Development.

This paper critically discusses how Appropriate Dispute Resolution (ADR) can fast-track energy transition in Africa. The paper examines the need for energy transition in Africa. It argues that achieving energy transition in Africa is crucial in fostering Sustainable Development and the goals and aspirations of Agenda 2063. The paper notes that there has been progress towards promoting energy transition in the continent. However, it argues that the progress towards energy transition in Africa is being undermined by disputes in the energy sector including those involving renewable energy projects. The paper notes that such disputes are untenable since they impact the quest towards achieving energy transition in Africa. In light of this challenge, the paper discusses how Africa can harness ADR towards equitable energy transition for Sustainable Development.

2.0 The Need for Energy Transition in Africa

Energy transition is crucial goal for Africa. It is estimated that nearly 600 million Africans still lack reliable access to electricity, which is approximately half the continent's population and more than 80 per cent of the global electricity access gap[17]. Millions of people in Africa therefore lack access to energy[18]. It has been observed that Eastern and Southern Africa accounts for more than half of the world's unelectrified population and nearly a quarter of the global population without

[15] Burges-Salmon., 'Energy Disputes Guide: Managing Risk and Avoiding Disputes in your Energy Project.' Available at https://www.burges-salmon.com/energy-disputes-guide-managing-risk-and-avoiding-disputes-in-your-energy-project (Accessed on 27/04/2025)

[16] Ibid

[17] United Nations Sustainable Development Group., 'Decoding Africa's Energy Journey: Three Key Numbers' Available at https://unsdg.un.org/latest/stories/decoding-africa%E2%80%99s-energy-journey-three-key-numbers?afd_azwaf_tok=eyJhbGciOiJSUzI1NiJ9.eyJhdWQiOiJ1bnNkZy51bi5vcmciLCJleHAiOjE3NDU3NTk5NzEsImlhdCI6MTc0NTc1OTk2MSwiaXNzIjoidGllcjEtNjk3ZDg1Nzc1Zi1oc3B4NCIsInN1YiI6IjEwNS4xNjMuMTU4Ljk2IiwiZGF0YSI6eyJ0eXBlIjoiaXNzdWVkIiwicmVmIjoiMjAyNTA0MjdUMTMxOTIxWi0xNjk3ZDg1Nzc1ZmhzcHg0aEMxSk5CeTNxODAwMDAwMDBjZDAwMDAwMDAwMDBocGgiLCJiIjoicXhJWkJ6a0MwUldpZ1IyQTdseF9xNWY2a3cxQ0MtTG5YMk9vTkd4eENVdyIsImgiOiJHYlg3MmpFdC1DXy1RWGFXWkVuMTFsLXBIcU13TGVIN2hvMS1ubEZsS09nIn19.FtjIDbHiyHZiZVFng_8mAa2cvJU2I80YZqxAjUANaZHf8FdGmJPnymZiJwtnAqrqoqpmp_uIgVypVhZZYkDrOz_J7VP-jTLKn5mGe46uNNqlORVJtGKz5EbkMTzt6jKCj8ov2UDhTKll7PGNuvFvoOtO202h2PFUmKcM4YSu34k5d_WkLS46XpvxYnY7nXJDQvUCLVcDaL4gzsboR_t01uWuiheHiwhNVpz582Ag3J26ydk30vlBYzhFrgLYWEOkKw-I2p4XNtQRZISKinS5Zg0Sw2VmZ81xov2q6c9eAsnxbUqaKnQT6_PLXyV9fP_0HmbN_3gvc5rr7ipHdxduPQ.WF3obl2IDtqgvMFRqVdYkD5s (Accessed on 27/04/2025)

[18] World Bank Group., 'Energy Access in Eastern and Southern Africa' Available at https://www.worldbank.org/en/region/afr/brief/afe-energy (Accessed on 27/04/2025)

access to clean sources of cooking[19]. According to the International Energy Agency (IEA), enhancing access to energy is a crucial goal for Africa, where nearly 600 million people live without electricity and roughly 1 billion people lack access to clean cooking sources[20]. It has been argued that accelerating energy access in Africa is essential not only in unlocking development in the continent but also to help the world achieve SDG7 (and other SDGs) and address global challenges including climate change[21].

Challenges in energy access are fueling the demand for energy transition in Africa. It has been argued that Africa is rich in energy resources, but very poor in energy supply especially the Sub-Saharan region[22]. Making reliable and affordable energy widely available in Africa is therefore critical for the development of the region[23]. Africa has immense potential for renewable energy with wind, solar, hydro, bioenergy, ocean tidal waves, geothermal among other renewables being abundant throughout the continent[24]. Africa is rich in renewable energy resources, including abundant sunlight, strong winds, and geothermal energy[25]. However, the continent faces several challenges hindering the widespread adoption of clean energy sources including infrastructure gaps, high initial costs, technological challenges, and legal, policy, and institutional barriers[26].

It has been argued that in order to address energy access and climate change concerns in Africa, energy transition is an essential and transformative process aimed at reducing the continent's carbon footprint and fostering socio-economic development[27]. Africa is poised to continue playing a significant role in the global energy transition while addressing its own Sustainable Development needs[28]. African Union's *Agenda 2063*[29] sets out the need for energy transition in Africa. Agenda 2063 portrays the vision of a Continent where renewable energy including wind,

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[19] Ibid

[20] International Energy Agency., 'World Energy Investments 2024: Africa' Available at https://www.iea.org/reports/world-energy-investment-2024/africa (Accessed on 27/04/2025)

[21] World Bank Group., 'Energy Access in Eastern and Southern Africa' Op Cit

[22] Africa Energy Outlook., Available at https://comssa.org/en/site-resources/africa-energy-outlook (Accessed on 27/04/2025)

[23] Ibid

[24] Africa Union., 'Agenda 2063: The Africa we Want.' Available at Available at https://au.int/sites/default/files/documents/33126-doc-framework_document_book.pdf (Accessed on 27/04/2025)

[25] AUDA-NEPAD., 'Empowering Africa: Enhancing Access To Electricity Through Renewable Energy' Available at https://www.nepad.org/blog/empowering-africa-enhancing-access-electricity-through-renewable-energy (Accessed on 27/04/2025)

[26] Ibid

[27] Boucetta. M., 'Towards a Just Energy Transition for Africa' Available at https://www.policycenter.ma/publications/towards-just-energy-transition-africa#:~:text=To%20address%20climate%20change%2C%20the,demand%20by%20altering%20consumption%20patterns. (Accessed on 27/04/2025)

[28] Ibid

[29] Africa Union., 'Agenda 2063: The Africa we Want.' Op Cit

solar, hydro, bioenergy, ocean tidal waves, geothermal and other renewables claim more than half of the energy consumption for households, businesses and organizations[30].

In order to realise the ideal of energy transition in Africa, there has been an increase in investments and adoption of renewable energy. It has been observed that the production of renewable energy is growing in Africa with hydro, solar, wind, biofuels and biomass accounting for a significant percentage of the total primary energy produced on the continent[31]. According to the United Nations, renewable energy investments are beginning to bear fruit in several African countries with wind and solar power dominating non-hydro renewable energy generation and installed capacity[32]. Despite, this promise, it has been observed that financing needs for energy access initiatives in Africa fall well short of the annual $25 billion that is required to achieve the objectives of the 2030 Agenda on Sustainable Development on full access to affordable, reliable, sustainable and modern energy for all[33]. Scaling up investments in renewable energy is therefore vital towards achieving energy transition in Africa.

With the world shifting towards a more sustainable future through energy transition, Africa has the capacity to emerge as a key player in the global renewable energy mix[34]. The continent can leverage on its vast renewable energy potential to diversify its energy mix, reduce reliance on fossil fuels, promote energy justice and combat climate change. Renewable energy projects are therefore expected to continue increasing all over Africa in order to achieve energy transition.

Despite the potential of renewable energy to drive energy transition in Africa, disputes in the sector are a common phenomenon. Disputes in the energy sector generally include joint venture/contractual disputes, claims arising from weather conditions in renewable energy projects, construction related disputes, technology related disputes, investor/state disputes, geopolitical disputes and regulatory disputes[35]. It has been pointed out that renewable energy sources have resulted in an increase in energy projects in Africa and, with that, the potential for

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[30] Ibid

[31] United Nations Conference on Trade and Development., 'Commodities at a Glance: Special Issue on Access to Energy in Sub-Saharan Africa.' Available at Available at https://unctad.org/publication/commodities-glance-special-issue-access-energy-sub-saharan-africa#:~:text=Access%20to%20energy%20is%20defined,be%20scaled%20up%20over%20time (Accessed on 27/04/2025)

[32] United Nations., 'Advancing SDG 7 in Africa.' Available at https://sdgs.un.org/sites/default/files/2023-06/2023%20Advancing%20SDG7%20in%20the%20Africa-062923.pdf (Accessed on 27/04/2025)

[33] International Energy Agency., 'World Energy Investments 2024: Africa' Op Cit

[34] Ebatamehi. S., 'Top 10 African Countries Leading in Renewable Energy and Green Innovation in 2025' Available at https://www.africanexponent.com/top-10-african-countries-leading-in-renewable-energy-and-green-innovation-in-2025/ (Accessed on 28/04/2025)

[35] McMahon. M., Shah. P., 'The Rise of Renewable Energy Disputes and Arbitration.' Available at https://www.stewartslaw.com/news/rise-of-renewable-energy-disputes/ (Accessed on 28/04/2025)

a growing number of disputes coming from the energy sector in the continent[36]. Given the heavy presence of foreign investors in the African renewable energy sector, disputes are likely to arise under both contractual instruments and investment treaties[37].

It has been argued that unpredictable regulatory environments, the pace of development required to achieve energy transition, the variety and number of stakeholders involved, supply chain complexity and the deployment of new technologies are some of the factors driving renewable energy disputes in Africa[38]. In addition, large-scale renewable projects in the continent contribute to local and regional tensions and conflicts, as competition for resources, environmental degradation, and socio-economic disparities associated with such projects ignite long-standing grievances[39]. It has been argued that wind and solar farms, hydroelectric dams, and geothermal plants needed to adopt renewable energy all require significant land and water resources, often leading to disputes over land rights and environmental impact[40]. In addition, such projects are often implemented while overlooking the rights of local communities and indigenous peoples who bear the brunt of the environmental and social impacts. For example, Lake Turkana Wind Power Project, one of the largest renewable energy projects in Africa has faced opposition from the indigenous Turkana community, who allege that they were not adequately consulted and that their right to Free, Prior, and Informed Consent (FPIC) for the use of their ancestral lands was violated[41]. This has fueled disputes over land rights and sharing of benefits from the project[42].

Renewable energy disputes are therefore common in Africa. It is estimated that Africa will see the largest growth in renewable energy-related disputes, driven by an increase in investment activities in many countries across the continent[43]. Renewable energy conflicts and disputes in Africa are undesirable. These disputes can hinder the successful completion of renewable energy

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[36] Global Arbitration Review., 'Energy Arbitration in Africa.' Available at https://globalarbitrationreview.com/review/the-middle-eastern-and-african-arbitration-review/2022/article/energy-arbitration-in-africa (Accessed on 28/04/2025)

[37] Resolving Energy Disputes in Africa through Arbitration and Alternative Dispute Resolution ('ADR')., Available at https://content.clearygottlieb.com/regions/africa-outlook/resolving-energy-disputes-in-africa-through-arbitration-and-alternative-dispute-resolution/index.html (Accessed on 28/04/2025)

[38] Hameau. P., Bentley. J., & Robert. M., 'Energy arbitration in Africa: potential sources of energy and natural resources disputes' Available at https://globalarbitrationreview.com/review/the-middle-eastern-and-african-arbitration-review/2024/article/energy-arbitration-in-africa-potential-sources-of-energy-and-natural-resources-disputes (Accessed on 28/04/2025)

[39] The Role of Fossil Fuel and Renewable Energy Projects in Conflict Across Africa., Available at https://www.accord.org.za/analysis/the-role-of-fossil-fuel-and-renewable-energy-projects-in-conflict-across-africa/ (Accessed on 28/04/2025)

[40] Ibid

[41] Ibid

[42] Ibid

[43] Resolving Energy Disputes in Africa Through Arbitration and Alternative Dispute Resolution ('ADR').' Op Cit

projects therefore undermining the quest towards energy transition in Africa[44]. In addition, they can fuel violence and insecurity especially when local communities and indigenous peoples have not been adequately consulted and their land rights upheld[45]. It is therefore imperative to effectively manage renewable energy disputes in Africa towards equitable energy transition.

3.0 The Role of Appropriate Dispute Resolution in Energy Transition

The concept of 'Appropriate Dispute Resolution' (ADR) refers to the suitability of processes such as negotiation, mediation, arbitration, conciliation, adjudication, expert determination, early neutral evaluation, and Traditional Dispute Resolution Mechanisms (TDRMs) in managing conflicts and disputes[46]. These processes are considered appropriate due to their potential to manage conflicts and disputes in a non-confrontational manner[47]. ADR techniques provide numerous advantages in the administration of justice including a system with procedural flexibility, a broad range of remedial options, and a focus on individualized justice[48]. Further, ADR allows for more creative and collaborative solutions than that those available in traditional litigation[49]. It has been argued that with the exception of binding arbitration, the goal of ADR is to provide a forum for disputing parties to work towards a voluntary, consensual agreement, as opposed to having a judge or other authority impose a determination upon them[50].

ADR processes are vital in the quest towards energy transition in Africa. It has been argued that in order to achieve energy transition in Africa, energy disputes need to be dealt with swiftly and amicably since access to energy and adequate infrastructures are necessary for Africa to sustain

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[44] The World Bank Group., 'Renegotiation, Government Step-in rights, Termination, and Dispute Resolution' Available at https://ppp.worldbank.org/public-private-partnership/renegotiation-government-step-rights-termination-and-dispute-resolution#:~:text=The%20accelerating%20availability%20of%20disruptive,in%20the%a20energy%20sector%20globally (Accessed on 28/04/2025)

[45] The Role of Fossil Fuel and Renewable Energy Projects in Conflict Across Africa., Op Cit

[46] Muigua. K., 'Alternative Dispute Resolution and Access to Justice in Kenya.' Glenwood Publishers Limited, 2015

[47] United Nations., 'Alternative Dispute Resolution Approaches and their Application in Water Management: A Focus on Negotiation, Mediation and Consensus Building' Available at https://www.un.org/waterforlifedecade/water_cooperation_2013/pdf/adr_background_paper.pdf (Accessed on 28/04/2025)

[48] Main. T., 'ADR: The New Equity.' Available at https://www.researchgate.net/profile/ThomasMain/publication/228182886_ADR_The_new_equity/links/53d00e470cf2fd75bc5c57a5/ADR-The-newequity.pdf (Accessed on 28/04/2025)

[49] JAMS ADR., 'What is ADR' Available at https://www.jamsadr.com/adr-spectrum/ (Accessed on 28/04/2025)

[50] Alternative Dispute Resolution., Available at https://www.dol.gov/general/topic/labor-relations/adr#:~:text=Types%20of%20ADR%20include%20arbitration,%2C%20neutral%20factfinding%2C%20and%20minitrials. (Accessed on 28/04/2025)

its growth[51]. Further, it has been argued that for quick and efficient resolution of disputes in strategic and vital sectors such as energy, it is important to always look for the most appropriate mechanism[52]. Effective management of renewable energy disputes is desirable towards fast-tracking energy transition in Africa by facilitating investments in clean energy projects, mitigating risks for investors and stakeholders in the energy sector, and ensuring a win-win scenario for both environmental protection and economic development in the continent[53].

ADR processes are appropriate towards effective management of renewable energy disputes and conflicts towards equitable energy transition. It has been pointed out that ADR provides a flexible, cost-effective, and efficient means of resolving disputes within the complex landscape of renewable energy projects, encompassing policy-making, regulatory litigation, and transactional disputes[54]. By embracing ADR, stakeholders in the renewable energy sectors including governments and investors can effectively address community concerns, foster collaborative relationships, and streamline project implementation towards achieving energy transition[55].

Utilising ADR techniques such as negotiation, mediation, and arbitration can foster effective management of renewable energy disputes towards achieving energy transition. For instance, it has been correctly observed that commercial relationships in the renewable energy sector are often long term and frequently operate across projects, borders and cultures[56]. This creates incentives for players in the renewable energy sector including investors and energy companies to look at alternatives to more formal dispute resolution mechanisms such as litigation or arbitration[57]. Mediation and negotiation are suitable in preserving relationships, addressing the root causes of conflicts and enhancing collaboration among parties and are therefore ideal in managing disputes in the renewable energy sector[58]. Further, mediation provides parties with the opportunity to manage and resolve disputes before they escalate, which can not only save

[51] Kebe. M., 'Resolving infrastructure and energy disputes in sub-Saharan Africa' Available at Available at https://www.dlapiperafrica.com/en/senegal/insights/2024/resolving-infrastructure-and-energy-disputes- (Accessed on 28/04/2025)
[52] Ibid
[53] Owa. I., 'The Role of Arbitration in the Energy Transition in Africa' Available at https://arbitrationblog.kluwerarbitration.com/2024/04/16/2024-lcia-west-africa-roadshow-the-role-of-arbitration-in-the-energy-transition-in-africa/ (Accessed on 28/04/2025)
[54] Graham. M., 'Sunny Days Ahead: Using ADR to Fuel the Future of Green Energy' *Journal of Dispute Resolution.,* Volume 2024, Issue 1
[55] Ibid
[56] Ashurst., 'Managing and Resolving Cross-Border Disputes in the Energy Sector.' Available at https://www.ashurst.com/en/insights/managing-and-resolving-cross-border-disputes-in-the-energy-sector/ (Accessed on 28/04/2025)
[57] Ibid
[58] Ibid

time and costs but can also preserve critical business relationships and ensure the long-term sustainability and viability of renewable energy projects[59].

Mediation is also suitable in managing disputes between investors and local communities ensuring inclusivity in decision making processes and fostering the right of local communities and indigenous peoples to FPIC[60]. It has been argued that utilising mediation to resolve conflicts and disputes is vital in engaging with local communities to reach shared agreements and allowing people to have a meaningful voice in deliberative decision-making processes related to their own development[61]. Harnessing mediation is therefore crucial in achieving energy transition.

Further, arbitration is an appropriate tool for effective management of renewable energy disputes towards energy transition. It has been observed that arbitration has emerged as a key mechanism for dispute resolution in Africa's growing renewable energy industry[62]. There has been an increase in arbitration provisions in energy contracts including those governing renewable energy projects[63]. This is due to the fact that arbitration is an appropriate process towards fair, timely, efficient, and effective dispute resolution in the energy sector[64]. The features of arbitration including flexibility, the ability to provide confidentiality, the ability to enlist specialist, commercial-minded arbitrators to determine the dispute, and its ability to provide for a neutral forum in complex energy disputes involving international parties, particularly when compared to litigation before domestic courts makes it an appropriate process towards managing energy disputes both globally and in Africa[65]. Its transnational applicability and ability to guarantee enforcement of awards also makes arbitration a preferable processes in managing energy disputes[66]. Consequently, it has been argued that arbitration is vital in energy transition in Africa

[59] Managing and Resolving Cross-Border Disputes in the Energy Sector.' Available at Available at https://www.ashurst.com/en/insights/managing-and-resolving-cross-border-disputes-in-the-energy-sector/ (Accessed on 28/04/2025)

[60] Buxton. A., & Wilson. E., 'FPIC and the Extractive Industries: A Guide to Applying the Spirit of Free, Prior and Informed Consent in Industrial Projects' Available at https://www.iied.org/16530iied (Accessed on 28/04/2025)

[61] Ibid

[62] Nalule. V., & Olawuyi. D., 'Introduction to International Energy Arbitration Disputes in Africa' Available at https://www.researchgate.net/publication/368643432_Introduction_to_International_Energy_Arbitration_Disputes_in_Africa (Accessed on 28/04/2025)

[63] Ibid

[64] Ibid

[65] Resolving Energy Disputes in Africa Through Arbitration and Alternative Dispute Resolution ('ADR'), Available at Resolving Energy Disputes in Africa Through Arbitration and Alternative Dispute Resolution ('ADR').' Available at https://content.clearygottlieb.com/regions/africa-outlook/resolving-energy-disputes-in-africa-through-arbitration-and-alternative-dispute-resolution/index.html (Accessed on 28/04/2025)

[66] Resolving Energy Disputes Through Arbitration., Available at https://www.acerislaw.com/resolving-energy-disputes-through-arbitration/ (Accessed on 28/04/2025)

providing a timely and effective avenue for managing renewable energy disputes towards a just and smooth transition to cleaner energy sources[67].

ADR is therefore an appropriate forum for managing renewable energy disputes in Africa in the quest towards energy transition. Through ADR, parties can select a mediator, arbitrator or expert who possesses legal and technical knowledge relevant to the particular energy sector, intellectual property and dispute resolution issues in question[68]. ADR processes also provide flexible, collaborative and cost-effective means of resolving disputes related to renewable energy projects therefore preserving commercial relationships[69].

Despite the appropriateness of ADR in fostering energy transition through effective management of renewable energy projects, processes such as negotiation and mediation are often underutilised in managing energy among other natural resource-based disputes[70]. Further, Africa is yet to fully develop its legal, institutional, policy and human capacity to fully harness ADR processes such as arbitration for effective management of renewable energy disputes[71]. Consequently, most energy arbitrations are conducted outside Africa[72]. In light of these challenges, it is vital to effectively harness ADR in order to actualise energy transition in Africa.

4.0 Conclusion

ADR processes have a vital role to play in energy transition in Africa providing an appropriate forum for effective management of renewable energy disputes. Appropriate dispute resolution mechanisms have a key role to play in ensuring a just and smooth transition to cleaner sources of energy in Africa[73]. As Africa navigates the complex process of energy transition, tailored approaches to dispute resolution are crucial in addressing the unique challenges and opportunities it presents[74]. It is thus imperative to strengthen the legal, policy, institutional and human capacity on ADR in order to effectively harness these processes to accelerate energy transition in Africa[75]. Further, there is need to integrate sustainability into ADR in order to ensure that renewable energy projects comply with the tenets of Sustainable Development including

[67] Owa. I., 'The Role of Arbitration in the Energy Transition in Africa' Op Cit
[68] Graham. M., 'Sunny Days Ahead: Using ADR to Fuel the Future of Green Energy' Op Cit
[69] Ibid
[70] United Nations Environment Programme., 'Natural Resources and Conflict: A Guide for Mediation Practitioners' Available at Available at https://peacemaker.un.org/sites/peacemaker.un.org/files/NRCMediation_UNDPAUNEP2015_0.pdf (Accessed on 28/04/2025)
[71] Li. R., 'Energy arbitration inequities affect Africa deeply' Available at https://www.africanlawbusiness.com/news/20762-energy-arbitration-inequities-affect-africa-deeply/ (Accessed on 28/04/2025)
[72] Ibid
[73] Owa. I., 'The Role of Arbitration in the Energy Transition in Africa' Op Cit
[74] Ibid
[75] Ibid

environmental conservation and human rights especially the right of local communities and indigenous peoples to FPIC[76]. Through the foregoing, it is possible to effectively harness Appropriate Dispute Resolution towards equitable energy transition in Africa.

[76] Muigua. K., 'Managing Energy Disputes in Africa' Available at https://kmco.co.ke/wp-content/uploads/2023/12/Managing-Energy-Disputes-in-Africa.pdf (Accessed on 28/04/2025)

Chapter 9: From Policy to Climate Action: Decarbonizing Energy for Social Justice and Sustainability

Abstract

This paper examines how energy can be decarbonized for social justice and sustainability. The paper argues that despite the crucial role that energy plays in fostering Sustainable Development, its consumption triggers several threats to people and planet. In particular, the paper posits that the energy sector is a major contributor to the climate crisis with severe consequences for people and planet. In light of these challenges, the paper argues that decarbonizing the energy sector is a vital and effective solution towards bolstering climate action and protecting people and planet. It discusses ways through which the energy sector can be decarbonized for social justice and sustainability.

1.0 Introduction

Energy is a vital resource whose availability, affordability and sustainability is necessary for human progress and prosperity. It has been argued that our everyday life depends on reliable and affordable energy[1]. Energy is therefore a key enabler of development. Access to modern, reliable, affordable and sustainable energy is crucial in attaining most of the Sustainable Development Goals (SDGs), including through the eradication of poverty to advancements in health, education, water supply and industrialization, to combating climate change[2]. According to the United Nations, well-established energy systems support all sectors including businesses, healthcare, education, agriculture, infrastructure, transport, communications and high technology[3].

Energy therefore provides opportunities to unlock human progress and Sustainable Development. For example, access to clean, modern, affordable, reliable and sustainable sources of energy is necessary for Sustainable Development by reducing greenhouse gas emissions, improving energy access and security, creating jobs, and stimulating socio-economic development across education, healthcare, transport and infrastructure, water and sanitation among other vital areas[4]. On the other hand, lack of access to clean, reliable and sustainable energy contributes to poverty and deprivation and can lead to economic decline[5]. For example, it has been observed that millions of people globally lack access to affordable, reliable, sustainable

[1] United Nations., 'Goal 7: Affordable and Clean Energy' Available at https://www.un.org/sustainabledevelopment/energy/ (Accessed on 09/11/2025)

[2] Energy and the Sustainable Development Goals., Available at https://energypedia.info/wiki/Energy_and_the_Sustainable_Development_Goals (Accessed on 09/11/2025)

[3] United Nations., 'Goal 7: Affordable and Clean Energy' Op Cit

[4] The role of renewable energy technologies in sustainable development., Available at https://timesofindia.indiatimes.com/blogs/voices/the-role-of-renewable-energy-technologies-in-sustainable-development/ (Accessed on 09/11/2025)

[5] Bradbrook. A., 'Access to Energy Services in a Human Rights Framework.' Available at https://www.un.org/esa/sustdev/sdissues/energy/op/parliamentarian_forum/bradbrook_hr.pdf (Accessed on 09/11/2025)

and modern sources of energy undermining social justice and sustainability[6]. This situation is particularly worse in Sub-Saharan Africa and Asia where lack of clean, reliable and affordable energy affects key sectors including healthcare, agriculture, education and industrialization[7]. At the same time, the consumption of energy is the dominant contributor to climate change, accounting for nearly two-thirds of total global greenhouse gas emissions[8]. In light of these concerns, it has become an urgent global priority to ensure access to affordable, reliable, sustainable and modern energy for people and planet.

This paper examines how energy can be decarbonized for social justice and sustainability. The paper argues that despite the crucial role that energy plays in fostering Sustainable Development, its consumption triggers several threats to people and planet. In particular, the paper posits that the energy sector is a major contributor to the climate crisis with severe consequences for people and planet. In light of these challenges, the paper argues that decarbonizing the energy sector is a vital and effective solution towards bolstering climate action and protecting people and planet. It discusses ways through which the energy sector can be decarbonized for social justice and sustainability.

2.0 Energy, Social Justice and Sustainability: Opportunities and Challenges

Energy plays a key role in ensuring social justice and sustainability. For example, access to clean, reliable and sustainable sources of energy has been identified as a pre-condition for socio-economic development due to its potential to spur economic development and poverty eradication towards social justice[9]. Further, the transition to clean sources of energy is key in fostering social justice and sustainability by addressing major global challenges including climate change, energy access disparities, poverty, inequality, and health impacts of the energy sector thus laying the foundation for a just, sustainable, inclusive and more resilient future[10].

However, poor designed energy systems can also undermine social justice and sustainability. For instance, the energy sector is linked to the climate crisis. It has been argued that the burning of fossil fuels like coal, oil and gas is the primary cause of climate change[11]. According to the United Nations, fossil fuels are by far the largest contributor to global climate change, accounting for

[6] United Nations., 'Universal access to sustainable energy will remain elusive without addressing inequalities' Available at https://www.un.org/en/desa/universal-access-sustainable-energy-will-remain-elusive-without-addressing-inequalities (Accessed on 09/11/2025)

[7] World Resources Institute., 'Energy Access and Equitable Development' Available at https://www.wri.org/energy/energy-access (Accessed on 09/11/2025)

[8] United Nations., 'Goal 7: Affordable and Clean Energy' Op Cit

[9] United Nations Development Programme., 'Energy Access.' Available at https://www.undp.org/energy/our-work-areas/energy-access (Accessed on 10/11/2025)

[10] United Nations Development Programme., 'What is the sustainable energy transition and why is it key to tackling climate change?' Available at https://climatepromise.undp.org/news-and-stories/what-sustainable-energy-transition-and-why-it-key-tackling-climate-change (Accessed on 10/11/2025)

[11] United Nations., 'What is Climate Change?' Available at https://www.un.org/en/climatechange/what-is-climate-change (Accessed on 10/11/2025)

over 75 percent of global greenhouse gas emissions and nearly 90 percent of all carbon dioxide emissions[12]. Fossil fuels still dominate the global energy supply since they provide nearly 80 percent of the energy used all over the world[13]. When fossil fuels are burned, they release immense amounts of planet-warming gases, such as carbon dioxide and methane which cause climate change[14]. The energy sector is therefore the largest emitter of greenhouse gases into the atmosphere, contributing to climate change. Decarbonizing energy is therefore key in tackling climate change. According to the United Nations Environment Programme (UNEP), reducing our reliance on fossil fuels and transitioning to clean, sustainable and affordable energy for all is key in combating climate change and protecting people and planet[15].

In addition to climate change, the energy sector is also linked to other global environmental and health challenges including pollution and biodiversity loss. It has been argued that billions of people all over the world rely on unsafe and polluting fuels for cooking[16]. For example, it has been observed that most of the energy consumed in Sub-Saharan Africa is generated through inefficient combustion of solid biomass - mainly wood or charcoal - for cooking[17]. A majority of the population in Sub-Saharan Africa especially those in rural areas rely on bio-energy sources such as charcoal, wood fuel and dung for cooking[18]. Use of these sources of energy is linked to more than 500,000 annual deaths globally due to indoor pollution[19].

It has been argued that energy production is one of the main causes of environmental pollution with severe consequences for people and planet[20]. The production and use of fossil fuels generates atmospheric pollutants and toxic wastes which harm both people and the environment[21]. For

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[12] United Nations., 'Renewable Energy – Powering a Safer Future' Available at https://www.un.org/en/climatechange/raising-ambition/renewable-energy (Accessed on 10/11/2025)

[13] United Nations Development Programme., 'What is the sustainable energy transition and why is it key to tackling climate change?' Op Cit

[14] Ibid

[15] United Nations Environment Programme., 'Energy' Available at https://www.unep.org/topics/energy (Accessed on 10/11/2025)

[16] United Nations., 'Goal 7: Affordable and Clean Energy' Op Cit

[17] Energy Access in Africa., Available at https://wwf.panda.org/discover/our_focus/climate_and_energy_practice/what_we_do/changing_energy_use/energy_access_africa/ (Accessed on 10/11/2025)

[18] Muchiri. L., 'Gender and Equity in Bioenergy Access and Delivery in Kenya' Practical Action East Africa, 2008, available at https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=2ahUKEwiy2P29z6PnAhUEiFwKHQlyCLoQFjAAegQIBRAB&url=http%3A%2F%2Fwww.cas.ed.ac.uk%2F__data%2Fassets%2Fword_doc%2F0007%2F24793%2FGender_and_Equity_in_Bio_energy_Access_and_Delivery_in_Kenya_final.doc&usg=AOvVaw2AKp1mvTSC9tafkIKJ-36_ (Accessed on 10/11/2025)

[19] United Nations., 'Advancing SDG 7 in Africa.' Available at https://sdgs.un.org/sites/default/files/2023-06/2023%20Advancing%20SDG7%20in%20the%20Africa-062923.pdf (Accessed on 10/11/2025)

[20] Energy Production Pollution: Environmental and Health Impacts., Available at https://kunakair.com/energy-production-pollution/ (Accessed on 10/11/2025)

[21] Ibid

example, air pollution due to the combustion of fossil fuels among other causes is directly linked to respiratory and cardiovascular diseases and premature deaths[22]. The energy sector is also linked to biodiversity loss. For example, intensive resource extraction leads to deforestation, habitat loss and ecosystem degradation[23].

From the foregoing, it is evident that the energy sector can undermine sustainability and social justice. For instance, reliance on fossil fuels contributes to climate change, biodiversity loss and air pollution with severe consequences on human and environmental health thus hindering progress towards sustainability[24]. Further, it has been argued that inequalities in access to energy contributes to poverty, undermining a wide range of human rights including the right to health, education, food, housing, water and sanitation, and the right to a clean, healthy and sustainable environment thus hindering progress towards social justice[25]. Energy poverty perpetuates social injustices by undermining economic development and fuelling disparities in access to health and education among other fundamental human rights[26]. Further, it has been argued that inequalities in access to clean and sustainable sources of energy affects the attainment of social justice since it adversely impacts vulnerable groups and populations including the poor, women and people in developing countries[27].

In light of the foregoing challenges, decarbonizing energy is fundamental towards social justice and sustainability.

3.0 Decarbonizing Energy for Social Justice and Sustainability

Decarbonizing energy is key in advancing social justice and sustainability. The concept of decarbonization involves reducing carbon emissions from human activities[28]. It is a process that aims to lower the amount of carbon dioxide generated from human activities with the ultimate goal of eliminating human-induced carbon emissions in their entirety[29]. Decarbonization is a crucial approach towards confronting climate change. It involves reducing or eliminating carbon

[22] Ibid
[23] Ibid
[24] United Nations Development Programme., 'What is the sustainable energy transition and why is it key to tackling climate change?' Op Cit
[25] The Right to Sustainable Energy., Available at https://naturaljustice.org/the-right-to-sustainable-energy/ (Accessed on 10/11/2025)
[26] Just Transition and Energy Access., Available at https://pacja.org/just-transition-and-energy-access-2/#:~:text=This%20energy%20deficit%20hampers%20economic,environmental%20implications%20of%20the%20transition. (Accessed on 10/11/2025)
[27] Energy Justice is Socially Just., Available at https://www.seforall.org/news/energy-justice-is-socially-just (Accessed on 10/11/2025)
[28] Decarbonisation., Available at https://www.iberdrola.com/about-us/our-sector/electrification/decarbonisation#:~:text=Decarbonisation%20is%20the%20process%20of,what%20the%20planet%20can%20absorb. (Accessed on 11/11/2025)
[29] What is Decarbonization?., Available at https://www.carbonneutral.com/news/what-is-decarbonization (Accessed on 11/11/2025)

dioxide among other greenhouse gases with the ultimate goal of tackling the climate crisis[30]. Through decarbonization, it is possible to achieve a global economy with low greenhouse gas emissions that ensures climate neutrality[31]. This process is key in achieving the goals and targets of the *Paris Agreement*[32] towards limiting global warming to 1.5 degrees celsius from pre-industrial levels.

Decarbonization is therefore a crucial process in the quest towards net-zero. The term net-zero refers to the target of reducing the greenhouse gas emissions that cause global warming to zero by balancing the amount released into the atmosphere with the amount removed and stored by carbon sinks[33]. This state is achieved when anthropogenic carbon dioxide emissions are balanced globally by anthropogenic carbon dioxide removals over a specified period[34]. It has been argued that achieving net-zero requires removing carbon emissions from the atmosphere equal to the amount produced by human activities through various measures which include carbon capture and storage, afforestation, and the use of renewable energy sources[35].

From the foregoing, it is evident that decarbonization is a key approach in strengthening climate action since it accelerates progress towards net-zero and carbon neutrality. In particular, decarbonizing energy is vital in bolstering climate action. For many decades, fossil fuels including coal, oil and gas have been major sources of global energy supply[36]. However, burning fossil fuels produces large amounts of greenhouse gases which cause climate change and air pollution with harmful impacts on people and planet[37]. It is estimated that energy accounts for more than two-thirds of total greenhouse gas emissions globally[38]. Consequently, it has been argued that in order to tackle the climate crisis, it is imperative to decarbonize energy systems[39]. At its core, decarbonization involves reducing the greenhouse gas emissions produced by the combustion of

[30] What is Decarbonization?., Available at https://www.sap.com/resources/decarbonization (Accessed on 11/11/2025)
[31] Decarbonisation., Op Cit
[32] United Nations Framework Convention on Climate Change., 'Paris Agreement.' Available at https://unfccc.int/sites/default/files/english_paris_agreement.pdf (Accessed on 11/11/2025)
[33] Kyriacou. G., & Burke. J., 'Why is Net Zero so Important in the Fight Against Climate Change?' Available at https://www.lse.ac.uk/granthaminstitute/explainers/why-is-net-zero-so-important-in-the-fight-against-climate-change/ (Accessed on 11/11/2025)
[34] Intergovernmental Panel on Climate Change., 'Glossary' Available at https://www.ipcc.ch/site/assets/uploads/sites/2/2022/06/SR15_AnnexI.pdf (Accessed on 11/11/2025)
[35] DGB Group., 'Net Zero: Benefits, Challenges, Strategies, and the Power of Nature-Based Solutions' Available at https://www.green.earth/blog/net-zero-benefits-challenges-strategies-and-the-power-of-nature-based-solutions (Accessed on 11/11/2025)
[36] United Nations., 'Goal 7: Affordable and Clean Energy' Op Cit
[37] Ibid
[38] Energy Justice is Socially Just., Op Cit
[39] Ibid

fossil fuels[40]. Decarbonizing energy is achieved by shifting from fossil fuel-based production to cleaner, more sustainable low-carbon or zero-carbon alternatives, such as renewable energy[41].

It is therefore imperative to decarbonize energy by shifting from fossil fuels to clean sources including renewables such as wind, solar and geothermal energy[42]. It has been argued that the shift to clean and renewable sources of energy is critical to tackling the climate crisis, pollution and other environmental challenges since fossil fuels still account for more than 80 percent of global energy supply, releasing immense amounts of planet-warming gases, including carbon dioxide and methane, which have devastating impacts on people and planet[43]. On the other hand, renewable sources of energy are a health and sustainable option for both people and planet. For example, generating renewable energy creates far lower emissions than burning fossil fuels[44]. It has been argued that most renewable energy sources produce zero carbon emissions and minimal air pollutants[45]. Further, renewable sources of energy including solar, wind, hydropower and geothermal energy are available in abundance, cheaper and are a healthier option for people and the planet[46].

Shifting to renewable sources of energy such as wind, solar and geothermal energy is therefore vital in decarbonizing energy for social justice and sustainability. By transitioning to renewable energy, it is possible to confront climate change towards ensuring sustainability[47]. It is therefore imperative to transition towards renewable energy in order to foster social justice and sustainability. Further, there is need to enhance energy efficiency in building, industries, transport and homes in order to reduce consumption and greenhouse gas emissions[48]. It is also imperative to ensure a just and equitable energy transition by involving vulnerable groups and populations including indigenous peoples and local communities in renewable energy developments[49].
Through the foregoing, it is possible to decarbonize energy for social justice and sustainability.

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[40] What Is Decarbonization, and How Do We Make It Happen?., Available at https://news.climate.columbia.edu/2022/04/22/what-is-decarbonization-and-how-do-we-make-it-happen/ (Accessed on 11/11/2025)
[41] What is Decarbonization?., Op Cit
[42] Energy Justice is Socially Just., Op Cit
[43] United Nations Development Programme., 'What is the sustainable energy transition and why is it key to tackling climate change?' Op Cit
[44] United Nations., 'What is Renewable Energy?.' Available at https://www.un.org/en/climatechange/what-is-renewable-energy (Accessed on 11/11/2025)
[45] What is Renewable Energy?., Available at https://www.ibm.com/think/topics/renewable-energy (Accessed on 11/11/2025)
[46] United Nations., 'Climate Action.' Available at https://www.un.org/en/climatechange/howcommunities-are-embracing-renewable-energy (Accessed 11/11/2025)
[47] United Nations Climate Change., 'Decarbonization cannot wait' Available at https://unfccc.int/news/decarbonization-cannot-wait (Accessed on 11/11/2025)
[48] Decarbonisation., Op Cit
[49] Energy Justice is Socially Just., Op Cit

4.0 Conclusion

Decarbonizing energy is crucial in the quest towards social justice and sustainability. It is vital to pursue this agenda by adopting renewable sources of energy, improving energy efficiency across all sectors and involving vulnerable groups and populations in energy transition. Decarbonizing energy is therefore a crucial agenda whose attainment is necessary for sound climate action for both people and planet.

Chapter 10: Towards Effective Climate Action: Fostering Clean Energy for Resilience and Sustainability

Abstract

This paper critically discusses the role of clean energy in climate action. The paper argues that adopting clean energy is crucial towards effective climate action for resilience and sustainability. It notes that the energy sector is the major cause of climate change and consequently transforming the sector through clean energy can strengthen climate action. The paper discusses opportunities and interventions towards fostering clean energy for effective climate action, resilience, and sustainability.

1.0 Introduction

Climate change continues to pose an unprecedented global challenge, affecting various aspects of human health, environmental stability and economic security[1]. It has been identified as the greatest threat humanity is currently facing[2]. Climate change represents a grave challenge to the global economy, environment, and societal well-being, jeopardizing their long-term sustainability[3]. It is a major global challenge that is affecting both developed and developing countries in their efforts towards achieving Sustainable Development[4]. Climate change is an undesirable phenomenon that affects realization of the Sustainable Development agenda across the world by affecting the sustainability of the planet's ecosystems, the stability of the global economy and the future of humankind[5]. The impacts of climate change such as intense droughts, water scarcity, severe fires, rising sea levels, flooding, melting polar ice, catastrophic storms and declining biodiversity are being witnessed across the world affecting development[6].

Due to its adverse impacts, tackling climate change has become a top policy agenda at local, national, regional and global levels[7]. The United Nations notes that climate change is now

[1] United Nations Industrial Development Organization., 'Tackling Climate Change: Fostering trust in climate action through quality and standards' Available at https://www.greenpolicyplatform.org/sites/default/files/downloads/resource/QI_CLIMATE_ACTION.pdf (Accessed on 14/02/2025)

[2] Ibid

[3] Ma. R et al., 'From Crisis to Resilience: Strengthening Climate Action in OECD Countries through Environmental Policy and Energy Transition' Available at https://pmc.ncbi.nlm.nih.gov/articles/PMC10682128/ (Accessed on 14/02/2025)

[4] Muigua. K., 'Achieving Sustainable Development, Peace and Environmental Security.' Glenwood Publishers Limited, 2021

[5] Climate Change., 'Meaning, Definition, Causes, Examples and Consequences.' Available at Available at https://youmatter.world/en/definition/climate-change-meaning-definition-causes-and-consequences/ (Accessed on 14/02/2025)

[6] United Nations., 'What is Climate Change?' Available at https://www.un.org/en/climatechange/what-is-climate-change (Accessed on 14/02/2025)

[7] United Nations Department of Economic and Social Affairs., 'Forum on Climate Change and Science and Technology Innovation.' Available at https://www.un.org/en/desa/forum-climate-changeandscience-and-technology-innovation (Accessed on 14/02/2025)

affecting every country on every continent[8]. It further notes that climate change is disrupting national economies and severely affecting lives, costing people, communities and countries[9]. As a result, governments and all other stakeholders have been urged to urgently put in place measures towards responding to the threat of climate change and ensuring that economies are climate resilient[10]. It has been noted that if left unchecked, climate change threatens to undo a lot of the development progress made over the past years and has the potential to provoke mass migrations that will lead to instability and wars[11]. Urgent and transformative climate action is therefore required if the Sustainable Development agenda is to be achieved by all countries[12].

Combating climate change is a key theme under the United Nations *2030 Agenda for Sustainable Development*[13]. The agenda acknowledges that climate change is one of the greatest challenges of our time and its adverse impacts undermine the ability of all countries to achieve Sustainable Development[14]. Sustainable Development Goal 13 under the agenda calls upon all countries to take urgent action towards combating climate change and its impacts[15]. At a continental level, Africa Union's *Agenda 2063*[16] acknowledges that climate change is a major challenge for the continent's development and seeks to strengthen climate action for sustainability in Africa. The *African Union Climate Change and Resilient Development Strategy and Action Plan*[17] has since been adopted to accelerate the realization of Africa's Agenda 2063 through proactive and collective continental efforts aimed at addressing the impacts of climate change in Africa. At a national level, Kenya enacted the *Climate Change Act*[18] in order to enhance the national response to climate change and achieve low carbon climate development for Sustainable Development[19]. The *Climate*

[8] United Nations., 'Climate Action' Available at https://www.un.org/sustainabledevelopment/climate-action/ (Accessed on 14/02/2025)
[9] Ibid
[10] Muigua. K., 'Achieving Sustainable Development, Peace and Environmental Security.' Glenwood Publishers Limited, 2021
[11] United Nations., 'Goal 13: Take Urgent Action to Combat Climate Change and its Impacts.' Available at https://www.un.org/sustainabledevelopment/climate-change/ (Accessed on 14/02/2025)
[12] Ibid
[13] United Nations General Assembly., 'Transforming Our World: the 2030 Agenda for Sustainable Development.' 21 October 2015, A/RES/70/1., Available at https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf (Accessed on 14/02/2025)
[14] Ibid
[15] Ibid
[16] Africa Union., 'Agenda 2063: The Africa we Want.' Available at https://au.int/sites/default/files/documents/33126-doc-framework_document_book.pdf (Accessed on 14/02/2025)
[17] African Union Climate Change and Resilient Development Strategy and Action Plan (2022-2032) Available at https://au.int/sites/default/files/documents/41959-doc-CC_Strategy_and_Action_Plan_2022-2032_08_02_23_Single_Print_Ready.pdf (Accessed on 14/02/2025)
[18] Climate Change Act., No. 11 of 2016, Government Printer, Nairobi
[19] Ibid, S 3(1)

Change (Amendment) Act[20] 2023 also seeks to strengthen climate action in Kenya including through the concept of carbon trading.

Despite the foregoing global, regional, and national efforts, climate change continues to intensify threatening sustainability. Strengthening climate action is therefore necessary for Sustainable Development.

This paper critically discusses the role of clean energy in climate action. The paper argues that adopting clean energy is crucial towards effective climate action for resilience and sustainability. It notes that the energy sector is the major cause of climate change and consequently transforming the sector through clean energy can strengthen climate action. The paper discusses opportunities and interventions towards fostering clean energy for effective climate action, resilience, and sustainability.

2.0 The Energy Sector and Climate Change

It has been noted that long-term shifts in temperatures and weather patterns attributed to climate change can occur naturally due to changes in the sun's activity or large volcanic eruptions[21]. Throughout history, volcanic eruptions, fluctuations in solar radiation, and tectonic shifts have all had observable effects on planetary warming and cooling patterns[22]. It has been observed that these natural causes of climate change are still in play today, but their impact is too small or they occur too slowly to explain the mounting threat of climate change[23].

Since the industrial revolution, human activities have been the main cause of climate change, primarily due to the burning of fossil fuels such as coal, oil and gas[24]. Burning fossil fuels generates greenhouse gas emissions which trap the sun's heat and raising global temperatures[25]. It has been noted that for many decades, fossil fuels such as coal, oil and gas have been major sources of electricity production, but burning these fuels produces large amounts of greenhouse gases which cause climate change and have harmful impacts on people's well-being and the environment[26]. The energy sector has been identified as the largest emitter of greenhouse gases into the atmosphere, contributing to climate change[27].

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[20] Climate Change (Amendment) Act, 2023, Government Printer, Nairobi

[21] United Nations., 'What is Climate Change?' Op Cit

[22] Turrentine. J., 'What Are the Causes of Climate Change?' Available at https://www.nrdc.org/stories/what-are-causes-climate-change (Accessed on 14/02/2025)

[23] Ibid

[24] United Nations., 'What is Climate Change?' Op Cit

[25] Ibid

[26] United Nations., 'Affordable and Clean Energy' Available at https://www.un.org/sustainabledevelopment/energy/ (Accessed on 14/02/2025)

[27] United States Environmental Protection Agency., 'Climate Change Impacts on Energy' Available at https://www.epa.gov/climateimpacts/climate-change-impacts-energy (Accessed on 14/02/2025)

The United Nations Environment Programme (UNEP) notes that energy drives economies and sustains societies[28]. However, it has been observed that the transformation and use of energy is the single biggest contributor to global warming[29]. It is estimated that fossil fuels including coal, oil and natural gas are by far the largest contributor to global climate change, accounting for over 75 per cent of global greenhouse gas emissions and nearly 90 per cent of all carbon dioxide emissions[30].

The global energy system is the foundation of modern economies and societies, yet the production and consumption of energy is the primary driver of climate change[31]. As a result, it has been noted that the energy sector holds the key in fostering effective climate action[32]. This requires reducing reliance on fossil fuels by accelerating the transition to sustainable and affordable energy for all[33]. Fostering clean energy is therefore fundamental towards effective climate action.

3.0 Fostering Clean Energy for Resilience and Sustainability: Promises and Pitfalls

Clean energy also referred to as green, sustainable or renewable energy is energy that is derived from natural resources, such as sunlight, wind or water[34]. It has also been described as energy that comes from renewable sources[35]. Such sources include solar power, wind power, hydropower, geothermal energy, biomass and biofuels[36]. Clean energy has also been described as a type of energy that does not contribute to the pollution of the environment[37]. It is also referred to as renewable energy since it comes from the sources that are replenished continuously[38]. Further, it has been noted that clean energy is energy that is gained from sources that do not

[28] United Nations Environment Programme., 'Energy' Available at https://www.unep.org/topics/energy (Accessed on 14/02/2025)
[29] Ibid
[30] United Nations., 'Causes and Effects of Climate Change.' Available at https://www.un.org/en/climatechange/science/causes-effects-climate-change (Accessed on 14/02/2025)
[31] International Energy Agency., 'Energy and Climate are Inextricably Linked' Available at https://www.iea.org/topics/climate-change (Accessed on 14/02/2025)
[32] International Energy Agency., 'The Energy Sector is Central to Efforts to Combat Climate Change' Available at https://www.iea.org/spotlights/the-energy-sector-is-central-to-efforts-to-combat-climate-change (Accessed on 14/02/2025)
[33] United Nations Environment Programme., 'Energy' Op Cit
[34] TWI Global., 'What is Green Energy? (Definition, Types and Examples).' Available at https://www.twi-global.com/technical-knowledge/faqs/what-is-green-energy (Accessed on 26/06/2023)
[35] Inspire Clean Energy., 'What is Green Energy? Types, Definitions and Examples.' https://www.inspirecleanenergy.com/blog/clean-energy-101/what-is-green-energy (Accessed on 14/02/2025)
[36] Ibid
[37] Patil . P., Sarkar. D., & Sarkar. A., 'Clean energy production by microorganisms: A sustainable approach' Available at https://www.sciencedirect.com/science/article/abs/pii/B9780323899369000060 (Accessed on 14/02/2025)
[38] Ibid

release air pollutants[39]. This type of energy works by producing power without having negative environmental impacts since it does not release greenhouse gases[40].

Clean energy is crucial in enhancing climate resilience and sustainability. For instance, it has been noted that generating clean energy sources including renewable energy creates far lower emissions than burning fossil fuels such as coal, oil and gas[41]. Consequently, transitioning to clean and renewable energy sources is one of the most effective ways to effectively confront climate change[42]. Clean sources of energy such as solar and wind energy produce minimal greenhouse gas emissions and are therefore crucial towards effective climate action[43].

The economic, societal and environmental benefits of clean and renewable sources of energy are numerous. For instance, renewable sources of energy are available in abundance, are cheaper and are a healthier option for people and the planet[44]. In addition to being clean, renewable source of energy also preserve the world's natural resources, reduce the risk of environmental disasters, such as fuel spills or the problems associated with natural gas leaks[45]. Clean energy is thus vital for effective climate action. The United Nations points out that clean energy including energy from renewable sources is available in abundance all over the world from sources such as the sun, wind, water, waste, and heat from the Earth, is easily replenished by nature and emit little to no greenhouse gases or pollutants into the air[46]. Clean energy is therefore readily available and in most cases is cheaper than fossil fuels such as coal, oil or gas[47].

In addition, it has been noted that switching to clean sources of energy, such as wind and solar not only helps in tackling climate change but also in abating air pollution for good human health and well-being[48]. The World Health Organization (WHO) points out that 99 percent of people in the world breathe air that exceeds air quality limits thus threatening their health, and that more than 13 million deaths around the world each year are due to avoidable environmental causes,

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[39] What is Clean Energy? How does it Work? Why is it so Important?., Available at https://www.twi-global.com/technical-knowledge/faqs/clean-energy (Accessed on 14/02/2025)

[40] Ibid

[41] United Nations., 'What is Renewable Energy?.' Available at https://www.un.org/en/climatechange/what-is-renewable-energy (Accessed on 14/02/2025)

[42] Climate Group., 'Understanding Climate Change: A Focus on Clean Energy and Global Action' Available at https://www.theclimategroup.org/understanding-climate-change-focus-clean-energy-and-global-action#:~:text=Achieving%20net%20zero%20emissions%20is,many%20other%20meaningful%20climate%20solutions. (Accessed on 14/02/2025)

[43] Ibid

[44] United Nations., 'Climate Action.' Available at https://www.un.org/en/climatechange/howcommunities-are-embracing-renewable-energy (Accessed on 14/02/2025)

[45] What is Clean Energy? How does it Work? Why is it so Important?., Op Cit

[46] United Nations., 'Renewable Energy – Powering a Safer Future' Available at https://www.un.org/en/climatechange/raising-ambition/renewable-energy (Accessed on 14/02/2025)

[47] Ibid

[48] Ibid

including air pollution[49]. WHO further notes that air quality is closely linked to the earth's climate and ecosystems globally[50]. For instance, many of the drivers of air pollution including combustion of fossil fuels are also sources of greenhouse gas emissions[51]. Therefore policies to tackle air pollution offer a win-win strategy for both climate and health, lowering the burden of disease attributable to air pollution, as well as contributing to the near- and long-term mitigation of climate change[52]. Adopting clean energy therefore provides a win-win outcome that strengthens climate action whole also combating air pollution for human health and well-being[53].

Due to its numerous benefits, there have been calls towards adopting clean energy at all levels. For example, the *United Nations Framework Convention on Climate Change (UNFCCC)*[54] acknowledges the need to transition from fossil fuels to clean energy. According to the UNFCCC, countries whose economies are highly dependent on income generated from the production, processing and export, and/or on consumption of fossil fuels and associated energy-intensive products are highly vulnerable to climate change[55]. It urges all countries and especially developing countries which are still highly dependent on fossil fuels to explore the possibilities for achieving greater energy efficiency and for controlling greenhouse gas emissions in general, including through the application of new technologies in the energy sector such as renewable energy on terms which make such an application economically and socially beneficial[56].

Sustainable Development Goal 7 under the 2030 Agenda for Sustainable Development further seeks to ensure access to affordable, reliable, sustainable and modern energy for all[57]. Among the targets under SDG 7 include ensuring universal access to affordable, reliable and modern energy services; substantially increasing the share of renewable energy in the global energy mix; doubling the global rate of improvement in energy efficiency; and enhancing international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology[58]. Actualising these targets is crucial towards fostering clean energy including through harnessing renewable sources of energy.

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[49] World Health Organization., 'Air Pollution' Available at https://www.who.int/health-topics/air-pollution#tab=tab_1 (Accessed on 14/02/2025)
[50] Ibid
[51] Ibid
[52] Ibid
[53] United Nations., 'Renewable Energy – Powering a Safer Future' Op Cit
[54] United Nations General Assembly, *United Nations Framework Convention on Climate Change :Rresolution / adopted by the General Assembly*, A/RES/48/189, 20 January 1994,
[55] Ibid, Article 4
[56] Ibid
[57] United Nations General Assembly., 'Transforming Our World: the 2030 Agenda for Sustainable Development.' 21 October 2015, A/RES/70/1., Op Cit
[58] Ibid

At a continent level, *Agenda 2063*[59] recognises that Africa faces enormous energy challenges which include low generation capacity and efficiency, high costs, unstable and unreliable energy supplies, low access to modern energy, insufficient energy infrastructure, and lack of institutional and technical capacity to harness huge resources partly due to dependence on fossil fuels for generation of electricity[60]. Among the aspirations under Agenda 2063 is to create environmentally sustainable and climate resilient economies and communities in Africa through measures such as the adoption of renewable sources of energy[61]. Agenda 2063 portrays the vision of a Continent where renewable energy including wind, solar, hydro, bioenergy, ocean tidal waves, geothermal and other renewables will claim more than half of the energy consumption for households, businesses and organizations[62].

It has been noted that Africa is highly vulnerable to climate change[63]. While the continent has contributed negligibly to climate change, with just about two to three percent of global emissions, it stands out disproportionately as the most vulnerable region in the world[64]. This vulnerability is driven by the prevailing low levels of socioeconomic growth in the continent[65]. It has been noted that Africa faces exponential collateral damage due to climate change posing systemic risks to its economies, infrastructure investments, water and food systems, public health, agriculture, and livelihoods, threatening to undo the continent's modest development gains and slip it into higher levels of extreme poverty[66]. Tackling climate change is therefore a key priority for Africa. The potential for clean energy production in Africa is very high due to the vast resources of solar, wind, hydro, geothermal and biomass available all over the continent the continent[67]. It is therefore necessary to adopt clean energy in Africa for effective climate action.

Fostering clean energy for effective climate action is also a major policy agenda in Kenya. For example, the *Climate Change Act*[68] requires the state to embrace climate change response measures and actions including enhancing energy conservation, efficiency and use of renewable energy in

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[59] Africa Union., 'Agenda 2063: The Africa we Want.' Op Cit
[60] Ibid
[61] Ibid
[62] Ibid
[63] United Nations Environment Programme., 'Responding to Climate Change' Available at https://www.unep.org/regions/africa/regional-initiatives/responding-climate-change (Accessed on 14/02/2025)
[64] Ibid
[65] Ibid
[66] African Development Bank Group., 'Climate Change in Africa' Available at https://www.afdb.org/en/cop25/climate-change-africa (Accessed on 14/02/2025)
[67] United Nations Conference on Trade and Development., 'Commodities at a Glance: Special Issue on Access to Energy in Sub-Saharan Africa.' Available at Available at https://unctad.org/publication/commodities-glance-special-issue-access-energy-sub-saharan-africa#:~:text=Access%20to%20energy%20is%20defined,be%20scaled%20up%20over%20time (Accessed on 14/02/2025)
[68] Climate Change Act., No. 11 of 2016., Laws of Kenya., Government Printer, Nairobi

industrial, commercial, transport, domestic and other uses[69]. Further, the *Energy Act*[70] requires the state to develop clean energy including but not limited to renewables such as solar energy, wind energy, biomass energy, biological waste energy, hydro energy, geothermal energy and ocean and tidal energy[71]. The Act further establishes the Rural Electrification and Renewable Energy Corporation which is tasked with promoting the adoption of clean energy in Kenya[72]. It has been noted that Kenya is endowed with clean energy with renewable sources of energy such as wind, solar, hydropower, geothermal and tidal energy being readily available in the country[73]. It is imperative to develop clean energy in Kenya for effective climate action.

Adopting clean energy is therefore a key agenda globally, regionally, and nationally. Clean energy from renewable sources such as wind, solar, geothermal, and ocean and tidal waves is crucial in fostering effective climate action since its generation emits little to no greenhouse gases or pollutants into the air[74]. Clean energy sources are also available in abundance, are cheaper and are a healthier option for people and the planet[75]. Clean energy is effective in tackling climate change and other global environmental challenges such as air pollution and is therefore vital for human health and well-being[76]. Despite its benefits, it has been noted that fossil fuel subsidies provided to companies in the fossil fuel sector continue to encourage the production and use of these sources of energy at the expense of clean energy[77]. In addition, developing countries continue to face challenges accessing technology and finance to invest in clean energy sources including renewable energy hence continued reliance on fossil fuels[78]. For instance, it has been observed that despite its vast potential, Africa has the lowest share of modern renewable energy compared to other continents and the world[79]. Several challenges remain in exploiting clean energy sources in Africa in terms of developing adequate infrastructure, increasing access to finance, and establishing appropriate regulations and targets to diversify the continent's energy

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[69] Ibid, S 13 (3) (j)
[70] Energy Act, Cap 314, Government Printer, Nairobi
[71] Ibid, S 2
[72] Ibid, S 43 & 44
[73] Muigua. K., 'Adopting Green Energy for a Bright Tomorrow.' Available at Available at http://kmco.co.ke/wp-content/uploads/2023/06/Adopting-Green-Energy-for-a-Bright-Tomorrow.pdf (Accessed on 08/02/2025)
[74] United Nations., 'Renewable Energy – Powering a Safer Future' Op Cit
[75] United Nations., 'Climate Action.' Op Cit
[76] United Nations., 'Renewable Energy – Powering a Safer Future' Op Cit

[77] The National Wildlife Federation., 'Reducing Fossil Fuel Reliance.' Available at Available at https://www.nwf.org/Home/Our-Work/Climate/Climate-Change/Fossil-Fuels (Accessed on 14/02/2025)
[78] Muigua. K., 'Accelerating Energy Transition in Kenya.' Available at https://kmco.co.ke/wp-content/uploads/2023/09/Accelerating-Energy-Transition-in-Kenya.pdf (Accessed on 14/02/2025)
[79] United Nations Conference on Trade and Development., 'Commodities at a Glance: Special Issue on Access to Energy in Sub-Saharan Africa.' Op Cit

mix[80]. Addressing these challenges is therefore key in fostering clean energy for resilience and sustainability both in Africa and globally towards effective climate action.

4.0 Conclusion

Clean energy including renewable sources such as solar energy, wind energy, hydro energy, geothermal energy and ocean and tidal energy are at the heart of effective climate action. SDG 7 envisages ensuring access to clean and affordable energy, which is key to the development of agriculture, business, communications, education, healthcare and transportation among other critical sectors[81]. It is therefore necessary to enhance investments in clean energy sources such as solar, wind and thermal energy in all countries[82]. Expanding infrastructure and upgrading technology to provide clean energy in all developing countries has been identified as a crucial goal that can both foster development and help strengthen environmental conservation by reducing reliance on polluting fossil fuels[83]. It is therefore necessary to support developing countries including through access to finance and relevant technology in order to bolster their capacity to adopt clean energy.

In addition, there is need to phase out fossil fuel subsidies which often crowd-out investment in clean energy, and encourage excessive energy consumption[84]. It has been noted that the transition to clean energy alternatives remains a challenge in countries where fossil fuel subsidies have still not been phased out[85]. Eliminating fossil fuel subsidies is therefore important in encouraging the adoption of clean energy.

Ensuring a just transition by placing the needs and rights of people at the heart of the transition towards clean energy is also paramount in making sure that no one is left behind in the quest towards clean energy[86]. It has been observed that a just transition promotes the shift towards renewable sources of energy and sustainable practices, reducing the reliance on fossil fuels and mitigating the impacts of climate change[87]. It is therefore important for all countries and especially

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[80] Ibid

[81] United Nations General Assembly., 'Transforming Our World: the 2030 Agenda for Sustainable Development.' 21 October 2015, A/RES/70/1., Op Cit

[82] United Nations., 'Affordable and Clean Energy' Available at https://www.un.org/sustainabledevelopment/energy/ (Accessed on 14/02/2025)

[83] Ibid

[84] United Nations Environment Programme., 'Fossil Fuel Subsidy Reform.' Available at https://www.unep.org/explore-topics/green-economy/what-we-do/economic-and-fiscal-policy/fiscalpolicy/policy-analysis-3 (Accessed on 14/02/2025)

[85] International Energy Agency., 'World Energy Outlook: 2023.' Available at https://iea.blob.core.windows.net/assets/42b23c45-78bc-4482-b0f9-eb826ae2da3d/WorldEnergyOutlook2023.pdf (Accessed on 14/02/2025)

[86] United Nations., 'Renewable Energy – Powering a Safer Future' Op Cit

[87] Kemei. N., 'Navigating the Path of Just Transition: Kenya's Sustainable Future.' Available at Available at https://www.linkedin.com/pulse/navigating-path-just-transition-kenyas-sustainable-future-naomi-

developing countries to embrace just transition by promoting clean and renewable sources of energy in order to effectively confront climate change, achieve climate justice and promote energy justice[88].

Fostering clean energy for resilience and sustainability is therefore a fundamental goal that can be achieved globally towards effective climate action.

kemei/?utm_source=share&utm_medium=member_android&utm_campaign=share_via (Accessed on 14/02/2025)

[88] Ibid

PART III: ENVIRONMENTAL PROTECTION, BIODIVERSITY AND URBAN SUSTAINABILITY

Abstract

This Part explores the interface between renewable energy development, environmental conservation and sustainable urbanisation. It analyses the environmental trade-offs inherent in expanding energy infrastructure, including impacts on ecosystems, biodiversity and urban health. Through discussions on waste-to-energy technologies, green energy adoption and integrated sustainability approaches, the chapters demonstrate how environmental protection can be harmonised with energy transition objectives. The Part underscores the need for holistic planning frameworks that embed environmental stewardship at the core of energy decision-making.

Chapter 11: Balancing Environmental Conservation and the Need for Renewable Energy Developments

Abstract

This paper critically examines how to balance environmental conservation and the need for renewable energy developments. It argues that renewable energy developments are vital in fast-tracking global energy transition. However, the paper also notes that renewable energy developments can fuel environmental concerns. The paper discusses some of the major environmental impacts of renewable energy developments. In light of these concerns, the paper proposes measures towards balancing environmental conservation and the need for renewable energy developments in order to realise energy transition for Sustainable Development.

1.0 Introduction

Renewable energy refers to energy that is derived from natural sources that are replenished at a higher rate than they are consumed[1]. Renewable energy has also been defined as non-fossil energy generated from natural non-depleting resources including but not limited to solar energy, wind energy, biomass energy, biological waste energy, hydro energy, geothermal energy and ocean and tidal energy[2]. Renewable energy can also be described as energy that comes from resources that nature replenishes on a human timescale such as sunlight, wind, tides, waves, and geothermal heat[3].

Renewable energy is a healthy and sustainable option for both people and planet. The economic, societal and environmental benefits of renewable sources of energy are numerous. For example, renewable sources of energy are available in abundance, cheaper and are a healthier option for people and the planet[4]. In addition, generating renewable energy creates far lower emissions than burning fossil fuels[5]. It has been argued that most renewable energy sources produce zero carbon emissions and minimal air pollutants[6]. Renewable sources of energy such as solar power, wind power, hydropower, geothermal energy and biomass are therefore considered as clean energy[7].

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[1] United Nations., 'What is Renewable Energy?' Available at https://www.un.org/en/climatechange/what-is-renewable-energy (Accessed 29/07/2025)

[2] Energy Act, No. 1 of 2019, Government Printer, Nairobi

[3] Dale. V.H., 'Incorporating bioenergy into sustainable landscape designs' *Renewable and Sustainable Energy Reviews*., Volume 56, 2016, pp 1158-1171

[4] United Nations., 'Climate Action.' Available at https://www.un.org/en/climatechange/howcommunities-are-embracing-renewable-energy (Accessed on 29/07/2025)

[5] United Nations., 'What is Renewable Energy?.' Available at https://www.un.org/en/climatechange/what-is-renewable-energy (Accessed on 28/09/2023)

[6] What is Renewable Energy?., Available at https://www.ibm.com/think/topics/renewable-energy (Accessed on 29/07/2025)

[7] Ibid

Due to its importance for people and planet, renewable energy is at the heart of energy transition. Energy transition refers to the shift in the global energy sector from fossil-based systems of energy production and consumption including oil, natural gas and coal to renewable energy sources like wind, geothermal and solar[8]. It involves the long-term structural change to energy systems from fossil-fuel based systems to cleaner and sustainable systems such as renewable sources of energy towards tackling environmental threats including climate change and pollution[9]. Energy transition therefore focuses on shifting from an energy mix based on fossil fuels to one that produces very limited, if not zero, carbon emissions, based on green and clean sources of energy such as renewable energy sources[10]. According to the International Energy Agency (IEA), renewables, including solar, wind, hydropower, biofuels and others, are at the centre of the transition to less carbon-intensive and more sustainable energy systems[11].

The global quest for energy transition is envisioned under the United Nations *2030 agenda for Sustainable Development*[12]. Under the Agenda, Sustainable Development Goal (SDG) 7 seeks to ensure access to affordable, reliable, sustainable and modern energy for all with a focus on renewable energy[13]. At a continental level, African Union's *Agenda 2063*[14] sets out the need for energy transition in Africa. Agenda 2063 portrays the vision of a Continent where renewable energy including wind, solar, hydro, bioenergy, ocean tidal waves, geothermal and other renewables claim more than half of the energy consumption for households, businesses and organizations[15].

In order to fast-track global energy transition, there has been an increase in renewable energy developments[16]. It has been observed that renewable energy generation capacity has grown rapidly all over the world in recent years, driven by policy support and sharp cost reductions for

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[8] S & P Global., 'What is Energy Transition?' Available at https://www.spglobal.com/en/researchinsights/articles/what-is-energy-transition (Accessed on 29/07/2025)

[9] Nalule. V., & Leal-Arcas. R., 'Energy Decentralization and Energy Transition in Poland.' *Electricity Decentralization in the European Union* 2nd Edition., 2023 pp 209-240

[10] The energy transition., Available at https://www.enelgreenpower.com/learning-hub/energy-transition (Accessed on 27/04/2025)

[11] International Energy Agency., 'Renewables' Available at https://www.iea.org/energy-system/renewables (Accessed on 29/07/2025)

[12] United Nations General Assembly., 'Transforming Our World: the 2030 Agenda for Sustainable Development.' 21 October 2015, A/RES/70/1., Available at https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf (Accessed on 29/07/2025)

[13] Ibid

[14] Africa Union., 'Agenda 2063: The Africa we Want.' Available at https://au.int/sites/default/files/documents/33126-doc-framework_document_book.pdf (Accessed on 29/07/2025)

[15] Ibid

[16] International Energy Agency., 'Renewables' Op Cit

solar photovoltaics and wind power[17]. Renewable energy developments are therefore necessary in harnessing renewable energy towards achieving energy transition. Despite their role in energy transition, it has been argued that renewable energy developments can have adverse environmental impacts including biodiversity loss, land use changes, impacts on water quality and quantity, and environmental degradation[18]. Addressing these impacts is key towards effectively harnessing renewable energy for people and planet.

This paper critically examines how to balance environmental conservation and the need for renewable energy developments. It argues that renewable energy developments are vital in fast-tracking global energy transition. However, the paper also notes that renewable energy developments can fuel environmental concerns. The paper discusses some of the major environmental impacts of renewable energy developments. In light of these concerns, the paper proposes measures towards balancing environmental conservation and the need for renewable energy developments in order to realise energy transition for Sustainable Development.

2.0 Renewable Energy Developments: Promises and Pitfalls

Renewable energy developments are on the rise globally. Driven by the global energy crisis, the environmental impacts of fossil fuels and policy momentum, renewable energy projects, in particular solar photovoltaic and wind energy, have grown drastically[19]. Renewable energy developments are also being implemented in Africa. It has been observed that Africa has immense potential for renewable energy with wind, solar, hydro, bioenergy, ocean tidal waves, geothermal among other renewables being abundant throughout the continent[20]. Africa is rich in renewable energy resources, including abundant sunlight, strong winds, and geothermal energy[21]. As a result, there has been an increase in investments and adoption of renewable energy in Africa. It has been observed that the production of renewable energy in Africa is growing with hydro, solar, wind, geothermal, biofuels and biomass accounting for a significant percentage of the total primary energy produced in the continent[22]. Renewable energy investments are

[17] Ibid

[18] Environmental Impacts of Renewable Energy Sources., Available at https://www.adecesg.com/resources/blog/environmental-impacts-of-renewable-energy-sources/ (Accessed on 29/07/2025)

[19] United Nations Environment Programme., 'Renewable Energy' Available at https://www.unep.org/topics/energy/renewable-energy/renewable-energy (Accessed on 30/07/2025)

[20] Africa Union., 'Agenda 2063: The Africa we Want.' Op Cit

[21] AUDA-NEPAD., 'Empowering Africa: Enhancing Access To Electricity Through Renewable Energy' Available at https://www.nepad.org/blog/empowering-africa-enhancing-access-electricity-through-renewable-energy (Accessed on 30/07/2025)

[22] United Nations Conference on Trade and Development., 'Commodities at a Glance: Special Issue on Access to Energy in Sub-Saharan Africa.' Available at Available at https://unctad.org/publication/commodities-glance-special-issue-access-energy-sub-saharan-africa#:~:text=Access%20to%20energy%20is%20defined,be%20scaled%20up%20over%20time (Accessed on 30/07/2025)

beginning to bear fruit in several African countries with wind and solar power dominating non-hydro renewable energy generation and installed capacity[23].

Renewable energy developments are therefore vital in the quest towards energy transition. Further, it has been argued that these projects can also enhance energy security and promote energy justice by fostering the attainment of the right of access to clean, affordable and sustainable energy[24]. Renewable energy developments provide many benefits including new industrial opportunities and jobs, greater energy security, cleaner air, universal energy access and a safer climate for everyone[25]. It has been argued that renewable energy projects can foster Sustainable Development by reducing greenhouse gas emissions, improving energy access and security, creating jobs, and stimulating socio-economic development across education, healthcare, transport and infrastructure, water and sanitation among other vital areas[26]. In addition, to fast-tracking energy transition, it has been argued that renewable energy developments provide added benefits of stimulating employment and economic growth, which move the world closer to a low-carbon economy[27].

Despite providing benefits for people and planet, renewable energy developments can have adverse environmental impacts. For example, clearing land to support renewable energy developments such as wind and geothermal projects can impact wildlife, biodiversity and ecosystems[28]. The production of renewable energy also depends on harnessing critical raw materials. These materials including copper, lithium, nickel, cobalt and rare earth elements are vital components of many of today's rapidly growing renewable energy technologies including wind turbines, electricity networks and electric vehicles[29]. IEA notes that the use of critical raw materials in the energy sector varies by technology; for instance lithium, nickel, cobalt, manganese and graphite are crucial in enhancing battery performance; rare earth elements are

[23] United Nations., 'Advancing SDG 7 in Africa.' Available at https://sdgs.un.org/sites/default/files/2023-06/2023%20Advancing%20SDG7%20in%20the%20Africa-062923.pdf (Accessed on 30/07/2025)

[24] Nizic. M.K., 'The Advantages and Disadvantages of Renewable Energy in the Tourist Destination.' Available at https://www.researchgate.net/publication/320584990_The_Advantages_and_Disadvantages_of_Renewable_Energy_in_the_Tourist_Destination (Accessed on 30/07/2025)

[25] International Energy Agency., 'The Energy World is Set to Change Significantly by 2030, Based on Today's Policy Settings Alone' Available at https://www.iea.org/news/the-energy-world-is-set-to-change-significantly-by-2030-based-on-today-s-policy-settings-alone (Accessed on 30/07/2025)

[26] The role of renewable energy technologies in sustainable development., Available at https://timesofindia.indiatimes.com/blogs/voices/the-role-of-renewable-energy-technologies-in-sustainable-development/ (Accessed on 30/07/2025)

[27] The Global Environment Facility., 'Renewable Energy and Energy Access' Available at https://www.thegef.org/what-we-do/topics/renewable-energy-and-energy-access (Accessed on 30/07/2025)

[28] Environmental Impacts of Renewable Energy Sources., Op Cit

[29] International Energy Agency., 'Critical Minerals' Available at https://www.iea.org/topics/critical-minerals (Accessed on 30/07/2025)

essential for permanent magnets used in wind turbines and electric vehicle motors; and electricity networks need a huge amount of aluminium and copper[30]. The extraction of critical raw materials to support renewable energy technologies often takes a huge toll on the environment and natural resources[31]. It has been argued that unsustainable extraction of critical raw materials can fuel environmental degradation, deforestation, pollution, and biodiversity loss[32]. The extraction of critical raw materials is also associated with significant greenhouse gas emissions arising from energy-intensive mining and processing activities which can worsen the climate crisis[33].

Further, it has been argued that poorly planned hydropower projects can impact ecosystems and biodiversity while also generating greenhouse gas emissions[34]. Hydropower projects often require the building of dams that can disrupt fish migrations and create reservoirs that emit large amounts of greenhouse gases[35]. Further, harnessing renewable energy from the ocean through tidal power projects can impact marine environments and harm marine biodiversity including fish and other species[36]. Renewable energy developments including hydropower projects can also impact water quality and quantity[37].

From the foregoing, it is evident that renewable energy developments can have negative environmental impacts. Balancing environmental conservation and the need for renewable energy developments is therefore key in actualising energy transition for people and planet.

3.0 Balancing Environmental Conservation and the need for Renewable Energy Developments

Renewable energy developments are needed globally in order to support the transition from fossil fuels to clean sources of energy. These projects also support energy justice, energy security, job creation and socio-economic development across key sectors including education, healthcare, agriculture, transport and infrastructure, water and sanitation among others[38]. Renewable energy developments are therefore vital in unlocking Sustainable Development. SDG 7 urges all countries to promote investments and expand infrastructure in the renewable energy sector towards ensuring universal access to affordable, reliable, sustainable and modern energy for all[39]. Despite their vital importance, renewable energy developments can also trigger environmental

[30] Ibid
[31] United Nations Environment Programme., 'What are energy transition minerals and how can they unlock the clean energy age?' Available at https://www.unep.org/news-and-stories/story/what-are-energy-transition-minerals-and-how-can-they-unlock-clean-energy-age (Accessed on 30/07/2025)
[32] Ibid
[33] Ibid
[34] Environmental Impacts of Renewable Energy Sources., Op Cit
[35] Ibid
[36] Tidal Power., Available at https://www.eia.gov/energyexplained/hydropower/tidal-power.php (Accessed on 30/07/2025)
[37] Environmental Impacts of Renewable Energy Sources., Op Cit
[38] The role of renewable energy technologies in sustainable development., Op Cit
[39] United Nations General Assembly., 'Transforming Our World: the 2030 Agenda for Sustainable Development.' 21 October 2015, A/RES/70/1., Op Cit

concerns such as biodiversity loss, pollution, environmental degradation, climate change from greenhouse gases emitted due to unsustainable extraction of critical raw materials, and impacts on water quality and quantity[40].

In light of the foregoing challenges, it is imperative to balance environmental conservation and the need for renewable energy developments. In order to achieve this ideal, it is imperative to plan and implement renewable energy developments in an effective and sustainable manner[41]. It has been argued that greenhouse gas emissions during manufacturing, construction, and maintenance of renewable projects depend largely on how efficiently energy is used as well as the degree of pollution control at the manufacturing site[42]. As a result, there is need to effectively plan renewable energy developments including through involving local communities where such developments are situated in order to ensure that such projects minimise impacts on the environment[43].

There is also need to ensure efficient use of resources such as water and energy in renewable energy developments. It has been argued that the impacts of wind and solar projects can be successfully mitigated through longer lifetimes, larger power capacities, and higher recycling rates[44]. For instance, a plant with a higher capacity and longer lifetime produces larger amounts of energy with lower relative emissions[45]. Consequently, it has been argued that renewable energy developments should be based on large-scale plants, with efficient operation and high end-life recycling rates in order to foster environmental conservation[46].

In addition, it is imperative to harness critical raw materials that support renewable energy developments in a sustainable manner. It has been argued that there is need to embrace responsible extraction practices in harnessing critical raw materials in order to achieve socially just and environmentally sustainable outcomes[47]. It has been suggested that developing circular economy and waste policies to reduce the generation of waste and the input of raw materials in products can enhance sustainability in harnessing critical raw materials[48]. By fostering responsible mining and ensuring circularity through recycling, reusing, and remanufacturing

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[40] Environmental Impacts of Renewable Energy Sources., Op Cit

[41] What are the environmental impacts of renewable energy?., Available at https://www.wilderness.org/news/blog/faq-what-are-environmental-impacts-renewable-energy (Accessed on 30/07/2025)

[42] Ibid

[43] Ibid

[44] Torres. J.F., & Petrakopoulou. F., 'A Closer Look at the Environmental Impact of Solar and Wind Energy' Available at https://pmc.ncbi.nlm.nih.gov/articles/PMC9360340/ (Accessed on 30/07/2025)

[45] Ibid

[46] Ibid

[47] United Nations Environment Programme., 'Critical Energy Transition Minerals' Op Cit

[48] Organisation for Economic Co-operation and Development., 'Making critical minerals work for sustainable growth and development' Available at https://www.oecd.org/en/topics/policy-issues/sustainable-mining-for-development.html (Accessed on 30/07/2025)

products and components, it is possible to ensure stability in supply of critical raw materials while reducing demand through responsible sourcing and resource circulation[49].

4.0 Conclusion

Renewable energy developments are the heart of sustainability by ensuring energy transition and supporting job creation and socio-economic development. However, if not implemented appropriately, these projects can also harm the environment. It is therefore imperative to ensure that renewable energy developments are implemented in an environmentally, culturally and socially responsible manner including through involving local communities in order to ensure that such projects are located in appropriate places that avoid or minimize such environmental impacts, conserving water and energy among other resources, protecting biodiversity, embracing circularity and developing large-scale plants, with efficient operation and high end-life recycling rates[50]. Balancing environmental conservation and the need for renewable energy developments is therefore possible towards realising energy transition for sustainability.

[49] United Nations Environment Programme., 'Critical Energy Transition Minerals' Op Cit

[50] Torres. J.F., & Petrakopoulou. F., 'A Closer Look at the Environmental Impact of Solar and Wind Energy' Op Cit

Chapter 12: Integrating Biodiversity Conservation Across Food, Energy and Financial Systems for Sustainability

Abstract

Threats like overdevelopment and deforestation endanger biodiversity, which leads to socioeconomic problems despite its vital role in delivering essential services. The significance of sustainable strategies that strike a balance between resource consumption and conservation is highlighted by the relationship between ecosystem services and economic stability. Mismanagement of renewable projects presents risks as nations seek to increase renewable energy while reducing biodiversity loss. It is critical to change energy use and assess energy sources impartially. Additionally, because of transition risks, businesses need to adjust to biodiversity-friendly practices. Investing in natural capital and increasing resource efficiency are two ways to support green economies, particularly in industries that rely on biological resources. This paper examines how sustainability can be improved by integrating biodiversity conservation into the food, energy, and financial systems.

1.0 Introduction

Since biodiversity was taken into consideration separately by the IUCN, the environmental aspect of sustainability has mostly concentrated on managing renewable resources rather than biodiversity.[1] At the Millennium Summit in 2000, the UN launched the Millennium Development Project, which marked the beginning of its focus on sustainable development. The conservation of biodiversity was not explicitly addressed by the Millennium Development Goals (MDGs), which placed an emphasis on the sustainable management of ecosystems and natural resources.[2] 157 nations signed the Convention on Biological Diversity (CBD) in 1992, acknowledging the value of biodiversity for ecosystem services and sustainable agricultural systems.[3] In particular, Goals 14 and 15 of the 2015 Sustainable Development Goals (SDGs) address the preservation and value of biodiversity, further integrating biodiversity and sustainability.[4]

Essential socio-cultural and economic services like food, water, shelter, medicine, energy, and aesthetic value depend on biodiversity.[5] Yet, problems like overdevelopment, deforestation, and ignorance are having a negative impact on biodiversity, leading to the extinction of species, the destruction of habitats, and the degradation of ecosystems.[6] At the moment, socioeconomic

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[1] Niesenbaum RA, 'The Integration of Conservation, Biodiversity, and Sustainability' (2019) 11 Sustainability 1.

[2] Ibid.

[3] Ibid.; see also Reyers B and others, 'Finding Common Ground for Biodiversity and Ecosystem Services' (2012) 62 BioScience 503.

[4] Ibid.; see also Stafford-Smith M and others, 'Integration: The Key to Implementing the Sustainable Development Goals' (2017) 12 Sustainability Science 911.

[5] Gul E and Chaudhry IS, 'Socio-Economic Context of Saving Biodiversity' (2016) 4 Journal of Environmental Management and Tourism 37.

[6] Ibid.

downturns result from the natural resources' regeneration rate being much slower than its consumption rate.[7] A sustainable strategy for biodiversity conservation is required to address this, with the goal of striking a balance between the benefits and drawbacks of resources. People's quality of life could be lowered, poverty could worsen, and economic conditions could degrade further if biodiversity is not sustainably preserved.[8]

Economic reliance on nature is explained by ecosystem services, which have their roots in economics and the natural sciences.[9] Provisioning, regulating, and supporting services are provided by a healthy ecosystem. The supply of these services is determined by the ecological production function, and calculating their monetary value aids in identifying trade-offs and effects on the state of the economy.[10] Businesses that depend on ecosystem services face serious risks as biodiversity loss diminishes their availability.[11]

Two of the biggest issues facing humanity in the twenty-first century are ensuring universal food security and protecting biodiversity. Generally speaking, these difficulties are thought to entail a trade-off, particularly in the Global South's farming environments.[12] As countries step up their efforts to tackle climate change, they face the twin challenges of increasing the production of renewable energy and tackling the loss of biodiversity.[13] Although the move away from fossil fuels has the potential to reduce the stress that climate change is placing on biodiversity, there are risks associated with this change. The expansion of renewable energy sources could jeopardise biodiversity if not carefully controlled.[14]

Dependency on fossil fuels leads to climate change, which poses a serious threat to ecosystems, and poorly designed renewable energy projects can also cause habitat fragmentation. We are

[7] Ibid.
[8] Ibid.
[9] Steindl T, Küster S and Hartlieb S, 'Pricing Firms' Biodiversity Risk Exposure: Empirical Evidence from Audit Fees' (2025) 29 Journal of Industrial Ecology 828.
[10] Ibid.; see also Niesenbaum RA, 'The Integration of Conservation, Biodiversity, and Sustainability' (2019) 11 Sustainability 1.
[11] Ibid.; see also Dong H and others, 'Does Natural Resource Dependence Restrict Green Development? An Investigation from the "Belt and Road" Countries' (2024) 255 Environmental Research 119108.
[12] Hanspach J and others, 'From Trade-Offs to Synergies in Food Security and Biodiversity Conservation' (2017) 15 Frontiers in Ecology and the Environment 489.
[13] 'Mainstreaming Biodiversity into Renewable Power Infrastructure' (*OECD*, 29 January 2024) <https://www.oecd.org/en/publications/mainstreaming-biodiversity-into-renewable-power-infrastructure_357ac474-en.html> accessed 29 October 2025; see also WCMC, UNEP. "Mainstreaming of Biodiversity into the Energy and Mining Sectors: An Information Document for the 21st Meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA-21)." (2017).
[14] Ibid.

encouraged by the nexus approach to recognise these links and look for integrated solutions.[15] The "Nexus" represents the connections and interdependencies between other industries, such as energy, and biodiversity conservation.[16]

Energy consumption in modern society is very high and keeps rising as the population and level of wealth increase. Natural areas and biodiversity are frequently negatively impacted by the production and consumption of energy.[17] It is essential that society create a future energy mix that incorporates alternative sources in order to lessen its dependency on coal, oil, and gas.[18] Different viewpoints on what makes up a sustainable energy portfolio are probably going to be generated through this process, which emphasises the necessity of an unbiased assessment of the advantages and disadvantages of different energy sources.[19]

Companies face transition risks in addition to the physical risks associated with biodiversity loss, as stakeholders like regulators and customers put pressure on them to slow biodiversity loss and switch to more biodiversity-friendly business practices.[20] The two main tactics for creating "green" economic sectors and moving towards a green economy are investing in natural capital and improving energy and resource efficiency.[21] For industries like agriculture, forestry, and fisheries that rely on biological resources, the former is a key tactic. For industries like manufacturing, transportation, and construction that rely on the transformation of natural capital, the latter is essential to lowering resource intensity and environmental impact.[22]

This paper critically discusses the prospects and challenges in integrating and entrenching biodiversity conservation across food, energy and financial systems as a way of promoting sustainability.

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[15] Directory S, 'Biodiversity Conservation Nexus → Term' (*Energy → Sustainability Directory*) <https://energy.sustainability-directory.com/term/biodiversity-conservation-nexus/> accessed 29 October 2025.

[16] Ibid.; see also Fleurke F and Paiement P, 'Are Renewable Energy Technologies Compatible with Biodiversity Conservation? The Energy–Conservation Legal Nexus', *Climate Technology and Law in the Anthropocene* (Bristol University Press 2025) <https://bristoluniversitypressdigital.com/edcollchap-oa/book/9781529232912/ch002.xml> accessed 29 October 2025.

[17] Brook BW and Bradshaw CJA, 'Key role for nuclear energy in global biodiversity conservation' (2015) 29 Conservation Biology 702.

[18] Ibid.

[19] Ibid.

[20] Steindl T, Küster S and Hartlieb S, 'Pricing Firms' Biodiversity Risk Exposure: Empirical Evidence from Audit Fees' (2025) 29 Journal of Industrial Ecology 828.

[21] Gasparatos A and others, 'Renewable Energy and Biodiversity: Implications for Transitioning to a Green Economy' (2017) 70 Renewable and Sustainable Energy Reviews 161.

[22] Ibid.

2.0 Impact of Biodiversity Loss on Food, Energy and Financial Systems: Challenges and Prospects

Different incentives, information frictions, and equity concerns make policy design for biodiversity conservation and ecosystem services both complex and full of opportunities.[23] These complexities are highlighted by Payments for Ecosystem Services (PES), where effective targeting of areas, enforcing conditions through dependable monitoring, setting payment levels appropriately, and managing participant and benefit tracking are all necessary for successful outcomes.[24] The consideration of counterfactuals and spillovers is necessary due to issues like leakage and dynamic responses. It is possible to overcome the drawbacks of individual strategies and promote adaptive management by combining different policy tools, such as price-based instruments and regulatory measures.[25] Advocating for transparent, accountable decision-making frameworks requires clear objectives, instrument interactions, and periodic review mechanisms—especially in the face of ecological uncertainty.[26]

Together with the integration of water, energy, and food nexus thinking, the intersection of ecosystems, livelihoods, and the economy is becoming a prominent area of scholarly inquiry.[27] The goal of this system-thinking approach is to highlight the relationships between policy and decision-making in order to minimise unintended consequences and negative externalities when addressing common issues on a local and global scale.[28]

As the demand for food, energy, and water rises due to urbanisation, climate change, population growth, and environmental degradation, the world faces a major resource management challenge.[29] As a remedy, the water–energy–food (WEF) nexus has surfaced, emphasizing the interdependencies and connections between these systems and the ecosystems that sustain them.[30] The WEF nexus seeks to improve resource efficiency and support sustainable development by encouraging integrated resource management and cooperation between

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[23] Ma L, Hong L and Liang X, 'Integrating Ecological and Economic Approaches for Ecosystem Services and Biodiversity Conservation: Challenges and Opportunities' (2025) 6 Ecologies 70.
[24] Ibid.; see also Wang P and Wolf SA, 'A Targeted Approach to Payments for Ecosystem Services' (2019) 17 Global Ecology and Conservation e00577.
[25] Ibid.
[26] Ibid.; see also Handoyo S, 'Public Governance and National Environmental Performance Nexus: Evidence from Cross-Country Studies' (2024) 10 Heliyon e40637; Gardner TA and others, 'Transparency and Sustainability in Global Commodity Supply Chains' (2019) 121 World Development 163; Shi T, 'Ecological Economics as a Policy Science: Rhetoric or Commitment towards an Improved Decision-Making Process on Sustainability' (2004) 48 Ecological Economics 23; Cairney P, Timonina I and Stephan H, 'How Can Policy and Policymaking Foster Climate Justice? A Qualitative Systematic Review' (2023) 3 Open Research Europe 51.
[27] Reyers B and others, 'Finding Common Ground for Biodiversity and Ecosystem Services' (2012) 62 BioScience 503.
[28] Ibid.
[29] Rhouma A and others, 'Trends in the Water–Energy–Food Nexus Research' (2024) 16 Sustainability 1162.
[30] Ibid.

stakeholders, scientists, and policymakers.[31] This strategy reduces environmental effects, increases resilience to upcoming difficulties, and guarantees the long-term availability of vital resources.[32] The successful application of the WEF nexus approach requires active cooperation between government organisations, the commercial sector, academia, and civil society.[33]

Global biodiversity loss and ecosystem degradation have been greatly exacerbated by the growth of agriculture, and this trend is likely to continue in the absence of efficient management techniques.[34] It is important to understand which elements endure during agricultural conversion and to acknowledge that biodiversity can be preserved in agricultural landscapes. The dynamics influencing the preservation of biodiversity and methods for efficient management are important questions.[35] In order to align with human well-being, progress in these areas will be controversial and require cooperation across research, ecosystem policy, and conservation science disciplines.[36] Even though integration may seem like a difficult goal, funding and research efforts are making progress in addressing these problems.[37]

Financing decisions continue to worsen the loss of biodiversity worldwide, despite growing awareness of the financial and economic risks associated with it.[38] Regulation imposing restrictions on the exploitation of nature, concentrating on local risks resulting from biodiversity impacts, scaling biodiversity finance using its secondary benefits, and co-leading the development of biodiversity finance by financial decision-makers are the four guiding principles for incorporating biodiversity into financial decision-making. This strategy will assist in lessening the adverse effects of biodiversity loss.[39]

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[31] Ibid.; see also 'A Review of Water-Energy-Food Nexus Frameworks, Models, Challenges and Future Opportunities to Create an Integrated, National Security-Based Development Index - ScienceDirect' <https://www.sciencedirect.com/science/article/pii/S2772427125000506> accessed 29 October 2025; 'Driving Climate Resilience through the Water-Energy-Food Nexus in Kenya' (*SEI*) <https://www.sei.org/features/driving-climate-resilience-through-the-water-energy-food-nexus-in-kenya/> accessed 29 October 2025; Richelle B, Mao F and Liebe U, 'Towards Equitable, Integrated, and Adaptive Water-Energy-Food Nexus Research in Africa: A Systematic Literature Review' (2025) 115 Environmental Impact Assessment Review 108043;

[32] Ibid.

[33] Ibid.; see also Olarewaju OO and others, 'Integrating Sustainable Agricultural Practices to Enhance Climate Resilience and Food Security in Sub-Saharan Africa: A Multidisciplinary Perspective' (2025) 17 Sustainability 6259.

[34] Norris K, 'Agriculture and Biodiversity Conservation: Opportunity Knocks' (2008) 1 Conservation Letters 2.

[35] Ibid.

[36] Ibid.; see also Gavin MC and others, 'Effective Biodiversity Conservation Requires Dynamic, Pluralistic, Partnership-Based Approaches' (2018) 10 Sustainability 1846.

[37] Ibid.

[38] Nedopil C, 'Integrating Biodiversity into Financial Decision-making: Challenges and Four Principles' (2023) 32 Business Strategy and the Environment 1619.

[39] Ibid.

Financial markets are also subject to (physical and transitional) biodiversity risks. In reality, risks to biodiversity account for over half of the market value of the major stock exchanges.[40] Thus, there could be severe financial repercussions if biodiversity risks are underestimated or ignored. Therefore, it is essential to comprehend whether and how financial markets price biodiversity risks.[41]

Gaining a better understanding of the role that biodiversity plays in a Green Economy and the potential financial costs and benefits of its conservation requires identifying the hidden "green-economic" trade-offs associated with the expansion of renewable energy.[42] There is some understanding of the nature of these trade-offs, but in order to steer the shift to a green economy without having detrimental effects on biodiversity, a stronger body of evidence and suitable assessment/planning tools will be needed.[43]

3.0 Integrating Biodiversity Conservation Across Food, Energy and Financial Systems for Sustainability: Way Forward

The relationship between environmental sustainability and human well-being is highlighted by the 17 interconnected Sustainable Development Goals (SDGs) in the 2030 Agenda.[44] It asserts that environmental sustainability is crucial for social and economic advancement and emphasises that the health and management of natural capital are necessary for the accomplishment of these goals.[45]

The establishment of quantifiable success indicators is essential for the successful integration of biodiversity conservation and sustainability goals. The creation and use of quantitative metrics to evaluate the results of these coordinated efforts is a top research priority.[46] Despite the existence of numerous criteria and indicators for biodiversity conservation in forest management, many of them require thorough species inventories, which can be difficult to carry out. There may be more practical ways to estimate biodiversity, such as by evaluating indicator species or structural indicators like stand complexity.[47] Quantifying biodiversity across different ecosystems and implementing adaptive management strategies that integrate continuous

[40] Steindl T, Küster S and Hartlieb S, 'Pricing Firms' Biodiversity Risk Exposure: Empirical Evidence from Audit Fees' (2025) 29 Journal of Industrial Ecology 828.
[41] Ibid.
[42] Gasparatos A and others, 'Renewable Energy and Biodiversity: Implications for Transitioning to a Green Economy' (2017) 70 Renewable and Sustainable Energy Reviews 161.
[43] Ibid.
[44] Ma L, Hong L and Liang X, 'Integrating Ecological and Economic Approaches for Ecosystem Services and Biodiversity Conservation: Challenges and Opportunities' (2025) 6 Ecologies 70.
[45] Ibid.
[46] Niesenbaum RA, 'The Integration of Conservation, Biodiversity, and Sustainability' (2019) 11 Sustainability 1.
[47] Ibid.

monitoring and research should be the main areas of future study.[48] Evaluation of conservation efforts and socioeconomic factors, such as poverty alleviation and sustainable resource use, must be done concurrently for integration to be effective.[49]

Connecting biophysical changes to human well-being through ideas like the ecosystem-services framework, which divides nature's contributions into provisioning, regulating, supporting, and cultural services, is necessary for a decision-oriented integration of ecology and economics.[50] This framework helps decision-makers understand how ecosystem changes affect social and economic outcomes. Because species diversity helps people become more resilient to shocks, especially those brought on by climate change, biodiversity is essential.[51] When ecosystems and biodiversity are framed as natural capital, upkeep and restoration are seen as long-term investments that will ensure social equity, economic stability, and ecological integrity across generations. This aligns environmental stewardship with sustainable development.[52]

One of the main causes of the decline in biodiversity worldwide is agriculture. A comprehensive grasp of how land use affects ecosystem services is necessary to address this in a sustainable future vision.[53] Understanding patterns in biodiversity, creating management plans, and investigating how biodiversity affects ecosystem function all depend on conservation science.[54] For agricultural landscapes to be managed effectively and to guarantee food security, poverty reduction, and environmental preservation, research from the social and agricultural sciences must be integrated.[55]

Production of food and fibre uses about 40% of the Earth's surface, and this percentage is predicted to increase, posing serious threats to biodiversity and the environment.[56] Maintaining

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[48] Ibid.

[49] Ibid.; see also Ma L, Hong L and Liang X, 'Integrating Ecological and Economic Approaches for Ecosystem Services and Biodiversity Conservation: Challenges and Opportunities' (2025) 6 Ecologies 70; see also Wu, Tong. "Integrating biodiversity conservation with poverty reduction: A socioeconomic perspective." *Bulletin of the Ecological Society of America* 90, no. 1 (2009): 80-86.

[50] Ma L, Hong L and Liang X, 'Integrating Ecological and Economic Approaches for Ecosystem Services and Biodiversity Conservation: Challenges and Opportunities' (2025) 6 Ecologies 70.

[51] Ibid.

[52] Ibid.

[53] Norris K, 'Agriculture and Biodiversity Conservation: Opportunity Knocks' (2008) 1 Conservation Letters 2; see also Dem P and others, 'Integrating Biodiversity and Ecosystem Services in Land Use Change Assessment through Sustainability Indicator' (2025) 114 Environmental Impact Assessment Review 107971.

[54] Ibid.

[55] Ibid.; see also Agrawal A and Redford KH, *Poverty, Development, and Biodiversity Conservation: Shooting in the Dark?*, vol 26 (Wildlife Conservation Society New York 2006) <https://www.academia.edu/download/91260595/Agrawal_Redford_WP26.pdf> accessed 28 October 2025.

[56] Niesenbaum RA, 'The Integration of Conservation, Biodiversity, and Sustainability' (2019) 11 Sustainability 1.

traditional agroecosystems and advancing regenerative sustainable agriculture practices are essential to reducing these risks.[57] Community-based outreach and demonstration should be used to promote these, emphasizing that they can improve yields over the long run without the need for outside or governmental enforcement.[58] Furthermore, sustainable development depends on increasing awareness of biodiversity and how to manage it. Future agricultural practices require fostering a sense of community and individual appreciation for agricultural biodiversity and putting policies in place to measure agrobiodiversity and biodiversity.[59]

Cooperation and research and innovation funding are necessary to address the difficulties in integrating biodiversity and agroecosystem practices to promote sustainable food security. Undoubtedly, highlighting the necessity of cooperation and funding for research and innovation is crucial to creating suitable technologies and policies.[60]

To enable African researchers to tackle regional issues, policymakers should concentrate on providing infrastructure and funding for regional research institutions.[61] In order to address food security and climate change, collaborative efforts are crucial. Policies should support the conservation of biodiversity and agroecological practices, providing farmers with incentives to use sustainable farming practices.[62] Resilience will be increased by incorporating traditional methods and indigenous knowledge. Future studies should look into the socioeconomic factors that contribute to food insecurity and develop specialized adaptation plans.[63] Investing in cutting-edge technologies, such as smart agriculture, is essential for increasing output and minimising environmental damage. To assess the efficacy of policies and practices, monitoring frameworks should be established.[64]

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[57] Ibid.
[58] Ibid.
[59] Ibid.
[60] Rapiya M, Truter W and Ramoelo A, 'The Integration of Land Restoration and Biodiversity Conservation Practices in Sustainable Food Systems of Africa: A Systematic Review' (2024) 16 Sustainability 8951.
[61] Ibid.
[62] Ibid.; see also Vikas and Ranjan R, 'Agroecological Approaches to Sustainable Development' (2024) 8 Frontiers in Sustainable Food Systems <https://www.frontiersin.org/journals/sustainable-food-systems/articles/10.3389/fsufs.2024.1405409/full> accessed 28 October 2025; Olarewaju OO and others, 'Integrating Sustainable Agricultural Practices to Enhance Climate Resilience and Food Security in Sub-Saharan Africa: A Multidisciplinary Perspective' (2025) 17 Sustainability 6259; Sahoo S and others, 'Review of Climate-Resilient Agriculture for Ensuring Food Security: Sustainability Opportunities and Challenges of India' (2025) 25 Environmental and Sustainability Indicators 100544.
[63] Ibid.; see also Masango, C.A. and Mbarika, V.W., "Indigenous knowledge application in increasing food security: A measure to consider?" *Inkanyiso: Journal of Humanities and Social Sciences* 14, no. 1 (2022): 1-10; see also Ngongolo K and Kyando M, 'Biodiversity Conservation and Socio-Economic Development for Africa's Harmonious Future: A Scoping Review' (2025) 2 BMC Environmental Science 11.
[64] Ibid.

Large-scale integration of sustainable agricultural practices necessitates ambitious legislative measures, farmer-led innovation, equitable funding, and continuous oversight.[65] To break down systemic barriers and make investments in scalable and locally based solutions, stakeholders—including governments, researchers, practitioners, and donors—must work together.[66] Food security can be greatly increased by reframing traditional farming methods that prioritize soil conservation and nutrition.[67] It is also crucial to make sure local varieties have access to propagation materials. However, issues like a lack of funding and human resources may prevent communities from realising the full potential of biodiversity. [68] To fully benefit from biological diversity, stakeholders and agencies must work together to develop social capital in local governance and community institutions.[69]

Environmental degradation is caused by nature's economic invisibility in traditional accounting, which needs to be addressed for sustainability policies to be effective.[70] The need to integrate ecological considerations into economic decision-making is underscored by initiatives such as the Economics of Ecosystems and Biodiversity (TEEB) and the 2019 Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Global Assessment, which highlight the dependence of human well-being on natural capital and ecosystem services.[71] Poor policy decisions can result from misconceptions, so institutional channels are required to incorporate valuation into planning and budgeting procedures. Although they need the right context and design, market-based conservation strategies like Payments for Ecosystem Services have promise.[72] Restructuring economies towards low-carbon, circular, and green models that take into account planetary boundaries is ultimately necessary for a successful sustainability transition. Institutional and cultural barriers that impede cooperative problem- solving must also be addressed.[73]

In order to achieve the Sustainable Development Goals (SDGs), economic models that respect biophysical limits and prioritize inclusion and innovation must replace linear and resource-

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[65] Olarewaju OO and others, 'Integrating Sustainable Agricultural Practices to Enhance Climate Resilience and Food Security in Sub-Saharan Africa: A Multidisciplinary Perspective' (2025) 17 Sustainability 6259.
[66] Ibid.
[67] 'Proceedings of the Workshop on Forests for Poverty Reduction: Opportunities with CDM, Environmental Services and Biodiversity' <https://www.fao.org/4/ae537e/ae537e0e.htm> accessed 29 October 2025.
[68] Ibid.
[69] Ibid.
[70] Ma L, Hong L and Liang X, 'Integrating Ecological and Economic Approaches for Ecosystem Services and Biodiversity Conservation: Challenges and Opportunities' (2025) 6 Ecologies 70.
[71] Ibid.
[72] Ibid.; see also Kieslich M and Salles J-M, 'Implementation Context and Science-Policy Interfaces: Implications for the Economic Valuation of Ecosystem Services' (2021) 179 Ecological Economics 106857; Newell, R., "The climate-biodiversity-health nexus: a framework for integrated community sustainability planning in the Anthropocene." *Frontiers in Climate* 5 (2023): 1177025.
[73] Ibid.

depleting consumption patterns.[74] This transition is guided by three interconnected paradigms: the Low-Carbon Economy, which primarily aims to mitigate greenhouse gas emissions but also requires sustainable management of ecosystems and social equity; the Circular Economy, which encourages durability and resource efficiency through sustainable design; and the Green Economy, which emphasises low carbon, resource efficiency, and social inclusion.[75] The low-carbon framework fits into the larger green and circular economies, and these strategies are interrelated. To achieve sustainability and reduce environmental impacts, effective policy must combine a variety of tools.[76]

Although biodiversity conservation is essential to human survival, it frequently clashes with human development and activity.[77] By including biodiversity conservation into frameworks for sustainable development, this conflict can be lessened. Biodiversity science has a long history, but it has taken a while to develop into a discipline that can handle today's problems, in part because of a lack of interdisciplinary cooperation.[78] Reconciliation ecology seeks to find constructive ways for humans and other species to coexist in order to ease the conflict between conservation and development. Policies for conservation and development must be informed by ongoing research in this field.[79]

Diversified technologies and resources, adaptive governance that includes monitoring and revision, and an acceptance of reliance on life-supporting systems are all characteristics of a sustainable economy.[80] In order to guarantee that progress towards the Sustainable Development Goals (SDGs) stays within the bounds of the Earth system and is adaptable to change, this strategy connects economic transformation to resilience and planetary boundaries.[81]

Ecosystem services from global biodiversity conservation can generate economic benefits, but it is essential to measure, value, and map these services in order to pinpoint areas where

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[74] Ma L, Hong L and Liang X, 'Integrating Ecological and Economic Approaches for Ecosystem Services and Biodiversity Conservation: Challenges and Opportunities' (2025) 6 Ecologies 70.
[75] Ibid.
[76] Ibid.
[77] Niesenbaum RA, 'The Integration of Conservation, Biodiversity, and Sustainability' (2019) 11 Sustainability 1; see also Fisher J and Rucki K, 'Re-conceptualizing the Science of Sustainability: A Dynamical Systems Approach to Understanding the Nexus of Conflict, Development and the Environment' (2017) 25 Sustainable Development 267.
[78] Ibid.; see also Evans MC, 'Re-Conceptualizing the Role (s) of Science in Biodiversity Conservation' (2021) 48 Environmental Conservation 151.
[79] Ibid.; see also Naeem, S., Bunker, D.E., Hector, A., Loreau, M. and Perrings, C., "Introduction: the ecological and social implications of changing biodiversity. An overview of a decade of biodiversity and ecosystem functioning research." (2009): 3-13; see also Liu J and others, 'Systems Integration for Global Sustainability' (2015) 347 Science 1258832.
[80] Ma L, Hong L and Liang X, 'Integrating Ecological and Economic Approaches for Ecosystem Services and Biodiversity Conservation: Challenges and Opportunities' (2025) 6 Ecologies 70.
[81] Ibid.

conservation benefits human economies and biodiversity at the same time.[82] By using data, maps, classifications, and scenarios to enhance decision-making on environmental issues, the Ecosystem Services (ES) concept is essential for incorporating environmental considerations into public policy.[83]

It is recommended that policymakers give priority to three areas: incorporating natural capital accounting into national fiscal analyses; enacting hybrid policy mixes for carbon pricing that incorporate green finance and targeted standards; and creating science–policy interfaces to improve planning and budgetary decision-making.[84] In the meantime, the research community should concentrate on improving integrated assessments of social-ecological systems, creating transparent Artificial Intelligence (AI) while keeping an eye on environmental effects, and closing the gap between theory and practice.[85] Long-term success for businesses depends on adopting circular economy models, making investments in nature-based solutions, and integrating nature into risk disclosures.[86] When used together, these tactics can support conservation and bring economic structures into line with ecological sustainability, which will be advantageous to both people and the environment.[87]

4.0 Conclusion

An economic approach to biodiversity conservation and ecosystem service delivery can offer justification for incorporating conservation goals into policy.[88] Additionally, this strategy might make it easier to generate additional revenue using market-based instruments. However, it is important to recognise and convey the inherent difficulties and constraints related to the design and valuation of these policy tools.[89] Integrating biodiversity conservation across Food, Energy and Financial Systems for Sustainability is an imperative that should be achieved.

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[82] Naidoo R and others, 'Global Mapping of Ecosystem Services and Conservation Priorities' (2008) 105 Proceedings of the National Academy of Sciences 9495.

[83] Kieslich M and Salles J-M, 'Implementation Context and Science-Policy Interfaces: Implications for the Economic Valuation of Ecosystem Services' (2021) 179 Ecological Economics 106857.

[84] Ma L, Hong L and Liang X, 'Integrating Ecological and Economic Approaches for Ecosystem Services and Biodiversity Conservation: Challenges and Opportunities' (2025) 6 Ecologies 70; see also Anjanappa, J., Samant, S. and Thakur, B., "Mainstreaming Biodiversity into Power Sector Planning and Policy to Deliver Better Outcomes for Nature and the Climate." *Available at SSRN 4965343* (2024).

[85] Ibid.

[86] Ibid.; see also Stefanakis, A.I., Calheiros, C.S. and Nikolaou, I., "Nature-based solutions as a tool in the new circular economic model for climate change adaptation." *Circular Economy and Sustainability* 1, no. 1 (2021): 303-318.

[87] Ibid.; see also Santangeli, A., Toivonen, T., Pouzols, F.M., Pogson, M., Hastings, A., Smith, P. and Moilanen, A., "Global change synergies and trade-offs between renewable energy and biodiversity." *Gcb Bioenergy* 8, no. 5 (2016): 941-951.

[88] Hansjürgens B, Kehl C and Loft L, 'The Economic Approach to Ecosystem Services and Biodiversity: Policy Design and Institutions Matter' (2016) 25 GAIA - Ecological Perspectives for Science and Society 174.

[89] Ibid.

Chapter 13: Attaining a Clean and Healthy Urban Environment: Utilising Waste-to-Energy Technology to Power Cities

Abstract

This paper critically examines how waste-to-energy technology can foster clean and healthy urban environments for Sustainable Development. The paper argues that cities and urban areas globally are facing mounting environmental and social challenges key among them being the problem of municipal waste. It notes that cities and urban areas globally are facing waste management challenges due to rapid urbanization, poor waste management practices, lack of technical and financial capacity, and low policy priority among other factors. The paper argues that the challenge of municipal waste is putting the lives and health of city residents at risk while also fueling environmental challenges including pollution and climate change. In light of the challenge of municipal waste, the paper advocates the adoption of waste-to-energy technology in order to power cities while also fostering clean and healthy urban environments.

1.0 Introduction

Cities and urban areas are hubs of economic growth and development. It has been observed that cities and urban areas are the centres where most countries generate their Gross Domestic Product (GDP)[1]. Further, most private sector jobs are created in cities and urban areas[2]. According to the United Nations Human Settlements Programme (UN Habitat), cities and urban areas act as engines of national economic development[3]. Strong urban economies are necessary in poverty reduction and the provision of vital services including adequate housing, transport and infrastructure, water and sanitation, health, education and safety[4]. Cities and urban areas are therefore engines of economic growth. It has been argued that the rapid economic growth usually associated with urbanisation can be attributed to structural transformation, as labour moves from the agricultural sector in rural areas to industry and services in cities and urban areas[5].

The world is witnessing a rapid pace of urbanization. It is estimated that currently, nearly half of the world's population live in cities and urban areas[6]. Further, it has been pointed out that by 2050, nearly 7 in 10 people globally will live in cities[7]. The world is therefore becoming increasingly urbanized with this trend expected to accelerate in the coming years. Much of this

[1] World Bank Group., 'Urban Development' Available at https://www.worldbank.org/en/topic/urbandevelopment/overview (Accessed on 01/07/2025)
[2] Ibid
[3] United Nations-Habitat., 'The Economic Role of Cities' Available at https://unhabitat.org/sites/default/files/download-manager-files/Economic%20Role%20of%20Cities.pdf (Accessed on 01/07/2025)
[4] Ibid
[5] Colenbrander. S., 'Cities as engines of economic growth: The case for providing basic infrastructure and services in urban areas' Available at https://www.iied.org/sites/default/files/pdfs/migrate/10801IIED.pdf (Accessed on 01/07/2025)
[6] World Bank Group., 'Urban Development' Op Cit
[7] Ibid

urbanization is expected to unfold in Africa and Asia ushering in huge social, economic and environmental transformations[8]. The rapid growth of cities and urban areas globally has the potential to drive human development and progress[9]. It has been argued that urbanization has the potential to usher in a new era of human well-being and prosperity, resource efficiency and economic growth[10]. As cities and urban areas grow, they help entire regions and even countries to become more prosperous and productive[11].

Despite having the potential to drive economic growth and prosperity, the rapid growth of cities and urban areas is also associated with several challenges. For instance, due to the high concentration of people, infrastructure, housing and economic activities, cities and urban areas are particularly vulnerable to climate change and natural disasters[12]. Further, urbanization has been identified as a major source of greenhouse gases contributing to the climate crisis[13]. Cities and urban areas are also facing challenges in meeting the growing demand for better jobs, transport, infrastructure, healthcare, education, housing and energy among other basic urban services[14]. In light of these challenges, it has been argued that Sustainable development depends on the successful management of urban growth to create sustainable cities and urban centres in both developed and developing countries[15]. Achieving sustainability in cities is therefore vital in enhancing the quality of life for people residing in cities and protecting urban environments for posterity.

This paper critically examines how waste-to-energy technology can foster clean and healthy urban environments for Sustainable Development. The paper argues that cities and urban areas globally are facing mounting environmental and social challenges key among them being the problem of municipal waste. It notes that cities and urban areas globally are facing waste management challenges due to rapid urbanization, poor waste management practices, lack of technical and financial capacity, and low policy priority among other factors. The paper argues that the challenge of municipal waste is putting the lives and health of city residents at risk while also fueling environmental challenges including pollution and climate change. In light of the

[8] United Nations Population Fund., 'Urbanization' Available at https://www.unfpa.org/urbanization (Accessed on 01/07/2025)
[9] Kuddus. M.A., Tynan. E., & McBryde. E., 'Urbanization: a problem for the rich and the poor?' *Public Health Reviews*., Volume 41., No. 1 (2020)
[10] United Nations Population Fund., 'Urbanization' Op Cit
[11] World Bank Group., 'Urban Development' Op Cit
[12] United Nations Environment Programme., 'Goal 11: Sustainable Cities and Communities' Available at https://www.unep.org/explore-topics/sustainable-development-goals/why-do-sustainable-development-goals-matter/goal-11 (Accessed on 01/07/2025)
[13] United Nations-Habitat., 'World Cities Report 2024: Cities and Climate Action' Available at https://unhabitat.org/wcr/ (Accessed on 01/07/2025)
[14] World Bank Group., 'Urban Development' Op Cit
[15] United Nations., 'Urbanization' Available at https://www.un.org/development/desa/pd/content/urbanization-0 (Accessed on 01/07/2025)

challenge of municipal waste, the paper advocates the adoption of waste-to-energy technology in order to power cities while also fostering clean and healthy urban environments.

2.0 The Problem of Municipal Waste in Cities

Municipal waste has been identified as the most significant contributor to the problem of waste. Municipal waste refers to the waste generated by individuals and households in their day-to-day activities[16]. Municipal waste has also been defined as waste collected and treated by, or for municipalities[17]. It covers waste from households, commerce and trade, office buildings, yard and garden waste, street sweepings among other kinds of waste[18]. It has been pointed out that municipal waste consists of waste collected by or on behalf of municipal authorities and disposed of through waste management systems[19]. It mainly consists of waste generated by households, although it also includes similar waste from other sources including shops, offices and public institutions[20].

Municipal waste generation is a global problem. It is estimated that more than 2 billion tonnes of municipal waste is generated globally every year with this figure expected to rise to over 3.8 billion tonnes by 2050 if no urgent action is taken[21]. It has been pointed out that food, green waste and plastics among other sources are the major contributor to municipal waste[22]. Rapid urbanization, population growth, poor waste management practices, and the expansion of industries contribute to the global problem of municipal waste[23]. With rising urbanization, rapid industrialization, and ever-increasing consumption, the generation of municipal waste is expected to increase in the coming years[24]. Increase in generation of municipal waste is expected to be more in developing countries, where the challenge of municipal waste is worsened by the lack of reliable waste collection services, limited source separation of waste types, inadequate

[16] JeyaSundar. P.G et al., 'Waste treatment approaches for environmental sustainability' *Microorganisms for Sustainable Environment and Health.,* 2020 pp 119-135

[17] Organisation for Economic Co-operation and Development., 'Municipal Waste' Available at https://www.oecd.org/en/data/indicators/municipal-waste.html (Accessed on 01/07/2025)

[18] Ibid

[19] European Commission., 'Glossary: Municipal waste' Available at https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Municipal_waste (Accessed on 01/07/2025)

[20] Ibid

[21] United Nations Environment Programme., 'Global Waste Management Outlook 2024' Available at https://www.unep.org/resources/global-waste-management-outlook-2024 (Accessed on 01/07/2025)

[22] Yatoo. A.M., 'Global perspective of municipal solid waste and landfill leachate: generation, composition, eco-toxicity, and sustainable management strategies' Available at https://pubmed.ncbi.nlm.nih.gov/38443532/ (Accessed on 01/07/2025)

[23] Ibid

[24] International Finance Corporation., 'The World has a Waste Problem. Here's How to Fix It' Available at https://www.ifc.org/en/blogs/2024/the-world-has-a-waste-problem (Accessed on 01/07/2025)

financial and technical capacity to foster sound waste management and reliance on unmanaged landfills and open dumps for disposal of municipal waste[25].

The problem of municipal waste is more severe in cities and urban areas. It has been observed that urban households and businesses produce substantial amounts of solid waste that must be collected regularly, recycled or treated and disposed properly in order to maintain clean, healthy and sustainable urban environments[26]. However, due to rapid urbanization, population growth, poor waste collection and management practices, and inadequate investments, many cities are facing municipal solid waste management challenges[27]. In addition, it has been argued that the higher the income level of a city, the greater the amount of municipal waste produced[28]. Therefore, the economic growth expected in developing countries is likely to pose greater challenges in solid waste management in cities and urban areas[29]. For example, it has been observed that due to the fast rate of population growth and rapid urbanization in Africa, the amount of municipal solid waste in the continent is increasing drastically[30].

Lack of effective management of municipal waste in cities affects both people and planet. For example, poor management and disposal of municipal waste in cities creates vast, toxic mountains that pollute the air, contaminate sources of water and endanger public health[31]. Further, the disposal and treatment of waste produces greenhouse gases including methane thus contributing to climate change[32]. The financial costs of waste management are also huge taking a toll on economies especially in developing countries[33]. In light of these challenges, effective municipal waste management strategies are necessary in order ensure clean and healthy urban environments.

[25] Ibid
[26] United Nations-Habitat., 'Solid Waste Management in Cities' Available at https://unhabitat.org/sites/default/files/2019/02/Indicator-11.6.1-Training-Module_Solid-waste-in-cities_23-03-2018.pdf (Accessed on 01/07/2025)
[27] Ibid
[28] Ibid
[29] Ibid
[30] African Clean Cities Platform., 'Situation of Municipal Solid Waste Management in African Cities - An Interpretation of the Information provided by the First ACCP Meeting' Available at https://www.africancleancities.org/sites/default/files/2023-06/8_Discussion_Paper_2.pdf (Accessed on 01/07/2025)
[31] International Finance Corporation., 'The World has a Waste Problem. Here's How to Fix It' Op Cit
[32] Contribution from waste to climate change., Available at https://www.grida.no/resources/5665 (Accessed on 01/07/2025)
[33] United Nations Environment Programme., 'Global Waste Management Outlook 2024' Op Cit

3.0 Utilising Waste-to-Energy Technology to Power Cities

Waste-to-energy refers to various technologies that convert non-recyclable waste into usable forms of energy including electricity, heat and fuels[34]. It has been pointed out that waste-to-energy plants and technologies burn energy-rich materials including plastics, paper and products made from wood to generate various forms of energy including electricity[35]. Waste-to-energy therefore refers to waste treatment technologies that convert municipal waste among other forms of waste into energy[36]. Waste-to-energy technologies use several processes including incineration, pyrolysis, gasification, anaerobic digestion and landfill gas recovery in order to convert waste into usable forms of energy[37]. For example, incineration involves burning combusted waste at ultra-high temperatures in order to produce energy[38]. Anaerobic digestions entails the use of technologies that biologically convert organic material into compost as well as biogas for energy[39]. Further, the process of pyrolysis involves the use of technologies that thermo-chemically convert waste products into clean liquid fuels[40]. In addition, landfill gas recovery involves the process of capturing the gases emitted from municipal landfills and converting them into energy[41].

Waste-to-energy technologies provide an effective and environmental-friendly solution to the problem of municipal waste in cities[42]. It has been correctly noted that waste-to-energy technology reduces the volume of municipal waste while also converting waste into usable forms of energy including electricity and fuel[43]. According to the United Nations Environment Programme (UNEP), waste-to-energy technology has potential benefits of waste reduction and energy generation[44]. Further, it has been argued that waste-to-energy technology can potentially reduce waste sector greenhouse gas emissions in comparison to open burning and landfills without methane gas capture and use[45]. Waste-to-energy technology can also foster human health

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[34] Waste to Energy., Available at https://studentenergy.org/conversion/waste-to-energy/#:~:text=Waste%20to%20Energy%20(WTE)%2C,%2C%20heat%2C%20fuels%20and%20electricity (Accessed on 02/07/2025)

[35] Biomass Explained: Waste-to-Energy (Municipal Solid Waste)., Available at https://www.eia.gov/energyexplained/biomass/waste-to-energy-in-depth.php (Accessed on 02/07/2025)

[36] What is Waste-to-Energy?., Available at https://www.ibm.com/think/topics/waste-to-energy (Accessed on 02/07/2025)

[37] Waste to Energy., Op Cit

[38] Ibid

[39] Ibid

[40] Ibid

[41] Ibid

[42] United Nations Climate Change., 'Municipal Waste' Available at https://unfccc.int/climate-action/momentum-for-change/activity-database/Municipal%20Waste (Accessed on 02/07/2025)

[43] Ibid

[44] United Nations Environment Programme., 'Waste to Energy: Considerations for Informed Decision-making' Available at https://www.unep.org/ietc/resources/publication/waste-energy-considerations-informed-decision-making (Accessed on 02/07/2025)

[45] Ibid

by tackling urban air and water pollution associated with burning waste and dumping waste into unsuitable landfills[46].

With the generation of municipal solid waste expected to rise in the coming years especially in developing countries, waste-to-energy technology provides a potential and effective solution to the global waste problem[47]. UNEP notes that effective municipal solid waste management is one of the key drivers for countries to achieve the goals of both the Paris Agreement towards confronting climate change and the 2030 Agenda for Sustainable Development geared towards fostering sustainability[48]. Waste-to-energy technology can therefore help cities and countries to foster sound waste management towards combating climate change and ensuring Sustainable Development[49].

Waste-to-energy technology is both beneficial to people and planet. This technology can make cities and human settlements clean, healthy, sustainable and liveable by tackling the problem of waste[50]. It also fosters human health by reducing the problem of air and water pollution associated with poor waste management practices[51]. Further, waste-to-energy technology can promote environmental sustainability by addressing environmental pollution and the generation of greenhouse gases from waste[52]. This technology can also reduce the volume of waste that is landfilled thus ensuring clean and healthy urban environments[53].

There has been progress towards utilising waste-to-energy technology to power cities. For instance, thermal waste-to-energy also known as incineration with energy recovery, is a major waste-to-energy technology that has been embraced in some developed countries and the most widely adopted technology that dominates the global waste-to-energy market[54]. China for example has utilised public-private partnerships that offer concessions to municipal governments to build waste-to-energy plants in several cities with appropriate and clean technologies[55].

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[46] United Nations Climate Change., 'Municipal Waste' Op Cit

[47] United Nations Environment Programme., 'Waste-to-Energy Incineration' Available at https://www.unep.org/ietc/resources/toolkits-manuals-and-guides/waste-energy-incineration (Accessed on 02/07/2025)

[48] Ibid

[49] Ibid

[50] United Nations Climate Change., 'Municipal Waste' Op Cit

[51] Ibid

[52] United Nations Environment Programme., 'Waste to Energy: Considerations for Informed Decision-making' Op Cit

[53] Guberman. R., 'What is Waste-to-Energy?' Available at https://www.rts.com/blog/what-is-waste-to-energy/ (Accessed on 02/07/2025)

[54] United Nations Environment Programme., 'Waste to Energy: Considerations for Informed Decision-making' Op Cit

[55] United Nations Climate Change., 'Municipal Waste to Energy Project – China' Available at https://unfccc.int/climate-action/momentum-for-change/activity-database/momentum-for-change-municipal-waste-to-energy-project (Accessed on 02/07/2025)

Further, it has been observed that developing countries especially in the Asia-Pacific region including India and Thailand are increasingly utilising waste-to-energy technologies to power their cities and economies[56].

Waste-to-energy technology therefore provides potential solutions to foster clean and healthy urban environments by converting waste to energy that can be utilised to power cities. Despite its benefits, it has been observed that waste-to-energy is underutilised globally with most cities and urban areas still using landfills as their primary disposal method[57]. However, this practice is unsustainable and poses serious risks to human health and the environment[58]. Further, waste-to-energy technologies that utilise fossil fuels to burn waste can generate greenhouse gases thus causing environmental concerns including pollution and climate change[59]. Waste-to-energy technology also requires significant investment for startup, operation and maintenance which can be out of reach for some cities and urban areas especially in developing countries[60]. It has also been argued that waste-to-energy technology can undermine circularity which is the most effective way of dealing with the global waste problem[61]. It is imperative to address these concerns in order to effectively harness waste-to-energy technology to power cities towards fostering clean and healthy urban environments.

4.0 Conclusion

Waste-to-energy technology is an appropriate solution to the problem of municipal waste in cities and urban areas. This technology converts waste to energy that can power cities while fostering clean and healthy urban areas[62]. Waste-to-energy technology provides benefits for people and planet by reducing the impacts of waste on human health and the environment including water, air and urban biodiversity and ecosystems[63]. It is therefore imperative for cities and urban areas including those in developing countries to enhance investments in waste-to-energy technology in order to promote clean and healthy urban environments[64]. Further, there is need to ensure that waste-to-energy technologies utilise appropriate and clean technology that do not require additional burning of fossil fuels in order to avoid generating more greenhouse gases[65]. It is also necessary to ensure that waste-to-energy technology is employed alongside the principles of circular economy with priority being placed on reducing, re-using and recycling waste for

[56] United Nations Environment Programme., 'Waste to Energy: Considerations for Informed Decision-making' Op Cit
[57] Waste to Energy., Op Cit
[58] Ibid
[59] Guberman. R., 'What is Waste-to-Energy?' Op Cit
[60] United Nations Environment Programme., 'Waste to Energy: Considerations for Informed Decision-making' Op Cit
[61] Ibid
[62] Ibid
[63] Ibid
[64] United Nations Climate Change., 'Municipal Waste to Energy Project – China' Op Cit
[65] Ibid

effective waste management[66]. Utilising waste-to-energy to power cities is therefore a viable and effective option towards achieving clean and healthy urban environments. It is vital for all cities globally to embrace this approach for the benefit of people and planet.

[66] United Nations Environment Programme., 'Waste-to-Energy Incineration' Op Cit

Chapter 14: Adopting Green Energy for a Bright Tomorrow

Abstract

The paper argues a case for the adoption of green energy for a bright tomorrow. It posits that access to clean and affordable energy is a fundamental human right as envisaged under the 2030 Agenda for Sustainable Development. The paper further asserts that green energy sources such as renewable energy are environmentally friendly and can aid in fostering Sustainable Development and promoting climate change mitigation and adaptation. It interrogates various attempts towards adopting green energy at the global, regional and national levels. It also highlights the concerns and challenges facing the adoption of green energy and offers proposals towards enhancing the adoption of green energy for a bright tomorrow.

1.0 Introduction

Energy is a fundamental human need that has been described as a basic factor necessary to sustain life[1]. Indeed, access to energy is so fundamental that some authors have argued that food and energy are the two essential resources to support the modern and civilized society of the mankind[2]. Energy is a basic human need that has been equated to food, air and water[3]. It has been pointed out that energy can spur economic development and poverty eradication[4]. Energy has the potential of accelerating the attainment of socio-economic rights such as the right to food, the right to education, the right to health, the right to water among others[5]. Energy plays a critical role in economic growth and development, and future economic growth has been seen to be largely hinged on the long-term availability of energy which is to be derived from sources that are affordable, accessible and environmentally friendly[6]. Access to energy is thus a fundamental human right.

Energy plays an important role in the Sustainable Development agenda. It has the ability to stimulate development by connecting the Sustainable Development Goals (SDGs) and unlocking sustainable economic growth[7]. On this basis, it has been argued that Sustainable Development will not be achieved without the realization of the right of access to energy[8]. This fact is recognized

[1] Goldthau. A & Sovacool. B., 'The Uniqueness of the Energy Security, Justice and Governance Problem' *Energy Policy*, 41 (2012) 232-240

[2] Tomabechi K, 'Energy Resources in the Future' Energies 2010, 3, 686-695, 686.

[3] Goldthau. A & Sovacool. B., 'The Uniqueness of the Energy Security, Justice and Governance Problem' Op Cit

[4] Muigua. K., 'Access to Energy as a Constitutional Right in Kenya', available at http://kmco.co.ke/wp-content/uploads/2018/08/Access-to-Energy-as-a-Constitutional-Right-in-Kenya-NOVEMBER-2013.pdf (Accessed on 26/06/2023)

[5]The World Bank, 'Sustainable Development Goal on Energy (SDG7) and the World Bank Group, available at https://www.worldbank.org/en/topic/energy/brief/sustainable-development-goal-onenergy-sdg7-and-the-world-bank-group (Accessed on 26/03/2023)

[6] Muigua. K., Wamukoya. D & Kariuki. F., 'Natural Resources and Environmental Justice in Kenya.' Glenwood Publishers Limited, 2015

[7] Goldthau. A & Sovacool. B., 'The Uniqueness of the Energy Security, Justice and Governance Problem' Op Cit

[8] Muigua. K., 'Access to Energy as a Constitutional Right in Kenya' Op Cit

under the United Nations 2030 Agenda for Sustainable Development which seeks to achieve universal access to affordable, reliable and modern energy services among other targets in the quest towards Sustainable Development[9].

However, despite the importance of energy as basic human need, several challenges continue to be witnessed in the energy sector in Kenya and across the globe. It has been pointed out that many people across the world lack access to clean energy sources such as electricity and use polluting, inefficient fuels such as firewood for household chores such as cooking[10]. This challenge is especially prevalent in Sub-Saharan Africa where majority of the population lack access to clean and affordable energy and depend on traditional fuels[11]. Access to energy represents one of Africa's greatest obstacles to social and economic development[12]. Further, it has been pointed out that the energy sector is by far the main contributor to the global threat of climate change and accounts for approximately 73 percent of human caused greenhouse gases [13]. It is on this basis that the paper argues for adoption of green energy sources such as renewable energy to address the concerns raised above. The paper argues that green energy can promote the right of access to clean and affordable energy and foster Sustainable Development. It defines green energy and identifies its various sources. The paper then examines some of the global, regional and national initiatives towards the adoption of green energy and identifies the challenges thereof. It then suggests reforms and measures towards the adoption of green energy in Kenya and across the globe for a bright tomorrow.

2.0 The Concept of Green Energy

Growing human populations and rising levels of consumption have elevated energy demands, placing increasing burdens on the environment, particularly on the global climate[14]. Convention energy sources such as fossil fuels cause significant environmental impacts such as climate change[15]. This has necessitated the transition to green energy sources.

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[9] United Nations., 'Transforming Our World: The 2030 Agenda for Sustainable Development.' Availableat https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf

[10] Muigua. K., 'Towards Energy Justice in Kenya.' Available at http://kmco.co.ke/wp-content/uploads/2020/02/Towards-Energy-Justice-in-Kenya-00000005.pdf (Accessed on 26/06/2023)

[11] Bildirici. M & Ozaksoy.F., 'Woody Biomass Energy Consumption and Economic Growth in Sub-Saharan Africa' Procedia Economics and Finance 38 (2016) 287 – 293.

[12] Hafner. M., 'The Challenge of Energy Access in Africa.' Available at https://link.springer.com/chapter/10.1007/978-3-319-92219-5_1 (Accessed on 26/06/2023)

[13] United Nations Development Programme., 'Goal 7: Affordable and Clean Energy.' Available at https://www.undp.org/sustainable-development-goals/affordable-and-clean-energy?gclid=EAIaIQobChMIxrfXsO3g_wIVDZhRCh1NqALvEAAYAiAAEgJwTvD_BwE (Accessed on 26/06/2023)

[14] Gibson. L et al., 'How Green is 'Green' Energy?' *Trends in Ecology & Evolution*, 2306

[15] Ibid

Green energy which is also referred to as clean, sustainable or renewable energy is energy that is derived from natural resources, such as sunlight, wind or water[16]. It has also been described as energy that comes from renewable sources of energy[17]. Such sources include solar power, wind power, hydropower, geothermal energy, biomass and biofuels[18]. Renewable energy has been defined as energy derived from natural sources that are replenished at a higher rate than they are consumed[19]. The Energy Act of Kenya defines renewable energy as non-fossil energy generated from natural non-depleting resources including but not limited to solar energy, wind energy, biomass energy, biological waste energy, hydro energy, geothermal energy and ocean and tidal energy[20].

Green energy sources such as renewable energy are environmentally friendly and can aid in fostering Sustainable Development and promoting climate change mitigation and adaptation[21]. Generating green energy from renewable energy sources creates far lower emissions than traditional sources such as burning fossil fuels[22]. Green energy has the potential of replacing the negative effects of fossil fuels with more environmentally-friendly alternatives[23]. Since, it is derived from natural resources, green energy is also often renewable and clean, meaning that it emits no or few greenhouse gases and is often readily available[24]. Transitioning from fossil fuels, which currently account for the lion's share of emissions, to green energy sources such renewable energy is key to addressing the climate crisis[25]. Green energy sources such as renewable energy can also enhance security of energy supply and promote energy justice by fostering the attainment of the right of access to clean and affordable energy[26].

Despite the viability of green energy sources such as renewable energy, these sources are yet to be widely embraced due to several challenges including inadequate funding and investment in

[16] TWI Global., 'What is Green Energy? (Definition, Types and Examples).' Available at https://www.twi-global.com/technical-knowledge/faqs/what-is-green-energy (Accessed on 26/06/2023)
[17] Inspire Clean Energy., 'What is Green Energy? Types, Definitions and Examples.' https://www.inspirecleanenergy.com/blog/clean-energy-101/what-is-green-energy (Accessed on 26/06/2023)
[18] Ibid
[19] United Nations., 'What is Renewable Energy?' Available at https://www.un.org/en/climatechange/what-is-renewable-energy (Accessed on 26/06/2023)
[20] Energy Act, No. 1 of 2019, Laws of Kenya., S 2.
[21] Mohtasham. J., 'Review Article: Renewable Energies' *Energy Procedia*, 74 (2015) 1289 – 1297
[22] Ibid
[23] TWI Global., 'What is Green Energy? (Definition, Types and Examples).' Op Cit
[24] Ibid
[25] United Nations., 'What is Renewable Energy?' Op Cit
[26] Nizic. M.K., 'The Advantages and Disadvantages of Renewable Energy in the Tourist Destination.' Available at https://www.researchgate.net/publication/320584990_The_Advantages_and_Disadvantages_of_Renewable_Energy_in_the_Tourist_Destination (Accessed on 26/06/2023)

green energy, lack of political goodwill and ignorance among consumers[27]. There is need to adopt green energy in order to achieve energy justice, promote socio-economic development and foster Sustainable Development through climate change mitigation and adaptation[28].

3.0 The Journey towards Green Energy: Prospects and Challenges

There have been several attempt towards recognizing the right of access to clean and affordable energy as a fundamental human right at the global, regional and national levels. The *Energy Charter Treaty* is a multilateral framework for energy cooperation that is designed to promote energy security through the operation of more open and competitive energy markets, while respecting the principles of Sustainable Development and sovereignty over energy resources[29]. Among the target of the Treaty is the promotion of energy efficiency and minimising the environmental impact of energy production and use[30]. The Treaty is one of the best available instruments for improving international energy security by promoting international energy investments and fair access to markets[31]. It also urges its member states to formulate clear policies for improving energy efficiency and reducing the energy cycle's negative environmental impacts[32]. However, membership of the Energy Charter Treaty is mostly drawn from European nations[33]. The Treaty may thus not address energy concerns in most African countries.

The United Nations *2030 Agenda on Sustainable Development* also seeks to foster the adoption of green energy[34]. Sustainable Development goal 7 is aimed at ensuring universal access to affordable, reliable and modern energy services[35]. It further recognizes that investing in green energy including renewable sources of energy such as solar, wind and thermal power; improving energy productivity, and ensuring energy for all are vital in the attainment of the Sustainable Development agenda[36]. Adopting green energy is thus vital in fostering Sustainable Development.

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[27] Muigua. K., 'Nurturing Our Environment for Sustainable Development.' Glenwood Publishers Limited, 2016

[28] Ibid

[29] The Energy Charter Treaty., Available at https://www.energycharter.org/fileadmin/DocumentsMedia/Legal/ECTC-en.pdf (Accessed on 26/06/2023)

[30] Ibid

[31] Konoplyanik. A & Walde. T., 'Energy Charter Treaty and its Role in International Energy.' Available at http://konoplyanik.ru/ru/publications/articles/417_Energy_Charter_Treaty_and_its_Role_in_International_Energy.pdf (Accessed on 26/06/2023)

[32] Ibid

[33] Energy Charter., 'Members and Observers to the Energy Charter Conference.' Available at https://www.energycharter.org/who-we-are/members-observers/ (Accessed on 26/06/2023)

[34] United Nations., 'Transforming Our World: The 2030 Agenda for Sustainable Development.' Op Cit

[35] United Nations Development Programme., 'Goal 7: Affordable and Clean Energy.' Op Cit

[36] Ibid

At the regional level, the *Treaty Establishing the East African Community*[37] recognizes the role of energy in the East African integration agenda. It urges member states to adopt policies and mechanisms to promote the efficient exploitation, development, joint research and utilisation of various energy resources available within the region[38]. Further, the Treaty calls upon member states to promote the exploitation and utilisation of new and renewable sources of energy within the East African Community[39]. The Treaty also implores member states to take measures towards supplying affordable energy to their citizens while taking cognisance of the protection of the environment[40].

In Kenya, it has been pointed that access to energy is a Constitutional right[41]. Although the Constitution does not expressly provide for the right to access to energy, it recognizes energy as part of the natural resources in Kenya[42]. To this extent, the Constitution provides that natural resources means the physical non-human factors and components, whether *renewable or non-renewable*, including inter alia rocks, minerals, fossil fuels and other sources of energy[43]. The Constitution also enshrines the principle of Sustainable Development in Kenya[44]. Enhancing universal access to affordable, reliable and modern energy services including green energy sources such as renewable energy is an essential part of the Sustainable Development agenda[45]. The Constitution of Kenya thus envisages adoption of green energy.

Further, the *Energy Act*[46] embraces the concept of green energy by recognizing renewable sources of energy. The Act mandates the government to facilitate the provision of affordable energy services to all persons in Kenya[47]. It also requires the government to promote the development and use of renewable energy technologies, including but not limited to biomass, biodiesel, bioethanol, charcoal, fuelwood, solar, wind, tidal waves, hydropower, biogas and municipal waste[48]. Towards this end, the Act requires the government to undertake several measures including formulating a national strategy for coordinating research in renewable energy; promoting international co-operation on programs focusing on renewable energy sources and harnessing opportunities offered under clean development mechanism and other mechanisms including, but not limited to, carbon credit trading to promote the development and exploitation

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[37] Treaty Establishing the East African Community., Available at https://investmentpolicy.unctad.org/international-investment-agreements/treaty-files/2487/download (Accessed on 26/06/2023)
[38] Ibid, Article 101 (1)
[39] Ibid, Article 101 (2) (a)
[40] Ibid, Article 101 (2) (f)
[41] Muigua. K., 'Access to Energy as a Constitutional Right in Kenya' Op Cit
[42] Constitution of Kenya, 2010., Article 260, Government Printer, Nairobi
[43] Ibid
[44] Ibid, Article 10 (2) (d)
[45] United Nations Development Programme., 'Goal 7: Affordable and Clean Energy.' Op Cit
[46] Energy Act, No.1 of 2019, Government Printer, Nairobi
[47] Ibid, Article 7 (1)
[48] Ibid, S 75 (1)

of renewable energy sources[49]. Actualizing the vision of the Energy Act is paramount in enhancing the right of access to clean and affordable energy in Kenya and adopting green energy. In addition, the *National Energy Policy* is recognizes energy as a critical component in Kenya[50]. The policy seeks to achieve which several objectives including improving access to affordable, competitive and reliable energy services, promoting energy efficiency and conservation and promoting diversification of energy supply sources in Kenya to ensure security of supply among others[51]. It contains several proposals towards the use, development and conservation of energy sources in the country such as coal resources, renewable energy and electricity[52]. The Policy also contains energy efficiency and conservation measures aimed at reducing energy consumption without sacrificing productivity or increasing costs[53]. Effective implementation of the Policy is integral in promoting green energy in Kenya and enhancing the right of access to clean and affordable energy.

The concept of green energy is thus well captured at the global, regional and national levels. The International Energy Agency notes that the rate of adoption of green energy sources such as renewable energy is expected to rise with the world set to add as much renewable power in the next 5 years as it did in the past 20 years[54]. It further observes that renewables have grown rapidly in recent years, driven by policy support and sharp cost reductions for solar photovoltaics and wind power in particular[55]. In addition, it has been asserted that the electricity sector remains the brightest spot for renewables with the strong growth of solar photovoltaics and wind in recent years, building on the already significant contribution of hydropower in the transition towards green energy[56]. In Africa, the African Energy Forum is geared towards driving Africa's green energy transition[57]. It notes that Africa's vast renewable resources give it a distinct advantage in the move towards a green hydrogen future[58]. Among the key themes of its 2023 agenda is to increasing pace and scale of Africa's renewable energy projects towards adoption of green energy[59]. Further in Kenya, the Rural Electrification and Renewable Energy Corporation is mandated to develop, promote and manage in collaboration with other agencies, the use of

[49] Ibid, S 75 (2)
[50] Ministry of Energy., 'National Energy Policy.' Available at https://repository.kippra.or.ke/bitstream/handle/123456789/1947/BL4PdOqKtxFT_National%20Energy%20Policy%20October%20%202018.pdf?sequence=1&isAllowed=y (Accessed on 26/06/2023)
[51] Ibid
[52] Ibid, S 1.2
[53] Ibid, S 5.0
[54] International Energy Agency., 'Renewables.' Available at https://www.iea.org/fuels-and-technologies/renewables (Accessed on 27/06/2023)
[55] Ibid
[56] Ibid
[57] Africa Energy Forum., 'Held on 20-23 June 2023 in Nairobi, Kenya', Available at https://www.africa-energy-forum.com/ (Accessed on 27/06/2023)
[58] Ibid
[59] Ibid

renewable energy and technologies[60]. The Corporation has undertaken projects towards implementing this mandate including installation of solar power plants, electrification of public facilities and schools and transformer maximization projects to enhance electricity access and connectivity in areas with large populations[61]. Thus, there are immense opportunities for adoption of green energy at the global, regional and national levels.

However, despite the viability of green energy sources including renewable energy, several concerns have hindered their effective adoption. These include inadequate funding, lack of political goodwill and ignorance among consumers[62]. Further, the threat of climate change can hinder adoption of green energy sources such as hydroelectricity due to the depletion of forests and water catchment areas which act as a source for water used in their generation[63]. There is need to address these concerns in order to foster the adoption of green energy and fast track the transition to a less carbon-intensive and more sustainable energy system.

4.0 Way Forward

The economic, societal and environmental benefits of green energy sources such as renewable energy are numerous. It is available in abundance, cheaper and a healthier option for people and the planet[64]. There is thus need to promote sustainability in the energy sector through the adoption and investing in the abundant renewable energy available all over the planet[65]. This will be essential in enhancing access to clean and affordable energy which is a fundamental human right and a critical component of the Sustainable Development agenda[66]. It has been pointed that in Kenya while notable progress has been made towards enhancing access to electricity through measures such as the rural electrification program, progress remains slow in promoting clean cooking facilities with bio-energy sources such as charcoal and wood fuel still being the most common source of energy in Kenya especially among the rural population[67]. However, the environmental concerns raised by these sources of energy such as climate change calls for the adoption of green sources of energy[68]. Measures can be put in place to

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[60] Energy Act, No. 1 of 2019, S 44 (1) (j)

[61] Rural Electrification and Renewable Energy Corporation., Available at https://www.rerec.co.ke/our-work.php (Accessed on 27/06/2023)

[62] Muigua. K., 'Nurturing Our Environment for Sustainable Development.' Op Cit

[63] Muigua. K., Wamukoya. D & Kariuki. F., 'Natural Resources and Environmental Justice in Kenya.' Op Cit

[64] United Nations., 'Climate Action.' Available at https://www.un.org/en/climatechange/how-communities-are-embracing-renewable-energy (Accessed on 27/06/2023)

[65] Ibid

[66] Ibid

[67] Muchiri. L., 'Gender and Equity in Bioenergy Access and Delivery in Kenya' Practical Action East Africa, 2008, available at https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=2ahUKEwiy2P29z6PnAhUEiFwKHQlyCLoQFjAAegQIBRAB&url=http%3A%2F%2Fwww.cas.ed.ac.uk%2F__data%2Fassets%2Fword_doc%2F0007%2F24793%2FGender_and_Equity_in_Bio_energy_Access_and_Delivery_in_Kenya_final.doc&usg=AOvVaw2AKp1mvTSC9tafkIKJ-36 (Accessed on 27/06/2023)

[68] Ibid

enhance access to clean energy sources for purposes of cooking such as reducing the cost of Liquefied Petroleum Gas (LPG) to promote its affordability[69]. Further, costs related to electricity such as connection charges and billing costs should be made affordable for the benefit of all Kenyans especially those in rural areas[70]. This will ensure adoption of green energy while also fostering the right of access to clean and affordable energy.

In addition, there is need for government support through funding and putting in place relevant programs and policy measures in order to ensure adequate investment and adoption of green energy[71]. In Kenya, there is need to realize the vision of the Energy Act in order to adopt green energy sources such as renewable energy[72]. Further, the Rural Electrification and Renewable Energy Corporation needs to effectively discharge its mandate in order to promote the adoption of green energy sources in Kenya[73]. There is also need for governments to put in place appropriate measures such as tax incentives and appropriate laws and policies in order to encourage investments in green energy sources by entities such as multinational corporations[74]. This will ensure green financing and investment in renewable energy projects and provide practical solutions for filling the green financing gap which is a key concern in adopting green energy especially in developing countries[75].

It is also necessary promote public participation in the journey towards adopting green energy in order to guarantee energy justice. Sustainability in the energy sector also calls for the identification of the energy needs of consumers in a country and ensuring that the needs are met in a manner that is efficient[76]. Thus in fostering investments in the energy sector, players such as the government and the private sector are required to ensure that they adopt measures towards promoting acceptability of green energy projects to local communities and that further, such projects are socially sustainable[77]. Community consultation through meaningful public participation is important to ensure that there is public acceptance and cooperation in green energy projects[78]. Public participation is an essential component of environmental governance including investments in green energy as envisaged under the Rio Declaration which acknowledges that environmental issues are best handled with the

[69] Muigua. K., 'Towards Energy Justice in Kenya.' Op Cit
[70] Ibid
[71] Muigua. K., 'Access to Energy as a Constitutional Right in Kenya' Op Cit
[72] Centurion., 'Renewable Energy Growth in Kenya.' Available at https://centurionlg.com/2022/02/01/renewable-energy-growth-in-kenya/ (Accessed on 27/06/2023)
[73] Ibid
[74] Taghizadeh-Hesary. F & Yoshino. N., 'Sustainable Solutions for Green Financing and Investment in Renewable Energy Projects.' Available at https://www.mdpi.com/1996-1073/13/4/788 (Accessed on 27/06/2023)
[75] Ibid
[76] Muigua. K., Wamukoya. D & Kariuki. F., 'Natural Resources and Environmental Justice in Kenya.' Op Cit
[77] Ibid
[78] Muigua. K., 'Access to Energy as a Constitutional Right in Kenya' Op Cit

participation of all concerned citizens, at the relevant level[79]. Public participation has also been enshrined as one of the national values and principles under the Constitution of Kenya[80]. Public participation can thus promote energy justice in the quest towards adopting green energy.

Finally, there is need to promote sound environmental management in order to enhance adoption of green energy. Conservation of the environment ensures that certain renewable sources of energy such as water used for the generation of hydroelectricity is not exhausted due to the depletion of forests and other water catchment areas[81]. It is also imperative to combat climate change through appropriate mitigation and adaptation measures in order to ensure continued availability of green energy sources such as biomass and hydropower[82]. Through these among other measures, adoption of green energy for a bright tomorrow will be realized.

5.0 Conclusion

Access to clean and affordable energy is an essential human right[83]. In the wake of environmental concerns such as climate change, adoption of green energy is integral in enhancing access to clean and affordable energy and promoting Sustainable Development. Green energy sources such as renewable energy are environmentally friendly and can aid in fostering Sustainable Development and promoting climate change mitigation and adaptation[84]. However, despite the viability of green energy, several concerns have hindered its adoption at the global, regional and national level. These include inadequate funding, lack of political goodwill and ignorance among consumers.[85] There is need to address these concerns through measures such embracing green energy sources such as renewable energy, adequate funding and investment in green energy, promoting public participation in green energy projects in order to guarantee energy justice and combating climate change in order to promote sustainability in the energy sector[86]. Through these measures, the ideal of adopting green energy for a bright tomorrow will be realized at the global, regional and national levels.

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[79] United Nations General Assembly., 'Report of the United Nations Conference on Environment and Development: Rio Declaration on Environment and Development' 1992' A/CONF.151/26 (Vol. I)

[80] Constitution of Kenya, 2010., Article 10 (2) (a)

[81] Muigua. K., Wamukoya. D & Kariuki. F., 'Natural Resources and Environmental Justice in Kenya.' Op Cit

[82] Owusu. P. & Asumadu-Sarkodie. S., 'A Review of Renewable Energy Sources, Sustainability Issues and Climate Change Mitigation.' *Cogent Engineering* (2016).

[83] Muigua. K., 'Access to Energy as a Constitutional Right in Kenya' Op Cit

[84] Mohtasham. J., 'Review Article: Renewable Energies' Op Cit

[85] Muigua. K., 'Nurturing Our Environment for Sustainable Development.' Op Cit

[86] Owusu. P. & Asumadu-Sarkodie. S., 'A Review of Renewable Energy Sources, Sustainability Issues and Climate Change Mitigation.' Op Cit

PART IV: CRITICAL RAW MATERIALS, GREEN MINERALS AND ESG CONSIDERATIONS

Abstract

This Part interrogates Africa's growing strategic importance as a source of critical raw materials and green minerals essential for the global energy transition. It analyses the legal, governance and sustainability challenges associated with mineral extraction, including environmental degradation, social conflict and ESG compliance. By examining policy choices, regulatory safeguards and benefit-sharing mechanisms, the Part highlights pathways for leveraging mineral wealth to support energy transition while avoiding resource exploitation and sustainability violations. It advances the case for responsible mineral governance grounded in environmental justice and sustainable development principles.

Chapter 15: Harnessing Critical Raw Materials to Fast-track the Energy Transition

Abstract

This paper critically discusses how the energy transition can be fast-tracked by harnessing critical raw materials. The paper defines and identifies critical raw materials. It argues that harnessing these materials is vital in accelerating energy transition since they play a pertinent role in supporting clean and renewable energy technologies. The paper further notes that if not harnessed sustainably, critical raw materials can undermine the energy transition by fueling environmental degradation, pollution, biodiversity loss, and human rights abuses. The paper proposes approaches towards harnessing critical raw materials in a sustainable manner towards achieving a just energy transition that leaves no one behind in the quest for Sustainable Development.

1.0 Introduction

Energy transition refers to the shift in the global energy sector from fossil fuel based systems of energy production and consumption including oil, natural gas and coal to renewable energy sources like wind and solar[1]. It has also been defined as a transformative shift in how energy is produced, distributed and consumed, aiming to move away from fossil fuels towards a system centred on renewable sources of energy such as solar, wind, hydropower and geothermal[2]. Energy transition thus involves the long-term structural change to energy systems from fossil-fuel based systems to cleaner and sustainable systems such as renewable sources of energy[3]. It has been argued that energy transition is a continuing process requiring long-term energy strategies and planning, with country-tailored focus on applying appropriated energy technologies to reach net-zero emissions[4].

Achieving energy transition is a crucial goal for the global community. It has been observed that a huge proportion of greenhouse gases responsible for the climate crisis are generated through energy production, by burning fossil fuels to generate electricity and heat[5]. According to the United Nations, fossil fuels, such as coal, oil and gas, are by far the largest contributor to global

[1] S & P Global., 'What is Energy Transition?' Available at https://www.spglobal.com/en/researchinsights/articles/what-is-energy-transition (Accessed on 15/04/2025)

[2] United Nations Development Programme., 'What is the sustainable energy transition and why is it key to tackling climate change?' Available at https://climatepromise.undp.org/news-and-stories/what-sustainable-energy-transition-and-why-it-key-tackling-climate-change (Accessed on 15/04/2025)

[3] Nalule. V., & Leal-Arcas. R., 'Energy Decentralization and Energy Transition in Poland.' *Electricity Decentralization in the European Union* 2nd Edition., 2023 pp 209-240

[4] United Nations Development Programme., 'Energy Transition' Available at https://www.undp.org/energy/our-work-areas/energy-transition#:~:text=Annual%20energy%2Drelated%20CO2%20emissions,90%25%20of%20the%20necessary%20reduction. (Accessed on 14/03/2024)

[5] United Nations., 'Renewable Energy – Powering a Safer Future' Available at https://www.un.org/en/climatechange/raising-ambition/renewable-energy (Accessed on 15/04/2025)

climate change, accounting for over 75 percent of global greenhouse gas emissions and nearly 90 percent of all carbon dioxide emissions[6]. In addition to fueling climate change, the burning of fossil fuels also contributes to pollution with devastating impacts on human health and the environment[7]. Further, fossil fuels are non-renewable and can depleted and thus placing too much reliance on them can affect global energy supply and security[8]. Global conflicts including the Russo-Ukrainian war and global economic uncertainty further continue to cause significant volatility in global energy prices prompting the need for energy transition in order to ensure that countries are energy secure[9].

On the other hand, the economic, societal and environmental benefits of renewable sources of energy such as solar, wind and geothermal are numerous. For instance, these sources of energy are available in abundance globally, are cheaper and are a healthier option for people and the planet[10]. In addition, generating renewable energy creates far lower emissions than burning fossil fuels which is very vital in confronting climate change[11]. It has been correctly noted that transitioning from fossil fuels to clean sources of energy is vital in reducing greenhouse gas emissions, improving air quality and mitigating the impacts of the triple planetary crisis of climate change, nature and biodiversity loss, and pollution and waste[12].

Energy transition is therefore at the heart of Sustainable Development protecting both people and the planet. Global energy transition is also envisioned under the United Nations *2030 agenda for Sustainable Development*[13]. Sustainable Development Goal (SDG) 7 seeks to ensure access to affordable, reliable, sustainable and modern energy for all including through substantially increasing the share of renewable energy in the global energy mix[14]. Fast-tracking the energy transition is thus vital in achieving the Sustainable Development agenda.

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[6] Ibid

[7] Solomon. B., & Krishna. K., 'The Coming Sustainable Energy Transition: History, Strategies, and Outlook.' Energy Policy 39 (2011) 7422-7431

[8] Ibid

[9] United Nations Environment Programme., 'Goal 7: Affordable and Clean Energy' Available at https://www.unep.org/topics/sustainable-development-goals/why-do-sustainable-development-goals-matter/goal-7 (Accessed on 15/04/2025)

[10] United Nations., 'Climate Action.' Available at https://www.un.org/en/climatechange/howcommunities-are-embracing-renewable-energy (Accessed on 15/04/2025)

[11] United Nations., 'What is Renewable Energy?.' Available at https://www.un.org/en/climatechange/what-is-renewable-energy (Accessed on 15/04/2025)

[12] United Nations Environment Programme., 'Goal 7: Affordable and Clean Energy' Op Cit

[13] United Nations General Assembly., 'Transforming Our World: the 2030 Agenda for Sustainable Development.' 21 October 2015, A/RES/70/1., Available at https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf (Accessed on 15/04/2025)

[14] Ibid

This paper critically discusses how the energy transition can be fast-tracked by harnessing critical raw materials. The paper defines and identifies critical raw materials. It argues that harnessing these materials is vital in accelerating energy transition since they play a pertinent role in supporting clean and renewable energy technologies. The paper further notes that if not harnessed sustainably, critical raw materials can undermine the energy transition by fueling environmental degradation, pollution, biodiversity loss, and human rights abuses. The paper proposes approaches towards harnessing critical raw materials in a sustainable manner towards achieving a just energy transition that leaves no one behind in the quest for Sustainable Development.

2.0 Critical Raw Materials and Energy Transition: Promises and Pitfalls

Critical raw materials refer to precious natural resources that are considered strategic for technological development and for which there is not a secure supply, causing dependence on international markets[15]. They have also been defined as raw materials which are economically and strategically important but have a high-risk associated with their supply[16]. It has been observed that these materials are vital in environmental technologies, consumer electronics, health, steel-making, defence, space exploration, and aviation among other industries making them not only 'critical' for effective functioning of these industries but also in the quest towards development[17]. Critical raw materials include cobalt, graphite, lithium, magnesium, niobium, silicon, vanadium, and rare earth elements[18]. It has been argued that these materials are classified as 'critical' not because they are considered as scarce but because they have significant economic importance in key sectors including the environment, health, defence, and consumer electronics[19]; they have a high-supply risk due to the very-high import dependence and high level of concentration in particular countries[20]; and they lack viable substitutes due to their unique properties and applications[21].

Critical raw materials play a crucial role in energy transition. According to the International Energy Agency (IEA), critical raw materials including copper, lithium, nickel, cobalt and rare earth elements are vital components of many of today's rapidly growing energy technologies including wind turbines, electricity networks and electric vehicles[22]. IEA notes that the use of

[15] Critical Raw Material., Available at https://www.sciencedirect.com/topics/engineering/critical-raw-material (Accessed on 16/04/2025)
[16] CRM Alliance., 'Critical Raw Materials' Available at https://www.crmalliance.eu/critical-raw-materials (Accessed on 16/04/2025)
[17] Ibid
[18] Critical Raw Material., Available at https://www.bgs.ac.uk/mineralsuk/statistics/security-of-supply/critical-raw-materials/ (Accessed on 16/04/2025)
[19] CRM Alliance., 'Critical Raw Materials' Op Cit
[20] Ibid
[21] Ibid
[22] International Energy Agency., 'Critical Minerals' Available at https://www.iea.org/topics/critical-minerals (Accessed on 16/04/2025)

critical raw materials in the energy sector varies by technology; for instance lithium, nickel, cobalt, manganese and graphite are crucial in enhancing battery performance; rare earth elements are essential for permanent magnets used in wind turbines and electric vehicle motors; and electricity networks need a huge amount of aluminium and copper[23].

According to the United Nations Environment Programme (UNEP), the transition from fossil fuels to clean energy sources depends on the availability and sustainable use of critical raw materials[24]. UNEP notes that critical minerals such as copper, lithium, nickel, and cobalt are essential components in many of today's rapidly growing clean energy technologies, from wind turbines and solar panels to electric vehicles[25]. As a result, critical raw materials have been described as energy transition minerals[26]. They are ideal for use in renewable energy technologies. For instance, lithium, nickel and cobalt are core components of batteries that power electric vehicles[27]; rare earth elements are part of the magnets that turn wind turbines and electric motors; and copper and aluminium are used in power transmission lines[28].

It has been argued that the demand for critical raw materials is growing quickly as the global energy transition continues to gather pace[29]. According to IEA, the global shift to clean energy systems is set to drive a huge increase in the requirements for critical raw materials[30]. It has been argued that in order to meet the objectives of the Paris Agreement, more than three billion tonnes of energy transition minerals and metals are needed for deployment in wind, solar and energy storage[31].

Critical raw materials are available in abundance globally and including in Africa. For example, the Democratic Republic of the Congo produces most of the cobalt in the world[32]. Further, it has been observed that Guinea holds almost one quarter of global bauxite reserves[33]. Further, most

[23] Ibid
[24] United Nations Environment Programme., 'Critical Energy Transition Minerals' Available at https://www.unep.org/topics/energy/renewable-energy/critical-energy-transition-minerals (Accessed on 16/04/2025)
[25] Ibid
[26] United Nations Environment Programme., 'What are energy transition minerals and how can they unlock the clean energy age?' Available at https://www.unep.org/news-and-stories/story/what-are-energy-transition-minerals-and-how-can-they-unlock-clean-energy-age (Accessed on 16/04/2025)
[27] Ibid
[28] Ibid
[29] International Energy Agency., 'Critical Minerals' Op Cit
[30] International Energy Agency., 'The Role of Critical Minerals in Clean Energy Transitions' Available at https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions/executive-summary (Accessed on 16/04/2025)
[31] United Nations Environment Programme., 'Critical Energy Transition Minerals' Op Cit
[32] Mo Ibrahim Foundation., 'Africa's Critical Minerals: Africa at the Heart of a Low-Carbon Future' Available at https://mo.ibrahim.foundation/sites/default/files/2022-11/minerals-resource-governance.pdf (Accessed on 16/04/2025)
[33] Ibid

of the world's chromium reserves are located in Southern Africa[34]. The Democratic Republic of the Congo and Zambia are also significant producers of copper in the world[35]. Further, Mozambique and Madagascar have been identified as major producers of graphite[36]. It is also estimated that over 60 per cent of global Manganese production occurs in Africa, with several countries on the continent hosting huge manganese reserves[37]. Africa is also emerging as a production hub for 'rare earths' with significant deposits of these valuable resources being available in the Eastern and Southern parts of the continent[38]. Due to the abundance of critical raw materials in Africa, it has been argued that the continent is at the heart of a low-carbon future[39]. Harnessing these resources in a sustainable manner can fast-track energy transition in Africa.

Critical raw materials are therefore crucial in energy transition. It has been argued that if sustainably harnessed, critical raw materials can accelerate Sustainable Development by fostering energy transition, creating jobs and helping countries to reduce poverty[40]. However, the extraction of critical raw materials is associated with several environmental and social concerns. For instance, unsustainable extraction of critical raw materials can fuel environmental degradation, deforestation, pollution, and biodiversity loss[41]. It has been noted that the extraction of critical raw materials takes a huge toll on the environment and natural resources[42]. For instance, it is estimated that it takes 2 million litres of water to extract a single tonne of lithium[43]. Further, it has been observed that most of the global copper and lithium production are concentrated in areas with water scarcity[44]. The extraction of critical raw materials is also associated with significant greenhouse gas emissions arising from energy-intensive mining and processing activities which can worsen the climate crisis[45].

In addition, there are concerns of human rights abuses including forced labour and child labour and negative impacts on indigenous people's rights who are often displaced from their ancestral lands[46]. Further, high and volatile prices for critical raw materials, rising geopolitical tensions

[34] Ibid
[35] Ibid
[36] Ibid
[37] Ibid
[38] Italian Institute for International Political Studies., 'The Scramble for Africa's Rare Earths: China is not Alone.' Available at https://www.ispionline.it/en/publication/scramble-africas-rare-earths-china-not-alone-30725 (Accessed on 16/04/2025)
[39] Mo Ibrahim Foundation., 'Africa's Critical Minerals: Africa at the Heart of a Low-Carbon Future' Op Cit
[40] United Nations Environment Programme., 'What are energy transition minerals and how can they unlock the clean energy age?' Op Cit
[41] Ibid
[42] Ibid
[43] Ibid
[44] Ibid
[45] United Nations Environment Programme., 'Critical Energy Transition Minerals' Op Cit
[46] Ibid

over their control, interference in markets, and strong political pressure to expand mining of critical raw materials into environmentally and socially sensitive areas is undermining the capacity of the global community to effectively harness critical raw materials to support the energy transition[47].

In light of the foregoing challenges, it vital to sustainably harness critical raw materials in order to foster energy transition. For example, it has been argued that in the absence of good governance and effective management practices, Africa's critical raw materials can become a burden rather than a blessing[48]. Consequently, there is need to sustainably harness critical raw materials in Africa and globally in order to actualise the energy transition towards Sustainable Development.

3.0 Harnessing Critical Raw Materials to Fast-track the Energy Transition

It is imperative to sustainably harness critical raw materials. These resources are vital in the energy transition by supporting key technologies including wind turbines, solar panels, electricity transmission lines and electric vehicles[49]. In order to effectively harness critical raw materials, there is need to foster sustainable mining[50]. The extraction of critical raw materials globally is associated with several environmental challenges including pollution, deforestation, loss of biodiversity, and pressure on vital natural resources such as water[51]. It has been argued that supply chains for critical raw materials carry a heavy burden[52]. Mining operations are often energy-intensive, significantly contributing to greenhouse gas emissions and climate change[53]. In addition vast amounts of mine waste generated during mining activities often contain toxic substances and contaminate land and water, creating long-term environmental hazards[54].

In light of these challenges, it is necessary to foster sustainable mining of critical raw materials in order to foster environmental conservation and Sustainable Development. This requires countries to embrace responsible extraction practices in harnessing critical raw materials in order to achieve socially just and environmentally sustainable outcomes[55]. It has been argued that developing circular economy and waste policies to reduce the generation of waste and the input of raw materials in products can enhance sustainability in harnessing critical raw materials[56]. Embracing

[47] Ibid
[48] Mo Ibrahim Foundation., 'Africa's Critical Minerals: Africa at the Heart of a Low-Carbon Future' Op Cit
[49] United Nations Environment Programme., 'Critical Energy Transition Minerals' Op Cit
[50] Ibid
[51] Ibid
[52] Environmental Coalition on Standards., 'Resourceful thinking: Why we need a better approach to critical raw materials' Available at https://ecostandard.org/news_events/resourceful-thinking-why-we-need-a-better-approach-to-critical-raw-materials/ (Accessed on 16/04/2025)
[53] Ibid
[54] Ibid
[55] United Nations Environment Programme., 'Critical Energy Transition Minerals' Op Cit
[56] Organisation for Economic Co-operation and Development., 'Making critical minerals work for sustainable growth and development' Available at https://www.oecd.org/en/topics/policy-issues/sustainable-mining-for-development.html (Accessed on 16/04/2025)

sustainable and responsible mining and circularity through recycling, reusing, and remanufacturing products and components can ensure stability in supply of critical raw materials while reducing demand through responsible sourcing and resource circulation[57].

It is also vital to protect human rights in order to effectively harness critical raw materials. It has been observed that human rights abuses including child labour, forced labour, and dangerous working conditions are widespread in mining regions globally[58]. Further, the rights of indigenous peoples and communities are often violated since their ancestral lands are located on or near mining activities[59]. It has been observed that most of the projects involving extraction of critical raw materials take place on lands belonging to indigenous peoples often resulting in conflict, displacement and loss of cultural heritage[60]. In light of these human rights concerns, it is necessary to embrace a standards-based approach while harnessing critical raw materials by prioritising human rights and environmentally sound practices, while also putting affected communities at the centre of participatory governance mechanisms[61]. This requires companies involved in extraction of critical raw materials to foster sound labour practices and safety standards including investing in the tools, equipment and training needed to safeguard workers involved in extraction of these resources[62].

Further, the participation of indigenous peoples and local communities in decision-making process is crucial in protecting their rights and fostering environmental democracy. According to the United Nations, the extraction of critical raw materials poses significant risks that threaten the rights, health, and environments of indigenous peoples[63]. As a result, ensuring the Free, Prior, and Informed Consent (FPIC) of indigenous peoples during extraction of critical raw materials is essential in upholding their rights and promoting the ideal of environmental democracy which seeks to promote meaningful participation in environmental decision-making by all people especially those affected by environmental laws and policies[64]. Upholding human rights and

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[57] United Nations Environment Programme., 'Critical Energy Transition Minerals' Op Cit

[58] Environmental Coalition on Standards., 'Resourceful thinking: Why we need a better approach to critical raw materials' Op Cit

[59] Organisation for Economic Co-operation and Development., 'Making critical minerals work for sustainable growth and development' Op Cit

[60] Environmental Coalition on Standards., 'Resourceful thinking: Why we need a better approach to critical raw materials' Op Cit

[61] Organisation for Economic Co-operation and Development., 'Making critical minerals work for sustainable growth and development' Op Cit

[62] Sammour. J., 'What Exactly is Ethical Mining?.' Available at Available at https://www.daintylondon.com/blogs/news/what-is-ethical-mining#:~:text=Whether%20mining%20metals%2C%20diamonds%20or,its%20workers%20a%20fair%20wage (Accessed on 16/04/2025)

[63] United Nations., 'Securing Indigenous Rights in the Energy Transition: Preventing Harm, Ensuring Consent, and Promoting Equity in Transition Minerals Extraction' Available at https://social.desa.un.org/sites/default/files/inline-files/Galina_Angarova_EGM_2024_0.pdf (Accessed on 16/04/2025)

[64] Ibid

indigenous peoples' rights and especially the right to FPIC is therefore crucial in sustainably harnessing critical raw materials and fostering environmental democracy[65].

Further, there is need to ensure that benefits accruing from critical raw materials are equitably shared among all stakeholders including vulnerable populations[66]. Ensuring equitable benefit-sharing across critical raw materials' value chains has been identified as a crucial strategy for a just energy transition that leaves no one behind[67]. This includes allowing vulnerable populations including local communities to access the riches that flow from critical raw materials[68]. It has been argued that with the right policy frameworks at different government levels and engagement mechanisms that ensure equitable sharing of benefits, critical mineral production has the potential to make all countries and especially the developing regions of the world more dynamic, resilient and prosperous, including by providing local job opportunities, increasing community well-being, attracting investment and supporting social infrastructure[69]. Enhancing benefit sharing in critical raw materials supply chains is therefore vital in achieving a just energy transition in the quest towards Sustainable Development.

By embracing the foregoing approaches among others, it is possible to effectively harness critical raw materials in order to fast-track the energy transition.

4.0 Conclusion

Critical raw materials are at the heart of the energy transition supporting key technologies including wind, solar, hydro, and electric vehicle technologies. However, the extraction of these vital resources often comes with environmental and social challenges including environmental degradation, pollution, biodiversity loss, and human rights abuses especially against workers involved in their extraction and indigenous peoples and local communities[70]. In light of these concerns, it is imperative to efficiently harness critical raw materials for a just, equitable and sustainable energy transition. This ideal can be achieved by embracing sustainable mining of critical raw materials, prioritising environmental conservation and Sustainable Development, protecting human rights including the rights of workers and the rights of indigenous and local communities, and ensuring equitable sharing of benefits accruing from critical raw materials[71]. Harnessing critical raw materials in a sustainable manner is therefore practical towards fast-tracking a just, equitable and inclusive energy transition for Sustainable Development.

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[65] Ibid

[66] United Nations Environment Programme., 'Critical Energy Transition Minerals' Op Cit

[67] United Nations Environment Programme., 'What are energy transition minerals and how can they unlock the clean energy age?' Op Cit

[68] Ibid

[69] Organisation for Economic Co-operation and Development., 'Making critical minerals work for sustainable growth and development' Op Cit

[70] United Nations Environment Programme., 'Critical Energy Transition Minerals' Op Cit

[71] Ibid

Chapter 16: Avoiding Energy Transition Pitfalls: Balancing Demand for Critical Raw Materials and Sustainability

Abstract

The necessity for diversification and the switch from fossil fuels to renewable energy sources is highlighted by the global energy crisis. More than two-thirds of greenhouse gas emissions come from the energy sector. SDG 7 seeks to double energy efficiency, boost renewable energy, and provide everyone access to modern, reasonably priced, and dependable energy services by 2030. Sustainable extraction depends on natural resource control, and the European Union argues it is important to lower the demand for essential raw resources worldwide. In order to accomplish sustainable development objectives and mitigate any possible negative impacts, this paper explores ways to balance the energy transition, extraction, and use of critical raw materials. The limited sources of the critical raw materials and the crucial role they play in the road to energy transition make them an important resource that may come with many challenges. This discussion highlights these challenges and how they can be addressed.

1.0 Introduction

Many regions of the globe continue to face major development problems related to basic energy availability and pricing.[1] The urgency with which all nations must diversify their energy sources and transition from fossil fuels to renewables, however, is highlighted by the climate emergency.[2] Currently, energy accounts for more than two-thirds of greenhouse gas emissions worldwide.[3]
It is estimated that 1.4 billion people worldwide lack access to electricity, with 85% in rural areas.[4] By 2030, this number will drop but only to 1.2 billion. However, traditional biomass use is projected to rise from 2.7 billion to 2.8 billion.[5] Addressing this requires international recognition, commitment, and a new financial, institutional, and technological framework.[6]Energy transitions are vital to addressing the climate catastrophe, since climate change is one of the biggest obstacles to reaching the Sustainable Development Goals (SDGs) of the United Nations.[7] Potential future outlooks for the global energy transition leave open the possibility of achieving two SDGs that are focused on energy and climate change: SDG 13 (climate action) and SDG 7 (affordable and clean energy).[8]

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[1] 'The Costs of Achieving the SDGs: Energy Transition | UN Trade and Development (UNCTAD)' <https://unctad.org/sdg-costing/energy-transition> accessed 27 December 2024.
[2] Ibid.
[3] Ibid.
[4] Kaygusuz K, 'Energy for Sustainable Development: A Case of Developing Countries' (2012) 16 Renewable and Sustainable Energy Reviews 1116.
[5] Ibid.
[6] Ibid.
[7] Ruan W and others, 'Assessing the Progress Toward Achieving Energy- and Climate-Related Sustainable Development Goals under Four Global Energy Transition Outlooks' (2024) 32 Sustainable Development 3695.
[8] Ibid.

As new technologies and methods are developed, the need to adapt to and mitigate the effects of climate change grows, and patterns of production and consumption shift, the energy sector has changed.[9] By 2030, SDG 7 aims to double the worldwide rate of energy efficiency improvement, significantly increase the amount of renewable energy in the global energy mix, and provide universal access to reasonably priced, dependable, and contemporary energy services.[10]
Critical raw material (CRM) shortage is a major component in the shift away from fossil fuel-based energy systems and towards renewable energy, which is essential for mitigating climate change.[11] Natural resource governance is determined by a nation's industrial structure, economic requirements, and national security objectives.[12] In order to guarantee their sustainable extraction, the European Union believes that rising worldwide demands for the critical raw materials must be reduced.[13]

It is against this background that this paper discusses some of the perspectives that can be exploited in striking the balance needed between promoting energy transition through extraction and utilisation of critical raw materials and achieving the sustainable development goals in order to address any negative effects that may arise from the same.

2.0 Energy Transition: Meaning and Concepts

The term "energy transition" refers to a substantial change in the energy system that includes adjustments to the market, production equipment, consumption patterns, distribution networks, infrastructure, technology, and players' investment patterns, tactics, and capacities.[14] The process

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[9] 'Gender Equality in the Sustainable Energy Transition' (*UN Women – Headquarters*, 10 November 2023) <https://www.unwomen.org/en/digital-library/publications/2023/05/gender-equality-in-the-sustainable-energy-transition> accessed 27 December 2024.

[10] 'Gender Equality in the Sustainable Energy Transition' (*UN Women – Headquarters*, 10 November 2023) <https://www.unwomen.org/en/digital-library/publications/2023/05/gender-equality-in-the-sustainable-energy-transition> accessed 27 December 2024.

[11] Pommeret A, Ricci F and Schubert K, 'Critical Raw Materials for the Energy Transition' (2022) 141 European Economic Review 103991.

[12] 'Governing Critical Raw Materials and the Energy Transition' (*SEI*) <https://www.sei.org/events/governing-critical-raw-materials/> accessed 27 December 2024.

[13] Ibid.; see also December 2023 ASW 14, 'EU's Critical Raw Materials Act Is Balancing Ambitions and Concerns' <https://www.awe.international/article/1851113?utm_source=website&utm_medium=social> accessed 27 December 2024; Hool, Alessandra, Christoph Helbig, and Gijsbert Wierink. "Challenges and opportunities of the European critical raw materials act." *Mineral Economics* 37, no. 3 (2024): 661-668; 'EU Takes Steps to Secure a Sustainable Supply of Critical Raw Materials' (*Europe of Cities*) <https://www.europeofcities.com/blog/eu-secure-sustainable-supply-critical-raw-materials> accessed 27 December 2024; Bide T and others, 'Development of Decision-Making Tools to Create a Harmonised UK National Mineral Resource Inventory Using the United Nations Framework Classification' (2022) 76 Resources Policy 102558.

[14] Fattouh, Bassam, Rahmatallah Poudineh, and Rob West. "The rise of renewables and energy transition: what adaptation strategy exists for oil companies and oil-exporting countries?" *Energy transitions* 3, no. 1 (2019): 45-58, 50.

is multifaceted, intricate, non-linear, non-deterministic, and very unpredictable. Although energy transition is a multifaceted process with several players engaged, it is often evaluated based on the rate of changes in the physical dimension.[15] A major change in the world's energy consumption, the "Energy Transition" is fuelled by a variety of factors, including decarbonisation, economics, energy access, societal expectations, energy efficiency, political and regulatory forces, and emerging technologies.[16] It happens in different ways and at different rates in different parts of the world.[17]

To predict future corporate, social, and ecological trajectories, it is essential to comprehend the energy transition.[18] The modelling of energy transition and the adaptation of energy policy to related transitions will determine future economic, environmental, and social change.[19] The energy transition is a complicated process that has significant socioeconomic and ecological effects and is impacted by market forces, governance frameworks, technological developments, and sociocultural influences.[20] Addressing these impacts, avoiding dangers, and achieving a just transition are all essential.[21]

The energy transition involves the reconstruction of energy system elements beyond the energy sector, involving explicit and implicit transitions.[22] The explicit transition is characterized by energy utilization type, structure, and transportation, while the implicit transition involves changes in energy security, geopolitical structure, power, justice, and governance.[23]

For a clean, intergenerational shift to renewable energy sources and energy security, the energy transition—which is defined by sustainability, resilience, and vulnerability—is essential.[24] Even with the geopolitical crises of 2022, carbon-based energy will continue to be the mainstay, although attention is moving towards less polluting sources and efficient natural resource management, which is fostering economic and technical modernization.[25]

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[15] Ibid, 50.
[16] Craig, Jonathan. "The "Energy Transition": myth or reality?" In *EPJ Web of Conferences*, vol. 268, p. 00004. EDP Sciences, 2022.
[17] Ibid.
[18] Gatto, Andrea. "The energy futures we want: A research and policy agenda for energy transitions." *Energy Research & Social Science* 89 (2022): 102639.
[19] Ibid.
[20] Yang, Yu, Siyou Xia, Ping Huang, and Junxi Qian. "Energy transition: Connotations, mechanisms and effects." *Energy Strategy Reviews* 52 (2024): 101320.
[21] Ibid.
[22] Yang, Yu, Siyou Xia, Ping Huang, and Junxi Qian. "Energy transition: Connotations, mechanisms and effects." *Op. cit.*
[23] Ibid.
[24] Gatto, Andrea. "The energy futures we want: A research and policy agenda for energy transitions." *Energy Research & Social Science* 89 (2022): 102639.
[25] Ibid.

Literature on environmental justice emphasises how nearby communities, especially those of colour and lower incomes, are disproportionately affected by the negative externalities of infrastructure, amenities, or undesirable land uses.[26] This may also be seen in the energy transition, as people living close to low-carbon energy sources bear a disproportionate amount of the negative externalities these technologies produce.[27] Energy justice seeks to address poverty, climate change, and energy security while advancing social justice and fairness in energy systems by making safe, cheap, and sustainable energy available to everyone.[28] Injustices pertaining to domestic energy access and excessive household energy costs are intended to be addressed by the Energy Justice framework.[29] The lack of agreement on nomenclature to address these problems, however, causes misunderstandings among scholars, practitioners, and policymakers.[30] Achieving a fair transition to a low-carbon future is threatened by the variety of ideas and how they are applied.[31]

Energy security, greenhouse gas emission reduction, and energy mix diversification all depend on the switch to renewable energy sources like hydropower, wind, and solar.[32] Along with reducing negative effects on the environment, this shift promotes job development and economic expansion.[33] By striking a balance between meeting present energy demands and protecting resources for future generations, sustainability is the aim.[34] A sustainable energy framework, which incorporates energy efficiency techniques, renewable energy deployment, and circular economy concepts, guarantees that progress does not result in social injustice or environmental deterioration.[35]

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[26] Carley, Sanya, and David M. Konisky. "The justice and equity implications of the clean energy transition." *Nature Energy* 5, no. 8 (2020): 569-577.

[27] Ibid.

[28] Jenkins K, Sovacool BK and McCauley D, 'Humanizing Sociotechnical Transitions through Energy Justice: An Ethical Framework for Global Transformative Change' (2018) 117 Energy Policy 66.

[29] Hernández D, Yoon L and Simcock N, 'Basing "Energy Justice" on Clear Terms: Assessing Key Terminology in Pursuit of Energy Justice' [2022] Environmental Justice <https://www.liebertpub.com/doi/10.1089/env.2021.0049> accessed 29 December 2024.

[30] Ibid.

[31] Ibid.

[32] Sreekanth KJ, 'Energy Policy Analyses, Energy Transition and Sustainability' in KJ Sreekanth (ed), *Energy Efficiency Improvements with Emission Abatement for Energy Sustainability: Energy Statistics* (Springer Nature 2024) <https://doi.org/10.1007/978-981-97-9480-5_8> accessed 29 December 2024.

[33] Ibid.

[34] Ibid.

[35] Ibid.; see also 'Impact of Green Energy Production for Sustainable Economic Growth and Green Economic Recovery - ScienceDirect' <https://www.sciencedirect.com/science/article/pii/S2405844024126746> accessed 29 December 2024; Kirchherr J and others, 'Conceptualizing the Circular Economy (Revisited): An Analysis of 221 Definitions' (2023) 194 Resources, Conservation and Recycling 107001.

Supplying critical minerals for the Energy Transition is a major problem for the mining sector, and businesses need to make sure their environmental effect is as low as possible.[36] One significant problem that must be addressed is irresponsible, unsustainable, and non-ESG compliant mining.[37] The environmental effect of consuming energy, even renewable energy sources, is the issue, not the energy source itself.[38]

In order to address resource constraints, environmental concerns, and geopolitical risks, the global energy sector is experiencing a substantial change towards sustainability.[39] For a robust, ecologically conscious future, a smooth transition and a dedication to sustainability are essential, necessitating cooperation between companies, researchers, and legislators.[40] Ensuring equitable sharing of the advantages of energy production and use across various populations is the goal of energy justice.[41] Industries, healthcare, education, food security, innovation, and economic diversification all depend on it.[42] To solve particular issues and strike a balance between market creation and development concerns, Africa needs a just energy transition.[43] In order to boost well-being and sustainable development, policymakers must see the energy transition through a justice lens and support universal, safe, affordable, and secure energy access.[44]

Africa has to drastically change its perspective on energy if it is to meet the development objectives set out in the wider African Union (AU) Agenda 2063 and the United Nations 2030 Agenda for Sustainable Development.[45] It must also take immediate measures to resolve its long-standing problems with energy access. More funding from donor nations and international organisations must be a part of this effort.[46] Many African nations are falling short of the Sustainable Development Goal 7 (SDG7), which calls for universal access to modern, cheap, reliable, and sustainable energy.[47] Progress towards many other development objectives also

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[36] Craig, Jonathan. "The "Energy Transition": myth or reality?" *Op. cit., 30.*
[37] Ibid., 30.
[38] Ibid., 30.
[39] Sreekanth KJ, 'Energy Policy Analyses, Energy Transition and Sustainability' in KJ Sreekanth (ed), *Energy Efficiency Improvements with Emission Abatement for Energy Sustainability: Energy Statistics* (Springer Nature 2024) <https://doi.org/10.1007/978-981-97-9480-5_8> accessed 29 December 2024.
[40] Ibid.
[41] Abe, Oyeniyi, and Victor Azubike. "(Re) examining the intersection between energy justice and energy transition in Africa." *Journal of Energy & Natural Resources Law* 42, no. 3 (2024): 279-299.
[42] Ibid.
[43] Ibid.
[44] Ibid.; see also Jenkins, Kirsten, Benjamin K. Sovacool, and Darren McCauley. "Humanizing sociotechnical transitions through energy justice: An ethical framework for global transformative change." *Energy policy* 117 (2018): 66-74.
[45] United Nations, 'Ensuring Universal Energy Access and Advancing Just, Inclusive and Equitable Energy Transitions' *Policy Briefs in Support of the Un High-Level Political Forum 2023*, (*Energia*, 17 December 2024) <https://energia.org/publications/ensuring-universal-energy-access-and-advancing-just-inclusive-and-equitable-energy-transitions/> accessed 29 December 2024.
[46] Ibid.
[47] Ibid.

depends critically on having access to modern energy services that are dependable and fairly priced.

3.0 Energy Transition and Sustainable Development Goals

Since 2015, governments, businesses, and civil society groups have backed energy access initiatives in line with Sustainable Development Goal 7 of the UN, which aims to address poverty, food security, climate change, and health.[48] Achieving the Sustainable Development Goals, which centre on energy efficiency, access, and clean and renewable energy, depends on the energy transition. Investments in developing countries continue to stagnate despite advances in China and other nations.[49]

The current economy depends on critical raw materials (CRMs), which power important industries including digital technology, sustainable transportation, and renewable energy.[50] Achieving the Sustainable Development Goals (SDGs) of the UN depends on managing these resources sustainably in light of the rising global demand.[51] Political, economic, and environmental issues all contribute to the ongoing changes in the energy industry.[52] Geopolitical instability, disputes, and price volatility may result from poor planning and management.[53] New energy sources are being looked into to lessen these hazards, which might change ecological and economic methods as well as cultures.[54] Improved energy governance, policy, and regulatory efficacy that targets disadvantaged communities may help accomplish Sustainable Development Goals.[55]

[48] Minas, Angela Mae, Samira García-Freites, Christopher Walsh, Velma Mukoro, Jhud Mikhail Aberilla, Amanda April, Jaise Kuriakose, Carlos Gaete-Morales, Alejandro Gallego Schmid, and Sarah Mander. "Advancing Sustainable Development Goals through energy access: Lessons from the Global South." *Renewable and Sustainable Energy Reviews* 199 (2024): 114457.

[49] 'The Costs of Achieving the SDGs: Energy Transition | UN Trade and Development (UNCTAD)' <https://unctad.org/sdg-costing/energy-transition> accessed 27 December 2024.

[50] 'Critical Raw Materials for a Sustainable Future | UNECE' <https://unece.org/critical-raw-materials-sustainable-future> accessed 27 December 2024.

[51] Ibid.

[52] Gatto, Andrea. "The energy futures we want: A research and policy agenda for energy transitions." *Energy Research & Social Science* 89 (2022): 102639.

[53] Ibid.

[54] Ibid.

[55] Ibid.; see also Kaygusuz K, 'Energy for Sustainable Development: A Case of Developing Countries' (2012) 16 Renewable and Sustainable Energy Reviews 1116; Minas AM and others, 'Advancing Sustainable Development Goals through Energy Access: Lessons from the Global South' (2024) 199 Renewable and Sustainable Energy Reviews 114457; Glass L-M and Newig J, 'Governance for Achieving the Sustainable Development Goals: How Important Are Participation, Policy Coherence, Reflexivity, Adaptation and Democratic Institutions?' (2019) 2 Earth System Governance 100031.

Energy transition programs, sometimes financed by external funding, are helping communities in developing nations promote energy emancipation.[56] Through the creation of green jobs and enterprises, socioeconomic inclusivity, and sustainable entrepreneurship, these programs benefit marginalised communities.[57] They want to ensure that everyone has access to energy, enhance living standards, and advance sustainable models and cleaner energy transitions.[58] It must however be noted that because of commercial, political, and transformational obstacles, financing institutions may make green projects more expensive.[59] Up to half of the transition's investments are funded by capital expenses, which are greater for riskier initiatives. Because of the increased risks, projects in developing countries are less bankable and cost more.[60]

It is essential to resolve obstacles and encourage both centralised and decentralised renewable energy generation in order to achieve the 2030 goals.[61] Energy transformations, especially the promotion of electrification of transport and heating, need new policies, business models, and investment that are inclusive of all socioeconomic groups.[62]

In order to achieve SDGs such as gender equality, food security, health, education, and poverty eradication, energy transitions are essential.[63] Policy and program decision-making requires an integrated, participatory approach to ensure fair benefit sharing, environmental preservation, and economic development for communities and people while maximising benefits and minimising trade-offs.[64]

4.0 Energy Transition and Critical Raw Materials: Challenges and Prospects

The United Nations Framework Convention on Climate Change (UNFCCC) adopted the Paris Agreement in 2015, which sparked initiatives in every sector to decarbonize in order to meet the target of keeping global warming to 1.5 degrees Celsius above pre-industrial levels.[65]

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[56] Gatto, Andrea. "The energy futures we want: A research and policy agenda for energy transitions." *Op. cit.*

[57] Ibid.

[58] Ibid.

[59] 'Financing the Green Energy Transition' <https://www.deloitte.com/global/en/issues/climate/financing-the-green-energy-transition.html> accessed 29 December 2024.

[60] Ibid.

[61] Minas AM and others, 'Advancing Sustainable Development Goals through Energy Access: Lessons from the Global South' (2024), *op.cit.*

[62] Ibid.

[63] United Nations, 'Ensuring Universal Energy Access and Advancing Just, Inclusive and Equitable Energy Transitions' *Policy Briefs in Support of the Un High-Level Political Forum 2023*, *op. cit.*

[64] Ibid.

[65] 'The Paris Agreement | UNFCCC' <https://unfccc.int/process-and-meetings/the-paris-agreement> accessed 27 December 2024.

Sustainable Development and the shift to a green or circular economy depend on essential raw resources, industrialization, urbanisation, mobility, and renewable energy.[66] In the current quest to diversify energy sources—whether nuclear or renewable, among others—they are in fact essential.[67] Although the extractive industries have enormous potential to spur economic development and alleviate poverty, they are also linked to issues related to finance, economics, governance, society, and the environment.[68]

In every stage of the supply chain, raw materials may either directly or indirectly contribute to the SDGs, and their effects can be either good or bad.[69] The success of businesses, industries, national laws and governance, and consumer behaviour all have a significant role in the potential for both good and negative effects from the same raw materials activity.[70]

The production of raw materials may boost the local economy by generating jobs, increasing population income, and opening up commercial possibilities in other industries.[71]

Investments in clean technologies and renewable energy sources, such solar and wind power, are essential to the energy transition's advancement.[72] Enhancing everyone's access to clean energy and lowering reliance on fossil fuels are also essential.[73]

As the world moves towards electrification, critical raw materials (CRM) such as lithium, nickel, cobalt, copper, manganese, graphite, and rare earth elements are essential for the manufacturing of batteries and renewable energy technologies like solar panels and wind turbines.[74]

In 20 years, the demand for lithium is predicted to increase by over 90%. The demand for nickel and cobalt should increase by 60–70%. Demand for copper and rare earth elements is predicted to rise by 40%. The demand for these essential commodities is expected to more than treble by

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[66] 'The Working Group on Transforming the Extractive Industries for Sustainable Development | UNECE' <https://unece.org/unece-and-sdgs/working-group-transforming-extractive-industries-sustainable-development> accessed 27 December 2024.
[67] Ibid.
[68] Ibid.
[69] Mancini, Lucia, B. Vidal Legaz, Matteo Vizzarri, Dominic Wittmer, Giacomo Grassi, and David Pennington. "Mapping the role of raw materials in sustainable development goals." *A Preliminary Analysis of Links, Monitoring Indicators, and Related Policy Initiatives* 3 (2019): 1-9.
[70] Ibid.
[71] Ibid.
[72] 'The Costs of Achieving the SDGs: Energy Transition | UN Trade and Development (UNCTAD)' <https://unctad.org/sdg-costing/energy-transition> accessed 27 December 2024.
[73] Ibid.
[74] 'COP28: UN Urges Coordinated Action to Align Soaring Critical Raw Materials Extraction and Use with Sustainable Development | UNECE' <https://unece.org/climate-change/press/cop28-un-urges-coordinated-action-align-soaring-critical-raw-materials> accessed 27 December 2024.

2030 under the IEA's net-zero emissions scenario.[75] However, the use of these finite resources is currently far from sustainable. The world's material footprint, currently at approximately 100 billion tonnes annually, is projected to double by 2060. The extraction and processing of materials, fuels, and food contribute to half of total global greenhouse gas emissions and over 90% of biodiversity loss and water stress.[76]

During COP 28, all five United Nations Regional Commissions and international experts called for international coordination and urgent action at COP28 to ensure that massive CRM expansion does not undermine sustainable development due to rising demand, supply-side geopolitical uncertainties, and significant environmental and social impacts associated with CRM extraction and use.[77] Raw material extraction is still often associated with serious environmental harm and human rights abuses. This reality is not new; it has been a part of the exploitation of raw resources from antiquity, the colonial period, and even now.[78]

Advanced manufacturing, digital technology, the military, defence systems, and—above all—clean energy technologies all depend on essential basic resources.[79] Increased extraction is causing conflicting objectives across several policy sectors and governmental levels as the need for essential raw resources develops globally.[80] It also often exacerbates environmental inequities and increases climatic vulnerability in extraction locations.[81]

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[75] Ibid.; See also 'Outlook for Key Minerals – Global Critical Minerals Outlook 2024 – Analysis' (*IEA*) <https://www.iea.org/reports/global-critical-minerals-outlook-2024/outlook-for-key-minerals> accessed 28 December 2024.

[76] Ibid.; see also Potts E, 'UN Urges Sustainable Critical Raw Materials Extraction at COP28' (*Innovation News Network*, 8 December 2023) <https://www.innovationnewsnetwork.com/un-urges-sustainable-critical-raw-materials-extraction-at-cop28/40931/> accessed 28 December 2024; 'Resource Use and Materials' (5 December 2024) <https://www.eea.europa.eu/en/topics/in-depth/resource-use-and-materials> accessed 28 December 2024; 'Global Outlook Highlights Resource Extraction as Main Cause of Climate Change, Biodiversity Loss' (*SDG Knowledge Hub*) <https://sdg.iisd.org/news/global-outlook-highlights-resource-extraction-as-main-cause-of-climate-change-biodiversity-loss/> accessed 28 December 2024; Watts J, 'Resource Extraction Responsible for Half World's Carbon Emissions' *The Guardian* (12 March 2019) <https://www.theguardian.com/environment/2019/mar/12/resource-extraction-carbon-emissions-biodiversity-loss> accessed 28 December 2024; Wang Y and others, 'Human Health and Ecosystem Impacts of China's Resource Extraction' (2022) 847 Science of The Total Environment 157465.

[77] Ibid.; See also 'COP 28: What Was Achieved and What Happens Next? | UNFCCC' <https://unfccc.int/cop28/5-key-takeaways> accessed 28 December 2024; 'COP28: Extraction of Minerals Needed for Green Energy Must Be "Sustainable and Just", Says Guterres' (*Africa Renewal*, 3 December 2023) <https://www.un.org/africarenewal/magazine/december-2023/cop28-extraction-minerals-needed-green-energy-must-be-%E2%80%98sustainable-and-just%E2%80%99> accessed 28 December 2024.

[78] Huck, Winfried. "The Integration of Sustainable Development Goals (SDGs) into the Raw Materials Sector." *Europäische Zeitschrift für Wirtschaftsrecht (EuZW)* 7 (2018): 266.

[79] 'Governing Critical Raw Materials and the Energy Transition' (*SEI*) <https://www.sei.org/events/governing-critical-raw-materials/> accessed 27 December 2024.

[80] Ibid.

[81] Ibid.

The "resource curse" theory suggests that countries with abundant natural resources tend to grow slower than those with less.[82] This theory has been extensively studied in both developed and developing countries, with different conclusions drawn.[83] Mining projects can exacerbate land competition, negatively impacting rural populations' livelihoods and food insecurity, leading to poverty and impoverishment.[84]

Public health may be seriously harmed by hazardous materials and wastes that mining and manufacturing companies emit into the air, water, and land.[85] Given their function in delivering

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[82] Mancini, Lucia, B. Vidal Legaz, Matteo Vizzarri, Dominic Wittmer, Giacomo Grassi, and David Pennington. "Mapping the role of raw materials in sustainable development goals." *A Preliminary Analysis of Links, Monitoring Indicators, and Related Policy Initiatives* 3 (2019): 1-9.

[83] Ibid.; see also Alssadek M and Benhin J, 'Natural Resource Curse: A Literature Survey and Comparative Assessment of Regional Groupings of Oil-Rich Countries' (2023) 84 Resources Policy 103741; Baafi JA, 'Unraveling Ghana's Resource Curse Hypothesis: Analyzing Natural Resources and Economic Growth with a Focus on Oil Exploration' (2024) 12 Economies 79; Stan, Sylvia. "The Curse of Natural Resources Paradox of Abundance: The Case of Venezuela." *Logos Universality Mentality Education Novelty: Law* 12, no. 1 (2024): 14-22; Frankel JA, 'Chapter 2. The Natural Resource Curse: A Survey of Diagnoses and Some Prescriptions', *Commodity Price Volatility and Inclusive Growth in Low-Income Countries* (International Monetary Fund) <https://www.elibrary.imf.org/display/book/9781616353797/ch002.xml> accessed 28 December 2024; Badeeb RA, Lean HH and Clark J, 'The Evolution of the Natural Resource Curse Thesis: A Critical Literature Survey' (2017) 51 Resources Policy 123; Kinnaman TC, 'A New Perspective on the Natural Resource Curse' (2023) 4 World 670; Narh, John. "The resource curse and the role of institutions revisited." *Environment, Development and Sustainability* (2023): 1-21; Moti UG, 'Africa's Natural Resource Wealth: A Paradox of Plenty and Poverty' (2019) 6 Advances in Social Sciences Research Journal 483.

[84] Ibid.; see also Wegenast, Tim, and Jule Beck. "Mining, rural livelihoods and food security: A disaggregated analysis of sub-Saharan Africa." *World Development* 130 (2020): 104921; Mwakesi I and others, 'Mining Impact on Communities' Livelihoods: A Case Study of Taita Taveta County, Kenya' (2020) 7 AIMS Environmental Science 286; Mancini L and Sala S, 'Social Impact Assessment in the Mining Sector: Review and Comparison of Indicators Frameworks' (2018) 57 Resources Policy 98; Gukurume S and Tombindo F, 'Mining-Induced Displacement and Livelihood Resilience: The Case of Marange, Zimbabwe' (2023) 13 The Extractive Industries and Society 101210; Kazadi HN, Kusadokoro M and Chitose A, 'Participation in Artisanal Diamond Mining and Food Security: A Case Study of Kasai Oriental in DR Congo' (2024) 9 Open Agriculture <https://www.degruyter.com/document/doi/10.1515/opag-2022-0360/html?srsltid=AfmBOoqipe0EBxsIHefUYaxylpqO5vQWCm2nyVE8Z4nG10n21xMfby0c> accessed 28 December 2024; Haile NZ, Huluka AT and Beyene AB, 'Impacts of Mining Projects on Food Security of Households in Ethiopia: Empirical Evidence from Benishangul-Gumuz Region' (2024) 8 Frontiers in Sustainable Food Systems <https://www.frontiersin.org/journals/sustainable-food-systems/articles/10.3389/fsufs.2024.1481827/full> accessed 28 December 2024; Vanclay F, 'Project-Induced Displacement and Resettlement: From Impoverishment Risks to an Opportunity for Development?' [2017] Impact Assessment and Project Appraisal <https://www.tandfonline.com/doi/abs/10.1080/14615517.2017.1278671> accessed 28 December 2024.

[85] Ibid.; see also Moghimi Dehkordi M and others, 'Soil, Air, and Water Pollution from Mining and Industrial Activities: Sources of Pollution, Environmental Impacts, and Prevention and Control Methods' (2024) 23 Results in Engineering 102729; Siddiqua A, Hahladakis JN and Al-Attiya WAKA, 'An Overview of the Environmental Pollution and Health Effects Associated with Waste Landfilling and Open Dumping' (2022) 29 Environmental Science and Pollution Research 58514; Latimer, Geoff. "The health and environmental impacts of hazardous wastes." *Ascend Waste and Environment Pty Ltd* (2015); Levy, Barry S.,

ecosystem products and services that are mediated by biology and the physical world, aquatic ecosystem health and integrity are vital.[86] Human health is protected by aquatic systems, which lower the dangers of pollution and harmful microbes that may otherwise affect human health.[87] Sustainable environmental management must therefore prioritize the use of ecological indicators to track both natural and human threats to these ecosystems.[88]

Gender inequality and migration-driven population expansion in mining villages may lead to behavioural and psychological issues (such as prostitution, drug abuse, and alcoholism). HIV/AIDS and other sexually transmitted illnesses may be more common in local populations around mining sites, particularly in poor nations.[89] Particularly in underdeveloped nations, artisanal and small-scale mining (ASM) often works outside of environmental laws and health and safety regulations.[90] Between 25% and 33% of the mercury contamination in the world is

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and Cora Roelofs. "Impacts of climate change on workers' health and safety." In *Oxford research encyclopedia of global public health*. 2019.

[86] Ouma, Kennedy O., Agabu Shane, and Stephen Syampungani. "Aquatic ecological risk of heavy-metal pollution associated with degraded mining landscapes of the Southern Africa River Basins: A review." *Minerals* 12, no. 2 (2022): 225.

[87] Ibid.

[88] Ibid.

[89] Mancini, Lucia, B. Vidal Legaz, Matteo Vizzarri, Dominic Wittmer, Giacomo Grassi, and David Pennington. "Mapping the role of raw materials in sustainable development goals."*op.cit.*; see also Mancini L and Sala S, 'Social Impact Assessment in the Mining Sector: Review and Comparison of Indicators Frameworks' (2018) 57 Resources Policy 98; Chimoyi L and others, 'Exploring the Syndemic Interaction between Social, Environmental and Structural Contexts of HIV Infection in Peri-Mining Areas in South Africa: A Qualitative Study' (2024) 14 BMJ Open e076198; Nicholas PK and others, 'HIV Vulnerability in Migrant Populations in Southern Africa: Sociological, Cultural, Health-Related, and Human-Rights Perspectives' (2016) 5 International Journal of Africa Nursing Sciences 1; Scott, Jen, Rose Dakin, Katherine Heller, and Adriana Eftimie. "Extracting lessons on gender in the oil and gas sector." *The World Bank. Retrieved June* 10 (2013): 2021.

[90] Ibid.; see also Landrigan P and others, 'Reducing Disease and Death from Artisanal and Small-Scale Mining (ASM) - the Urgent Need for Responsible Mining in the Context of Growing Global Demand for Minerals and Metals for Climate Change Mitigation' (2022) 21 Environmental Health 78; Schwartz FW, Lee S and Darrah TH, 'A Review of the Scope of Artisanal and Small-Scale Mining Worldwide, Poverty, and the Associated Health Impacts' (2021) 5 GeoHealth e2020GH000325; Corbett T, O'Faircheallaigh C and Regan A, '"Designated Areas" and the Regulation of Artisanal and Small-Scale Mining' (2017) 68 Land Use Policy 393; 'Transforming Artisanal Mining Can Be Beneficial for People and the Planet' (*Africa Renewal*, 28 April 2024) <https://www.un.org/africarenewal/magazine/april-2024/transforming-artisanal-mining-can-be-beneficial-people-and-planet> accessed 28 December 2024; Landrigan P and others, 'Reducing Disease and Death from Artisanal and Small-Scale Mining (ASM) - the Urgent Need for Responsible Mining in the Context of Growing Global Demand for Minerals and Metals for Climate Change Mitigation' (2022) 21 Environmental Health 78; Vazquez-Brust DA, Arthur-Holmes F and Yakovleva N, 'The Social and Environmental Responsibility of Informal Artisanal and Small-Scale Mining in Ghana: An Akan Philosophical Perspective' (2024) 360 Journal of Environmental Management 121131; Fritz, Morgane, James McQuilken, Nina Collins, and Fitsum Weldegiorgis. *Global Trends in Artisanal and Small-Scale Mining (ASM): A review of key numbers and issues*. International Institute for Sustainable Development (IISD), 2022; Schwartz, Franklin W., Sangsuk Lee, and Thomas H. Darrah. "A review of the scope of artisanal and small-

caused by ASM gold mining, which has detrimental effects on the health of nearby populations and exposed workers.[91]

In order to facilitate this shift, governments may have to pay for energy planning, production, distribution, and regulation. They may also provide tax breaks and subsidies for clean and energy-efficient technology, or they may fund research and development.[92]

Industrialised nations are engaged in a competition for critical raw materials as a result of the shift to a low-carbon economy and the growth of the technology that make it possible, such as

scale mining worldwide, poverty, and the associated health impacts." *GeoHealth* 5, no. 1 (2021): e2020GH000325.

[91] Ibid.; see also Taux K, Kraus T and Kaifie A, 'Mercury Exposure and Its Health Effects in Workers in the Artisanal and Small-Scale Gold Mining (ASGM) Sector—A Systematic Review' (2022) 19 International Journal of Environmental Research and Public Health 2081; Esdaile LJ and Chalker JM, 'The Mercury Problem in Artisanal and Small-Scale Gold Mining' (2018) 24 Chemistry (Weinheim an Der Bergstrasse, Germany) 6905; Brunnschweiler CN, Karapetyan D and Lujala P, 'Opportunities and Risks of Small-Scale and Artisanal Gold Mining for Local Communities: Survey Evidence from Ghana' (2024) 17 The Extractive Industries and Society 101403; Vergara-Murillo F and others, 'Adverse Health Effects and Mercury Exposure in a Colombian Artisanal and Small-Scale Gold Mining Community' (2022) 10 Toxics 723; 'The Dark Side of Gold: The Dangerous Effects of Mercury Used in Artisanal Gold Mining' (30 April 2020) <https://www.un-ihe.org/dark-side-gold-dangerous-effects-mercury-used-artisanal-gold-mining> accessed 28 December 2024; Telmer, Kevin H., and Marcello M. Veiga. "World emissions of mercury from artisanal and small scale gold mining and the knowledge gaps about them." *Report to the World Bank on the "Global Mercury Project". New York: World Bank* (2008); Armah FA and others, 'Unsafe Occupational Health Behaviors: Understanding Mercury-Related Environmental Health Risks to Artisanal Gold Miners in Ghana' (2016) 4 Frontiers in Environmental Science <https://www.frontiersin.org/journals/environmental-science/articles/10.3389/fenvs.2016.00029/full> accessed 28 December 2024.

[92] 'The Costs of Achieving the SDGs: Energy Transition | UN Trade and Development (UNCTAD)' <https://unctad.org/sdg-costing/energy-transition> accessed 27 December 2024; see also 'Economic Subsidies: The Kenya Experience – KIPPRA' <https://kippra.or.ke/economic-subsidies-the-kenya-experience/> accessed 28 December 2024; Qadir SA and others, 'Incentives and Strategies for Financing the Renewable Energy Transition: A Review' (2021) 7 Energy Reports 3590; Alleyne TSC, 'Chapter 4. Reforming Energy Subsidies: Lessons from Experience', *Energy Subsidy Reform* (International Monetary Fund) <https://www.elibrary.imf.org/display/book/9781475558111/ch004.xml> accessed 28 December 2024; Leader|authorurl:https://www.ey.com/en_ps/people/catherine-friday authorsalutation: |authorfirstname:Catherine|authorlastname:Friday|authorjobtitle:EY G and EA-PG& II, Co-Leader|authorurl:https://www.ey.com/en_ps/people/meghan-mills authorsalutation:|authorfirstname:Meghan |authorlastname:Mills|authorjobtitle:EY GG& PSS& OLEGS and GEL and FC and Knowledge|authorurl:https://www.ey.com/en_ps/people/julie-mcqueen authorsalutation: |authorfirstname:Julie|authorlastname:McQueen|authorjobtitle:EY GG& ILA-E, 'Six Ways That Governments Can Drive the Green Transition' <https://www.ey.com/en_ps/insights/government-public-sector/six-ways-that-governments-can-drive-the-green-transition> accessed 28 December 2024; Bridle, Richard, Shruti Sharma, Mostafa Mostafa, and Anna Geddes. "Fossil fuel to clean energy subsidy swaps: How to pay for an energy revolution." (2019).

solar panels, wind power, and electric cars.[93] The protection of the environment and human rights is thus significantly impacted by increased extraction in both high- and low-income nations.[94] The key to ensuring sustainability is identifying the appropriate governance mechanisms to balance conflicting demands and aims.[95]

More essential than fossil fuel-based power production, the shift to sustainable energy sources raises demand for critical raw minerals including copper, lithium, nickel, cobalt, aluminium, and rare earth elements.[96] Given that the majority of minerals and metals are now used in industrial processes, we anticipate that the rivalry for resources will intensify during the next ten years.[97] Thus, the current reliance on oil may soon give way to reliance on critical raw materials.[98]

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[93] 'Governing Critical Raw Materials and the Energy Transition' (*SEI*) <https://www.sei.org/events/governing-critical-raw-materials/> accessed 27 December 2024; see also Kamali Saraji M and Streimikiene D, 'Challenges to the Low Carbon Energy Transition: A Systematic Literature Review and Research Agenda' (2023) 49 Energy Strategy Reviews 101163; Wang F and others, 'Technologies and Perspectives for Achieving Carbon Neutrality' (2021) 2 The Innovation 100180; Lv Y, 'Transitioning to Sustainable Energy: Opportunities, Challenges, and the Potential of Blockchain Technology' (2023) 11 Frontiers in Energy Research <https://www.frontiersin.org/journals/energy-research/articles/10.3389/fenrg.2023.1258044/full> accessed 28 December 2024; World Bank Group. *The growing role of minerals and metals for a low carbon future*. World Bank, 2017; 'Renewable Energy and Jobs: Annual Review 2023' <https://www.irena.org/Digital-Report/Renewable-energy-and-jobs-Annual-review-2023> accessed 28 December 2024; Holzwarth, S., O. Lah, and E. Martin. "Integration is key: the role of electric mobility for low-carbon and sustainable cities." (2022); Mitigation, Climate Change. "IPCC special report on renewable energy sources and climate change mitigation." *Renewable Energy* 20, no. 11 (2011); Menyhart J, 'Overview of Sustainable Mobility: The Role of Electric Vehicles in Energy Communities' (2024) 15 World Electric Vehicle Journal 275; Aderibigbe, Oluwayemi-Oniya, and Trynos Gumbo. "The role of electric vehicles in greening the environment: Prospects and challenges." *Proceedings of the REAL CORP, Ljubljana, Slovenia* (2023): 18-20; 'Electrifying the Future: Sustainable Mobility and the Rise of EV | Prysmian' <https://www.prysmian.com/en/insight/sustainability/electrifying-the-future-sustainable-mobility-and-the-rise-of-ev> accessed 28 December 2024.

[94] Ibid.; see also Levy BS and Patz JA, 'Climate Change, Human Rights, and Social Justice' (2015) 81 Annals of Global Health 310; Chapman AR and Ahmed AK, 'Climate Justice, Humans Rights, and the Case for Reparations' (2021) 23 Health and Human Rights 81; 'Rich Countries Use Six Times More Resources, Generate 10 Times the Climate Impacts than Low-Income Ones' (1 March 2024) <https://www.unep.org/news-and-stories/press-release/rich-countries-use-six-times-more-resources-generate-10-times> accessed 28 December 2024; Bruyninckx, Hans Hatfield-Dodds, Steve Hellweg, Stefanie Schandl, Heinz Vidal, Beatriz Razian, Hala Nohl, Rebecca Marcos-Martinez et al. "Global Resources Outlook 2024: Bend the trend-Pathways to a liveable planet as resource use spikes." *United Nations Environment Programme* (2024); 'Towards a Business, Human Rights and the Environment Framework' <https://www.mdpi.com/2071-1050/14/11/6596> accessed 28 December 2024; Alan, Boyle. "Human rights and the environment: where next?" In *Challenges in International Human Rights Law*, pp. 765-794. Routledge, 2017.

[95] Ibid.

[96] EY CA and CCC and SS, 'Critical Raw Materials for Energy Transition - How to Achieve the Targets' <https://www.ey.com/en_bg/insights/energy-resources/critical-raw-materials-for-energy-transition> accessed 29 December 2024.

[97] Ibid.

[98] Ibid.

The regions of Asia-Pacific, Latin America, and Africa now have the highest concentrations of CRM mining. The concentration of mineral processing is significantly higher. China is the main participant in this situation.[99] The Democratic Republic of the Congo (cobalt), South Africa (platinum, iridium), China (graphite, rare earths), Australia (lithium), Chile (copper and lithium), and Indonesia (nickel) are the leading countries in the mining of critical minerals.[100] At the processing stage, this concentration is much more noticeable, as China presently supplies 70% of cobalt, almost 60% of lithium, manganese, and 100% of the refined supply of natural graphite and dysprosium, a rare earth element.[101] The mining sector is very concentrated, with a small number of firms dominating a significant amount of output and trade worldwide. Sixty-one percent of lithium and 56 percent of cobalt are produced by the top five mining corporations.[102]

The climatic footprint of materials required for the energy transition and environmental concerns are just now being addressed by policymakers, even though environmental health is a major driver.[103] Examining sustainable energy systems and materials across their whole lifespan is essential to ensuring that they mitigate climate change. Extraction and processing pollutants are responsible for half of the most hazardous sites and industries in the world.[104] 92% of pollution-related fatalities take place in low- and middle-income nations, and material profits often trump responsibility. Because of a lack of accountability, the levels of heavy metal pollution and health hazards in Zambia's Central African Copperbelt and China's mining regions are rising.[105] In addition to having long-term health effects, heavy metal pollution in certain places may cause tensions with the local populace.[106]

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[99] Ibid.

[100] Press, Elizabeth, Thijs Van de Graaf, Martina Lyons, Isaac Elizondo Garcia, Ellipse Rath, and Benjamin Gibson. "Geopolitics of the energy transition: Critical materials." (2023).

[101] Ibid.

[102] Ibid.

[103] Calderon, Jordan L., Morgan Bazilian, Benjamin Sovacool, Kristen Hund, Simon M. Jowitt, T. P. Nguyen, André Månberger et al. "Reviewing the material and metal security of low-carbon energy transitions." *Renewable and Sustainable Energy Reviews* 124 (2020): 109789.

[104] Ibid.

[105] Ibid.; see also Balasha AM and Peša I, '"They Polluted Our Cropfields and Our Rivers, They Killed Us": Farmers' Complaints about Mining Pollution in the Katangese Copperbelt' (2023) 9 Heliyon <https://www.cell.com/heliyon/abstract/S2405-8440(23)02202-8> accessed 29 December 2024; Muimba-Kankolongo A and others, 'Impacts of Trace Metals Pollution of Water, Food Crops, and Ambient Air on Population Health in Zambia and the DR Congo' (2022) 2022 Journal of Environmental and Public Health 4515115; Mwaanga P and others, 'Preliminary Review of Mine Air Pollution in Zambia' (2019) 5 Heliyon e02485; Ouma, Kennedy O., Agabu Shane, and Stephen Syampungani. "Aquatic ecological risk of heavy-metal pollution associated with degraded mining landscapes of the Southern Africa River Basins: A review." *Minerals* 12, no. 2 (2022): 225; Ikenaka, Yoshinori, Shouta MM Nakayama, Kaampwe Muzandu, Kennedy Choongo, Hiroki Teraoka, Naoharu Mizuno, and Mayumi Ishizuka. "Heavy metal contamination of soil and sediment in Zambia." *African Journal of Environmental Science and Technology* 4, no. 11 (2010): 729-739; Kříbek, Bohdan, Imasiku Nyambe, Ondra Sracek, Martin Mihaljevič, and Ilja Knésl. "Impact of mining and ore processing on soil, drainage and vegetation in the Zambian copperbelt mining districts: a review." *Minerals* 13, no. 3 (2023): 384.

[106] Ibid.

Rare metal mining and metallurgical operations in African nations have raised environmental issues; heavy metals constitute significant pollutants as a result of environmental degradation and fast economic expansion.[107] A good example is the Kenyan case of against lead poisoning by a lead-acid batteries recycling smelter in Owino Uhuru slum, in the coastal city Mombasa, *Export Processing Zone Authority & 11 Others Vs. National Environment Management Authority & 6 Others, SC Petition No. E019 Of 2023 (As Consolidated With Petition E021 of 2023)*, where the Supreme Court of Kenya delivered its verdict on 6th December 2024 upholding the appeal and the decision of the trial court, Environment and Land Court. The trial court had issued a declaration that the appellants' rights to a clean and healthy environment; rights to the highest attainable standard of health and right to clean and safe water; and rights to life were violated by the actions and omissions of the 1st appellant and the respondents. The 2nd to 11th appellants were at the time residents of Owino-Uhuru Village within Changamwe Division, Mikindani Area of Mombasa County. They claimed that they have been living in the densely populated village and that in the year 2006 Penguin Paper and Book Company Limited leased a neighbouring plot to Metal Refinery (EPZ) Limited which set up a lead acid battery recycling factory.

The lead acid recycling activity produced toxic waste which seeped into the village causing the area residents various illness and ailments as a direct consequence of lead poisoning with more than 20 deaths attributed to it. Upon seeing the adverse effects of the existence of the factory, the 2nd – 11th Appellants campaigned for its permanent closure and urged the concerned authorities to investigate the environmental degradation caused as well as the negative impacts suffered. This led to several intermittent closures and re-openings of the factory until it permanently closed in 2014. Even so, they posited that the responsible State agencies licensed and sanctioned the activities of Metal Refinery contrary to their mandate, thus violating their constitutional rights.
An award of Kshs. 1.3 Billion to the 2nd – 11th appellants was thus made for personal injury and loss of life payable within ninety (90) days from the date of judgment by the 1st appellant and the respondents in accordance with the apportionment of liability set out by the trial court. The court also directed the 1st appellant and the respondents to clean up the soil, water and to remove any waste deposited within Owino-Uhuru village by the 6th Respondent within four (4) months of the judgment, in default the sum of Kshs. 700 Million would be due and payable by them to the 11th appellant to coordinate the soil and environmental clean-up exercise. An order of mandamus was in addition issued against the 2nd, 3rd, and 4th respondents directing them to develop and implement regulations to be adopted from best practices with regard to lead and lead alloys manufacturing plants; costs of the petition was equally granted to the 2nd – 11th appellants. The Supreme Court of Kenya upheld this decision by the Environment and Land Court.

[107] Ikenaka, Yoshinori, Shouta MM Nakayama, Kaampwe Muzandu, Kennedy Choongo, Hiroki Teraoka, Naoharu Mizuno, and Mayumi Ishizuka. "Heavy metal contamination of soil and sediment in Zambia." *African Journal of Environmental Science and Technology* 4, no. 11 (2010): 729-739.

This case, while not dealing with extraction of the critical resource minerals, shows that these minerals may have adverse effects on human rights, SDGs, human health and the environment hence creating the need for ensuring sustainability in extraction and processing of these minerals.

5.0 Avoiding Energy Transition Pitfalls: Balancing Demand for Critical Raw Materials and Sustainability

Decisions on resource governance, interest groups, and governance will all have an impact on the future energy transition paths.[108] The key factors influencing dynamics and time, forming growth paths, and directing societal change will be sustainability and complexity.[109] The Sustainable Development Goals emphasize sustainable energy and resource management, requiring governments, companies, and investors to align with the Paris Climate Accord's focus on low-carbon pathways in development strategies.[110] Capital expenditures and grant or concession payments are necessary for the energy transition. If real economy policies are well-designed and stimulate investment, the majority of financing may be obtained from private financial institutions and markets.[111] But reducing emissions will come at a cost, including phasing out coal, stopping deforestation, and increasing carbon dioxide removals.[112] Except for China, concessional or grant payments may be necessary to offset these costs in middle- and low-income nations. These payments may come from corporations, charities, voluntary carbon markets, and high-income nations.[113]

The United Nations Framework Classification (UNFC) is a universal system for classifying and reporting minerals, energy, and other resources.[114] It provides a standardized approach to ensure consistency, transparency, and sustainability in resource management. By integrating environmental, social, and economic considerations, UNFC aligns with global sustainability goals, including the 2030 Agenda for Sustainable Development and the Paris Agreement.[115] Its comprehensive framework supports decision-making processes across various sectors,

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[108] Gatto, Andrea. "The energy futures we want: A research and policy agenda for energy transitions." *Op. cit.*

[109] Ibid.

[110] United Nations Economic Commission for Europe, *Application of the United Nations Framework Classification for Resources: Case Studies* (United Nations 2020) <https://www.un-ilibrary.org/content/books/9789210045254> accessed 27 December 2024.

[111] 'Financing the Green Energy Transition' <https://www.deloitte.com/global/en/issues/climate/financing-the-green-energy-transition.html> accessed 29 December 2024.

[112] Ibid.

[113] Ibid.

[114] UNECE. *United Nations Framework Classification for Resources–Update 2019*. Geneva, Switzerland: ECE/ENERGY/125; United Nations Economic Commission for Europe, 2019.

[115] 'United Nations Framework Classification for Resources (UNFC) | UNECE' <https://unece.org/sustainable-energy/sustainable-resource-management/united-nations-framework-classification> accessed 27 December 2024.

facilitating efficient and responsible resource use globally. UNFC is essential for governments, industries, and stakeholders committed to sustainable resource management.[116]

Similarly, a thorough framework known as the African Mineral and Energy Resources Classification and Management System (AMREC) was created to direct the sustainable management of the continent's energy and mineral resources.[117] In line with Agenda 2063, the Sustainable Development Goals (SDGs), and the Africa Mining Vision (AMV), it is founded on the concepts of the United Nations Framework Classification for Resources (UNFC).[118] In addition to supporting national and regional resource management regulations, AMREC seeks to advance environmentally conscious business practices, economic diversification, and transparency.[119] In addition to integrating social, environmental, and economic factors into the process, the document provides standards and classifications for resource management across a variety of industries, including mining, petroleum, and renewable energy.[120]

At the 2009 AU summit, heads of state passed the Africa Mining Vision (AMV) to resolve the conflict between Africa's enormous mining resources and poverty.[121] The AMV promotes greater mining integration into regional, national, and municipal development plans since it is a comprehensive organisation. It seeks to guarantee that communities and labourers benefit from extensive industrial mining while preserving the environment.[122] Negotiating agreements with international corporations that provide equitable resource rents and local inputs for operations is another goal. Mining is included into industrial and trade strategy at the regional level.[123] Creating social and economic ties that benefit Africa as a whole is the main goal of the AMV, a developmental mining strategy.[124] The Africa Mining Vision seeks to promote industrialization and resource-based development techniques, such as value addition of minerals, technical clusters, infrastructure, cooperation, local beneficiation, and human resource development.[125] It assists small and medium-sized businesses, facilitates cooperation among industry participants, and supports local manufacturing.[126] Additionally, the vision places a strong emphasis on exploiting mid-tier resources, encouraging regional integration, and adhering to corporate governance norms.[127] In order to facilitate factor flows, it also supports regional integration and

[116] Ibid.
[117] African Union, 'African Minerals and Energy Resources Classification and Management System | African Union' <https://au.int/en/documents/20241021/african-minerals-and-energy-resources-classification-and-management-system> accessed 27 December 2024.
[118] Ibid.
[119] Ibid.
[120] Ibid.
[121] African Union, 'AMV – Africa Mining Vision | African Union' <https://au.int/en/ti/amv/about> accessed 29 December 2024.
[122] Ibid.
[123] Ibid.
[124] Ibid.
[125] Ibid.
[126] Ibid.
[127] Ibid.

the usage of public-private partnerships.[128] These tactics seek to draw in wealthy investors and enhance the standard of the corporate environment.[129]

The British government launched the Extractive Industries Transparency Initiative (EITI), a transnational alliance of nations, businesses, and civic associations, with the goal of enhancing income and payment transparency in the raw materials extraction industry.[130] The guidelines serve as a worldwide benchmark for the prudent management of mineral, oil, and gas resources. EITI aims for accountability and transparency in statutory administration by requesting full disclosure of national income from the sector.[131] The Sustainable Development Goals (SDGs) are partly met, however there no strong integration.[132]

Such frameworks and initiatives can go a long way in enhancing sustainability as far as extraction and exploitation of critical raw materials are concerned, especially in the case of African continent.

In addition, an intersectional strategy is required to guarantee that the shift to sustainable energy includes women and girls in all their diversity, in keeping with the 2030 Agenda's pledge to leave no one behind.[133] Since the energy sector is the main source of emissions worldwide, it can and ought to be a key player in ensuring a just transition to a sustainable energy future and a green economy.[134] The full and equal involvement, leadership, and decision-making of women and girls is necessary for a fair transition.[135]

The success of digitization and other technologies depends on the purchase of raw materials in a safe, sustainable, and competitive manner.[136] Because access in the Chinese mining industry is restricted, recycling solutions are essential.[137] An estimated 30,000 tonnes of cobalt are lost each year as a result of non-recycling; closed loop recycling might offset this loss.[138] In the energy transition, CRM is essential, and recycling them offers a fascinating prospect.[139] Depending on

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[128] Ibid.
[129] Ibid.
[130] Huck, Winfried. "The Integration of Sustainable Development Goals (SDGs) into the Raw Materials Sector." *Europäische Zeitschrift für Wirtschaftsrecht (EuZW)* 7 (2018): 266.
[131] Ibid.
[132] Ibid.
[133] 'Gender Equality in the Sustainable Energy Transition' (*UN Women – Headquarters*, 10 November 2023) <https://www.unwomen.org/en/digital-library/publications/2023/05/gender-equality-in-the-sustainable-energy-transition> accessed 27 December 2024.
[134] Ibid.
[135] Ibid.
[136] Huck, Winfried. "The Integration of Sustainable Development Goals (SDGs) into the Raw Materials Sector." *Europäische Zeitschrift für Wirtschaftsrecht (EuZW)* 7 (2018): 266.
[137] Ibid.
[138] Ibid.
[139] Pommeret A, Ricci F and Schubert K, 'Critical Raw Materials for the Energy Transition' (2022), *op. cit.*

concentration and unit value, agents must make many considerations while recycling.[140] As technologies change over time, recycled materials may not always be on par with original production.[141] Though it won't completely eliminate demand throughout the energy transition, recycling copper, lithium, nickel, and cobalt from batteries might cut primary supply by 10% by 2040, underscoring the need for sustainable alternatives.[142]

The international community must cut emissions and switch to renewable energy, according to the COP28 agreement, with financing for developing countries being a major priority.[143] All parties involved must be able to finance and access the green energy transition. This entails incorporating it into plans for capital supply, adjusting to fresh approaches to project evaluation, controlling risks, and setting up suitable tools.[144] In order to ensure a net-zero transition, the world must collaborate to build a sustainable green financial ecosystem.[145]

Africa must put in place effective legal and institutional infrastructure that not only promotes sustainability but also social development and investments in the exploitation of its critical raw materials wealth.

6.0 Conclusion

As the world explores the transition from unsustainable energy sources to sustainable ones through exploitation of critical raw materials as sources of renewable energy sources, it is possible to strike a balance between addressing the challenges identified in this paper and achieving sustainability in the energy sector. The African continent needs to put in place frameworks to not only promote sustainable exploitation of its share of critical resource minerals but also to ensure

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[140] Ibid.

[141] Ibid.

[142] EY CA and CCC and SS, 'Critical Raw Materials for Energy Transition - How to Achieve the Targets' <https://www.ey.com/en_bg/insights/energy-resources/critical-raw-materials-for-energy-transition> accessed 29 December 2024.

[143] '4 Ways to Finance the Energy Transition in Emerging Economies' (*World Economic Forum*, 23 January 2024) <https://www.weforum.org/stories/2024/01/finance-energy-transition-emerging-economies-climate-crisis/> accessed 29 December 2024.

[144] 'Financing the Green Energy Transition' <https://www.deloitte.com/global/en/issues/climate/financing-the-green-energy-transition.html> accessed 29 December 2024; see also Egli, Florian, Friedemann Polzin, Mark Sanders, Tobias Schmidt, Alexandra Serebriakova, and Bjarne Steffen. "Financing the energy transition: four insights and avenues for future research." *Environmental Research Letters* 17, no. 5 (2022): 051003; Zhou, Xiaoyan, Christian Wilson, and Ben Caldecott. "The energy transition and changing financing costs." *Oxford Review of Economic Policy* (2021); Qadir SA and others, 'Incentives and Strategies for Financing the Renewable Energy Transition: A Review' (2021) 7 Energy Reports 3590; Rana D, 'Financing the Energy Transition: Moving the Needle | WBCSD' (24 July 2024) <https://www.wbcsd.org/news/financing-the-energy-transition-moving-the-needle/> accessed 29 December 2024.

[145] Ibid.; cf. 'Kenya Climate Directory' <https://kenyaclimatedirectory.org/> accessed 29 December 2024; Republic of Kenya, *Kenya Energy Transition & Investment Plan 2023-2050*, Ministry of Energy and Petroleum, 2023.

that the same get to benefit its population as much as possible. This is the only way that the continent can remain a beneficial player in the race towards energy transition using the critical resource minerals.

Chapter 17: Scramble for Critical Green Minerals: Achieving Energy Transition without Violating ESG and Sustainability Tenets?

Abstract

This paper critically examines how global energy transition can be achieved by sustainably harnessing critical green minerals. The paper defines critical green minerals. It argues that the success of global energy transition depends on the availability and sustainable use of critical green minerals including copper, lithium, cobalt, manganese, graphite, nickel and rare earth elements. The paper notes that critical green minerals are essential components of many renewable energy technologies and consequently, they are the heart of energy transition. Despite playing an important role in fostering energy transition, the paper notes that the scramble for critical green minerals is fuelling sustainability concerns. It examines some of the negative impacts associated with the extraction and use of critical green minerals. In light of these challenges, the paper proposes how critical green minerals can be harnessed to achieve energy transition without violating Environmental, Social and Governance (ESG) and sustainability tenets.

1.0 Introduction

Energy transition is gaining pace globally in the pursuit of Sustainable Development. The concept of energy transition refers to a transformative shift in how energy is produced, distributed and consumed, with the goal of moving away from fossil fuels towards a system centred on renewable energy sources[1]. Energy transition has also been defined as the transformation of the global energy sector from fossil-based to zero-carbon sources with emphasis on renewable sources of energy, hydrogen and sustainable biomass[2]. The idea of energy transition therefore envisions the global energy sector's shift from fossil fuel- based systems of energy production and consumption – including oil, natural gas and coal – to renewable energy sources like wind, solar and geothermal energy with the goal of achieving zero carbon emissions[3]. It has been argued that energy transition involves the long-term structural change to energy systems from fossil-fuel based systems to cleaner and sustainable systems such as renewable sources of energy[4]. Further, it has been pointed out that energy transition is a continuing process requiring long-term energy strategies and planning, with country-tailored focus on applying appropriated energy technologies to reach net-zero emissions[5].

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[1] United Nations Development Programme., 'What is the sustainable energy transition and why is it key to tackling climate change?' Available at https://climatepromise.undp.org/news-and-stories/what-sustainable-energy-transition-and-why-it-key-tackling-climate-change (Accessed on 20/11/2025)

[2] International Renewable Energy Agency., 'Energy Transition Outlook' Available at https://www.irena.org/Energy-Transition/Outlook (Accessed on 20/11/2025)

[3] The Energy Transition., Available at https://www.enel.com/learning-hub/energy-transition (Accessed on 20/11/2025)

[4] Nalule. V., & Leal-Arcas. R., 'Energy Decentralization and Energy Transition in Poland.' *Electricity Decentralization in the European Union* 2nd Edition., 2023 pp 209-240

[5] United Nations Development Programme., 'Energy Transition' Available at https://www.undp.org/energy/our-work-areas/energy-transition#:~:text=Annual%20energy%2Drelated%20CO2%20emissions,90%25%20of%20the%20necessary%20reduction. (Accessed on 20/11/2025)

Achieving energy transition is crucial goal for the global community in the quest for Sustainable Development. Despite playing an important role in all development processes, the energy sector can also undermine sustainability by fueling environmental, economic and health threats. For instance, it has been noted that fossil fuels such as coal, oil and natural gas are by far the largest contributor to global climate change, accounting for over 75 percent of global greenhouse gas emissions and nearly 90 percent of all carbon dioxide emissions[6]. In addition to causing climate change, the burning of fossil fuels also contributes to air pollution with devastating impacts on human health and the environment[7]. Further, it has been argued that fossil fuels are non-renewable and can depleted and thus placing too much reliance on them can affect global energy supply and security with severe consequences for economic growth at all levels[8].

Consequently, transitioning from fossil fuels to a system of energy centred on renewables such as wind, solar and geothermal energy is necessary for both people and planet. Renewable sources of energy are abundant globally, are cheaper and are a healthier option for people and the planet[9]. In addition, it has been argued that generating renewable energy creates far lower emissions than burning fossil fuels and as a result, renewable sources of energy are key in confronting climate change[10]. The United Nations *2030 agenda for Sustainable Development*[11] acknowledges the role of energy transition in the quest towards sustainability. Consequently, Sustainable Development Goal (SDG) 7 seeks to ensure access to affordable, reliable, sustainable and modern energy for all including through substantially increasing the share of renewable energy in the global energy mix[12]. Achieving energy transition is therefore paramount if the Sustainable Development agenda is to be realised.

This paper critically examines how global energy transition can be achieved by sustainably harnessing critical green minerals. The paper defines critical green minerals. It argues that the success of global energy transition depends on the availability and sustainable use of critical green minerals including copper, lithium, cobalt, manganese, graphite, nickel and rare earth

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[6] United Nations., 'Renewable Energy – Powering a Safer Future' Available at https://www.un.org/en/climatechange/raising-ambition/renewable-energy (Accessed on 20/11/2025)

[7] Solomon. B., & Krishna. K., 'The Coming Sustainable Energy Transition: History, Strategies, and Outlook.' *Energy Policy* 39 (2011) 7422-7431

[8] Ibid

[9] United Nations., 'Climate Action.' Available at https://www.un.org/en/climatechange/howcommunities-are-embracing-renewable-energy (Accessed on 20/11/2025)

[10] United Nations., 'What is Renewable Energy?.' Available at https://www.un.org/en/climatechange/what-is-renewable-energy (Accessed on 20/11/2025)

[11] United Nations General Assembly., 'Transforming Our World: the 2030 Agenda for Sustainable Development.' 21 October 2015, A/RES/70/1., Available at https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf (Accessed on 20/11/2025)

[12] Ibid

elements. The paper notes that critical green minerals are essential components of many renewable energy technologies and consequently, they are the heart of energy transition. Despite playing an important role in fostering energy transition, the paper notes that the scramble for critical green minerals is fuelling sustainability concerns. It examines some of the negative impacts associated with the extraction and use of critical green minerals. In light of these challenges, the paper proposes how critical green minerals can be harnessed to achieve energy transition without violating Environmental, Social and Governance (ESG) and sustainability tenets.

2.0 Critical Green Minerals and Energy Transition: Promises and Pitfalls

It has been argued that minerals are considered critical when they are vital for economic and technological progress and development but face potential supply risks due scarcity, supply concentration and geopolitical factors among other reasons[13]. Further, it has been argued that some minerals are considered 'green' since they support the transition to a sustainable and net-zero future[14]. Green minerals are economically and strategically important but have a high-risk associated with their supply[15]. Critical green minerals include lithium, cobalt, copper, nickel, manganese, graphite, rare earth elements, and platinum, niobium, silicon and vanadium[16]. It has been argued that these minerals as classified as '*critical'* not because they are considered as scarce but because they have significant economic importance in key sectors including the environment, health, defence, and consumer electronics[17]; they have a high-supply risk due to the very-high import dependence and high level of concentration in particular countries[18]; and they lack viable substitutes due to their unique properties and applications[19].

Critical green minerals are crucial towards achieving energy transition. According to the United Nations Environment Programme (UNEP), the transition from fossil fuels to clean sources of

[13] International Council on Mining and Metals., 'Critical Minerals' Available at https://www.icmm.com/en-gb/mining-metals/critical-minerals?gad_source=1&gad_campaignid=22530173703&gbraid=0AAAAA-kBgRCZXtrLZ9MYG8uhIaflq2Xw-&gclid=CjwKCAiA8vXIBhAtEiwAf3B-g_Velvd3VbNSwExZ45rmE28ASrQNI-52fzPB7NPO88SXKMr2IkYzyxoC_4cQAvD_BwE (Accessed on 20/11/2025)

[14] Adolfsen. J.F., Kedan. D., & Lappe. M-S., 'The Geopolitics of Green Minerals' Available at https://www.ecb.europa.eu/press/blog/date/2024/html/ecb.blog240710~bb2bab6345.en.html (Accessed on 20/11/2025)

[15] CRM Alliance., 'Critical Raw Materials' Available at https://www.crmalliance.eu/critical-raw-materials (Accessed on 20/11/2025)

[16] African Union., 'Africa's Green Minerals Strategy (AGMS)' Available at https://au.int/en/documents/20250318/africas-green-minerals-strategy-agms (Accessed on 20/11/2025)

[17] CRM Alliance., 'Critical Raw Materials' Op Cit

[18] Ibid

[19] Ibid

energy depends on critical green minerals[20]. It has been argued that these minerals form essential components of clean energy technologies including wind turbines, solar panels and electric vehicles[21]. Consequently, it has been correctly noted that the technologies required to facilitate global energy transition, including wind turbines, solar panels and improved energy storage, all depend on critical green minerals[22]. Further, critical green minerals are widely used in energy transmission infrastructure such as power lines[23].

According to the International Energy Agency (IEA), critical green minerals are essential for a wide range of today's sustainable energy technologies and for the broader economy[24]. For instance, minerals such as cobalt, manganese, nickel, graphite and lithium are crucial for battery performance[25]. In addition, rare earth elements are widely utilised in wind turbines and electric vehicles[26]. Further, it has been pointed out that electricity transmission networks need vast amounts of copper and aluminium[27]. Due to their key role in today's clean energy technologies, critical green raw minerals have been described as energy transition minerals[28]. It has been argued that if sustainably harnessed, critical green minerals can accelerate Sustainable Development by fostering energy transition, creating jobs and helping countries to reduce poverty[29].

Due to their vital role in fostering energy transition, there has been an increased global interest and extraction of critical green minerals. It has been pointed out that the global quest to combat climate change and achieve sustainability has brought critical minerals into sharper focus[30]. Consequently, the demand and extraction of critical green minerals is expected to continue rising

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[20] United Nations Environment Programme., 'Critical Energy Transition Minerals' Available at https://www.unep.org/topics/energy/renewable-energy/critical-energy-transition-minerals (Accessed on 20/11/2025)

[21] Ibid

[22] International Institute for Sustainable Development., 'Green Conflict Minerals' Available at https://www.iisd.org/story/green-conflict-minerals/ (Accessed on 20/11/2025)

[23] World Resources Institute., 'The Critical Minerals Conundrum: What You Should Know' Available at https://www.wri.org/insights/critical-minerals-explained (Accessed on 20/11/2025)

[24] International Energy Agency., 'Critical Minerals' Available at https://www.iea.org/topics/critical-minerals (Accessed on 20/11/2025)

[25] Ibid

[26] Ibid

[27] Valverde. J., 'What Are Critical Minerals, and Why Are They So Important?' Available at https://unu.edu/merit/news/what-are-critical-minerals-and-why-are-they-so-important (Accessed on 20/11/2025)

[28] United Nations Environment Programme., 'What are energy transition minerals and how can they unlock the clean energy age?' Available at https://www.unep.org/news-and-stories/story/what-are-energy-transition-minerals-and-how-can-they-unlock-clean-energy-age (Accessed on 20/11/2025)

[29] Ibid

[30] International Council on Mining and Metals., 'Critical Minerals' Op Cit

all over the world[31]. IEA estimates that the demand for critical green minerals could increase six fold by 2040 depending on how rapidly governments act to reduce carbon emissions[32].

The demand for critical green minerals is therefore soaring as the world pursues net-zero targets. While this is commendable towards achieving energy transition, the scramble for critical green minerals is also fuelling sustainability concerns. The United Nations notes that without proper governance, the increasing demand for critical green minerals risks perpetuating commodity dependence, fuelling geopolitical tensions and environmental and social challenges, including impacts on livelihoods, human rights, the environment, health and human security[33]. In particular, it has been pointed out that extracting, processing and shipping of critical green minerals releases greenhouse gas emissions which can harm people and planet[34]. Further, it has been observed that a significant proportion of critical minerals mines are situated in water-stressed areas fuelling high demand and competition for water[35]. Unsustainable extraction of critical raw materials can therefore take a huge toll on the environment through environmental degradation, water scarcity, deforestation, pollution, and biodiversity loss[36].

The scramble for critical green minerals can also undermine human rights. It has been pointed out that there are concerns of human rights abuses including forced labour and child labour and negative impacts on indigenous peoples who are often displaced from their ancestral lands during extraction of critical raw materials[37].

In light of the foregoing, it is imperative to ensure that critical green minerals are sustainably extracted and utilised in order to achieve energy transition without violating ESG and sustainability tenets.

3.0 Achieving Energy Transition without Violating ESG and Sustainability Tenets

The availability, extraction and use of critical green minerals is a prerequisite towards attaining energy transition. These precious resources are vital in the energy transition by supporting key technologies including wind turbines, solar panels, electricity transmission lines and electric vehicles[38]. It has been argued that as the climate crisis intensifies, the global demand is soaring

[31] Ibid
[32] International Energy Agency., 'Clean energy demand for critical minerals set to soar as the world pursues net zero goals' Available at https://www.iea.org/news/clean-energy-demand-for-critical-minerals-set-to-soar-as-the-world-pursues-net-zero-goals (Accessed on 20/11/2025)
[33] United Nations., 'The UN Secretary-General's Panel on Critical Energy Transition Minerals' Available at https://www.un.org/en/climatechange/critical-minerals (Accessed on 20/11/2025)
[34] World Resources Institute., 'The Critical Minerals Conundrum: What You Should Know' Op Cit
[35] Ibid
[36] United Nations Environment Programme., 'What are energy transition minerals and how can they unlock the clean energy age?' Op Cit
[37] United Nations Environment Programme., 'Critical Energy Transition Minerals' Op Cit
[38] Ibid

for critical green minerals which are important for clean energy technologies – from wind farms to solar panels and electric vehicle batteries[39]. The scramble for critical green minerals therefore provides an opportunity to fast-track energy transition for sustainability. In addition, it has been noted that developing countries hold the bulk of the world's critical green minerals reserves[40]. For example, Africa holds significant deposits of the planet's critical green minerals including cobalt, bauxite, chromium, copper, graphite, manganese and rare earths[41]. The abundance of critical green minerals in developing countries provides opportunities not only to achieve energy transition but also to create jobs, boost revenues and diversify economies[42].

Despite the abundance of critical green minerals all over the world and their pertinent role in the quest towards energy transition, the scramble for these minerals is also violating ESG and sustainability tenets including through human rights violations and environmental threats such as pollution, climate change, deforestation, loss of biodiversity, and pressure on vital natural resources including water[43]. In light of these challenges, it is imperative to sustainably harness critical green minerals in order to achieve energy transition without violating ESG and sustainability tenets. Achieving this ideal involves responsible, ethical and sustainable mining and use of critical green minerals[44]. It has been argued that by embracing responsible extraction practices, ensuring stability in supply and reducing demand through measures such as responsible sourcing and resource circulation, it is possible to achieve balance between the demand and supply of critical green minerals for socially just and environmentally sustainable energy transition[45]. Responsible extraction, sourcing and supply of critical green minerals has been identified as a fundamental objective towards achieving energy transition while protecting people and planet[46]. It is therefore imperative to embrace sustainable practices including minimizing waste, recycling materials and protecting the environment and ecosystems during extraction of critical green minerals in order to achieve energy transition without violating ESG and sustainability tenets[47].

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[39] United Nations Trade and Development., 'Critical Minerals' Available at https://unctad.org/topic/commodities/critical-minerals (Accessed on 21/11/2025)

[40] Ibid

[41] Mo Ibrahim Foundation., 'Africa's Critical Minerals: Africa at the Heart of a Low-Carbon Future' Available at https://mo.ibrahim.foundation/sites/default/files/2022-11/minerals-resource-governance.pdf (Accessed on 21/11/2025)

[42] United Nations Trade and Development., 'Critical Minerals' Op Cit

[43] United Nations Environment Programme., 'Critical Energy Transition Minerals' Op Cit

[44] Ibid

[45] Ibid

[46] International Council on Mining and Metals., 'Critical Minerals' Op Cit

[47] World Economic Forum., 'What are critical minerals - and why are they key to a greener future?' Available at https://www.weforum.org/stories/2023/05/critical-minerals-technology-geopolitical-greener-future/?gad_source=1&gad_campaignid=22234048793&gbraid=0AAAAAoVy5F44dOzs9wCLCKmPyjfFERd90&gclid=CjwKCAiA8vXIBhAtEiwAf3B-

In addition, it is imperative to protect human rights throughout critical green minerals supply chains. It has been noted that there have been cases of poor working conditions, forced labour and child labour during the extraction of critical green minerals especially in developing countries[48]. Further, in some instance, mining activities are carried out in land and territories occupied by indigenous peoples and local communities leading to forced displacements, loss of culture and traditional livelihoods, and health risks linked to pollution from mines[49]. It is therefore vital to foster sound labour practices and safety standards including investing in the tools, equipment and training needed to safeguard workers involved in extraction of these resources and ensuring that workers are adequately paid[50]. In addition, there is need to prohibit and eliminate child labour in the extraction of critical green minerals[51]. Further, there is need to protect the rights of indigenous peoples and local communities including through ensuring their Free, Prior, and Informed Consent (FPIC) in all decision making processes during the extraction of critical green minerals[52]. It is also necessary to ensure that the countries and local communities endowed with critical green minerals receive adequate benefits for justice, fairness and equity[53].

4.0 Conclusion

The scramble for critical green minerals provides an opportunity to accelerate progress towards energy transition. However, if not sustainably harnessed, critical green minerals can undermine ESG and sustainability tenets by causing environmental degradation, affecting human rights and worsening inequalities[54]. In light of these challenges, it is vital to embrace sustainable and responsible mining practices, uphold human rights and ensure equitable sharing of benefits accruing from critical green minerals[55]. By effectively harnessing critical green minerals, it is possible to achieve energy transition without violating ESG and sustainability tenets for people and planet.

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g3EfisHxlPPATKtBvTDakE_9rtjDPIJZzWsQC25OBwqpBKriKhViixoC1nkQAvD_BwE (Accessed on 21/11/2025)

[48] World Resources Institute., 'The Critical Minerals Conundrum: What You Should Know' Op Cit

[49] Ibid

[50] Sammour. J., 'What Exactly is Ethical Mining?.' Available at https://www.daintylondon.com/blogs/news/what-is-ethical-mining#:~:text=Whether%20mining%20metals%2C%20diamonds%20or,its%20workers%20a%20fair%20wage (Accessed on 21/11/2025)

[51] DRC: Cobalt Mines, Child Labour and the Green Transition., Available at https://www.savethechildren.net/stories/drc-cobalt-mines-child-labour-and-green-transition (Accessed on 21/10/2025)

[52] United Nations., 'Securing Indigenous Rights in the Energy Transition: Preventing Harm, Ensuring Consent, and Promoting Equity in Transition Minerals Extraction' Available at https://social.desa.un.org/sites/default/files/inline-files/Galina_Angarova_EGM_2024_0.pdf (Accessed on 21/11/2025)

[53] United Nations., 'The UN Secretary-General's Panel on Critical Energy Transition Minerals' Op Cit

[54] United Nations Trade and Development., 'Critical Minerals' Op Cit

[55] World Resources Institute., 'The Critical Minerals Conundrum: What You Should Know' Op Cit

PART V: ENERGY INFRASTRUCTURE, TRANSPORT AND INVESTMENT MODELS

Abstract

This Part focuses on energy infrastructure development, investment frameworks and technological innovation as drivers of sustainable energy transition. It examines the integration of renewable energy into transport systems and the role of public-private partnerships in expanding energy infrastructure. Particular attention is given to regulatory certainty, risk allocation and dispute resolution mechanisms in energy investments. The Part demonstrates how sound legal and institutional frameworks can enhance investor confidence, promote low-carbon transport solutions and accelerate sustainable energy deployment.

Chapter 18: Greening of Transport Systems in Africa: Utilising Renewable Energy for Low-Emission

Abstract

This paper critically examines the need to green transport systems in Africa. The paper argues that Africa is facing the challenge of balancing the increasing demand for transport services with environmental conservation. It posits that if not well designed, transport systems can contribute to environmental challenges including climate change, biodiversity loss, pollution and environmental degradation. In light of these challenges, the paper argues that greening transport systems in Africa and the rest of the world is a vital agenda towards sustainability. The paper discusses how Africa can utilise renewable energy for low emission vehicles towards greening transport systems for sustainability.

1.0 Introduction

Transport systems are vital sectors that ensure economic growth in all countries. It has been argued that transport systems including roadways, public transit systems, airports, train stations, bus stations, ferry terminals, pipelines and warehouses ensure the safe movement of people and goods therefore significantly contributing to economic growth[1]. Further, it has been pointed out that transport is fundamental to supporting economic growth, creating jobs and connecting people to essential services including education and healthcare[2]. Due to its intensive use of infrastructures, the transport sector has been identified as an important component of modern economies and a common tool used for development[3]. The global economy has transformed to the extent where economic opportunities are increasingly related to the mobility of people, goods and services, including information and communication technologies[4].

Due to its benefits, it has been pointed out that there is a positive correlation between the level of economic development in a country and the quantity and quality of its transport systems[5]. Safe, accessible, reliable, affordable and modern transport systems are associated with lower transport costs, shorter transit times, and business expansion making economic activities more productive and competitive[6]. Integrated and well-functioning transport facilities are therefore necessary for

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[1] How to build more sustainable transportation infrastructure., Available at https://www.ibm.com/think/topics/sustainable-transportation (Accessed on 26/09/2025)

[2] World Bank Group., 'Transport' Available at https://www.worldbank.org/en/topic/transport/overview#:~:text=Transport%20plays%20an%20important%20role,%2C%20efficient%2C%20clean%20and%20accessible. (Accessed on 26/09/2025)

[3] Rodrigue. J.P., & Notteboom. T., 'Transportation and Economic Development' Available at https://transportgeography.org/contents/chapter3/transportation-and-economic-development/ (Accessed on 26/09/2025)

[4] Ibid

[5] Ibid

[6] Transport Impacts on Economic Opportunities., Available at https://transportgeography.org/contents/chapter3/transportation-and-economic-development/economic-opportunities-transport-impacts/ (Accessed on 26/09/2025)

achieving sustained and inclusive economic growth[7]. Such transport systems play a key role in countries' competitiveness, balanced and liveable urban spatial development, access to water and energy, and food security, and are critical for social inclusion and improved quality of life[8]. Further, well-designed and functioning transport systems facilitate mobility and positively impact the development and welfare of the population through employment and income creation, connecting and providing to businesses and vital services thus enhancing economic development and growth[9].

Accessible, reliable, safe and efficient transport systems are therefore key in ensuring economic growth. However, it has been pointed out that transport systems especially those in developing countries are not accessible or reliable[10]. For instance, most people in rural areas remain unconnected to transport systems[11]. Further, it has been argued that in most cities, public transport remains unsustainable, unsafe, inefficient, inaccessible or unaffordable – a situation that is particularly detrimental to people living in poverty[12]. Further, the transport sector comes at a huge cost since it may cause adverse planetary and environmental changes if left unchecked[13]. In light of these challenges, it has become necessary to build safe, accessible, affordable, reliable and modern transport systems. Greening of transport systems is therefore a key pathway towards sustainability.

This paper critically examines the need to green transport systems in Africa. The paper argues that Africa is facing the challenge of balancing the increasing demand for transport services with environmental conservation. It posits that if not well designed, transport systems can contribute to environmental challenges including climate change, biodiversity loss, pollution and environmental degradation. In light of these challenges, the paper argues that greening transport systems in Africa and the rest of the world is a vital agenda towards sustainability. The paper discusses how Africa can utilise renewable energy for low emission vehicles towards greening transport systems for sustainability.

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[7] Kumar. G.P., & Soumyananda. D., 'Revisited the Relationship Between Economic Growth and Transport Infrastructure in India: An Empirical Study' Available at https://mpra.ub.uni-muenchen.de/116876/5/MPRA (Accessed on 26/09/2025)

[8] Okoro. C., Musonda. I., & Agumba. J., 'Validity and Reliability of a Transportation Infrastructure Sustainable Performance Framework: A Study of Transport Projects in South Africa.' *Construction Economics & Building*., Volume 19, No. 2 (2019)

[9] Ibid

[10] United Nations., 'Fact Sheet: Inequalities' Available at https://www.un.org/sites/un2.un.org/files/media_gstc/FACT_SHEET_Inequalities.pdf (Accessed on 26/09/2025)

[11] Ibid

[12] Ibid

[13] Brickstone., 'Low-Carbon Infrastructure in Curbing Climate Change.' Available at https://brickstone.africa/low-carbon-infrastructure-in-climate-change/#:~:text=Urban%20transport%20projects%2C%20such%20as,emissions%20compared%20to%20fossil%20fuels (Accessed on 26/09/2025)

2.0 The Need to Green Transport Systems in Africa

The transport sector both globally and in Africa is linked to several environmental challenges. For instance, it is estimated that transport systems account for more than one-third of carbon dioxide emissions from end-use sectors[14]. This is due to the fact that motorised transport on land, sea and air remains dependent on internal combustion engines that run on fossil fuels[15]. The transport sector is therefore a major contributor to the global climate crisis. It has been argued that the transport sector significantly generates greenhouse gas emissions due to burning of fossil fuels making its transformation an urgent priority towards confronting climate change[16].

In addition, transport systems in Africa and the rest of the world are a major cause of air pollution[17]. According to the World Health Organization (WHO), the transport sector is responsible for a large proportion of air pollution, as well as being a leading source of greenhouse gas emissions[18]. It has been argued that the transport sector is linked to air pollution-related deaths and illnesses due to transport emissions such as carbon monoxide, nitrogen oxides and methane[19]. Air pollution from transport is a major global environmental threat that impacts the health and well-being of millions of people all over the world[20]. This is caused by the release of harmful pollutants into the atmosphere as a result of the operation of vehicles and transport systems which rely on fossil fuels such as petrol and diesel[21]. Air pollution has been linked to millions of deaths all over the world as well as respiratory and cardiovascular illnesses in humans demonstrating the urgent need to transform the transport sector towards sustainability[22].

Transport systems can also lead to environmental degradation and biodiversity loss. For example, the development of transport systems including roads, public transit systems, railways and airports often leads to habitat loss and a subsequent decline in biodiversity[23]. Extensive transport systems including major roads and railway lines usually pass through areas with endangered

[14] International Energy Agency., 'Transport' Available at https://www.iea.org/energy-system/transport (Accessed on 26/09/2025)
[15] Ibid
[16] United Nations Development Programme., 'What is sustainable transport and what role does it play in tackling climate change?' Available at https://climatepromise.undp.org/news-and-stories/what-sustainable-transport-and-what-role-does-it-play-tackling-climate-change#:~:text=Why%20is%20transforming%20the%20transport,adults%20aged%205%E2%80%9329%20years. (Accessed on 26/09/2025)
[17] World Bank Group., 'Transport' Op Cit
[18] World Health Organization., 'Air Pollution' Available at https://www.who.int/teams/environment-climate-change-and-health/healthy-urban-environments/transport/health-risks (Accessed on 26/09/2025)
[19] Ibid
[20] Air pollution from transport: causes, effects and solutions., Available at https://kunakair.com/air-pollution-from-transport/ (Accessed on 26/09/2025)
[21] Ibid
[22] Ibid
[23] Transportation and Biodiversity., Available at https://transact.enotrans.org/wp-content/uploads/2014/04/Transportation_and_Biodiversity_Report.pdf (Accessed on 26/09/2025)

species, productive landscapes and critical ecosystems posing a threat to biodiversity conservation and ecosystem services[24]. For instance, the construction of major transport systems in Kenya including the Standard Gauge Railway and the Nairobi Expressway led to significant biodiversity loss due to cutting down of indigenous trees and encroachment into green spaces and parks[25].

In light of the foregoing challenges, it has become necessary to green the transport sector both globally and in Africa. It has been argued that in order to curb the negative environmental impacts associated with transport systems while maintaining transport as a priority sector for national economic growth, governments need to radically rethink how transport is planned, delivered and managed in order to make it suitable for a green, sustainable, low emission and resilient future[26]. Governments have been urged to provide transport services for the mobility of people and goods in a manner that is safe, affordable, accessible, efficient, and resilient, while minimizing carbon and other emissions and environmental impacts including pollution and biodiversity loss[27].

The need to green transport systems globally is envisioned under the United Nations *2030 Agenda for Sustainable Development*[28]. The Agenda seeks to achieve sustainable transport systems; and quality and resilient infrastructure[29]. Among the key targets under SDG 11 include providing access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons[30]. In addition,

[24] Experts propose solutions for sustainable European transport by mainstreaming biodiversity., Available at https://bison-transport.eu/2022/09/14/experts-propose-solutions-for-sustainable-european-transport-by-mainstreaming-biodiversity/#:~:text=Transport%20sustainability%20policies%20focus%20on,preserve%20biodiversity%20and%20ecosystem%20services. (Accessed on 26/09/2025)

[25] Greening expressway to reverse environmental loss., Available at https://peopledaily.digital/news/greening-expressway-to-reverse-environmental-loss (Accessed on 26/09/2025)

[26] Brickstone., 'Low-Carbon Infrastructure in Curbing Climate Change.' Op Cit

[27] International Institute for Sustainable Development., 'The Road to Sustainable Transport.' Available at Available at https://www.iisd.org/articles/deep-dive/road-sustainable-transport#:~:text=Transport%20accounts%20for%20about%2064,directly%20attributed%20to%20vehicular%20pollution. (Accessed on 26/09/2025)

[28] United Nations General Assembly., 'Transforming Our World: the 2030 Agenda for Sustainable Development.' 21 October 2015, A/RES/70/1., Available at https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf (Accessed on 26/09/2025)

[29] Ibid

[30] Ibid, SDG 11.2

African Union's *Agenda 2063*[31] seeks to expand Africa's transport and infrastructure systems including railway and road networks, port facilities and other transport infrastructure to enhance connectivity, spur trade and economic growth and create jobs[32]. Agenda 2063 further seeks to ensure that every citizen in Africa has affordable and sustainable access to quality transport and other services[33]. It further seeks to ensure that all urban mass transport will operate on renewable and low to zero emissions fuels[34].

Greening transport systems is therefore a key theme both globally and in Africa. It is imperative to actualise this agenda for sustainability.

3.0 Greening of Transport Systems in Africa

In light of the environmental impacts of the transport sector both globally and in Africa, there is need to green transport systems. Green transport which is also referred to as sustainable transport aims to minimize greenhouse gas emissions and environmental impacts of the transport sector while ensuring safety and affordability and providing equitable access to mobility for all[35]. It has been that greening of transport systems is not a single solution, but a systems approach, which integrates technology, infrastructure, planning, policy and behavior change to reduce emissions and curb the negative environmental impacts of transport systems while enhancing connectivity[36]. According to the United Nations Environment Programme (UNEP), greening of transport systems is vital towards mitigating and adapting to the impacts of climate change, decarbonizing economies, conserving biodiversity and minimizing pollution[37]. By greening transport systems, it is possible to ensure that people and nature thrive together[38].

Greening of transport systems therefore involves designing and utilising environmentally friendly modes of travel towards lowering emissions, conserving energy, and reducing the environmental footprint of transporting people and goods[39]. Achieving this ideal involves

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[31] Africa Union., 'Agenda 2063: The Africa we Want.' Available at https://au.int/sites/default/files/documents/33126-doc-framework_document_book.pdf (Accessed on 26/09/2025)

[32] Ibid

[33] Ibid

[34] Ibid

[35] United Nations Development Programme., 'What is sustainable transport and what role does it play in tackling climate change?' Available at https://climatepromise.undp.org/news-and-stories/what-sustainable-transport-and-what-role-does-it-play-tackling-climate-change#:~:text=Sustainable%20transport%20refers%20to%20mobility,across%20land%2C%20water%20and%20air? (Accessed on 27/09/2025)

[36] Ibid

[37] United Nations Environment Programme., 'New Report Reveals how Infrastructure Defines our Climate.' Available at https://www.unep.org/news-and-stories/press-release/new-report-reveals-how-infrastructure-defines-our-climate (Accessed on 27/09/2025)

[38] Ibid

[39] What is Green Transportation and its Significance?., Available at https://nextbillion.ai/blog/what-is-green-transportation (Accessed on 27/09/2025)

embracing sustainable modes of transport including the use of electric vehicles, public transit systems, cycling and walking[40]. It also requires scientific and technological advancements through low carbon infrastructure projects such as railway infrastructure; urban transport projects including metros and light rail projects which reduce car usage; and renewable energy projects including solar, wind, and hydropower which are essential in transitioning the transport sector towards sustainability[41].

Africa has the potential to green its transport systems through the use of low and zero emission, energy efficient, affordable modes of transport, including electric and alternative fuel vehicles, as well as domestic fuels[42]. In particular, low emission vehicles provide an effective pathway towards transitioning the transport sector in Africa towards sustainability. These vehicles are designed to produce fewer emissions such as carbon dioxide emissions when compared to convention vehicles[43]. Low emission vehicles have become a vital tool in ensuring the sustainability of the transport sector due to improvements to engine technology, as well as using 'hybrid' technology, where a vehicle runs in electric mode sometimes and petrol or diesel mode at others thus reducing emissions among other environmental impacts[44]. These vehicles include battery-electric vehicles, plug-in hybrid electric vehicles and hybrid electric vehicles[45]. Since these vehicles utilise viable and green sources of energy including electric power and hydrogen they have fewer environmental impacts due to little or no reliance on fossil fuels while also saving the cost of fuel[46].

Africa has immense potential to utilise low emission vehicles towards greening its transport systems. For example, it has been argued that renewable sources of energy including wind and solar power are a vital component of green transport systems by generating electricity for low emission vehicles thus reducing the environmental impacts of the transport sector[47]. The

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[40] Ibid

[41] Muigua. K., 'Enhancing Low Carbon Development for Sustainability.' Available at https://kmco.co.ke/wp-content/uploads/2023/09/Enhancing-Low-Carbon-Development-for-Sustainability-.pdf (Accessed on 27/09/2025)

[42] Office of the Energy Efficiency & Renewable Energy., 'Sustainable Transportation and Fuels.' Available at https://www.energy.gov/eere/sustainable-transportation-andfuels#:~:text=Sustainable%20transportation%20refers%20to%20low,as%20well%20as%20domestic%20fue ls. (Accessed on 27/09/2025)

[43] Low emission and zero emission vehicles., Available at https://www.rbwm.gov.uk/transport-and-streets/motoring/guide-electric-vehicles/low-emission-and-zero-emission-vehicles#:~:text=An%20ultra%2Dlow%20emission%20vehicle,pollution%20from%20tyres%20and%20brakes). (Accessed on 27/09/2025)

[44] Ibid

[45] Ibid

[46] Ibid

[47] European Commission., '5 things you should know about electric cars' Available at https://climate.ec.europa.eu/news-other-reads/news/5-things-you-should-know-about-electric-cars-2024-05-

electricity used to power low emission vehicles such as battery-electric vehicles is increasingly being derived from renewable sources of energy such as solar and wind, which means that such vehicles cause fewer greenhouse gas emissions[48]. Africa is rich in renewable energy with wind, solar, hydro, bioenergy, ocean tidal waves, geothermal among other renewables being abundant throughout the continent[49]. In addition, Africa is rich in critical minerals such as manganese, bauxite, graphite, lithium and cobalt which are vital to renewable and low- carbon technologies including solar, electric vehicles, battery storage, green hydrogen and geothermal[50]. Africa therefore has the potential to harness its vast renewable energy potential and critical raw materials towards greening its transport systems through low emission vehicles. It is therefore imperative to put in place and implement policies that support sustainable transport and enhance investments, technology development and transfer, research and innovation towards harnessing renewable energy and critical raw materials to support the uptake of low emission vehicles towards greening transport systems in Africa[51].

4.0 Conclusion

Greening of transport systems is key towards tackling climate change, pollution and biodiversity loss among other environmental impacts of the transport sector. Africa has immense potential to green its transport systems due to the abundance of renewable sources of energy and critical raw materials in the continent which can support the adoption of low emission vehicles[52]. Utilising renewable energy for low emission vehicles is therefore a worthy endeavour that should be fast-tracked towards greening transport systems in Africa for sustainability.

14_en#:~:text=The%20electricity%20used%20to%20power,levels%20of%20road%20traffic%20noise? (Accessed on 27/09/2025)

[48] Ibid

[49] Africa Union., 'Agenda 2063: The Africa we Want.' Op Cit

[50] Renewable Energy Technologies in the Global South: Insights from Africa., Available at https://saiia.org.za/research/renewable-energy-technologies-in-the-global-south-insights-from-africa/ (Accessed on 27/09/2025)

[51] Ibid

[52] Ibid

Chapter 19: Energy PPPs in Kenya: Examining the Regulatory Framework and the Efficacy of Dispute Resolution and ADR

Abstract

This paper critically examines the role of PPPs in the energy sector in Kenya. The paper argues that PPPs play a crucial role in fostering access to energy in Kenya towards energy justice. The paper interrogates the regulatory framework governing energy PPPs in Kenya. It also explores some of the pertinent concerns in energy PPPs in Kenya including the likelihood of disputes between the public and private sectors. The paper further suggests reforms towards strengthening energy PPPs in Kenya including through utilising Alternative Dispute Resolution (ADR) processes to manage energy disputes in order to achieve the ideal of energy justice in Kenya.

1.0 Introduction

Public Private Partnerships (PPPs) refers to arrangements between a government or its entities on one side and a private sector entity on the other, for the provision of public assets and/or public services, through investments being made and/or management being undertaken by the private sector entity, for a specified period of time[1]. PPPs have also been defined as long-term agreements in which a private company/party offers a service traditionally provided by a government entity[2]. It has been noted that such service is performed based on the output specifications outlined by the public entity and any payments to the private party are based on the performance of the specified service[3]. In addition, risks and responsibilities are usually shared in PPPs and are in most cases assigned to the party that is best suited to handle them in the most cost- effective manner[4].

PPPs have become necessary in ensuring efficient service delivery for citizens. It has been noted that the financial crisis of 2008 brought about renewed interest in PPPs in both developed and developing countries[5]. With governments in both developed and developing countries facing constraints on public resources and fiscal space, while recognizing the importance of investment in infrastructure to help their economies grow, they are increasingly turning to the private sector as an alternative additional source of funding to meet the funding gap and ensure economic growth[6]. The partnership between the public and private sectors has been described as essential

[1] What is PPP?., Available at https://www.pppinindia.gov.in/faqs#:~:text=Public%20Private%20Partnership%20(PPP)%20means,undertaken%20by%20the%20private%20sector (Accessed on 07/02/2025)

[2] PPP Directorate., 'What are Public Private Partnerships (PPPs)?' Available at https://pppkenya.go.ke/faqs/#:~:text=The%20PPP%20Law%20in%20Kenya,project%20to%20the%20public%20party. (Accessed on 07/02/2025)

[3] Ibid

[4] Ibid

[5] The World Bank ., 'Government Objectives: Benefits and Risks of PPPs' Available at https://ppp.worldbank.org/public-private-partnership/overview/ppp-objectives (Accessed on 07/02/2025)

[6] Ibid

in enhancing service delivery since the two can leverage each other's strengths and resources for more efficient, effective and sustainable outcomes[7].

It has been noted that PPs are a vital tool in driving Sustainable Development all over the world[8]. These collaborations between government entities and private enterprises are instrumental in addressing critical infrastructure and socio-economic needs[9]. They are ideal in managing large scale projects in critical sectors such as health, energy, education, and transport[10].The United Nation's *2030 Agenda for Sustainable Development*[11] recognises the importance of bringing together all sectors including governments and the private sector in mobilising all available resources towards Sustainable Development[12]. Sustainable Development Goal (SDG) 17 seeks to encourage and promote effective PPPs for Sustainable Development[13]. At a national level, the *Public Private Partnerships Act of Kenya*[14] seeks to provide for the participation of the private sector in the financing, construction, development, operation or maintenance of infrastructure or development projects in Kenya through PPPs[15]. Leveraging on PPPs is therefore crucial towards Sustainable Development.

This paper critically examines the role of PPPs in the energy sector in Kenya. The paper argues that PPPs play a crucial role in fostering access to energy in Kenya towards energy justice. The paper interrogates the regulatory framework governing energy PPPs in Kenya. It also explores some of the pertinent concerns in energy PPPs in Kenya including the likelihood of disputes between the public and private sectors. The paper further suggests reforms towards strengthening energy PPPs in Kenya including through utilising Alternative Dispute Resolution (ADR) processes to manage energy disputes in order to achieve the ideal of energy justice in Kenya.

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[7] Ibid

[8] Otundo. M., 'Leveraging Public-Private Partnerships for Sustainable Development: Examining the Role of Project Management and Educational Stakeholder Engagement in Donor- Funded Projects in Kenya's Coastal Region' Available at https://www.researchgate.net/publication/384243287_Leveraging_Public-Private_Partnerships_for_Sustainable_Development_Examining_the_Role_of_Project_Management_and_Educational_Stakeholder_Engagement_in_Donor-_Funded_Projects_in_Kenya's_Coastal_Region (Accessed on 07/02/2025)

[9] Ibid

[10] Ibid

[11] United Nations General Assembly., 'Transforming Our World: the 2030 Agenda for Sustainable Development.' 21 October 2015, A/RES/70/1., Available at https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf (Accessed on 07/02/2025)

[12] Ibid

[13] Ibid

[14] Public Private Partnerships Act, Cap 430 Laws of Kenya., Government Printer, Nairobi

[15] Ibid, Preamble

2.0 Access to Energy as a Human Right

Access to energy is a core human right[16]. Energy is a fundamental human need that has been described as a basic factor necessary to sustain life.[17] It is a basic human need that has been equated to food, air and water[18]. It has been noted that access to energy in general or to electricity in particular can be equated to other human rights[19]. Access to energy is vital in enhancing human needs[20]. For instance, energy has the potential of accelerating the attainment of socio-economic rights such as the right to food, the right to education, the right to health, the right to water among others[21]. As a result, it has been pointed out that energy plays a critical role in economic growth and development, and future economic growth in all countries is largely hinged on the long-term availability of energy which is to be derived from sources that are affordable, accessible and environmentally friendly[22].

Energy is at the heart of Sustainable Development. Energy has the potential to stimulate development by connecting the SDGs and unlocking sustainable economic growth[23]. On this basis, it has been argued that Sustainable Development will not be achieved without the realization of the right of access to energy[24]. SDG 7 seeks to ensure access to affordable, reliable, sustainable and modern energy for all in order to spur Sustainable Development[25].

Despite being a fundamental human right and playing a crucial role in Sustainable Development, access to affordable, reliable, sustainable and modern energy continues to be an elusive dream for millions of people globally especially in Africa. The International Energy Agency (IEA) estimates that approximately 600 million people in Africa lack access to electricity, most of them

[16] Muigua. K., 'Access to Energy as a Constitutional Right in Kenya', available at http://kmco.co.ke/wp-content/uploads/2018/08/Access-to-Energy-as-a-Constitutional-Right-inKenya-NOVEMBER-2013.pdf (Accessed on 07/02/2025)

[17] Goldthau. A & Sovacool. B., 'The Uniqueness of the Energy Security, Justice and Governance Problem' *Energy Policy*, 41 (2012) 232-240

[18] Ibid

[19] Lofquist. L., 'Is there a universal human right to electricity?' Available at https://www.tandfonline.com/doi/full/10.1080/13642987.2019.1671355#abstract (Accessed on 07/02/2025)

[20] Ibid

[21]The World Bank, 'Sustainable Development Goal on Energy (SDG7) and the World Bank Group, available at https://www.worldbank.org/en/topic/energy/brief/sustainable-development-goal-onenergy-sdg7-and-the-world-bank-group (Accessed on 07/02/2025)

[22] Muigua. K., Wamukoya. D & Kariuki. F., 'Natural Resources and Environmental Justice in Kenya.' Glenwood Publishers Limited, 2015

[23] Goldthau. A & Sovacool. B., 'The Uniqueness of the Energy Security, Justice and Governance Problem' Op Cit

[24] Muigua. K., 'Access to Energy as a Constitutional Right in Kenya' Op Cit

[25] United Nations General Assembly., 'Transforming Our World: the 2030 Agenda for Sustainable Development.' 21 October 2015, A/RES/70/1., Op Cit

who live in sub-Saharan Africa[26]. According to the World Bank, millions of people in Sub-Saharan Africa lack access to electricity and clean cooking sources[27]. It has been observed that the Sub-Saharan region has the lowest rate of access to electricity with just nearly half of the population having access to electricity compared to the global access rate of nearly 90 per cent[28]. In addition, bio-energy sources such as charcoal, wood fuel and dung remain the most common source of energy for cooking in Africa especially among the rural population[29]. However, use of these sources is associated with environmental challenges such as air and soil pollution and environmental degradation through deforestation[30]. The use of such sources of energy in cooking has also been linked to more than 500,000 annual deaths associated with indoor pollution[31].

Several factors also hinder access to energy in Kenya. It has been noted that despite the strides made towards enhancing access to electricity in Kenya, there exists a wide disparity in electrification between urban and rural areas with a majority of the rural population not having electricity connection[32]. Energy affordability also remains a challenge in most sub-Saharan African Countries including Kenya due to the high cost of power relative to income making energy sources such as electricity out of the reach of most people[33]. Consequently, bio-energy sources such as charcoal, wood fuel and dung remain the most common source of energy in Kenya especially among the rural population in Kenya[34].

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[26] International Energy Agency., 'Africa Energy Outlook 2022' Available at https://www.iea.org/reports/africa-energy-outlook-2022/key-findings (Accessed on 07/02/2025)

[27] World Bank Group., 'Energy Access in Eastern and Southern Africa' Available at https://www.worldbank.org/en/region/afr/brief/afe-energy (Accessed on 07/02/2025)

[28] United Nations Conference on Trade and Development., 'Commodities at a Glance: Special Issue on Access to Energy in Sub-Saharan Africa.' Available at Available at https://unctad.org/publication/commodities-glance-special-issue-access-energy-sub-saharan-africa#:~:text=Access%20to%20energy%20is%20defined,be%20scaled%20up%20over%20time (Accessed on 07/02/2025)

[29] Muchiri. L., 'Gender and Equity in Bioenergy Access and Delivery in Kenya' Practical Action East Africa, 2008, available at https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=2ahUKEwiy2P29z6PnAhUEiFwKHQlyCLoQFjAAegQIBRAB&url=http%3A%2F%2Fwww.cas.ed.ac.uk%2F__data%2Fassets%2Fword_doc%2F0007%2F24793%2FGender_and_Equity_in_Bio_energy_Access_and_Delivery_in_Kenya_final.doc&usg=AOvVaw2AKp1mvTSC9tafkIKJ-36_ (Accessed on 23/11/2023)

[30] Muigua. K., 'Towards Energy Justice in Kenya.' Available at https://kmco.co.ke/wp-content/uploads/2020/02/Towards-Energy-Justice-in-Kenya-00000005.pdf (Accessed on 07/02/2025)

[31] United Nations., 'Advancing SDG 7 in Africa.' Available at Available at https://sdgs.un.org/sites/default/files/2023-06/2023%20Advancing%20SDG7%20in%20the%20Africa-062923.pdf (Accessed on 07/02/2025)

[32] Moner-Girona. M et al, 'Decentralized Rural Electrification in Kenya: Speeding Up Universal Energy Access' *Energy for Sustainable Development*, Volume 52, October 2019, p 128-146.

[33] Ibid

[34] Muchiri. L., 'Gender and Equity in Bioenergy Access and Delivery in Kenya' Practical Action East Africa, 2008.' Op Cit

In light of the foregoing challenges, fostering energy justice has become an urgent priority in Kenya and the rest of Africa. The concept of energy justice aims to recognise and rectify existing systemic injustices in the energy system, and ensure that the benefits and burdens associated with the consumption, production, and distribution of energy are equitably shared[35]. It evaluates where injustices in the energy sector emerge, which sections of the society are affected and ignored, and which processes exist for their remediation in order to reveal, and reduce injustices in the energy sector[36]. According to the United Nations, energy justice seeks to ensure universal access to safe, affordable and sustainable energy for all individuals, across all areas and to protect individuals from the disproportionate share of costs or negative impacts relating to building, operating, maintaining, generating, transmission, and distribution of energy and to ensure equitable access to benefits from each system[37]. The ideal of energy justice therefore seeks to achieve equity, affordability, accessibility and participation in energy systems and the energy transition[38].

3.0 Energy PPPs in Kenya: Prospects and Challenges

With many governments globally struggling to foster the right to energy, PPPs have become a powerful tool towards enhancing universal access to affordable, reliable, sustainable and modern energy for all in the quest towards energy justice[39]. Despite access to electricity being vital for economic growth, it has been noted that power sector projects especially the development of power generation and transmission infrastructure is very capital intensive[40]. This situation is particularly evident in developing countries where demand for electricity is rapidly growing due to population and economic growth and the potential infrastructure gap to meet this demand is very large[41]. For instance, it has been noted that financing Africa's energy transition in Africa remains a challenge due to limited access to capital and high political and regulatory barriers[42].

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[35] Energy Justice., Available at https://studentenergy.org/influencer/energy-justice/ (Accessed on 07/02/2025)

[36] Jenkins. K et al., 'Energy Justice: A conceptual Review.' *Energy Research & Social Science*., Volume 11, 2016, pp 174-182

[37] United Nations., 'In Quest of an Energy Justice Framework for Bangladesh.' Available at https://www.un.org/en/chronicle/article/quest-energy-justice-framework-bangladesh (Accessed on 07/02/2025)

[38] Nel. L., & Basajjasubi. A., 'An Energy Justice Framework should be applied to Energy Planning' Available at https://naturaljustice.org/an-energy-justice-framework-should-be-applied-to-energy-planning/ (Accessed on 07/02/2025)

[39] The World Bank Group., 'Energy and Power PPPs' Available at https://ppp.worldbank.org/public-private-partnership/sector/energy (Accessed on 07/02/2025)

[40] Ibid

[41] Ibid

[42] Ronge. A., Shastry. V., & Kamau. A., 'Public-Private Partnerships in the African Energy Sector' Available at https://www.energypolicy.columbia.edu/publications/public-private-partnerships-in-the-african-energy-sector/ (Accessed on 07/02/2025)

Energy PPPs therefore offer an alternative strategy that can help African governments to navigate the energy transition effectively[43].

According to the World Bank, energy PPPs provide a useful tool which, if properly implemented, can provide governments with access to private sector capital, technology and expertise towards enhancing access to energy[44]. Energy PPPs can also leverage private capital and expertise to support the development of renewable energy projects towards fostering universal access to affordable, reliable, sustainable and modern energy for all[45]. Further, it has been noted that energy PPPs can achieve long-term value by transferring risk to the private sector throughout the project's lifespan, from design and construction to operations and maintenance[46]. They can also foster skill transfer between the private sector and state-owned enterprises and governments, increasing the competitiveness of national entities thus improving service delivery[47].

The importance of energy PPPs has been recognised in Kenya. For instance, the *Energy Act*[48] mandates the Nuclear Power and Energy Agency to put in place mechanisms to attract private sector funding in research and human resource development for matters relating to energy[49]. Further, the Ministry of Energy and Petroleum's *Strategic Plan 2023-2027*[50] seeks to engage the private sector through PPPs in order to realise the technical and financial resources required to achieve energy transition in Kenya[51]. The Strategic Plan also seeks to promote the participation of the private sector in the development of renewable energy initiatives in the country[52]. The Strategic Plan acknowledges that implementation of energy projects under the PPPs framework can accelerate energy transition in the country[53].

Energy PPPs are governed under the Public Private Partnerships Act[54]. The Act establishes the Public Private Public Private Partnership Committee which is responsible for formulating policies on PPPs, overseeing the implementation of PPPs contracts, approving feasibility studies, and approving negotiated contract terms, the cancellation of procurements or termination of project

[43] Ibid
[44] The World Bank Group., 'Energy and Power PPPs' Op Cit
[45] The World Bank Group., 'Renewable Energy' Available at https://ppp.worldbank.org/public-private-partnership/energy-and-power/renewable-energy (Accessed on 07/02/2025)
[46] Ronge. A., Shastry. V., & Kamau. A., 'Public-Private Partnerships in the African Energy Sector' Op Cit
[47] Ibid
[48] Energy Act, Cap 314, Government Printer, Nairobi
[49] Ibid, S 56 (2) (k)
[50] Republic of Kenya., Ministry of Energy and Petroleum: Strategic Plan 2023-2027., Available at https://www.energy.go.ke/sites/default/files/KAWI/strategicplan/Final%20Draft%20Strategic%20Plan%20with%20sig.pdf (Accessed on 07/02/2025)
[51] Ibid
[52] Ibid
[53] Ibid
[54] Public Private Partnerships Act, Op Cit

agreements, and the variation of project agreements[55]. Under the Act a contracting authority intending to finance, operate, equip or maintain an infrastructure facility or provide a public service may enter into a project agreement with a qualified private party for the financing, construction, operation, equipping or maintenance of the infrastructure facility or provision of the public service[56]. The Act further limits the term of PPPs to thirty years[57]. Energy PPPs in Kenya are therefore limited to a period of thirty years as envisaged under the Public Private Partnerships Act. Before entering into a PPP, the contracting authority is mandated to determine that the private party has the financial capacity to undertake the project, relevant experience in undertaking projects of a similar nature, relevant expertise to undertake the project, and satisfied the legal, social and environmental due diligence parameters as stipulated by law[58]. The Act further requires a contracting authority to undertake feasibility study in order to determine the viability of the project to be submitted to a PPP[59]. While undertaking the feasibility study, key considerations include the technical requirements of the project, the social, economic and environmental impact of the project, and the affordability and value for money proposition in the project[60]. Energy PPPs in Kenya are therefore subjected to rigorous requirements stipulated under the Public Private Partnerships Act.

Energy PPPs are playing a crucial role in fostering access to energy in Kenya. It has been noted that the construction, operation and maintenance of infrastructure in Kenya in critical sectors such as energy is a capital intensive undertaking that requires collaboration between the public and private actors[61]. PPPs therefore provide an avenue for the government to partner with the private sector to pool more resources, innovation and efficiencies for the faster development of the country[62]. The energy sector including power generation has been identified as a key focus for PPPs in Kenya[63]. It has been noted that the PPPs framework has over the years enabled the Government of Kenya to implement high quality infrastructure projects especially in the energy and roads sectors[64]. For instance, in the energy sector, the Kenya Electricity Transmission Company Limited (KETRACO), is engaging with private parties in the development and operation of transmission lines projects in the country[65]. This process is geared towards bridging

[55] Ibid, s 6 & 8
[56] Ibid, s 20
[57] Ibid, s 21 (2)
[58] Ibid, s 27
[59] Ibid, s 32
[60] Ibid
[61] PPP Directorate., Op Cit
[62] Ibid
[63] Ibid
[64] Republic of Kenya., The National Treasury & Economic Planning., 'Directorate of Public Private Partnerships' Available at https://www.treasury.go.ke/directorate-public-private-partnerships/ (Accessed on 08/02/2025)
[65] Kenya Electricity Transmission Company Limited., 'Statement on Privately Initiated Transmission Proposals (PIPs) and Public Private Partnership Energy Sector Projects' Available at

the finance gap and ensure timely development of the needed transmission infrastructure mainly for increased adequacy, improved system stability and security of supply[66]. KETRACO acknowledges that Kenya is grappling with aging transmission infrastructure and insufficient investment in power transmission a situation that has resulted in frequent power blackouts that have taken a toll on the economy[67]. Energy PPPs are therefore a suitable tool in ensuring security of energy supply in Kenya.

Energy PPPs are also an appropriate model of harnessing Kenya's vast renewable energy potential towards ensuring universal access to affordable, reliable, sustainable and modern energy for all[68]. Renewable energy sources have become increasingly important as the world faces the challenge of mitigating the negative impacts of climate change and reducing the dependence on finite and polluting fossil fuels[69]. These sources of energy are environmentally-friendly and readily available[70]. The 2030 Agenda for Sustainable Development urges all countries to adopt renewable sources of energy towards enhancing energy access and fostering sustainability[71]. Kenya is endowed with renewable sources of energy including wind, solar, hydropower, geothermal and tidal energy which are readily available in the country[72]. PPPs have become a suitable tool in enabling Kenya to harness its vast renewable energy potential towards energy justice. It has been noted that Kenya has made significant strides in promoting the use of renewable sources of energy including solar, wind and geothermal power by attracting private investments for renewables projects[73]. PPPs are ideal in leveraging private capital and expertise to support the development of renewable energy projects throughout the country[74]. Kenya is currently utilising PPPs to harness key renewable sources of energy such as geothermal, wind, and hydro power[75].

https://www.ketraco.co.ke/information-center/media-center/news/statement-privately-initiated-transmission-proposals-pips-and (Accessed on 08/02/2025)

[66] Ibid

[67] Ibid

[68] The World Bank Group., 'Renewable Energy' Op Cit

[69] Verma. A., 'The Role of Renewable Energy Technologies in Sustainable Development.' Available at https://timesofindia.indiatimes.com/blogs/voices/the-role-of-renewable-energy-technologies-in-sustainable-development/ (Accessed on 08/02/2025)

[70] Ibid

[71] United Nations General Assembly., 'Transforming Our World: the 2030 Agenda for Sustainable Development.' 21 October 2015, A/RES/70/1., Op Cit

[72] Muigua. K., 'Adopting Green Energy for a Bright Tomorrow.' Available at Available at http://kmco.co.ke/wp-content/uploads/2023/06/Adopting-Green-Energy-for-a-Bright-Tomorrow.pdf (Accessed on 08/02/2025)

[73] ExpoGroup., 'Kenya Power and Energy Market Analysis 2024.' Available at https://www.expogr.com/kenyaenergy/market_info.php (Accessed on 08/02/2025)

[74] The World Bank Group., 'Renewable Energy' Op Cit

[75] Ibid

Energy PPPs are therefore crucial in fostering access to energy in Kenya. However, there are various risks and challenges associated with energy PPPs. For instance, it has been noted that energy PPP projects can incur higher capital costs due to private investors' limited access to low-cost financing and risk mitigation tools[76]. Further, these projects can be costly since the projects are expected to generate a return on investment with such costs being covered by end-customers or through government guarantees[77]. Disputes are also a common feature in energy PPPs[78]. It has been noted that interpretations of PPP contractual provisions, adjustments of contractual terms and obligations, or requests to renegotiate or terminate the PPP contract can be amicable or contentious[79]. It has been noted that unilateral changes to conditions of PPP contracts by the contractual authority especially governments have resulted in many disputes in the energy sector globally[80]. Effective management of these disputes is key towards actualising the terms of the PPPs and fostering access to energy.

4.0 Energy PPPs and Dispute Management

Energy PPPs are a vital tool in fostering access to energy towards energy justice. They have been embraced in Kenya as envisaged under the Public Private Partnerships Act[81]. Energy PPPs are playing a key role in enhancing access to energy in Kenya by improving stability and security of energy supply and enabling the country harness its vast renewable sources of energy including geothermal, wind, and hydro power[82]. However there are several fiscal risks arising from energy PPPs[83]. Further, disputes are a common occurrence in energy PPPs[84]. Failure to effectively manage such disputes can affect energy projects and hinder universal access to energy[85].

It is imperative to enhance the efficiency of energy PPPs. Governments should effectively monitor and identify risks stemming from energy PPPs and provide support and guarantees to private

[76] Ronge. A., Shastry. V., & Kamau. A., 'Public-Private Partnerships in the African Energy Sector' Op Cit
[77] Ibid
[78] The World Bank Group., 'Renegotiation, Government Step-in rights, Termination, and Dispute Resolution' Available at https://ppp.worldbank.org/public-private-partnership/renegotiation-government-step-rights-termination-and-dispute-resolution#:~:text=The%20accelerating%20availability%20of%20disruptive,in%20the%a20energy%20sector%20globally. (Accessed on 08/02/2025)
[79] Ibid
[80] Ibid
[81] Public Private Partnerships Act, Op Cit
[82] The World Bank Group., 'Renewable Energy' Op Cit
[83] Ronge. A., Shastry. V., & Kamau. A., 'Public-Private Partnerships in the African Energy Sector' Op Cit
[84] The World Bank Group., 'Renegotiation, Government Step-in rights, Termination, and Dispute Resolution' Op Cit
[85] Ibid

entities transacting in public investment projects including those in the energy sector[86]. Monitoring of projects is also critical in ensuring the success of PPPs[87].

It is also necessary to embrace effective management of disputes in order to ensure the viability and success of energy PPPs. Conflict management procedures should be invoked at the earliest instance after a conflict arises, before it becomes a real dispute or impedes the project[88]. Collaboration among all stakeholders including the government and private sector during a project's life cycle is important in maintaining an ongoing relationship between the parties and preventing conflicts[89]. Disputes flowing from energy PPPs in Kenya are managed through Public Private Partnerships Petition Committee established under the Public Private Partnerships Act[90]. However, the Committee is a quasi-judicial body and can be associated with several challenges in managing disputes flowing from energy PPPs. Use of litigation in managing energy disputes can result in delays, costs and damaging of relationships which is an undesirable situation especially in long term energy projects[91].

There is room to utilise more appropriate tools including ADR mechanisms to manage disputes in energy PPPs[92]. For instance, arbitration has been identified as a suitable approach in managing disputes. It has been noted that foreign investors prefer arbitration in managing disputes in the energy sector due to its flexibility, the ability to provide for confidentiality, the ability to enlist specialist, commercial-minded arbitrators to determine the dispute, and its ability to provide for a neutral forum in complex energy disputes involving international parties, particularly when compared to litigation before domestic courts[93]. It has been noted that the principal goal in utilising arbitration in energy disputes is to avoid a dependence on the national courts if the relationship is with a host state or its agent such as a national energy company, and if the

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[86] Republic of Kenya., The National Treasury & Economic Planning., 'Fiscal Risks Arising from Public Private Partnerships' Available at https://www.treasury.go.ke/wp-content/uploads/2021/09/Kenya-PPP-Fiscal-Risk-Disclosure-28Sept2021.pdf (Accessed on 08/02/2025)

[87] Ibid

[88] The World Bank Group., 'Renegotiation, Government Step-in rights, Termination, and Dispute Resolution' Op Cit

[89] Ibid

[90] Public Private Partnerships Act, s 75

[91] Bird & Bird., 'A Need for Speed? The Possible Use of Expedited Dispute Resolution Procedures in the Energy Sector.' Available at https://www.twobirds.com/en/insights/2016/uk/a-need-for-speed-the-possible-use-of-expedited-dispute-resolution-procedures (Accessed on 08/02/2025)

[92] Muigua. K., 'Managing Energy Disputes in Africa' Available at https://kmco.co.ke/wp-content/uploads/2023/12/Managing-Energy-Disputes-in-Africa.pdf (Accessed on 08/02/2025)

[93] Resolving Energy Disputes in Africa Through Arbitration and Alternative Dispute Resolution ('ADR'), Available at Resolving Energy Disputes in Africa Through Arbitration and Alternative Dispute Resolution ('ADR').' Available at https://content.clearygottlieb.com/regions/africa-outlook/resolving-energy-disputes-in-africa-through-arbitration-and-alternative-dispute-resolution/index.html (Accessed on 08/02/2025)

relationship is with a private party, to achieve the efficiency and confidentiality benefits of arbitration as opposed to litigation[94].

Other ADR techniques such as mediation and negotiation are also ideal in managing energy disputes[95]. For instance, it has been observed that commercial relationships in the energy sector are often long term and frequently operate across projects, borders and cultures[96]. This creates incentives for players in the energy sector including energy companies to look at alternatives to more formal dispute resolution mechanisms such as litigation or arbitration[97]. Mediation and negotiation are suitable in preserving relationship, addressing the root causes of conflicts and enhancing collaboration among parties and are therefore ideal in managing disputes in the energy sector[98].

Further, it has been noted that utilising ADR processes including the use of dispute review boards in energy PPPs can be a powerful tool to prevent and resolve conflicts at an early stage[99]. The Public Private Partnerships Act urges parties to PPPs to embrace arbitration or any other amicable dispute resolution mechanism towards effective management of disputes[100]. It is therefore necessary to utilise ADR for sound management of disputes in energy PPPs.

5.0 Conclusion

Energy PPPs hold great potential to accelerate access to energy in Kenya for energy justice and Sustainable Development. However, it is vital to enhance their viability including through enhancing their efficiency, mitigating fiscal risks, and fostering effective management of disputes through ADR in order to achieve this dream.

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[94] Peter. C., 'International arbitration and energy disputes' Available at https://discovery.dundee.ac.uk/ws/portalfiles/portal/99500417/GELS_ARTICLE_CAMERON_14112022_FINAL.pdf (Accessed on 08/02/2025)

[95] Muigua. K., 'Managing Energy Disputes in Africa' Op Cit

[96] Ashurst., 'Managing and Resolving Cross-Border Disputes in the Energy Sector.' Available at https://www.ashurst.com/en/insights/managing-and-resolving-cross-border-disputes-in-the-energy-sector/ (Accessed on 08/02/2025)

[97] Ibid

[98] Ibid

[99] The World Bank Group., 'Renegotiation, Government Step-in rights, Termination, and Dispute Resolution' Op Cit

[100] Public Private Partnerships Act, s 71 (2)

PART VI: COMMUNITY RIGHTS, INCLUSIVITY AND SOCIAL LICENCE TO OPERATE

Abstract

This Part centres community participation, inclusivity and social justice within energy transition processes. It examines the rights and interests of indigenous and vulnerable communities and the importance of securing a social licence to operate for renewable energy developments. By highlighting negotiation, consultation and benefit-sharing mechanisms, the chapters underscore the role of participatory governance in preventing conflict and enhancing project legitimacy. The Part positions community engagement as a foundational requirement for equitable, sustainable and conflict-sensitive energy transition in Africa.

Chapter 20: Energy Transition in Africa: Ensuring Inclusivity and Climate Justice for Indigenous and Vulnerable Communities

Abstract

This paper discusses how Africa can ensure inclusivity and justice in its journey towards energy transition. The paper argues that energy transition is a key priority for Africa towards actualising the 2030 Agenda for Sustainable Development and the goals and aspirations of African Union's Agenda 2063. It posits that Africa has immense potential to achieve energy transition due to several favourable factors including the abundance of renewable sources of energy in the continent and the availability of energy transition minerals. Despite its immense potential to actualise energy transition, the paper argues that energy transition in Africa is fuelling justice, equity and human rights concerns. In particular, the paper notes that indigenous and vulnerable communities are often excluded from decision-making processes with their rights also being violated. In light of these challenges, the paper argues that it is imperative to foster equitable energy transition in Africa. It examines how Africa can ensure inclusivity and climate justice for indigenous and vulnerable communities in order to achieve equitable energy transition for Sustainable Development.

1.0 Introduction

Energy transition refers to the transformative shift in how energy is produced, distributed and consumed, with the aim of moving away from fossil fuels towards an energy system centred on clean and sustainable sources of energy such as renewable energy[1]. In addition, energy transition has been described as the global energy sector's shift from fossil fuel-based systems of energy production and consumption including oil, natural gas and coal to renewable energy sources like wind and solar[2]. It has been argued that energy transition involves the shift from an energy mix based on fossil fuels to one that produces very limited, if not zero, carbon emissions, based on renewable energy sources[3]. The concept of energy transition therefore involves shifting energy production, supply and consumption away from fossil fuels and towards clean and sustainable energy sources, with a focus on renewable energy, without derailing economic growth[4].

Fast-tracking energy transition is a vital agenda globally for both people and planet. For instance, it has been noted that burning of fossil fuels like coal, oil and gas is the primary cause of climate

[1] United Nations Development Programme., 'What is the sustainable energy transition and why is it key to tackling climate change?' Available at https://climatepromise.undp.org/news-and-stories/what-sustainable-energy-transition-and-why-it-key-tackling-climate-change (Accessed on 19/09/2025)

[2] S & P Global., 'What is Energy Transition?' Available at https://www.spglobal.com/en/research-insights/articles/what-is-energy-transition (Accessed on 19/09/2025)

[3] The Energy Transition., Available at https://www.enelgreenpower.com/learning-hub/energy-transition (Accessed on 19/09/2025)

[4] The Energy Transition., Available at https://www.pwc.com/id/en/services/energy-transition.html (Accessed on 19/09/2025)

change[5]. The United Nations points out that fossil fuels are by far the largest contributor to global climate change, accounting for over 75 percent of global greenhouse gas emissions and nearly 90 percent of all carbon dioxide emissions[6]. Fossil fuels also have devastating impacts on human and environmental health. They have been linked to air pollution with severe impacts on people and planet[7]. In addition, since fossil fuels are non-renewable, they can be depleted and therefore, placing too much reliance on them can affect global energy security and supply[8].

Actualising energy transition therefore provides numerous benefits in the quest towards Sustainable Development. It has been argued that achieving energy transition presents a unique opportunity to address key global challenges including climate change, energy access disparities, poverty, inequality, and health impacts of the energy sector therefore laying the foundation for a sustainable, inclusive and more resilient future[9]. The ideal of global energy transition is envisioned under the United Nations *2030 agenda for Sustainable Development*[10]. Under the Agenda, Sustainable Development Goal (SDG) 7 seeks to ensure access to affordable, reliable, sustainable and modern energy for all including through substantially increasing the share of renewable energy in the global energy mix[11]. Despite its crucial role in the Sustainable Development agenda, it has been argued that global energy transition is undermined by several challenges including renewable energy disputes, human rights violations and injustices against indigenous and vulnerable communities who are often excluded from decision-making processes and displaced from their ancestral lands[12]. In light of these challenges, it is imperative to ensure just, equitable and inclusive energy transition for Sustainable Development.

This paper discusses how Africa can ensure inclusivity and justice in its journey towards energy transition. The paper argues that energy transition is a key priority for Africa towards actualising the 2030 Agenda for Sustainable Development and the goals and aspirations of African Union's Agenda 2063. It posits that Africa has immense potential to achieve energy transition due to

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[5] United Nations., 'What is Climate Change?' Available at https://www.un.org/en/climatechange/what-is-climate-change (Accessed on 19/09/2025)

[6] United Nations., 'Renewable Energy – Powering a Safer Future' Available at https://www.un.org/en/climatechange/raising-ambition/renewable-energy (Accessed on 19/09/2025)

[7] Solomon. B., & Krishna. K., 'The Coming Sustainable Energy Transition: History, Strategies, and Outlook.' *Energy Policy* 39 (2011) 7422-7431

[8] Ibid

[9] United Nations Development Programme., 'What is the sustainable energy transition and why is it key to tackling climate change?' Op Cit

[10] United Nations General Assembly., 'Transforming Our World: the 2030 Agenda for Sustainable Development.' 21 October 2015, A/RES/70/1., Available at https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf (Accessed on 19/09/2025)

[11] Ibid

[12] United Nations Environment Programme., 'Critical Energy Transition Minerals' Available at https://www.unep.org/topics/energy/renewable-energy/critical-energy-transition-minerals (Accessed on 19/09/2025)

several favourable factors including the abundance of renewable sources of energy in the continent and the availability of energy transition minerals. Despite its immense potential to actualise energy transition, the paper argues that energy transition in Africa is fuelling justice, equity and human rights concerns. In particular, the paper notes that indigenous and vulnerable communities are often excluded from decision-making processes with their rights also being violated. In light of these challenges, the paper argues that it is imperative to foster equitable energy transition in Africa. It examines how Africa can ensure inclusivity and climate justice for indigenous and vulnerable communities in order to achieve equitable energy transition for Sustainable Development.

2.0 Energy Transitions in Africa: Opportunities and Challenges

Energy transition is a fundamental goal in Africa. For example, energy access remains a key challenge in the continent with millions of people lacking reliable, affordable, sustainable and modern energy services[13]. It is estimated that nearly half of Africa's population lack access to electricity which is more than 80 per cent of the global population without access to electricity[14]. Further, it has been observed that Africa accounts for majority of the world's population without access to electricity and clean sources of cooking[15]. According to the International Energy Agency (IEA), enhancing access to energy is a crucial goal for Africa, where nearly 600 million people live without electricity and roughly 1 billion people lack access to clean cooking sources[16].

The continued reliance on fossil fuels and bio-energy sources such as charcoal, wood fuel and dung for cooking is fueling environmental and health concerns in Africa. For example, fossil fuels are causing and worsening the impacts of climate change in Africa[17]. Africa is the most vulnerable region globally to climate change and its impacts and therefore effective responses including adopting renewable sources of energy are required in order to confront climate change in the continent[18]. In addition, majority of the population in Sub-Saharan Africa lack access to clean and

[13] United Nations Sustainable Development Group., 'Decoding Africa's Energy Journey: Three Key Numbers' Available at https://unsdg.un.org/latest/stories/decoding-africa%E2%80%99s-energy-journey-three-key-numbers#:~:text=600%20million%20Africans%20without%20access,access%2C%20according%20to%202022%20data. (Accessed on 19/09/2025)

[14] Ibid

[15] World Bank Group., 'Energy Access in Eastern and Southern Africa' Available at https://www.worldbank.org/en/region/afr/brief/afe-energy (Accessed on 19/09/2025)

[16] International Energy Agency., 'World Energy Investments 2024: Africa' Available at https://www.iea.org/reports/world-energy-investment-2024/africa (Accessed on 19/09/2025)

[17] Muigua. K., 'Towards Energy Justice in Kenya.' Available at https://kmco.co.ke/wp-content/uploads/2020/02/Towards-Energy-Justice-in-Kenya-00000005.pdf (Accessed on 19/09/2025)

[18] United Nations Environment Programme., 'Responding to climate change' Available at https://www.unep.org/regions/africa/regional-initiatives/responding-climate-change (Accessed on 19/09/2025)

affordable energy and depend on traditional fuels for cooking[19]. The use of traditional fuels for cooking in Africa is destroying nature through deforestation, destruction of habitats and biodiversity loss, and climate change[20]. In addition, the use of bio-energy sources for cooking is also linked to more than 500,000 annual deaths globally due to indoor pollution[21].

In light of the foregoing challenges, achieving energy transition has become a vital sustainability and development objective in Africa. It has been argued that in order to address energy access, climate change, biodiversity loss and pollution concerns in Africa, energy transition is an essential and transformative process aimed at reducing the continent's carbon footprint, safeguarding the environment and fostering socio-economic development[22]. The ideal of energy transition in Africa is well captured under African Union's *Agenda 2063*[23] which portrays the vision of a Continent where renewable energy including wind, solar, hydro, bioenergy, ocean tidal waves, geothermal and other renewables claim more than half of the energy consumption for households, businesses and organizations[24].

Africa has immense potential to achieve energy transition. For example, the continent is rich in renewable energy with wind, solar, hydro, bioenergy, ocean tidal waves, geothermal among other renewables being abundant throughout the continent[25]. It has been pointed out that Africa is rich in renewable energy resources, including abundant sunlight, strong winds, and geothermal energy which can be harnessed to fast-track energy transition and Sustainable Development[26]. In addition, Africa has viable deposits of critical raw materials including cobalt,

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[19] Bildirici. M & Ozaksoy.F., 'Woody Biomass Energy Consumption and Economic Growth in Sub-Saharan Africa' *Procedia Economics and Finance* 38 (2016) 287 – 293.

[20] Energy Access in Africa., Available at https://wwf.panda.org/discover/our_focus/climate_and_energy_practice/what_we_do/changing_energy_use/energy_access_africa/ (Accessed on 19/09/2025)

[21] United Nations., 'Advancing SDG 7 in Africa.' Available at https://sdgs.un.org/sites/default/files/2023-06/2023%20Advancing%20SDG7%20in%20the%20Africa-062923.pdf (Accessed on 19/09/2025)

[22] Boucetta. M., 'Towards a Just Energy Transition for Africa' Available at https://www.policycenter.ma/publications/towards-just-energy-transition-africa#:~:text=To%20address%20climate%20change%2C%20the,demand%20by%20altering%20consumption%20patterns. (Accessed on 19/09/2025)

[23] Africa Union., 'Agenda 2063: The Africa we Want.' Available at https://au.int/sites/default/files/documents/33126-doc-framework_document_book.pdf (Accessed on 19/09/2025)

[24] Ibid

[25] Ibid

[26] AUDA-NEPAD., 'Empowering Africa: Enhancing Access To Electricity Through Renewable Energy' Available at https://www.nepad.org/blog/empowering-africa-enhancing-access-electricity-through-renewable-energy (Accessed on 19/09/2025)

bauxite, manganese, graphite, lithium, chromium and rare earth elements[27]. It has been argued that the transition from fossil fuels to clean energy sources globally depends on the availability and sustainable use of critical energy transition minerals including copper, lithium, nickel and cobalt which are essential components in many of today's rapidly growing clean energy technologies including wind turbines, solar panels and electric vehicles[28]. Due to the abundance of these vital resources in Africa, it has been argued that the continent is at the heart of a low-carbon future[29].

Africa therefore has several favourable factors that can be harnessed towards achieving energy transition. As a result, there has been a growth of investments in renewable energy in Africa. It has been observed that the production of renewable energy is growing in Africa with hydro, solar, wind, geothermal, biofuels and biomass accounting for a significant percentage of the total primary energy produced on the continent[30]. It has been argued that energy transition is beginning to bear fruit in several African countries with wind and solar power dominating non-hydro renewable energy generation and installed capacity[31]. Further, there has been a significant growth in mining activities aimed at extracting critical raw materials in Africa towards actualising energy transition[32].

Despite the foregoing efforts, energy transition in Africa is fuelling several concerns against indigenous and vulnerable communities. For example, wind and solar farms, hydroelectric dams, and geothermal plants needed to adopt renewable energy all require significant land and water resources, often leading to disputes with indigenous and vulnerable communities over land rights and environmental impacts[33]. In some instances, renewable energy projects have been implemented in Africa while overlooking the rights of local communities and indigenous peoples who bear the brunt of the environmental and social impacts[34]. Investors have often been accused of violating the Free, Prior and Informed Consent (FPIC) of indigenous and vulnerable

[27] Mo Ibrahim Foundation., 'Africa's Critical Minerals: Africa at the Heart of a Low-Carbon Future' Available at https://mo.ibrahim.foundation/sites/default/files/2022-11/minerals-resource-governance.pdf (Accessed on 19/09/2025)
[28] United Nations Environment Programme., 'Critical Energy Transition Minerals' Op Cit
[29] Mo Ibrahim Foundation., 'Africa's Critical Minerals: Africa at the Heart of a Low-Carbon Future' Op Cit
[30] United Nations Conference on Trade and Development., 'Commodities at a Glance: Special Issue on Access to Energy in Sub-Saharan Africa.' Available at Available at https://unctad.org/publication/commodities-glance-special-issue-access-energy-sub-saharan-africa#:~:text=Access%20to%20energy%20is%20defined,be%20scaled%20up%20over%20time (Accessed on 19/09/2025)
[31] United Nations., 'Advancing SDG 7 in Africa.' Op Cit
[32] Mo Ibrahim Foundation., 'Africa's Critical Minerals: Africa at the Heart of a Low-Carbon Future' Op Cit
[33] The Role of Fossil Fuel and Renewable Energy Projects in Conflict Across Africa., Available at https://www.accord.org.za/analysis/the-role-of-fossil-fuel-and-renewable-energy-projects-in-conflict-across-africa/ (Accessed on 19/09/2025)
[34] Ibid

communities during the implementation of renewable energy projects[35]. Renewable energy projects in Africa have come at the expense of human rights, including the loss of land, livelihoods and other rights of indigenous peoples including the right to a clean, healthy and sustainable environment[36].

In addition, unsustainable extraction of critical raw materials is a major threat to the environmental rights of indigenous peoples and vulnerable communities since it leads to environmental degradation, deforestation, pollution, climate change and biodiversity loss[37]. The extraction of critical raw materials needed to actualise energy transitions both globally and in Africa has had negative impacts on indigenous people's rights who are often displaced from their ancestral lands[38]. Energy transitions in Africa can therefore undermine the rights of indigenous and vulnerable communities. It is imperative to ensure inclusivity and justice for indigenous peoples and vulnerable communities in order to achieve equitable energy transition in Africa for Sustainable Development.

3.0 Ensuring Inclusivity and Climate Justice for Indigenous and Vulnerable Communities in Energy Transition in Africa

Energy transition is a crucial goal for Africa. It has been argued that energy transition will continue transforming the global economic landscape in terms of regulations, energy investments, and technological solutions in the coming decades[39]. With its abundant renewable sources of energy and critical raw materials, Africa is poised to play a significant role in energy transition while addressing its own Sustainable Development needs[40]. It has been argued that Africa can harness its abundant potential of increasingly cost-competitive renewable energy to service the growing demand for electricity in the continent while avoiding the negative impacts of fossil fuels including oil, gas and coal[41]. By realising energy transition, Africa can create new jobs, accelerate economic growth and mitigate the adverse impacts of climate change[42]. With the world shifting towards a more sustainable future through energy transition, Africa has the

[35] Ibid

[36] Impact of renewable energy projects on Indigenous communities in Kenya., Available at https://iwgia.org/en/kenya/3534-impact-of-renewable-energy-projects-on-indigenous-communities-in-kenya.html#:~:text=Kenya's%20ambitious%20plan%20to%20transition,energy%20by%20this%20year%2C%202020. (Accessed on 19/09/2025)

[37] United Nations Environment Programme., 'What are energy transition minerals and how can they unlock the clean energy age?' Available at https://www.unep.org/news-and-stories/story/what-are-energy-transition-minerals-and-how-can-they-unlock-clean-energy-age (Accessed on 19/09/2025)

[38] United Nations Environment Programme., 'Critical Energy Transition Minerals' Op Cit

[39] Boucetta. M., 'Towards a Just Energy Transition for Africa' Op Cit

[40] Ibid

[41] The Renewable Energy Transition in Africa: Powering Access, Resilience and Prosperity., Available at https://www.giz.de/en/downloads/Study_Renewable%20Energy%20Transition%20Africa-EN.pdf (Accessed on 19/09/2025)

[42] Ibid

capacity to emerge as a key player in the global renewable energy mix[43]. Energy transition is therefore an achievable dream for Africa.

Africa therefore has immense potential to achieve energy transition. However, it is imperative to ensure inclusivity and climate justice for indigenous peoples and vulnerable communities. Indigenous and vulnerable communities are usually sidelined in renewable energy projects while also facing human rights threats including dispossession from their ancestral lands and environmental degradation[44]. As a result, there is need to ensure inclusivity and participation of indigenous and vulnerable communities in energy transitions including through upholding their right to FPIC[45]. The concept of FPIC is a legal principle that seeks to protect indigenous peoples' collective rights including their right to self-determination, their right to be consulted, their right to participate in decisions that may affect them, and their rights to their lands and resources[46]. It has been argued that FPIC is a process where indigenous peoples and vulnerable communities who may be affected by a project are meaningfully engaged in project design, implementation and decision-making, are fully informed and are able to grant or deny consent at any stage[47]. By promoting FPIC for indigenous and vulnerable communities, it is possible to ensure that energy transition is just and equitable including through the participation of indigenous peoples in renewable energy projects, respect for the land rights of indigenous and vulnerable communities and embracing sustainable and ethical mining practices while extracting critical raw materials[48].

It is also imperative to foster climate justice for indigenous and vulnerable communities in Africa. It has been argued that indigenous peoples both globally and in Africa are among the first to face the direct consequences of climate change, due to their dependence upon, and close relationship, with the environment and its resources[49]. Climate change worsens the difficulties already faced by indigenous peoples and vulnerable communities including political and economic

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[43] Ebatamehi. S., 'Top 10 African Countries Leading in Renewable Energy and Green Innovation in 2025' Available at https://www.africanexponent.com/top-10-african-countries-leading-in-renewable-energy-and-green-innovation-in-2025/ (Accessed on 19/09/2025)

[44] Impact of renewable energy projects on Indigenous communities in Kenya., Op Cit

[45] Ibid

[46] United Nations Development Programme., 'SES Supplemental Guidance: Frequently Asked Questions (FAQs) on Applying Free Prior Informed Consent (FPIC)' Available at https://ses-toolkit.info.undp.org/sites/g/files/zskgke446/files/SES%20Document%20Library/Uploaded%20October%202016/FINAL%20FPIC%20FAQ%20Guidance%20-%20June%2015%202022.pdf (Accessed on 19/09/2025)

[47] Ibid

[48] United Nations., 'Securing Indigenous Rights in the Energy Transition: Preventing Harm, Ensuring Consent, and Promoting Equity in Transition Minerals Extraction' Available at https://social.desa.un.org/sites/default/files/inline-files/Galina_Angarova_EGM_2024_0.pdf (Accessed on 19/09/2025)

[49] United Nations., 'Climate Change' Available https://www.un.org/development/desa/indigenouspeoples/climate-change.html (Accessed 19/09/2025)

marginalization, loss of land and resources, human rights violations, discrimination and unemployment[50]. Achieving climate justice for indigenous and vulnerable communities is therefore vital towards effectively confronting climate change. Climate justice focuses on how climate change impacts people differently, unevenly, and disproportionately, as well as redressing the resultant injustices in fair and equitable ways[51]. It seeks to reduce marginalization, exploitation, and oppression, and enhance equity and justice in climate action[52]. It involves putting equity and human rights at the core of decision-making and action on climate change[53]. Climate justice is key in achieving just and equitable energy transition that upholds the rights of the vulnerable including indigenous peoples and vulnerable communities. By fostering climate justice, it is possible to achieve a fair and inclusive shift to clean energy across Africa, ensuring that the continent's most vulnerable populations including indigenous peoples are not left behind[54]. Ensuring climate justice is therefore vital towards just and equitable energy transition in Africa.

4.0 Conclusion

Energy transition is a key agenda both globally and in Africa towards protecting people and planet. Africa has immense potential to achieve energy transition due to several favourable factors including the abundance of renewable energy and critical raw materials[55]. However, energy transition in Africa can potentially undermine the rights of indigenous peoples and vulnerable communities. It is therefore necessary to foster just and equitable energy transition in Africa by protecting indigenous and vulnerable communities. Ensuring inclusivity and climate justice for indigenous peoples and vulnerable communities are urgent and achievable priorities towards achieving a fair and equitable energy transition in Africa for sustainability.

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[50] Ibid

[51] Sultana. F., 'Critical Climate Justice.' Available at https://www.farhanasultana.com/wp-content/uploads/Sultana-Critical-climate-justice.pdf (Accessed on 19/09/2025)

[52] Ibid

[53] United Nations Development Programme., 'Climate Change is a Matter of Justice – Here's Why.' Available at https://climatepromise.undp.org/news-and-stories/climate-change-matter-justice-heres-why (Accessed on 19/09/2025)

[54] Thematic Profile: Just Transition and Energy Access., Available at https://pacja.org/just-transition-and-energy-access-2/#:~:text=Overview,million%20without%20clean%20cooking%20solutions. (Accessed on 19/09/2025)

[55] Mo Ibrahim Foundation., 'Africa's Critical Minerals: Africa at the Heart of a Low-Carbon Future' Op Cit

Chapter 21: Securing a Social Licence to Operate from Local Communities for Renewable Energy Developments through Negotiation

Abstract

This paper critically examines the need to secure a SLO from local communities in renewable energy developments. The paper posits that renewable energy developments have become increasingly necessary all over the world especially in developing countries towards fast-tracking energy transition for Sustainable Development. Despite their environmental, social and economic benefits, the paper argues that in some cases, renewable energy developments are usually implemented without the participation of local communities leading to disputes, delays, project closure and violence. In light of these concerns, the paper argues that securing a SLO from local communities is vital for the successful completion of renewable energy developments towards achieving energy transition for Sustainable Development. In order to achieve this goal, the paper discusses how negotiation can be utilised to secure a SLO from local communities for renewable energy developments.

1.0 Introduction

A Social Licence to Operate (SLO), describes the relationship between investors and the communities and societies in which they operate[1]. SLO relates to the ongoing approval and acceptance of projects by the public and local communities among other stakeholders where such projects are undertaken[2]. Unlike a legal licence which is normally granted under the law, a SLO is an informal contract under which the right to conduct operations and investment activities are not granted by the state but rather are approved by local communities[3]. It has been argued that a SLO is obtained and maintained slowly over time as a company builds trust with the community it operates in and other stakeholders[4]. SLO is usually secured and maintained when investors and companies operate ethically and responsibly with due considerations to the economic, social and environmental needs of the local communities where they operate[5].

Securing a SLO is vital towards building and maintaining good relationships between investors and local communities for the successful completion of projects. It has been argued that implementing a project without a SLO can lead to operational delays, financial costs and litigation, or even project closure, violence and loss of life[6]. Obtaining and maintaining a SLO has become a necessary part of business and investment especially in the extractive industry

[1] Heffron. R.J et al., 'The emergence of the 'social licence to operate' in the extractive industries?' *Resources Policy*., Volume 74, 2021

[2] Ibid

[3] Ibid

[4] Social License to Operate (SLO): Definition and Standards., Available at https://www.investopedia.com/terms/s/social-license-slo.asp (Accessed on 02/10/2025)

[5] Ibid

[6] Buxton. A., & Wilson. E., 'FPIC and the Extractive Industries: A Guide to Applying the Spirit of Free, Prior and Informed Consent in Industrial Projects' Available at https://www.iied.org/16530iied (Accessed on 02/10/2025)

involving oil, gas and mining companies[7]. A SLO enables investors to build trust with local communities, maximize economic benefits from projects and contribute to the well-being of local communities including through job creation, development of amenities and sound environmental conservation[8]. Securing and maintaining a SLO is therefore a prerequisite for ethical, sustainable and profitable investments.

This paper critically examines the need to secure a SLO from local communities in renewable energy developments. The paper posits that renewable energy developments have become increasingly necessary all over the world especially in developing countries towards fast-tracking energy transition for Sustainable Development. Despite their environmental, social and economic benefits, the paper argues that in some cases, renewable energy developments are usually implemented without the participation of local communities leading to disputes, delays, project closure and violence. In light of these concerns, the paper argues that securing a SLO from local communities is vital for the successful completion of renewable energy developments towards achieving energy transition for Sustainable Development. In order to achieve this goal, the paper discusses how negotiation can be utilised to secure a SLO from local communities for renewable energy developments.

2.0 Renewable Energy Developments: Prospects and Challenges for Local Communities

Renewable energy developments have become increasingly vital and are being implemented all over the world towards achieving energy transition. The concept of energy transition involves shifting the global energy sector from fossil fuel- based systems of energy production and consumption including oil, natural gas and coal to renewable energy sources including wind, solar and geothermal energy[9]. Energy transition entails long-term structural change to energy systems from fossil-fuel based systems to cleaner and sustainable systems such as renewable sources of energy[10]. This concept focuses on shifting from an energy mix based on fossil fuels to one that produces very limited, if not zero, carbon emissions, based on green and clean sources of energy such as renewable energy sources[11].

Energy transition is vital for people and planet. Fossil fuels including oil, gas and coal still dominate the global energy sector and account for more than 80 per cent of global energy

[7] Ibid
[8] Ibid
[9] S & P Global., 'What is Energy Transition?' Available at https://www.spglobal.com/en/researchinsights/articles/what-is-energy-transition (Accessed on 03/10/2025)
[10] Nalule. V., & Leal-Arcas. R., 'Energy Decentralization and Energy Transition in Poland.' *Electricity Decentralization in the European Union* 2nd Edition., 2023 pp 209-240
[11] The energy transition., Available at https://www.enelgreenpower.com/learning-hub/energy-transition (Accessed on 03/10/2025)

supply[12]. However, the extraction and use of fossil fuels poses several threats to both people and planet. For example, fossil fuels are by far the largest contributor to global climate change, accounting for over 75 percent of global greenhouse gas emissions and nearly 90 percent of all carbon dioxide emissions[13]. In addition, fossil fuels contribute to air pollution with severe impacts on human and ecosystem health[14]. In addition, it has been argued that since fossil fuels are non-renewable, they can be depleted and therefore, placing too much reliance on them can affect global energy security and supply[15]. Achieving energy transition is therefore important towards addressing global energy, environmental, economic and health challenges including climate change, energy access disparities, poverty, inequality, and health impacts of the energy sector therefore laying the foundation for a sustainable, inclusive and more resilient future[16].

Renewable sources of energy including wind, solar and geothermal are key in realising energy transition. It has been argued that renewables, including solar, wind, hydropower, biofuels and others, are at the centre of the transition to less carbon-intensive and more sustainable energy systems[17]. These sources of energy are available in abundance all over the planet, are cheaper than fossil fuels and are a healthier option for people and planet[18]. Further, generating renewable energy creates far lower emissions than burning fossil fuels such as oil, gas and coal[19]. Shifting from fossil fuels to renewable sources of energy is therefore necessary towards tackling the climate crisis, pollution and other environmental challenges since fossil fuels still account for more than 80 percent of global energy supply, releasing immense amounts of planet-warming gases, including carbon dioxide and methane, which have devastating impacts on people and planet[20].

Renewable energy developments are therefore vital towards achieving energy transition. There has been an increase in these developments all over the world. According to the International

[12] United Nations Development Programme., 'What is the sustainable energy transition and why is it key to tackling climate change?' Available at https://climatepromise.undp.org/news-and-stories/what-sustainable-energy-transition-and-why-it-key-tackling-climate-change (Accessed on 03/10/2025)

[13] United Nations., 'Renewable Energy – Powering a Safer Future' Available at https://www.un.org/en/climatechange/raising-ambition/renewable-energy (Accessed on 03/10/2025)

[14] Solomon. B., & Krishna. K., 'The Coming Sustainable Energy Transition: History, Strategies, and Outlook.' *Energy Policy* 39 (2011) 7422-7431

[15] Ibid

[16] United Nations Development Programme., 'What is the sustainable energy transition and why is it key to tackling climate change?' Op Cit

[17] International Energy Agency., 'Renewables' Available at https://www.iea.org/energy-system/renewables (Accessed on 03/10/2025)

[18] United Nations., 'Climate Action.' Available at https://www.un.org/en/climatechange/howcommunities-are-embracing-renewable-energy (Accessed on 03/10/2025)

[19] United Nations., 'What is Renewable Energy?.' Available at https://www.un.org/en/climatechange/what-is-renewable-energy (Accessed on 03/10/2025)

[20] United Nations Development Programme., 'What is the sustainable energy transition and why is it key to tackling climate change?' Op Cit

Energy Agency (IEA), renewable energy generation capacity has grown rapidly all over the world in recent years, driven by policy support and sharp cost reductions for solar photovoltaics and wind power[21]. In Africa, the abundance of renewable sources of energy has also led to a rise in renewable energy developments. The continent is rich in renewable energy sources with wind, solar, hydro, bioenergy, ocean tidal waves, geothermal among other renewables being abundant throughout the continent[22]. Further, Africa experiences abundant sunlight and strong winds for most parts of the year creating suitable conditions for harnessing clean sources of energy including solar and wind energy[23]. It has been observed that the production of renewable energy in Africa is growing with hydro, solar, wind, geothermal, biofuels and biomass accounting for a significant percentage of the total primary energy produced in the continent[24]. According to the United Nations, renewable energy investments are beginning to bear fruit in several African countries with wind and solar power dominating non-hydro renewable energy generation and installed capacity[25]. Renewable energy developments are becoming more popular in Africa due to the continent's enormous clean energy potential and the need to address energy-related issues, electrify remote areas, confront climate change and pollution, and improve energy security[26].

The growth of renewable energy developments both globally and in Africa can thus bring immense benefits for the planet and the global population including local communities. In addition, to improving energy access and security, renewable energy developments can also create jobs, and stimulate socio-economic development across education, healthcare, transport and infrastructure, water and sanitation among other vital areas therefore immensely benefiting local communities[27]. Therefore, in addition to fast-tracking energy transition, it has been argued that renewable energy developments provide added benefits of stimulating employment and

[21] International Energy Agency., 'Renewables' Op Cit

[22] African Union., 'Agenda 2063: The Africa we Want.' Available at Available at https://au.int/sites/default/files/documents/33126-doc-framework_document_book.pdf (Accessed on 03/10/2025)

[23] AUDA-NEPAD., 'Empowering Africa: Enhancing Access To Electricity Through Renewable Energy' Available at https://www.nepad.org/blog/empowering-africa-enhancing-access-electricity-through-renewable-energy (Accessed on 03/10/2025)

[24] United Nations Conference on Trade and Development., 'Commodities at a Glance: Special Issue on Access to Energy in Sub-Saharan Africa.' Available at Available at https://unctad.org/publication/commodities-glance-special-issue-access-energy-sub-saharan-africa#:~:text=Access%20to%20energy%20is%20defined,be%20scaled%20up%20over%20time (Accessed on 03/10/2025)

[25] United Nations., 'Advancing SDG 7 in Africa.' Available at https://sdgs.un.org/sites/default/files/2023-06/2023%20Advancing%20SDG7%20in%20the%20Africa-062923.pdf (Accessed on 03/10/2025)

[26] Alex-Oke. T et al., 'Renewable energy market in Africa: Opportunities, progress, challenges, and future prospects' *Energy Strategy Reviews*., Volume 59, 2025

[27] The role of renewable energy technologies in sustainable development., Available at https://timesofindia.indiatimes.com/blogs/voices/the-role-of-renewable-energy-technologies-in-sustainable-development/ (Accessed on 03/10/2025)

economic growth with benefits for both local and global populations[28]. The shift towards renewable energy is creating new opportunities for investment, innovation, and job creation, driving economic growth across sectors and empowering local communities[29].

However, despite providing environmental, social and economic benefits for local communities, energy developments fuel several challenges for local communities. For example, it has been argued that the acquisition and use of land for renewable energy production, especially in Africa, without addressing historical land-based community grievances contributes to the vulnerability of local communities leading to conflicts and disputes[30]. Renewable energy developments have often resulted in environmental damage exposing local communities to health hazards, and destroying local ecosystems and livelihoods including farming, fishing and pastoralism[31].Clearing land to support renewable energy developments such as wind and geothermal projects can impact wildlife, biodiversity and ecosystems thus affecting local communities who rely on biodiversity and ecosystems for their livelihoods[32]. Further, wind and solar farms, hydroelectric dams, and geothermal plants needed to adopt renewable energy all require significant land and water resources, often leading to disagreements and disputes with local communities over land rights and environmental impact[33]. These challenges have resulted in renewable energy developments facing opposition from local communities leading to operational delays, disputes and costs related to litigation[34]. In light of these challenges, it is imperative to secure and maintain a SLO from local communities in order to ensure the successful completion and operation of renewable energy developments towards achieving energy transition.

3.0 Utilising Negotiation to Secure a Social Licence to Operate from Local Communities for Renewable Energy Developments

Obtaining and maintaining a SLO from local communities is key in business and investment communities including renewable energy developments. It has been argued that in renewable

[28] The Global Environment Facility., 'Renewable Energy and Energy Access' Available at https://www.thegef.org/what-we-do/topics/renewable-energy-and-energy-access (Accessed on 03/10/2025)

[29] Africa's Steady Race Towards Renewable Energy Sources., Available at https://energyalliance.org/africas-steady-race-towards-renewable-energy-sources/ (Accessed on 03/10/2025)

[30] The Danish Institute For Human Rights., 'Scoping Paper: Human Rights and The Energy Transition in Kenya' Available at https://www.humanrights.dk/files/media/document/Kenya%20Energy%20Transition%20and%20Human%20Rights%20Scoping_accessible.pdf (Accessed on 03/10/2025)

[31] Ibid

[32] Ibid

[33] The Role of Fossil Fuel and Renewable Energy Projects in Conflict Across Africa., Available at https://www.accord.org.za/analysis/the-role-of-fossil-fuel-and-renewable-energy-projects-in-conflict-across-africa/ (Accessed on 03/10/2025)

[34] Ibid

energy developments, a SLO is no longer optional but an effective business and investment strategy that can enable investors to proactively manage relationships with local communities and address human rights, land and environmental conservation concerns[35]. Securing a SLO is key in fulfilling the Free, Prior and Informed Consent (FPIC) for indigenous peoples and local communities in renewable energy developments[36].

FPIC has been described as a fundamental right of self-determination that ensures participation by all people with a particular focus on indigenous peoples and local communities in development projects in order to ensure that such projects are conducted in a sustainable manner taking into account their economic, social and cultural impact[37]. It enables vulnerable groups including indigenous peoples and local communities to negotiate the conditions under which a project will be designed, implemented, monitored and evaluated[38]. It has been argued that FPIC is a key approach towards protecting the rights (human, environmental, land and customary) of all affected communities, especially the most vulnerable ones[39]. Securing and maintaining a SLO from local communities for renewable energy developments is therefore key towards achieving the right to FPIC since it enables them to give or withhold consent to a project that may affect them or their territories[40].

Negotiation is an effective approach towards obtaining and maintaining a SLO from local communities for renewable energy developments. Negotiation is an informal process that involves parties to a conflict meeting to identify and discuss the issues at hand so as to arrive at a mutually acceptable solution without the help of a third party[41]. It has been argued that negotiation is a dynamic process aimed at resolving disputes, differences, or disagreements between parties by finding common ground and reaching mutually acceptable solutions[42]. It is a strategic form of communication where conflicting parties engage in discussions to address their

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[35] Building a resilient social license to operate in Africa's renewable energy transition., https://www.sustainability.com/insights/building-a-resilient-social-license-to-operate-in-africas-renewable-energy-transition/ (Accessed on 03/10/2025)

[36] Ibid

[37] Owen, J.R. and Kemp, D., "'Free Prior and Informed Consent', Social Complexity and the Mining Industry: Establishing A Knowledge Base," *Resources Policy*, Vol.41 (2014): 91-100

[38] United Nations., 'Free Prior and Informed Consent – An Indigenous Peoples' right and a good practice for local communities – FAO' Available at https://www.un.org/development/desa/indigenouspeoples/publications/2016/10/free-prior-and-informed-consent-an-indigenous-peoples-right-and-a-good-practice-for-local-communities-fao/ (Accessed on 03/10/2025)

[39] Ibid

[40] Building a resilient social license to operate in Africa's renewable energy transition., Op Cit

[41] Muigua. K., 'Alternative Dispute Resolution and Access to Justice in Kenya.' Glenwood Publishers Limited, 2015

[42] The Role of Negotiation in Conflict Resolution Strategies., Available at https://www.karrass.com/blog/conflict-resolution-strategies (Accessed on 03/10/2025)

respective needs, interests, and concerns[43]. Negotiation is a powerful approach towards managing disagreements and disputes since it focuses on cooperation, open communication, and finding win-win outcomes[44]. It enables parties to collaborate towards achieving sustainable, mutually satisfactory and long-lasting outcomes[45].

Negotiation is therefore a suitable process towards securing a SLO from local communities for renewable energy developments. In order to achieve equitable energy transition, it has been argued that there is need to ensure inclusivity and participation of indigenous and vulnerable communities in renewable energy developments including through upholding their right to FPIC[46]. Utilising negotiation alongside other collaborative processes such as mediation is vital in engaging with local communities to reach shared agreement and allowing people to have a meaningful voice in deliberative decision-making processes related to their own development[47]. By embracing negotiation, it is possible to enhance cooperation between renewable energy developers and communities that host renewable energy developments[48]. Negotiation can foster stakeholder engagements with local communities and agreements such as the distribution of monetary or other community benefits to mitigate or eliminate opposition to renewable energy development thus granting investors a SLO[49]. Utilising negotiation is therefore an effective approach towards securing a SLO to operate from local communities for renewable energy developments.

4.0 Conclusion

Renewable energy developments are key in fostering energy transition. However, inadequate involvement and participation by local communities in renewable energy projects leads to operational delays, disputes and costs related to litigation[50]. Securing a SLO from local communities is therefore vital for the successful completion and operation of renewable energy developments in the quest towards energy transition and sustainability. Negotiation is an effective process in securing and maintaining a SLO from local communities in renewable energy

[43] Ibid

[44] Miroslavov. M., 'Mastering the Collaborating Conflict Style In 2024' Available at https://www.officernd.com/blog/collaborating-conflictstyle/#:~:text=It's%20one%20of%20the%20strategies,their%20underlying%20needs%20and%20interests (Accessed on 03/10/2025)

[45] Ibid

[46] Impact of renewable energy projects on Indigenous communities in Kenya., Available at https://iwgia.org/en/kenya/3534-impact-of-renewable-energy-projects-on-indigenous-communities-in-kenya.html#:~:text=Kenya's%20ambitious%20plan%20to%20transition,energy%20by%20this%20year%2C%202020 (Accessed on 03/10/2025)

[47] Buxton. A., & Wilson. E., 'FPIC and the Extractive Industries: A Guide to Applying the Spirit of Free, Prior and Informed Consent in Industrial Projects' Op Cit

[48] Maonaigh. C et al., 'Revisiting the social licence to operate in the energy transition: An intersectional agenda for research and practice' *Energy Research & Social Science*., Volume 126, 2025

[49] Ibid

[50] Ibid

developments by fostering dialogue, cooperation and collaboration between investors and communities[51]. Utilising negotiation is therefore an appropriate strategy towards securing and maintaining a SLO from local communities for renewable energy developments.

[51] Building a resilient social license to operate in Africa's renewable energy transition., Op Cit

PART VII: DISPUTE PREVENTION, MANAGEMENT AND RESOLUTION IN ENERGY AND CLIMATE GOVERNANCE

Abstract

This Part advances dispute prevention and resolution as integral components of sustainable energy and climate governance. It explores the nature of energy, water and climate-related disputes and evaluates the effectiveness of mediation, arbitration and multi-tiered conflict management mechanisms. With a strong African perspective, the Part examines emerging proposals for harmonised dispute resolution frameworks, including the possibility of an African Energy Arbitration Protocol. It demonstrates how appropriate dispute resolution mechanisms can reinforce the rule of law, social cohesion and long-term sustainability in energy transition initiatives.

Chapter 22: Managing Energy Disputes in Africa

Abstract

Energy disputes are undesirable. Such disputes can adversely impact the viability and success of energy projects. As a result, there is need to effectively and efficiently manage energy disputes in order to foster the success of energy projects and ensure that the energy transition maintains its positive course. The paper argues a case for effective management of energy disputes in Africa. It posits that energy disputes are a threat to the energy transition and Sustainable Development in Africa. It examines the nature and causes of energy disputes in Africa. The paper further explores the efficacy of the current framework on managing energy disputes in Africa and proposes reforms towards effective management of energy related disputes in the Continent in order to foster energy justice and accelerate the energy transition.

1.0 Introduction

Disputes in the energy industry are inevitable. It has been asserted that energy projects are, by their nature, often complex undertakings[1]. They frequently involve new and innovative technologies, significant investment, and also a high degree of interface between multiple parties who may sometimes have different, and even competing, interests[2]. This means that energy projects are often incredibly interesting and dynamic, but also may be exposed to a variety of risks and challenges such as disputes which can adversely impact project viability and success[3]. It has been argued that the nature of the energy industry has consistently thrown up disputes[4]. This has been attributed to the size and complexity of most energy and natural resource projects meaning that the stakes are normally high enough to fight over[5]. Further it has been observed that from the effects of the prolonged war in Ukraine, to the energy transition and other geopolitical tensions, the potential for energy-related disputes is on the rise worldwide[6]. According to the International Centre for Settlement of Investment Disputes (ICSID), the energy industry is the single largest user of international investment arbitration demonstrating a prevalence of disputes in the sector[7].

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[1] Burges-Salmon., 'Energy Disputes Guide: Managing Risk and Avoiding Disputes in your Energy Project.' Available at https://www.burges-salmon.com/energy-disputes-guide-managing-risk-and-avoiding-disputes-in-your-energy-project (Accessed on 02/12/2023)

[2] Ibid

[3] Ibid

[4] Financier Worldwide Magazine., 'FORUM: Managing Energy and Natural Resources Industry Disputes.' Available at https://www.financierworldwide.com/forum-managing-energy-and-natural-resources-industry-disputes (Accessed on 02/12/2023)

[5] Ibid

[6] Clearly Gottlieb., 'Resolving Energy Disputes in Africa Through Arbitration and Alternative Dispute Resolution ('ADR').' Available at https://content.clearygottlieb.com/regions/africa-outlook/resolving-energy-disputes-in-africa-through-arbitration-and-alternative-dispute-resolution/index.html (Accessed on 02/12/2023)

[7] International Centre for Settlement of Investment Disputes., 'Annual Report: 2023.' Available at https://icsid.worldbank.org/sites/default/files/publications/ICSID_AR2023_ENGLISH_web_spread.pdf (Accessed on 02/12/2023)

Energy disputes can be attributed to various factors. It has been pointed out that energy companies usually operate in environments where projects generally involve a variety of public and private stakeholders, significant investment and programmes that sometimes span years[8]. Further, energy projects often involve the use of cutting-edge technology, have touch points within geographically and politically challenging jurisdictions, and form part of complex global supply chains[9]. As a result, it is therefore unsurprising that energy companies become involved in cross-border disputes[10]. Potential disputes in the energy sector include joint venture/contractual disputes, claims arising from weather conditions in renewable energy projects, construction related disputes, technology related disputes, investor/state disputes, and regulatory disputes[11].

Energy disputes are undesirable. Such disputes can adversely impact the viability and success of energy projects[12]. As a result, it has been argued that there is need to effectively and efficiently manage energy disputes in order to foster the success of energy projects and ensure that the energy transition maintains its positive course[13]. The paper argues a case for effective management of energy disputes in Africa. It posits that energy disputes are a threat to the energy transition and Sustainable Development in Africa. It examines the nature and causes of energy disputes in Africa. The paper further explores the efficacy of the current framework on managing energy disputes in Africa and proposes reforms towards effective management of energy related disputes in the Continent in order to foster energy justice and accelerate the energy transition.

2.0 Energy Disputes in Africa

Africa is a continent that is endowed with immense sources of energy including renewables such as wind, solar, hydro, bioenergy, ocean tidal waves, geothermal among other renewables[14]. It has been pointed out that the Continent is home to approximately eight per cent of the world's natural gas and 12 per cent of the world's oil reserves[15]. According to the International Energy Agency,

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[8] Ashurst., 'Managing and Resolving Cross-Border Disputes in the Energy Sector.' Available at https://www.ashurst.com/en/insights/managing-and-resolving-cross-border-disputes-in-the-energy-sector/ (Accessed on 02/12/2023)

[9] Ibid

[10] Ibid

[11] McMahon. M., Shah. P., 'The Rise of Renewable Energy Disputes and Arbitration.' Available at https://www.stewartslaw.com/news/rise-of-renewable-energy-disputes/ (Accessed on 02/12/2023)

[12] Burges-Salmon., 'Energy Disputes Guide: Managing Risk and Avoiding Disputes in your Energy Project.' Op Cit

[13] Herbert Smith Freehills., 'Energy Transition and the Impact on Disputes.' Available at https://www.herbertsmithfreehills.com/insights/2021-07/energy-transition-and-the-impact-on-disputes#:~:text=A%20ubiquitous%20feature%20of%20energy,some%20or%20all%20of%20them. (Accessed on 02/12/2023)

[14] Africa Union., 'Agenda 2063: The Africa we Want.' Available at https://au.int/sites/default/files/documents/33126-doc-framework_document_book.pdf (Accessed on 04/12/2023)

[15] United Nations Environment Programme., 'Our Work in Africa.' Available at https://www.unep.org/regions/africa/our-

oil and gas continue to dominate energy use in North Africa and coal dominates in South Africa, due to the local availability of low cost resources, while renewables are the dominant fuel category in Sub-Saharan Africa[16].

Africa Union's *Agenda 2063* identifies energy as the backbone of Africa's economic transformation[17]. Agenda 2063 seeks to enhance utilization of the Continent's energy sources, especially renewable energy in fostering economic growth and eradicating energy poverty[18]. It further seeks to promote environmentally sustainable and climate resilient economies and communities in Africa wherein renewable energy (including wind, solar, hydro, bioenergy, ocean tidal waves, geothermal and other renewables) will claim more than half of the energy consumption for households, businesses and organizations[19]. The International Energy Agency asserts that electricity will underpin Africa's economic future, with solar leading the way[20]. It further posits that electricity is the backbone of Africa's new energy systems, powered increasingly by renewables[21].

The need for energy transition has accelerated investments in energy in Africa towards enhancing access to energy[22]. Sustainable Development Goal (SGG) 7 under the United Nations 2030 Agenda for Sustainable Development seeks to ensure universal access to affordable, reliable, sustainable and modern energy for all[23]. Access to energy in Africa is crucial not only for the attainment of health and education outcomes, but also for reducing the cost of doing business and for unlocking economic potential and creating jobs[24]. However, access to energy in Africa still remains a major problem where majority of the population lack access to clean and affordable energy and depend on traditional fuels[25]. It has been estimated that nearly 600 million people or an equivalent of 43

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workafrica#:~:text=The%20continent%20has%2040%20percent,internal%20renewable%20fresh%20water%20so urce (Accessed on 04/12/2023)

[16] International Energy Agency., 'Africa Energy Outlook: 2022.' Available at https://iea.blob.core.windows.net/assets/220b2862-33a6-47bd-81e9-00e586f4d384/AfricaEnergyOutlook2022.pdf (Accessed on 04/12/2023)

[17] Africa Union., 'Agenda 2063: The Africa we Want.' Op Cit

[18] Ibid

[19] Ibid

[20] International Energy Agency., 'Africa Energy Outlook: 2022.' Op Cit

[21] Ibid

[22] Ibid

[23] United Nations., 'Transforming Our World: The 2030 Agenda for Sustainable Development.' Available at https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf (Accessed on 04/12/2023)

[24] Africa Development Bank Group., 'Light Up and Power Africa – A New Deal on Energy for Africa.' Available at https://www.afdb.org/en/the-high-5/light-up-and-power-africa-%E2%80%93-a-new-deal-on-energy-for-africa (Accessed on 04/12/2023)

[25] United Nations Conference on Trade and Development., 'Commodities at a Glance: Special Issue on Access to Energy in Sub-Saharan Africa.' Available at https://unctad.org/publication/commoditiesglance-special-issue-access-energy-sub-

per cent of the Continent's population lack access to electricity[26]. It has also been pointed out that Africa does poorly compared to other regions regarding access to clean cooking since a majority of its population relies on traditional biomass for preparing food[27]. These problems have necessitated investments in energy in order to foster access to energy in Africa. Further, the International Energy Agency points out that problems in the energy sector including global energy crisis brought about by Russia's invasion of Ukraine, and climate change have underscored the urgency as well as the benefits of an accelerated scale up of cheaper and cleaner sources of energy in Africa[28].

It has been asserted that the immense potential for growth in the energy sector in Africa, and the need to do so in line with the large and growing population's energy demand, makes it an attractive destination for global investment flow[29]. Further, it has been correctly observed that the renewable energy resources with which Africa is endowed, in tandem with the recent initiatives to accelerate development of its energy requirements, has resulted in an increase in energy projects and, with that, the potential for a growing number of disputes coming from the energy sector in Africa[30]. Despite the vast investment opportunities available in the energy sector in Africa, entrants into energy markets in Africa often face risks that pose huge threats to the economic viability of investments[31]. If not properly addressed and mitigated, such risks may result in complex and protracted legal disputes[32].

It is estimated that Africa will see the largest growth in energy-related disputes, driven by an increase in exploration activities in many countries across the continent[33]. In addition, it has been observed that given the heavy presence of foreign investors in the African energy sector, energy disputes are likely to arise under both contractual instruments (such as concession agreements)

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saharanafrica#:~:text=Access%20to%20energy%20is%20defined,be%20scaled%20up%20over%20time (Accessed on 04/12/2023)

[26] International Energy Agency., 'Access to Electricity.' Available at https://www.iea.org/reports/sdg7-data-and-projections/access-to-electricity (Accessed on 04/12/2023)

[27] United Nations., 'Advancing SDG 7 in Africa.' Available at https://sdgs.un.org/sites/default/files/2023-06/2023%20Advancing%20SDG7%20in%20the%20Africa062923.pdf (Accessed on 04/12/2023)

[28] International Energy Agency., 'Africa Energy Outlook: 2022.' Op Cit

[29] Global Arbitration Review., 'Energy Arbitration in Africa.' Available at https://globalarbitrationreview.com/review/the-middle-eastern-and-african-arbitration-review/2022/article/energy-arbitration-in-africa (Accessed on 06/12/2023)

[30] Ibid

[31] Nalule. V., Olawuyi. D., 'Introduction to International Energy Arbitration Disputes in Africa.' *The Palgrave Handbook of Arbitration in the African Energy and Mining Sectors*. Palgrave Studies in Energy Transitions. Palgrave Macmillan, Cham. Available at https://doi.org/10.1007/978-3-030-96183-1_1-1 (Accessed on 06/12/2023)

[32] Ibid

[33] Clearly Gottlieb., 'Resolving Energy Disputes in Africa Through Arbitration and Alternative Dispute Resolution ('ADR').' Op Cit

and investment treaties[34]. Additionally, energy disputes in Africa may arise in respect of compliance with requirements under concessions and local laws such as the decommissioning of oil fields in a safe, environmentally-friendly manner[35]. The potential for Africa to be a hive of activity for energy-related disputes is ultimately a consequence of its leading position in global energy production, both in the oil & gas and renewable energy sectors[36].

There is need for effective management of energy disputes in Africa. Such disputes can adversely impact the viability and success of energy projects in Africa[37]. Consequently, it is imperative to effectively and efficiently manage energy disputes in Africa in order to foster the success of energy projects and ensure that the energy transition maintains its positive course[38].

3.0 Management of Energy Disputes in Africa: Opportunities and Challenges

The need for effective management of energy disputes at the global stage is envisaged under the *Energy Charter Treaty*[39]. The Charter stipulates that energy disputes between an investor and a contracting state shall be settled amicably[40]. In the absence of amicable settlement of disputes, the Charter provides for the settlement of energy disputes through other mechanisms including courts and administrative tribunals of the contracting party to the dispute, international arbitration and conciliation[41]. In relation to energy disputes between contracting parties, the Charter provides that such disputes shall be managed through diplomatic channels and where such channels fail, then the dispute shall be managed through an ad hoc arbitral tribunal[42]. The Energy Charter Treaty therefore sets out mechanisms for management of energy disputes including amicable settlement, use of courts and tribunals, international arbitration, conciliation and diplomacy[43].

Arbitration has been identified as the predominant method of dispute resolution for energy-related disputes on the African continent[44]. It has been observed that over the past decades, arbitration has emerged as a key mechanism for dispute resolution in Africa's growing energy

[34] Ibid
[35] Ibid
[36] Ibid
[37] Burges-Salmon., 'Energy Disputes Guide: Managing Risk and Avoiding Disputes in your Energy Project.' Op Cit
[38] Herbert Smith Freehills., 'Energy Transition and the Impact on Disputes.' Op Cit
[39] The Energy Charter Treaty., Available at https://www.energycharter.org/fileadmin/DocumentsMedia/Legal/ECTC-en.pdf (Accessed on 06/12/2023)
[40] Ibid, Article 26 (1)
[41] Ibid, Articles 26 (2) (a) & 3 (a)
[42] Ibid, Article 27
[43] Ibid
[44] Clearly Gottlieb., 'Resolving Energy Disputes in Africa Through Arbitration and Alternative Dispute Resolution ('ADR').' Op Cit

industry[45]. This is due to the fact that arbitration has developed into the preferred mode of management of disputes especially those that are transnational in nature[46]. It has been correctly observed that in the face of globalization, the need for effective and reliable mechanisms for management of commercial disputes as well as other general disputes involving parties from different jurisdictions has not only become desirable but also invaluable[47]. At the international level, arbitration has a transnational applicability and guarantees neutrality in the determination of disputes by addressing differences that may arise as a result of multiple legal systems[48]. Further, arbitration also guarantees enforcement of decisions through the *New York Convention* which provides a harmonized legal framework for the recognition and enforcement of foreign awards in arbitration[49].

Arbitration also has a number of attributes including privacy, confidentiality, party autonomy and the ability to foster expeditious and cost effective management of disputes[50]. These features make arbitration a viable mechanisms for managing disputes. The need for expeditious management of energy disputes is of paramount importance. It has been pointed out that disputes in the energy sector can take a very long time to be resolved, during which there may be significant disruptions to energy supply[51]. Parties therefore have a particular interest in resolving disputes swiftly. For example, according to the International Chamber of Commerce (ICC), half of all emergency arbitrator proceedings under the ICC rules concern disputes in the infrastructure/energy sectors[52]. International Commercial Arbitration has thus been widely embraced as the preferred mechanism of managing global commercial disputes including energy disputes. It has been pointed out that foreign investors' preference for arbitration may be explained by arbitration's flexibility, the ability to provide for confidentiality and the ability to enlist specialist, commercial-minded arbitrators to determine the dispute, and its ability to provide for a neutral forum in complex energy disputes involving international parties, particularly when compared to litigation before domestic courts[53].

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[45] Nalule. V., Olawuyi. D., 'Introduction to International Energy Arbitration Disputes in Africa.' Op Cit

[46] Muigua. K., 'Promoting International Commercial Arbitration in Africa.' Available at http://kmco.co.ke/wp-content/uploads/2018/08/PROMOTING-INTERNATIONAL-COMMERCIALARBITRATION-IN-AFRICA.pdf (Accessed on 06/12/2023)

[47] Ibid

[48] Moses, '*The Principles and Practice of International Commercial Arbitration*' 2nd Edition, 2017, Cambridge University Press

[49] United Nations Commission on International Trade Law., '*Convention on the Recognition and Enforcement of Foreign Arbitral Awards.*' (New York, 1958)

[50] Muigua. K., 'Settling Disputes through Arbitration in Kenya.' Glenwood Publishers Limited, 4th Edition, 2022

[51] Clearly Gottlieb., 'Resolving Energy Disputes in Africa Through Arbitration and Alternative Dispute Resolution ('ADR').' Op Cit

[52] Ibid

[53] Clearly Gottlieb., 'Resolving Energy Disputes in Africa Through Arbitration and Alternative Dispute Resolution ('ADR').' Op Cit

As a result of its advantages, there has been prevalence of arbitration in African energy projects[54]. For example, it has been observed that the growing renewable energy sector in Africa is embracing arbitration in managing disputes due to several reasons which include the confidentiality of arbitration proceedings and awards which preserves the information and data behind the new technologies at the heart of renewable energy projects; finality and enforceability of arbitral awards under the New York Convention; ability to provide a neutral and final dispute resolution forum since renewable energy projects often involve joint ventures between investors or contractors from several jurisdictions; the flexibility of parties in choosing a panel of arbitrators that have the most relevant technical expertise in the subject matter; the ability to consolidate cases in multi-party arbitration either under the terms of an arbitration clause or under the rules of an arbitral institution thus avoiding the risk of competing tribunals and inconsistent awards; and the ability to protect investors under investor/state arbitration[55].

Arbitration of energy disputes is envisaged in energy projects under the 2013 Tanzanian Model *Product Sharing Agreement (PSA)*[56]. The PSA seeks to ensure that petroleum operations including exploration activities are conducted in an ethical, efficient, safe, transparent and accountable manner on the basis of the best international environmental, social and economic sustainability principles in order to achieve optimal long-term petroleum resource exploitation for maximum value creation for equitable benefit and welfare of the people of the United Republic of Tanzania[57]. It provides for management of disputes between investors and the Republic of Tanzania through negotiations and in the event such negotiations fail, then such disputes shall be managed through arbitration[58]. The PSA envisages arbitration of energy disputes in Tanzania under the auspices of the International Chamber of Commerce (ICC)[59]. In addition, the Ugandan Model Production Sharing Agreement also envisages the use of arbitration in managing energy disputes related to the exploration, development and production of petroleum[60]. It stipulates that a dispute arising under the Agreement which cannot be settled amicably within one hundred and twenty (120) days, shall be referred to arbitration in accordance with the United Nations Commission for International Trade Law (UNCITRAL) Arbitration Rules[61]. Further, the Standard Power Purchase Agreement of Kenya provides for final settlement of disputes through arbitration under the Rules of Conciliation and Arbitration of the International Chamber of Commerce[62].

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[54] Ibid

[55] McMahon. M., Shah. P., 'The Rise of Renewable Energy Disputes and Arbitration.' Op Cit

[56] Republic of Tanzania., 'Model Product Sharing Agreement, 2013.' Available at https://www.resourcecontracts.org/contract/ocds-591adf-8006566420/download/pdf (Accessed on 06/12/2023)

[57] Ibid

[58] Ibid

[59] Ibid

[60] Republic of Uganda., 'Model Production Sharing Agreement.' Available at https://www.unoc.co.ug/wp-content/uploads/2018/06/MPSA.pdf (Accessed on 06/12/2023)

[61] Ibid, Article 24

[62] Republic of Kenya., 'Standard Power Purchase Agreement.' Available at https://ppp.worldbank.org/public-private-

Arbitration of energy disputes in Africa often takes the form of investment arbitration often taking the form of investor/state arbitration and commercial arbitration[63]. In the context of investor/state arbitration, it is estimated that there are over five hundred Bilateral Investment Treaties (BITs) between foreign investors and African countries including almost fifty intra-African BITs in force, alongside more than thirty multilateral treaties with investment protections, including the COMESA (Common Market for Eastern and Southern Africa) Treaty (1993); the OIC (Organisation of Islamic Cooperation) Investment Agreement (1981); the Economic Community of the Western African States (ECOWAS) Supplementary Act for Common Investment Rules for the Community (2008) and the Common Investment Code (2019); as well as the Arab League of States' Arab Investment Agreement (1980) covering investments in various sectors including energy[64]. Against this backdrop, there have been a number of Africa-related ICSID cases involving energy disputes. In its 2023 annual report, ICSID notes that North Africa and Sub Saharan Africa accounted for 9% each of the cases registered in Financial Year 2023 with most of the cases involving the oil, gas, and mining industries as well as electric power and other energy sources[65].

For commercial arbitration, there has been an increase in energy disputes involving parties from Africa before international arbitration centres including the International Chamber of Commerce and the London Court of International Arbitration[66]. In addition, there are a number of regional arbitration centres gaining prominence in Africa such as the Cairo Regional Centre for International Commercial Arbitration (CRCICA), the Arbitration Foundation of Southern Africa (AFSA), Lagos Court of Arbitration (LCA), the Kigali International Arbitration Centre (KIAC), the Nairobi Centre for International Arbitration (NCIA), the Mediation and Arbitration Centre (MARC) in Mauritius, and the Casablanca International Mediation and Arbitration Centre (CIMAC) which have been vital in fostering energy arbitration in Africa[67].

Other Alternative Dispute Resolution (ADR) mechanisms including negotiation and mediation have also been proposed as viable in managing energy disputes. It has rightly been asserted that commercial relationships in the energy sector are often long term and frequently operate across projects, borders and cultures[68]. This creates incentives for players in the energy sector including energy companies to look at alternatives to more formal dispute resolution mechanisms such as

partnership/sites/ppp.worldbank.org/files/documents/Kenya_ppa_ppfull.pdf (Accessed on 06/12/2023)

[63] Global Arbitration Review., 'Energy Arbitration in Africa.' Op Cit

[64] White & Case., 'Investment Treaty Protection: How to Safeguard Foreign Investments in Africa.' Available at https://www.whitecase.com/insight-our-thinking/africa-focus-winter-2022-investment-treatyprotection#:~:text=As%20of%20October%202022%2C%20there%20were%20525%20BITs%20with%20African,OIC%20(Organisation%20of%20Islamic%20Cooperation) (Accessed on 06/12/2023)

[65] International Centre for Settlement of Investment Disputes., 'Annual Report: 2023.' Op Cit

[66] Global Arbitration Review., 'Energy Arbitration in Africa.' Op Cit

[67] Ibid

[68] Ashurst., 'Managing and Resolving Cross-Border Disputes in the Energy Sector.' Op Cit

litigation or arbitration[69]. Alternative Dispute Resolution (ADR) provides parties with the opportunity to manage and resolve disputes before they escalate, which can not only save time and costs but can also preserve critical business relationships[70]. ADR mechanisms possess key attributes including informality, privacy, confidentiality, flexibility and the ability to promote expeditious and cost-effective management of disputes which makes them a viable tool of enhancing access to justice[71]. In addition, these mechanisms have the ability to foster long term solutions by addressing the root causes of conflicts[72]. These mechanisms are therefore viable in managing energy disputes. For example, it has been observed that negotiation features at some stage in almost every dispute in the energy sector[73]. In most occasions, it is the first process in a dispute resolution journey, either because is mandated by a dispute resolution clause or because it is instigated by the parties at the time the dispute arises[74]. It has been asserted that negotiation in energy disputes is most effective either at the time the dispute first arises, before the parties have formed entrenched views on the matter, or following a mediation or other structured ADR process[75].

In addition, it has been argued that there is potential for the use of mediation in managing energy disputes in Africa since parties to long-term energy contracts may seek to agree mediated solutions rather than escalating their dispute to a judicial forum[76]. Mediation can be used as a precursor to arbitration, with agreements or investment treaties frequently providing for multi-tiered dispute resolution processes facilitating escalation of disputes to arbitration in the event that mediation is unsuccessful[77]. The viability of mediation in managing energy disputes in Africa is further enhanced by the United Nations Convention on International Settlement Agreements Resulting from Mediation (*'Singapore Convention'*), which promotes the use of international commercial mediation by harmonizing the regime for the enforcement of mediated settlements

[69] Ibid
[70] Ibid
[71] Muigua. K., 'Fusion of Mediation and Other ADR Mechanisms with Modern Dispute Resolution in Kenya: Prospects and Challenges.' Available at http://kmco.co.ke/wpcontent/uploads/2022/11/Fusion-of-Mediation-and-Other-ADR-Mechanisms-with-Modern-DisputeResolution-in-Kenya-Prospects-and-Challenges.pdf (Accessed on 06/12/2023)
[72] Muigua. K., 'Alternative Dispute Resolution and Access to Justice in Kenya.' Glenwood Publishers Limited, 2015
[73] Ashurst., 'Managing and Resolving Cross-Border Disputes in the Energy Sector.' Op Cit
[74] Ibid
[75] Ibid
[76] Clearly Gottlieb., 'Resolving Energy Disputes in Africa Through Arbitration and Alternative Dispute Resolution ('ADR').' Op Cit
[77] Ibid

of disputes[78]. It is therefore important to embrace mediation in the management of energy disputes particularly in cases where parties have a continuing relationship[79].

Finally, litigation can also be an effective mechanism in managing energy disputes in Africa. The viability of litigation in managing energy disputes in Africa is attributed to its emphasis on efficiency in granting interim and preventive measures in the form of interim injunctions, and other such measures designed to minimize disruptions to energy production and supply during the pendency of energy related disputes[80]. Such measures of protection may not be easily obtained in other mechanisms including ADR processes such as arbitration and mediation.

From the foregoing, it is evident that there is a wide range of mechanisms available for managing of energy disputes in Africa including arbitration, negotiation, mediation and litigation. However, energy disputes often pose unique challenges that needs to be taken in consideration to ensure their effective management. For example, it has been pointed out that the industry has always had a political dimension and, by their very nature, energy or natural resources projects are capital intensive and involve long-term commitments[81]. Therefore whenever an energy dispute arises, there will often be a narrow line to tread, between standing up for commercial rights and maintaining good longer-term government relations[82]. In addition, it has been asserted that energy related disputes in Africa have historically involved unique challenges as a result of state ownership of energy assets and frequent collaboration between state-owned entities and foreign investors[83]. Such challenges are likely to affect the nature of energy disputes in Africa and the course of the dispute management process[84].

Further, energy disputes often involve control and management of vital transboundary natural resources and could escalate into protracted legal battles that could threaten peace and sustainable management of natural resources[85]. For example, the construction of the Grand Ethiopia Renaissance Dam on the Blue Nile has resulted in a protracted dispute between Ethiopia

[78] United Nations: United Nations Commission on International Trade Law.,' Convention on International Settlement Agreements Resulting from Mediation.' United Nations, New York, 2019., Available at https://uncitral.un.org/sites/uncitral.un.org/files/singapore_convention_eng.pdf (Accessed on 06/12/2023)

[79] Clearly Gottlieb., 'Resolving Energy Disputes in Africa Through Arbitration and Alternative Dispute Resolution ('ADR').' Op Cit

[80] Clearly Gottlieb., 'Resolving Energy Disputes in Africa Through Arbitration and Alternative Dispute Resolution ('ADR').' Op Cit

[81] Financier Worldwide Magazine., 'FORUM: Managing Energy and Natural Resources Industry Disputes.' Op Cit

[82] Ibid

[83] Clearly Gottlieb., 'Resolving Energy Disputes in Africa Through Arbitration and Alternative Dispute Resolution ('ADR').' Op Cit

[84] Ibid

[85] Kaledzi. I., 'How Could Ethiopia's Dam Dispute Escalate?.' Available at https://www.dw.com/en/how-could-ethiopias-dam-dispute-escalate/a-66798628 (Accessed on 06/12/2023)

and the two neighboring downstream countries of Egypt and which argue that the dam threatens to cut off their water supply[86]. It has been argued that such conflicts in the energy sector if not properly managed could escalate into direct clashes between nations threatening peace and sustainability in Africa[87]. It is therefore imperative to take these concerns into account in order to foster effective management of energy disputes in Africa.

There is also need to address the challenges facing dispute management processes in the energy sector including arbitration, mediation and litigation. For example, it has been pointed out that the practice of arbitration in Africa faces several challenges including inadequate legal and institutional framework, inadequate marketing, uncertainty in drafting arbitration clauses, interference by national courts, uncertainty of costs, perception of corruption and bias against Africa[88]. Mediation on the other faces challenges such as enforceability of decisions due to its non-binding nature, the possibility of endless proceedings, lack of precedents and inability to grant urgent protection such as injunctions[89]. Further, use of litigation in managing energy disputes could result in delays, costs and damaging of relationships which is an undesirable situation especially in long term energy projects[90].

It is imperative to address the foregoing concerns in order to enhance effective and efficient management of energy disputes in Africa.

4.0 Way Forward

There is need to embrace ADR mechanisms in the management of energy disputes in Africa. It has been pointed out that concerns with regard to time and cost relating to energy disputes call for swift and efficient dispute resolution in Africa, which will likely take the form of ADR methods, especially in the context of volatile economic and commercial contexts[91]. ADR mechanisms including arbitration and mediation are therefore appropriate in the management of energy disputes in Africa[92]. It has rightly been observed that ADR mechanisms have been practiced in Africa for many centuries[93]. These techniques fit comfortably within traditional

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[86] Ibid

[87] Ibid

[88] Muigua. K., 'Nurturing International Commercial Arbitration in Kenya.' Available at https://kmco.co.ke/wp-content/uploads/2021/10/Nurturing-International-Commercial-Arbitration-in-Kenya.pdf (Accessed on 06/12/2023)

[89] Muigua. K., 'Alternative Dispute Resolution and Access to Justice in Kenya.' Op Cit

[90] Bird & Bird., 'A Need for Speed? The Possible Use of Expedited Dispute Resolution Procedures in the Energy Sector.' Available at https://www.twobirds.com/en/insights/2016/uk/a-need-for-speed-the-possible-use-of-expedited-dispute-resolution-procedures (Accessed on 06/12/2023)

[91] Clearly Gottlieb., 'Resolving Energy Disputes in Africa Through Arbitration and Alternative Dispute Resolution ('ADR').' Op Cit

[92] Ibid

[93] Muigua. K., 'Resolving Conflicts through Mediation in Kenya.' Glenwood Publishers Limited, 2nd Edition, 2017

concepts of African justice, particularly its core values of reconciliation, peace and cohesion[94]. ADR mechanisms provide parties with the opportunity to manage and resolve disputes before they escalate, which can not only save time and costs but can also preserve critical business relationships especially in long term energy projects[95]. Parties should therefore embrace ADR mechanisms including negotiation, mediation and arbitration in order to foster effective management of energy disputes in Africa.

In the case of arbitration, it is essential to address inadequate legal and institutional framework, inadequate marketing, uncertainty in drafting arbitration clauses, interference by national courts, uncertainty of costs, perception of corruption and bias against Africa[96]. This calls for strengthening the legal and institutional capacity on arbitration in Africa, drafting of effective arbitration clauses in energy contracts, marketing Africa as a hub for arbitration, capacity building for arbitrators through education and training, limiting court intervention in arbitration to a basic and necessary minimum, and addressing the problem of corruption through good governance[97]. It has also been suggested that there is need to establish a unified international arbitration court for energy disputes[98]. It has been argued that there is a need for unification of the current international arbitration mechanisms since the different arbitration procedures, subject to different procedural and substantial rules, may result in problems concerning the enforcement of the arbitral awards in local jurisdictions[99]. Establishment of a unified international arbitration court for energy disputes will ensure that the court has the widest jurisdiction to hear the energy disputes through the most suitable procedural and substantial rules for energy-specific disputes[100]. This will also ensure predictable, transparent, and unified arbitration mechanism for management of energy disputes[101].

It is also imperative for parties to embrace dispute avoidance. It has been asserted that conflict avoidance requires clear, concise, careful and proper planning of the strategy for the execution of projects[102]. It is also about adopting a proactive conflict avoidance approach such as risk analysis,

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[94] Uwazie. E., 'Alternative Dispute Resolution in Africa: Preventing Conflict and Enhancing Stability.' *Africa Security Brief*, No. 16 of 2011

[95] Ashurst., 'Managing and Resolving Cross-Border Disputes in the Energy Sector.' Op Cit

[96] Muigua. K., 'Nurturing International Commercial Arbitration in Kenya.' Op Cit

[97] Ibid

[98] Ozcan. T., & Sareen. D., 'A New Suggestion For Resolution Of Energy Disputes Through A Unified International Arbitration Court For Energy Disputes.' Available at https://www.mondaq.com/turkey/oil-gas--electricity/1031994/a-new-suggestion-for-resolution-of-energy-disputes-through-a-unified-international-arbitration-court-for-energy-disputes (Accessed on 07/12/2023)

[99] Ibid

[100] Ibid

[101] Ibid

[102] Gould. N., 'Conflict Avoidance and Dispute Resolution.' Available at https://www.fenwickelliott.com/sites/default/files/nick_gould_-_conflict_avoidance_and_dispute_resolution.indd_.pdf (Accessed on 07/12/2023)

clarity in the contract documentation or partnering[103]. It is therefore vital for players in the energy sector in Africa including energy companies to avoid or minimise the chance of disputes arising in the first instance through measures such as ensuring clear and well-drafted contracts which include workable and not overly complicated dispute resolution provisions followed by effective project management from beginning to end[104].

Finally, there is need for the energy sector in Africa to embrace Sustainable Development. The principle of Sustainable Development requires an integrated approach to development that takes into account environmental protection, economic development and social progress[105]. Players in the energy sector in Africa especially multinational corporations in the oil and gas sector have on several occasions been accused of failing to adhere to the principles of Sustainable Development as evidenced by environmental concerns including the extinction of biodiversity, contamination and destruction of soil and air pollution as a result of oil spillages[106]. Further, multinational corporations operating in Africa including those in the energy sector have been accused of gross human rights violations, such as killings, bad labour practices and land injustices[107]. Such practices have had an impact on economic activities, social-cultural life and human health of the affected people thus hindering the attainment of Sustainable Development[108]. This has also led to rise of disputes between host states and investors under investment treaty arbitration with host states seeking to enforce the tenets of Sustainable Development including environmental protection and human rights against multinational corporations[109]. It is therefore imperative for energy companies including multinational corporations in Africa to embrace Sustainable Development by fostering social justice, environmental sustainability, alternative energy and clean technology efforts[110]. In addition, it has been asserted that it is important for African Countries to ensure that they review and negotiate appropriately with foreign countries in order to capture the tenets of Sustainable Development including Environmental, Social and

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[103] Ibid

[104] Financier Worldwide Magazine., 'FORUM: Managing Energy and Natural Resources Industry Disputes.' Op Cit

[105] Fitzmaurice. M., 'The Principle of Sustainable Development in International Development Law.' International Sustainable Development Law., Vol 1

[106] Ajibade, L.T & Awomuti, A.A. 'Petroleum Exploitation or Human Exploitation? An Overview of Niger Delta Oil Producing Communities in Nigeria' *African Research Review* Vol. 3 (1), 2009. Pp. 111-124

[107] Makwana, R., 'Multinational Corporations (MNCs): Beyond the Profit Motive,' Share the World Resources, 3rd October 2006, available at http://www.stwr.org/multinationalcorporations/multinational-corporations-mncs-beyond-theprofitmotive.html#legalrights (Accessed on 07/12/2023)

[108] Ajibade, L.T & Awomuti, A.A. 'Petroleum Exploitation or Human Exploitation? An Overview of Niger Delta Oil Producing Communities in Nigeria' Op Cit

[109] Goh. N., 'ESG and Investment Arbitration: A Future with Cleaner Foreign Investment?' *The Journal of World Energy Law & Business*., Volume 15, Issue 6, 2022

[110] Oehmke. M & Opp. M., 'A Theory of Socially Responsible Investment.' Available at https://www.runi.ac.il/media/rzcpiq4a/a-theory-of-s.pdf (Accessed on 07/12/2023)

Governance (ESG) clauses in BITs[111]. The need for Sustainable Development in the energy sector in Africa is informed by global agendas including energy transition, environmental protection and confronting climate change[112].

5.0 Conclusion

Energy disputes in Africa are undesirable. Such disputes can adversely impact the viability and success of energy projects in Africa[113]. As a result, there is need to effectively and efficiently manage energy disputes in Africa in order to foster the success of energy projects and ensure that the energy transition maintains its positive course[114]. In order to effectively and efficiently embrace energy disputes in Africa, it is important to embrace ADR mechanisms including arbitration and meditation, address the challenges facing dispute management processes in the energy sector including arbitration, mediation and litigation, foster dispute avoidance and promote Sustainable Development[115]. There is need to effectively manage disputes in Africa in order to accelerate the energy transition towards Sustainable Development.

Effectively managing energy disputes in Africa is an imperative whose time is now.

[111] Muigua. K., 'Bilateral Investment Treaties and Environmental, Social and Governance in Africa.' Available at https://kmco.co.ke/wp-content/uploads/2023/07/Bilateral-Investment-Treaties-and-Environmental-Social-and-Governance-in-Africa-1.pdf (Accessed on 07/12/2023)

[112] Global Arbitration Review., 'Energy Arbitration in Africa.' Op Cit

[113] Burges-Salmon., 'Energy Disputes Guide: Managing Risk and Avoiding Disputes in your Energy Project.' Op Cit

[114] Herbert Smith Freehills., 'Energy Transition and the Impact on Disputes.' Op Cit

[115] Clearly Gottlieb., 'Resolving Energy Disputes in Africa Through Arbitration and Alternative Dispute Resolution ('ADR').' Op Cit; Financier Worldwide Magazine., 'FORUM: Managing Energy and Natural Resources Industry Disputes.' Op Cit; and Goh. N., 'ESG and Investment Arbitration: A Future with Cleaner Foreign Investment?'

Chapter 23: Managing Water and Energy Disputes through Mediation in Kenya

Abstract

This paper discusses how mediation can be effectively harnessed to manage water and energy disputes in Kenya. It argues that mediation is a viable tool for managing water and energy disputes in Kenya allowing parties an expeditious, cost-effective, efficient, and collaborative approach towards resolving their differences. The paper critically examines the causes and effects of water and energy disputes in Kenya. It also explores the specific features of mediations that makes it suitable in managing water and energy disputes in Kenya. The paper further proposes reforms towards addressing some of the challenges facing mediation in Kenya towards effectively harnessing and utilising this process in managing water and energy disputes.

1.0 Introduction

Mediation is one of the Alternative Dispute Resolution (ADR) processes. ADR refers to a wide range of mechanisms that are applied to manage disputes without resort to adversarial litigation[1]. ADR can also be defined as a set of approaches and techniques aimed at resolving disputes in a non-confrontational manner[2]. These mechanisms include negotiation, mediation, arbitration, conciliation, adjudication, expert determination, early neutral evaluation, and Traditional Dispute Resolution Mechanisms (TDRMs) among others[3].

Mediation as an ADR process is a method of conflict management where conflicting parties gather to seek solutions to the conflict, with the assistance of a third party who facilitates discussions and the flow of information thus aiding in the process of reaching an agreement[4]. According to the United Nations, mediation is a process whereby a third party assists two or more parties, with their consent, to prevent, manage or resolve a conflict by helping them to develop mutually acceptable agreements[5]. Mediation has also been described as a non-adversarial and collaborative process through which an impartial third party helps parties in a dispute reach a resolution through interest-based negotiations[6]. In mediation, parties meet with

[1] Muigua. K., 'Alternative Dispute Resolution and Access to Justice in Kenya.' Glenwood Publishers Limited, 2015

[2] United Nations., 'Alternative Dispute Resolution Approaches and their Application in Water Management: A Focus on Negotiation, Mediation and Consensus Building' Available at https://www.un.org/waterforlifedecade/water_cooperation_2013/pdf/adr_background_paper.pdf (Accessed on 16/03/2025)

[3] Muigua. K., 'Alternative Dispute Resolution and Access to Justice in Kenya.' Op Cit

[4] Muigua. K., 'Resolving Conflicts through Mediation in Kenya.' Glenwood Publishers Limited, 2nd Edition., 2017

[5] United Nations., 'Basics of Mediation: Concepts and Definitions.' Available at https://peacemaker.un.org/sites/peacemaker.un.org/files/Basics%20of%20Mediation.pdf (Accessed on 16/03/2025)

[6] United Nations Environment Programme., 'Natural Resources and Conflict: A Guide for Mediation Practitioners' Available at Available at https://peacemaker.un.org/sites/peacemaker.un.org/files/NRCMediation_UNDPAUNEP2015_0.pdf (Accessed on 16/03/2025)

a mutually selected impartial and neutral person who assists them in the negotiation of their differences[7]. Mediation is therefore usually a continuation of the negotiation process since it arises where parties to a conflict have attempted negotiations, but have reached a deadlock[8]. As a result of the deadlock, parties involve a third party known as a mediator to assist them continue with the negotiations and ultimately break the deadlock[9]. A mediator cannot impose a solution upon the parties but rather facilitates communication, promotes understanding, focuses the parties on their interests, and uses creative problem solving to enable the parties to reach their own mutually acceptable agreement[10].

It has been argued that mediation and other ADR processes are suitable in enhancing access to justice[11]. Mediation and other ADR processes contain key attributes such as privacy, confidentiality, flexibility, informality, efficiency, party autonomy and the ability to foster expeditious and cost- effective management of disputes and conflicts[12]. In addition, mediation and other ADR processes allows for more creative and collaborative solutions than those available in traditional litigation[13]. Due to these advantages, there have been calls to embrace mediation and ADR at both the global and national levels. At the global level, the *Charter of the United Nations*[14] requires parties to a dispute to seek a solution by negotiation, enquiry, *mediation*, conciliation, arbitration, judicial settlement, resort to regional agencies or arrangements, or other *peaceful means* of their own choice[15] (Emphasis added). Further, at a national level, the *Constitution of Kenya*[16] mandates courts and tribunals to promote ADR mechanisms including reconciliation, *mediation*, arbitration and TDRMs[17] (Emphasis added).

Mediation is therefore an appropriate tool for managing conflicts and disputes. It has been observed that mediation has been practiced globally since antiquity and is now being widely embraced in managing conflicts and disputes in the modern era[18]. Its widespread application in the management of conflicts and disputes in the contemporary world is because it is a flexible, confidential, cost-effective and speedier process of resolving disputes[19].

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[7] Mediation Defined: What is Mediation?., Available at https://www.jamsadr.com/mediation-defined/ (Accessed on 16/03/2025)
[8] Bercovitch. J., 'Mediation Success or Failure: A Search for the Elusive Criteria.' *Cardozo Journal of Conflict Resolution,* Vol. 7, p 289
[9] Ibid
[10] Ibid
[11] Muigua. K., 'Alternative Dispute Resolution and Access to Justice in Kenya.' Op Cit
[12] Ibid
[13] JAMS ADR., 'What is ADR? Defining the Alternative Dispute Resolution Spectrum' Available at Available at https://www.jamsadr.com/adr-spectrum/ (Accessed on 16/03/2025)
[14] United Nations, Charter of the United Nations, 24 October 1945, 1 UNTS XVI
[15] Ibid, article 33 (1)
[16] Constitution of Kenya., 2010., Government Printer, Nairobi
[17] Ibid, article 159 (2) (c)
[18] Muigua. K., 'Resolving Conflicts through Mediation in Kenya.' Op Cit
[19] Ibid

This paper discusses how mediation can be effectively harnessed to manage water and energy disputes in Kenya. It argues that mediation is a viable tool for managing water and energy disputes in Kenya allowing parties an expeditious, cost-effective, efficient, and collaborative approach towards resolving their differences. The paper critically examines the causes and effects of water and energy disputes in Kenya. It also explores the specific features of mediations that makes it suitable in managing water and energy disputes in Kenya. The paper further proposes reforms towards addressing some of the challenges facing mediation in Kenya towards effectively harnessing and utilising this process in managing water and energy disputes.

2.0 Water and Energy Disputes in Kenya: Causes and Effects

Water and energy disputes are classified under environmental and natural resource disputes[20]. Natural resources including land, water, timber, minerals, metals and energy sources such as oil and gas are important sources of livelihoods, income and influence for countries and communities all over the world[21]. However, when these natural resources are poorly managed or inequitably shared, or when business operations are implemented without due consideration for context and communities, they can contribute to tensions that can escalate into violent conflict, or feed into and worsen pre-existing conflict dynamics[22]. Natural resource disputes often flow from disagreements in relation to access, control, and use of natural resources[23]. As the global population continues to rise, the demand for scarce natural resources continues to grow- a situation that can potentially fuel natural resource-based conflicts[24]. Further, the impacts of climate change are leading to scarcity and degradation of natural resources thus fueling competition and disputes[25]. Therefore, while natural resources are key to achieving Sustainable Development, they are also increasingly acting as drivers of fragility, disputes, conflicts and violence globally[26].

Conflicts and disputes over water are a common occurrence globally. It has been argued that while water frequently features as a weapon or victim of war, it also increasingly constitutes a contributing trigger of conflicts and disputes as competing users assert their claims to this vital

[20] United Nations Environment Programme., 'Natural Resources and Conflict: A Guide for Mediation Practitioners' Op Cit

[21] Ibid

[22] Ibid

[23] Food and Agriculture Organization., 'An Introduction to Natural Resource Conflicts, Collaborative Management and Sustainable Livelihoods' Available at https://www.fao.org/4/a0032e/a0032e04.htm#:~:text=Natural%20resource%20conflicts%20are%20disagreements,or%20inequities%20in%20resource%20distribution. (Accessed on 17/03/2025)

[24] United Nations Environment Programme., 'Environmental Cooperation and Peacebuilding.' Available at https://www.unep.org/topics/fresh-water/disasters-and-climatechange/environmentsecurity/environmentalcooperationand#:~:text=International%20law%2C%20environment%20and%20conflict,and%20reliance% 20on%2 0conflict%20resources (Accessed on 17/03/2025)

[25] Ibid

[26] Ibid

resource[27]. The rising demand for water globally due to rapid population growth, escalating environmental pressures including climate change and pollution, and unsustainable management practices increasingly strain global water supplies fueling disputes and conflicts[28].

The United Nations Environment Programme notes that water covers more than two thirds of the planet, but readily accessible fresh water – found in rivers, lakes, wetlands and aquifers – accounts for less than one per cent of the world's water supply[29]. Further, UNEP points out that as the world's population continues to rise, so too do the demands for water – for drinking, sanitation, farming and energy production, among many other human needs and uses[30]. In addition, human activity and climate change are disrupting natural water cycles, putting freshwater ecosystems, under pressure[31]. Pollution, infrastructure development and resource extraction also pose additional challenges to water resulting in degradation and scarcity of water[32]. These factors are fueling water disputes and conflicts globally. Water disputes can therefore be attributed to factors such as population growth, unsustainable development projects, environmental factors including climate change and severe and prolonged drought, human activities such as pollution, and poor governance of water and water resources[33].

Energy disputes are also prevalent globally and in Africa. For instance, the demand for energy in Africa continues to rise as the continent's population and income grow[34]. The continent has huge reserves for fossil fuels including oil and gas, with a large capacity for green energy due to abundance of renewable sources of energy such as solar, wind, and geothermal energy[35]. Consequently, there has been an increase in investments in the energy sector in Africa including through bilateral and multilateral investment treaties[36]. The rise of energy and infrastructure projects in Africa, combined with the challenges deriving from the energy transition have led to a wide range of disputes both under contractual instruments (such as concession agreements) and investment treaties[37]. Energy disputes can take the form of joint venture/contractual

[27] Center for Strategic & International Studies., 'What Causes Water Conflict?' Available at https://www.csis.org/analysis/what-causes-water-conflict (Accessed on 17/03/2025)
[28] Ibid
[29] United Nations Environment Programme., 'About Water' Available at https://www.unep.org/explore-topics/water/about-water (Accessed on 17/03/2025)
[30] Ibid
[31] Ibid
[32] Ibid
[33] Iceland. C., 'How to Solve Water-Related Conflicts' Available at https://www.wri.org/insights/how-solve-water-related-conflicts (Accessed on 17/03/2025)
[34] Kebe. M., 'Resolving infrastructure and energy disputes in sub-Saharan Africa' Available at https://www.dlapiperafrica.com/en/senegal/insights/2024/resolving-infrastructure-and-energy-disputes- (Accessed on 17/03/2025)
[35] Muigua. K., 'Adopting Green Energy for a Bright Tomorrow.' Available at Available at http://kmco.co.ke/wp-content/uploads/2023/06/Adopting-Green-Energy-for-a-Bright-Tomorrow.pdf (Accessed on 17/03/2025)
[36] Kebe. M., 'Resolving infrastructure and energy disputes in sub-Saharan Africa' Op Cit
[37] Ibid

disputes, claims arising from weather conditions in renewable energy projects, construction related disputes, technology related disputes, investor/state disputes, and regulatory disputes[38].

Water and energy disputes are therefore on the rise globally. It has been observed that in Kenya, water disputes are common especially in the arid and semi-arid North Eastern region which is predominantly occupied by pastoralists[39]. Climate change and severe and prolonged droughts are fueling disputes over pasture and water access between pastoralists and farmers sometimes resulting in violent clashes[40]. The growing water demand and water scarcity in Kenya are also creating conditions that can spiral into conflicts and disputes[41]. In addition, climate change, population growth, urbanization, water pollution, and poor management of water resources are worsening the water crisis in the country, which affects economic activities, food security, education, and health and contribute to conflicts and disputes[42].

Energy disputes are also bring witnessed in Kenya. For instance, it has been observed that the acquisition and use of land for renewable energy production in Kenya without addressing historical land-based community grievances contributes to the vulnerability of local communities fueling conflicts and disputes[43]. Energy projects in Kenya including the Lake Turkana Wind Power project and the Olkaria Geothermal project have all resulted in disputes emerging from complaints by local communities in relation to land ownership and use, forced eviction and inadequate compensation[44]. Further, investors in the energy sector have been accused of fueling environmental damage exposing local communities to health hazards, and destroying local ecosystems and livelihoods including farming, fishing and pastoralism[45]. In addition, the rise of

[38] McMahon. M., Shah. P., 'The Rise of Renewable Energy Disputes and Arbitration.' Available at https://www.stewartslaw.com/news/rise-of-renewable-energy-disputes/ (Accessed on 17/03/2025)

[39] Koigi. B., 'Failed rains spark Kenya's water wars' Available at https://www.fairplanet.org/dossier/water-2/failed-rains-spark-kenyas-water-wars/#:~:text=Deaths%20from%20water%20related%20conflicts,not%20new%20to%20water%20wars (Accessed on 17/03/2025)

[40] International Institute for Sustainable Development., 'Climate change and conflict: Lessons from Community Conservancies in Northern Kenya' Available at https://www.iisd.org/system/files/publications/climate_change_conflict_kenya.pdf (Accessed on 17/03/2025)

[41] Kenya's water and sanitation crisis., Available at https://water.org/our-impact/where-we-work/kenya/ (Accessed on 17/03/2025)

[42] Ibid

[43] The Danish Institute For Human Rights., 'Scoping Paper: Human Rights and The Energy Transition in Kenya' Available at https://www.humanrights.dk/files/media/document/Kenya%20Energy%20Transition%20and%20Human%20Rights%20Scoping_accessible.pdf (Accessed on 17/03/2025)

[44] Ibid

[45] Ibid

energy investments in Kenya has resulted in the growth of investor/state disputes flowing from termination of investment treaties and interpretation of contractual terms[46].

Water and energy disputes in Kenya are undesirable. Water disputes especially among pastoralists often turn violent in nature resulting in loss of human lives[47]. They also fuel ethnic tensions and insecurity undermining peace and development in Kenya[48]. On the other hand, energy disputes can hinder the successful completion of energy projects therefore undermining universal access to energy[49]. It is therefore imperative to foster effective, efficient, and expeditious management of water and energy disputes in Kenya.

3.0 Utilising Mediation to Manage Water and Energy Disputes in Kenya

Mediation has been identified as a viable tool towards effective management of environmental and natural resource-based conflicts and disputes[50]. According to UNEP, mediation processes – which are voluntary and consensus-based – tend to lead to resolutions and outcomes that are longer- lasting and more sustainable than adversarial processes or otherwise imposed outcomes such as litigation or arbitration[51]. It has been observed that in conflicts involving natural resources such as water and energy, sustainable outcomes are more desirable since the shared benefits of these resources often cross tribal, societal, communal, and national boundaries[52].

Mediation is suitable in managing water and energy disputes due to its ability to promote collaboration and cooperation in conflict management[53]. A key feature of collaboration in conflict management is that decisions are made by consensus[54]. It has been observed that consensus in conflict management is reached when each stakeholder feels that his/her interests have been

[46] Muigua. K., 'Energy PPPs in Kenya: Examining the Regulatory Framework and Efficacy of Dispute Resolution and ADR' Available at https://kmco.co.ke/articles-publications/energy-ppps-in-kenya-examining-the-regulatory-framework-and-efficacy-of-dispute-resolution-and-adr-2/ (Accessed on 17/03/2025)

[47] International Institute for Sustainable Development., 'Climate change and conflict: Lessons from Community Conservancies in Northern Kenya' Op Cit

[48] Ibid

[49] The World Bank Group., 'Renegotiation, Government Step-in rights, Termination, and Dispute Resolution' Available at https://ppp.worldbank.org/public-private-partnership/renegotiation-government-step-rights-termination-and-dispute-resolution#:~:text=The%20accelerating%20availability%20of%20disruptive,in%20the%a20energy%20sector%20globally (Accessed on 17/03/2025)

[50] United Nations Environment Programme., 'Natural Resources and Conflict: A Guide for Mediation Practitioners' Op Cit

[51] Ibid

[52] Ibid

[53] Food and Agriculture Organization., 'Collaborative Conflict Management for Enhanced National Forest Programmes (NFPs)' Available at https://www.fao.org/4/i3101e/i3101e00.pdf (Accessed on 17/03/2025)

[54] Food and Agriculture Organization., 'An Introduction to Natural Resource Conflicts, Collaborative Management and Sustainable Livelihoods' Op Cit

adequately addressed[55]. Mediation focuses on the interests on the parties and provides a platform for collaboration enabling parties to come up with mutually satisfactory outcomes[56]. Mediation over natural resources is effective in helping parties identify ways to maximize and share benefits, and ultimately unlock entrenched or zero-sum positions, allowing parties to develop cooperative and constructive relationships that can be carried over to other areas[57]. Mediation is therefore a suitable tool in managing natural resource-based conflicts due to its potential to bring all stakeholders on board and work towards practical solutions that meet each person's needs[58]. This affords parties an opportunity to sustain or improve their relationships therefore yielding long-lasting and sustainable outcomes[59].

The foregoing attributes of mediation makes it a viable tool in managing water and energy disputes in Kenya. For example, it has been asserted that how natural resources, and disputes over their scarcity in Kenya are managed is a key factor in fostering peace and development. It has been observed that disputes over access to both pasture and water among pastoralist communities can often be peacefully mediated through the agency of traditional institutions and mechanisms that have historically served this purpose through measures such as reciprocal grazing rights[60]. There is adequate room to utilise mediation to manage water disputes at the community level due to presence of institutions such as community elders who have experience in traditional means of conflict mediation and resolution[61]. Mediation is therefore an effective tool for managing water disputes since it provides a platform for interest-based negotiation, active dialogue among parties, timely decision-making while also building and strengthening relationships[62]. It can also foster sustainable management of shared water resources through local, regional, and global cooperation therefore minimising the likelihood of disputes[63]. It is therefore vital to embrace mediation for effective management of water disputes in Kenya.

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[55] Ibid

[56] United Nations Environment Programme., 'Natural Resources and Conflict: A Guide for Mediation Practitioners' Op Cit

[57] Ibid

[58] Ibid

[59] Muigua. K., 'Natural Resource Conflicts: Addressing Inter-Ethnic Strife through Environmental Justice in Kenya.' Available at http://kmco.co.ke/wp-content/uploads/2019/09/NaturalResourceConflictsAddressing-Inter-Ethnic-Strife-Through-Environmental-Justice-in-kenya-KariukiMuigua7th-September2019.pdf (Accessed on 17/03/2025)

[60] International Institute for Sustainable Development., 'Climate change and conflict: Lessons from Community Conservancies in Northern Kenya' Op Cit

[61] Ibid

[62] Facilitation and Mediation., Available at https://iwrmactionhub.org/learn/iwrm-tools/facilitation-and-mediation (Accessed on 17/03/2025)

[63] Morek. R., 'Mediation in water disputes – one more drop' Available at https://mediationblog.kluwerarbitration.com/2016/11/18/mediation-water-disputes-one-drop/ (Accessed on 17/03/2025)

Mediation is also suitable in managing energy disputes in Kenya. It has been correctly observed that commercial relationships in the energy sector are often long-term and frequently operate across projects, borders and cultures[64]. This creates incentives for stakeholders in the energy sector including energy companies and states to look at alternatives to more formal dispute resolution mechanisms such as litigation or arbitration[65]. Mediation provides parties with the opportunity to manage and resolve disputes before they escalate, which can not only save time and costs but can also preserve critical business relationships and ensure the long-term sustainability and viability of energy projects[66]. It has been argued that in energy projects, collaboration among all stakeholders including the government and private sector during a project's life cycle is important in maintaining an ongoing relationship between the parties and preventing conflicts[67]. Mediation is therefore an appropriate tool in managing energy disputes due to its potential to foster collaboration and preserve commercial relationships therefore ensuring the successful completion of energy projects towards enhancing access to energy for all[68]. It is also suitable in managing disputes between investors and local communities. It has been observed that players in the energy sector including oil and gas companies and investors in the renewable energy sector are increasingly aware of the need to secure the trust of local communities to gain a 'social licence to operate'[69]. Implementing a project without it can lead to operational delays, financial costs and litigation, or even project closure, violence and loss of life[70]. Utilising mediation to resolve disagreements is therefore vital in engaging with local communities to reach shared agreement and allowing people to have a meaningful voice in deliberative decision-making processes related to their own development[71]. Harnessing mediation is therefore crucial towards effective management of energy disputes in Kenya.

Mediation is key towards effective and appropriate management of water and energy disputes in Kenya. However, it has been noted that mediation has been underutilised in managing natural resource-based disputes including those involving water and energy[72]. Further, mediation faces challenges such as enforceability of decisions due to its non-binding nature, the possibility of endless proceedings, lack of precedents and inability to grant urgent protection such as

[64] Managing and Resolving Cross-Border Disputes in the Energy Sector.' Available at Available at https://www.ashurst.com/en/insights/managing-and-resolving-cross-border-disputes-in-the-energy-sector/ (Accessed on 17/03/2025)
[65] Ibid
[66] Ibid
[67] The World Bank Group., 'Renegotiation, Government Step-in rights, Termination, and Dispute Resolution' Op Cit
[68] Ibid
[69] Buxton. A., & Wilson. E., 'FPIC and the Extractive Industries: A Guide to Applying the Spirit of Free, Prior and Informed Consent in Industrial Projects' Available at https://www.iied.org/16530iied (Accessed on 17/03/2025)
[70] Ibid
[71] Ibid
[72] United Nations Environment Programme., 'Natural Resources and Conflict: A Guide for Mediation Practitioners' Op Cit

injunctions[73]. It is imperative to address these concerns in order to enhance the use of mediation in managing water and energy disputes in Kenya.

4.0 Conclusion

There is need to embrace mediation for effective management of water and energy disputes in Kenya. Mediation provides a platform for collaboration and cooperation among all stakeholders and is therefore suitable in preserving and strengthening relationships while also leading to long-lasting and sustainable outcomes[74]. Mediation should therefore be widely utilised in managing water and energy disputes in Kenya. In order to realise this ideal, it is imperative to build the capacity of mediators on technical and scientific aspects of water and energy disputes in order to enhance their role in managing such disputes[75]. Further, traditional institutions of conflict management such as community elders should be included in mediation processes due to their knowledge and expertise on local circumstances and dispute resolution which is key in managing disputes at the local level[76]. The national legal, policy, and institutional capacity on mediation should also be strengthened and effectively implemented in order to bolster the role of mediation in managing natural resource- based conflicts and disputes including water and energy disputes in Kenya[77].Managing water and energy disputes in
Kenya through mediation is an imperative whose time is now.

[73] Muigua. K., 'Alternative Dispute Resolution and Access to Justice in Kenya.' Op Cit

[74] United Nations Environment Programme., 'Natural Resources and Conflict: A Guide for Mediation Practitioners' Op Cit

[75] Ibid

[76] International Institute for Sustainable Development., 'Climate change and conflict: Lessons from Community Conservancies in Northern Kenya' Op Cit

[77] Muigua. K., 'Managing Natural Resource Conflicts in Kenya through Negotiation and Mediation.' Available at https://kmco.co.ke/wp-content/uploads/2018/08/Managing-Natural-Resource-Conflictsin-Kenya-through-Negotiation-and-Mediation.pdf (Accessed on 17/03/2025)

Chapter 24: The Rule of Law in Action: Mediating Climate Change and Energy Disputes

Abstract

This paper critically discusses how the rule of law can be applied to ensure effective management of climate change and energy disputes. The paper posits that climate change and energy disputes are on the rise globally undermining the quest towards Sustainable Development. It argues that the rule of law in general, and environmental rule of law in particular is vital in ensuring effective management of climate change and energy disputes through its emphasis on access to justice in environmental matters. In addition, the paper notes that mediation is an effective tool in managing climate change and energy disputes towards achieving environmental rule of law. It highlights some of the barriers that can hinder the use of mediation in managing climate change and energy disputes. The paper further discusses how mediation can be effectively harnessed to resolve climate and energy disputes through a rule of law approach.

1.0 Introduction

The rule of law is a fundamental principle of governance in which all persons, institutions and entities, both public and private, including the State itself, are accountable to laws that are publicly promulgated, equally enforced and independently adjudicated, and which are consistent with international human rights norms and standards[1]. It has been argued that the rule of law comprises a number of principles of a formal and procedural character, addressing the way in which a society is governed[2]. The formal principles concern the generality, clarity, publicity, stability, and prospectivity of the norms that govern a society[3]. The procedural principles on the other part concern the processes by which these norms are administered, and institutions like an independent judiciary that ensures administration of such norms[4]. According to the United Nations, the rule of law envisages adherence to the principles of supremacy of the law, equality before the law, accountability to the law, fairness in the application of the law, separation of powers among the various arms of government, participation in decision-making, legal certainty, avoidance of arbitrariness, and procedural and legal transparency[5].

The rule of law is the foundation of peaceful and prosperous societies and is necessary to ensure development, accountability in government, and respect for fundamental rights and freedoms[6]. Under the rule of law, all public powers act within the constraints set out by law, in accordance with the values of democracy and human rights, and under the control of independent and

[1] United Nations., 'What is the Rule of Law.' Available at https://www.un.org/ruleoflaw/what-is-the-rule-of-law/ (Accessed on 08/04/2025)
[2] Waldron. J., 'The Rule of Law.' Available at https://plato.stanford.edu/Entries/rule-of-law/ (Accessed on 08/04/2025)
[3] Ibid
[4] Ibid
[5] United Nations., 'What is the Rule of Law.' Op Cit
[6] World Justice Project., 'What is the Rule of Law?' Available at https://worldjusticeproject.org/about-us/overview/what-rule-law (Accessed on 08/04/2025)

impartial courts and tribunals[7]. The rule of law envisages an ideal society where no one is above the law, everyone is treated equally under the law, everyone is held accountable to the same laws, there are clear and fair processes for enforcing laws, there is an independent judiciary, and human rights are guaranteed for all persons[8]. The rule of law has been described as an enabler of justice, good governance and development[9].

The rule of law is fundamental for Sustainable Development. The United Nations notes that the ideas of the rule of law and development are strongly linked and mutually reinforcing, that the advancement of the rule of law at the local, national, continental and international levels is essential for sustained and inclusive economic growth, Sustainable Development, the eradication of poverty and hunger and the full realization of all human rights and fundamental freedoms, including the right to development, all of which in turn reinforce the rule of law[10]. The United Nation's *2030 Agenda for Sustainable Development*[11] recognises the vital role that the rule of law plays in fostering sustainable and inclusive development. Sustainable Development Goal (SDG) 16 seeks to foster peace, justice and strong institutions and calls for the promotion of peaceful and inclusive societies for Sustainable Development, the provision of access to justice for all and for the building of effective, accountable and inclusive institutions at all levels[12]. Among the targets under SDG 16 is *promoting the rule of law at the national and international levels* and ensuring equal access to justice for all(Emphasis added[13]. It has been argued that SDG 16 is an enabler for all other SDGs since the rule of law is a necessary prerequisite to translate commitments, such as the SDGs as well as other global, regional or national development goals into action[14]. Promoting the rule of law is therefore crucial for Sustainable Development.

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[7] European Commission., 'What is the rule of law?' Available at https://commission.europa.eu/strategy-and-policy/policies/justice-and-fundamental-rights/upholding-rule-law/rule-law/what-rule-law_en (Accessed on 08/04/2025)

[8] American Bar Association., 'Rule of Law.' Available at https://www.americanbar.org/groups/public_education/resources/rule-of-law/ (Accessed on 08/04/2025)

[9] International Development Law Organization (IDLO)., 'Rule of Law.' Available at https://www.idlo.int/what-we-do/rule-law (Accessed on 08/04/2025)

[10] United Nations., 'Rule of Law and Development.' Available at https://www.un.org/ruleoflaw/rule-of-law-and-development/ (Accessed on 08/04/2025)

[11] United Nations General Assembly., 'Transforming Our World: the 2030 Agenda for Sustainable Development.' 21 October 2015, A/RES/70/1., Available at https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf (Accessed on 08/04/2025)

[12] Ibid, SDG 16

[13] Ibid, SDG 16.3

[14] United Nations Office on Drugs and Crime., 'Rule of Law.' Op Cit

It has been argued that the rule of law is vital in achieving Sustainable Development across all its dimensions including environmental sustainability[15]. To this end, the rule of law has been refined into the concept of environmental rule of law[16]. The United Nations Environment Programme (UNEP) posits that environmental rule of law is central to Sustainable Development[17]. Environmental rule of law integrates environmental needs with the essential elements of the rule of law, and provides the basis for improving environmental governance[18]. Environmental rule of law is attained when environmental laws and policies are widely understood, respected, and enforced and the benefits of environmental protection are enjoyed by people and the planet[19]. This concept provides a framework for addressing the gap between environmental laws in text and in practice[20].

Environmental rule of law focuses on key aspects of environmental governance including the development, enactment, and implementation of clear, strict, enforceable, and effective environmental laws, regulations, and policies that are efficiently administered through fair and inclusive processes[21]; protection of human rights, including the right to a safe, clean, healthy, and sustainable environment[22]; ensuring access to information, public participation, and access to justice in environmental matters[23]; and accountability, transparency, ethics, and integrity in environmental governance[24]. Strengthening the rule of law and in particular environmental rule of law is therefore vital in improving environmental governance.

This paper critically discusses how the rule of law can be applied to ensure effective management of climate change and energy disputes. The paper posits that climate change and energy disputes are on the rise globally undermining the quest towards Sustainable Development. It argues that the rule of law in general, and environmental rule of law in particular is vital in ensuring effective management of climate change and energy disputes through its emphasis on access to justice in environmental matters. In addition, the paper notes that mediation is an effective tool in

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[15] United Nations Environment Programme., 'Promoting Environmental Rule of Law' Available at https://www.unep.org/topics/environmental-law-and-governance/promoting-environmental-rule-law/promoting-environmental (Accessed on 08/04/2024)

[16] Ibid

[17] United Nations Environment Programme., 'Environmental Rule of Law' Available at https://www.unep.org/explore-topics/environmental-rights-and-governance/what-we-do/promoting-environmental-rule-law-0 (Accessed on 08/04/2025)

[18] Ibid

[19] Environment Law Institute., 'Environmental Rule of Law' Available at https://www.eli.org/environmental-rule-law (Accessed on 08/04/2025)

[20] Ibid

[21] United Nations Environment Programme., 'Environmental Rule of Law: First Global Report' Available at https://www.unep.org/resources/assessment/environmental-rule-law-first-global-report (Accessed on 08/04/2025)

[22] Ibid

[23] Ibid

[24] Ibid

managing climate change and energy disputes towards achieving environmental rule of law. It highlights some of the barriers that can hinder the use of mediation in managing climate change and energy disputes. The paper further discusses how mediation can be effectively harnessed to resolve climate and energy disputes through a rule of law approach.

2.0 Overview of Climate Change and Energy Disputes

The world is facing a climate emergency[25]. The impacts of climate change including intense droughts, water scarcity, severe fires, rising sea levels, flooding, melting polar ice, catastrophic storms and declining biodiversity are being witnessed all over the world, undermining development[26] The United Nations 2030 Agenda for Sustainable Development acknowledges that climate change is one of the greatest challenges of our time and its adverse impacts undermine the ability of all countries to achieve Sustainable Development[27]. According to the United Nations, the links between climate change and Sustainable Development are strong[28]. For instance, poor and developing countries, particularly least developed countries, are among those most adversely affected and least able to cope with the anticipated climate shocks to their social, economic and natural systems undermining their development efforts[29].

Climate change undermines human well-being by impacting the availability of basic needs such as food, water, and energy[30]. It is also a major threat to human health. For instance, as climatic conditions change, more frequent and intensifying weather and climate events are on the rise including storms, extreme heat, floods, droughts and wildfires[31]. These events affect human health both directly and indirectly, increasing the risk of deaths, noncommunicable diseases, the emergence and spread of infectious diseases, and health emergencies[32].

In addition to its impacts on development and human health and well-being, climate change is also fueling conflicts and disputes globally[33]. Climate change contributes to conflicts and disputes in several ways. For instance, in vulnerable and fragile regions, climate change increases food insecurity and scarcity of vital resources such as water triggering competition and conflicts over

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[25] United Nations Environment Programme., 'Climate Action' Available at https://www.unep.org/topics/climate-action (Accessed on 09/04/2025)

[26] United Nations., 'What is Climate Change?' Available at https://www.un.org/en/climatechange/what-is-climate-change (Accessed on 09/04/2025)

[27] United Nations General Assembly., 'Transforming Our World: the 2030 Agenda for Sustainable Development.' 21 October 2015, A/RES/70/1., Op Cit

[28] United Nations., 'Climate Change' Available at https://sustainabledevelopment.un.org/topics/climatechange (Accessed on 09/04/2025)

[29] Ibid

[30] Ibid

[31] World Health Organization., 'Climate Change' Available at https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health (Accessed on 09/04/2025)

[32] Ibid

[33] United Nations Climate Change., 'Conflict and Climate' Available at https://unfccc.int/news/conflict-and-climate (Accessed on 09/04/2025)

such resources[34]. Climate change has been identified as a threat multiplier triggering food insecurity, water scarcity and resource competition, while disrupting livelihoods and spurring migration[35]. Therefore when communities, regions and countries experience extreme climatic events such as severe droughts, floods, and environmental degradation, the existing socio-economic and political tensions can be worsened[36]. This puts a strain on vital natural resources such as water and arable land, which are critical for survival and economic stability, a situation that can turn these tensions into full-blown conflicts[37]. Further, the impacts of climate change including environmental degradation, droughts, and floods are fueling migration and displacement of populations resulting in tensions and likelihood of conflicts and disputes between host communities and 'climate refugees'[38]. Climate change can therefore trigger or worsen conflicts.

Energy disputes are also on the rise globally. It has been observed that the global energy sector continues to be shaped by geopolitical shifts, regulatory changes, and the ongoing energy transition in response to climate change[39]. As industries, energy companies and governments navigate decarbonisation, energy security, and evolving investment landscapes, energy disputes are becoming more frequent and complex[40]. In the quest towards energy transition, there has been an increase in investments in the renewable energy sector globally including through bilateral and multilateral investment treaties[41]. The rise of energy and infrastructure projects globally combined with the challenges deriving from the energy transition have led to a wide range of disputes both under contractual instruments (such as concession agreements) and investment treaties[42]. Energy disputes can take the form of joint venture/contractual disputes, claims arising from weather conditions in renewable energy projects, construction related disputes, technology related disputes, investor/state disputes, and regulatory disputes[43].

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[34] Ibid

[35] Crisis Group., 'Climate, Environment and Conflict' Available at https://www.crisisgroup.org/future-conflict/climate-environment-and-conflict (Accessed on 09/04/2025)

[36] Anderson. K., 'Does climate change make conflict more likely?' Available at https://greenly.earth/en-gb/blog/ecology-news/does-climate-change-make-conflict-more-likely (Accessed on 09/04/2025)

[37] Ibid

[38] United Nations Climate Change., 'Conflict and Climate' Op Cit

[39] Energy Disputes: Navigating Key Trends and Challenges., Available at https://www.velaw.com/insights/energy-disputes-navigating-key-trends-and-challenges/ (Accessed on 09/04/2025)

[40] Ibid

[41] Kebe. M., 'Resolving infrastructure and energy disputes in sub-Saharan Africa' Available at Available at https://www.dlapiperafrica.com/en/senegal/insights/2024/resolving-infrastructure-and-energy-disputes- (Accessed on 09/04/2025)

[42] Ibid

[43] McMahon. M., Shah. P., 'The Rise of Renewable Energy Disputes and Arbitration.' Available at https://www.stewartslaw.com/news/rise-of-renewable-energy-disputes/ (Accessed on 09/04/2025)

Climate change and energy disputes are undesirable. For instance, climate change disputes can affect peace and security[44]. It has been observed that in many of the countries that are most vulnerable to climate change, fragility and conflict have weakened coping mechanisms severely affecting the poor and vulnerable[45]. Climate change disputes can hinder the achievement of climate goals at levels and fuel climate injustices[46]. Effective management of climate change disputes has been identified as crucial in strengthening the global response towards climate change and delivering climate justice for the vulnerable[47].

In addition, energy disputes can undermine the viability of energy projects therefore affecting energy transition[48]. Effective management of energy disputes is therefore necessary to support energy transition including through the successful completion of renewable energy projects[49].

3.0 Mediating Climate Change and Energy Disputes: Promises and Pitfalls

The United Nations defines mediation as a process whereby a third party assists two or more parties, with their consent, to prevent, manage or resolve a conflict by helping them to develop mutually acceptable agreements[50]. Mediation has also been defined as a method of conflict management where conflicting parties gather to seek solutions to the conflict, with the assistance of a third party who facilitates discussions and the flow of information thus aiding in the process of reaching an agreement[51]. Mediation can also be understood as a process wherein parties to a dispute meet with a mutually selected impartial and neutral person who assists them in the negotiation of their differences[52].

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[44] United Nations Department of Political and Peacebuilding Affairs., 'The Implications of Climate Change for Mediation and Peace Processes' Available at https://peacemaker.un.org/sites/peacemaker.un.org/files/DPPAPracticeNote-TheImplicationsofClimateChangeforMediationandPeaceProcesses.pdf (Accessed on 09/04/2025)

[45] Ibid

[46] United Nations Environment Programme., 'Climate Litigation More than Doubles in Five Years, now a Key Tool in Delivering Climate Justice' Available at Available at https://www.unep.org/news-and-stories/press-release/climate-litigation-more-doubles-five-years-now-key-tool-delivering (Accessed on 09/04/2025)

[47] Ibid

[48] The World Bank Group., 'Renegotiation, Government Step-in rights, Termination, and Dispute Resolution' Available at https://ppp.worldbank.org/public-private-partnership/renegotiation-government-step-rights-termination-and-dispute-resolution#:~:text=The%20accelerating%20availability%20of%20disruptive,in%20the%a20energy%20sector%20globally (Accessed on 09/04/2025)

[49] Ibid

[50] United Nations., 'Basics of Mediation: Concepts and Definitions.' Available at https://peacemaker.un.org/sites/peacemaker.un.org/files/Basics%20of%20Mediation.pdf (Accessed on 09/04/2025)

[51] Muigua. K., 'Resolving Conflicts through Mediation in Kenya.' Glenwood Publishers Limited, 2nd Edition., 2017

[52] Mediation Defined: What is Mediation?., Available at https://www.jamsadr.com/mediation-defined/ (Accessed on 09/04/2025)

Mediation alongside other Alternative Dispute Resolution (ADR) processes are considered suitable in enhancing access to justice[53]. They contain key attributes such as privacy, confidentiality, flexibility, informality, efficiency, party autonomy and the ability to foster expeditious and cost- effective management of disputes and conflicts[54]. In addition, mediation and other ADR processes allows for more creative and collaborative solutions than those available through litigation[55]. Due to their advantages, mediation and other ADR processes have been embraced globally and at national levels. At the global level, the *Charter of the United Nations*[56] requires parties to a dispute to seek a solution by negotiation, enquiry, *mediation*, conciliation, arbitration, judicial settlement, resort to regional agencies or arrangements, or other *peaceful means* of their own choice[57] (Emphasis added). Further, at a national level, the *Constitution of Kenya*[58] mandates courts and tribunals to promote ADR mechanisms including reconciliation, *mediation*, arbitration and TDRMs[59] (Emphasis added).

Mediation is a crucial process in advancing the rule of law. It provides an affordable, efficient, expeditious, flexible, and accessible platform towards accessing justice and protecting human rights[60]. Mediation further promotes a culture of fair and amicable management of disputes while also fostering inclusivity and participation in decision-making processes in accordance with the key tenets of the rule of law[61]. Harnessing mediation is therefore vital in promoting the rule of law.

Due to its key attributes, mediation provides a suitable platform for effective management of climate change and energy disputes while ensuring climate justice for vulnerable individuals and communities. According to the United Nations, mediation is an appropriate tool in helping conflicting parties address the risks associated with the adverse effects of climate change while also providing potential opportunities to discuss shared responses to common climate-related threats[62]. Mediation provides a platform for parties to engage and work together towards a peaceful and sustainable solution to their dispute[63].

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[53] Muigua. K., 'Alternative Dispute Resolution and Access to Justice in Kenya.' Glenwood Publishers Limited, 2015
[54] Ibid
[55] JAMS ADR., 'What is ADR? Defining the Alternative Dispute Resolution Spectrum' Available at Available at https://www.jamsadr.com/adr-spectrum/ (Accessed on 09/04/2025)
[56] United Nations, Charter of the United Nations, 24 October 1945, 1 UNTS XVI
[57] Ibid, article 33 (1)
[58] Constitution of Kenya., 2010., Government Printer, Nairobi
[59] Ibid, article 159 (2) (c)
[60] Singapore International Mediation Centre., 'Mediation and the Rule of Law' Available at https://simc.com.sg/insights/mediation-and-rule-law (Accessed on 09/04/2025)
[61] Ibid
[62] United Nations., 'The Implications of Climate Change for Mediation and Peace Processes' Available at https://peacemaker.un.org/sites/default/files/document/files/2024/03/dppapracticenote-theimplicationsofclimatechangeformediationandpeaceprocesses.pdf (Accessed on 09/04/2025)
[63] Ibid

It has been argued that in climate change conflicts and disputes mediation can enable parties to move from a position of conflict towards collaboration[64]. For instance, the competition over scarce natural resources such as land and water has been identified as major cause of climate change disputes globally[65]. In such contexts, mediation is a useful entry point in peace processes enabling all stakeholders to collaborate over the control, management and use of scarce natural resources[66]. Mediation can enhance collaboration by fostering the engagement of local parties and communities, while offering options for integrating their voices and expertise in the climate change discourse[67]. It has been argued that by focusing on collaboration and cooperation, mediation enables the integration of women, youth and marginalized groups, who face particular climate risks and indigenous peoples, whose expertise can help identify key issues, priorities, and solutions in climate change conflicts[68].

Mediation is therefore an appropriate tool in managing climate change disputes through collaboration while also promoting climate justice by giving a voice to marginalized and vulnerable people and communities including women, youth and indigenous peoples. Features of mediation including voluntary participation and agreement, confidentiality of exchanges among parties, and the search of mutually satisfactory solutions have been identified as well suited for the multi-party complex context of climate change disputes[69]. The transnational applicability of mediation also makes it suitable in resolving cross border climate change disputes[70]. In such disputes, mediation is ideal in promoting diplomacy across borders and initiating cooperation and strengthening of relations between nations[71]. Harnessing mediation is therefore vital for effective management of climate change disputes globally.

Further, in energy disputes, mediation is suitable in ensuring amicable resolution of disputes and preserving the parties' business relationships especially in long-term energy projects[72]. Commercial relationships in the energy sector are often long-term and frequently operate across

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[64] Ibid
[65] United Nations., 'The Implications of Climate Change for Mediation and Peace Processes' Op Cit
[66] Ibid
[67] Ibid
[68] Ibid
[69] Kaufman. S., 'Mediation in Environmental Disputes.' Available at https://www.eolss.net/samplechapters/c14/E1-40-03-03.pdf (Accessed on 09/04/2025)
[70] Muigua. K., 'Utilizing Alternative Dispute Resolution in Climate Change Disputes' Available at https://kmco.co.ke/wp-content/uploads/2024/03/Utilizing-Alternative-Dispute-Resolution-in-Climate-Change-Disputes.pdf (Accessed on 09/04/2025)
[71] Girinarayanan. I., 'Can Climate Change Disputes be Resolved through Mediation?' Available at https://www.voicesofyouth.org/blog/can-climate-change-disputes-be-resolved-through-mediation (Accessed on 09/04/2025)
[72] Cameron. P., & Kolo. A., 'Mediating International Energy Disputes' Available at https://discovery.dundee.ac.uk/ws/portalfiles/portal/37913515/Cameron_Abba_Energy_Reviewed_6_7_2018.pdf (Accessed on 09/04/2025)

projects, borders and cultures[73]. This creates incentives for stakeholders in the energy sector including energy companies and states to look at alternatives to more formal dispute resolution mechanisms such as litigation or arbitration[74]. Mediation is therefore useful in preserving critical business relationships and ensuring the long-term sustainability and viability of energy projects[75]. It is perfectly suited in energy disputes such as those concerning energy transition and renewable energy projects where it is desirable to preserve relationships and complete projects in order to realize access to clean and affordable energy for all[76].

Further, mediation can enhance the participation of local communities in energy projects therefore granting investors a 'social licence to operate'[77]. It has been argued that implementing a project without the participation of local communities can lead to operational delays, disputes, financial costs and litigation, project closure, violence and loss of life[78]. Utilising mediation to resolve disagreements is therefore vital in engaging with local communities to reach shared agreement and allowing people to have a meaningful voice in deliberative decision-making processes related to their own development[79]. Mediation can therefore be harnessed to ensure that the Free, Prior and Informed Consent (FPIC) of local communities is obtained before energy projects are implemented therefore minimising the likelihood of disputes[80].

Mediation is therefore an appropriate tool towards effective management of climate change and energy disputes. However, the use of mediation in such disputes may be undermined in cases where a legal precedent is needed, where there are power imbalances among the parties, where a mediator lacks expertise in climate change and energy matters, where parties are uncooperative, and where there is need for binding outcomes especially for purposes of multi-jurisdictional enforcement[81]. These challenges can undermine the rule of law. For instance, lack of precedents in mediation can result in similar climate change and energy disputes having different

[73] Managing and Resolving Cross-Border Disputes in the Energy Sector.' Available at Available at https://www.ashurst.com/en/insights/managing-and-resolving-cross-border-disputes-in-the-energy-sector/ (Accessed on 09/04/2025)
[74] Ibid
[75] Ibid
[76] Muigua. K., 'Attaining Environmental Justice through Alternative Dispute Resolution' Available at https://kmco.co.ke/wp-content/uploads/2023/07/Attaining-Environmental-Justice-through-Alternative-Dispute-Resolution.pdf (Accessed on 09/04/2025)
[77] Buxton. A., & Wilson. E., 'FPIC and the Extractive Industries: A Guide to Applying the Spirit of Free, Prior and Informed Consent in Industrial Projects' Available at https://www.iied.org/16530iied (Accessed on 09/04/2025)
[78] Ibid
[79] Ibid
[80] Ibid
[81] Civil Mediation Council., 'Mediating Climate Change Disputes: Navigating Scope 3 Effects and International Law Implementation in Energy Transition Projects' Available at https://civilmediation.org/mediating-climate-change-disputes/ (Accessed on 09/04/2025)

outcomes[82]. This is inconsistent with the cardinal tenets of the rule of law including certainty, consistency, and predictability in application of the law[83]. Further, where there is an abusive imbalance of power among parties in mediation, this could undermine fairness in management of disputes and potentially result in violation of the rights of the vulnerable and marginalized individuals and communities[84]. It is therefore necessary to address these challenges in order to effectively mediate climate change and energy disputes.

4.0 Conclusion

Mediation is an appropriate tool in promoting the rule of law. It ensures affordable, efficient, expeditious, flexible, and accessible resolution of disputes thus fostering access to justice and protecting human rights[85]. Mediation is vital in fostering environmental rule of law through effective management of climate change and energy disputes[86]. It is an important process towards climate justice since it ensures that the voice of women, youth, indigenous peoples and marginalized groups, who face particular climate risks are integrated in decision-making processes in climate change and energy disputes[87]. However, the suitability of mediation in climate change and energy disputes can be undermined by lack of precedents, power imbalances, capacity challenges, and enforceability challenges due to the voluntary nature of mediation[88]. These factors can undermine the rule of law.

In order to effectively mediate climate change and energy disputes, it is imperative to strengthen the legal, policy, and institutional frameworks on mediation at all levels[89]. In addition, there is need to build the capacity of mediators on technical and scientific aspects of climate change and energy disputes in order to enhance their role in managing such disputes[90]. Further, the participation of marginalized and vulnerable individuals and communities including women, the youth, local communities, and indigenous peoples in mediation should also be bolstered towards climate justice[91]. It is also necessary to address power imbalances in mediation in order to ensure

[82] Acharya. N., 'Mediation, the Rule of Law, and Dialogue' Available at https://journal.queenslaw.ca/sites/qljwww/files/img/vol%2046/4.%20Acharya.pdf (Accessed on 09/04/2025)
[83] Waldron. J., 'The Rule of Law.' Op Cit
[84] Buxton. A., & Wilson. E., 'FPIC and the Extractive Industries: A Guide to Applying the Spirit of Free, Prior and Informed Consent in Industrial Projects' Op Cit
[85] Singapore International Mediation Centre., 'Mediation and the Rule of Law' Op Cit
[86] Kaufman. S., 'Mediation in Environmental Disputes.' Op Cit
[87] United Nations., 'The Implications of Climate Change for Mediation and Peace Processes' Op Cit
[88] Civil Mediation Council., 'Mediating Climate Change Disputes: Navigating Scope 3 Effects and International Law Implementation in Energy Transition Projects' Op Cit
[89] Muigua. K., 'Managing Natural Resource Conflicts in Kenya through Negotiation and Mediation.' Available at https://kmco.co.ke/wp-content/uploads/2018/08/Managing-Natural-Resource-Conflictsin-Kenya-through-Negotiation-and-Mediation.pdf (Accessed on 09/04/2025)
[90] United Nations., 'The Implications of Climate Change for Mediation and Peace Processes' Op Cit
[91] Ibid

fairness while also ensuring enforcement of outcomes in order to safeguard the rule of law[92]. Mediating climate change and energy disputes is therefore possible towards promoting the rule of law.

[92] Civil Mediation Council., 'Mediating Climate Change Disputes: Navigating Scope 3 Effects and International Law Implementation in Energy Transition Projects' Op Cit

Chapter 25: Harmonising Dispute Resolution for Sustainability: Towards an African Energy Arbitration

Abstract

This paper critically examines how arbitration can be effectively harnessed towards effective management of energy disputes in Africa. The paper argues that energy disputes are prevalent in Africa. It further notes that these disputes are undesirable since they affect the quest towards energy transition and energy justice in Africa. The paper asserts that arbitration is a viable tool for effective management of energy disputes in Africa. It discusses the key features of arbitration which makes it a viable process for managing energy disputes in Africa and globally. The paper further highlights some of the challenges associated with arbitration of energy disputes in Africa. In light of these challenges, the paper proposes reforms towards harmonizing dispute resolution through adoption of an African Energy Arbitration Protocol towards effective management of energy disputes for sustainability.

1.0 Introduction

Energy is a crucial resource human development. It has been argued that energy creates capacities to take advantage of the opportunities that development brings, as well as to face the challenges it poses[1]. The use of sustainable and clean energy sources has been identified as crucial in protecting the environment and promoting equitable development[2]. Further, it has been pointed out that energy plays a critical role in economic growth and development, and future economic growth in all countries is largely hinged on the long-term availability of energy which is to be derived from sources that are affordable, accessible and environmentally friendly[3].

Despite its crucial role in fostering socio-economic development, the energy sector poses several challenges to people and the planet. For instance, a huge proportion of greenhouse gases responsible for the climate crisis are generated through energy production, by burning fossil fuels to generate electricity and heat[4]. It has been noted that fossil fuels, such as coal, oil and gas, are by far the largest contributor to global climate change, accounting for over 75 percent of global greenhouse gas emissions and nearly 90 percent of all carbon dioxide emissions[5]. In light of these challenges, there has been an increased global focus on energy transition aimed at shifting the global energy sector from fossil fuel- based systems of energy production and consumption

[1] United Nations Development Programme., 'Energy and Human Development' Available at https://www.undp.org/sites/g/files/zskgke326/files/migration/py/UNDP-PY-engINDH_Py_2020_Summary.pdf (Accessed on 24/04/2025)

[2] Ibid

[3] Muigua. K., Wamukoya. D & Kariuki. F., 'Natural Resources and Environmental Justice in Kenya.' Glenwood Publishers Limited, 2015

[4] United Nations., 'Renewable Energy – Powering a Safer Future' Available at https://www.un.org/en/climatechange/raising-ambition/renewable-energy (Accessed on 24/04/2025)

[5] Ibid

including oil, natural gas and coal to renewable energy sources like wind and solar[6]. Global energy transition is envisioned under the United Nations *2030 agenda for Sustainable Development*[7]. Sustainable Development Goal (SDG) 7 seeks to ensure access to affordable, reliable, sustainable and modern energy for all including through substantially increasing the share of renewable energy in the global energy mix[8].

In order to achieve energy transition, there has been an increase in investments in the energy sector globally with specific focus on renewable energy projects[9]. While these projects are critical in achieving energy transition globally, they are also associated with several challenges including high incidence of disputes. Energy disputes are undesirable since they can adversely impact the viability and success of energy projects therefore undermining energy transition[10]. Effective management of energy disputes is therefore vital to achieve energy transition for Sustainable Development. Arbitration has been identified as an appropriate tool for managing energy disputes both globally and in Africa[11].

This paper critically examines how arbitration can be effectively harnessed towards effective management of energy disputes in Africa. The paper argues that energy disputes are prevalent in Africa. It further notes that these disputes are undesirable since they affect the quest towards energy transition and energy justice in Africa. The paper asserts that arbitration is a viable tool for effective management of energy disputes in Africa. It discusses the key features of arbitration which makes it a viable process for managing energy disputes in Africa and globally. The paper further highlights some of the challenges associated with arbitration of energy disputes in Africa. In light of these challenges, the paper proposes reforms towards harmonizing dispute resolution through adoption of an African Energy Arbitration Protocol towards effective management of energy disputes for sustainability.

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[6] S & P Global., 'What is Energy Transition?' Available at https://www.spglobal.com/en/researchinsights/articles/what-is-energy-transition (Accessed on 24/04/2025)

[7] United Nations General Assembly., 'Transforming Our World: the 2030 Agenda for Sustainable Development.' 21 October 2015, A/RES/70/1., Available at https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf (Accessed on 24/04/2025)

[8] Ibid

[9] Burges-Salmon., 'Energy Disputes Guide: Managing Risk and Avoiding Disputes in your Energy Project.' Available at https://www.burges-salmon.com/energy-disputes-guide-managing-risk-and-avoiding-disputes-in-your-energy-project (Accessed on 24/04/2025)

[10] Ibid

[11] Clearly Gottlieb., 'Resolving Energy Disputes in Africa Through Arbitration and Alternative Dispute Resolution ('ADR'). Available at Available at https://content.clearygottlieb.com/regions/africa-outlook/resolving-energy-disputes-in-africa-through-arbitration-and-alternative-dispute-resolution/index.html (Accessed on 24/04/2025)

2.0 Energy Disputes in Africa

Energy disputes are inevitable. It has been observed that energy projects are, by their nature, often complex undertakings[12]. They frequently involve new and innovative technologies, significant investment, and also a high degree of interface between multiple parties who may sometimes have different, and even competing, interests[13]. This creates several risks and challenges including disputes which can adversely impact project viability and success[14].

The global energy sector is being shaped by several factors including geopolitical shifts, regulatory changes, and the ongoing quest for energy transition[15]. It has been argued that as energy companies and governments navigate decarbonisation, energy security, and investment landscapes, energy disputes are becoming more frequent and complex[16]. These disputes include joint venture/contractual disputes, claims arising from weather conditions in renewable energy projects, construction related disputes, technology related disputes, investor/state disputes, and regulatory disputes[17]. Further, there has been a rise in climate litigation with a particular focus on the energy sector[18]. For instance, climate-washing cases, where statements made by public and private actors on contributions to climate action and the energy transition are challenged over their misleading or overstated nature, are on the rise globally[19]. Further, it has been noted that critical minerals which play a crucial role in energy transition are intensifying geopolitical tensions and driving global conflicts and disputes in the energy sector[20].

Energy disputes are also prevalent in Africa. It has been argued that the demand for energy in Africa continues to rise as the continent's population and income grow[21]. Africa has huge reserves for fossil fuels including oil and gas, with a large capacity for green energy due to abundance of

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[12] Burges-Salmon., 'Energy Disputes Guide: Managing Risk and Avoiding Disputes in your Energy Project.' Op Cit

[13] Ibid

[14] Ibid

[15] Energy Disputes: Navigating Key Trends and Challenges., Available at https://www.velaw.com/insights/energy-disputes-navigating-key-trends-and-challenges/ (Accessed on 25/04/2025)

[16] Ibid

[17] McMahon. M., Shah. P., 'The Rise of Renewable Energy Disputes and Arbitration.' Available at https://www.stewartslaw.com/news/rise-of-renewable-energy-disputes/ (Accessed on 25/04/2025)

[18] What is Climate Change Litigation?., Available at https://www.lse.ac.uk/granthaminstitute/explainers/what-is-climate-change-litigation/#:~:text=Climate%2Dwashing%20cases%3A%20those%20where,against%20the%20airline%20KLM%EF%BB%BF%20. (Accessed on 25/04/2025)

[19] Ibid

[20] The critical minerals scramble: How the race for resources is fuelling conflict and inequality., Available at https://globalwitness.org/en/campaigns/transition-minerals/the-critical-minerals-scramble-how-the-race-for-resources-is-fuelling-conflict-and-inequality/#:~:text=How%20are%20critical%20minerals%20driving,communities%20in%20resource%2Drich%20nations. (Accessed on 25/04/2025)

[21] Kebe. M., 'Resolving infrastructure and energy disputes in sub-Saharan Africa' Available at https://www.dlapiperafrica.com/en/senegal/insights/2024/resolving-infrastructure-and-energy-disputes- (Accessed on 25/04/2025)

renewable sources of energy such as solar, wind, and geothermal energy[22]. Africa is endowed with numerous sources of energy including renewables such as wind, solar, hydro, bioenergy, ocean tidal waves, and geothermal among other renewables[23]. It is estimated that Africa is home to approximately 8 per cent of the world's natural gas and 12 per cent of the world's oil reserves[24]. According to the International Energy Agency (IEA), oil and gas continue to dominate energy use in North Africa and coal dominates in South Africa, due to the local availability of low cost resources, while renewables are the dominant fuel category in Sub-Saharan Africa[25].

Due to the abundance of energy sources in the continent, there has been an increase in investments in the energy sector in Africa including through bilateral and multilateral investment treaties[26]. The rise of energy and infrastructure projects in Africa, combined with the challenges deriving from the energy transition have led to a wide range of disputes both under contractual instruments (such as concession agreements) and investment treaties[27]. For instance, renewable energy sources have resulted in an increase in energy projects and, with that, the potential for a growing number of disputes coming from the energy sector in Africa[28]. It has been correctly observed that as the energy transition in Africa continues to gather pace, and concerted efforts are made to expand energy capacity all over the continent through new renewable projects, energy disputes are bound to occur[29]. Unpredictable regulatory environments, the pace of development required to achieve energy transition, the variety and number of stakeholders involved, supply chain complexity and the deployment of new technologies all create fertile conditions for energy disputes in Africa[30]. It is estimated that Africa will see the largest growth in energy-related disputes, driven by an increase in energy exploration activities in many

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[22] Muigua. K., 'Adopting Green Energy for a Bright Tomorrow.' Available at Available at http://kmco.co.ke/wp-content/uploads/2023/06/Adopting-Green-Energy-for-a-Bright-Tomorrow.pdf (Accessed on 25/04/2025)

[23] Africa Union., 'Agenda 2063: The Africa we Want.' Available at https://au.int/sites/default/files/documents/33126-doc-framework_document_book.pdf (Accessed on 25/04/2025)

[24] United Nations Environment Programme., 'Our Work in Africa.' Available at https://www.unep.org/regions/africa/our-workafrica#:~:text=The%20continent%20has%2040%20percent,internal%20renewable%20fresh%20water%20so urce (Accessed on 25/04/2025)

[25] International Energy Agency., 'Africa Energy Outlook: 2022.' Available at https://iea.blob.core.windows.net/assets/220b2862-33a6-47bd-81e9-00e586f4d384/AfricaEnergyOutlook2022.pdf (Accessed on 25/04/2025)

[26] Kebe. M., 'Resolving infrastructure and energy disputes in sub-Saharan Africa' Op Cit

[27] Ibid

[28] Global Arbitration Review., 'Energy Arbitration in Africa.' Available at https://globalarbitrationreview.com/review/the-middle-eastern-and-african-arbitration-review/2022/article/energy-arbitration-in-africa (Accessed on 25/04/2025)

[29] Hameau. P., Bentley. J., & Robert. M., 'Energy arbitration in Africa: potential sources of energy and natural resources disputes' Available at https://globalarbitrationreview.com/review/the-middle-eastern-and-african-arbitration-review/2024/article/energy-arbitration-in-africa-potential-sources-of-energy-and-natural-resources-disputes (Accessed on 24/04/2025)

[30] Ibid

countries across the continent[31]. In addition, given the heavy presence of foreign investors in the African energy sector, energy disputes are likely to arise under both contractual instruments (such as concession agreements) and investment treaties[32].

Energy disputes in Africa are undesirable. Such disputes can hinder the successful completion of energy projects therefore undermining energy transition[33]. Energy disputes in Africa need to be dealt with swiftly and amicably since access to energy and adequate infrastructures are necessary for Africa to sustain its growth[34]. In addition, it has been correctly asserted that for the quick and efficient resolution of disputes in strategic and vital sectors such as energy, it is important to always look for the most appropriate mechanism[35]. Effective management of energy disputes in Africa is therefore vital towards achieving energy transition and Sustainable Development.

3.0 Managing Energy Disputes in Africa through Arbitration: Opportunities and Challenges

Arbitration is a private and consensual process where parties in dispute agree to present their grievances to a third party for resolution[36]. It has also been defined as a dispute management mechanism where parties through an agreement submit their dispute to one or more neutral third parties who make a binding decision on the dispute[37]. Arbitration has been embraced in dispute management at both the global and national levels. At the global level, Alternative Dispute Resolution (ADR) mechanisms including arbitration are recognized under the *Charter of the United Nations*[38]. The Charter provides that parties to a dispute shall first of all seek a solution by negotiation, enquiry, mediation, conciliation, *arbitration*, judicial settlement, resort to regional agencies or arrangements, or other peaceful means of their own choice[39] (Emphasis added). At a national level, the Constitution of Kenya mandates courts and tribunals to promote ADR mechanisms including reconciliation, mediation, *arbitration* and Traditional Dispute Resolution Mechanisms (TDRMs)[40].

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[31] Clearly Gottlieb., 'Resolving Energy Disputes in Africa Through Arbitration and Alternative Dispute Resolution ('ADR').' Op Cit

[32] Ibid

[33] The World Bank Group., 'Renegotiation, Government Step-in rights, Termination, and Dispute Resolution' Available at https://ppp.worldbank.org/public-private-partnership/renegotiation-government-step-rights-termination-and-dispute-resolution#:~:text=The%20accelerating%20availability%20of%20disruptive,in%20the%a20energy%20sector%20globally (Accessed on 25/04/2025)

[34] Kebe. M., 'Resolving infrastructure and energy disputes in sub-Saharan Africa' Op Cit

[35] Ibid

[36] Muigua. K., 'Settling Disputes through Arbitration in Kenya.' Glenwood Publishers, 4th Edition, 2022

[37] World Intellectual Property Organization., 'What is Arbitration' Available at https://www.wipo.int/amc/en/arbitration/what-is-arb.html (Accessed on 25/04/2025)

[38] United Nations, Charter of the United Nations, 24 October 1945, 1 UNTS XVI

[39] Ibid, article 33 (1)

[40] Constitution of Kenya., 2010., article 159 (2) (c)

Arbitration is considered an appropriate tool in managing energy disputes both globally and in Africa. Arbitration has been identified as the most preferred mechanism for settling energy disputes globally whether in its commercial or its investment modes[41]. Arbitration is a suitable process for managing disputes in the energy sector due to its flexibility, the ability to provide confidentiality, the ability to enlist specialist, commercial-minded arbitrators to determine the dispute, and its ability to provide for a neutral forum in complex energy disputes involving international parties, particularly when compared to litigation before domestic courts[42]. It has been argued that the principal goal in utilising arbitration in energy disputes is to avoid a dependence on national courts if the relationship is with a host state or its agent such as a national energy company, and if the relationship is with a private party, to achieve the efficiency and confidentiality benefits of arbitration as opposed to litigation[43].

Due to its numerous benefits, arbitration has become the preferred method of managing energy disputes globally. It is being utilised to manage both investor/state disputes including contract-based disputes, treaty-based disputes, and domestic investment law-based disputes[44]; and private disputes[45]. It has been argued that the advantages of arbitration in energy disputes include party autonomy, access to a neutral forum, flexibility, confidentiality, the ability to choose arbitrators with the required expertise and the enforceability of arbitral awards globally under the *Convention on the Recognition and Enforcement of Foreign Arbitral Awards (New York Convention)*[46]; and the *Convention on the Settlement of Investment Disputes between States and Nationals of other States (ICSID Convention)*[47].

Arbitration has been identified as the predominant method for settling energy-related disputes in Africa[48]. It has developed into a preferable process for managing disputes in Africa's growing

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[41] Cameron. P., 'International Arbitration and Energy Disputes' Available at https://discovery.dundee.ac.uk/ws/portalfiles/portal/99500417/GELS_ARTICLE_CAMERON_14112022_FINAL.pdf (Accessed on 25/04/2025)

[42] Resolving Energy Disputes in Africa Through Arbitration and Alternative Dispute Resolution ('ADR'), Available at Resolving Energy Disputes in Africa Through Arbitration and Alternative Dispute Resolution ('ADR').' Available at https://content.clearygottlieb.com/regions/africa-outlook/resolving-energy-disputes-in-africa-through-arbitration-and-alternative-dispute-resolution/index.html (Accessed on 25/04/2025)

[43] Peter. C., 'International arbitration and energy disputes' Available at https://discovery.dundee.ac.uk/ws/portalfiles/portal/99500417/GELS_ARTICLE_CAMERON_14112022_FINAL.pdf (Accessed on 25/04/2025)

[44] Resolving Energy Disputes Through Arbitration., Available at https://www.acerislaw.com/resolving-energy-disputes-through-arbitration/ (Accessed on 25/04/2025)

[45] Ibid

[46] United Nations Convention on the Recognition and Enforcement of Foreign Arbitral Awards (New York, 10 June 1958)

[47] Convention on the Settlement of Investment Disputes Between States and Nationals of Other States (International Centre for Settlement of Investment Disputes [ICSID]) 575 UNTS 159

[48] Clearly Gottlieb., 'Resolving Energy Disputes in Africa Through Arbitration and Alternative Dispute Resolution ('ADR').' Op Cit

energy industry[49]. It has been argued that arbitration is vital in energy transition in Africa providing a timely and effective avenue for managing disputes towards a just and smooth transition to cleaner energy sources in Africa[50]. Arbitration is vital in navigating the unique challenges and opportunities presented by the quest towards energy transition in Africa[51]. Effective dispute management mechanisms such as arbitration can play a key role in fast-tracking energy transition in Africa by facilitating investments in clean energy projects, mitigating risks for investors and stakeholders in the energy sector, and ensuring a win-win scenario for both environmental protection and economic development in the continent[52].

Despite its promise, the use of arbitration in managing energy disputes in Africa raises several concerns. For example, it has been argued that the practice of arbitration in Africa faces several challenges including inadequate legal and institutional frameworks, inadequate marketing, uncertainty in drafting arbitration clauses, interference by national courts, uncertainty of costs, perception of corruption and bias against Africa[53]. These challenges undermine the suitability of Africa as a preferred seat for energy arbitration. The unique nature of energy disputes can also create challenges in managing such disputes through arbitration in Africa. For instance, issues may arise in energy arbitrations involving price review, for which experts are often needed[54]. It has been observed that expert determination and arbitration clauses can be ambiguous, creating difficulties as to the scope of the arbitral tribunal's and the expert's powers[55].

The foregoing challenges are undermining the growth of energy arbitration in Africa with most disputes being managed outside the continent. It has been argued that the preference for energy arbitrations involving Africa to be seated outside of the continent denies it the opportunities to improve its reputation for jurisprudence, expand its legal skills and reap the financial benefits that flow to the local economy from being the venue of proceedings[56]. In light of the ongoing energy arbitration inequities, it is imperative for Africa to reposition itself in order to become a preferred destination for energy arbitration. Adoption of an African Energy Arbitration Protocol can play a key role towards achieving this objective.

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[49] Ibid

[50] Owa. I., 'The Role of Arbitration in the Energy Transition in Africa' Available at https://arbitrationblog.kluwerarbitration.com/2024/04/16/2024-lcia-west-africa-roadshow-the-role-of-arbitration-in-the-energy-transition-in-africa/ (Accessed on 25/04/2025)

[51] Ibid

[52] Ibid

[53] Muigua. K., 'Nurturing International Commercial Arbitration in Kenya.' Available at https://kmco.co.ke/wp-content/uploads/2021/10/Nurturing-International-Commercial-Arbitration-in-Kenya.pdf (Accessed on 25/04/2025)

[54] Resolving Energy Disputes Through Arbitration., Op Cit

[55] Ibid

[56] Li. R., 'Energy arbitration inequities affect Africa deeply' Available at https://www.africanlawbusiness.com/news/20762-energy-arbitration-inequities-affect-africa-deeply/ (Accessed on 25/04/2025)

4.0 Towards an African Energy Arbitration Protocol?

There may be need to adopt an African Energy Arbitration Protocol in order to harmonise energy dispute resolution in the continent for sustainability. At the global level, the *Energy Charter Treaty*[57] provides a guiding legal framework for managing energy disputes. The Charter stipulates that energy disputes between an investor and a contracting state shall be settled amicably[58]. It requires energy disputes to be managed through diplomatic channels and where such channels fail, then such disputes shall be managed through an ad hoc arbitral tribunal[59]. The Energy Charter Treaty sets out mechanisms for management of energy disputes including amicable settlement, use of courts and tribunals, international arbitration, conciliation and diplomacy[60].

However, it has been argued that the Energy Charter Treaty is unfit for purpose fueling several withdrawals from the Treaty[61]. For instance, its investor-state dispute settlement mechanism (ISDS) has been accused of potentially undermining national policies especially those concerning energy transition and environmental conservation[62]. Further, with several African countries seeking to join the Treaty, it has been argued that the extension of the Energy Charter Treaty represents a threat to developing countries[63]. The Treaty can hinder the exploitation of energy resources in developing countries in a way that guarantees local added value and compliance with environmental standards thus undermining energy transition and fueling energy related disputes[64].

In light of the challenges associated with energy arbitration in Africa and the ISDS under the Energy Charter Treaty, adopting an African Energy Arbitration Protocol may be a viable option towards effective management of energy disputes in the continent for sustainability. Such a Protocol can cure challenges associated with energy arbitration in Africa including incomplete and unclear arbitration clauses, challenges in selecting governing law, and differences in legal

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[57] The Energy Charter Treaty., Available at https://www.energycharter.org/fileadmin/DocumentsMedia/Legal/ECTC-en.pdf (Accessed on 25/04/2025)

[58] Ibid, Article 26 (1)

[59] Ibid, Article 27

[60] Ibid

[61] Commercial Dispute Resolution., 'A bad year for the Energy Charter Treaty' Available at https://www.cdr-news.com/categories/litigation/19704-a-bad-year-for-the-energy-charter-treaty/ (Accessed on 25/04/2025)

[62] Ibid

[63] Takouleu. J.M., 'London withdraws from the Energy Charter Treaty: a lesson for Africa?' Available at https://africa-energy-portal.org/blogs/london-withdraws-energy-charter-treaty-lesson-africa#:~:text=The%20risk%20of%20extension%20to%20Africa&text=While%20several%20European%20countries%20have,process%20of%20joining%20the%20ECT. (Accessed on 25/04/2025)

[64] Ibid

frameworks in the continent[65]. It can also harmonise dispute resolution by tackling the challenge of parallel proceedings which can arise due to simultaneous adjudication of related disputes across multiple fora, including domestic courts, ICSID, the United Nations Commission on International Trade Law (UNCITRAL) tribunals, and commercial arbitration panels[66]. It has been argued that this situation fuels jurisdictional fragmentation, as investors and state entities each seek to take advantage of overlapping legal frameworks to advance their interests[67]. It also creates tensions between arbitral tribunals and domestic courts, particularly where competing decisions challenge the primacy of arbitration agreements and the enforceability of arbitral awards[68]. Adopting an African Energy Arbitration Protocol may be vital in addressing this challenge and ensuring certainty and predictability in energy arbitration in Africa.

5.0 Conclusion

Arbitration is a viable process for managing energy disputes in Africa ensuring flexibility, confidentiality, the ability to enlist specialist, commercial-minded arbitrators, neutrality of forum and enforcement of awards[69]. However, challenges such as inadequate legal frameworks, capacity challenges, and bias undermine the viability of energy arbitration in Africa with many disputes being managed outside the continent[70]. Adopting an African Energy Arbitration Protocol may therefore be key in ensuring certainty and predictability while also strengthening and harmonizing energy dispute resolution in Africa for sustainability.

[65] Energy arbitration in Africa: Potential sources of energy and natural resources disputes., Available at https://www.nortonrosefulbright.com/en-ke/knowledge/publications/da675a37/energy-arbitration-in-africa (Accessed on 25/04/2025)

[66] Hameau. P., Asselineau. C., & Robert. M., 'Energy arbitration in Africa: parallel proceedings' Available at https://globalarbitrationreview.com/review/the-middle-eastern-and-african-arbitration-review/2025/article/energy-arbitration-in-africa-parallel-proceedings (Accessed on 25/04/2025)

[67] Ibid

[68] Ibid

[69] Resolving Energy Disputes in Africa Through Arbitration and Alternative Dispute Resolution ('ADR'), Available at Resolving Energy Disputes in Africa Through Arbitration and Alternative Dispute Resolution ('ADR').' Op Cit

[70] Li. R., 'Energy arbitration inequities affect Africa deeply' Op Cit

Chapter 26: Utilising Multi-tiered Conflict Management Mechanisms to Resolve Energy Disputes in Africa

Abstract

This paper critically examines how energy disputes can be successfully managed in Africa. The paper observes that energy disputes are prevalent all over Africa. It discusses the causes and effects of energy disputes in Africa. The paper notes that energy disputes in Africa are undesirable since they hinder development efforts with negative consequences for people and planet. Consequently, the paper argues that effective management of energy disputes in Africa is necessary in fostering the continent's development agenda. It explores how multi-tiered conflict management mechanisms can be utilised to resolve energy disputes in Africa for sustainability.

1.0 Introduction

Access to energy is a fundamental human right. Energy has been described as basic human need and a vital resource whose accessibility, reliability, affordability and sustainability is a prerequisite for human progress and Sustainable Development[1]. For example, it has been argued that energy plays a critical role in economic growth and development, and future economic growth in all countries is largely hinged on the long-term availability of energy which is to be derived from sources that are affordable, accessible and environmentally friendly[2]. Further, it has been pointed out that energy has the potential of accelerating the attainment of socio-economic rights such as the right to food, the right to education, the right to health and the right to water among others[3]. Energy is therefore crucial for achieving almost all of the Sustainable Development Goals (SDGs) from its role in eradicating poverty to advancements in health, education, water supply, industrialization and climate action among other key sectors[4].

Due to its importance in unlocking Sustainable Development and human progress, there has been a rise in investments in the energy sector globally towards harnessing this vital resource. In particular, there has been an increase in investments in clean energy globally with specific focus on renewable energy projects[5]. In order to achieve this goal, SDG 7 under the 2030 Agenda for

[1] United Nations Environment Programme., 'Goal 7: Affordable and Clean Energy' Available at https://www.unep.org/topics/sustainable-development-goals/why-do-sustainable-development-goals-matter/goal-7 (Accessed on 16/12/2025)

[2] Muigua. K., Wamukoya. D & Kariuki. F., 'Natural Resources and Environmental Justice in Kenya.' Glenwood Publishers Limited, 2015

[3]The World Bank, 'Sustainable Development Goal on Energy (SDG7) and the World Bank Group, available at https://www.worldbank.org/en/topic/energy/brief/sustainable-development-goal-onenergy-sdg7-and-the-world-bank-group (Accessed on 16/12/2025)

[4] Energy and the Sustainable Development Goals., Available at https://energypedia.info/wiki/Energy_and_the_Sustainable_Development_Goals (Accessed on 16/12/2025)

[5] Burges-Salmon., 'Energy Disputes Guide: Managing Risk and Avoiding Disputes in your Energy Project.' Available at https://www.burges-salmon.com/energy-disputes-guide-managing-risk-and-avoiding-disputes-in-your-energy-project (Accessed on 16/12/2025)

Sustainable Development seeks to ensure access to affordable, reliable, sustainable and modern energy for all in order to spur Sustainable Development[6]. It urges all countries to enhance investments in clean energy in order to substantially increase the share of renewable energy in the global energy mix for people and planet[7].

The increased focus on the energy sector including the growth of investments in renewable energy is crucial in fostering Sustainable Development. However, it has been noted that this trend has led to a rise in energy disputes globally including in Africa[8]. It has been argued that energy disputes are undesirable since they can hinder the successful completion of energy projects therefore undermining universal access to energy[9]. Effective management of energy disputes is therefore vital in the quest for Sustainable Development.

This paper critically examines how energy disputes can be successfully managed in Africa. The paper observes that energy disputes are prevalent all over Africa. It discusses the causes and effects of energy disputes in Africa. The paper notes that energy disputes in Africa are undesirable since they hinder development efforts with negative consequences for people and planet. Consequently, the paper argues that effective management of energy disputes in Africa is necessary in fostering the continent's development agenda. It explores how multi-tiered conflict management mechanisms can be utilised to resolve energy disputes in Africa for sustainability.

2.0 Energy Disputes in Africa: Causes and Effects

Energy disputes are prevalent all over the world. For example, it has been argued that the rise of energy and infrastructure projects globally and in Africa, combined with the challenges deriving from the energy transition have led to a wide range of disputes both under contractual instruments (such as concession agreements) and investment treaties[10]. As the global and regional energy sectors continue to be shaped by geopolitical shifts, regulatory changes, and the quest for

[6] United Nations General Assembly., 'Transforming Our World: the 2030 Agenda for Sustainable Development.' 21 October 2015, A/RES/70/1., Available at https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf (Accessed on 16/12/2025)

[7] Ibid

[8] McMahon. M., Shah. P., 'The Rise of Renewable Energy Disputes and Arbitration.' Available at https://www.stewartslaw.com/news/rise-of-renewable-energy-disputes/ (Accessed on 16/12/2025)

[9] The World Bank Group., 'Renegotiation, Government Step-in rights, Termination, and Dispute Resolution' Available at https://ppp.worldbank.org/public-private-partnership/renegotiation-government-step-rights-termination-and-dispute-resolution#:~:text=The%20accelerating%20availability%20of%20disruptive,in%20the%a20energy%20sector%20globally (Accessed on 16/12/2025)

[10] Kebe. M., 'Resolving infrastructure and energy disputes in sub-Saharan Africa' Available at https://www.dlapiperafrica.com/en/senegal/insights/2024/resolving-infrastructure-and-energy-disputes- (Accessed on 16/12/2025)

energy transition, energy disputes are becoming more common and complex[11]. These disputes are flowing from various sources including power purchase agreements, carbon markets, pricing and delivery contracts, access and control over critical minerals, and climate change regulations[12]. It has been argued that energy disputes can take the form of joint venture/contractual disputes, claims arising from weather conditions in renewable energy projects, construction related disputes, technology related disputes, investor/state disputes, and regulatory disputes[13].

Africa is highly vulnerable to energy disputes. For instance, it has been argued that due to the continent's viable deposits of oil and gas and abundant renewable energy potential, the rise in renewable energy projects, shifting regulatory landscapes, deployment of new technologies in the energy sector and supply chain challenges create conditions that can cause energy disputes[14]. Africa has huge reserves for fossil fuels including oil and gas, with a large capacity for clean energy due to abundance of renewable sources of energy such as solar, wind, and geothermal energy[15]. Consequently, there has been an increase in investments in the energy sector in Africa including through bilateral and multilateral investment treaties[16]. This has led to growth of energy disputes in Africa including in the renewable energy sector. For example, it has been argued that large-scale renewable projects in Africa contribute to local and regional tensions and conflicts, as competition for resources, environmental degradation, and socio-economic disparities associated with such projects ignite long-standing grievances[17]. Wind and solar farms, hydroelectric dams, and geothermal plants needed to adopt renewable energy in Africa all require significant land and water resources, often leading to disputes over land rights and environmental impact[18]. In some cases, renewable energy projects in Africa have been implemented without the Free, Prior and Informed Consent (FPIC) of indigenous peoples and local communities giving rise to disputes[19].

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[11] Energy Disputes: Navigating Key Trends and Challenges., Available at https://www.velaw.com/insights/energy-disputes-navigating-key-trends-and-challenges/ (Accessed on 16/12/2025)

[12] Ibid

[13] McMahon. M., Shah. P., 'The Rise of Renewable Energy Disputes and Arbitration.' Available at https://www.stewartslaw.com/news/rise-of-renewable-energy-disputes/ (Accessed on 16/12/2025)

[14] ESG and human rights issues set to spark rise in Africa energy disputes., Available at https://www.africanlawbusiness.com/news/esg-and-human-rights-issues-set-to-spark-rise-in-africa-energy-disputes/#:~:text=Africa's%20energy%20transition%20movement%20will,human%20rights%20and%20ESG%20concerns. (Accessed on 16/12/2025)

[15] Muigua. K., 'Adopting Green Energy for a Bright Tomorrow.' Available at Available at http://kmco.co.ke/wp-content/uploads/2023/06/Adopting-Green-Energy-for-a-Bright-Tomorrow.pdf (Accessed on 16/12/2025)

[16] Kebe. M., 'Resolving infrastructure and energy disputes in sub-Saharan Africa' Op Cit

[17] The Role of Fossil Fuel and Renewable Energy Projects in Conflict Across Africa., Available at https://www.accord.org.za/analysis/the-role-of-fossil-fuel-and-renewable-energy-projects-in-conflict-across-africa/ (Accessed on 16/12/2025)

[18] Ibid

[19] Ibid

Energy disputes in Africa are undesirable. It has been argued that Africa will witness the largest growth in energy-related disputes, driven by an increase in energy exploration activities all over the continent[20]. In addition, given the heavy presence of foreign investors in the African energy sector, energy disputes are likely to arise under both contractual instruments and investment treaties[21]. It has been argued that energy disputes in Africa need to be managed effectively and expeditiously since fast-tracking energy transition in Africa is necessary for Sustainable Development[22]. Energy disputes can hinder the successful completion of energy projects thus undermining universal access to energy[23]. In particular, renewable energy disputes in Africa can undermine energy transition with severe consequences for people and planet since the shift from fossil fuels to clean sources of energy is necessary in tackling environmental challenges such climate change, pollution and biodiversity loss[24]. Further, such disputes can fuel violence and insecurity especially when local communities and indigenous peoples have not been adequately consulted and their land rights upheld[25]. Effective management of energy disputes in Africa is therefore necessary if the Sustainable Development agenda is to be achieved in the continent.

3.0 Utilising Multi-tiered Conflict Management Mechanisms to Resolve Energy Disputes in Africa

The prevalence of energy disputes in Africa is a major threat to sustainability. Effective management of energy disputes in Africa is therefore key towards actualising energy transition and the human right to energy for people and planet. Various approaches and techniques are suitable in resolving energy disputes in Africa. For example, it has been argued that litigation can be suitable in managing energy disputes both globally and in Africa due to its emphasis on efficiency in granting interim and preventive measures in the form of interim injunctions, and other such measures designed to minimize disruptions to energy production and supply during the pendency of disputes[26].

Alternative Dispute Resolution (ADR) techniques are also appropriate in managing energy disputes in Africa. For example, arbitration has been hailed as a viable approach in managing energy disputes due to its flexibility, confidentiality, the ability to enlist specialist, commercial-

[20] Resolving Energy Disputes in Africa through Arbitration and Alternative Dispute Resolution ('ADR')., Available at https://content.clearygottlieb.com/regions/africa-outlook/resolving-energy-disputes-in-africa-through-arbitration-and-alternative-dispute-resolution/index.html (Accessed on 16/12/2025)
[21] Ibid
[22] Kebe. M., 'Resolving infrastructure and energy disputes in sub-Saharan Africa' Op Cit
[23] The World Bank Group., 'Renegotiation, Government Step-in rights, Termination, and Dispute Resolution' Op Cit
[24] Kebe. M., 'Resolving infrastructure and energy disputes in sub-Saharan Africa' Op Cit

[25] The Role of Fossil Fuel and Renewable Energy Projects in Conflict Across Africa., Op Cit
[26] Resolving Energy Disputes in Africa through Arbitration and Alternative Dispute Resolution ('ADR').' Op Cit

minded arbitrators to determine energy disputes, and its ability to provide for a neutral forum in complex transnational energy disputes involving parties from multiple jurisdictions when compared to litigation before domestic courts[27]. Due to its attributes and advantages, it has been argued that arbitration is the most suitable and preferred mechanism for settling energy disputes globally whether in their commercial or investment modes[28]. By adopting arbitration, parties can avoid a dependence on national courts if the relationship is with a host state or its agent such as a national energy company, and if the relationship is with a private party, parties can achieve the privacy, efficiency, expeditiousness and confidentiality benefits of arbitration as opposed to litigation[29].

Other ADR processes such as negotiation and mediation are also suitable in resolving energy disputes in Africa. These processes focus on collaboration and dialogue[30]. For example, by embracing negotiation and mediation, it is possible to effectively involve local communities in the design and implementation of renewable energy projects thus minimising the likelihood of disputes[31]. It has been argued that negotiation and mediation provide parties with the opportunity to manage and resolve disputes before they escalate, which can not only save time and costs but can also preserve critical business relationships and ensure the long-term sustainability and viability of energy projects[32]. It has been correctly noted that commercial relationships in the energy sector are often long term and frequently operate across projects, borders and cultures[33]. Therefore, embracing collaboration among all stakeholders including governments, investors and local communities during a project's life cycle is important in maintaining ongoing relationships between the parties and preventing conflicts[34]. It has been argued that mediation and negotiation are suitable in preserving relationships, addressing the root causes of energy disputes and enhancing collaboration among parties and are therefore appropriate in resolving disputes in the energy sector[35].

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[27] Ibid

[28] Cameron. P., 'International Arbitration and Energy Disputes' Available at https://discovery.dundee.ac.uk/ws/portalfiles/portal/99500417/GELS_ARTICLE_CAMERON_14112022_FINAL.pdf (Accessed on 16/12/2025)

[29] Peter. C., 'International arbitration and energy disputes' Available at https://discovery.dundee.ac.uk/ws/portalfiles/portal/99500417/GELS_ARTICLE_CAMERON_14112022_FINAL.pdf (Accessed on 16/12/2025)

[30] Managing and Resolving Cross-Border Disputes in the Energy Sector.' Available at Available at https://www.ashurst.com/en/insights/managing-and-resolving-cross-border-disputes-in-the-energy-sector/ (Accessed on 16/12/2025)

[31] Ibid

[32] Ibid

[33] Ashurst., 'Managing and Resolving Cross-Border Disputes in the Energy Sector.' Available at https://www.ashurst.com/en/insights/managing-and-resolving-cross-border-disputes-in-the-energy-sector/ (Accessed on 16/12/2025)

[34] The World Bank Group., 'Renegotiation, Government Step-in rights, Termination, and Dispute Resolution' Op Cit

[35] Ashurst., 'Managing and Resolving Cross-Border Disputes in the Energy Sector.' Op Cit

Various processes are therefore suitable in managing energy disputes in Africa. These include litigation, arbitration, mediation and negotiation. In order to effectively embrace these processes, it is necessary to utilise multi-tiered conflict management techniques. This idea involves the use of various techniques to manage disputes starting with amicable resolution through processes such as negotiation and mediation prior to commencement of formal processes including arbitration and litigation[36]. Multi-tiered conflict management establishes a structured framework designed to resolve disputes through internal negotiation and mediation before parties can commence formal court or arbitration proceedings[37]. The goal is to prevent disputes from escalating and facilitate amicable, expeditious and cost-effective resolution in order to preserve relationships[38].

Embracing a multi-tiered approach is necessary towards successfully resolving energy disputes in Africa. For example, by embracing collaborative approaches such as negotiation and mediation in the first instance, parties can amicably resolve disputes before they escalate, which not only saves time and costs but also preserves critical business relationships especially in long-term energy projects[39]. Further, where negotiation and mediation fails, a multi-tiered approach allows parties to move to arbitration which provides the benefits of privacy, confidentiality, transnational applicability, neutrality of forum and expertise[40]. In addition, parties can also embrace litigation where arbitration fails and harnesses its benefits including enforcement of outcomes and ability to grant interim and preventive measures during the pendency of disputes[41]. Utilising multi-tiered conflict management mechanisms is therefore necessary towards harnessing the benefits of several processes including negotiation, mediation, arbitration and litigation for the successful management of energy disputes in Africa.

4.0 Conclusion

A multi-tiered approach is effective in resolving energy disputes in Africa for sustainability. Parties should therefore be encouraged to embrace multi-tiered conflict management mechanisms with priority on collaborative approaches such as negotiation and mediation before

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[36] International Bar Association., 'Tiered Dispute Resolution Clauses: Do You Walk the Straight and Narrow Path?' Available at https://www.ibanet.org/article/162496bc-c977-48e7-8ab0-33c108927dc0#:~:text=International%20Bar%20Association-,Tiered%20Dispute%20Resolution%20Clauses:%20Do%20You,the%20Straight%20and%20Narrow%20Path?&text=Many%20dispute%20resolution%20clauses%20today,required%20to%20be%20strictly%20followed? (Accessed on 16/12/2025)

[37] Multi-tiered dispute resolution procedure., Available at https://uk.practicallaw.thomsonreuters.com/3-369-3959?transitionType=Default&contextData=(sc.Default)&firstPage=true (Accessed on 16/12/2025)

[38] Ibid

[39] Ashurst., 'Managing and Resolving Cross-Border Disputes in the Energy Sector.' Op Cit

[40] Ibid

[41] Resolving Energy Disputes in Africa through Arbitration and Alternative Dispute Resolution ('ADR').' Op Cit

proceeding to formal processes including arbitration and litigation[42]. It is also vital to draft dispute resolution clauses that envisage the use of multi-tiered conflict management mechanisms to resolve energy disputes in Africa[43]. Utilising multi-tiered conflict management mechanisms is a viable and appropriate approach towards resolving energy disputes in Africa for sustainability.

[42] Resolving Energy Disputes in Africa through Arbitration and Alternative Dispute Resolution ('ADR').' Op Cit
[43] Ibid

Chapter 27: Conclusion

Africa's energy transition offers a critical opportunity to expand energy access, advance climate action and support sustainable development. However, success will depend not only on clean energy technologies, but on strong legal, policy and governance frameworks that ensure equity, environmental protection and effective conflict management.

Aligning energy transition strategies with the Sustainable Development Goals, the Paris Agreement and Agenda 2063 provides a clear roadmap for action. SDG 7 and SDG 13 emphasise clean energy access and climate resilience, while SDG 16 underscores the importance of strong institutions and effective dispute resolution in managing energy and climate-related conflicts. These global commitments resonate with Agenda 2063's aspirations for inclusive growth, sustainability and peaceful societies.

To achieve a just and inclusive transition, African states must promote coherent energy, climate and environmental governance, protect community rights and embed environmental stewardship in energy planning. Equally important is the integration of negotiation, mediation and arbitration as core governance tools to secure social licence, enhance investor confidence and uphold the rule of law.

Ultimately, Africa's energy transition must be people-centred, justice-oriented and conflict-sensitive to deliver clean, affordable and resilient energy systems for present and future generations.

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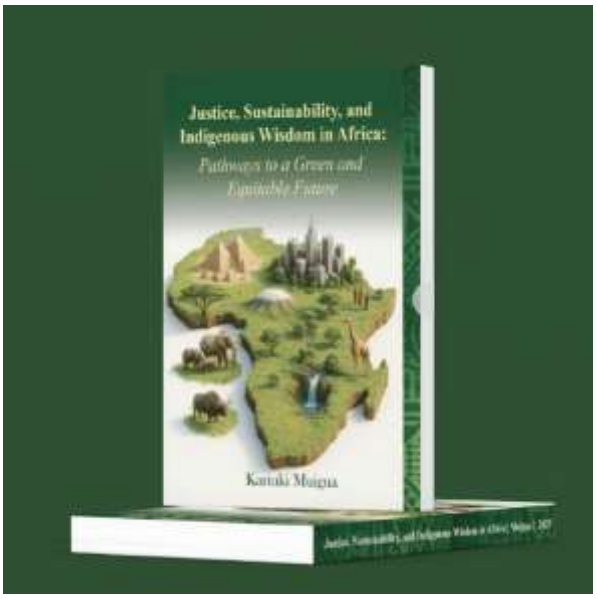

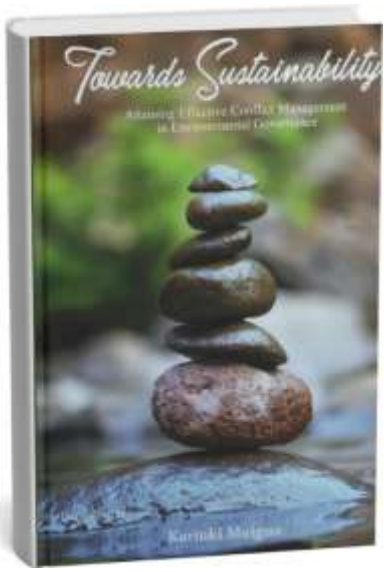
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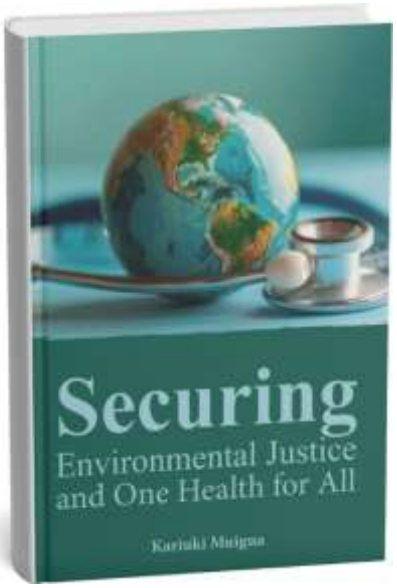
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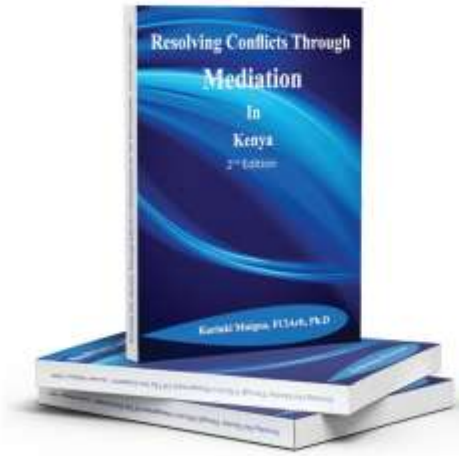
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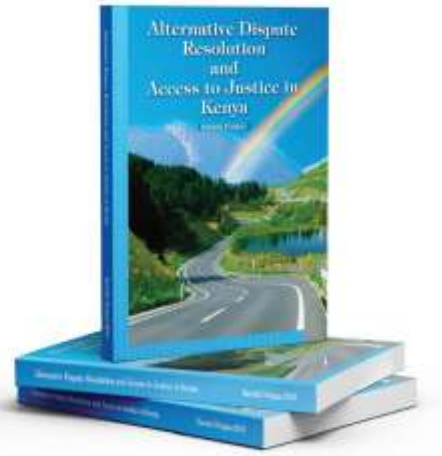
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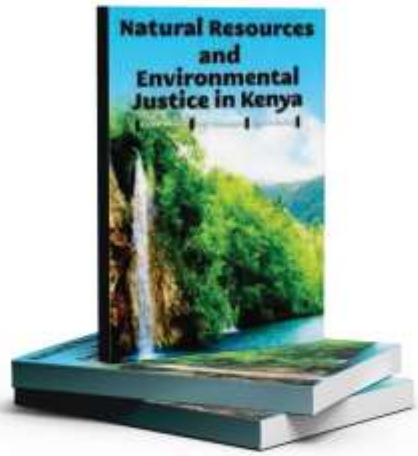
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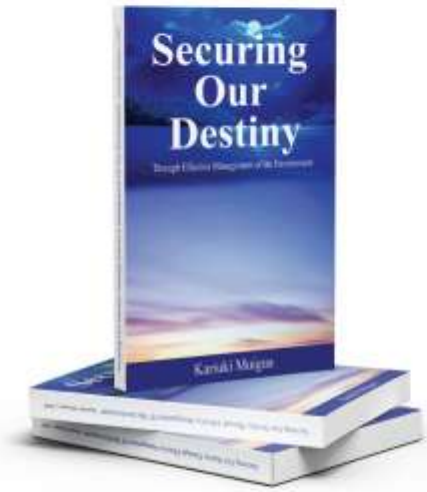
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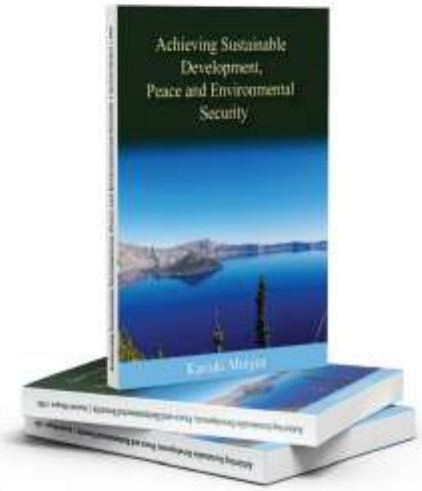
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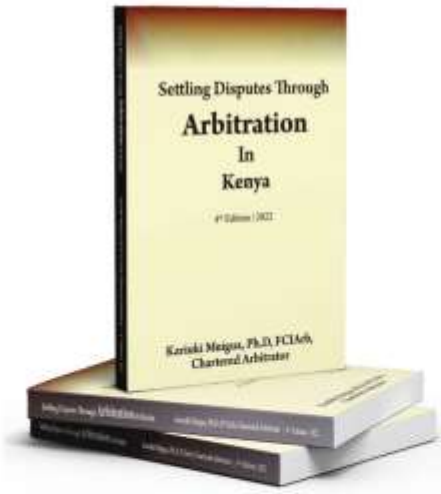
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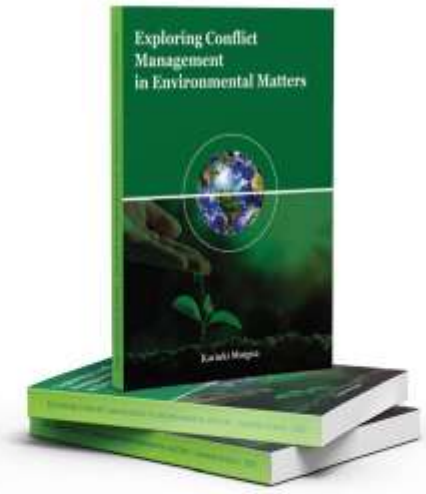
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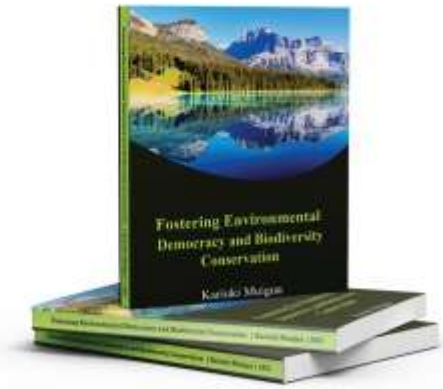
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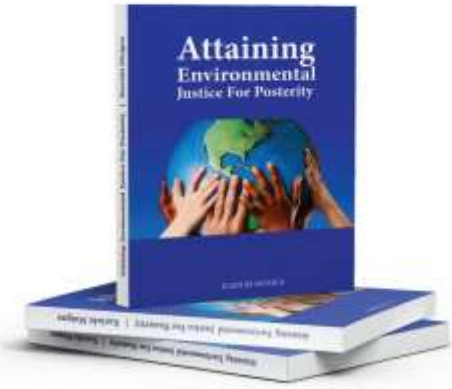
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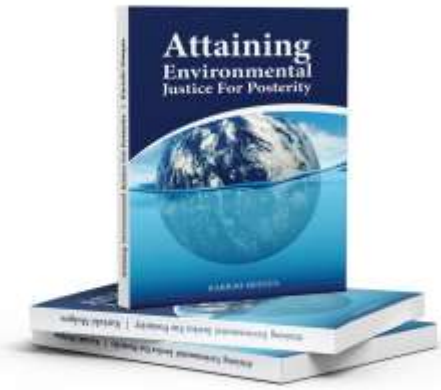
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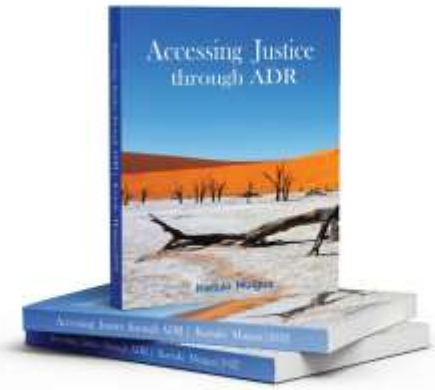
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Nurturing Our
Environment

Embracing Environmental,
Social and Governance (ESG)
Trends for Sustainable Development

Realising True

Combating Climate Change
for Sustainability

Achieving
Climate Justice
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Sustainable Development
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Realising
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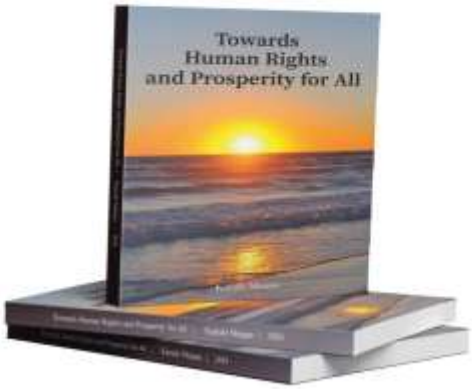
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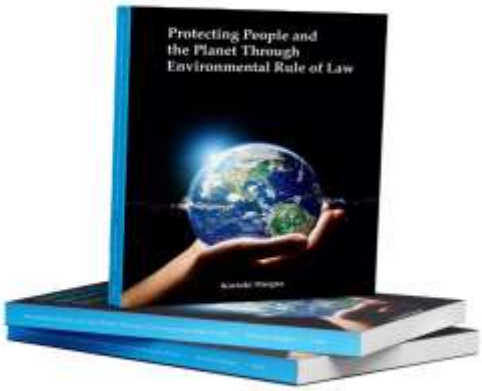
Protecting People and
the Planet Through
Environmental Rule of Law

Attaining Gender Equity for
Inclusive Development in Africa

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Africa's pursuit of clean, affordable and secure energy lies at the heart of its sustainable development and climate action ambitions. Yet the continent's energy transition is shaped by complex legal, policy, governance and social challenges, including persistent energy poverty, regulatory fragmentation, environmental protection concerns, community inclusion, and resource-based conflicts.

Energy Transition, Justice and Sustainability in Africa: Law, Policy, Governance and Conflict Management Perspectives brings together interdisciplinary perspectives on the laws, policies and governance frameworks shaping Africa's evolving energy landscape. With particular focus on Kenya and comparative African experiences, the book critically examines renewable energy deployment, the governance of critical raw materials, green transport systems, biodiversity conservation, and energy justice for indigenous and vulnerable communities.

A distinctive contribution of the volume lies in its emphasis on conflict management as a core pillar of sustainable energy governance. Through analysis of negotiation, mediation, arbitration and hybrid ADR mechanisms the book demonstrates how disputes can be prevented, managed and constructively transformed to support social licence, investor confidence and long-term sustainability.

This volume is an essential resource for scholars, policymakers, legal practitioners, development partners and students committed to advancing just, inclusive and sustainable energy transitions in Africa.

Hon. Prof. Kariuki Muigua, Ph.D; FCIArb; Ch.Arb; OGW, SC, is a scholar and Practitioner focusing on Sustainable Development, Conflict Management and Environmental Governance.

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