

# **Climate Change and Energy Security in Africa**

*By Josphat Machagua and Eliud Moyi*

*Kenya Institute for Public Policy Research and Analysis (KIPPRA)*

(1993 Words excluding references)

## **Introduction**

Africa now accounts for less than 3% of global energy-related carbon dioxide (CO<sub>2</sub>) emissions and has the lowest emissions per capita of any continent, while having almost one-fifth of the world's population<sup>1</sup>. Despite having the least culpability for emissions the continent is already experiencing more severe climate change than other regions of the world. Energy, food, oil, and other commodity costs have also skyrocketed as a result of Russia's invasion of Ukraine, placing even more pressure on African economies already suffering greatly from the Covid-19 outbreak. The current global energy crisis has highlighted the need for an expedited scale-up of less expensive and cleaner sources of energy. Globally, 2.4 billion people continue to cook using fuels which are detrimental to their health such as coal, firewood, kerosene, while 733 million people still have no access to electricity, with 568 million of them in Africa<sup>2</sup> hence the need for joint efforts to tackle the problem.

## **Climate Change in Africa**

According to estimates, human activities have contributed to an average global warming of 1.0°C over pre-industrial temperatures, with a likely range of 0.8°C to 1.2°C<sup>3</sup>. If global warming continues to grow at the current rate, it is projected to hit 1.5°C between 2030 and 2052<sup>4</sup>. Anthropogenic emissions from the pre-industrial era to the present that have contributed to global warming will continue to have long-term effects on the climate system, such as sea level rise, for hundreds or millennia to come<sup>5</sup>.

However, the effects are not felt equally. The impact of climate change on Africa's environment is far-reaching. The rise in temperature has led to the melting of glaciers and snow caps on Africa's mountains affecting the availability of water for electricity generation, irrigation and drinking. The rise in sea levels is also affecting coastal areas in Africa, which are home to millions of people. If the current rate of sea level rise continues, 117 million Africans would

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<sup>1</sup> Africa Energy Outlook 2022 <https://africa-energy-portal.org/reports/africa-energy-outlook-2022>

<sup>2</sup> Report: Covid-19 slows progress towards Universal Energy Access <https://www.worldbank.org/en/news/press-release/2022/06/01/report-covid-19-slows-progress-towards-universal-energy-access>

<sup>3</sup> Global warming of 1.5 C: Framing and Context <https://www.ipcc.ch/sr15/chapter/spm/>

<sup>4</sup> Achieving Paris Agreement temperature goals requires carbon neutrality by middle century with far-reaching transitions in the whole society <https://www.sciencedirect.com/science/article/pii/S1674927821000435>

<sup>5</sup> Global warming of 1.5 C <https://www.ipcc.ch/sr15/chapter/spm/>

be affected by a 0.3-meter rise in sea level by 2030<sup>6</sup>. Numerous fast growing coastal metropolises in Africa are in danger due to rising ocean levels, which will result in a reduction in land area, increased coastal flooding, stronger storm surges, and a need for greater mitigation<sup>7</sup>. The Intergovernmental Panel on Climate Change (IPCC) predicts that by 2100, the sea level could rise by 1 meter, which would displace over 25 million people in Africa<sup>8</sup>.

Climate change has also exacerbated the existing social and economic inequalities in Africa. The continent's economy is largely dependent on agriculture, which is highly sensitive to weather patterns. The decrease in agricultural productivity due to droughts and floods has led to food shortages and an increase in food prices. This has had a devastating effect on Africa's poorest communities, who are already struggling to make ends meet<sup>9</sup>. The scarcity of resources such as water and food has led to conflict between communities and countries.

### **Energy Security in Africa**

By 2030, 670 million people would still lack access to electricity at the current progress rate, an increase of 10 million over the previous forecast in 2021<sup>10</sup>. To change the tide globally, the yearly investments in clean cooking and access to energy will have to rise to US\$35 billion and US\$25 billion, respectively<sup>11</sup>. However, the converging Covid-19 and Russo-Ukraine crises are having an impact on many aspects of Africa's energy systems, including reversing the positive trends in boosting access to sustainable energy. Additionally, they are worsening energy utility company financial problems, raising the possibility of blackouts, and implementing rationing through load shedding.

In Africa, access to clean and sustainable energy has been unequal for the past two decades. Countries in North Africa such as Egypt and Morocco have been having better access to clean energy for cooking compared to leading economies in sub-Saharan Africa such as Nigeria, South Africa, Angola, Ethiopia, Kenya and Ghana (Figure 1). Due to these issues, Africa is experiencing a dramatic surge in clean and sustainable energy needs. However, the current

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<sup>6</sup> Rising sea levels besieging Africa's booming coastal cities – world <https://reliefweb.int/report/world/rising-sea-levels-besieging-africas-booming-coastal-cities>

<sup>7</sup> Rising sea levels besieging Africa's booming coastal cities – world <https://reliefweb.int/report/world/rising-sea-levels-besieging-africas-booming-coastal-cities>

<sup>8</sup> Sea level rise and implications for low-lying islands <https://www.ipcc.ch/srocc/chapter/chapter-4-sea-level-rise-and-implications-for-low-lying-islands-coasts-and-communities/>

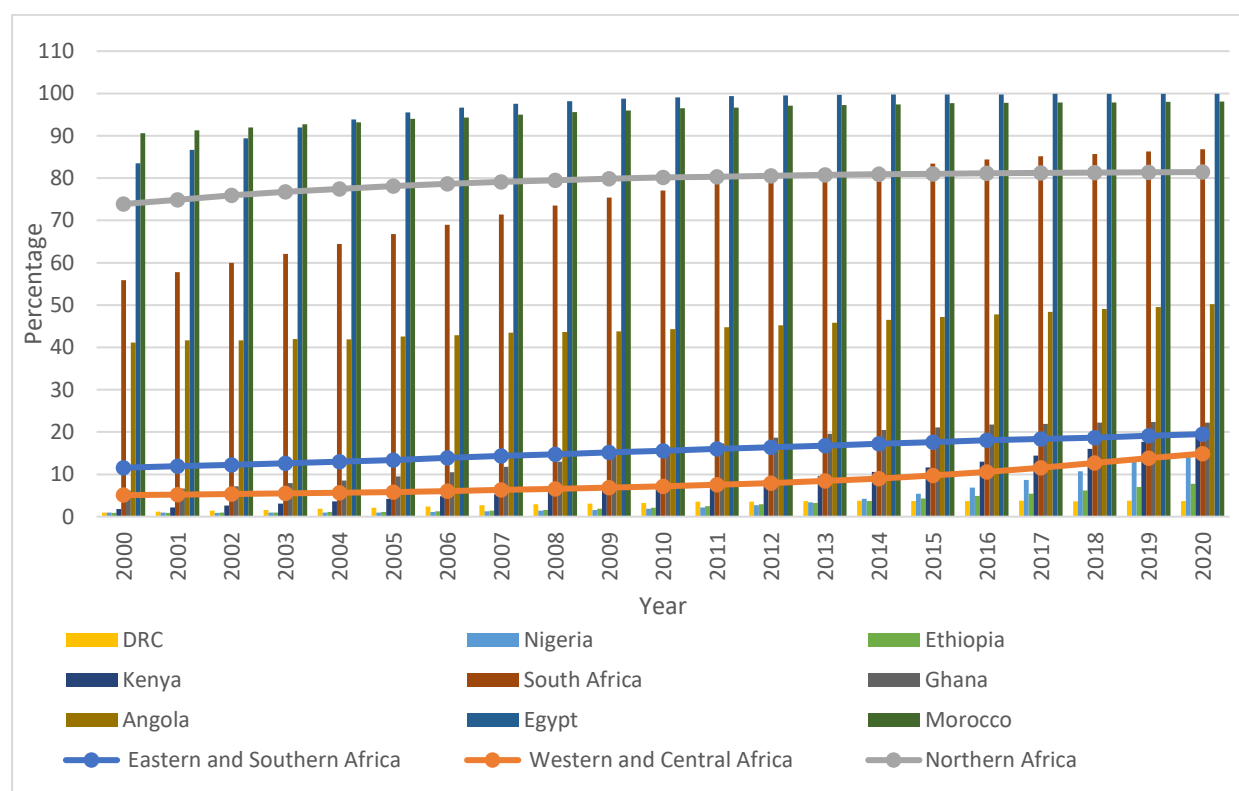
<sup>9</sup> Drought influences on food insecurity in Africa: A Systematic literature review <https://www.mdpi.com/1660-4601/17/16/5897>

<sup>10</sup> Rising sea levels besieging Africa's booming coastal cities – world <https://reliefweb.int/report/world/rising-sea-levels-besieging-africas-booming-coastal-cities>

<sup>11</sup> UN secretary-general issues new global roadmap to secure Clean Energy Access for all by 2030 and net zero emissions by 2050 <https://www.un.org/en/desa/un-secretary-general-issues-new-global-roadmap-secure-clean-energy-access-all-2030-and-net-zero>

investments are insufficient to tackle the problem, slowing the continent's progress toward universal clean energy access and attainment of Sustainable Development goal 7<sup>12</sup>. To remedy this, Africa needs US \$190 billion in investment annually from 2026 and 2030 to meet its energy and climate targets, with two-thirds going to sustainable energy<sup>13</sup>. By 2030, 130 million people must be weaned off of unclean cooking fuels annually to achieve universal access to clean cooking fuels. Currently, over 970 million Africans lack access to clean cooking<sup>14</sup>.

**Figure 1: Access to Clean Fuels and Technologies for Cooking (% of Population)**



**Source: World Bank (2022)**

The most popular option for addressing energy needs in urban areas is liquefied petroleum gas (LPG), but recent price hikes have made it prohibitive for millions of people in Africa, forcing many to revert to using **firewood, charcoal and kerosene**. African countries are revising their clean fuel subsidy programmes and looking into substitutes, including upgraded biomass cook stoves, electric cooking, and biodigesters. The advantages are enormous, such as substantially decreasing the amount of time spent gathering fuel and cooking. However, the improvement rates required for access to clean cooking for everyone by 2030 are unprecedented as the

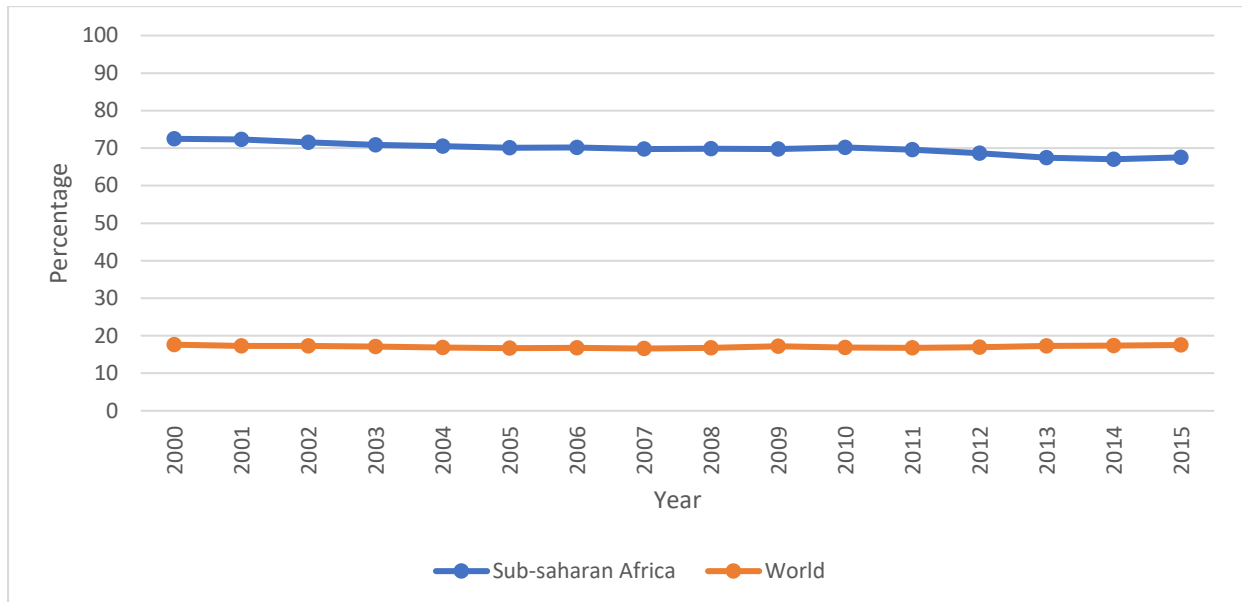
<sup>12</sup> SGD Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all  
<https://sdgs.un.org/goals/goal7>

<sup>13</sup> Africa Energy Outlook 2022 <https://africa-energy-portal.org/reports/africa-energy-outlook-2022>

<sup>14</sup> Africa Energy Outlook 2022 <https://africa-energy-portal.org/reports/africa-energy-outlook-2022>

continent, more so sub-Saharan African region still lags behind the world average in renewable energy consumption usage (Figure 2).

**Figure 2: Renewable Energy Consumption (as % of Total Final Energy Consumption)**



**Data Source: World Bank (2021)**

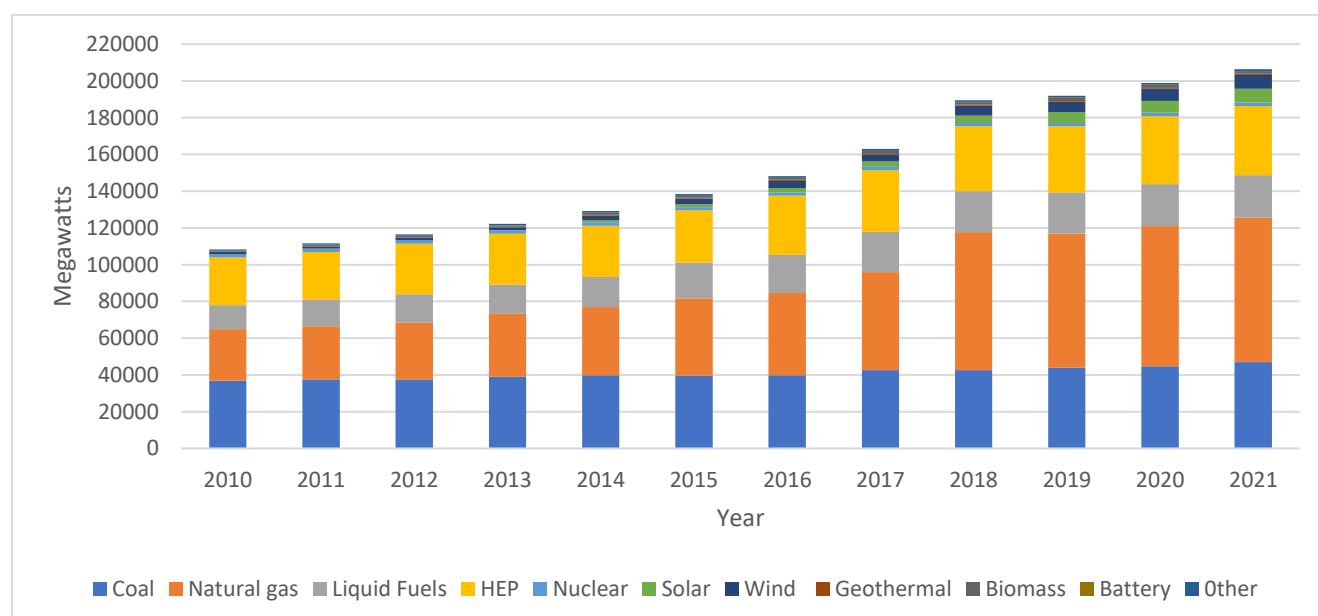
### **How Climate Change affects Energy Security in Africa**

Climate change and energy security are two critical issues affecting Africa. Africa is experiencing the adverse impacts of climate change, such as droughts, floods, and desertification, which are leading to food insecurity, and water scarcity. At the same time, the continent is struggling to meet the energy needs of its growing population. The continent heavily relies on hydropower, which is susceptible to climate change. Water levels in dams and hydroelectric power plants have been impacted by erratic weather patterns as a result of rising temperatures and low precipitation, which has decreased the quantity of water that can be utilized to generate electricity.

The energy mix of the continent exacerbates the effect of climate change on energy security in Africa. Due to its high reliance on fossil fuels such as coal, natural gas, liquid fuels for energy, Africa contributes significantly to greenhouse gas emissions (Figure 3). Also, due to the mounting financial pressures and debt distress, African countries are being forced to cease or cut subsidies on renewable energy. However, the continent has been deepening its investments in renewable energy sources by increasing on-grid installed capacity for Hydroelectric Power (HEP), nuclear, wind, solar, geothermal, biomass (Figure 3). African nations might change

their economies and cultures in a climate-resilient and low-carbon direction by implementing ambitious mitigation and adaptation measures as well as upgrading their finance and governance systems. These objectives also require regional and international collaboration and assistance, and developed nations have a duty to aid Africa's efforts to combat climate change through resources including funding, technology, and capacity building in sustainable energy sources.

**Figure 3: Africa On-grid Installed Capacity by Fuel (Megawatts)**



**Source: African Energy (2022)**

### Way Forward

A comprehensive and coordinated strategy across the region will be needed to solve the interrelated challenges that Africa faces with regard to climate change and energy security. However, many African nations lack the policies, legislation, institutional and regulatory frameworks necessary to promote investments in renewable energy and foster the involvement of the private sector. African countries need to prioritize adaptation measures to cope with the impacts of climate change and energy insecurity through the African Continental Free Trade Area (AfCFTA) framework.

African nations must take bold measures to cut greenhouse gas emissions and make the switch to renewable energy sources. Policies such as carbon pricing, renewable energy subsidies, and energy efficiency regulations are encouraged. There is also a large potential for African nations to switch to sustainable energy sources. This could include investments in renewable energy

infrastructure, early warning systems, and climate-smart agriculture<sup>15</sup>. The African Development Bank has launched the Adaptation Benefits Mechanism to support financing and adaptation projects in Africa to enable African countries to explore innovative solutions, such as drought-tolerant crops, and community-based adaptation approaches<sup>16</sup>.

The lack of investment in renewable energy sources such as solar, wind, and hydropower is a major problem. Fossil fuels are intensively used in many African nations, which increases greenhouse gas emissions and the consequences of climate change. However, these countries can pool capital through issuance of public bonds in domestic capital markets to construct key renewable energy infrastructure such as the US\$80 billion Grand Inga Dam project in Congo River, a flagship projects of African Union's Agenda 2063. The mega dam has the potential to generate 43.2 Gigawatts (GW) of electricity which could provide over 500 million people (40% of Africa's population) with cheap and clean renewable energy, easing the use of fossil fuels on the continent.<sup>17</sup>

Because of the anticipated significant increase in demand for renewable energy services in Africa, ensuring affordability must continue to be a top focus. All these ambitious proposals for increased access to clean, affordable and sustainable energy also require massive investments in capacity building, infrastructure development and regulations. Indeed, the investments needed supersede Africa's ability to fund them, more so with these economies facing debt crises and insufficient revenues from tax collections. Therefore, there are increasing calls for the private sector to help in plugging the energy financing gaps through public private partnerships (PPPs). However, the private sector's inherently fundamental business strategy operates on a profit-making model. That differs from the public good model that fuels public sector service delivery. To attract private investments in clean and sustainable energy initiatives on the continent, there is need for tailored incentives that guarantee certain profit margins, and risk minimization models for the sector to attain its investment goals and attain SDG goal 7 on access to clean, sustainable and affordable energy for all by 2030<sup>18</sup>.

## **Conclusion**

Access to clean and sustainable energy is one of the key building blocks for delivering services, coping with climatic concerns, and supplying sustainable livelihoods, preserving the peace,

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<sup>15</sup> Mobilizing climate finance for adaptation through the Adaptation Benefits Mechanism

<sup>16</sup> Adaptation Benefit Mechanism (ABM) <https://www.afdb.org/en/topics-and-sectors/initiatives-partnerships/adaptation-benefit-mechanism-abm>

<sup>17</sup> Flagship projects of Agenda 2063 <https://au.int/en/agenda2063/flagship-projects>

<sup>18</sup> Sustainable Development Goal Number 7: Ensure access to affordable, reliable, sustainable and modern energy for all <https://sdgs.un.org/goals/goal7>

security, and prosperity of the continent for future generations. For Africa's renaissance, having access to clean energy has a powerful multiplier impact. It is essential to guaranteeing food security since it increases the effectiveness of food production, storage, and transportation while also creating jobs via value addition and reducing deforestation.

Access to dependable, reasonably priced, and clean energy is also essential for Africa to expedite its industrial revolution and realize the potential of the African Continental Free Trade Area. The financial stability of public utilities, which have been severely harmed by inherent mismanagement, inefficiencies, the recent economic crises, and long-standing overpricing of power, must be drastically improved in order to expand and modernize Africa's energy infrastructure. Priority should be given to regulatory reforms, especially those involving cost-of-service power pricing.

## References

- African Development Bank. (2021, November 30). *Adaptation benefit mechanism (ABM)*. African Development Bank - Building today, a better Africa tomorrow. Retrieved February 20, 2023, from <https://www.afdb.org/en/topics-and-sectors/initiatives-partnerships/adaptation-benefit-mechanism-abm>
- African Energy. (2022). *Africa on-grid installed capacity by fuel (MW)*. African Energy Live Data. Retrieved February 23, 2023, from <https://www.africa-energy.com/live-data/data-trends>
- African Union. (2022, February 10). *Flagship projects of Agenda 2063*. Flagship Projects of Agenda 2063 | African Union. Retrieved February 23, 2023, from <https://au.int/en/agenda2063/flagship-projects>
- Huang, M. T., & Zhai, P. M. (2021). Achieving Paris Agreement temperature goals requires carbon neutrality by middle century with far-reaching transitions in the whole society. *Advances in Climate Change Research*, 12(2), 281-286.
- IEA. (2022, June 24). *Africa Energy Outlook 2022: Africa Energy Portal*. International Energy Agency. Retrieved February 19, 2023, from <https://africa-energy-portal.org/reports/africa-energy-outlook-2022>
- IPCC. (2018). *Sea level rise and implications for low-lying islands*. Inter-Governmental Panel on Climate Change. Retrieved February 20, 2023, from <https://www.ipcc.ch/srocc/chapter/chapter-4-sea-level-rise-and-implications-for-low-lying-islands-coasts-and-communities/>
- IPCC. (2018). *Summary for policymakers*. Special Report: Global Warming of 1.5 °C. Intergovernmental Panel on Climate Change. Retrieved February 20, 2023, from <https://www.ipcc.ch/sr15/chapter/spm/>
- Masson-Delmotte, V., Zhai, P., Pörtner, H. O., Roberts, D., Skea, J., Shukla, P. R., ... & Waterfield, T. (2018). Global warming of 1.5 C. *An IPCC Special Report on the impacts of global warming of, 1(5)*, 43-50.
- Ngcamu, B. S., & Chari, F. (2020). Drought influences on food insecurity in Africa: A Systematic literature review. *International Journal of Environmental Research and Public Health*, 17(16), 5897.
- OCHA. (2022, November 24). *Rising sea levels besieging Africa's booming coastal cities - world*. United Nations Office for the Coordination of Humanitarian Affairs. ReliefWeb. Retrieved February 20, 2023, from <https://reliefweb.int/report/world/rising-sea-levels-besieging-africas-booming-coastal-cities>
- Pandipati, S., & Abel, D. E. (2023). Anticipated impacts of climate change on women's health: a background primer. *International Journal of Gynecology & Obstetrics*, 160(2), 394-399.
- Phillips, G. (2022). Mobilizing climate finance for adaptation through the Adaptation Benefits Mechanism. In *Handbook of International Climate Finance* (pp. 420-444). Edward Elgar Publishing.
- Thiede, B. C., & Strube, J. (2020). Climate variability and child nutrition: Findings from sub-Saharan Africa. *Global Environmental Change*, 65, 102192.
- United Nations. (2016, January 1). Goal 7 | Department of Economic and Social Affairs. United Nations. Retrieved February 19, 2023, from <https://sdgs.un.org/goals/goal7>
- United Nations. (2021). *UN secretary-general issues new global roadmap to secure Clean Energy Access for all by 2030 and net zero emissions by 2050*. United Nations. Retrieved February 19, 2023, from <https://www.un.org/en/desa/un-secretary-general-issues-new-global-roadmap-secure-clean-energy-access-all-2030-and-net-zero>



- World Bank. (2021). *Access to clean fuels and technologies for cooking (% of population)*. World Bank World Development Statistics. Retrieved February 23, 2023, from <https://data.worldbank.org/indicator/EG.CFT.ACCS.ZS>
- World Bank. (2021). *Renewable energy consumption (% of total final energy consumption)*. World Development Indicators. Retrieved February 20, 2023, from <https://data.worldbank.org/indicator/EG.FEC.RNEW.ZS>
- World Bank. (2022, June 1). *Tracking SDG 7 – the energy progress report 2022*. World Bank. Retrieved February 20, 2023, from <https://www.worldbank.org/en/topic/energy/publication/tracking-sdg-7-the-energy-progress-report-2022>
- World Bank. (2022, June 22). *Report: Covid-19 slows progress towards Universal Energy Access*. World Bank. Retrieved February 19, 2023, from <https://www.worldbank.org/en/news/press-release/2022/06/01/report-covid-19-slows-progress-towards-universal-energy-access>