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Policy Recommendations for Reducing CO2 Emissions in Kenya's Electricity Generation, 2015-2030

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Abstract : Kenya is an East African Country lying at the Equator. It had a population of 46 million in 2015 with an annual growth rate of 2.7%, making a population of at least 65 million in 2030. Kenya's GDP in 2015 was about 63 billion USD with per capita GDP of about 1400 USD. The rural population is 74%, whereas urban population is 26%. Kenya grapples with not only access to energy but also with energy security. There is direct correlation between economic growth, population growth, and energy consumption. Kenya's energy composition is at least 74.5% from renewable energy with hydro power and geothermal forming the bulk of it; 68% from wood fuel; 22% from petroleum; 9% from electricity; and 1% from coal and other sources. Wood fuel is used by majority of rural and poor urban population. Electricity is mostly used for lighting. As of March 2015 Kenya had installed electricity capacity of 2295 MW, making a per capital electricity consumption of 0.0499 KW. The overall retail cost of electricity in 2015 was 0.009915 USD/ KWh (KES 19.85/ KWh), for installed capacity over 10MW. The actual demand for electricity in 2015 was 3400 MW and the projected demand in 2030 is 18000 MW. Kenya is working on vision 2030 that aims at making it a prosperous middle income economy and targets 23 GW of generated electricity. However, cost and non-cost factors affect generation and consumption of electricity in Kenya. Kenya does not care more about CO2 emissions than on economic growth. Carbon emissions are most likely to be paid by future costs of carbon emissions and penalties imposed on local generating companies by sheer disregard of international law on C02 emissions and climate change. The study methodology was a simulated application of carbon tax on all carbon emitting sources of electricity generation. It should cost only USD 30/tCO2 tax on all emitting sources of electricity generation to have solar as the only source of electricity generation in Kenya. The country has the best evenly distributed global horizontal irradiation. Solar potential after accounting for technology efficiencies such as 14-16% for solar PV and 15-22% for solar thermal is 143.94 GW. Therefore, the paper recommends adoption of solar power for generating all electricity in Kenya in order to attain zero carbon electricity generation in the country.

Keywords : co2 emissions, cost factors, electricity generation, non-cost factors
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