



Access to Electricity:
Measuring the Impact of

POWER AFRICA

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The problem: who has access to electricity?

From cooking dinner to illuminating homes and business after sundown, electricity has proven to be an essential need for people throughout the world. Like most basic needs, however, access to electricity is not distributed equally and has shown to have a strong correlation to income; those living in poverty simply do not have the resources or reliable environments to produce stable power necessary to live their lives with ease. Lack of electricity then works to exacerbate existing inequities in human development, keeping people in poverty and inhibiting economic growth.

Figure 1

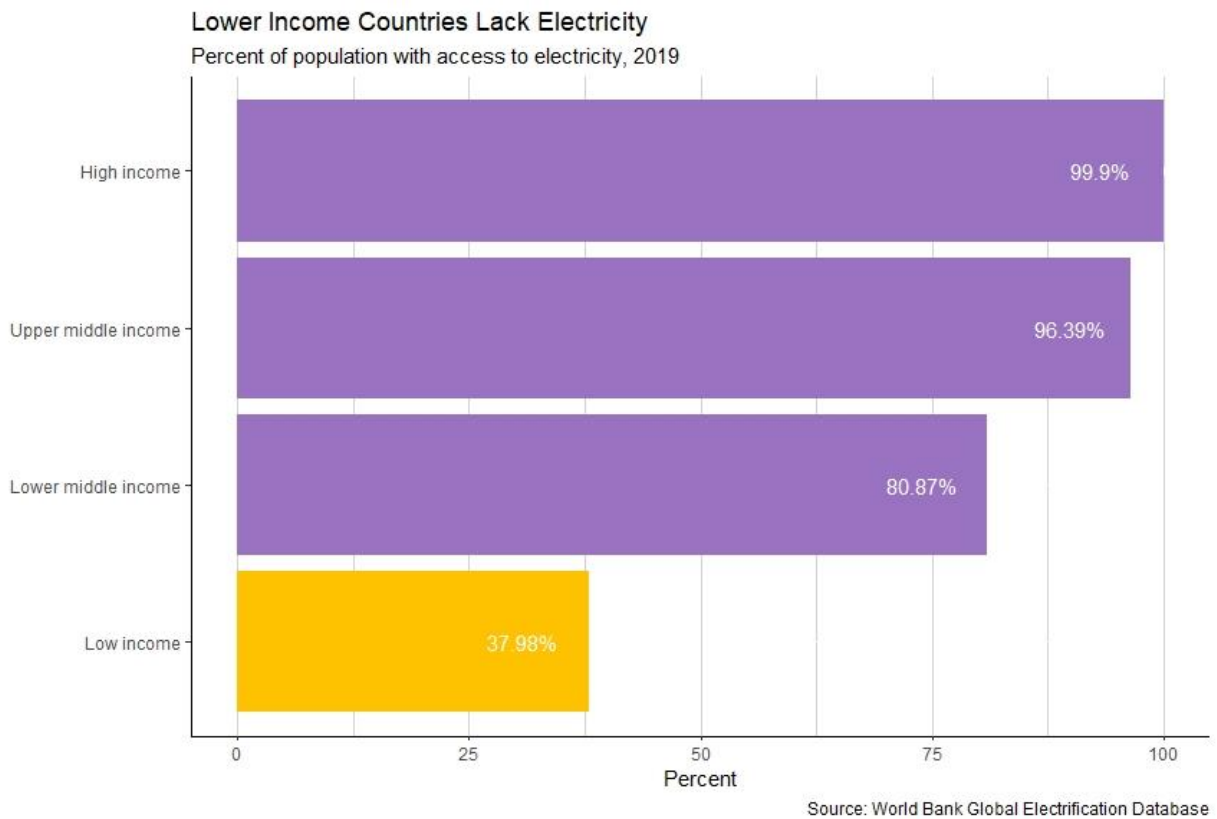


Figure 1 exhibits the correlation between income and access to electricity. There is a large discrepancy between high income countries versus low income.

As the poorest continent in the world, Africa trails behind the rest of the world in its access to electricity. Only just slightly above half of its population has electricity¹ and still relies heavily on biomass, which is plant-based material, as its primary fuel for power. This reliance on biomass is problematic because it not only increases levels of pollution, but also contributes to health issues.

¹ Access to Electricity (% of population), World Bank Data (<https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS>)

Figure 2

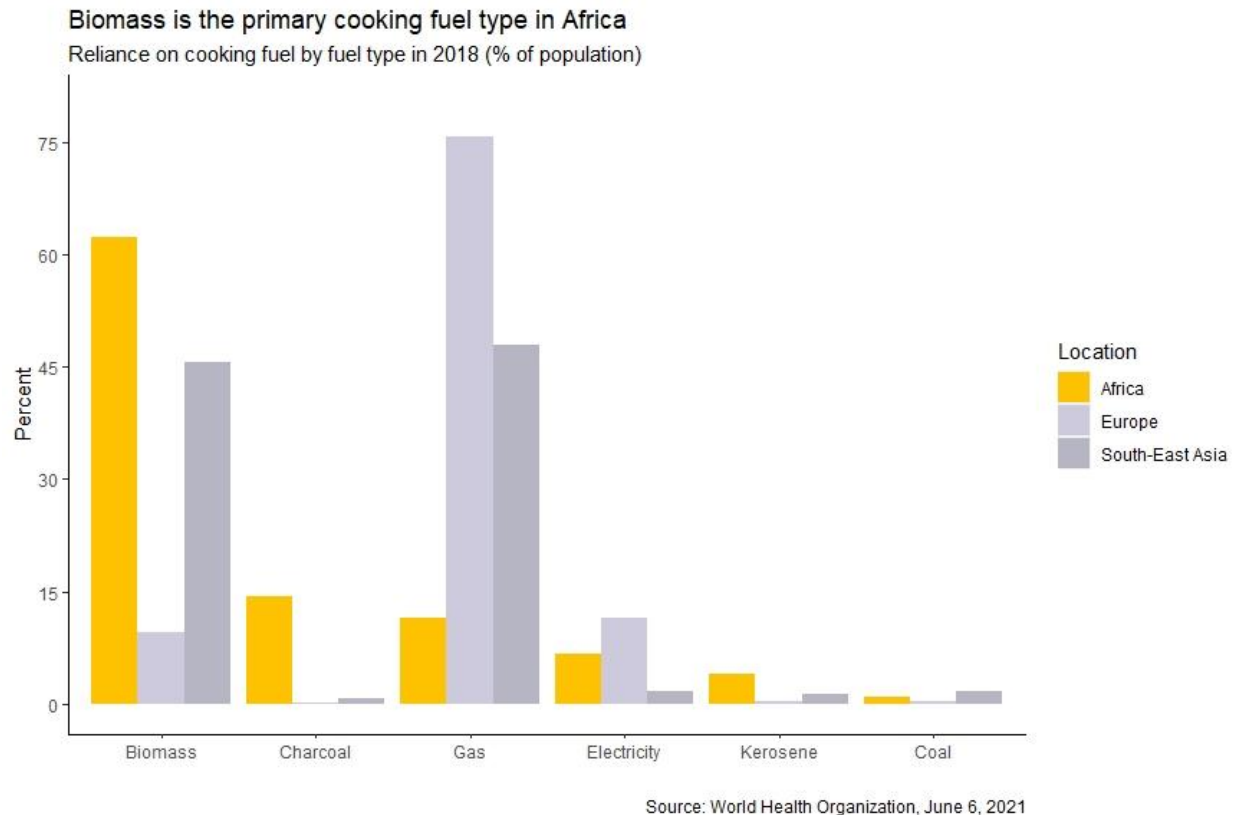


Figure 2 outlines Africa's reliance on biomass in comparison to Europe and South Asia. Europe, a more developed continent relies mostly on gas. In contrast, South Asia also uses biomass as its primary source of power, but not to the same level as Africa.

There have been many initiatives and programs to address this issue, one of which is Power Africa, a United States Agency for International Development (USAID) funded program that aims to bring electricity to Sub-Saharan Africa. Through analysis of multiple indicators, this brief will measure the impact of the Power Africa program in Kenya and concludes with recommendations for the success of the program's future.

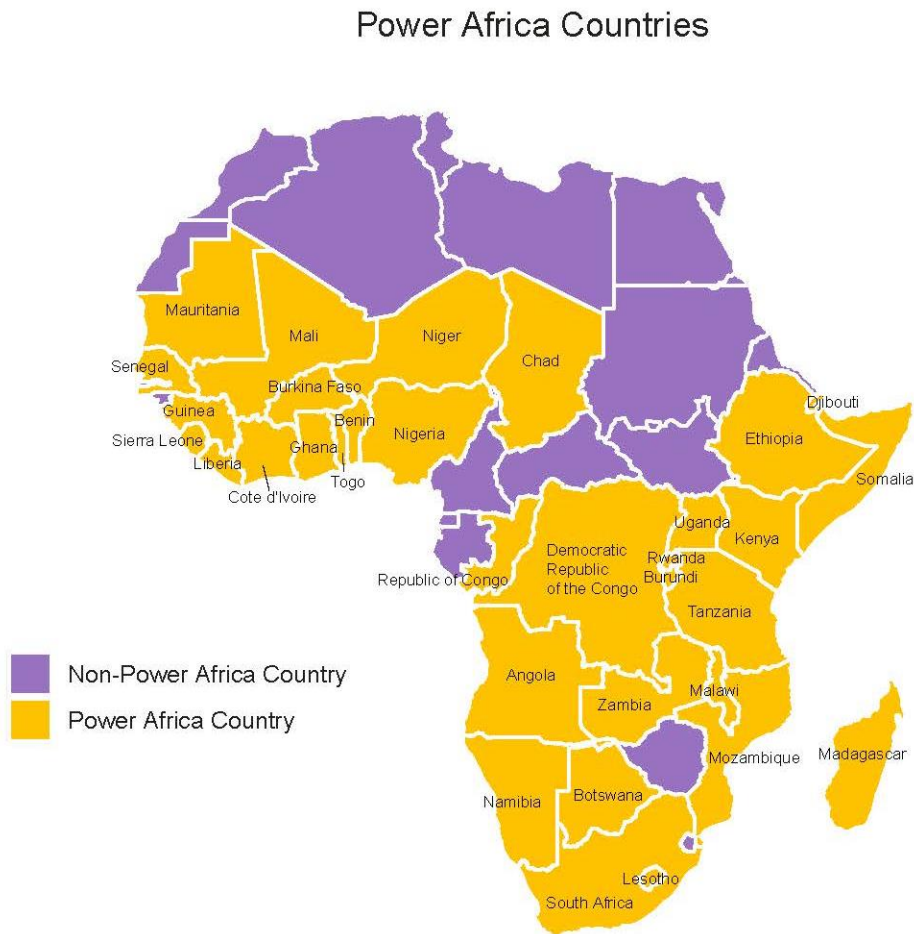
A Potential Solution: What is Power Africa?

Beginning in 2013, the Power Africa program was established to bring reliable, clean power sources to Sub-Saharan Africa with the overarching missions to decrease the cost and use of unhealthy forms of energy, create opportunity for wind, solar, and geothermal resources to ultimately reduce poverty and increase economic growth. With a focus on six countries, Ethiopia, Ghana, Kenya, Liberia, Nigeria, and Tanzania, Power Africa pledged to bring 30,000 megawatts of power and 60 million new connections to homes and business to the region by the year 2030² through the listed actions below:

² Leveraging Partnerships to Increase Access to Power in Sub-Saharan Africa, USAID (<https://www.usaid.gov/sites/default/files/documents/1860/power-africa-overview.pdf>)

- Provide technical expertise from advisors all around the world to identify feasible and efficient solutions to bring power to the communities most in need and maneuver a variety of social, political, and financial barriers.
- Provide the necessary funding for renewable energy projects that is not currently available within the African Government or other foreign, private, and public investors.
- Lead policy reforms to improve governance throughout Africa and to increase knowledge and technical skills so that the power sector can reach its full potential.
- Focus on the most vulnerable communities and remote areas by bringing them small scale and renewable energy sources.
- Empower women to address inequalities across gender so that everyone can engage in the energy transition³.

Figure 3



³ About Us, USAID (<https://www.usaid.gov/powerafrica/aboutus>)

Figure 3 shows a map of the countries that have received assistance from the Power Africa program as of 2021.

To date, Power Africa has aided in a variety of capacities and has engaged in countless private and public partnerships, including but not limited to The African Development Bank, Deloitte, U.S. Department of Commerce, and the World Bank.

The primary measure of assistance used in this brief is the number of megawatts received. To date, Nigeria, South Africa, and Kenya have received the highest number of megawatts from financially closed projects as of 2021. Those three countries are also the most highly populated in Africa⁴, while Djibouti, South Africa, and Mauritius have received the highest number of megawatts per person. For the purpose of this brief, Kenya will be analyzed more closely for a variety of reasons, which will be discussed in the next section.

Figure 4a

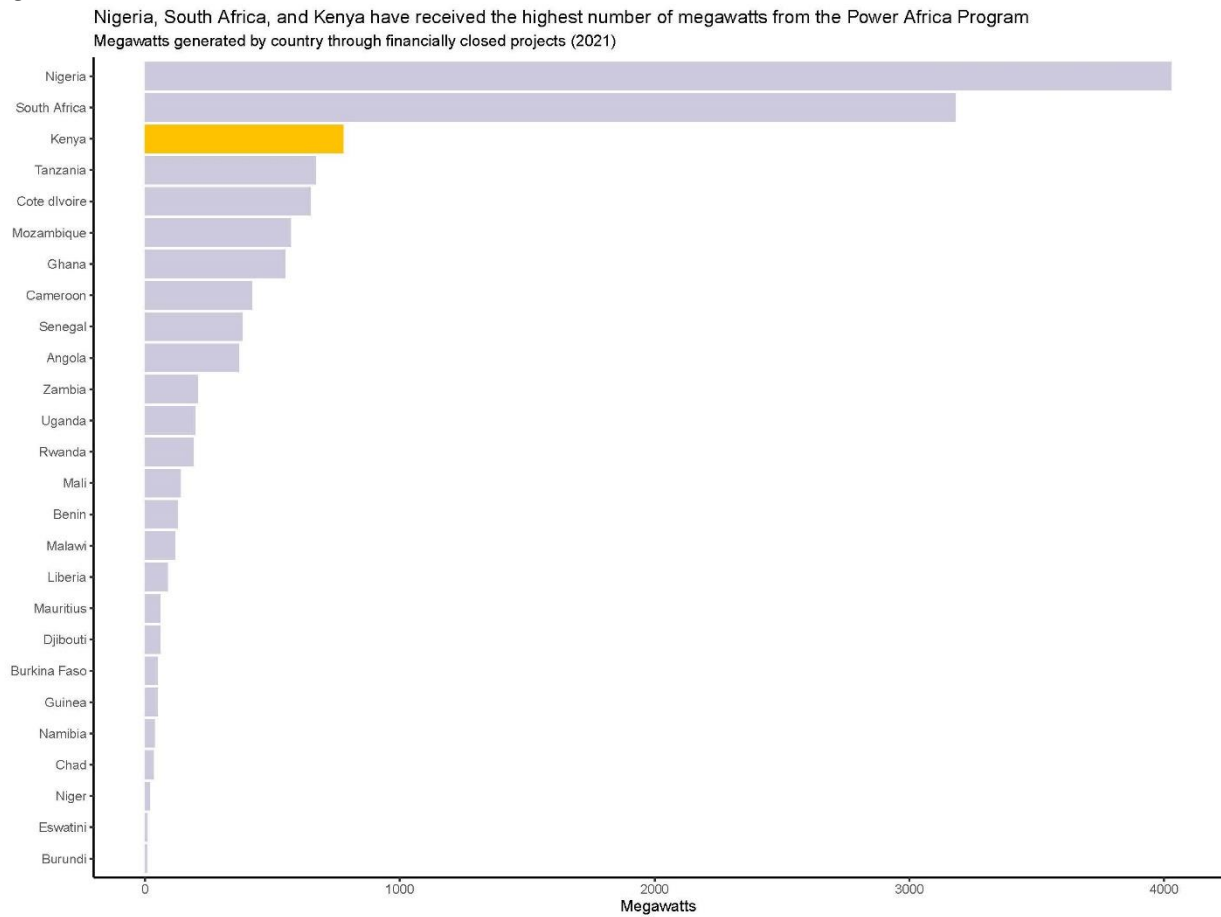
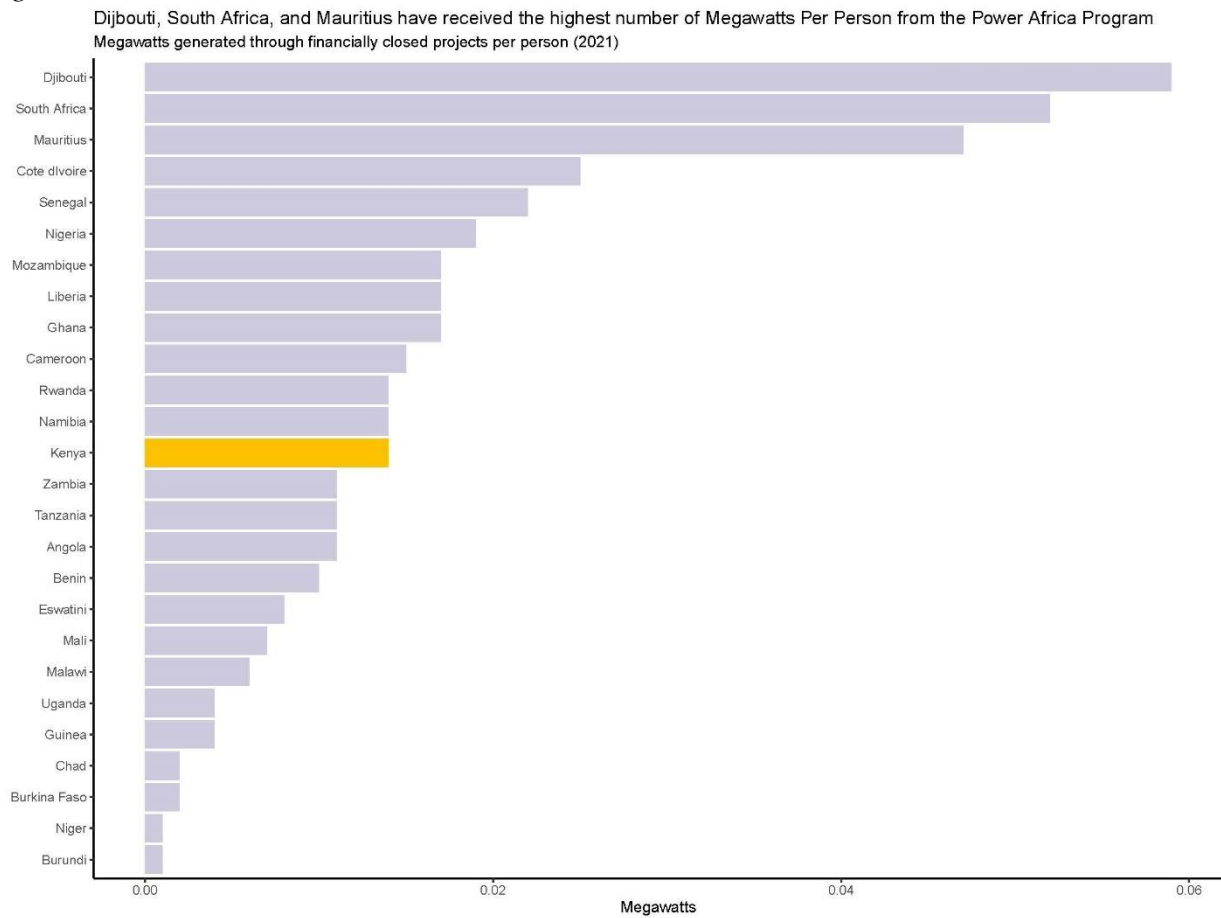


Figure 4a shows the breakdown of megawatts received by Power Africa program while Figure 4b shows the number of megawatts received per person.

⁴ Africa Population 2022, World Population Review (<https://worldpopulationreview.com/continents/africa-population>)

Figure 4b



The focus program: Why Kenya?

As one of the focus countries under Power Africa, Kenya will be analyzed because it not only has received some of the highest number of megawatts to date, but its programs' areas of focus have indicators that can be easily be measured through national data gathered from external sources such as World Bank and World Health Organization. In Kenya, Power Africa focuses on bringing clean energy sources to remote areas of the country, supplying renewable energy technologies for cooking, and employing local women to promote and sell the cooking technologies to their communities⁵. From these brief program descriptions, three main indicators emerge: reliance on biomass, female employment, and reliance on clean energy. These can be used to measure potential impact that Power Africa has in Kenya. Assuming a positive impact of the program, the below is what we hope to see:

1. A decrease in reliance on biomass for cooking
2. An increase in female employment
3. An increase in clean energy reliance

The three indicators above will be analyzed using data from 2000 – 2019 from a variety of sources, highlighting 2013, which is the year the Power Africa Program began. We will compare

⁵ Kenya: Power Africa Fact Sheet, USAID (<https://www.usaid.gov/powerafrica/kenya>)

the timeframes of before and after Power Africa to determine whether the program is responsible for a significant change in the data.

Indicator 1: Reliance on Biomass for Cooking

As discussed earlier, biomass is plant-based material that when burned, can serve as fuel for cooking. Due to Kenya’s, and most of Africa’s, lack of other reliable energy sources, they fell heavily reliant on biomass to power essential activities. In the graph below, about 70% of Kenya’s and Africa’s population were reliant on biomass. As the years progressed, Africa showed a continuous and slow decline. Kenya, on the other hand, showed a slight increase at around the time Power Africa funding began. This is clearly not the positive progression we hoped to see. Based on the data, Power Africa cannot claim that it contributed to a visible decrease in Kenya’s reliance on biomass for cooking.

Figure 5

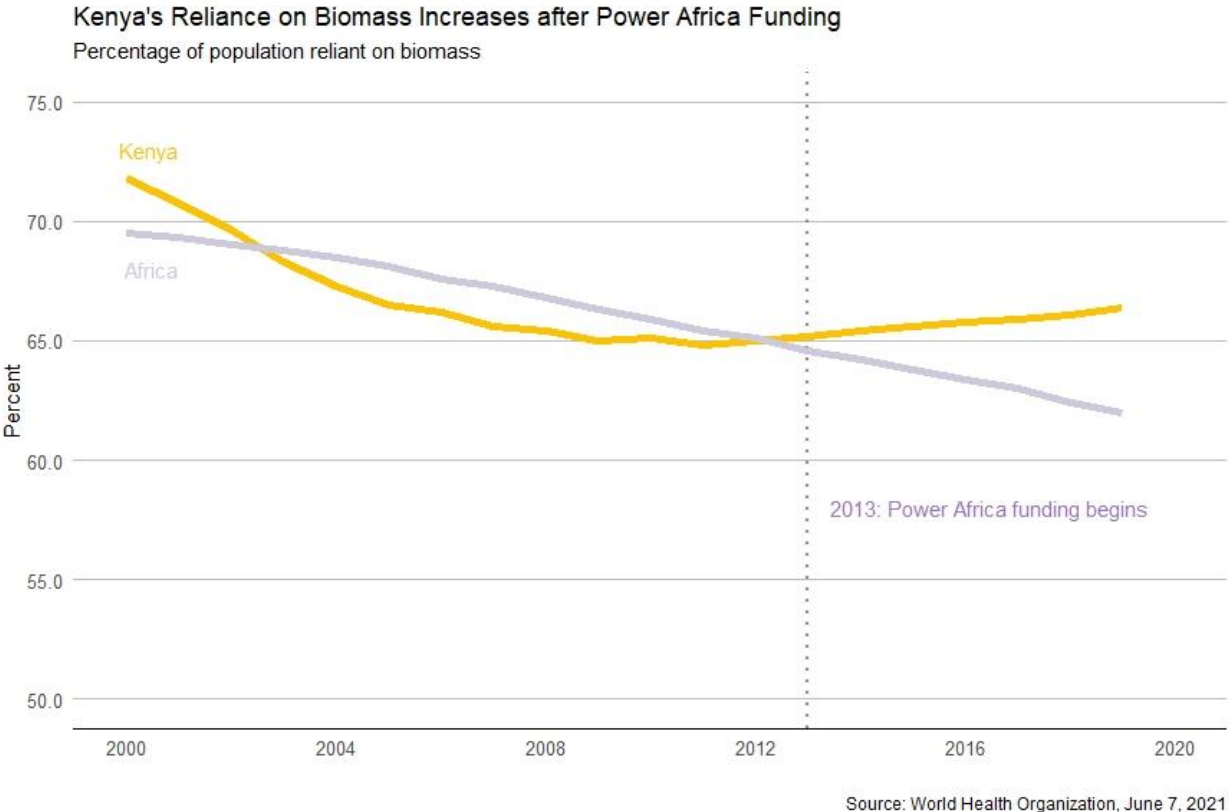


Figure 5 shows Kenya’s and Africa’s reliance and biomass for cooking over time, from 2000 – 2019.

Indicator 2: Female Employment

Like many international development projects, Power Africa also made a specific commitment to women’s empowerment. Through the creation of its programs in Kenya that work to employ women to sell and promote clean cooking technologies, we would hope to see an increase in women’s employment. From the graph below, Kenya shows a strong increase in female

employment. Despite this favorable trend, it does not seem to correlate with the introduction or presence of Power Africa.

Figure 6

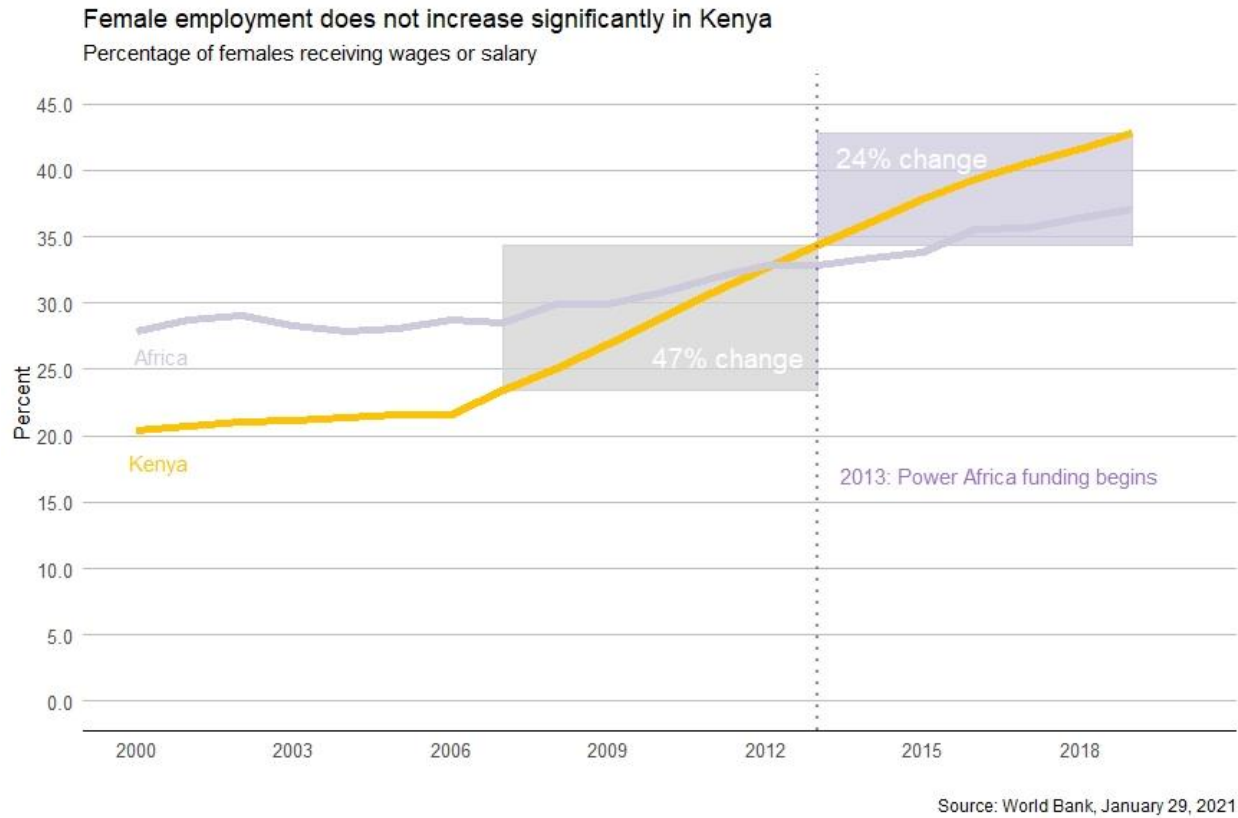


Figure 6 shows the percent of females who receive wages or a salary in Kenya and Africa over the time, from 2000 – 2019.

Two notable dates are 2006 and about 2011. In 2006 Kenya showed a sharp increase in female employment through its obvious change in slope. And around the year 2011, Kenya surpassed Africa’s female employment rate and continued to increase at a faster rate. Although this data is favorable regarding Kenya’s progress toward women entering the workforce, both dates occurred prior to Power Africa’s lifetime. Furthermore, when we look closer at the percent change in the data, we see a 47% change in female employment from 2007 – 2013, as opposed to only a 24% change in the same six-year time frame from 2013 – 2019. Similar to the reliance in biomass, Power Africa is still unable to show that its presence brings positive impact on female employment.

Indicator 3: Reliance on Clean Energy

In addition to simply providing power sources to Kenya, Power Africa also pledged to ensure that most of those sources produced clean energy. Through the development of various wind, hydro, and geothermal projects, we would hope to see an increase in clean energy reliance in Kenya. The graph below depicts just this. Starting in 2000, Kenya was just shy of 2% of its

population reliant on clean energy, while Africa was at nearly 14%. We can see a clear and sharp increase in Kenya’s slope over the 20-year time frame. Looking at the data more closely, we find a higher percent change in Kenya’s clean energy reliance after 2013 at 81% (from 2013 – 2019), as opposed to only 74% in the six years prior to Power Africa assistance (2007 – 2013). From these numbers, we can see a positive impact of the program not only in the percent changes, but also in the slope comparison to the rest of Africa; Kenya is clearly reaping the benefits as one of Power Africa’s focus countries.

Figure 7

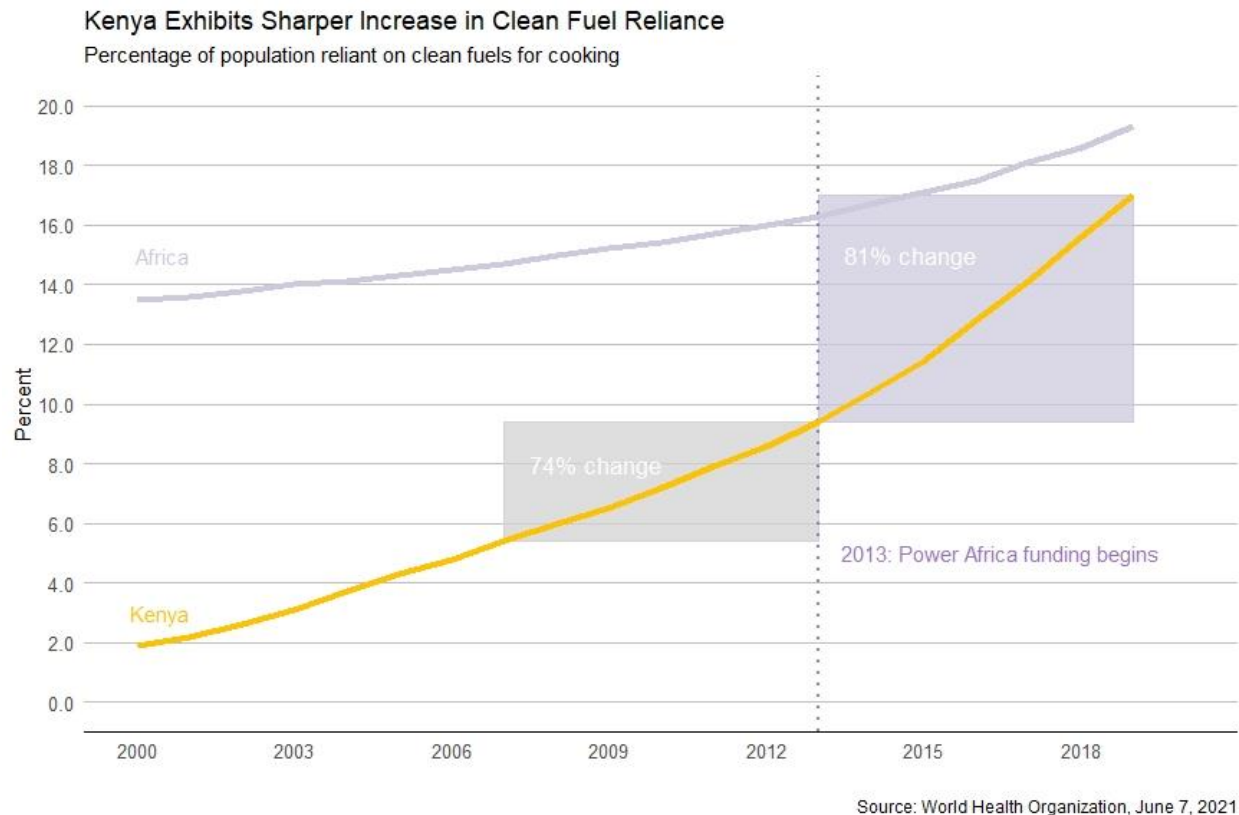


Figure 7 shows Africa’s and Kenya’s increase in clean energy reliance over the time frame of 2000 – 2019.

Considerations and Limitations to the Data

Based on the graphs above, we found that Power Africa showed positive impact in one out of three indicators. There was not a decrease in Kenya’s reliance on biomass, there was not an increase in female employment, but there was, however, an increase in clean energy reliance. Despite the impact we see in the graphs, or lack thereof, there are many limitations to using this data as indication of program success. These limitations derive from various and complicated external factors that deserve further discussion.

We may not have seen a decrease in the use of biomass for a variety of reasons. First and foremost, due to Africa’s extreme reliance on this energy source, the introduction of a new

program may not be able to show visible change within a short six year-time frame. The introduction of clean energy sources, though fully present in communities, may not equate to a direct or immediate substitution of biomass. Users may demand more time and comfort to fully adapt to the new technologies.

Secondly, female employment saw a major increase that was unrelated Power Africa's involvement. Although Power Africa made a commitment toward women's empowerment, it is not the only program, policy, or driver of this social and cultural shift. Additionally, there was not a specific measure of how Power Africa aimed to empower women, whether that be targeting a specific number of women, or surveys to test levels of knowledge surrounding new technologies or energy transition initiatives, etc. Measuring Power Africa's impact on women may be better suited through qualitative data, such as anecdotes or testimonials as opposed to large-scale, national data.

Thirdly, we did see Power Africa's positive impact on Kenya through an increase in clean energy reliance. Although this finding is favorable to the program's success, we do not know how many other external programs or policies are also active in promoting Kenya's clean energy transition. Therefore, it is difficult to isolate Power Africa's impact on Kenya as the data remained at a national level.

Finally, it is worth noting that the program is still ongoing. Beginning in 2013 and using data through 2019, the analysis covers only a six-year time frame, while the entirety of the program is expected to cover 17 years. Due to this, it simply may be too early to come to any conclusions from the data that is currently available. With eight more years of implementation and 11 more years of data to be collected, this brief can serve only as a mid-program evaluation. Based on these limitations, however, recommendations for the program are outlined in the final section.

Program Recommendations

Based on the considerations and limitations outlined above, the recommendations for the program are outlined below:

- Develop trainings to inform communities about the negative impacts of biomass and how to use alternative, clean power sources.
- Build qualitative data collection methods to measure female empowerment and their involvement in the clean energy transition.
- Continue to provide technical and financial assistance to bring clean energy sources to the communities most in need.

Although the data may not directly or obviously point to positive impact in all the indicators explored, that does not mean Power Africa has been unsuccessful in its efforts thus far. The program has nearly a decade remaining to continue bringing power to remote communities, homes and individuals throughout the region and undoubtedly deserves further analysis and funding.