

## 7 AFFORDABLE AND CLEAN ENERGY



# SDG7 Implementation: The Kenyan Scenario

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Policy Brief, February, 2020

### *Key Messages*

- *Support research and development on the new local, renewable and sustainable sources of energy.*
- *Promote public private partnerships in the energy sector. This will increase investments in the sector since the government budgetary allocation of the sector is inadequate.*
- *Government and civil societies to develop an online centralized information database that can provide information on the local renewable energy solutions and business modules.*
- *More incentives and tax breaks are still needed in order to increase uptake of renewable energy to rural areas.*
- *Government through climate change secretariat to have more robust mechanisms of tracking renewable energy projects in the Counties.*
- *Civil Societies and Government should organize forums with private sector companies in order to raise capacity and encourage them to finance renewable energy projects*
- *Develop a regional Energy policy framework learning from the successes and short-comings of the East Africa Power Pool Agreement.*

## ***1.0 Types of Renewable Energy in Kenya***

**Geothermal:** Currently, 80% of KenGen's energy portfolio is geothermal and hydro. In 2018, contribution from geothermal resources increased by 4% to 47% of the total energy purchased by KPLC easing overreliance on hydropower generation and mitigating increase in electricity costs by minimizing dispatch of expensive thermal power.

**Hydropower:** Kenya has an estimated hydropower potential of about 6,000MW comprising large hydros (sites with capacity of more than 10MW) and small hydros.

**Solar:** Kenya has great potential for the use of solar energy throughout the year because of its strategic location near the equator with 4-6kWh/m<sup>2</sup>/day levels of insolation. Following the coming into force of the Energy (Solar Water Heating) Regulations, 2012 there has been a surge in solar usage. The government also initiated the Kenya Off-grid Solar Access Project (KOSAP) for electrification of institutions far from grid using solar PV systems. By the year 2020, it is projected that the installed capacity of solar photovoltaic systems will reach 100MW generating 220GWh annually.

**Wind:** The Lake Turkana Wind Power Project (LTWP) and the Ngong Hills Wind Power Project are the only wind farms that are connected to the national grid, with capacities of 310MW and 25.5MW respectively. The LTWP is the largest wind power plant in Africa having achieved full commercial operation in March 2019. The government of Kenya has estimated that 2GW of wind capacity will be installed in Kenya by 2030.

**Biomass:** Biomass fuels are the largest source of primary energy in Kenya with wood-fuel (firewood and charcoal) accounting for about 68% of the total primary energy consumption. About 55% of this is derived from farmlands in the form of woody biomass as well as crop residue and animal waste and the remaining 45% is derived from forests.

**Biogas:** Biogas potential in Kenya has been identified in municipal waste, sisal and coffee production. The total installed electric capacity potential of all sources ranges from 29-131MW, generating 202 to 1,045GWh, which is about 1.3% to 5.9% of the total electricity purchased in the system.

## 2.0 Why Implement SDG7

- ☞ Improved access to energy sources especially electricity improves human development conditions through provision of water; industrial and agricultural productivity; disadvantaged groups empowerment; better health and education conditions and environmental sustainability. In view of that, universal electricity access remains one of the drivers of social economic development in Kenya.
- ☞ Equally, access to affordable, competitive, reliable, quality, safe and sustainable energy remains an integral part in the achievement of the “Big 4 Agenda”. As such, development of the energy sector is critical if Kenya is to achieve the Kenya Vision 2030 and become a newly industrializing, middle income country. Kenya possesses significant potential sources for clean and affordable power generation in geothermal, wind, hydro and biomass energy.

## 3.0 SDG7 implementation Milestones in Kenya

- ☞ **December 6, 2018** - Kenya had achieved substantial progress in economic, social, and human development over the past decade. Significant progress has also been made in the energy sector. For instance, Kenya has been taking advantage of its rich renewable resources and has emerged as one of the global leaders in the use of geothermal resources as a clean fuel for power generation.
- ☞ Through the government, private sector investment and support from development partners, Kenya has also experienced an impressive expansion of access to electricity. Kenya now has the highest electricity access rate in East Africa: total access stands at 75% both from grid and off-grid solutions, according to the recent Multi-Tier Framework Energy Access Survey Report.

*But there a quarter of Kenyans still lack access to electricity.*

- ☞ Responding to this challenge, in December 2018 the government launched the Kenya National Electrification Strategy (KNES) - a roadmap for achieving universal access to electricity by the year 2022. With the help of geospatial technology, the strategy has identified least-cost options for bringing electricity to homes, businesses and public facilities. In addition to grid extension and intensification, it recognizes the important role the private sector will have to play in off-grid solutions, both mini-grids and standalone solar systems.

- ☞ Kenya's reliance on renewable energy sources that are significantly less input intensive and favorable to the sector's performance continued to grow in 2018 with the introduction of additional power from wind and solar to the national grid
- ☞ Kenya's installed electricity capacity stood at 2,316MW as at 2016 and during the period under review additional power was installed bringing the total installed capacity to 2,351MW, from renewable sources: hydro, geothermal and wind.
- ☞ To enhance generation from renewable energy technologies, Kenya has completed the largest wind farm in Africa - the Lake Turkana Wind Power Consortium (LTWP).
- ☞ Total domestic demand for electricity increased by 4.4 and 3.5 per cent to 8,410.1 and 8,702.3 GWh in 2017 and 2018 respectively.
- ☞ The private sector contribution to this goal includes the Mkopa solar product that aims at enabling off grid communities to leap from using non-renewable energy to affordable and sustainable practices, while cutting down on pollution.
- ☞ Development of a Carbon Action Plan, with the aim of increasing the use of energy from renewable sources with dedicated projects. Some of these include (photovoltaic power plants, cogeneration plant powered by vegetable oil, biomass plant for steam generation and supply of electricity from wind power. Households have also been supported to invest in improved cooking stoves, household biogas systems and to access small solar systems for lighting and basic electricity services.
- ☞ The percentage of population with primary reliance on clean fuels and technology was 11.9 percent in 2014. At the same time, the renewable energy share in the total final energy consumption stood at 11.4 percent in 2014 before decreasing slightly to 10.7 percent in 2017 and subsequently increasing to 12.2 in 2018.
- ☞ In the policy, legal and institutional framework, the Energy Act 2019 was enacted and the Energy Policy 2015 as a fundamental successor to Sessional Paper No. 4 of 2004 on Energy was formulated passed by the National Assembly and is before the Senate for deliberations. In addition, the process of review of the FiT policy was also initiated. The National draft policy and strategy for the nuclear power programme was also developed.

## 4.0 Challenges in implementation of SDG 7

### *Biomass Energy Development*

- i. Unsustainable use of biomass with attendant negative impacts on the environment.
- ii. Widening gap between supply and demand for wood-fuel.
- iii. Emissions from wood fuel leading to health hazards among users.
- iv. Weak enforcement of the legal and regulatory framework for sustainable production, distribution and marketing of biomass.
- v. Insufficient promotion of sustainable afforestation programmes.
- vi. Inadequate data on biomass production and consumption.
- vii. Uncoordinated approach in policy formulation and implementation by the relevant ministries and organizations to reduce overreliance on biomass as a primary source of energy.
- viii. Inadequate recognition of alternative clean modern energy sources to reduce overreliance on biomass energy source.
- ix. Lack of efficient technologies for production, conversion and consumption of biomass energy.
- x. Competing interests over land use between biomass production, food production and other commercial uses

### *Geothermal Power Generation*

- i. Relatively long lead time of between 5-7 years from conception to production of electricity.
- ii. High upfront investment costs.
- iii. High resource exploration and development risks.
- iv. Inadequate geothermal expertise.
- v. The resources are site specific.
- vi. Heavy investment in transmission and other support infrastructure due to long distances to existing load centres.
- vii. Land use conflict

### *Hydropower Development*

- i. Hydropower is vulnerable to variations in hydrology and climate change, leading to reduction of water levels in reservoirs and thus reducing the contribution of hydro power in the energy mix.
- ii. Inadequate storage capacity in existing power generating reservoirs.
- iii. The economic risk in hydropower projects is high.
- iv. Relocation and resettlement of affected persons to create room for the construction reservoirs.
- v. Long lead time of between 7-10 years.
- vi. Inadequate hydrological data within the region.
- vii. Water levies that have a direct effect on the cost of hydro generated electricity.
- viii. Conflicting and competing land and water uses between various sub-sectors of the economy with regard to development and utilization of the same for electricity generation.
- ix. Absence of synergies and competing interests in the management of hydropower generating infrastructure leading to delays in implementation of viable energy projects

### *Biofuels*

- i. Insufficient feed-stocks to produce biofuels for blending.
- ii. Limited research data/information for the use and sustainable production of biofuel.
- iii. Insufficient legal and institutional framework to support sustainable generation, utilization, production, distribution, supply and use of liquid biofuels.
- iv. Threat of competition over land use that could lead to food insecurity.
- v. Reliance on rain fed, slow maturing feed-stock for biofuels.
- vi. Inadequate RD&D on alternative biofuel feed-stocks and technologies.
- vii. Lack of knowledge among the stakeholders on the importance of biofuels for complementing energy needs in the country.
- viii. Competing uses of the ethanol

### ***Biogas Development***

- i. Lack of awareness on the potential and benefits of biogas technology.
- ii. Inadequate RD&D on biogas technologies.
- iii. High upfront costs of domestic and commercial biogas plant and equipment.
- iv. Inadequate capacity and skilled biogas contractors in the country.
- v. Insufficient legal and regulatory framework for biogas contracts.

### ***Solar Power Development***

- i. Uncoordinated approach in policy implementation and promotion of solar energy projects.
- ii. High upfront capital cost for plant and equipment.
- iii. Weak enforcement of standards and regulations.
- iv. Rampant theft of solar photovoltaic panels, which discourages the installation.
- v. Lack of awareness on the potential, opportunities and economic benefits offered by solar technologies.
- vi. Proliferation of sub-standard solar energy technologies and equipment

### ***Wind Power Development***

High upfront costs for wind power generation equipment.

2. High capital investment for transmission lines due to wind power potential areas being far away from the grid and load centers.

3. Inadequate wind regime data.

4. Inadequate skilled capacity for wind power technology.

5. Inadequate wind energy industry standards due to fast changing technologies.

6. Competing interest in land use with other activities.

7. Inadequate RD&D in wind technologies

### ***Waste to Energy Development***

- i. Lack of legal and regulatory framework for exploitation.
- ii. Lack of management and exploitation by the responsible institutions.
- iii. Inadequate data and information on potential of municipal waste.

- iv. Lack of incentives for exploitation

### *Co-Generation (Baggasse from Sugar Cane)*

- i. Inefficient plant and equipment in the cogeneration industry.
- ii. Unreliable and insufficient supply of agro-waste.
- iii. Limited technical, human and financial resources for cogeneration development.
- iv. Under-utilization of cogeneration potential in areas where agro-wastes are available.
- v. Inadequate data and documented assessment of resources and potential.
- vi. Lack of clear dissemination strategy of information to investors on issues relating to licensing, taxation and feed in tariff policy.

### **5.0 Emerging Issues**

- Embracing of Public Private Partnership (PPP) as a financing option for the sustainability of infrastructure development;
- Growing concerns on safety, health and environmental issues during project implementation and operation;
- Need for security of power infrastructure installations as a key national concern to guard against terror threats and safeguards against projects delivery timelines;
- Economic integration and growth of regional power trade and taxation of cross-border power exchanges;
- Climate change related issues and significant shift towards production of clean and green renewable energy; and
- Gender mainstreaming in the implementation of energy projects and programme.
- Improve Energy Efficiency and Conservation for both domestic and industrial use through energy audits.

## 6.0 Recommendations

- Increase budgetary support for energy sector to promote geothermal resources assessment, transmission capacity enhancement and rural electrification expansion.
- Expand and strengthen the energy infrastructure to deal with ever increasing demand of energy services in the Country. This includes transmission lines, distribution lines, and substations among others.
- Promote public private partnerships in the energy sector. This will increase investments in the sector since the government budgetary allocation of the sector is inadequate.
- Deliberate interventions in the energy market through fiscal incentives (taxes, duties, levies) and non-fiscal incentives (subsidies, fees, guarantees, credits).
- Consensus building and mutual understanding among key stakeholders in project planning and implementation.
- Support research and development on the new, local, renewable and sustainable sources of energy.
- Strengthening performance monitoring, accountability and project/program planning systems, i.e. to improve governance and productivity of resources.
- Develop a regional Energy policy framework learning from the successes and short-comings of the East Africa Power Pool Agreement.
- Diversification of the electrical energy generations mix by finding other commercially viable alternative sources of energy such as geothermal, wind, and solar to reduce dependence on hydropower and thermal energy.
- Government and civil societies to develop an online centralized information database that can provide information on the local renewable energy solutions and business modules.
- Civil Societies and Government should organize forums with private sector companies in order to raise capacity and encourage them to finance renewable energy projects through a more coordinated approach. Such forums shall also raise capacity for private sector financing and open up opportunities for communities to directly get involved in implementing the projects.
- Government through climate change secretariat to have more robust mechanisms of tracking renewable energy projects in the Counties. This should include a monitoring and result oriented

framework in order to give more accurate reporting of project progress, results and impacts of such projects

- Government to enhance monitoring of renewable energy equipment's and accessories by creating standards and compliance rules in order to avoid entry of substandard goods into the country thus discouraging users and therefore penetrations
- More incentives and tax breaks are still needed in order to increase uptake of renewable energy to rural areas.
- Support the formulation, enactment and implementation of Energy Efficiency and Conservation strategy

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