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Blue panels, green energy

6 February 2013

Lying in quietude in remote wasteland areas of Gujarat, millions of solar panels are harvesting solar power to produce electricity. K v venkatasubramanian reports on how the numerous projects are changing the landscape and lives of the people

A vast sea of blue solar panels greets us as we reach the Charanka solar park in Gujarat's Patan district, after driving about 225 km from the state capital Gandhinagar. Spread over 5,000 acres of mostly government, and private, wasteland, the solar park, flaunted as the biggest in Asia, is a labyrinth of millions of photovoltaic panels. Arrayed in columns and rows, the park provides an astounding view. Time stands still, as the panels silently harvest solar power and generate electricity.

Gujarat has commissioned 824MW of solar PV power, accounting for 71 per cent of the 1,160MW of solar electricity in the country. The Charanka project is the biggest among these; in peak mode, the panels produce 219MW of electricity, which is directly fed into the national grid. The plants have been set up on a public-private partnership (PPP) model. Under this, the state government has launched an attractive feed-in tariff (FiT) for solar power payable to the developers while offering them the option of developing projects in a solar park.

State government agencies have leased the land and provided common infrastructure facilities and services ~ including site preparation, transmission evacuation, access roads, water and other services ~ thereby allowing developers to focus on the timeliness and cost efficiency of the project. "Land has been allotted on lease to 21 developers for 30 years. A 1MW plant occupies five acres and each developer has been allotted 5MW (in blocks of five)," said Cdr. M Jagdish, AGM, Operations, Charanka solar park. A 1MW plant requires an investment of around Rs 8 crore, down from about Rs 15 crore last year. "The capital investment is high, but the working capital is minimised. Of the total capital expenditure, about 35 per cent is the operational cost," Jagdish informed. The gestation period is small and once installed, the solar panels start producing electricity immediately.

Dust losses

The panels have been erected in a sloping manner in parallel rows leaving adequate distance between them to eliminate the shadow effect. However, a major problem is accumulation of dust on the surface of photovoltaic modules, which decreases the radiation reaching the solar cell and produces power losses. It causes a mean daily energy loss, along a year, of around 4.4 per cent, and in dry areas the losses could reach 15 per cent, research studies have shown. To minimise losses, the only solution is to wash the modules with pure water. In large-scale photovoltaic plants this task is often expensive, especially in areas with

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water shortage. "Water is being supplied to developers from a temporary storage system (one lakh litres a day). For long-term needs, a pipeline has been laid to pump water to the park from the Kutch Branch Canal at Soneth village, 36 km away. Treated water is supplied to developers who wash the panels, once a week," said Kapilesh Vaniya, an official of Gujarat Power Corporation Ltd. (GPCL) at the park. An artificial canal with concrete lining, winding through the park, has been constructed. Rain water is harvested in this canal and fed to a reservoir, which has a three-month reserve capacity. The water body will enrich the ecosystem and attract birds in this vast barren land.

Innovative projects

Though the Charanka solar park is the biggest in the state, there are three other projects in and around Gandhinagar. An innovative 1MW solar pilot project on the Narmada branch canal rooftop at Chandrasan village, (Kadi taluk) in Mehsana district, has become a visitor's delight. Covering 750 m of the canal, the telescopic panels are mutely harnessing sun power in a serene rural setting, 30 km from Ahmedabad.

First of its kind, the plant generates around 16 lakh units of electricity in a year. The calm water below cools the panels, which may get heated to 60 degrees C in peak energy harnessing mode, between noon and 2 pm. Water from below is sprayed, once a week, to remove dust which lowers the efficiency of power generation. The panels above considerably reduce evaporation of the water below.

Adequate care was taken while erecting scores of concrete pillars, which flank the two sides of the canal and support the solar panels. The developer was not allowed to sink the piles into the canal's concrete bottom as it would lead to seepage of rain water and damage the surface during monsoon, said Bela Jani, executive engineer, Gujarat State Electricity Corporation Ltd., who looks after the canal project.

"We are taking up the extension of project by about 100 km to generate 100MW at the rate of 1MW per km. Japan has evinced keen interest to provide technology and also a light solar panel structure," D J Pandian, principal secretary, Energy and Petrochemicals Department, Gujarat Government, told this journalist who visited the various solar power plants in the state. A budgetary provision of Rs 100 crore is being envisaged, he said. Another 1MW Ash Dyke project has been executed on a barren land, dumped with ash discharged by the nearby thermal power station, on Gandhinagar outskirts.

Rural employment

The various solar projects in the state have created job opportunities, improved social services and are contributing to poverty reduction locally. They are also supporting power distribution companies in Gujarat and other power utilities meet part of their clean energy procurement obligations through solar energy. Besides, state government agencies are providing vocational training in energy-related skills and livelihood opportunities to local people. There is a great demand for trained manpower in solar energy. GERMI is developing manpower, both at professional and also at vocational level personnel," said

Prof T Harinarayana, Director, Gujarat Energy Research and Management Institute (GERMI), Gandhinagar. Trainees spend substantial time at the 1MW solar plant at the Pandit

Deendayal Petroleum University's (PDPU) campus, Gandhinagar, to get acquainted with the running of power plant. Gadhavi Prakashdan Pabhudan, a trainee at GERMI, said, "We have low education level;

we used to see the power plants but could never understand what it is? Now we are going with renewed energy and inspiration. Our village youth should be benefited." Harinarayana said local people are also provided training in operation and maintenance of the plants. "Due to the large solar park creation near Charanka, most of the villagers have got jobs. This has greatly reduced their poverty as they are all earning and very happy with the solar projects nearer to their village."

(Written under the aegis of CSE Media Fellowships)

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