Renewable Energy for a Sustainable Future: Moving towards Just Transition, Clean Air, One Health and Net Zero in the African Context

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Table of Contents

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Abstract

This paper examines ways through which Africa can transition to renewable energy for sustainable future. The paper notes that Africa has a rich renewable energy potential due to the abundance of solar, wind and geothermal among other renewables in the continent. It asserts that renewable energy provides many advantages in the quest for Sustainable Development in Africa. The paper discusses the benefits that Africa can derive from its vast renewable energy sources. Despite being endowed with renewable energy, the paper notes that Africa is yet to fully utilise this potential. It examines some of the barriers hindering the adoption of renewable energy in Africa. In light of these challenges, the paper discusses how Africa can effectively embrace renewable energy for a sustainable future by moving towards just transition, clean air, One Health and net zero.

1.0 Introduction

Renewable energy is a form of 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 energy that is generated from natural sources and processes that are continuously replenished[2]. It can also be described 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

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[1] United Nations., 'What is Renewable Energy?' Available at https://www.un.org/en/climatechange/what-is-renewable-energy (Accessed on 02/01/2026)

[2] What is Renewable Energy?., Available at https://extension.psu.edu/what-is-renewable-energy (Accessed on 02/01/2026)

and tidal energy[3]. It has been observed that renewable energy is derived from sources such as sunlight and wind that are abundant and constantly being replenished[4].

Renewable energy provides many benefits for people and planet. For example, generating renewable energy creates lower emissions than burning fossil fuels[5]. It has been observed that fossil fuels including oil, gas and coal, which dominate the global energy mix, are responsible for nearly two-thirds of global carbon dioxide emissions[6]. When burned to produce energy, fossil fuels release harmful greenhouse gases including carbon dioxide thus fuelling climate change[7]. Further, fossil fuels contribute to air pollution with severe impacts on human and ecosystem health[8]. In addition, it has been argued that since fossil fuels such as oil, gas and coal are non-renewable, they can be depleted and therefore, placing too much reliance on them can affect global energy security and supply[9].

Adopting renewable sources of energy is therefore important for people and planet. These sources of energy are available in abundance, cheaper and are a healthier option for people and the planet[10]. It has been argued that renewable sources of energy including solar, wind, geothermal, hydropower, biofuels and others, are at the centre of the transition to less carbon-intensive and more sustainable energy systems towards tackling environmental challenges including climate change and pollution while fostering energy

[3] Energy Act, No. 1 of 2019, Government Printer, Nairobi
[4] United Nations., 'What is Renewable Energy?' Op Cit
[5] Ibid
[6] United Nations., 'The Role of Fossil Fuels in a Sustainable Energy System' Available at https://www.un.org/en/chronicle/article/role-fossil-fuels-sustainable-energy-system (Accessed on 02/01/2025)
[7] Ibid
[8] Solomon. B., & Krishna. K., 'The Coming Sustainable Energy Transition: History, Strategies, and Outlook.' *Energy Policy* 39 (2011) 7422-7431
[9] Ibid
[10] United Nations., 'Climate Action.' Available at https://www.un.org/en/climatechange/howcommunities-are-embracing-renewable-energy (Accessed on 02/01/2026)

security[11]. This ideal is envisaged under the United Nations *2030 Agenda for Sustainable Development*[12]. 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]. Further, 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]. Transitioning to renewable sources of energy is therefore vital in fostering a sustainable future both globally and in Africa.

This paper examines ways through which Africa can transition to renewable energy for sustainable future. The paper notes that Africa has a rich renewable energy potential due to the abundance of solar, wind and geothermal among other renewables in the continent. It asserts that renewable energy provides many advantages in the quest for Sustainable Development in Africa. The paper discusses the benefits that Africa can derive from its vast renewable energy sources. Despite being endowed with renewable energy, the paper notes that Africa is yet to fully utilise this potential. It examines some of the barriers hindering the adoption of renewable energy in Africa. In light of these challenges, the paper discusses how Africa can effectively embrace renewable energy for a sustainable future by moving towards just transition, clean air, One Health and net zero.

[11] International Energy Agency., 'Renewables' Available at https://www.iea.org/energy-system/renewables (Accessed on 02/01/2026)
[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 02/01/2026)
[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 02/01/2026)
[15] Ibid

2.0 Renewable Energy in the African Context: Opportunities and Challenges

Africa has an immense renewable energy potential with wind, solar, hydro, bioenergy, ocean tidal waves, geothermal among other renewables being abundant throughout the continent[16]. It has been observed that Africa experiences abundant sunlight and strong winds for most parts of the year creating suitable conditions for harnessing renewable sources of energy including solar and wind energy[17]. In addition, Africa has viable deposits of critical raw materials including cobalt, bauxite, copper, nickel, manganese, graphite, lithium, chromium and rare earth elements[18]. These materials are at the heart of the energy transition since they are essential components in many of today's rapidly growing clean energy technologies including wind turbines, solar panels and electric vehicles[19].

The abundance of renewable sources of energy provides immense opportunities to unlock Sustainable Development in Africa. For example, adopting renewable sources of energy including wind, solar, hydro and geothermal resources is key towards tackling energy poverty in Africa[20]. Access to energy remains a key challenge in Africa with millions of people lacking reliable, affordable, sustainable and modern energy services[21].

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[16] Ibid

[17] 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 03/01/2026)

[18] 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 03/01/2026)

[19] United Nations Environment Programme., 'Critical Energy Transition Minerals' Available at https://www.unep.org/topics/energy/renewable-energy/critical-energy-transition-minerals (Accessed on 03/01/2025)

[20] Africa Policy Research Institute., 'Energising Africa: enabling private sector development in renewable energy' Available at https://afripoli.org/energising-africa-enabling-private-sector-development-in-renewable-energy (Accessed on 03/01/2026)

[21] 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 03/01/2026)

It is estimated that nearly 600 million people in Africa lack access to electricity[22]. The International Energy Agency (IEA) observes that 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[23]. Adopting renewable energy, which is abundant all over Africa, is therefore a pertinent agenda towards tackling energy poverty for a sustainable future.

In addition to fostering access to energy for the citizens of Africa, renewable energy provides many other benefits for people and planet. For example, renewable energy can enable Africa to achieve a just energy transition. Energy transition involves shifting the global, regional and national energy sectors from fossil fuel- based systems of energy production and consumption including oil, natural gas and coal to renewable energy sources like wind and solar[24]. This concept envisages 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[25]. It has been observed that 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[26]. In particular, energy transition is key in tackling climate change since fossil fuels are the main source of greenhouse gas emissions responsible for the climate crisis[27]. With Africa facing disproportionate impacts from

[22] Africa Policy Research Institute., 'Energising Africa: enabling private sector development in renewable energy' Op Cit

[23] International Energy Agency., 'World Energy Investments 2024: Africa' Available at https://www.iea.org/reports/world-energy-investment-2024/africa (Accessed 03/01/2026)

[24] S & P Global., 'What is Energy Transition?' Available at https://www.spglobal.com/en/researchinsights/articles/what-is-energy-transition (Accessed on 03/01/2026)

[25] The energy transition., Available at https://www.enelgreenpower.com/learning-hub/energy-transition (Accessed on 03/01/2026)

[26] 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 03/01/2026)

[27] Ibid

climate change, achieving energy transition is vital in protecting people and planet[28]. Renewable energy thus provides opportunities towards a achieving a just transition to clean energy in Africa for a sustainable future[29].

Renewable energy can also enable Africa to move towards clean air. For example, it has been observed that a majority of Africa's population relies on traditional biomass for preparing food[30]. 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[31]. Use of such sources of energy for cooking is linked to more than 500,000 annual deaths globally due to indoor pollution[32]. It has been observed that air quality is closely linked to the earth's climate and ecosystems globally[33]. For instance, many of the drivers of air pollution including combustion of fossil fuels are also sources of greenhouse gas emissions[34]. As a result, 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[35]. Adopting renewable energy in Africa therefore provides a win-win outcome that strengthens climate action while also fostering clean air for human health and well-being[36].

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[28] AUDA-NEPAD., 'Empowering Africa: Enhancing Access To Electricity Through Renewable Energy' Op Cit

[29] Ibid

[30] 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 03/01/2026)

[31] 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 03/01/2026)

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

[33] World Health Organization., 'Air Pollution' Available at https://www.who.int/health-topics/air-pollution#tab=tab_1 (Accessed on 03/01/2026)

[34] Ibid

[35] United Nations., 'Renewable Energy – Powering a Safer Future' Available at https://www.un.org/en/climatechange/raising-ambition/renewable-energy (Accessed on 03/01/2026)

[36] Ibid

In addition, renewable energy is key towards achieving One Health for people and planet in Africa. One Health is an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals and ecosystems[37]. This approach recognizes that the health of humans, domestic and wild animals, plants, and the wider environment (including ecosystems) are closely linked and interdependent[38]. The concept of One Health aims to achieve optimal health outcomes recognizing the interconnection between people, animals, plants, and their shared environment[39]. Embracing renewable sources of energy in Africa can aid in moving towards One Health. For example, by combating air pollution and climate change, renewable energy improves human, animal and ecosystem health[40]. Renewable energy can also power healthcare systems towards improving overall health outcomes for both people and planet for One Health[41].

Adopting renewable energy can also accelerate progress towards a net zero future in Africa. The ideal of net zero is achieved when anthropogenic carbon dioxide emissions are balanced globally by anthropogenic carbon dioxide removals over a specified period[42]. Achieving net zero emissions requires striking a balance between the amounts of emissions put into the atmosphere with the amount taken out[43]. It has been observed

[37] World Health Organization., 'One Health' Available at https://www.who.int/health-topics/one-health#tab=tab_1 (Accessed on 03/01/2026)

[38] Adisasmito. W., 'One Health: A New Definition for a Sustainable and Healthy Future' Available at https://pmc.ncbi.nlm.nih.gov/articles/PMC9223325/#:~:text=The%20approach%20mobilizes%20multiple%20sectors,climate%20change%20and%20contributing%20to (Accessed on 03/01/2026)

[39] About One Heath., Available at https://www.cdc.gov/one-health/about/index.html#:~:text=One%20Health%20is%20a%20collaborative,plants%2C%20and%20their%20shared%20environment (Accessed on 03/01/2026)

[40] Sustainable Development Goals and One Health: SDG 7., Available at https://blogs.ifas.ufl.edu/onehealth/2022/11/17/clean-energy-and-one-health/#:~:text=Hence%2C%20access%20to%20clean%20energy,is%20a%20very%20concerning%20estimate. (Accessed on 03/01/2026)

[41] Ibid

[42] Intergovernmental Panel on Climate Change., 'Glossary' Available at https://www.ipcc.ch/site/assets/uploads/sites/2/2022/06/SR15_AnnexI.pdf (Accessed on 03/01/2026)

[43] United Nations Climate Change., 'Get Net Zero Right' Available at https://racetozero.unfccc.int/wp-content/uploads/2021/07/Get-Net-Zero-right-2.pdf (Accessed on 03/01/2026)

that generating renewable energy creates lower emissions than burning fossil fuels[44]. Renewable energy is therefore key in moving towards net zero due to their potential to significantly reduce greenhouse gas emissions driving climate change[45]. According to IEA, achieving the ideal of net zero emissions by 2050 requires significant investments in clean sources of energy including renewable energy[46].

From the foregoing, it is evident that renewable energy is crucial in the quest towards a sustainable future for Africa. However, despite endowed with renewable sources of energy including wind, solar and geothermal resources, their adoption has been very low in Africa. It is estimated that only 2 percent of global renewable energy investments have been made in Africa in the last two decades[47]. Inadequate investments in renewable energy, insufficient regulatory and policy environments and lack of adequate infrastructure and financing are some of the barriers undermining the adoption of renewable energy in Africa[48]. It is imperative to address these challenges in order to move towards just transition, clean air, One Health and net zero in Africa through renewable energy.

3.0 Adopting Renewable Energy in Africa for a Sustainable Future

Harnessing Africa's immense renewable energy potential is vital in ensuring a sustainable future for people and planet in the continent. Renewable sources of energy provide numerous benefits and enhance progress towards energy transition, clean air, One Health and net zero. By adopting renewable sources of energy including wind, solar, geothermal and hydro energy, African nations can diversify their energy mix, reduce

[44] United Nations., 'What is Renewable Energy?' Op Cit
[45] International Energy Agency., 'Net Zero by 2050' Available at https://www.iea.org/reports/net-zero-by-2050 (Accessed on 03/01/2026)
[46] Ibid
[47] Africa Policy Research Institute., 'Energising Africa: enabling private sector development in renewable energy' Op Cit
[48] 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 03/01/2026)

dependence on polluting fossil fuels, and enhance energy security[49]. Further, the shift to renewable energy can unlock new opportunities for investment, innovation, and job creation, driving economic growth across key sectors such as agriculture, healthcare and education[50].

In order to ensure a sustainable future for people and planet in Africa, it is necessary to enhance investments in clean energy sources such as solar, wind and geothermal energy that are abundant all over the continent[51]. African countries have been urged to create suitable legal and regulatory frameworks, harness both public and private investments and upgrade infrastructure and technology in order to adopt renewable energy in the continent[52]. Further, it is imperative to sustainably harness critical raw materials in Africa. These materials including copper, manganese, cobalt, nickel, graphite, lithium, chromium and bauxite can enhance the adoption of renewable energy in Africa by supporting clean energy technologies including solar panels, wind turbines, electric vehicles and electricity transmission networks[53]. It is therefore vital to ensure the sustainable extraction and use of critical raw materials by prioritising human rights, environmental conservation and equitable benefit-sharing arrangements for a just energy transition[54].

In addition, it is imperative to prioritise the needs of vulnerable populations in order to achieve a just and equitable energy transition in Africa. For example, it has been observed that clearing land to support renewable energy developments such as wind and

[49] Global Energy Alliance., 'Africa's Steady Race Towards Renewable Energy Sources' Available at https://energyalliance.org/africas-steady-race-towards-renewable-energy-sources/ (Accessed on 03/01/2026)
[50] Ibid
[51] United Nations., 'Affordable and Clean Energy' Available at https://www.un.org/sustainabledevelopment/energy/ (Accessed on 03/01/2026)
[52] AUDA-NEPAD., 'Empowering Africa: Enhancing Access To Electricity Through Renewable Energy' Op Cit
[53] United Nations Environment Programme., 'Critical Energy Transition Minerals' Op Cit
[54] International Energy Agency., 'Critical Minerals' Available at https://www.iea.org/topics/critical-minerals (Accessed on 03/01/2026)

geothermal projects can impact wildlife, biodiversity and ecosystems with adverse effects on indigenous peoples and local communities[55]. 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 disputes with indigenous and vulnerable communities over land rights and environmental impacts[56]. The adoption of renewable energy in Africa has often come at the expense of human rights due to loss of land, livelihoods and other rights of indigenous peoples including the right to a clean, healthy and sustainable environment[57]. It is therefore vital to ensure that the adoption of renewable energy in Africa is inclusive and prioritises the needs of the vulnerable including through safeguarding the land and environmental rights of indigenous peoples and local communities[58].

Through the foregoing, it is possible to harness Africa's immense renewable energy potential for a sustainable future.

4.0 Conclusion

Adopting renewable energy is a key agenda in ensuring a sustainable future for people and planet in Africa. The continent has abundant sources of renewable energy including wind, solar, geothermal, hydro, bioenergy, ocean and tidal energy[59]. Harnessing these sources of energy provides immense opportunities to foster Sustainable Development in Africa including through achieving environmental sustainability by confronting climate change and air pollution and promoting energy security, job creation and socio-economic

[55] Environmental Impacts of Renewable Energy Sources., Available at https://www.adecesg.com/resources/blog/environmental-impacts-of-renewable-energy-sources/ (Accessed on 03/01/2026)

[56] 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 03/01/2026)

[57] 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 03/01/2026)

[58] Ibid

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

development[60]. Embracing renewable energy is necessary in order to move towards just transition, clean air, One Health and net zero for a sustainable future for people and planet in Africa.

[60] AUDA-NEPAD., 'Empowering Africa: Enhancing Access To Electricity Through Renewable Energy' Op Cit

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S & P Global., 'What is Energy Transition?' Available at https://www.spglobal.com/en/researchinsights/articles/what-is-energy-transition

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