# Capacity of quot solar plant quot in ghana for ipp

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Access to electricity, coupled with aggressive industrialization, is a key component in achieving sound economic development. Electricity is needed to maintain law and order, security, and stability [1]. From an economic point of view, the production of all goods and services and the development of economic infrastructure all depend on a reliable and sustainable supply of electrical energy.

The Institute of Statistical, Social and Economic Research (ISSER) in 2014 estimated Ghana to lose between $320 million and $924 million per annum in productivity and economic growth due to the current power crises [2]. The Wholesale Power Reliability Assessment report (2010) also estimated that Ghana loses between 2 and 6 % of gross domestic product (GDP) annually due to inadequate and unreliable power supply.Footnote 1 Thus, with the economic costs of inadequate power supply, a reliable and adequate supply of power becomes even more pressing.

While Ghana has committed itself to universal electricity access by 2020, the real challenge is the capacity to meet this goal and, most important, to ensure that supply is reliable and adequate. Respective governments have also failed in their preparation towards building a sustainable and resilient power hub to cater for the incessant power demand. Especially for a lower middle-income country like Ghana, it is important to recognize the growth of industries and the increasing population growth in relation to the increase in power demand.

Another power crisis in 1998, largely attributed to low rainfalls and inflows to the Volta Lake, resulted in another round of power rationing [2]. Electricity supply to consumers significantly fell to about 4942 GWh in 1998 while consumption dipped from 5110 GWh in 1991 to 4965 GWh in 1998, closely outstripping available electricity supply in that year (see Fig. 2).

Ghana generates about 64 % of its electrical power from hydro sources. Electricity is the dominant form of modern energy used in Ghana, accounting for about 65 % of the energy used in the industrial and service sectors and about 36 % in residential use.Footnote 4

Ghana"s Energy Commission (2014),Footnote 6 has identified the potential drivers of electricity consumption as industrial growth, petroleum up-stream and mid-stream activities, mining, ongoing electrification scheme, and energy conservation and efficiency measures. The rapid expansion of the four major cities, Accra, Tema, Takoradi, and Kumasi, has also been key drivers of residential demand for electricity. Overall, Ghana"s population is projected to rise from the 2010 estimate of 25 million to about 40 million by 2030.Footnote 7

Ghana"s electricity consumer base, as at 2010, exceeded 2 million residential consumers and 1150 industrial consumers.Footnote 8 In 2014, the peak power demand of electricity increased from 1943 MW in 2012 to

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2061 MW in 2014.Footnote 9 Given the pace of increment in peak power demand, Ghana requires a generation capacity of between 16,398 and 17,350 GWh. This translates into an additional capacity requirement of 4000 to 4200 MW to keep up with the incessant demand currently.Footnote 10

Frequent nationwide power outages and load shedding are indicative of the supply-demand mismatch. According to the World Economic Forum"s Global Competitiveness Report 2013-2014, Ghana ranks 114th in the quality of electricity supply and scores 3.0 (below the word"s mean average of 4.5) in terms of sufficiency and reliability of electricity.

Since the first power crises in 1984, drought and reduced water levels have been the primary cause of the shortfalls in the generating capacity and supply of energy. Increasingly, rising crude oil prices, a patchwork of government policies, mismanagement, corruption, neglect, the monopoly of the energy sector, and obsolete energy infrastructure have become major contributory factors to the supply shortfalls. Since 2013, about 64 % of the country"s energy supply is generated from hydro while 35 % is generated from the thermal plants (see Table 2).

The 2015 projections from the Energy Commission indicate a marginal increase in the installed capacity of electricity. The projections also show that most of the power sources will maintain their generating capacity in 2015 (see Table 2). Given the historic dependency of Ghana on hydro (with relatively unchanged generating capacities) and the trend in current power consumption, what is more troubling is for the thermal plants (with relatively little addition to the generating capacity in 2015) to operate under capacity.

The power sector faces a host of challenges, including inadequate power supply infrastructure that requires huge investment, over-reliance on hydro and gas, inadequate access to electricity, high cost of fuel for electricity generation, transmission and distribution losses, an inadequate regulatory capacity, enforcement, operational and management difficulties, and vulnerability to climate change. Future power development faces great challenges due to rising living standards and increasing demand for cleaner energy.

The supply challenges of Ghana"s power sector are mainly seen in the periodic hydrological shortfalls as a result of the uncertain pattern on rainfall and inflows into the hydropower facilities. Relying on rainfall to supply water to the hydro dams to generate power may not be optimal due to changing climate patterns. According to the Energy Commission (2014),Footnote 11 higher inflows into the hydropower facilities would have improved the overall power generation in 2013 amidst the limited gas supply from Nigeria.

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