The Economic Times
Title : SOLAR ENERGY - Here Comes the Sun
Author : Biswajit Das & Shekhar Dutt
Location :
Article Date : 05/13/2015

SOLAR ENERGY

Here Comes the Sun


Biswajit Das & Shekhar Dutt

The need for renewable energy has gained momentum globally, particularly in the backdrop of pollution created by fossil fuels resulting in climate change. India is blessed with plenty of sunshine, mighty rivers, thick forest covers as well as glacial valleys. Solar power has a huge potential in this varied topography. Its simplicity in manufacture, erection and operation affords a unique advantage for India.

The demand for land for homesteads, agriculture and irrigation is sharply increasing. Which is why solar panel installation on existing building rooftops is gaining popularity. As in September 2014, solar power production connected to the grid is 2,766 MW.

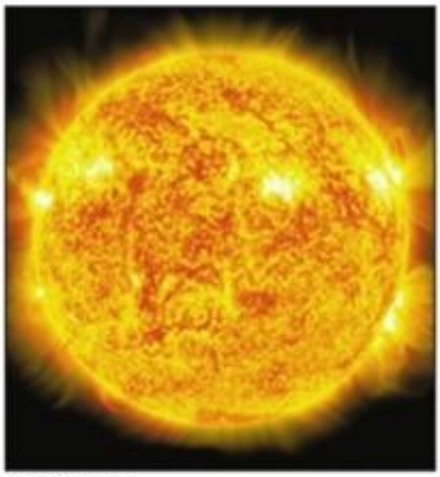
The canal-top solar panels in Gujarat are advantageous since land cost is eliminated and evaporation loss from the canal is reduced. A project for utilising 35,000 sq km in the Thar Desert for producing 700-2,100 GW solar power is planned. New transmission lines are needed to evacuate power, which will have to be run with 17-19% line feed (LF) for solar power, instead of the average 60% LF for overall power, resulting in a substantial time-cost hike. An investment of $100 billion has been earmarked for developing 100 GW of solar power by 2022.

Similarly, the reservoir surface of dams for hydropower, irrigation, water supply and flood control could be utilised. There are more than 4,857 large dams. The Central Water Commission's National Register of Large Dams points to a surface area of 4,68,08,683 sq km. Even if 30% of this effective surface area is available — incorporating reservoir depletion during lean times — the net area will be 1,40,42,604 sq km. Considering that 1 MW solar panels require 20,000 sq m of surface area, servicing area included, the 1,40,42,604 sq km available will have a potential of generating 7,02,130 MW.

There are about 59 large dams with a height of 100 m or more, and 1 km^3 reservoir capacity with more than 10,000 sq km reservoir area. Even if 30% of the effective surface area is available, the net area will be 3,000 sq km. This can result in the generation of up to 1,50,000 MW of power.

Solar panels can be installed over lightweight interlinking pontoons. The reservoir will have an existing substation and transmission line to be used for power evacuation. The panels will also substantially reduce evaporation loss. As these will be scattered all over India, the benefit will be well distributed among all regions without much investment in transmission and distribution systems.

The efficiency of the panels for generating electricity is higher when they are on a water body, as this allows the panels to maintain the ambient temperature even during high levels of solar radiation. The panels attract less amount of dust as they rest on water, which means less washing and lower maintenance costs.



Plug into it

The best option is to develop a mixed system. Part of the solar power created can be consumed locally and the surplus supplied to grids as a base load. Solar panels with storage batteries are an excellent solution for smaller consumers in isolated areas.

Hydro power takes care of peak and fluctuating loads and can store tremendous amounts of energy in its reservoirs to counter hazards of instantaneous rise and fall of thousands of megawatts of power demand in the system. Solar power can take care of peak load efficiently and at a low cost. Moreover, it can contribute to the base load of the grid, even with its intermittent supply of energy.

There is yet another existing infrastructure that can be utilised to capture solar power. The Indian Railways (IR) is, in terms of total transport volumes and facilities, one of the largest public sector undertakings in the world. The roofs of wagons can provide an excellent place to fix solar panels.

The IR's wagon volume is around 2,50,000, of which 1,50,000 are on the move. The surface area of wagon roofs is about 60 sq m and that of a coach roof is 75 sq m. Even if 70% of such surfaces are equipped with solar panels, each wagon or coach will have a potential 2.5 kW of solar power, totalling 375 MW in 1,50,000 moving wagons.

The maintenance and safety of floating panels during inclement weather may be an issue. Fixed structures on piles similar to those at offshore facilities could be an answer. The enormous potential and multiple benefits from both floating and wagon-roof solar panels demand a detailed study and feasibility report.

Biswajit Das is former member, Hydro West Bengal, and Shekhar Dutt is former governor, Chhattisgarh