

Towards Green Industrialization: Attaining Sustainability for Africa

Kariuki Muigua

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Kariuki Muigua*

Abstract

The journey towards Sustainable Development in Africa is marked by a compelling paradox: the continent's minimal contribution to global greenhouse gas emissions and the climate crisis is in sharp contrast with its high vulnerability to the impacts of climate change. Despite having the lowest greenhouse gas emissions, Africa is the most vulnerable region to the effects of climate change. This sharp contrast underscores the urgent need for African countries to adopt development models that combine economic growth with environmental sustainability. Such models include green industrialization which has been described as a precondition for sustainable and inclusive growth in Africa. This paper examines the need to embrace green industrialization in Africa. It posits that green industrialization can unlock sustainability in Africa. The paper conceptualizes green industrialization. It also explores the progress made towards green industrialization in Africa. In addition, the paper also analyses factors hindering green industrialization in Africa. The paper suggests ways through which Africa can foster green industrialization for sustainability.

1.0 Introduction

Sustainability as defined in the Report of the World Commission on Environment and Development envisages development that meets the needs of current generations without compromising the ability of future generations to meet their needs¹. According to this definition, sustainability has elements of equity among current generations and across successive generations². It has been noted that sustainability requires an integrated

* PhD in Law (Nrb), FCI Arb (Chartered Arbitrator), OGW, LL. B (Hons) Nrb, LL.M (Environmental Law) Nrb; Dip. In Law (KSL); FCPS (K); Dip. in Arbitration (UK); MKIM; Mediator; Consultant: Lead expert EIA/EA NEMA; BSI ISO/IEC 27001:2005 ISMS Lead Auditor/ Implementer; ESG Consultant; Advocate of the High Court of Kenya; Professor of Environmental Law and Conflict Management at the University of Nairobi, Faculty of Law; Member of the Permanent Court of Arbitration (PCA) [July, 2024].

¹ World Commission on Environment and Development., 'Our Common Future.' Oxford, (Oxford University Press, 1987)

² Ibid

approach that takes into consideration environmental protection along with economic development and social progress³.

Attaining sustainability is key priority for Africa. It has been noted that the continent which is rich in natural resources and brimming with untapped potential, faces a unique opportunity to chart a Sustainable Development path which balances economic growth, social progress, and environmental sustainability⁴. The continent's rapid population growth, urbanization, and increased consumer demands, presents an ideal environment for economic growth and development⁵. However, it is imperative to ensure that this growth is approached with a keen focus on sustainability to avoid exacerbating environmental degradation and climate change among other environmental challenges in the continent⁶.

The quest for Sustainable Development in Africa is marked by a compelling paradox: the continent's minimal contribution to global greenhouse gas emissions contrasts sharply with its significant vulnerability to the impacts of climate change⁷. The continent has been identified as the most vulnerable region to the impacts of climate change⁸. Despite having contributed the least to the climate crisis, Africa faces exponential collateral damage as a result of climate change posing systemic risks to its economies, infrastructure investments, water and food systems, public health, agriculture, and livelihoods, threatening to undo its modest development gains and slip the continent into higher

³ United Nations., 'Sustainability' Available at <https://www.un.org/en/academic-impact/sustainability> (Accessed on 24/07/2024)

⁴ Sustainable Development: Balancing Profitability and Environmental Sustainability in Africa., Available at <https://www.tonyelumelufoundation.org/research-publications/sustainable-development-balancing-profitability-and-environmental-sustainability-in-africa> (Accessed on 24/07/2024)

⁵ Ibid

⁶ Ibid

⁷ Youssef. A. B., & Dahmani. M., 'Evaluating Environmental Sustainability in Africa: The Role of Environmental Taxes, Productive Capacities, and Urbanization Dynamics' *Economies* 2024, 12(4), 80; Available at <https://doi.org/10.3390/economies12040080> (Accessed on 24/07/2024)

⁸ African Development Bank Group., 'Climate Change in Africa' Available at <https://www.afdb.org/en/cop25/climate-change-africa> (Accessed on 24/07/2024)

levels of extreme poverty⁹. Africa's vulnerability to climate change is driven by low levels of socioeconomic growth in the continent¹⁰. This underscores the urgent need for African countries to adopt development models that combine economic growth with environmental sustainability¹¹. One such model is green industrialization¹². The idea of green industrialization has been described as a precondition for sustainable and inclusive growth in Africa¹³.

This paper examines the need to embrace green industrialization in Africa. It posits that green industrialization can unlock sustainability in Africa. The paper conceptualizes green industrialization. It also explores the progress made towards green industrialization in Africa. In addition, the paper also analyses factors hindering green industrialization in Africa. The paper suggests ways through which Africa can foster green industrialization for sustainability.

2.0 Delimiting Green Industrialization

Industrialization can be understood as the period of social and economic change that transforms a human group from the agrarian society into an industrial one, involving the extensive reorganization of an economy for the purpose of manufacturing¹⁴. Industrialization has also been described as the process through which an agrarian (farm-

⁹ Ibid

¹⁰ United Nations Environment Programme., 'Responding to Climate Change' Available at <https://www.unep.org/regions/africa/regional-initiatives/responding-climate-change> (Accessed on 24/07/2024)

¹¹ Youssef. A. B., & Dahmani. M., 'Evaluating Environmental Sustainability in Africa: The Role of Environmental Taxes, Productive Capacities, and Urbanization Dynamics' Op Cit

¹² United Nations., 'A Green Path to Industrialization' Available at <https://www.un.org/africarenewal/magazine/august-2016/green-path-industrialization> (Accessed on 24/07/2024)

¹³ Ibid

¹⁴ Tochukwu. J., 'Industrialization and the Green Economy: Great Dilemma towards Achieving Sustainable Development of the Less Developed Countries (LDCs)' Available at <https://core.ac.uk/download/pdf/234683003.pdf> (Accessed on 25/07/2024)

based) economy transforms into one based on mass manufacturing¹⁵. Industrialization can also be defined as the process in which a society or country transforms itself from a primarily agricultural society into one based on the manufacturing of goods and services¹⁶. It is associated with mechanization where human efforts are replaced with machines, and mechanized mass production of goods is made possible¹⁷. A country is considered industrialized if such country has moved from agriculturally based to manufacturing based economy with the use of mechanized equipment which increases output of goods and services¹⁸.

Industrialization is a beneficial process for any country. Its positive characteristics include economic growth, a more efficient division of labor, and a growth in technological innovation¹⁹. Industrialization also enhances availability and affordability of goods and services²⁰. It makes it possible for companies to manufacture products in bulk²¹. Further, by making goods more readily available, industrialization also makes them more affordable²².

Despite its benefits, industrialization has never come without any cost on both the society and the natural environment²³. Industrial activities have been considered as the major

¹⁵ What is Industrialization?., Available at <https://learn.robinhood.com/articles/5UrnBV39B9cL7kwr1EwRYq/what-is-industrialization/> (Accessed on 25/07/2024)

¹⁶ Tochukwu. J., 'Industrialization and the Green Economy: Great Dilemma towards Achieving Sustainable Development of the Less Developed Countries (LDCs)' Op Cit

¹⁷ Ibid

¹⁸ Ibid

¹⁹ Industrialization: What It Is, Examples, and Impacts on Society., Available at <https://www.investopedia.com/terms/i/industrialization.asp#:~:text=Mechanized%20methods%20of%20mass%20production,growth%20spurt%20in%20technological%20innovation.> (Accessed on 25/07/2024)

²⁰ What Is Industrialization? (With Benefits and Challenges)., Available at <https://www.indeed.com/career-advice/career-development/industrialization> (Accessed on 25/07/2024)

²¹ Ibid

²² Ibid

²³ Tochukwu. J., 'Industrialization and the Green Economy: Great Dilemma towards Achieving Sustainable Development of the Less Developed Countries (LDCs)' Op Cit

generator of wastes, pollutions, and effluents, which affect the natural condition of the environment and threaten the existence of humans²⁴. It has been noted that since the Industrial Revolution, human activities have released large amounts of carbon dioxide and other greenhouse gases into the atmosphere, which has changed the earth's climate²⁵.

In light of the foregoing challenges, it has become necessary to adopt sustainable models of industrialization. One such model is green industrialization. This model relies on moving from fossil fuels to renewable energy sources, increasing resource efficiency and transitioning to a circular economy²⁶. Green industrialization aims to decouple economic growth from negative environmental externalities by maximising the application of clean energy, sustainable inputs and green-production technologies²⁷. This process ensures that the structural transformation process avoids stranded assets²⁸; copes with challenges such as accelerated urbanization²⁹; reduces resource inputs and increases efficiency in the production process³⁰; cuts back on harmful emission of wastes including chemical effluents and poisonous gases³¹; strengthens infrastructure to reduce environmental impacts (such as pollution and climate change)³²; and maintains or improves the natural resource base, including providing associated environmental goods and services³³. It has

²⁴ Ibid

²⁵ United States Environmental Protection Agency., 'Causes of Climate Change' Available at <https://www.epa.gov/climatechange-science/causes-climate-change#:~:text=Since%20the%20Industrial%20Revolution%2C%20human,also%20affect%20the%20earth's%20climate>. (Accessed on 25/07/2024)

²⁶ Working paper and Policy brief: Territorial Perspective on Green Industrialisation., Available at <https://www.espon.eu/publications/working-paper-and-policy-brief-territorial-perspective-green-industrialisation#:~:text=Green%20industrialisation%20is%20one%20building,transitioning%20to%20a%20circular%20economy>. (Accessed on 25/07/2024)

²⁷ Tony Blair Institute for Global Change., 'Maximising the Green Path to Industrialisation in Africa' Available at <https://www.institute.global/insights/climate-and-energy/maximising-green-path-industrialisation-africa> (Accessed on 25/07/2024)

²⁸ United Nations Economic Commission for Africa., 'Greening Industrialization: Rationale and Concepts' Available at https://www.uneca.org/sites/default/files/chapterimages/era2016_chap3_en-rev6may.pdf (Accessed on 25/07/2024)

²⁹ Ibid

³⁰ Ibid

³¹ Ibid

³² Ibid

³³ Ibid

been noted that green industrialisation requires far-reaching socio-economic changes, not only in the way industries produce and businesses are run, but also in the way governments facilitate such transition processes³⁴.

Green industrialization is key in transitioning towards green economies³⁵. The concept of green economy is geared towards the preservation of the natural environment as countries pursue economic and social growth³⁶. The United Nations Environment Programme (UNEP), defines a green economy as one that is low carbon, resource efficient and socially inclusive³⁷. UNEP further notes that in a green economy, growth in employment and income are driven by public and private investment into such economic activities, infrastructure and assets that allow reduced carbon emissions and pollution, enhanced energy and resource efficiency, and prevention of the loss of biodiversity and ecosystem services³⁸. It is therefore possible to ensure green economies by promoting green industrialization.

The need to achieve green industrialization is set out in the *2030 Agenda for Sustainable Development*³⁹. Sustainable Development Goal (SDG) 9 sets out targets towards building resilient infrastructure, promoting inclusive and sustainable industrialization, and fostering innovation⁴⁰. In order to achieve green industrialization, SDG 9 urges all countries to enhance resource-use efficiency, and adopt clean and environmentally sound

³⁴ Working paper and Policy brief: Territorial Perspective on Green Industrialisation., Op Cit

³⁵ Tochukwu. J., 'Industrialization and the Green Economy: Great Dilemma towards Achieving Sustainable Development of the Less Developed Countries (LDCs)' Op Cit

³⁶ Ibid

³⁷ United Nations Environment Programme., 'Green Economy' Available at <https://www.unep.org/regions/asia-and-pacific/regional-initiatives/supporting-resource-efficiency/green-economy#:~:text=A%20green%20economy%20is%20defined,resource%20efficient%20and%20socially%20inclusive>. (Accessed on 25/07/2024)

³⁸ Ibid

³⁹ 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 25/07/2024)

⁴⁰ Ibid

technologies and industrial processes⁴¹. It also encourages countries to embrace science, research, and innovation towards green industrialization⁴². It is therefore imperative for all countries to achieve the targets of SDG 9 in order to achieve green industrialization.

3.0 Green Industrialization in Africa: Opportunities and Challenges

Industrialization is a key priority for Africa. It has been correctly pointed out that African countries need to industrialize to increase incomes, create employment, raise value-added activity and diversify their economies⁴³. Industry has traditionally been a central source of generating employment both in developed and developing countries⁴⁴. Rapid industrial development and economic transformation have been identified as strategic objective for developing countries, especially African countries⁴⁵. Africa, with its great resource potentials and an increasing population has recognized the important role of industrialization in overcoming the socioeconomic challenges that are prevalent in the continent⁴⁶.

The United Nations notes that industrial development is of critical importance for sustained and inclusive economic growth in African countries⁴⁷. Industry can enhance productivity, increase the capabilities of the workforce, and generate employment, by introducing new equipment and new techniques⁴⁸. Therefore, industrialization, with strong linkages to domestic economies can help African countries achieve high growth

⁴¹ Ibid, SDG 9.4

⁴² Ibid

⁴³ United Nations Economic Commission for Africa., 'Greening Industrialization: Rationale and Concepts' Op Cit

⁴⁴ Ibid

⁴⁵ Aquilas. N.A et al., 'Industrialization and Environmental Sustainability in Africa: The Moderating Effects of Renewable and Non-Renewable Energy Consumption' Available at <https://www.sciencedirect.com/science/article/pii/S2405844024017122> (Accessed on 25/07/2024)

⁴⁶ Ibid

⁴⁷ United Nations., 'Industrialization for Development' Available at <https://www.un.org/en/observances/africa-industrialization-day#:~:text=Industrialization%2C%20with%20strong%20linkages%20to,through%20employment%20and%20wealth%20creation.> (Accessed on 25/07/2024)

⁴⁸ Ibid

rates, diversify their economies and reduce their exposure to external shocks⁴⁹. This will in turn substantially contribute to poverty eradication through employment and wealth creation⁵⁰.

Africa has immense potential to achieve industrialization⁵¹. It has been noted that there is a huge opportunity for Africa to create jobs and promote inclusive economic transformation through domestic manufacturing and a commodity-based industrialization process, capitalizing on the continent's natural resources and opportunities presented by the changes in the structure of global production⁵². Further, it has been asserted that exploiting Africa's opportunities for industrialization involves adding value to domestic products, soft and hard commodities and developing forward and backward linkages to the regional and international value chains⁵³.

Africa is endowed with an abundance of natural resources which can unlock industrialization in the continent⁵⁴. Africa's natural resources provide a unique opportunity to foster human and economic development⁵⁵. Processing such resources can enhance the continent's industrialization and integration⁵⁶. In order to achieve this goal,

⁴⁹ Ibid

⁵⁰ Ibid

⁵¹ African Development Bank Group., 'Industrialize Africa' Available at <https://www.afdb.org/en/the-high-5/industrialize-africa> (Accessed on 25/07/2024)

⁵² Ibid

⁵³ Ibid

⁵⁴ Sa. PD., 'Can Natural Resources Pave the Road to Africa's Industrialization?' Available at <https://blogs.worldbank.org/en/energy/can-natural-resources-pave-road-africa-s-industrialization> (Accessed on 25/07/2024)

⁵⁵ International IDEA., 'Enhancing Natural Resource Governance in Africa' Available at <https://www.idea.int/publications/catalogue/enhancing-natural-resource-governance-africa#:~:text=Africa's%20natural%20resources%20provide%20a,development%20and%20resource%2Dbased%20industrialization>. (Accessed on 25/07/2024)

⁵⁶ African Development Bank Group., 'African Natural Resources Management and Investment Centre Issues New Report: "Further Processing of Wood Products in Africa will Contribute to the Continent's Industrialization and Integration' Available at <https://www.afdb.org/en/news-and-events/african-natural-resources-management-and-investment-centre-issues-new-report-further-processing-wood-products-africa-will-contribute-continents-industrialization-and-integration-70084> (Accessed on 25/07/2024)

it has been argued that Africa needs to shift from exporting raw material to ensuring that the continent's natural resources serve as a catalyst for accelerated industrialization⁵⁷.

Africa Union's *Agenda 2063*⁵⁸ emphasizes the significant role that a robust manufacturing sector can play in enhancing Africa's socioeconomic development⁵⁹. It recognizes that industrialization and manufacturing is key to Africa's structural transformation⁶⁰. Industrialization and manufacturing can enable value-addition, growth of high paying jobs in Africa, increased incomes and greater share of Africa in global value chains⁶¹. Agenda 2063 seeks to ensure that Africa economies are structurally transformed through industrialization, manufacturing and value addition to create shared growth through private sector development, entrepreneurship and decent jobs for all⁶². Implementing Agenda 2063 can therefore unlock industrialization in Africa.

In addition, the establishment of the *African Continental Free Trade Area (AfCFTA)*⁶³ can propel industrialization in Africa. AfCFTA seeks to create a single market for goods and services in Africa⁶⁴. Implementing the AfCFTA can unlock the potential for manufacturing, accelerate industrialization in Africa, promote sustainable and inclusive growth, and reduce unemployment and poverty for Africans⁶⁵. With the right policies, AfCFTA can drive industrialization in Africa, contribute to poverty reduction and

⁵⁷ Sa. PD., 'Can Natural Resources Pave the Road to Africa's Industrialization?' Op Cit

⁵⁸ 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 25/07/2024)

⁵⁹ Ibid

⁶⁰ Ibid

⁶¹ Ibid

⁶² Ibid

⁶³ African Union., 'Agreement Establishing the African Continental Free Trade Area' Available at https://au.int/sites/default/files/treaties/36437-treaty-consolidated_text_on_cfta_-_en.pdf (Accessed on 25/07/2024)

⁶⁴ Ibid

⁶⁵ Aquilas. N.A et al., 'Industrialization and Environmental Sustainability in Africa: The Moderating Effects of Renewable and Non-Renewable Energy Consumption' Op Cit

environmentally sound industrial development in Africa by establishing regional value chains and boosting Intra-African trade⁶⁶.

In light of these opportunities, it has been noted that Africa needs to pursue green industrialization⁶⁷. Though industrialization holds great potential for Africa's sustainable economic growth, its environmental impacts cannot be neglected⁶⁸. It can result in air pollution, water pollution, land degradation and climate change⁶⁹.

Green industrialization has therefore been described as a precondition for sustainable and inclusive growth in Africa⁷⁰. The United Nations notes that it is imperative to green the industrial sector in Africa through the decoupling of economic and social growth from resource use⁷¹. Green and inclusive industrialization offers a valuable pathway for Africa to combine sustainable economic growth, more inclusive incomes and an enhanced environment within a broader green economy strategy⁷². It has been noted that green industrialization in Africa and all over the world can be achieved through three routes: transitioning out of brown industries⁷³; greening existing industries by increasing resource productivity, cutting pollution, and managing chemicals more safely⁷⁴; and creating new green enterprise, such as producing green capital goods, generating renewable energy and providing environmental advisory services⁷⁵.

⁶⁶ United Nations Economic Commission for Africa., 'With the Right Policies, the AfCFTA Can drive Africa's Industrialization' Available at <https://www.uneca.org/stories/with-the-right-policies%2C-the-afcfta-can-drive-africa%E2%80%99s-industrialization> (Accessed on 25/07/2024)

⁶⁷ United Nations., 'A Green Path to Industrialization' Op Cit

⁶⁸ Aquilas. N.A et al., 'Industrialization and Environmental Sustainability in Africa: The Moderating Effects of Renewable and Non-Renewable Energy Consumption' Op Cit

⁶⁹ Ibid

⁷⁰ United Nations., 'A Green Path to Industrialization' Op Cit

⁷¹ United Nations Economic Commission for Africa., 'Greening Industrialization: Rationale and Concepts' Op Cit

⁷² Ibid

⁷³ Ibid

⁷⁴ Ibid

⁷⁵ Ibid

Embracing green industrialization could provide certain benefits to African countries, including an opportunity to integrate themselves into an increasingly global green economy⁷⁶. This approach offers the possibility of manufacturing greener products and engaging in new activities to improve innovation and productivity⁷⁷. It is therefore imperative for Africa to design and implement industrial policies that aim to enhance green initiatives while pursuing industrialization paths to reduce poverty and create jobs and sectors of scale⁷⁸.

Despite the immense opportunities that Africa can unlock through green industrialization, this reality is yet to be attained. Energy consumption has long been considered as one of the most important resources for industrialization and economic growth for any country⁷⁹. However, African economies highly rely on non-renewable energy consumption including fossil fuels for industrialization and economic growth due to the necessity to reduce energy deficiency and because such sources are easily accessible relative to renewable energies⁸⁰. Energy use from non-renewable sources for industrialization among other uses accounts for more than conventional energy use in Africa⁸¹. These energy sources include the combustion of natural gas, coal, and oil⁸². Use of such sources of energy is associated with the release of greenhouse gas emissions which is the leading cause of climate change and environmental and air pollution in Africa and globally⁸³. Further, it has been noted that the manufacturing sector in Africa currently emits about 440 megatons of carbon dioxide which is nearly 30 to 40 percent of

⁷⁶ Tony Blair Institute for Global Change., 'Maximising the Green Path to Industrialisation in Africa' Op Cit

⁷⁷ Ibid

⁷⁸ Ibid

⁷⁹ Aquilas. N.A et al., 'Industrialization and Environmental Sustainability in Africa: The Moderating Effects of Renewable and Non-Renewable Energy Consumption' Op Cit

⁸⁰ Ibid

⁸¹ Wen. Y et al., 'Role of Technological Innovation, Renewable and Non-Renewable Energy, and Economic Growth on Environmental Quality. Evidence from African Countries' Available at <https://www.frontiersin.org/journals/energy-research/articles/10.3389/fenrg.2022.958839/full> (Accessed on 25/07/2024)

⁸² Ibid

⁸³ Ibid

total greenhouse gas emissions in the continent⁸⁴. As a result, it has been noted that decarbonizing Africa's manufacturing and energy sectors and building new green assets is likely to have profound economic implications for the continent, ensuring that African manufacturing can grow and create jobs without adding emissions and remain globally competitive⁸⁵. Pursuing green industrialization is therefore vital in attaining sustainability for Africa.

4.0 Conclusion

Green industrialization is a key priority for Africa. It aims to decouple economic and social growth from negative environmental externalities by maximising the application of clean energy, sustainable inputs and green-production technologies⁸⁶. It has been described as a precondition for sustainable and inclusive growth in the continent⁸⁷. Green industrialization is vital in enabling the continent achieve socio-economic growth while fostering environmental sustainability through tackling climate change, environmental degradation, and pollution among other environmental problems in the continent⁸⁸.

In order to achieve green industrialization, it is vital for African countries to find a realistic and pragmatic balance between following their industrialization and development paths and their climate goals, with support from developed countries⁸⁹. It has been noted that for Africa to attain green industrialization, it is vital to strengthen the industrialization path that nations have embarked on by supporting local capabilities, while also maximising the application of sustainable technologies to accelerate the reduction of carbon footprints and help grow green industries⁹⁰.

⁸⁴ McKinsey & Company., 'Africa's Green Manufacturing Crossroads: Choices for a Low-Carbon Industrial Future' Available at <https://www.mckinsey.com/capabilities/sustainability/our-insights/africas-green-manufacturing-crossroads-choices-for-a-low-carbon-industrial-future> (Accessed on 25/07/2024)

⁸⁵ Ibid

⁸⁶ Tony Blair Institute for Global Change., 'Maximising the Green Path to Industrialisation in Africa' Op Cit

⁸⁷ United Nations., 'A Green Path to Industrialization' Op Cit

⁸⁸ Aquilas. N.A et al., 'Industrialization and Environmental Sustainability in Africa: The Moderating Effects of Renewable and Non-Renewable Energy Consumption' Op Cit

⁸⁹ Tony Blair Institute for Global Change., 'Maximising the Green Path to Industrialisation in Africa' Op Cit

⁹⁰ Ibid

Further, it is imperative for governments to adopt and implement green industrial policies⁹¹. Such policies are key in shifting carbon-intensive economic and industrial sectors into greener trajectories, advancing the transition towards a green, more resilient global economy while positioning countries to tackle environmental challenges⁹². African countries can therefore utilize green industrial policies for active and strategic identification of green activities, sectors and frontier technologies that can be developed by local capabilities and adopted in African economies⁹³.

Renewable energy also has a key role to play towards green industrialization in Africa⁹⁴. Reliable and affordable energy and in particular electricity is an essential precondition for industrialization and economic growth⁹⁵. Green industrialization therefore relies on moving from fossil fuels to renewable energy sources⁹⁶. Renewable sources of energy 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 fuels⁹⁷. Africa has immense potential for renewable energy including wind, solar, hydro, bioenergy, ocean tidal waves, geothermal among other renewables which are abundant throughout the continent⁹⁸. Therefore, Africa has the capacity to build a cleaner and greener future by increasing access to clean energy through sustainable and environment friendly solutions such as green and renewable sources of energy in order to ensure that the region is not left behind as the world

⁹¹ United Nations Environment Programme., 'Green Industrial Policy' Available at <https://www.unep.org/explore-topics/green-economy/what-we-do/economic-and-trade-policy/green-industrial-policy> (Accessed on 25/07/2024)

⁹² Ibid

⁹³ Tony Blair Institute for Global Change., 'Maximising the Green Path to Industrialisation in Africa' Op Cit

⁹⁴ Aquilas. N.A et al., 'Industrialization and Environmental Sustainability in Africa: The Moderating Effects of Renewable and Non-Renewable Energy Consumption' Op Cit

⁹⁵ Africa Policy Research Institute., 'Leveraging Clean Energy to Drive Industrialization in Sub-Saharan Africa: Imaginaries and Realities' Available at <https://afripoli.org/leveraging-clean-energy-to-drive-industrialization-in-sub-saharan-africa-imaginaries-and-realities> (Accessed on 25/07/2024)

⁹⁶ Working paper and Policy brief: Territorial Perspective on Green Industrialisation., Op Cit

⁹⁷ 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-insustainable-development/> (Accessed on 25/07/2024)

⁹⁸ Africa Union., 'Agenda 2063: The Africa we Want.' Op Cit

moves towards net zero⁹⁹. Unlocking the continent's renewable energy potential is therefore necessary for green industrialization¹⁰⁰. Renewable energy has the ability to bolster industrial growth in Africa while sustaining the environment. Africa has therefore been urged to grow its manufacturing sector by extending the range of manufactured products from light to heavy manufactures while ensuring that renewable energy remains the major source of industrial energy supply¹⁰¹. It is therefore necessary for Africa to harness its renewable energy potential in order to achieve green industrialization.

Finally, there is need to enhance research and development in order to achieve green industrialization in Africa¹⁰². Research and development can enhance access to green technologies in Africa therefore fostering sustainability¹⁰³. Such technologies tend to address environmental challenges, reduce resource consumption, minimize pollution, and promote sustainability¹⁰⁴. African countries should therefore strengthen research and development in order to actualize green industrialization in the continent through the adoption of green technologies¹⁰⁵.

Green industrialization is therefore a viable path for Africa to achieve socio-economic growth while fostering environmental sustainability. It is therefore necessary to accelerate the progress towards green industrialization in order to attain sustainability for Africa.

⁹⁹ United Nations Conference on Trade and Development., 'Improving Energy Access Key to Meeting Development Goals in Africa.' Available at <https://unctad.org/news/improving-energy-access-keymeeting-development-goals-africa> (Accessed on 25/07/2024)

¹⁰⁰ Aquilas. N.A et al., 'Industrialization and Environmental Sustainability in Africa: The Moderating Effects of Renewable and Non-Renewable Energy Consumption' Op Cit

¹⁰¹ Ibid

¹⁰² United Nations Economic Commission for Africa., 'Greening Industrialization: Rationale and Concepts' Op Cit

¹⁰³ Adomako. S., & Tran. M.D., 'Exploring the Effect of R&D Support, Green Technology Transfer, Sustainable Innovation' Available at <https://onlinelibrary.wiley.com/doi/full/10.1002/sd.2936#:~:text=These%20technologies%20tend%20to%20address,development%20on%20a%20global%20scale>. (Accessed on 25/07/2024)

¹⁰⁴ Ibid

¹⁰⁵ United Nations Economic Commission for Africa., 'Greening Industrialization: Rationale and Concepts' Op Cit

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Africa Policy Research Institute., 'Leveraging Clean Energy to Drive Industrialization in Sub-Saharan Africa: Imaginaries and Realities' Available at <https://afripoli.org/leveraging-clean-energy-to-drive-industrialization-in-sub-saharan-africa-imaginaries-and-realities>

Africa Union., 'Agenda 2063: The Africa we Want' Available at https://au.int/sites/default/files/documents/33126-doc-framework_document_book.pdf

African Development Bank Group., 'African Natural Resources Management and Investment Centre Issues New Report: "Further Processing of Wood Products in Africa will Contribute to the Continent's Industrialization and Integration' Available at <https://www.afdb.org/en/news-and-events/african-natural-resources-management-and-investment-centre-issues-new-report-further-processing-wood-products-africa-will-contribute-continent-industrialization-and-integration-70084>

African Development Bank Group., 'Climate Change in Africa' Available at <https://www.afdb.org/en/cop25/climate-change-africa>

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