Transitioning from Fossil Fuels to Clean Energy

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Kariuki Muigua*

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

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[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)

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 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

[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
[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

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

[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)

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 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

[16] Ibid
[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

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 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.

[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)
[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)

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

[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

[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

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.

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

[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)
[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)

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 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

[46] Ibid, Part 3.2.4 (i)
[47] Ibid
[48] Ibid
[49] Ibid
[50] Energy Act., No. 1 of 2019., Laws of Kenya., Government Printer, Nairobi
[51] Ibid, S 2

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 spiralling 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

[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

points out that although demand 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 stocktake 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

[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

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, 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

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[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)
[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)

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 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

[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
[81] International Energy Agency., 'World Energy Outlook: 2023.' Op Cit
[82] Ibid

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

[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

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, 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

[90] United Nations Framework Convention on Climate Change., United Nations 1992., Op Cit
[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

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 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

[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
[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

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 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

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

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.

[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

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