Renewable Energy Scenario for Egypt

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Abstract

Egypt is a fast growing country with 85.3 million population as of July 2013 and annual per capita installed power 0.346 MW/c as of July 2012 (83.7 million). Moderate to mature population and economic growth trends forecast population and annual per capita installed power to reach 99 millions and 0.48 MW/c by 2022, and 111 millions at per capita power of 0.63 MW/c by 2032, respectively. With these trends installed electricity generation capacity are forecasted at 47 GW by 2022 and 70 GW by 2032 as compared to the 2012 installed power of 29.0 GW. Meeting these demands is almost impossible using the known limited national fossil fuel reserves. Current electricity generation scheme exhausts ~ 65% of country's total fossil production. Crude oil balance is negative starting from 2007, while gas reserves will be overstrained starting from 2030. Hence, a major policy change has been adopted towards the use of non-fossil resources especially wind and solar. In February 2008, Egypt's Supreme Council of Energy approved an ambitious plan to satisfy 20% of the generated electricity by renewable energies by 2020, including 12% from wind energy, 6% from hydro and 2% from solar.

Egypt is endowed with excellent resources of wind and solar energy. Thus the country coastal zones enjoy high wind energy potential particularly at the Suez Canal and Red Sea Coast. A wind atlas for the Suez Canal - Red Sea zone and Egypt covering 30 sites was issued in Dec. 2005. The atlas shows the locations of most favorable areas for wind power generation. Favorable wind speeds of 9-11 m/s (at 50 m height) of sufficient strength and stability exist at Abu-Darag, Zaafarana, Ras Ghareb and El-Zeit Gulf. According to estimates, the total power that could be generated using wind farms along the Red Sea coast approximates 20 GW. Wind energy resources are also available in large regions on the Nile banks in the Eastern and Western Deserts and parts of Sinai.

Moreover, Egypt belongs to the global sun-belt. The country is in advantageous position with solar energy. In 1991 solar atlas for Egypt was issued indicating that the country enjoys 9-11 hours of sunshine per day with annual direct normal energy density 1970-3200 kWh/m^2 and technical solar-thermal electricity generating potential of 73.6 Petawatt.hour (PWh). Nowadays utilization of solar energy includes use of photovoltaic cells, solar water heating and solar thermal power.

Recent political changes have not affected Egypt's long term commitment to renewable energies. The promotion of renewable energies became a political aim that is shared across the political spectrum. In July 2012 an Egyptian Solar Plan has been approved by the Cabinet which targeting to install about 3.5 GW by 2027 (2.8 GW CSP + 0.70 GW PV) with private investment share of 67% including enhancement of relevant local industry.

The article discusses perspectives of renewable energy in Egypt with total renewables (hydro + wind + solar) to provide ~7.4 GWe by 2022 and 12.3 GWe by 2032 representing ~ 17.4% and of the total installed power at either date. Such a share would reduce dependence on depleting oil and gas resources, improve environmental conditions, and add to country's sustainable development.