YSDC 2020

BACKGROUND GUIDE: AFFORDABLE AND CLEAN ENERGY COMMITTEE

Written by: Livingstone Akin-Ajala & Hikmah Ogunnubi

EXPLORING CLEAN AND AFFORDABLE ENERGY IN RURAL AREAS FOR DEVELOPMENT

1. INTRODUCTION

"Without energy, our hospitals will not run well; without energy, our children cannot study at night; without access to energy, we cannot process food and store it long enough to deal with food security issues."

There is a need for global access to affordable, reliable and sustainable energy services requires expanding access to electricity and clean cooking fuels and technologies, as well as improving energy efficiency and increasing the share of renewable energy in the world. However, renewable energy and its processes are not cheap and easy to come by. This already places a great disadvantage for rural areas. Progress in all these areas falls short of what is needed to achieve the Goal by 2030. Increased financing and bolder policies are advised also with the willing power of countries to embrace new technologies on a much more intentional scale. Due to the inability to access these better forms of energy, people in these areas still stay with their fossil energy products which are very harmful to them and also contribute greatly to pollution in places like land, the atmosphere etc.

The United Nations (UN) explains that energy is at the center to nearly every major challenge and opportunity the world encounters today. Be it jobs, security, climate change, food production or increasing incomes, access to energy for all is very important and should be prioritized. Transitioning the global economy towards clean and sustainable sources of energy is one of the greatest challenges in the coming decades. Sustainable energy is an opportunity; it transforms lives, economies and the planet. With access to energy, people can study, go to the university, get a job, start a business and achieve their full potential.

Indoor air pollution from using combustible fuels for household energy caused 4.3 million deaths in 2012, with women and girls accounting for 6 out of every 10 of these and this is why clean and affordable will always be a focus of the new age as it is important for sustainable development and longevity. The goal is to have a world where there is less effect and event of pollution as a result of energy usage and to ensure access to affordable, reliable, sustainable and modern energy for everyone irrespective of location or area. Between the years 1990 and 2010, the number of people with access to electricity alone had increased by 1.7 billion, and as the

global population continues to rise so will the demand for cheap energy. Over the years, there have been damming occurrences of the effects of climate change as a result of the depletion of the ozone layer through greenhouse gases. The long term plan is to mitigate these effects through clean and renewable energy.

2. INTERNATIONAL AND REGIONAL FRAMEWORK

The provision of clean and affordable energy especially with rural areas in concern is an action of the Sustainable Development Goal (SDGs) which are to be achieved by 2030. These goals were set out by the United Nations Development Programme in 2015, and Clean and Affordable Energy is the 7th Goal.

There is no progress without fuelling the engine of growth. Energy access therefore contributes a core component of the sustainable development agenda for energy. The production of useable energy can also be a source for climate change accounting for around 60% of total global greenhouse gas emissions. Energy is critical and people with no sustainable access to energy are deprived of the opportunity to become part of national and global progress. And even on this, one billion people around the world live without access to energy. More than 781 million people in 2016 (39% of the world's population) do not have access to clean fuels and technologies for cooking. The UN has stated 5 Targets and 6 Indicators for clean and affordable energy. Targets specify the goals and indicators represent the metrics by which the world aims to track whether these targets are achieved.

Goal 7 of the SDGs which is clean and affordable energy aims to correct this enormous imbalance by ensuring everyone has access to affordable, reliable, and modern energy services by the year 2030. To expand energy reach and accessibility, it is crucial to enhance energy efficiency and to invest in renewable energy. Asia has been the driver of progress in this area, expanding access at twice the rate of its demographic growth. 72% of the increase in energy consumption from modern renewable sources between 2010 and 2012 came from developing regions, including parts of Asia. Energy from renewable resources such as wind, water, solar, biomass and geothermal energy are inexhaustible and clean. Although the solution to energy's climate crisis lies off-grid (not connected to or served by publicly or privately managed utilities

such as electricity, gas, or water), renewable energy currently constitutes only 15% of the global energy mix, thus, the action for a new global partnership on sustainable energy for all, guided by Sustainable Development Goal 7 on universally accessible, efficient, clean, and reliable energy sources and services.

India as a State study is projected to be a significant contributor to the rise in global energy demand, around one-quarter of the total demand is from the country. However, as of 2016, more than 207 million people in India did not have access to electricity. The government's National Solar Mission is playing an important role in the work towards renewable energy, and interventions in rural electrification and new ultra-mega power projects are moving India towards achieving universal energy access.

The target goal of the SDG 7 is, by the year 2030, to ensure universal access to affordable, reliable and modern energy services. Also to increase substantially, the share of renewable energy in the global energy mix and double the global rate of improvement in energy efficiency. Similarly, to also enhance international co-operation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology. It likewise with its target goals, expands infrastructure and upgrades technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing states and land-locked developing countries, in accordance with their respective programmes of support.

In every area of sustainable energy, a number of countries are outperforming the world, despite slower than required progress overall to achieve global energy access, renewable energy and energy efficiency goals. 'Entitled Global Tracking Framework 2017 – Progress toward Sustainable Energy', the report directs the International Energy Agency's projections to show that at the current rate of progress, only 91 percent of the world will have electricity access in 2030, while only 72% will have access to clean cooking. Improvements in energy intensity are also projected to fall short of the 2030 goal while the share of renewables will only reach 21% by that time. Those estimates underscore the need for urgent action.

Energy is fundamental for economic growth. With access to modern, reliable and affordable energy, life becomes easier for individuals: a child can study at night, small businesses can thrive, women can walk home under the safety of working streetlights and hospitals can function efficiently and save lives. That is the reason for the action for Sustainable Energy for All's (SEforALL) objectives of universal access to modern energy, doubling the rate of improvement of energy efficiency and doubling the share of renewable energy by 2030 is crucial.

To make meaningful improvements, higher levels of financing and bolder policy commitments, along with the willingness on countries' part to embrace new technologies on a much wider scale are essential and strongly advised according to the report.

The Global Tracking Framework made some findings in their 2017 report:

ELECTRIFICATION:

In 2014, access to electricity globally climbed to 85.3%, up only slightly from 85.0% in 2012, representing a slowdown from previous years. This implies that 1.06 billion people (about three times the population of the United States) still lived without access to electricity; despite the fact that an additional sum of 86 million people are getting electricity every year. Access to electricity in Africa is not growing as rapidly as its population, which is a cause for concern. But countries like Kenya, Malawi, Sudan, Uganda, and Zambia and Rwanda, in particular, increased their electrification by 2 to 4 percentage points annually in the 2012-2014 period.

COOKING:

In 2014, access to clean fuels and technologies for cooking climbed to 57.4%, up slightly from 56.5% in 2012. 3.04 billion people (about nine times the population of the United States) still lived without access to clean cooking, which was actually slightly higher than the deficit in 2012.The bulk of these people live in Asia, and to a lesser extent, Africa, where clean cooking does not appear to be a policy priority. Quite peculiar is the case of Africa where the population grows by 20 million each year, while access to clean cooking only increases by 4 million.

Relative to electricity, only a small handful of countries are showing encouraging progress on access to clean cooking, most notably Indonesia, as well as Peru and Vietnam.

ENERGY EFFICIENCY:

Energy efficiency is the one area where progress accelerated from 2012-2014, leading to substantial global energy savings equivalent to the entire energy consumption of both Brazil and Pakistan in 2014. Fifteen of the world's 20 high energy consumers reduced their energy intensity in the 2012-2014 period with countries like China, Mexico, Nigeria and the Russian Federation showing more than a 2.6% reduction annually. The driving progress in energy efficiency is strong performance from a number of major energy consuming sectors, in particular industry. Progress in transport is also encouraging as widespread adoption of fuel efficiency standards helps to drive down energy intensity particularly for passenger transportation. An important exception, however, is the residential sector that is getting more energy intensive over time.

RENEWABLE ENERGY:

Overall, progress was quite slight on this front, with the share of renewable energy in the world's total final energy consumption increasing slightly from 17.9% in 2012 to 18.3% in 2014. While new power generation technologies such as wind and solar are growing rapidly and representing a third of the expansion in renewable energy consumption in 2012–2014, they were growing from a very small base, accounting for only 4% of renewable energy consumption in 2012. The challenge is to increase reliance on renewable energy in the heat and transport sectors, which account for 80% of global energy consumption. How rapidly the world's 20 largest energy consumers meet demand with modern renewables is key to reaching this goal. In 2012-2014, only 13 of these countries succeeded in increasing their modern renewable energy share and only Italy and the United Kingdom increased their renewable energy share by more than 1 percentage point in that period.

3. STATISTICAL ANALYSIS OF THE TOPIC

Nearly 9 out of 10 people now have access to electricity, but reaching those that do not have will require increased efforts. 3 billion people rely on wood, coal, charcoal or animal waste for cooking and heating. The health and well-being of these people are adversely impacted by the lack of clean cooking fuels. Lack of access to clean cooking fuels and technologies presents many health hazards and results in millions of deaths each year due to household air pollution. From 2000 to 2014, the proportion of the global population with access to such fuels and technologies (for instance gas and electricity) increased from 50% to 57%, progressing much more slowly than electrification. The International Energy Agency's projections shows that at the current rate of progress, only 91% of the world will have electricity access in 2030, while only 72% will have access to clean cooking. 13% of the global population still lacks access to modern electricity. Energy is the dominant contributor to climate change, accounting for around 60% of total global greenhouse gas emissions. Indoor air pollution from using burning fuels for household energy caused 4.3 million deaths in 2012, with women and girls accounting for 6 out of every 10 of these. 85% of the 1.2 billion people who lack access to electricity and 78% of the 2.8 billion who still rely on unsustainable solid biomass as fuel for cooking and heating live in rural areas. 50% of these people are found in Sub-Saharan Africa. Globally, there are close to 4 million premature deaths from household air pollution every year, 70 to 80% of which are women and children. Household pollution has been said to be the number four killer in the world and the number two killer of women.

Between 1990 and 2010, the number of people with access to electricity had increased by 1.7 billion, and as the global population continues to rise, so will the demand for cheap energy. A global economy reliant on fossil fuels and the increase of greenhouse gas emissions is creating drastic changes to our climate system. This is having a visible impact on every continent. However, there has been a new drive to encourage alternative energy sources, and in 2011, renewable energy accounted for more than 20% of global power generated. Still one in five people lack access to electricity and as the demand continues to rise there needs to be a substantial increase in the production of renewable energy across the world.

In Sub-Saharan Africa, an estimated 573 million people still lack access to electricity. Without electricity, women and girls have to spend hours fetching water, clinics cannot store vaccines for

children, many schoolchildren cannot do homework at night, and people cannot run competitive businesses. More than half the people without electricity live in Sub-Saharan Africa. The region had the lowest electrification rate overall at 37%, but the figure dropped to just 17% in rural areas. A major challenge is providing electrification rapidly enough to outpace growing populations. While some 86 million people a year are able to access electricity for the first time, this progress has been offset in some areas by population growth.

More than a billion people, mostly in rural areas, live without the benefits of electricity

Reliable and affordable access to electricity saves and improves lives. Among its many benefits, electricity powers computers in schools, charges phones, keeps food cold and businesses and essential infrastructure functioning. In 2014, 85.3% of the global population had access to electricity, up from 77.6% in 2000, with progress slowing in the last few years. While 96% of urban residents had access to electricity in 2014, the share was only 73% for those in rural areas.

A 2014 study revealed that, 85.3 per cent of the global population had access to electricity, up from 77.6% in 2000, with progress regressing in the last few years. While 96% of urban residents had access to electricity in the same year, the share was only 73% for those in rural areas, which in actual consideration, is better progress but not sufficient for the main aim. Comparing the statistics in both areas, almost the whole population in urban areas had access to electricity either through pure energy or renewable energy but greater than 25% in rural areas still didn't have access to electricity.

Still on the year statistics, globally, 1.06 billion people still lived without this essential amenity, with 80% of them concentrated in just 20 countries. More than half the people without access to electricity live in Sub-Saharan Africa. Providing universal access to affordable electricity by 2030 means investing in clean energy sources such as solar, wind and thermal sources as opposed to fossil sources. Adopting cost-effective standards for a wider range of technologies could also reduce the global electricity consumed by buildings and industry, by 14%. This means avoiding roughly 1,300 mid-size power plants.

This background guide is centered on exploring these affordable forms of clean energy in rural areas, taking into consideration, the form of living of rural areas, the form(s) which will be most applicable and other factors. The aim is to move the practice of the use of fossil fuel and

charcoals to other forms of clean energy that are affordable and accessible to people in rural areas.

4. SUB TOPICS

4.1 Renewable Energy Technologies (RETs)

RETs are energy-providing technologies that utilize energy sources in ways that do not deplete the earth's natural resources and are as environmentally friendly as possible. These sources are sustainable in that they can be managed to ensure they can be used incessantly without degrading the environment By exploiting these energy sources, RETs have great potential to meet the energy needs of rural societies in a sustainable way, albeit most likely applied with conventional systems. The decentralized nature of some RETs allows them to be matched with the specific needs of different rural areas. For the purposes of this guide, it is useful to separate RETs into two categories: those used to provide energy for domestic use (predominantly cooking and heating) and those used to supply electricity. RETs used to produce energy for domestic use tend to do so by exploiting modern fuels or by utilizing traditional fuels in new and improved ways. RETs that generate electricity can do so either as part of a stand-alone (or off-grid) system or as a grid-based system, by way of connection to a mini-grid or the national grid.

Common RET options for providing energy in rural areas utilize wind, solar, small-scale hydropower and biomass resources. Wind energy is used for pumping water and generating electricity. Solar photovoltaic (PV) systems convert sunlight into electricity and solar heaters use sunlight to heat stored water. Small-scale hydropower plants are used to generate electricity and vary in size (mini, micro and pico, in descending size). Many small-scale hydro systems are "run-of-the-river" schemes, meaning that the main energy-carrying medium is the natural flow of water. In these cases, dams are small and there is very little storage of water. As a result, they are cheaper and less demanding on the environment, although they are less efficient and heavily dependent on local hydrological patterns.

Greater access to energy for domestic use and electricity using RETs can have a significant impact on livelihoods in rural areas. Cleaner use of traditional fuels can significantly improve health by reducing acute respiratory infection and conjunctivitis, commonly caused by indoor pollution. Wider health benefits can occur too; cooking with more efficient technologies can

make dietary choice and boiling of water more affordable or more likely. Women and children in particular will have more time for education, leisure and economic activity. Access to electricity can significantly reduce the time required to devote to household activities. Electric water pumps, for example, can provide clean water thereby reducing the effort needed for collection. Electricity can make possible the refrigeration of vaccines and operation of medical equipment in rural health clinics. Access to radio and television can improve educational opportunities and provide entertainment. Electric lighting provides higher quality illumination than kerosene lanterns, improving opportunities for extended work and study time as well as better security, comfort and safety.

Improved health and education, combined with more time to undertake non-energy related activities, are important goals in themselves. However, access to modern energy services also have the added value of helping local populations to engage in income-generating activities. Demand for services associated with RETs can help generate local economic activity based on these technologies, in addition to the existing means to power local industry. Applications of RETs for productive activities vary from mechanical wind-powered water pumping to motorized milling machines for grinding grain. Radio services can provide farmers and fishermen with weather forecasts and telecommunication services can provide growers with information on crop prices. These applications can lead to job creation and improved livelihoods, both of which can contribute to significant increases in productivity in rural areas.

4.2 Solar Energy

Solar energy is radiant light and heat from the sun that is harnessed using a range of ever-evolving technologies such as solar heating, solar thermal energy, solar architecture, molten salt power plants and artificial photosynthesis. It is an important source of renewable energy and its technologies are broadly characterized as either passive solar or active solar depending on how they capture and distribute solar energy or convert it into solar power. Active solar techniques include the use of photovoltaic systems, concentrated solar power and solar water heating to harness the energy. Passive solar techniques include: orienting a building to the sun, selecting materials with favorable thermal mass or light-dispersing properties, and designing spaces that

naturally circulate air. The large magnitude of solar energy available makes it a highly appealing source of electricity.

Solar power is energy from the sun that is converted into thermal or electrical energy. Solar energy is the cleanest and most abundant renewable energy source available, and the U.S. has some of the richest solar resources in the world. Solar technologies can harness this energy for a variety of uses, including generating electricity, providing light for a comfortable interior environment, and heating water for domestic, commercial, or industrial use.

In 2011, the International Energy Agency said that "the development of affordable, inexhaustible and clean solar energy technologies will have huge longer-term benefits. It will increase countries' energy security through reliance on an indigenous, inexhaustible and mostly import-independent resource, enhance sustainability, reduce pollution, lower the costs of mitigating global warming, and keep fossil fuel prices lower than otherwise. These advantages are global. Hence, the additional costs of the incentives for early deployment should be considered learning investments; they must be wisely spent and need to be widely shared"

Solar thermal technologies can be used for water heating, space heating, space cooling and process heat generation.

There are three main ways to harness solar energy: photovoltaics, solar heating & cooling, and concentrating solar power. Photovoltaics generate electricity directly from sunlight via an electronic process and can be used to power anything from small electronics such as calculators and road signs to homes and large commercial businesses. Solar heating & cooling (SHC) and concentrating solar power (CSP) applications both use the heat generated by the sun to provide space or water heating in the case of SHC systems, or to run traditional electricity-generating turbines in the case of CSP power plants.

Solar energy is a very flexible energy technology: it can be built as distributed generation (located at or near the point of use) or as a central-station, utility-scale solar power plant (similar to traditional power plants). Both of these methods can also store the energy they produce for distribution after the sun sets, using cutting edge solar + storage technologies.

4.3 Wind Energy

Wind power or wind energy is the use of wind to provide mechanical power through wind turbines to turn electric generators and traditionally to do other work, like milling or pumping. Wind power is a sustainable and renewable energy, and has a much smaller impact on the environment compared to burning fossil fuels. Wind energy is a form of solar energy. Wind energy (or wind power) describes the process by which wind is used to generate electricity. Wind turbines convert the kinetic energy in the wind into mechanical power. A generator can convert mechanical power into electricity. Mechanical power can also be utilized directly for specific tasks such as pumping water.

Wind farms consist of many individual wind turbines, which are connected to the electric power transmission network. Onshore wind is an inexpensive source of electric power, competitive with or in many places, cheaper than coal or gas plants. Onshore wind farms also have an impact on the landscape as typically, they need to be spread over more land than other power stations and need to be built in wild and rural areas, which can lead to "industrialization of the countryside" and habitat loss. Offshore wind is steadier and stronger than on land and offshore farms have less visual impact, but construction and maintenance costs are higher. Small onshore wind farms can feed some energy into the grid or provide electric power to isolated off-grid locations.

Wind is an intermittent energy source, which cannot make electricity nor be dispatched on demand. It also gives variable power, which is consistent from year to year but varies greatly over shorter time scales. Therefore, it must be used together with other electric power sources or storage to give a reliable supply. As the proportion of wind power in a region increases, more conventional power sources are needed to back it up (such as fossil fuel power and nuclear power), and the grid may need to be upgraded. Power-management techniques such as having dispatch-able power sources, enough hydroelectric power, excess capacity, geographically distributed turbines, exporting and importing power to neighboring areas, energy storage, or reducing demand when wind production is low, can in many cases overcome these problems. Weather forecasting permits the electric-power network to be readied for the predictable variations in production that occur.

Wind is caused by the uneven heating of the atmosphere by the sun, variations in the earth's surface, and rotation of the earth. Mountains, bodies of water, and vegetation all influence wind flow patterns. Wind turbines convert the energy in wind to electricity by rotating propeller-like blades around a rotor (the rotating part of a mechanical device, for example in a generator, or an electric motor). The rotor turns the drive shaft, which turns an electric generator. Three key factors affect the amount of energy a turbine can harness from the wind: wind speed, air density, and swept area.

4.4 Hydro Electric Energy

Hydroelectric energy, also called hydroelectric power or hydroelectricity, is a form of energy that harnesses the power of water in motion such as water flowing over a waterfall in order to generate electricity. People have used this force for millennia. Over two thousand years ago, people in Greece used flowing water to turn the wheel of their mill to ground wheat into flour.

Most hydroelectric power plants have a reservoir of water, a gate or valve to control how much water flows out of the reservoir, and an outlet or place where the water ends up after flowing downward. Water gains potential energy just before it spills over the top of a dam or flows down a hill. The potential energy is converted into kinetic energy as water flows downhill. The water can be used to turn the blades of a turbine to generate electricity, which is distributed to the power plant’s customers.

There are three different types of hydroelectric energy plants, the most common being an impoundment facility. In an impoundment facility, a dam is used to control the flow of water stored in a pool or reservoir. When more energy is needed, water is released from the dam. Once water is released, gravity takes over and the water flows downward through a turbine. As the blades of the turbine spin, they power a generator.

Another type of hydroelectric energy plant is a diversion facility. This type of plant is unique because it does not use a dam. Instead, it uses a series of canals to channel flowing river water toward the generator-powering turbines.

The third type of plant is called a pumped-storage facility. This plant collects the energy produced from solar, wind, and nuclear power and stores it for future use. The plant stores energy by pumping water uphill from a pool at a lower elevation to a reservoir located at a higher elevation. When there is high demand for electricity, water located in the higher pool is released. As this water flows back down to the lower reservoir, it turns a turbine to generate more electricity.

Hydroelectric energy is the most commonly-used renewable source of electricity. China is the largest producer of hydroelectricity. Other top producers of hydropower around the world include the United States, Brazil, Canada, India, and Russia. Approximately 71% of all of the renewable electricity generated on earth is from hydropower.

The Three Gorges Dam in China, which holds back the Yangtze River, is the largest hydroelectric dam in the world, in terms of electricity production. The dam is 2,335 meters (7,660 feet) long and 185 meters (607 feet) tall, and has enough generators to produce 22,500 megawatts of power.

5. Relating the Topic to the Conference Theme: Youth at the Centre of the Achievement and Implementation of the SDGs.

As a youth, how can you contribute to the achievement of the SDG 7: Affordable and Clean Energy?

The success of the SDGs depends on youth engagement. Youths are critical thinkers. Part of being young involves making sense of personal experiences and asking questions about the world around you. Youth have the capacity to identify and challenge existing power structures and barriers to change, and to expose contradictions and biases

As a youth, you have to be a change maker. Young people also have the power to act and mobilize others. Youth activism is on the rise the world over, bolstered by broader connectivity via access to social media. You also have to be an innovator. In addition to bringing fresh perspectives, young people often have direct knowledge of and insights into issues that are not accessible to adults. Youth best understand the problems they face and can offer new ideas and alternative solutions. Youths are also communicators. Outside the international development sector, few people are aware that world leaders have come to a historic, far-reaching agreement to improve the lives of people and the planet by 2030. Young people can be partners in communicating the development agenda to their peers and communities at the local level, as well as across countries and regions.

Most importantly, youths as the leaders of tomorrow are key in achieving the SDGs. When young people are empowered with the knowledge of their rights and equipped with leadership skills, they can drive change in their communities and countries. Youth-led organizations and networks, in particular, should be supported and strengthened, because they contribute to the development of civic leadership skills among young people, especially marginalized youth.

With regard to SDG 7, you can save electricity by plugging appliances into a power strip and turning them off completely when not in use, including your computer. You can also bike, walk or board public transit to reduce carbon emissions.

6. CONCLUSION

To ensure access to affordable, reliable, sustainable and modern energy for all, there's need for a well-established energy system support all sectors: from businesses, medicine and education to agriculture, infrastructure, communications and high-technology. Access to electricity in poorer countries has begun to accelerate, energy burning carbon fuels produces large amounts of greenhouse gases which cause climate change and have harmful impacts on people's well-being and the environment. This affects everyone, not just a few. Moreover, global electricity use is rising rapidly. In a nutshell, without a stable electricity supply, countries will not be able to power their economies.

FURTHER RESEARCH

The following stipulated below are issues which are to be analyzed and understood during the conference:

1. The importance of Clean and Affordable Energy to the healthcare system in Nigeria.
2. The role of international organizations, asides the United Nations, in the achievement of these goals.
3. Economic importance of affordable and Green Energy in Nigeria.
4. Importance of renewable energy as a better and efficient substitute for fossil fuels especially in rural areas.
5. Practical steps towards achieving this goal in the next decade.

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