

Implementing Energy Efficiency Policies in East Africa

The Cases of Kenya and Ethiopia

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#### Abstract

Implementing energy efficiency policies in the third world is a critical step for a developing nation to improve its social, economic, and political well-being. Within the African context, East Africa has emerged as a region in which energy efficiency is making steady advancements. Of the nations located in East Africa, Kenya and Ethiopia have become leaders in implementing policies that promote the use of renewable resources in order to increase energy efficiency. This paper discusses the several ways in which Kenya and Ethiopia have achieved this goal by analyzing resource availability, energy projects, energy policies, and national history. A majority of this paper analyzes Kenyan and Ethiopia energy policies which are eventually compared in order to determine which of the two nations is making faster improvements.

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Chapter One: Energy Efficiency



## Implementing Energy Efficiency Policies in East Africa

### The Cases of Kenya and Ethiopia

You pump gas into your car at a gas station. You turn on the stove. You flip a light switch. You turn on a ceiling fan. You install solar power panels onto your house. All of these actions are examples of how energy is used on a day to day basis. Whether it's petroleum, electricity, solar power, or hydro-power, energy impacts individuals in every way. In today's world, energy is a function of every aspect of society. Understanding the importance of energy resources and how to effectively use them is a major concern in any country. For some countries that naturally lack access to energy, imposing energy efficient systems would lead to a better use of scarce resources. Many developing countries in the third world face the issue of rural electrification. For example, picture a remote village with a small population of inhabitants with very little access to electricity. In these situations, access to electricity is difficult to achieve. In most cases, these individuals must resort to using kerosene lamps and generators or must travel great distances to access electricity. The 21<sup>st</sup> century has introduced new technological advances to improve the production of energy with renewable resources which increase efficiency without sacrificing resource supply. However, many third world nations are still lacking the necessary energy efficiency policies to stimulate success rates in national electrification.

#### ENERGY EFFICIENCY

According to the U.S. Energy Information Administration, energy efficiency<sup>1</sup> is defined as a “means [of] using less energy to provide the same level of energy services... [by] using technology that requires less energy to perform the same function” (U.S. EIA 2017). By applying

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<sup>1</sup> U.S. EIA . (2017, February 1). Energy efficiency: Our work. Retrieved from

<https://www.iea.org/topics/energyefficiency/>

this definition of energy efficiency to nations, one must understand the implications energy efficiency would have on a greater society. There are several benefits to improving a nation's energy efficiency. For example, an efficient use of energy resources can lead to less pollution in energy production. By designing energy plants to emit less pollutants during production, or factoring in the use of renewable resources within energy production, one can achieve efficiency. This efficiency also has the potential to create more environmentally conscientious society.

Energy efficiency also leads to an increased access to energy and efficiency within industrial manufacturing. Utilizing less resources but still being able to provide the same amount of energy allows for a wider network of energy access. Additionally, implementing energy efficiency within the manufacturing process leads to a less waste. Patterson (1996) states that "energy efficiency refers to using less energy to produce the same amount of services or useful output" (Patterson 1996). He then goes on to provide the following equation to represent energy efficiency:

$$\frac{\text{Useful output of a process}}{\text{Energy input of a process}}$$

In this equation, Patterson (1996) shows how a more efficient use of resources in energy production creates better energy production. In order to achieve energy efficiency, one must consider alternative ways to input resources in energy production that minimize cost, effort, and resource reliability but still create the same amount of energy. This process relies on innovative ideas and technology.

## BENEFITS OF ENERGY EFFICIENCY

According to the International Energy Agency, there are multiple benefits<sup>2</sup> of increasing energy efficiency within any given nation. These benefits encompass every aspect of a society's social, political, and economic sectors. The IEA states that increasing energy efficiency can lead to benefits that include a decrease in local air pollution, an increase in overall health and well-being, energy security and savings, environmental stability, assets value, macroeconomic development, an increase in industrial productivity, energy access, stability in energy prices, efficiency within public budgets, and a disposable income.

In terms of environmental effects, a proper system of implementing energy efficiency would involve using less resources to produce the same amount of energy. A more efficient use of resources in production through innovative technology or renewable resources (as opposed to non-renewable) would have extremely positive effects on the environment such as a decrease in air pollution and CO<sub>2</sub> emissions. This in turn would increase the overall health and well-being of environmental ecosystems and societies. In addition to this, energy efficiency would increase cost savings, stabilize market prices, and create a more disposable market income. These financial savings would also increase public budgets and the overall value of assets related to the energy sector. With this financial growth comes macroeconomic development that begins in the energy sector and has the potential to grow to other industries.

The overall process of implementing energy efficiency is one that follows a spill over process. It begins with a focus in one sector and has the potential to spread into other areas within the energy sector which can in turn lead to growth within other industries and therefore society as a whole. In this way, increasing energy efficiency can be seen as a mechanism for a

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<sup>2</sup> IEA. (2014). Benefits of Energy Efficiency . Retrieved from <https://www.iea.org/topics/energyefficiency/benefits/>

nation to move towards a more modernized civilization. A strict focus on improving energy efficiency is a key factor in improving any nation's overall well-being.

### ENERGY TRANSITIONS

In order for energy efficiency to be achieved, one must make an active transition in one's current energy system. This transition involves efforts to change the current system of energy production. According to Araujo (2014), energy transition refers to, "a shift in the nature or pattern of how energy is utilized within a system. This definition recognizes the change associated with fuel type, access, sourcing, delivery, reliability... as well as with the overall orientation of the system" (Araujo 2014). A nation that is trying to achieve energy efficiency must first make a transition from their current energy system towards a more efficient system. "[This] change can occur at any level- from local systems to the global one" (Araujo 2014). On a national level, energy transitioning must encompass local level actors in order to transition the nation as a whole.

Araujo (2014) states that there are several components in the energy transition process. One of the first steps in energy transitioning involves having a sense of urgency. Araujo states that, "this view is shaped by pressure relating to sustainability, access, security and/or reliability" (Araujo 2014). In other words, a great sense of urgency is required once a nation has realized that there is an issue with their current energy system. A nation that recognizes that their current energy system can no longer sustain their population must act quickly in transitioning to a more suitable system of producing energy. These sustainability issues may be related to resource accessibility. Many third world nations have come to realize that utilizing non-renewable resources within energy production is a short-term solution. As population rates increase, demand increases but this does not mean that a nation's resources can sustain the additional

growth. The same sense of urgency is required when a nation recognizes issues with access, security and reliability.

Another component to making energy transitions includes understanding the tradeoffs (costs and benefits) to changing one's energy system. The IMF has estimated that approximately \$38 trillion dollars are needed in order to achieve global demand for energy by 2035 (Araujo 2014). From a national perspective, one must look at how much of the total investment (\$38 trillion) is needed to meet individual energy demand. One must do a cost-benefit analysis to determine how this might be achieved. However there are several components in a cost-benefit analysis that cannot be monetized. These include the social and political aspects of energy transitioning (Araujo 2014). One cannot put a fiscal value to social practices that might prevent an energy transition. An example of this can be found in some third world countries where certain tribes reject the use of western technologies or modernization (as is the case with the Turkana and Maasai tribes in Kenya). Additionally, the politics surrounding an energy transition cannot be monetized.

Observing one's environment and innovating technology are key factors in making an energy transition. In order to successfully transition an energy system, one must be fully aware of the surrounding environment that affects the current energy system. Observing the surrounding environment means taking a closer look at population growth, urbanization rates, globalization, supply chains, and other components that factor into energy production. It is also important to observe environment and health effects (Araujo 2014). All of these factors play an important role in determining the rate to which a country can successfully transition its energy system. In assessing these variables, a country must work with local and private sector actors. Cooperation between the national and local governments, along with private sector actors allows

for a more efficient, smoother transition process. Additionally, the use of innovative technology in the research and development process of planning an energy transition requires the assistance of academic personnel (engineers, scientists, etc.) and private sector firms such as construction companies, architecture firms, etc. Actively seeking innovation in technology and energy efficiency ideas is an essential tool in transitioning one's energy system.

### ENERGY EFFICIENCY AND RENEWABLE RESOURCES

There are many strategies that can be used to implement energy efficiency. These strategies include using innovating technology, cutting back on usage of non-renewables, preventing deforestation, etc. Of these strategies, the use of renewable resources in energy production has become increasingly popular. Akella, Saini and Sharma (2009) state that the “use of traditional fossil fuel based resources has led to increased pressure on host environments”. In order to combat this environmental issue, Akella et al. (2009) state that the use of renewables in energy production is the only sustainable solution. The various renewable resources used for energy production include solar, wind, and hydropower along with biomass and geothermal resources. Akella et al. (2009) argue that recent technological innovations have reduced the overall cost of solar and wind powered systems.

#### Reasons for Renewable Resources in Energy Efficiency

Akella et al. (2009) state that there are several societal reasons to use renewable resources in energy production as a means of increasing energy efficiency. These reasons include an increase in the gap between urbanized and rural societies with respect to their access to electricity. Here it is argued that urbanized regions of a nation have a greater access to reliable energy sources in comparison the their rural counterparts. This disproportionate gap has led to disparities in access to raw materials and income. By increasing the presence of renewable

resources in energy production, societies will experience an increase in consumer choice, self-reliance, employment, and technological advances (Akella et al. 2009).

Another important reason to integrate renewable resources in the energy efficiency process involves the betterment of environmental stability. Climate change, air pollution, soil depletion, water pollution, and deforestation are several indicators of an inefficient energy sector (Akella et al. 2009). The use of renewable resources within energy production decreases a reliance on non-renewable resources and allows for environmental re-stabilization. In many developing countries, natural resources (such as traditional biomasses- fuel and wood) are used for basic cooking and lighting purposes. The use of renewable resources as an alternative means would decrease an overdependence on non-renewables.

The use of renewable resources within the energy sector would also lead to an increase in employment and job creation<sup>3</sup>. An increased demand for renewable resources within energy production would lead to an increased demand for researchers, scientists, engineers, and other academics in order to ensure energy efficiency is achieved. This growth would create employment opportunities at new factories and power plants for engineers and scientists to create innovative technology to power energy production. In this way, adding renewable resources would expand the market for employment opportunities within the energy sector. An increase labor and work force would also lead to economic gains as new employees would experience an increase in purchasing power that would cycle back into the economy (Akella et al. 2009). Here we see financial gains being made for both employees, the economy, and the energy industry.

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<sup>3</sup> Burger, J. (2017, July 26). Unpacking renewable energy in Africa. Retrieved from <https://www.howwemadeitinafrica.com/unpacking-renewable-energy-africa/59248/>

Another economic benefit to utilizing renewable resources would be an increase in investments towards the energy sector. As stated before, integrating renewable resources into energy production has proven to be cost efficient. Investors in the energy sector and in other industries would take notice of how renewable resources have made energy production more efficient and financially rewarding. The efficiency of using renewable resources would therefore draw attention from financial investors into the energy sector. An added benefit to this would be a diversification of economies. Investors from all areas of the economy directing funds into the energy sector would increase profits and increase funds for research and development (Akella et al. 2009). In this way, actively incorporating the use of renewable resources into energy production would lead to several advances within any given nation.

#### EAST AFRICA AND ENERGY EFFICIENCY

##### Benefits of Energy Efficiency in the Developing World

Energy production within developing countries is a process that has the potential to transform a nation. Implementing policies that create agencies and raise funds to monitor the progression of energy efficiency is a process that can have several social, political and economic benefits. The legislative process of implementing energy efficiency policies is one that can improve a nation's bureaucratic proceedings by forcing national governments to work with local governments. This would allow for the involvement of local agencies and private sector firms. Socially, having reliable access to energy is often seen as a luxury in many developing countries. Increasing these rates of accessibility has the potential to increase a population's overall health and well-being. In addition to this, implementing energy efficiency within a nation's political and social spheres would positively influence economic growth. The opportunity for investment



and employment would increase a nation's overall GDP. This would also lead to a wider consumer base with access to energy resources.

### Energy in East Africa

From a global perspective, Sub-Saharan Africa (which encompasses 46 out of 54 African nations) has the lowest rates of access to energy resources on a global scale. The World Atlas<sup>4</sup> lists ten nations with the lowest rates of access to electricity from a global perspective, all of which are African nations. Data from the World Bank<sup>5</sup> shows that in 2014, only 37.4% of Sub-Saharan Africa's population had access to electricity. Although the African continent is rich in natural resources, many nations lack the necessary policies to implement energy efficiency that would elevate them from an underdeveloped or developing status.

Another impediment to electricity access rates in Africa involves the production process. Access rates in rural areas continue to be an issue in Sub-Saharan Africa. This paper argues that increasing efficiency within the energy production process could help alleviate this issue. In Kenya, rural populations depend on non-renewable resources (kerosene lamps and fuel powered generators or transmitters) for energy access. The use of renewable resources within the energy production could lead to a more convenient and cheaper means of access for rural areas. This in turn could help minimize the drastic difference in rates of energy access among rural and urban areas. Therefore, creating a more energy efficient system is the key to production and distribution issues.

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<sup>4</sup> Wee, R. Y. (2016, March 04). Countries With The Lowest Access To Electricity. Retrieved from <https://www.worldatlas.com/articles/countries-with-the-lowest-access-to-electricity.html>

<sup>5</sup> World Bank. (2014). Access to electricity (% of population). Retrieved from <https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?end=2014locations>

Despite these grim statistics, the East African region has emerged as a leader in improving energy efficiency in order to combat low rates of access to electricity and energy. In recent years, several East African nations have partnered alongside one another in order to create effective changes within their individual and collective energy sectors. Organizations like the East African Center for Renewable Energy and Energy Efficiency (EACREEE<sup>6</sup>) seek to increase access rates, provide energy security, and reduce negative effects on the environment. This specific organization includes the countries of Burundi, Uganda, Rwanda, Kenya and Tanzania. Similarly, the Ethiopia-Kenya Power Interconnection Project (2012) seeks to “transfer electricity between Ethiopia and Kenya and to facilitate the integration of the power grids of the East African countries” (World Bank 2012). Other projects include the LAPSSET Corridor which is a transportation corridor that begins in Kenya and works its way outwards to create a system of transportation and infrastructure building. This project also includes plans to improve energy production and access to the participating countries of Kenya, Ethiopia, and South Sudan. Investing in projects such as the LAPSSET Corridor and creating international organizations and treaties has made East Africa a leader among other Sub-Saharan nations to push for energy efficiency implementation.

Among the nations in East Africa who have significantly improved their energy sectors are Kenya and Ethiopia. The African Renewables Summit<sup>7</sup> states that Kenya has made significant improvements in solar and wind energy production with geothermal power being a

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<sup>6</sup> EACREEE. (2016, October 01). Objectives and Mandate. Retrieved from <http://www.eacreee.org/content/objectives-and-mandate>

<sup>7</sup> Africa Renewable Summit. (2017, April). Why East Africa. Retrieved from <http://www.africarenewables Summit.com/sponsorship/why-east-africa/>

major source of renewable energy production (ARS 2017). The New York Times<sup>8</sup> credits Kenya as being the first African nation to access geothermal resources for energy (Yee 2018). Today, geothermal resources are Kenya's leading source of renewable energy production. In addition, Ethiopia's geographic location makes it a leader in hydro-power and wind production within the East African region (African Renewables Summit 2018). There is great potential in both cases for improving energy efficiency through the use of renewable resources.

In both countries, improving energy efficiency has become a main focus for policy makers. In the case of Kenya, a focus on improving energy efficiency stems from a social and political desire to improve the nation's overall well-being and move towards modernization and a developed status. In order to achieve this goal, Kenya has been very active in partnering with its neighboring countries to create projects and organizations. Domestically, Kenya has imposed a number of energy related policies with the hope of improving the country's overall use of resources and access to energy. These policies include the Sessional Paper No. 4 (2004), the Energy Act (2006), The Geothermal Resources Act (2012), The Energy Bill (2015), and the National Energy Policy (2015). These policies share a common goal of improving energy efficiency within the Kenyan energy sector and will be addressed individually in the following chapter.

In the case of Ethiopia, a surge in national economic growth has led to a social need for energy efficiency. Quartz Africa<sup>9</sup> used data from the International Monetary Fund to show how

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<sup>8</sup> Yee, A. (2018, February 23). Geothermal Energy Grows in Kenya. Retrieved from <https://www.nytimes.com/2018/02/23/business/geothermal-energy-grows-in-kenya.html>

<sup>9</sup> Kopf, D. (2017, October 26). Ethiopia's incredible economic rise. Retrieved from <https://qz.com/1109739/ethiopia-is-one-of-the-fastest-growing-economies-in-the-world/>

Ethiopia's quickly growing economy made it the third fastest growing country in the world in 2016 (Kopf 2017). In the following year, the World Economic Forum<sup>10</sup> used World Bank Data to state that Ethiopia had risen to first place in terms of being the fastest growing nation and economy worldwide (Gray 2017). Even with this rapid growth, national rates of access to electricity remain relatively low. In addressing these low rates, the Ethiopian national government created organizations and policies like the Environmental Policy (1997), the Ethiopian Rural Energy Development and Promotion Center (2002), the Rural Electrification Fund (2003), the National Biogas Programme (2007), the Proclamation on Energy (2013), and the National Energy Policy (2013), and the Growth and Transportation Plan II (2016) which will all be addressed in chapter three of this paper.

#### CHALLENGES FACED IN EAST AFRICA

East Africa has proven to be successful in their several attempts to improve energy efficiency with the developing world. Kenya and Ethiopia have emerged as two countries within the region who have driven the conversation on energy efficiency. Although these nations have received international recognition for being the fastest developing countries in East Africa<sup>11</sup> (with Ethiopia leading in 2017), they are still facing the issue of efficient energy production and consumption. In both cases there is a common understanding that improving national energy efficiency is a crucial step in moving towards a developed status. However, making this step can be difficult for several reasons. In Ethiopia, traditional beliefs and a strong national connection to

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<sup>10</sup> Gray, A. (2017, June 9). These are the world's fastest-growing economies in 2017. Retrieved from <https://www.weforum.org/agenda/2017/06/these-are-the-world-s-fastest-growing-economies-in-2017-2/>

<sup>11</sup> Kazeem, Y. (2017, May 31). Africa's economic growth in 2016 was driven by East Africa. Retrieved December 07, 2017, from <https://qz.com/994526/ethiopia-led-east-africas-economic-growth-in-2016/>

culture can often times hinder modernization. In Kenya there is a need for consensus within government oversight in order to implement energy efficiency. Both countries require government involvement in drafting and implementing the necessary energy efficiency policies.

The role of government involvement in each nation is a key factor. First I examine each nation's history individually. This assessment includes a brief description of the government composition and cultural heritage of each country. Introducing these descriptions allows for a better understanding of the role of culture on politics in each nation. Next, I examine the resources available in each country. This assessment includes a quantitative evaluation of the rate to which these resources are used on a national level. This paper also examines a few energy efficiency policies that have been implemented in both cases. An assessment of these policies includes suggestions on how they might be improved to increase energy efficiency. In introducing these elements, I examine how culture and government composition influences the rate to which energy efficiency policies are drafted and implemented in Kenya and Ethiopia. In order to understand how these countries might accomplish this goal, we must first examine each country individually.

In order to effectively utilize the resources available in both Kenya and Ethiopia, both countries must successfully draft and implement energy efficiency policies. This process will be different in both cases due to the differing governing systems. Both countries must first have a broader understanding of success policy implementation in which to apply to their respective systems. This understanding of policy implementation can then be applied to the process of energy efficiency policy implementation.

## ENERGY EFFICIENCY AND POLICY IMPLEMENTATION

Policy implementation in relation to energy efficiency is largely dependent upon the research and development of alternative means for energy use. Allcott and Mullainathan (2010) argue that the drafting of energy efficiency policies should be based on “behavioral science research”. The research and development programs that examine new methods of created efficiency within a given country’s energy sector need to be regulated in order to ensure researchers are utilizing new methods that might eventually prove to be beneficial. In this instance, allowing for government intervention within the private sector would create a higher level of ethical accountability. Allcott and Mullainathan (2010) argue that researchers often disregard discoveries that produce “unpleasant” short-term results but provide clearly beneficial long-term solutions. An example of this might be the construction of a new state of the art factory powered by renewable resources that would cost millions of dollars to build but would ultimately decrease greenhouse gas emissions. This might lead researchers to abandon certain methods that might appear to be too difficult to address, thus forfeiting any future benefit of implementing those methods. Allcott and Mullainathan (2010) propose that in order to address this informational gap in the research and development of energy efficient methods, government institutions need to fund extensive behavioral programs and integrate them with energy efficiency research programs.

Integrating the research and development sector with behavioral programs would allow for an efficient use of funds. These behavioral programs must have clear project goals and must be thoroughly regulated by the national government or government agencies. Government institutions also need to introduce market incentives to encourage private sector participation in the research and development of energy efficiency. In addition to this, government institutions

need to provide information and resources to these behavioral programs and private sector firms in order to assist in their research and development. These steps require cooperation from a nation's government body in order to influence positive results in the research and development of energy efficient methods that might be used in policy drafting.

#### Europe as an Example of Energy Efficiency

Along with having a better understanding of the behavioral influences behind the research and development on energy efficiency, third world nations could also improve energy efficiency by examining the energy structure of many European nations. Improving the efficiency within one's energy sector is a strategic tool used by many third world nations in hopes of increasing their overall GDP and moving towards a more developed state. Many European nations have successfully improved their energy sectors with the use of renewable resources and innovative technology. In 2016, the American Council for an Energy Efficient Economy did a study called the International Energy Efficient Scoreboard. This study measured the efficiency rates of the world's top energy consuming nations. Several of the nations that ranked high in energy efficiency were European. These nations included France, Germany, Italy, the Netherlands and Spain. Often times, the result of these efforts has increased their overall GDP and global ranking.

By mirroring these same efforts, developing nations in East Africa such as Kenya and Ethiopia might produce similar results. The benefits of these efforts would lead to an improvement in overall well-being, national access to energy, and economic growth. Koskimäki (2012) argues that countries located in Sub-Saharan Africa should look to the experiences of many European Union nations in their quest to improve on their implementation of energy efficiency. These countries must first have an in-depth understanding of the resources available

to them. Koskimäki (2012) states that although many nations in Sub-Saharan Africa are rich in resources, they fail to understand how to best utilize those resources through effective policy implementation. Increased levels of urbanization in Sub-Saharan African nations have led to an increase in demand for energy. These nations must understand how to provide a higher rate of access to energy without unnecessarily increasing costs. In order to do this, Koskimäki (2012) proposes that African nations implement policies like the EU's 20/20/20 by 2020 policy which seeks to decrease greenhouse gas emissions by increasing the use of renewable resources in order to decrease consumption rates by 20% by the year 2020. Imposing a plan like this would be extremely cost-efficient in the energy sector in a developing country and would alleviate any environmental damage to limited resources. A failure to implement energy efficient methods within the urbanization sector would lead to power shortages, thus stagnating urbanization efforts. Implementing policies like the EU's 20/20/20 would also increase cost-efficiency in infrastructure and construction.

Koskimäki (2012) proposes several lessons from European Union states that could be beneficial to countries in Sub-Saharan Africa. These include introducing the use of renewable resources such as solar and hydro-powering in the construction of new buildings. Energy efficient transportation is another method that is widely used in Europe. This includes the manufacturing of fuel efficient vehicles or the alternative of electric cars. Finally, Koskimäki (2012) proposes a system of cooperation between a nation's federal and local governments in order to encourage citizenry participation. By including all of these elements in the policy drafting process, countries like Kenya and Ethiopia may be able to effectively implement energy efficiency policies that will help move each nation towards a developed status.



## GOVERNMENT INFLUENCE

In the case of Ethiopia, a parliamentary system posits a different implementation process than that of Kenya's presidential republic. The differing government structures require different systems of drafting and implementing policy. The policy implementation process in Ethiopia is one that involves varying bodies of political parties which are often based on tribal affiliation. Examples of these parties include the Tigrayan People's Liberation Front and the Oromo Peoples' Democratic Organization<sup>12</sup>. In Kenya<sup>13</sup> tribal affiliation appears in the support of certain political parties over others. The Luhya tribe is known for its support of the Forum for the Restoration of Democracy (FORD-Kenya) whereas Luos are known for their support of the Labour Democratic Party (LDP). Cultural affiliations in politics are strongly present in both Kenya and Ethiopia. This presence often times introduces differing social practices into politics. All of these influences will be discussed in the following two chapters on Kenya and Ethiopia.

## OVERVIEW OF FOLLOWING CHAPTERS

In the following chapters I will examine the two case studies individually. A brief overview is done on each case that includes an introduction on each country's origins, their political climate, the availability of their natural resources, and the extent to which they have exploited renewable resources. After identifying the resources available in each country, I will examine what policy procedures have been taken to ensure the efficient use of those resources. In order to do this, I will first create a timeline of policies that have been passed in each country

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<sup>12</sup> Mehretu, A., & Crummey, D. E. (2017, July 06). Constitutional framework. Retrieved December 07, 2017, from <https://www.britannica.com/place/Ethiopia/Constitutional-framework>

<sup>13</sup> In Kenya, politics split on ethnic divide | Africa | DW | 26.10.2017. Retrieved December 08, 2017, from <http://www.dw.com/en/in-kenya-politics-split-on-ethnic-divide/a-37442394>

since the establishment of a federal government. This will allow me to assess how each country has adapted with time.

In Chapter Two I will examine Kenya individually and assess how government participation has contributed to energy efficiency policy implementation. In both cases I examine national energy efficiency policies and their resulting implications. In Chapter Three, I establish a timeline of Ethiopia's policies and research that examines Ethiopia's development in energy efficiency from the late 1990s (with the passing of Ethiopia's first energy related policy) to now. A separate analysis is done with the case of Kenya in which I examine the current types of resources available to the national population and how different energy related policies affect the rate to which those resources are effectively used over time. In both cases, natural resource availability influenced the need for implementing efficiency within the energy sector. The rate to which Ethiopia implements energy efficiency with the use of renewable resources is somewhat dependent on cultural beliefs and tradition whereas Kenyan development in energy efficiency is more reliant upon a continuous examination of available resources and a strong presence and participation from the national government.

In Chapter Four I will compare both cases to determine which country is more successful in their energy efficiency policy implementation process. In order to do this, I will compare Kenya and Ethiopia's current energy portfolio's to determine which country has achieved significant growth as a result of energy efficient policies. This assessment will also include brief overviews on current projects within each nation to see which country is continuously expanding their energy sectors. Some external factors will be discussed in Chapter Three. These include a brief discussion on how Kenya's colonial history has influenced its legislative procedure (whereas Ethiopia has no colonial history) and the influence of foreign investors on the energy

process such as China. In this final chapter, I will factor in all of the findings from the previous three chapters to determine which case (Kenya or Ethiopia) has made significant advancements in achieving energy efficiency.

## Chapter Two: The Case of Kenya

## INTRODUCTION

Within the context of the developing world, energy efficiency has the potential to elevate a nation into a more developed status. In recent years, several nations in East Africa have come to recognize the importance of improving their current energy systems. Several East African nations have shown great advancements in energy efficiency. With the case of Kenya, a desire to implement energy efficiency stems from a desire to move towards modernization in hopes of becoming a developed nation. In order to achieve this goal, Kenya has become a role model among East African nations by actively seeking energy efficiency. In this chapter I examine the several energy related policies that have been passed by the Kenyan government. In taking a closer look at these policies, I assess how policy language and specific policy goals are structured so that achieving energy efficiency is made possible. I also examine the ways in which Kenya has partnered with its surrounding neighbors to create organizations that seek to utilize renewable resources in order to achieve a more energy efficient system. Examining all of these components in Kenya's energy sector will provide a better understanding of why and how third world nations create more energy efficient systems.

## BACKGROUND ON KENYA:

### Political Background and Government Structure

The Republic of Kenya<sup>14</sup> was established in 1963 after gaining its independence from Great Britain. Kenya is headed by a presidential democratic government comprised of executive, judicial, and legislative branches. Government executives include a President, a Deputy President, an Attorney General, a Speaker of the Senate, and a Speaker of the National

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<sup>14</sup> Ominde, S. H., Ingham, K., & Ntarangwi, M. (2017, November 28). Kenya. Retrieved December 07, 2017, from <https://www.britannica.com/place/Kenya>

Assembly who leads the legislative branch. Kenya's Parliament<sup>15</sup> consists of a National Assembly with 349 members and a Senate that holds 67 members. Finally, Kenya's Judiciary<sup>16</sup> consists of Superior and Subordinate Courts which are headed by the Chief Justice.

### Geography and Demographics

Understanding Kenya's geographic location and demographics gives a better overview of their resource availability and the ways in which cultural affiliations shape policy making. Kenya is located in East Africa along the Great Rift Valley. Its bordering countries include Uganda, South Sudan, Tanzania, Somalia and Ethiopia. Due to its coastal location along the Indian Ocean (which allow for sea access) Kenya has established economic and social relationships for trading purposes with almost all of its neighboring countries. Kenya's sea port access makes it an importing and exporting powerhouse which can be advantageous when it comes to trade relations with its neighbors. Kenya is able to make substantial profits by allowing its neighbors to access its sea ports<sup>17</sup>. Kenya is home to over 48 million people with 42 different ethnic tribes. English and Swahili are the two nationally recognized languages in Kenya. Christianity, Catholicism, and Islam are the major religions that are recognized and practiced by most Kenyans. Based off of religious affiliation, Christianity accounts for 59.5%, Roman Catholicism accounts for 23.5% and Islam accounts for 11.2% of the national population.

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<sup>15-16</sup> Structure of the Kenya Government. (n.d.). Retrieved from <https://www.kenyahighcom.org.my/structure-of-the-kenya-government/>

<sup>17</sup> Njanja, A. (2016, April 05). Mombasa port boom nets KPA Sh35.6 billion. Retrieved from <https://www.businessdailyafrica.com/magazines/Mombasa-port-boom-nets-KPA-Sh35-6-billion/1248928-3147442-nsda7dz/index.html>

### Economy

Kenya's GDP is heavily reliant upon agricultural production. Kenya is a big producer of tea and coffee which are exported worldwide. Kenya also produces a majority of the world's supply of pyrethrum, which is used to create pesticides for agricultural purposes. Kenya is known for its expansive wildlife reserves and game parks which attract tourists from around the world. Kenya's geographical location makes it home to beautiful lakes, plateaus, waterfalls, hills, and white sand beaches all of which contribute to the nation's tourism sector.

### Energy

Kenya's natural resources include petroleum, coal, and minerals (gold, rubies, titanium). Kenya's energy related resources include fossil fuels, biomass materials, solar power, hydro-power, and geothermal resources. According to the Ministry of Energy and Petroleum<sup>18</sup> the most current use of these resources are as follows:

<b>CATEGORY</b> (Resources)	<b>CAPACITY</b> <b>INSTALLED (MW)</b>	<b>Percentage (%)</b>
Hydro	820.7	35.12
Geothermal	627	26.84
Co-generation (Biomass)	28	1.12
Wind	25.2	1.09
Thermal (Fossil)	816.2	34.93
Off-grid <sup>19</sup>	19	0.81
Total	2,336.4	100

<sup>18</sup> Kenyan Ministry of Energy and Petroleum. (n.d.). Energy Sources Statistics. Retrieved from <http://energy.go.ke/energy-sources-statistics/>

<sup>19</sup> In this chart, off-grid resources refer to resource that contribute to energy production but are not associated with the national grid. Off-grid energy is common in rural areas where accessibility to the national grid is low.

In 2015, USAID<sup>20</sup> reported that Kenya's Energy Regulatory Commission (ERC) calculated "2,295MW of installed on-grid capacity across 42 plants, plus an additional 11.5 MW in 19 off-grid stations in remote parts of the country. Kenya's installed capacity consists of 70% renewable sources..." (USAID 2015). All of these resources have been utilized by the national government with hopes of increasing the nation's access to energy.

### WILLINGNESS TO PAY

One of the many challenges that affects energy accessibility rates in Kenya involves consumer willingness to pay. In rural areas where income rates are significantly lower than urban areas, a willingness to pay for energy access is seen as a luxury expense that most cannot afford. In 2010 it was reported that "around 4% of rural areas in Kenya [are]... electrified" (Abdullah & Jeanty, 2011). Abdullah and Jeanty (2011) state that improving these numbers would lead to improvements in welfare and education within rural communities. However, the fees associated with getting connected to the national grid are so high that most rural communities feel deterred from getting connected.

### Survey

In order to better assess the extent to which rural communities were willing to pay for access to electricity, Abdullah and Jeanty (2011) conducted a survey of 200 households in Kenya's third largest city, Kisumu district in 2007. "Nearly 53% of the total population in this district lives below the poverty line... [and] about 60% of respondents fall under an income level less than 10,000 Kenyan shillings (\$150 USD)" (Abdullah & Jeanty, 2011). Surveying these households allowed for Abdullah and Jeanty to assess the extent to which rural populations

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<sup>20</sup> USAID . (2015). Kenya Power Sector . Retrieved from

[https://www.usaid.gov/sites/default/files/documents/1860/Kenya\\_Power\\_Sector\\_report.pdf](https://www.usaid.gov/sites/default/files/documents/1860/Kenya_Power_Sector_report.pdf)



and low income households are willing to pay for energy access. In their survey method, Abdullah and Jeanty (2011) use income, educational attainment, age, number of household members, home ownership, employment, and business ownership as variables in assessing respondents. The results of this survey found that educational attainment was a major factor in calculating willingness to pay. Additional results found that most households were willing to pay at least 32,500 (\$322 USD) Kenyan shillings to get connected to the national grid. Ultimately, a lack of willingness to pay to be connected to the national grid from rural communities is associated with low income.

### Proposals

In order to combat a lack of willingness to pay from rural communities, Abdullah and Jeanty state that there is a need “for policy making decisions [from] governments, administrators, donors and investors... to estimate, at the district level, electrification services to rural households using various payment options” (Abdullah & Jeanty, 2011). Integrating efforts from national and local level governments, private donors and organizations, as well as rural and low income communities will lead to solutions that increase the willingness to pay for services, therefore increasing accessibility rates. In order to do this, Abdullah and Jeanty (2011) propose four solutions: “policy recommendation to increase connection for the non-electrified population [by] 1. Subsidizing the connection costs, 2. Supporting financial schemes to connect electricity services. 3. Adjusting the appropriate payment period to meet affordability needs, and 4. Restructuring the market ownership and institutions related to the rural electrification process” (Abdullah & Jeanty 2011). With all of these proposals enacted, Abdullah and Jeanty (2011) state that the rural electrification process would become a bottom-up process in which consumers state their needs and how much they are willing to pay for those needs. With this clear understanding

of consumer demand, the necessary institutions (government agencies and private sector organizations) can come up with affordable solutions to achieve consumer needs.

## KENYAN GOVERNMENT INFLUENCE ON POLICIES

### Policymaking

In order for a proposed bill<sup>21</sup> to be passed in Kenya, it must go through a first reading stage in which the bill is introduced to members of the National Assembly. The reading process in policymaking ensures that members of the National Assembly are aware of policy objectives. It is in the reading process that members can make objections that will be addressed by committees in the revision process. From here the bill is transferred to the Secretarial Committee for consideration on whether or not the bill may progress to the a second reading. In this stage, the main clauses of the bill are repeated to members of the National Assembly so that its policy objectives are expressly communicated. After this reading, the bill is sent to the Committee of the Whole House where it is dissected and broken down for further analysis. The Committee then informs the National Assembly of its decisions on the bill before it can enter the final stage in which the bill is read for a third time to the assembly after which a vote is made for the bill's approval. After this legislative process has taken place, the President signs the bill into law.

### Trends in Kenyan Policymaking

In a closer analysis of Kenya, social and political changes led to an increase in neoliberal approaches that influenced energy policy creation. This meant a shift towards laissez-faire, liberal decisions made by the Kenyan government with respect to the economy and subsequently, the energy sector. "We refer to neoliberali[z]ation not as an end state, but rather as a contested

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<sup>21</sup> Kenya Law Reform Commission. (2015). A Guide to the Legislative Process in Kenya . Retrieved from <http://www.klrc.go.ke/images/images/downloads/klrc-a-guide-to-the-legislative-process-in-kenya.pdf>

and spatially and socially uneven process through which ever more areas of political life are subject to market discipline which increase the dependence on private actors for the provision of public goods” (Newell & Philips 2016). Newell and Philips used a series of interviews of 29 government officials, donors, and NGO representatives to comment on how shifting political perspectives have influenced recent energy policies within Kenya. Newell et al. (2016) suggest that a shift towards neoliberal political views have led to an increase in the desire for more efficiency within the energy sector. The experts interviewed for this study suggest that this can be seen in Kenya’s willingness to look for foreign investment<sup>22</sup> from the UK, Belgium, China, and South Africa to name a few, to fund energy developments. Subsequently, this shift towards neoliberal ideals has been successful in attracting foreign investments. A neoliberal approach usually eases restrictions on foreign involvement in domestic programs. Under this approach, the national government is more accepting of foreign input and their role within the energy sector. Newell et al. (2016) assert that with a more neoliberal approach to the energy sector accompanied with more government involvement, energy efficiency in Kenya can be achieved.

#### Energy Resources and Policymaking

In analyzing the availability of natural resources in Kenya, one can identify the challenges that arise from implementing policies related to them. Kiplagat, Wang, and Li (2011) present an in-depth analysis of the types of energy resources available in Kenya and their relation to geography, government entities and legislation. For example, the use of hydropower comes from several rivers in the eastern regions whereas wind power comes from areas within the Great Rift Valley where winds tend to be stronger. Kiplagat et al. (2011) state that the production and

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<sup>22</sup> Santander Trade Portal . (n.d.). Kenya: Foreign investment. Retrieved from <https://en.portal.santandertrade.com/establish-overseas/kenya/investing>

distribution of these resources are tied to several government entities such as the Ministry of Energy and the Energy Regulation Commission (a commission created under the Energy Act of 2006) who create policies such as the Sessional Papers on Kenya Vision 2030. This policy seeks to create “a globally competitive and prosperous country with a high quality of life by 2030...” which utilizes “a newly-industriali[z]ing, middle-income country providing a high quality of life to all its citizens in a clean and secure environment” (Sessional Paper No. 10 of 2012). The Ministry of Energy and the Energy Regulation Commission are also responsible for creating feed-in tariffs in order to monitor factors within the energy sector. These feed-in tariffs<sup>23</sup> are used to “promote active investment in and production of renewable energy sources”. In establishing the resources available and the policies that govern their production and distribution, Kiplagat et al. (2011) introduce several challenges that threaten the growth of Kenya’s energy sector. These challenges include high costs of electricity production, low access to modernization, overuse of biomass resources and a greater demand than supply. In addressing these challenges Kiplagat et al. (2011) suggest a higher rate of government presence and more efficient usage of resources in order to ensure the possibility of stable growth.

### KENYAN ENERGY POLICIES

With the passing of the Energy Act of 2006, the Kenyan government established the Energy Regulatory Commission whose objectives included regulating the importing and exporting of energy resources and the production and distribution of renewable resources among several others related to the Kenyan energy sector. This act also established the Rural Electrification Authority whose purpose was to create a plan of action for connecting rural parts

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<sup>23</sup>Investopedia, (2018, January 31). Feed-In Tariff - (FIT). Retrieved from <https://www.investopedia.com/terms/f/feed-in-tariff.asp>

of the Kenyan population to the grid while simultaneously promoting the use of renewable resources such as hydropower, solar power, wind, and geothermal energy. In addition to these new organizations, the Energy Act also called for the establishment of renewable energy programs which would be established by the Ministry of Energy Regulatory Commission. These programs would be implemented in new and existing factories and building in order to promote energy efficiency within the construction industry. To ensure these programs were being effectively imposed, the commission was granted permission to fine any companies that refused to incorporate renewable resources into the construction or updating of their buildings. In this way, the Energy Act was successful in integrating the need for energy efficiency using renewable resources with other parts of Kenyan society.

In 2012, the Kenyan government passed the Geothermal Resources Act. This act proclaimed any and all geothermal resources to be vested in the government by authorizing the Ministry of Energy and Petroleum to search for geothermal resources on private property. The act also prohibits any unauthorized use of geothermal resources. The act states that all use of geothermal resources must be approved by the Ministry of Energy and Petroleum who has the exclusive right to issue licenses. These licenses grant individuals the right to enter private property to extract geothermal resources. Individuals who are granted a license must pay an annual fee or “rent”. Under this act, the Ministry also controls the renewal, rejection, and forfeiture of licenses. The Geothermal Resources Act also briefly explains safety procedures for geothermal extraction and states that the Ministry cannot be held liable for injuries that may occur on the field at the expense of a license holder. With respect to compensating land owners for damage and occupation as well as the procedure for giving proper notice to land owners of private property. Finally the act gives the Ministry the exclusive control of prices and fees related

to geothermal extractions and briefly explains the penalties for any offenses which come in the form of fines.

Three years later the Kenyan Government passed the Energy Bill of 2015 which aimed at serving the national energy sector with policies that were to be renewed every five years. Policy goals under this bill included a survey of national resource availability and proposals on how to increase Kenya's energy infrastructure by promoting technological advances. (Energy Bill 2015). The bill also places responsibilities to specific government agencies in fulfilling policy goals. For example, the bill states that the Cabinet Secretary is responsible for drafting strategies to ensure an increase in national access to electricity. The Cabinet Secretary is also responsible for facilitating field studies and experiments. The bill also encourages cooperation among national and county governments in identifying areas in which access to energy can be improved. These actors are also charged with the responsibility of acquiring the necessary land and funds to develop energy infrastructure.

#### Agencies Created by the Energy Bill of 2015

Under the Energy Bill of 2015, the Energy Regulatory Authority was established. The bill grants this agency the right to take legal and financial action in implementing policy goals. The Energy Regulatory Authority is in charge of the generation, production, importation, exportation, and exploration of all energy related resources, collecting data and statistics, protecting consumer and stakeholder interests, authorizing licenses. The structure of this agency is also explained under the bill.

Under the Energy Bill of 2015, an Energy and Petroleum Tribunal was created with the purpose of hearing and judging over trials related to energy. The structure for the tribunal is

thoroughly explained in the bill with approval of executive positions coming from the Cabinet Secretary.

The bill also introduces the creation of a Rural Electrification and Renewable Energy Corporation. This agency's primary objectives include overseeing the rural electrification program by allocating funds, developing plans to promote rural electrification and working with county governments to identify problem areas that can be addressed. The corporation is also responsible for developing strategic plans to increase the use of renewable resources within the energy sector.

Finally, the Energy Bill of 2015 created the Energy and Petroleum Institute. This institute is responsible for promoting the use of nuclear electrification production within the energy sector through research and development. A few other responsibilities of the institute include educating the general public on nuclear electrification, working with other government agencies, as well as staffing an HR department to ensure the institute has enough resources to successfully implement a nuclear electrification program.

#### Renewable Energy Under the Energy Bill of 2015

The Energy Bill of 2015 states that the national government is solely in charge of all unexploited forms of renewable energy (Energy Bill 2015). The exploration of renewable resources falls under the responsibility of the Cabinet Secretary. The Cabinet Secretary is responsible for the exploration of new renewable resources, developing programs to promote the use of renewable resources, and working with other agencies and local governments to ensure the use of renewable resources.

The bill also created a Renewable Energy Resource Advisory Committee which is composed of representatives from the above agencies and other energy related organizations.

This committee is responsible for advising the Cabinet Secretary on resource allocation, licensing procedures, and research and development into renewable resource production.

In the same year, the national government passed the National Energy and Petroleum Policy. Under this policy, the national government is responsible for promoting the efficient use of energy and petroleum while protecting the environment. The policy sought to promote energy conservation by educating the public and working with agencies like the Ministry of Energy, the Energy Tribunal, Energy Regulatory Commission, Rural Electrification Authority, and several private power producing companies. In having these agencies work together, the policy sought to increase the government's presence in the energy sector. A coalition of these agencies would also increase the effectiveness of research and development strategies into increasing energy efficiency.

#### IMPLICATIONS OF ENERGY POLICIES

By passing policies like the Energy Act of 2006 and its successors which sought to integrate renewable resources into the energy sector, the Kenyan government hoped to increase the nation's overall access to electricity. According to World Bank data<sup>24</sup>, Kenya's overall access to electricity rose from 21.3% in 2006 when the Energy Act was passed to 36% in 2014. In their research, Yadoo and Cruickshank (2012) find that using renewable resources in electricity production is cheaper than using diesel based resources. When examining solar powered electrification in Kenya, Yadoo and Cruickshank (2012) found that although the process has been criticized for being more expensive, it has become of great use for the rural middle class who mainly use solar powering for connective applications such as TV, radio, and mobile phone usage. This development thus creates significant improvements in the day to day lives of those

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<sup>24</sup> World Bank. (2014). Access to electricity (% of population).



living in rural areas where access to electricity has historically been an issue. In examining micro-hydro mini grids compared to diesel generators, Yadoo and Cruickshank (2012) found that diesel fueled systems must operate at 80% capacity in order to compete with the same cost of hydro-powered system. This shows that technological advancements within the energy sector are making the use of renewable resources more efficient and affordable in place of fuel based electrifying resources.

By implementing several policies like the Energy Act, the Kenyan government is able to continuously improve energy efficiency within the energy sector. Kendagor and Prevost (2013) center their research on focusing on more current energy policies in Kenya and then make suggestions to improve on such policies. They first start with an analysis of energy resources available in Kenya. These include biomass resources, hydropower, solar power, wind energy, imported and imported oils to name a few. From here Kendagor et al. (2013) introduces several key pieces of legislation that have affected these resources such as the 2006 Energy Act and Policy Paper No.4. An analysis of these policies by Kendagor et al. (2013) shows that there is need for a more active role of the national government within the energy sector. This would lead to effective implementation, stability and infrastructural development. Kendagor et al. (2013) also conclude that government intervention should include actively encouraging citizens and private companies to engage in rural electrification through investments. In concluding, Kendagor et al. (2013) posit that government intervention is the key to creating efficient energy reforms in Kenya.

## CONCLUSION

The passing of policies like the Energy Act of 2006, the Geothermal Resources Act, the Energy Bill of 2015, and the National Energy and Petroleum Policy have drastically increased Kenya's ability to effectively utilize the natural resources available to them while simultaneously providing basic access to energy for its citizens. In 2015 and 2016 the Ministry of Energy and Petroleum reported that 4.8 million citizens were connected to electricity. 2017 proved to be a year of great improvement for Kenya with six million households connected to the grid, putting the national average of consumers at 45% according to the Kenya Power and Lighting Corporation<sup>25</sup>. Although the national average of consumers connected to the grid still needs improvement, there has been significant change within Kenya's energy sector that has increased its rate of successful implementation.

Kenya's energy related policies have succeeded in attaining policy goals. By creating government agencies charged with specific objectives and clarifying how those objectives might be achieved within the policy itself makes implementation more realistic. Clearly stating procedures, protocol, and structure for the government agencies also aligns their objective with policy goals. Ultimately, these policies have increased the national government's presence in Kenya's energy sector which has resulted in vast improvements.

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<sup>25</sup> Kenya Power. (2017). Connectivity Performance as at October 2017. Retrieved from <http://www.kplc.co.ke/content/item/1095/connectivity-performance>

### Chapter Three: The Case of Ethiopia

## INTRODUCTION

Among the several East African nations to be making steady advances towards energy efficiency is Ethiopia. Ethiopia's desire implement energy efficiency stems from its quickly growing population and economy. As population rates increase, consumer demand for energy increases along with it. Additionally, Ethiopia's skyrocketing economy has led to government efforts to improve areas like welfare, health, employment, poverty, and energy. These efforts are preemptive attempts to improve the nation as a whole in order to sustain its growth. In regards to energy efficiency, this chapter focuses on Ethiopia's key energy related policies and how these policies have evolved alongside with the rapid growth. This chapter also examines various construction projects that have made Ethiopia another role model among East African nations with respect to achieving energy efficiency.

## BACKGROUND ON ETHIOPIA

### History and Government

One of the most significant events in Ethiopian modern history was Italy's invasion in 1895 and again in 1935 that sparked political turmoil and several social movements. This period of Ethiopia's history put the nation on the map and brought international attention to the young developing country. Haile Selassie's rise to power in 1930-1975 marked a new era in Ethiopian history that would lead to the development of what is Ethiopia today. In 1993, Eritrea succeeded from Ethiopia and declared itself an independent state following a public referendum<sup>26</sup>. This referendum and the succession of Eritrea made Ethiopia a landlocked nation. Following the defeat of Italy's presence in Ethiopia, the nation became one of the first independent nations to

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<sup>26</sup> BBC. (2018, February 19). Ethiopia profile - Timeline. Retrieved from <http://www.bbc.com/news/world-africa-13351397>

ratify the Charter of the United Nations which attracted international attention to the young country. In 1994, The Federal Democratic Republic of Ethiopia was established. Ethiopia's current government<sup>27</sup> is comprised of a federal parliamentary system headed by a Prime Minister acting as the head of government and a President acting as the head of state. Ethiopia includes three branches of government- executive, legislative, and judiciary branches. Ethiopia's parliament is a bicameral parliament with a House of Federation in which members are chosen by state assemblies and House of People's Representatives in which members are chosen by direct election. Members within the House of People's Representative elect the President.

### Geography and Demographics

Ethiopia is located on the Horn of Africa in the northeastern region of the continent. Ethiopia is home to over 100 million people with over 80 different ethnic tribes. Orthodox Christianity, Protestantism and Islam are the major religions practiced in Ethiopia. Religious affiliation of each religion out of the national population account for 43.1% Orthodox Christianity, 19.4% Protestant, and 34.1% Muslim. The only nationally recognized language in Ethiopia is Amharic with some tribes having slight variations in dialect. However there are many Ethiopian citizens who speak Tigrinya, the national language of Eritrea. Ethiopia's geographic composition includes highlands, plains, forests, rivers, mountains, hills, deserts and savannas.

### Economy

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<sup>27</sup> Ethiopian Government. (2018). Government Structure Government Structure. Retrieved from

<http://www.ethiopia.gov.et/government-structure>

Domestic agriculture in Ethiopia includes smallholder farming, cash crops, and livestock herding which combine to make up almost half of Ethiopia's GDP. The biggest exporting crop produced by the nation is the coffee bean. Ethiopia also produces significant amounts of gold and tantalum.

### Energy

Ethiopia's energy sector includes both renewable and non-renewable resources. These include firewood, petroleum, and charcoal. One of the biggest renewable resources used in Ethiopia are hydroelectricity which is powered by the several rivers. Another major source of renewable energy involves wind-powering which is made possible due to the high altitude levels of the highland regions. Although all of these resources are utilized in different ways in Ethiopia, rates of access to electricity on a national level are still relatively low. Only 27% of Ethiopia's population has access to electricity<sup>28</sup>. Low accessibility rates and a growing population has led Ethiopian energy executives to consider the use of renewable resources within the energy sector. These resources include hydro, solar, wind powering and geothermal resources.

Hydro-power in Ethiopia has the greatest potential to improve Ethiopia's energy sector due to the nation's natural access to river basins like the Nile, Adar, Sobat, Jubba and Awash Rivers. Ethiopia's geographic location in relation to all of these rivers gives it the 2<sup>nd</sup> highest generation capacity in Africa for hydro-power<sup>29</sup>.

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<sup>28</sup> World Bank. (2014). Access to electricity (% of population). Retrieved from <https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?end=2014locations>

<sup>29</sup> Energypedia. (2017). Ethiopia Energy Situation. Retrieved from [https://energypedia.info/wiki/Ethiopia\\_Energy\\_Situation](https://energypedia.info/wiki/Ethiopia_Energy_Situation)

Ethiopia's diversity in climate regions and plenty of access to sunlight. This advantage allows for solar-powering to be used in energy production. In addition to this, Ethiopia's location within the Great Rift Valley allows for wind-powering from the highland and lowland regions. In 2013, Ethiopia became home to Africa's biggest wind farm. The Ashegoda Wind Farm<sup>30</sup> consists of 84 wind turbines that provide electricity to over three million Ethiopians annually. The chart below represents the extent to which these resources have been exploited as of 2017:

Resource <sup>31</sup>	Unit	Exploitable Reserve	Exploited Percent
Hydropower	MW	45,000	<5%
Solar/day	kWh/m <sup>2</sup>	4 – 6	<1%
Wind: Power	GW	100	<1%
Speed	m/s	>7	<1%
Geothermal	MW	<10,000	<1%
Wood	Million tons	1120	50%
Agricultural waste	Million tons	15-20	30%
Natural Gas	Billion m <sup>3</sup>	113	0%
Coal	Million tons	300	0%
Oil shale	Million tons	253	0%

The chart above identifies energy resources, their exploitable reserves, and the extent to which they have been exploited. For resources such as hydro-power and wind-power which are Ethiopia's biggest source of renewable energy production, exploited usage rates remain relatively low. This is an issue seen with other resources such as geothermal and solar power.

<sup>30</sup> Vergnet . (2013). Ethiopia, Ashegoda. Retrieved from <http://www.vergnet.com/project/ethiopia-ashegoda/>

<sup>31</sup> Export.gov. (2017, June 21). Ethiopia – Energy Ethiopia - Energy. Retrieved from <https://www.export.gov/article?id=Ethiopia-Energy>

Although Ethiopia has shown potential in their natural access to renewable resources, these resources remain largely untouched. This may be attributed to a lack of energy related policies to create the tools needed to exploit resources in an efficient manner.

The drafting and implementing of energy efficiency policies is needed in order to ensure that natural and renewable resources are being properly used within Ethiopia's energy sector. These policies could create the necessary procedures to oversee the research and development process to integrate renewable resources into energy production. These policies would also create government agencies to fund research and development, creating contracts with private sector firms, and cooperating with local government agencies. By implementing a structured energy efficiency policy, one with clear policy objectives that create organizations to oversee policy goals, Ethiopia would experience efficiency within their energy sector that would lead to a growth in national access to electricity.

#### POLICYMAKING IN ETHIOPIA

In 2006, the lower house of the Ethiopia government (House of People's Representative) adopted a code of regulations to oversee the legislative process. This code was "meant to reinforce the prevalent practice in which the government plays the leading role in the initiation of laws" (Gebrehiwot & Zeyohannes, 2009). This code, otherwise known as the Regulation, states that members and committees of the House, parliamentary groups and other bodies authorized by law are allowed to initiate laws for parliamentary consideration. Ethiopia's legislative process mirrors that of other federal parliamentary systems around the world. Once a bill has been initiated and accepted by the lower house, it goes to the first reading. In this stage there is "...a



brief explanation as to the content and purpose of the draft law<sup>32</sup>. This explanation is followed by a debate between members of the lower house over the bill's content and purpose. From here, the bill can be deferred to a parliamentary committee or it can be moved directly into a second reading. This stage of the legislative process entails a closer examination of the bill's content by members of the House. If the bill was referred to a parliamentary committee members of the House use committee reports to examine the bill. A vote is required in order to move the bill into the next stage, the third reading. In this stage, the house continues its deliberations on the drafted bill. This includes extensive cooperation with parliamentary committees for their reports on any amendments or revisions. At the end of this stage, the House must vote on the bill in two ways: the House must vote on exacting the bill's individual amendments as well as the entire bill. In the final stage of the legislative process, the Speaker of the House presents the bill to the President for his signature of approval. The President has 15 to sign the bill before it automatically becomes law. Finally, the bill must be published on the Federal *Negarit Gazetta*, for public viewing after which the bill officially becomes law.

## ETHIOPIAN ENERGY POLICIES

### The Environmental Policy of 1997

One of the earliest pieces of legislation that pertained to energy efficiency in Ethiopia was the Environmental Policy of 1997. In enacting this law, the Ethiopian government addressed the significance of cultural heritage in the day-to-day lives of its citizens. The policy attributes the nation's deeply rooted sense of traditionalism to the continued growth within the tourism industry. It states that Ethiopia's rich culture and traditional beliefs attract tourists from all over

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<sup>32</sup> House of Peoples Representative of the Federal Democratic Republic of Ethiopia Rules of Procedure and Members' Code of Conduct Regulation No. 3/2006 (the Regulation).

the world, thus contributing to the nation's overall tourism sector. At the same time, Ethiopia's persistent dependence on human and animal power within the agricultural sector contributes to some of this cultural heritage. In citing the importance of traditional practices, the policy goes on to state that the country's dependence on traditional agricultural farming and herding puts a strain on Ethiopia's physical environment (soil depletion, deforestation, overgrazing, etc) thus increasing the need for an environmental policy to be implemented. Some provisions of the policy propose ensuring the sustainability of current natural resources by monitoring the usage of non-renewables, reducing pollution, and implementing conservation techniques. To ensure this sustainability, the Environmental Policy called for the participation and empowerment of Ethiopian citizens in order to raise public awareness.

#### Environmental Policy- Limitations

By implementing this new act, the Ethiopian government made one of its first steps in drafting and implementing energy efficient policies. Although progressive at the time, the Ethiopian Environmental Policy lacked a clear system of implementation. Many provisions within the act use generalizations. For example, with regards to energy resources, the policy seeks to "... promote the development of renewable energy sources and reduce the use of fossil energy resources both for ensuring sustainability and for protecting the environment, as well as for their continuation into the future [and] ... encourage Government leases for private entrepreneurs..." (the Environmental Policy, 1997). Unfortunately, the policy fails to address the technicalities of how this might be achieved. Without a proper system of enforcing these strategies, the policy itself becomes somewhat useless in implementation. In order to improve the policy's implementation, provisions should have been added to create government agencies that seek to organize and enforce the policy guidelines. These organizations would also need to be

closely monitored by the federal government in order to ensure a secure network of implementation.

#### Energy Efficiency Research After the Environmental Policy

In his research, Wolde-Ghiorgis (2002) examined the effect of rural agricultural practices on the development of energy efficiency implementation in the process of connecting the entire nation to the electric grid. Ethiopia's heavy reliance on petroleum and wood biomasses for traditional agricultural purposes stagnated the exploration of alternative sources of electricity production. To support this claim, Wolde-Ghiorgis (2002) used data from the Ethiopian Rural Energy Development and Promotion Centre which presented a list of renewable resources available in Ethiopia and compared that availability to the percent used for energy production much like the previous chart. This comparison showed that although Ethiopia had high rates of renewable resources at their disposal, these resources remained largely untouched. For example, in the case of hydropower, Ethiopia had 30,000 Megawatts of reserves available for consumption in 2000 but only used 0.9% of those reserves. Similar trends can be seen with other renewable resources such as solar, wind, and geothermal reserves. In another comparison, Wolde-Ghiorgis (2002) presented another list of fuel based resources such as wood biomass and petroleum which demonstrated much higher rates of consumption. This may be a result of Ethiopia's deeply rooted cultural beliefs which often prevented innovative ideas from being accepted into mainstream society. These beliefs are often found in rural communities where western technologies and modernization efforts are rejected in order to preserve cultural traditions. For example, Wolde-Ghiorgis (2002) discussed a lack of social demand for modern fuels to improve energy efficiency. In presenting Ethiopia's cultural beliefs and then analyzing the data on available resources and their usage rate in the early 2000s, Wolde-Ghiorgis (2002) showed that

cultural traditions have historically prevented energy efficiency (by choosing to reject modernization efforts) from being developed on a national level. In failing to enforce implementation procedures, the Environmental Policy of 1997 prevented the development of research into effective means of integrating the use of renewable resources in energy production.

In their research, Kebede and Kedir (2003) find that during the early 2000s, electrification in both rural and urban sectors of the Ethiopian population proved to be expensive, even for individuals who were financially more secure than the national average. In examining the differences in costs for kerosene, butane gas and electricity for electrification use in both urban and rural sectors, Kebede and Kedir (2003) show that electricity is the most expensive to maintain between kerosene, butane gas, and electricity. In 1997, the use of electricity cost 60% more on a national average than the use of butane gas and five times more than the use of kerosene gas. In addition to this, Kebede and Kedir (2003) examine the budgeting shares and household incomes of poor and non-poor (rural versus urban) communities to see how much they spent on electricity, kerosene and butane gas. Kebede and Kedir (2003) conclude again, that based on the numbers, electricity usage proved to be expensive. This can be attributed to Ethiopia's lack of policy enforcement to influence energy efficiency. Without legislation to finance the necessary research, technological research into creating energy efficient practices cannot be done thus hindering the integration of renewable resources into energy efficiency attempts.

#### Ethiopian Rural Energy Development and Promotion Center

In 2002 the national government passed a proclamation to establish the Ethiopian Rural Energy Development and Promotion Center (EREDPC). The proclamation states that this research center would be charged with the responsibilities of making "conditions convenient for

the development and promotion of rural energy resources and technologies”<sup>33</sup>. Specific powers allotted to the research center include: identifying energy resources that would be relevant to rural populations, adapting foreign technologies to accommodate for Ethiopian rural areas, promoting the research and development of energy related programs, evaluating energy demand and production, examining social and environmental impacts of resource use, providing consultation services within the energy sector, and raising awareness to rural communities of the benefits of alternative and renewable energy resources. Finally, the proclamation concludes by stating that the research center’s budget will be allocated by the national government and will be subject to annual review.

#### EREDPC- Limitations

Although the proclamation was clear in stating the objectives for the research center, the proclamation itself lacks clear directions on how these objectives might be achieved. Simply stating that an individual director should be in charge of overseeing procedures is not enough of a guarantee. A more successful structure would include a board of directors each charged with specific objectives and perhaps a small staff to ensure that those objectives were implemented. In addition, the proclamation lacks an in depth explanation of where and how much funding will be appropriated to the center. The proclamation states that along with government funds, resources will also be allocated from “services charges and other fees” and “other sources”<sup>34</sup>. Although it can be inferred that these service charges might come from consultation services provided by the

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<sup>33</sup> A Proclamation to Provide for the Establishment of the Ethiopian Rural Energy Development and Promotion Center, the Federal Democratic Republic of Ethiopia. (2002).

<sup>34</sup> A Proclamation to Provide for the Establishment of the Ethiopian Rural Energy Development and Promotion Center, the Federal Democratic Republic of Ethiopia. (2002).

center, the proclamation fails to address the “other sources”. Here we see the same issue faced by the Environmental Policy of 1997. A lack of clear implementation strategies weakens policy goals and prevents actual change from being made.

#### Rural Electrification Fund

Following the establishment of the Rural Energy Development and Promotion Center, the Ethiopian government passed a separate proclamation to establish the Rural Electrification Fund (REF) in 2003. This organization was charged with the responsibilities of providing “loans and technical services for Rural Electrification Projects”<sup>35</sup> under the Ministry of Finance and Economic Development. Funding for the REF would be allocated by the national government (in the form of a yearly budget, loans, and grants), international institutions, and NGOs. Structurally, the proclamation states that the fund would be headed by a board of executives and an Executive Secretariat which would be appointed by the Ministry of Finance and Economic Development with each member of the board serving five year terms. Under this proclamation, the REF would act as an advisory committee to the Ministry of Finance and Economic Development, establish the criteria for financing under the Ministry, examine reports, approve nominations for the Trust Agent (who is responsible for administrating REF funds), administer the fund, and ensure timely collection of all funds. The proclamation goes on to state how meetings and voting should be held among members of the board. The Executive Secretariat is charged with the responsibilities of preparing annual briefs for board approval, reviewing applications, establishing the criteria for the Trust Agent position, representing the REF when working with other agencies, finding alternative funding for the REF, and making recommendations to the board for appropriate use

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<sup>35</sup> A Proclamation Provided for the Establishment of the Rural Electrification Fund, The Federal Democratic Republic of Ethiopia. (2003).

of REF funds. Other parts of the proclamation address the requirements for being granted REF funding, licensing practices under the REF, and protections guaranteed to REF customers and operators.

#### Rural Electrification Fund- Significance

The establishment of the Rural Electrification Fund is one of the first examples of how detailed policy language and structured planning can produce actual results. Unlike the cases of the Environmental Policy and the EREDPC, the policy goals behind establishing the REF were clearly defined and included the necessary government support to achieve those goals. By creating the REF under the Ministry of Finance and Economic Development means that the REF would be have the necessary funding required for its operations which would be regulated by the Ministry. This overseeing body would also establish a system of ethical accountability. In addition, including a clear structure with descriptions of all positions helps ensure efficiency within the REF. With the establishment of the REF, we see more organization and accuracy in policy language that can lead to effective change.

#### National Biogas Programme

In 2007, Ethiopia launched the National Biogas Programme (NBP). This program sought to exploit the use of renewable biogas (i.e. fertilizers, manure, plant materials, etc.) resources as an alternative to traditional biogas resources (i.e. wood and charcoal). In order to do this, the program promised to construct 14,000 biogas plants over a period of five years. The initial proposal estimates that 14,000 household would benefit from biogas powering initiated by the program. Protocol for the program states that a focus on a targeted market would ensure the successful integration of renewable biogas resources into the energy sector. This would be done by implementing eight components: promotion and marketing, training, quality management,

research and development, monitoring and evaluation, institutional support, extension, and gender mainstreaming<sup>36</sup>. The program also welcomes partnerships with private sector biogas firms to promote the use of renewable biogas resources to the wider public. Funding for the programs would be allocated from farmers, the federal government, the regional governments, external donors (Biogas for Africa Initiative) and SNV/Ethiopia with 10% coming from the national government and 90% coming from donors. Structurally, the NBP would be regulated by the Ethiopian Rural Energy Development and Promotion Center (EREDPC). Here the EREDPC would assign duties to the National Biogas Program Coordination Office (NBPCO). This office would be responsible for initiating, coordinating, and monitoring activities within the biogas sector. The NBPCO would also be responsible for accounting, financial procedures, and staff management.

#### Scaling - Up Renewable Energy Program and the GTP (2011)

Under the Scaling- Up Renewable Energy Program (SREP) of 2012, the Ethiopian government decided to focus energy efficiency efforts towards renewable energy resources. This policy sought to increase the research and development of hydro-electric, solar, wind and biogas powering. This policy acted as an extension of Ethiopia's Growth and Transportation Plan of 2011. Under the GTP, economic growth would be a major focus of Ethiopian development from 2011-2015. In regards to the energy sector the GTP sought to, "provide sufficient and reliable power sources at all time for economic and social development as well as for irrigation activities, to accelerate and complete the construction of the ongoing hydropower electric generation

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<sup>36</sup> Ethiopian National Biogas Programme, The Federal Democratic Republic of Ethiopia. (2007).



projects”.<sup>37</sup> In 2011, the GTP aimed at increasing Ethiopia’s power generation capacity from 2000 MW to 10,000 MW by the end of 2015. In 2016, the GTP was extended into a second phase that would last from 2016-2020. Under the SREP and GTP policies, a focus on renewable energy and energy efficiency as a function of economic growth.

### Energy Policy of Ethiopia

In 2013, the national government passed the Energy Policy of Ethiopia. This policy was passed to introduce energy conservation and efficiency into Ethiopia’s energy sector. The policy also sought to support economic sectors in developing energy policies and making efficient use of foreign resources. In addition, the policy sought to create comprehensive energy prices and ensure reliability in access to energy. In doing this, the Energy Policy of Ethiopia (2013) would ensure a gradual shift from traditional biogas resources (wood and fuel) to more modern means of powering (renewable resources). The policy states that a transition to modern energy would mean that, “hydro power will form the backbone of the country's energy sector development strategy, as it is the country's most abundant and sustainable energy resource; Ethiopia's geothermal and coal resources will be developed on the basis of their economic profitability; natural gas resources will be developed and utilized to meet as much of the country's energy demand as possible; and promising areas for oil and natural gas will be explored by providing incentives to oil companies to encourage them to take in exploration activities; solar and geothermal energy will be used, wherever possible, for process heat and power generation; Ethiopia's wind energy resources will be developed to provide shaft power for water pumping and irrigation; coal will be developed and introduced as an alternative fuel” (Energy Policy of

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<sup>37</sup> IEA. (n.d.). Ethiopian Energy Policies . Retrieved from

<http://www.iaa.org/policiesandmeasures/renewableenergy/?country=ethiopia>

Ethiopia 2013). Here we see a more direct focus on resources and how alternatives might be introduced in order to implement energy efficiency.

#### Proclamation on Energy

With the passing of Proclamation 810/2013, better known as a Proclamation on Energy in 2013, Ethiopia made significant improvements in their plans for implementation. This policy officially opened electricity generation to the private sector which was previously in the exclusive control of the national government. This meant that for the first time since the nation's establishment, private contractors could partake in the electrification industry which was previously prohibited by the Ethiopian government. This proclamation also established the Ethiopian Energy Authority (EEA) which would oversee the licensing of private companies and monitor their activities. The EEA would also be responsible for the promoting and incentivizing the conservation of resources as well as promoting energy efficiency with the use of alternative resources in the electricity production process. With the passage of the Proclamation on Energy, the Ethiopian government made great improvements in ensuring successful integration of the private sector into the electrification industry, thus increasing employment and contract opportunities with government agencies. Here we see less generalizations in policy language and more direct means of achieving the policy goals.

#### RESEARCH ON ETHIOPIAN ENERGY EFFICIENCY

Since the passage of the Proclamation, Ethiopia's economy has grown to be better suited to supporting the use of renewable resources within their energy sector. Bryan et al. (2017) examine a few long-term energy supply strategies that seek to prioritize renewable resources in place of non-renewables by using an energy systems model to analyze economic influences of different energy policies over long periods of time. To do this, Bryan et al. (2017) first explore

current energy resources within the Ethiopian energy sector. Here they find that hydro-power has the highest potential for rural electrification purposes in Ethiopia with a 90% generation capacity of the total power grid (Bryan et al., 2017). However in 2012 (before the passing of the proclamation) it was reported that only 23% of the national population was connected to the grid with rates as high as 87% in urban areas and 5% in rural areas. Higher rates of electrification within the urban sector shows that tremendous efforts are needed in rural areas. Again, this can be attributed to the Ethiopian cultural beliefs of traditional agricultural techniques that persist in rural areas. Populations in rural areas tend to be heavily reliant on the traditional agricultural practices of human and animal power. In addition to this, Ethiopia's rapidly growing economy has created a need for mass electrification. To address this issue, the Ethiopian government established the National Growth and Transformation Plan in 2010 with hopes of doubling the percent of people with access to electricity throughout the following five years. Although the plan was fully on track in its first two years of implementation, it experienced slower rates of success in the following three years. In response to this, the Ethiopian government extended the plan into a second part that will run until 2020 . In addition, the Ethiopian Electric Power Corporation seeks to incorporate alternative means of resources such as wind, solar, and hydro-power for power production (Bryan et al. 2017). In these ways, economic growth allows for the Ethiopian government to implement energy efficient policies.

## CONCLUSION

The result of enacting policies with more structured methods of implementing its goals can lead to developmental research into the use of renewable resources for the purpose of improving energy efficiency. This would ultimately lead to a decrease in the costs associated with integrating renewable resources in energy production. By including plans to create organizations that seek to enforce policy goals and work with local agencies, energy efficiency can be achieved. In this way, increasing energy production while maintaining costs can lead to efficiency.

## Chapter Four: Kenya and Ethiopia

## INTRO

Energy efficiency in East Africa has come a long way in recent years. Of the several East African nations that have made changes to their energy sectors in an attempt to achieve efficiency, Kenya and Ethiopia have made significant advancements. In this chapter, I use the information from the previous two chapters to compare the two cases. This comparison includes a brief overview of the current relations between Kenya and Ethiopia, cultural and political differences, a comparison of statistical data on the resources found in each nation, alternative methods to improving the energy situation in East Africa, and the impact of foreign investment on East African energy. Using these several components to compare the two cases will allow a better understanding of how energy efficiency is being implemented in East Africa. In this chapter I seek to discover which of these two cases, Kenya or Ethiopia, has made more advancements with respect to implementing energy efficiency.

## KENYA AND ETHIOPIA RELATIONS

Of the several neighboring countries surrounding Kenya is Ethiopia. Kenya and Ethiopia first established relations shortly after Kenya's independence from Great Britain. In establishing these relations, the two nations have become major trading partners. With its landlocked status, Ethiopia has become heavily reliant on Kenya for sea port access. In recent times, the two nations have partnered up with their mutually surrounding border nations to develop the LAPSSET Corridor which is a transportation corridor that begins in Kenya and works its way outwards to create a system of transportation and infrastructure building. This project is a prime example of the friendly international relations between Kenya and Ethiopia.

KENYAN v. ETHIOPIAN GOVERNMENTBackground Comparison<sup>38</sup>

	<b>Ethiopia</b>	<b>Kenya</b>
<b>Government Type</b>	Federal Parliamentary Republic	Presidential Republic
<b>Administrative Divisions</b>	9 ethnically based states and 2 self-governing administrations	47 counties
<b>Independence</b>	Oldest independent country in Africa and one of the oldest in the world	December 12, 1963
<b>Legal System</b>	Civil Law System	Mixed legal system of English common law, & Islamic law
<b>Executive Branch</b>	Chief of State: Mulatu Teshome Head of Government: Prime Minister Abiy Ahmed	Chief of State: President Uhuru Kenyatta Head of Government: President Uhuru Kenyatta
<b>Legislative Branch</b>	Bicameral parliament consists of the House of Federation (153 seats, members serve 5 year terms) and House of People's Representatives (547 seats, members serve 5 year terms)	Bicameral Parliament consists of Senate (67 seats, members serve 5 year terms) and National Assembly (349 seats, members serve 5 year terms)
<b>Judicial Branch</b>	Federal Supreme Court (11 judges)	Supreme Court (Chief of State and Chief Justices + 5 judges)
<b>Political Parties</b>	<ol style="list-style-type: none"> <li>1. Afar National Democratic Party</li> <li>2. Argoba People Democratic Organization</li> <li>3. Benishangul Gumuz People's Democratic Unity Party</li> <li>4. Blue Party</li> <li>5. Ethiopian Federal Democratic Unity Forum</li> <li>6. Ethiopian People's Revolutionary Democratic Front</li> <li>7. National Democratic Movement</li> <li>8. Oromo People's Democratic Organization</li> <li>9. Southern Ethiopian People's Democratic</li> <li>10. Tigray People's Liberation Front</li> <li>11. Gambella Peoples Unity Democratic Movement</li> <li>12. Harari National League</li> <li>13. Somali People's Democratic Party</li> </ol>	<ol style="list-style-type: none"> <li>1. Alliance Party of Kenya Amani</li> <li>2. National Congress</li> <li>3. Federal Party of Kenya</li> <li>4. Forum for the Restoration of Democracy-Kenya</li> <li>5. Forum for the Restoration of Democracy-People</li> <li>6. Jubilee Party</li> <li>7. Kenya African National Union</li> <li>8. National Rainbow Coalition</li> <li>9. National Super Alliance</li> <li>10. Orange Democratic Movement Party of Kenya</li> <li>11. Wiper Democratic Movement-K</li> </ol>

<sup>38</sup> IndexMundi. (n.d.). Ethiopia vs. Kenya. Retrieved from

<https://www.indexmundi.com/factbook/compare/ethiopia.kenya>

Energy Comparison<sup>39</sup>

<b>Energy Type</b>	<b>Ethiopia</b>	<b>Kenya</b>
Electricity - production	10.08 billion kWh (2015 est.)	9.548 billion kWh (2015 est.)
Electricity - consumption	8.143 billion kWh (2015 est.)	7.666 billion kWh (2015 est.)
Electricity - exports	166 million kWh (2015 est.)	45 million kWh (2015 est.)
Electricity - imports	0 kWh (2016 est.)	67 million kWh (2015 est.)
Electricity - installed generating capacity	2.704 million kW (2015 est.)	2.301 million kW (2015 est.)
Electricity - from fossil fuels	7.5% of total installed capacity (2015 est.)	31.9% of total installed capacity (2015 est.)
Electricity - from hydroelectric plants	79.5% of total installed capacity (2015 est.)	35.6% of total installed capacity (2015 est.)
Electricity - from other renewable sources	13.4% of total installed capacity (2015 est.)	53.6% of total installed capacity (2015 est.)
Electricity access	<b>population without electricity: 71,200,000</b> <b>electrification - total population: 24%</b> <b>electrification - urban areas: 85%</b> <b>electrification - rural areas: 10%</b> (2013)	<b>population without electricity: 35,400,000</b> <b>electrification - total population: 20%</b> <b>electrification - urban areas: 60%</b> <b>electrification - rural areas: 7%</b> (2013)

The above chart represents a brief glimpse into the energy situation in Ethiopia and Kenya. Overall, Ethiopia's rates of production, consumption and exports of electricity are higher than that of Kenya. This may be a result of Ethiopia's larger population size which created a greater demand. In both urban and rural areas, Ethiopia has higher rates of access to electricity. However, Ethiopia also has a larger population without access to electricity. In regards to electricity production from renewable resources, Kenya outranks Ethiopia's installed generation capacity. However, Ethiopia's electricity production from hydroelectric resources, which is one of the most commonly used renewable resource in energy production, outweighs Kenyan

<sup>39</sup> IndexMundi. (n.d.). Ethiopia vs. Kenya. Retrieved from

<https://www.indexmundi.com/factbook/compare/ethiopia.kenya>



production rates. The factors that influence these statistics can be found in the implementation of energy efficiency policies in each case.

### Policymaking

There are some similarities in the legislative processes in Kenya and Ethiopia. In both cases, a proposed bill must go through several readings in which the national assembly can contest to specific amendments and propose revisions. Both cases also depend on house committees for recommendations for revisions. However, the role of house committees is different in each case. In Kenya, specific committees are assigned with the task of pushing the bill through to the next stage. The Secretarial Committee and the Committee of the Whole House play a decisive role on the future of a proposed bill. These committees are charged with the responsibilities of providing revisions and voting on whether or not the bill is ready to move to the next stage. In the case of Ethiopia house committees are responsible for creating reports and recommendations for House members to use in their deliberations. Ethiopian house committees play more of an advisory role. However, Kenyan committees have much more influence in the legislative process in that they have the power to stop a bill in its tracks, effectively killing it.

Allowing for more input from committees creates a more efficient legislative process because their input is used by members of the House to make amendments to the draft bill. For example, when making reports and recommendations on energy related draft bills, committees rely on information obtained from local governments, private sector organizations, and energy related ministries. This cooperation between organizations creates a more efficient process that could lead to better implementation of bills. This can be seen in the case of Kenya, where committees have the power to further a draft's bills progress. In some cases, Ethiopian house committees can initiate draft bills, however the decision to pass these bills (and all others) are

reserved to the House members (with the President's approval). This is a striking difference from Kenyan house committees who are responsible for deciding whether or not to allow a draft bill into the next stage in the legislative process. This additional power allows for house committees to thoroughly scrutinize a bill and make recommendations for further revisions, therefore strengthening the legislative process.

### Cultural Differences and Politics

With a better understanding of the process of energy efficiency policy implementation, each country must apply the process to their respective government systems. In the case of Ethiopia, a parliamentary system posits a different implementation process than that of Kenya's presidential republic. The policy implementation process in Ethiopia is also one that must adhere to the varying bodies of political parties which are often based on tribal affiliation. Examples of these parties include the Tigrayan People's Liberation Front and the Oromo Peoples' Democratic Organization<sup>40</sup>. In Kenya<sup>41</sup> tribal affiliation appears in the support of certain political parties. The Luhya tribe is known for its support of the Forum for the Restoration of Democracy (FORD-Kenya) whereas the Luos are known for their support of the Labour Democratic Party (LDP). Cultural affiliations in politics are strongly present in both Kenya and Ethiopia. This presence often times introduces differing social practices into politics as varying cultural practices between tribes influence party platforms.

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<sup>40</sup> Mehretu, A., & Crummey, D. E. (2017, July 06). Constitutional framework. Retrieved December 07, 2017, from <https://www.britannica.com/place/Ethiopia/Constitutional-framework>

<sup>41</sup> In Kenya, politics split on ethnic divide | Africa | DW | 26.10.2017. Retrieved December 08, 2017, from <http://www.dw.com/en/in-kenya-politics-split-on-ethnic-divide/a-37442394>

## STATS ON KENYAN AND ETHIOPIAN ENERGY

Kenya and Ethiopia reflect similar trends in the research conducted on renewable energy resources in Africa in the early 2000s. Karekezi and Kithyoma (2003) show how each individual country's geographic advantages increase their performance regarding energy efficiency in using renewable resources. For example, Kenya calculated a 65% use of biomass fuels out of the total energy consumed on national level whereas Ethiopia calculated an 85% usage rate of biomass fuels out of total energy consumed on a national level. This can be attributed to Ethiopia's long-standing history of utilizing traditional agricultural techniques. In addition to this, research also shows that Ethiopia reported an installed power capacity of 424 Megawatts with an 88% usage rate of hydro-power out of this total capacity whereas Kenya reported 70% in usage rates of hydro-power (Karekezi and Kithyoma, 2003). Here we see Ethiopia making significant advancements with respect to integrating renewable resources into the energy sector.

Although Ethiopia experienced rapid growth in their energy sector in the early 2000s, this growth would eventually stagnate as private sector actors were prevented from engaging in energy related growth plans by the national government. During this time, Kenya had begun integrating public and private sectors in developing geothermal resources. This would not be permitted by the Ethiopian government until 2013. In allowing public and private sector actors into the energy sector, Kenya reported 20% of its urban areas having access to electricity in 2001. Rates of urban access to electricity were only 13% in Ethiopia during the same year. However, both Kenya and Ethiopia reported that 19% of its population experienced power outages (Karekezi and Kithyoma, 2003). In these early studies, the differences in usage rates of renewable resources are affected by the geographic, social, and political climate of each country. With the case of Ethiopia in the early 2000s, there is evidence of heavy reliance on traditional

agricultural practices which prevented the social desire for implementing energy efficiency. The national government's intentional blocking of private and public sector actors within the energy sector also proved to be detrimental to Ethiopia. With the case of Kenya, integrating the private sector into energy production helped develop the use of geothermal technologies.

Over time, further research has been conducted into the rate at which Kenya and Ethiopia have utilized their natural environmental advantages with respect to increasing the use of renewable resources in energy production. Diechmann et al. (2011) use a geographical framework to examine the efficiency and costs associated with several types of renewable resources in Kenya, Ethiopia and Ghana. Regarding Kenya and Ethiopia, Diechmann et al. (2011) discover that overall, decentralized renewable resources, or resources that are governed by private sector individuals such as hydro, wind, and solar power prove to be much cheaper in more recent times. In terms of generation capacity, Ethiopia shows promising figures that outnumber Kenya in areas such as hydro, wind, and solar power. In Ethiopia, hydro-power production stands at 91.9% of the total operational generation capacity of the entire country. In Kenya, hydro-power production stands at 59.5% of the total power generation capacity. That gap is increased further with wind potential which accounts for 34.1% of the national generation capacity in Ethiopia versus a 5.5% in Kenya. With regards to oil, diesel, and geothermal power generation, Kenya outnumbers Ethiopia. Oil and diesel potential in Kenya accounts for 27.1% of the national generation capacity versus a 6.9% generation capacity in Ethiopia. Similarly, geothermal production stands at 10.8% in Kenya and 1.2% in Ethiopia (Diechmann et al. 2011).

## LEAPFROGGING AS AN ALTERNATIVE

One of the quickest ways a nation can implement energy efficiency involves utilizing innovative technology in order to fast track the energy efficiency process. Murphy (1999) states that there are three ways in which rural areas in East Africa can quicken the energy efficiency process: “conventional grid expansion, renewable energy technology supplying electricity, and improved cookstoves” (Murphy 1999). An analysis of these three variables includes the social, economic and political implications of leapfrogging the energy efficiency process. In this context, leapfrogging refers to fast tracking the energy efficiency process by utilizing innovative technologies. “Through leapfrogging, Africa and other developing regions will be able to bypass the conventional path of energy development. [Additionally], leapfrogging technologies are thought to offer people the opportunity to make a rapid switch away from traditional forms of energy... [by bringing] modern energy sources to rural people quickly and cost effectively” (Murphy 1999). Leapfrogging has the potential to expediate the energy efficiency process in East Africa so that consumer needs (which are rapidly expanding) are met in a timely fashion.

In order to do achieve leapfrogging in implementing energy efficiency, Murphy (1999) states that the national government and energy planners in East Africa must cooperate with local actors (local governments and private firms) in order to understand the needs of the consumers. Cooperating with locals will require for a social, cultural, and political understanding of local consumers along with the technical and economic aspects of leapfrogging the energy efficiency process. It is important for the national government and energy planners to remember that technological advancement in the leapfrogging process should coincide with economic and social development in implementing energy efficiency (Murphy 1999). Ultimately, the goal

behind leapfrogging the energy situation in East Africa is to improve the well-being and quality of life of its citizens.

### Challenges to Leapfrogging

Although leapfrogging offers a quick solution to East Africa's energy issue, there are some challenges in implementing this technique. The costs associated with installing energy efficient technologies can be burdensome to households with low income. Other challenges include low capacity levels of power sector planners, lack of skilled technicians, lack of independent firms, and issues with rural transport (Murphy 1999). Institutionally, pork barrel politics in energy related projects often slows down the process. This refers to the bureaucratic aspects that govern the launch of energy related projects. Without the proper tools to encourage leapfrogging, implementing energy efficiency in East Africa could be a slow process.

## IMPACT OF FOREIGN ACTORS IN EAST AFRICA

### Colonial v. Non-Colonial Rule

One characteristic that distinguishes Kenya from Ethiopia is the presence of a colonial power in its history. Kenya's history as a British colony has created lasting impacts on its democratic procedures. Lee and Paine (2016) argue that, "former British colonies are considerably more democratic than other countries immediately following independence..." (Lee & Paine, 2016). Britain's colonial power in Kenya from 1920-1963 allowed for British democracy to take root and lay the foundation of what is Kenyan politics today. This political influence is still present in Kenya's democratic procedures. "Britain fostered post-colonial democracy by altering the political institutions and/or culture of its territories in ways that increased demand for democracy" (Lee & Paine, 2016). A British influence on legislative proceedings affects all areas of Kenyan policymaking.

These lasting influences also play a role in policy language. Kenyan energy policies are comprised of clear objectives and goals by creating the necessary institutions to oversee these goals. For example, with the case of the Energy Act of 2006, Kenya created the Energy Regulation Commission to ensure that the act's policies were accomplished. Similar advancements have been made in more recent Kenyan energy policies. With each policy, a new government institution is created to oversee its goals. Additionally, these policies explicitly state how policy goals will be initiated, funded, and regulated. Several Kenyan energy policies also include a list of sanctions in case a violation is made. A majority of Kenyan energy policies also state that policy objectives may only be met if there is cooperation between national and state governments as well as local actors. This cooperation is another characteristic of Britain's colonial rule. "Britain promoted bureaucratic structures that maintained order through the rule of law rather than through arbitrary authority. Britain tended to grant greater responsibilities to its elected legislative organs whereas France practiced a more centralized style of rule" (Lee & Paine, 2016). In cases like this, Britain's influence on Kenyan politics continues to carry weight even in recent times.

On the other hand, Ethiopia's lack of a colonial ruler may have impacted their democratic proceedings in a different way. Italy's presence in Ethiopia in the 1930s was met with a rejection of European ideals. Under military occupation, Ethiopia remained belligerent to Italy's influence. Ethiopia's democratic growth was severely limited by Italy's fascist ideals. A lack of democratic influence from a colonial power left Ethiopia in a more vulnerable position. This is evident in one of Ethiopia's earliest energy related policies, the Environmental Policy of 1997. This policy is ambitious in its objectives but lacks a clear means of achieving them. Similar issues are noted in later energy related policies until the early to mid-2000s when Ethiopian energy policies

became more explicit in policy language. However by this time, Kenya had already outpaced Ethiopia in drafting and implementing efficient energy policies.

### China

In recent years, China has been increasingly expanding its foreign relations within Africa. Some of China's most notable trading partners lie in East Africa. "According to the McKinsey report, China's trade and influence is growing rapidly in East Africa. Among the eight countries surveyed, the report classifies Ethiopia, Kenya and Tanzania's partnerships with China as among the advanced and fastest growing trade and economic relations" (Kiprop 2017). China's relations in East Africa encompass construction, real estate, finances, trade (import/export), and resource extraction.

China's energy related exploration in Africa has been steadily increasing with time. In 2006, the China National Offshore Oil Corporation (CNOOC) signed an exploration deal with Kenya that allowed the CNOOC to explore over 44,000 square miles of land. In that same year, "Zhongyuan Petroleum Company start[ed] exploratory drilling in the Gambella basin of western Ethiopia" (Taylor 2006). According to Ademola, Bankole, and Adewuyi (2009), China's import of Ethiopian fuels in 2007 accounted for 51.3% of national fuel imports. Additionally, China's import of crude raw materials from Kenya accounted for 68.7% of Kenya's exports (Ademola et al. 2009). Chinese relations with Ethiopia and Kenya have also led to increased use of renewable resources. Several Chinese real estate firms have introduced the use of solar powered homes. For example, the President of Shenzhen Power Solution Limited (a Chinese based solar solutions manufacturer) said that, "Kenya poses a highly profitable and budding market for solar equipment as the country gradually shifts to renewable energy sources" (Kiganda 2017).



In 2016, the China Electric Power Equipment and Technology launched plans to build an electric highway between Kenya and Ethiopia by 2018. This project is estimated to cost \$1.26 billion dollars and service almost 900,000 Kenyans by 2018 (and 1.4 million in 2022). In July of 2018, China's Dongfang Electric Corporation is expected to build Ethiopia's fourth wind farm. With this project (and several others), "the Ethiopian government plans to increase its electricity generation capacity from the current 4,200 MW to about 17,300 MW by 2020 using hydro, wind, geothermal, biomass and solar energy" (Reve 2017). China's extensive presence in East Africa has proven to be extremely beneficial to both Kenya and Ethiopia. All of these projects have improved Kenya and Ethiopia's foreign relations by making them more aware of how to efficiently utilize their resources.

#### EAST AFRICAN ENERGY PROJECTS

According to the Kenyan Wall Street, seven of the top ten largest infrastructure projects in East Africa are being constructed in either Kenya or Ethiopia<sup>42</sup>. In Ethiopia, the Grand Renaissance Dam is one of Ethiopia's largest renewable resource energy projects that seeks to fast track hydro-electricity production on a national level. Additionally, Ethiopia is home to Africa's largest wind-power farm (Ashegoda farm). However this project is now in competition with Kenya's Lake Turkana Wind Power which seeks to become Africa's largest wind- power farm. Kenya's proposal for the LAPSSET Corridor- an international infrastructure and transport project involving Kenya, Ethiopia, South Sudan and Uganda. Other Kenyan projects include the

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<sup>42</sup> Kenyan Wallstreet. (2017, June 06). Top 10 Largest Infrastructure Projects in East Africa. Retrieved from <https://kenyanwallstreet.com/top-10-largest-infrastructure-projects-in-east-africa-20162017/>

SDE Wave Energy Project and the Ngong Wind Project which seek to increase the use of hydro and wind power production.

### FINDINGS AND CONCLUSION

An examination of Kenyan and Ethiopia energy policies and the extent to which they have successfully implemented energy efficiency finds that Kenyan energy policies are more advanced than Ethiopia's. Kenya has shown a better understanding of how to successfully implement energy policies by drafting explicit legislation that creates government organizations to support policy goals. Although Ethiopian energy policies have similar characteristics, these policies have only recently begun to include clear instructions for how policy goals are to be achieved. Additionally, Kenya has proven to be more involved with its neighbors in order to achieve energy efficiency by holding memberships in organizations like EACREEE, EAC, East African Energy, the East African Community and engaging in projects like the LAPSSET Corridor, and the Kenya-Ethiopia Electric Highway. Ethiopian energy policies have made significant improvement in recent years, however there is still much work to be done in order for Ethiopia to compete with Kenyan development.

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