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### **3 Need for the project**

This sub-section discusses the purpose and need for the proposed 1,050MW coal fired power plant to power Kenya's economic growth. In principle, Kenya needs an additional 5000+MW of power generation capacity by September 2018. According to the Draft National Energy and Petroleum Policy dated January 20, 2015, the above 5000+MW is envisaged to be developed from a variety of energy sources including geothermal (1,646MW), wind (630MW) and coal (1,920MW) through Independent Power Producers (IPPs) under the Public Private Partnership (PPP) framework.

Sub-section 3.2 discusses the current energy mix in the country and the projected demand up to the year 2033 using the Least Cost Power Development Plan (LCPDP) blueprint while section 3.3 discusses how the proposed 1,050MW coal fired power plant fits into the 5000+MW program.

#### **3.1. Project Background**

In 2013, the Government of Kenya invited Expressions of Interest (EoI) for the design, construction and operation of a 960MW  $\pm 10\%$  coal fired power plant to be located in Manda Bay, Lamu County. 26 companies submitted their EoI and after evaluations, the Government invited 10 bidders to submit their bids on a Build Own and Operate (BOO) basis. The project envisaged the following key components:

- A coal power plant in the range of 816 – 1056MW capacity;
- Coal Handling Facilities including Jetty and associated infrastructure;
- 400 kV switchyard at site;
- Evacuation by 400 kV transmission line to be built by KETRACO; and
- Power Purchase by KPLC under 25-year Power Purchase Agreement (PPA).

Of the 10 bidders, 3 consortia submitted their bids to the Ministry of Energy and Petroleum on April 23<sup>rd</sup>, 2014. The consortium led by Gulf Energy Limited was awarded the contract in September 1<sup>st</sup>, 2014, however one of the losing bidders through the PPP Petitions Committee tried to have the award nullified. Gulf Energy Limited and Centum Investments Limited formed a project development company called Amu Power Company Limited (APCL). After a lengthy process, the PPP Petitions Committee upheld the decision to award APCL the coal fired power plant project on January 13<sup>th</sup>, 2015.

#### **3.2. Energy mix and demand forecast**

In the fiscal year ended December 31, 2014, 69.1% of Kenya's electrical power was generated through renewable energy sources while 30.9% was generated by fossil fuel sources as indicated in Table 3-1. The table also shows that as at December 31, 2014, 68% of the installed capacity was from renewable energy sources while 32% was from fossil fuel sources.

<sup>1</sup>Table 3-1: Electric power generation sources and energy generated

Source of electric power		Installed capacity (December 2014)		Annual generation (FY 2013/2014)	
		(MW)	(%)	(GWh)	(%)
RENEWABLE ENERGY	Hydro	821	37.8	3,945	44.6
	Geothermal	593.5	27.3	2,008	22.7
	Wind	25	1.2	18	0.2
	Cogeneration	38	1.7	57	0.6
	Imports	-	-	85	1.0
	<b>Total</b>	<b>1477.5</b>	<b>68.0</b>	<b>6,112</b>	<b>69.1</b>
FOSSIL FUELS	MSD	579.5	26.7	2,533	28.6
	Gas Turbines	60	2.8	41	0.5
	HSD (Isolated stations)	25.8	1.2	61	0.7
	Emergency Power Plant	30	1.4	94	1.1
	<b>Total</b>	<b>695.3</b>	<b>32.0</b>	<b>2729</b>	<b>30.9</b>
<b>Installed capacity and units generated</b>		<b>2,173MW</b>		<b>8,840GWh</b>	

Kenya's Sessional Paper No. 4 of 2004 lays the policy framework upon which cost-effective affordable and adequate quality energy services will be made available to the domestic economy on a sustainable basis over the period 2004 – 2023. This policy recognizes that Kenya needs to develop its energy infrastructure as an enabler of the economy for present and future generations.

The energy and petroleum sector plays a critical role in the socio-economic development of a country. Indeed, petroleum and electricity as sources of energy are the primary enablers of the economy. According to the March 2013 Least Cost Power Development Plan (LCPDP) covering the period 2013 – 2033, the energy demand forecast and the peak load forecast in Kenya is expected to increase significantly and is shown in the Table 3-2.

Table 3-2: Energy demand forecast

Year	Low scenario			Reference scenario			High scenario		
	GWh	MW	Load factor (%)	GWh	MW	Load factor (%)	GWh	MW	Load factor (%)
<b>2012</b>	8,010	1,370	66.76	8,010	1,370	66.76	8,010	1,370	66.76
<b>2030</b>	45,723	8,641	60.41	81,352	14,446	64.28	114,502	19,940	65.55
<b>2033</b>	59,135	11,318	59.65	118,680	21,075	64.28	179,850	31,237	65.73

As at December 2014, the installed electric power generation capacity in the country was 2,173MW. The reference scenario (table 3-2) indicates that by 2030, the electricity

<sup>1</sup> Source: Energy Regulatory Commission

demand could be 14,446MW implying that over 12,000MW of installed capacity is required between 2015 and 2030 or an average of over 800MW per year or 1,050MW annually by 2033.

The reference scenario indicates that the country's energy demand is expected to rise from 1,370MW in 2013 to 14,446MW in 2030 and 21,075MW in 2033.

In order to meet the above demand, Kenya will need to generate electric power from a variety of renewable and fossil fuel sources. While it would be beneficial to have an energy mix made up purely of renewable energy sources, the reality is that such resources take time to develop, subsequent to which, the power generation plants need to be constructed and operated. Additionally, renewable energy sources such as wind and solar provide peaking load instead of base load due to their intermittent availability.

### **3.3. 5000+MW Project**

Demand for electricity in Kenya has been increasing since 2004 due to accelerated growth. The peak demand increased from 899MW in 2004/2005 to 1,470MW in 2013/2014 to 1,512 by December 2014. This increased trend of electricity consumption saw the electricity consumer base increase from just over 700,000 consumers in 2004/2005 to over 2,700,000 consumers by June 2014. Kenya Power aims at connecting 70% of the Kenyan population to grid electricity by 2017.

According to the Draft National Energy and Petroleum Policy 2015, peak demand is projected to grow from 1512MW as at December, 2014 to 3,400MW by 2016 and to 5,359MW by 2018. To meet this demand, an additional 5,000 MW of new generation is to be developed by 2017 to bring total installed capacity to at least 6,600MW. Annual energy consumption is projected to increase from 8,841GWh in 2013/14 to 32,862GWh in 2016/17.

It is projected that by 2030, peak demand will be 18,000MW against an installed capacity of 24,000MW

With the introduction of devolution and County Governments in 2013, it is anticipated that electricity demand will increase significantly due to the increased economic opportunities. According to the Ministry of Energy and Petroleum, some reasonably foreseeable energy intensive economic projects are listed below and their approximate energy demand:

1. Standard Gauge Railway – ~1200MW;
2. Steel smelting and rolling mills – ~2,000MW;
3. Konza City Technopolis – ~650MW; and
4. LAPSSSET projects in Lamu – ~350MW.

The total energy demand of the above projects is about 4,200MW. In order to be prepared to cost effectively supply energy to projects such as those mentioned above, the Government of Kenya developed a roadmap in October 2013 to generate an additional 5000+MW of power generation capacity in 40 months.

In order to meet the exponential demand of electricity, the proposed 1,050MW coal power plant in Lamu will be a crucial part of Kenya's energy mix to provide affordable electricity to its commercial and residential customers. The project is the first large scale project to be approved under the PPP framework under the National Treasury.

Coal is an abundant, affordable, competitive, reliable and easily accessible source of energy especially for energy generation. At a tariff rate of US\$ cents 7.53/kWh, the proposed Lamu coal power plant is expected to be the cheapest source of electricity in Kenya. By comparison, the tariff for geothermal is approximately US\$ cents 9/kWh and for wind and solar, it is US\$ cents 12/kWh.

The proposed project is one of several power plants under the 5000+MW program that the Ministry of Energy and Petroleum must develop in order to meet the growing energy needs. Given in Table 3-3 are the anticipated power generation projects by type over the 40 month period beginning October 2013.

**Table 3-3: New generation capacity additions in MW from October 2013**

Technology	New capacity additions (MW)							
	No. of months from start of the 5000+MW program							
	6	12	18	24	30	36	40	Total
<b>Hydro</b>	24	0	0	0	0	0	0	24
<b>Thermal</b>	87	163	0	0	0	0	0	250
<b>Geothermal</b>	90	176	190	50	205	150	785	1,646
<b>Wind</b>	0	0	20	60	300	250	0	630
<b>Coal</b>	0	0	0	0	960	0	960	1,920
<b>LNG</b>	0	0	0	700	350	0	0	1,050
<b>Co-generation</b>	0	0	18	0	0	0	0	18
<b>Total</b>	<b>201</b>	<b>339</b>	<b>228</b>	<b>810</b>	<b>1,815</b>	<b>400</b>	<b>1,745</b>	<b>5,538</b>