

**SOLAR POWER - CHALLENGES AND OPPORTUNITIES**

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## Solar Power - Challenges and opportunities

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The world will have to completely phase out fossil fuels in electricity generation by the end of century and reduce their use by 20 per cent by 2050 if disastrous consequences of climate change are to be avoided, the UN backed Intergovernmental panel on climate changes said in its synthesis report.

With the Narendra Modi Government's strong emphasis on development of renewable power and energy sector, solar energy has come to the limelight. The government has come up with a number of solutions to boost the solar power. This is expected to receive a fresh pour of investments from private players.

India was the first country in the world to set up Ministry of Non Conventional Energy Sources (MNES) in 1980. Today India's cumulative grid tied renewable energy capacity (excluding large Hydro) has reached around 31692 MW. Jawaharlal Nehru National Solar Mission was launched in January, 2010 with an ambitious target of deploying 20,000 MW of grid connected solar power by 2022. Initially this target appeared over ambitious but as things stand today it is possible to surpass even this target. Solar power is going to be viable energy source in coming years.

### Solar Mounting Systems

Mounting System Directory:  
 Pitched Roof, Flat Roof,  
 Ground Mount, BIPV

The thermal generation in the country account for 69 % of total generating capacity followed by 15.75 % in hydro generation. The share of non renewable energy sources is around 12.2% .The solar energy is less than 10% of renewable energy sources. India has so far commissioned over 2500 MW of solar power generation which

## In Focus



Men's Right Commission  
required in India?

What's Your view?

India has an average annual temperature that ranges from 25°C to 27.5°C because of its location between the tropic of cancer and the equator, The average sunny days in country are about 300 and this implies that India has a very high potential of generating solar energy as availability of solar radiation in various parts of the country is quite good.

To gather a solar energy at national level we need about 45000 square kms of land area. While there would be natural motivation to use available land closer to load centers for collection of solar energy but for large scale generation of solar power focus should be on barren uncultivable areas, deserts away from population.

Most of the areas where there is adequate insolation are likely to be water stressed. Ability to minimize dependence on water should thus be an important criterion for **technology** choices.

The solar energy sources in not available round the clock, the significant investment on storage of energy would be necessary. Development of cost effective energy storage technologies assume importance. With the drastic fall in prices of solar modules solar energy solutions are increasingly viable economically & have other multiple benefits.

### SOLAR PARKS

Narendra Modi-led government's first Budget has given high priority to renewable energy sector with an allocation of Rs. 1,000 crore for development of ultra large solar power plants and solar parks.

The Ministry of new & Renewable Energy has planned to develop 25 solar parks at an estimated cost of Rs. 4050 crore under the Jawahar Lal Nehru Solar Mission. These solar parks will be developed in collaboration with state governments and private sector. Each project will be completed in a period of 18 months. The Ministry will give 30% of project cost as subsidy.

The proposed solar parks shall be set up at locations with sufficient insolation levels and where at least 5 acres per MW land is available towards installation of these projects. To keep the project cost low and

In the current financial year the work on 10 solar parks are to be started and another 15 will be taken up next year. The development of land and creation of infrastructure for all the 25 projects will be completed by 2016-17.

### **ROOFTOP SCHEMES**

In this type of system, the generated solar power can be self consumed and excess power could be fed to the grid. These projects are envisaged to mitigate diesel consumption when the buildings / Industries / Institutions are operating with Diesel generator backup.

The advantage of roof top solar power plant are, low gestation period, saving in transmission and distribution losses, utilization of vacant roof tops for power generation, there is no requirement of additional land and amount towards operation and maintenance, safety, security and up keep will be the responsibility of solar power generator and thus government will save this amount.

A Rooftop Solar Photovoltaic Power Plant is a system which uses one or more Photovoltaic panels, installed on rooftop of residential or commercial buildings to convert sunlight in to DC electricity. This DC electricity is then converted into AC by a unit called Power Conditioning Unit (PCU) / Inverter. The Grid Interactive Power Plants are of two type's i.e. without battery backup or with Battery backup.

Power plant with battery backup can also be used during night hours. The capacity of the solar plant is calculated on the basis of the total energy consumption per day during sun shine hours. For Grid Interactive Solar Power plant (Without battery Backup) the electrical energy generated during day time will only be synchronized with existing power grid.

In case there is no grid the solar power plant will be automatically off. Space requirement for a 100 KW Solar Power Plant is approximately 1,500 meter square. The plant can be mounted on flat roof or sheds having south facing shadow free area. The roof or sheds should be capable of holding weight of 20 Kilogram per square meter. 100 KW solar power plants without battery backup will approximately

## **COST ECONOMICS**

Solar capacity in **India** is expected to grow at a rapid pace in the coming years with **India** expected to reach the 4000 MW mark by the end of the current fiscal year. With power tariff increasing every year and to keep pace with rising power demand the opportunities in solar energy will see manifold rise despite challenges.

The existing REC framework provides that each certificate (REC) shall represent 1 MW hour of electricity generated from renewable energy source and injected into the grid. There is a minimum and maximum price of REC within which REC transactions can be undertaken. This has been provided to avoid adverse impact of price volatility. These are called the 'floor price' and 'forbearance price'.

In order to support the solar power Central Electricity Regulatory Commission (CERC) had fixed the forbearance price of Rs. 17 per unit with floor price of Rs. 12 per unit for the period up to 31st. March 2012. For next five years up 31st. March 2017 to these are Rs. 13.40 and Rs. 9.30 per unit. Now CERC has proposed further reduction in rates in view of lowering installation cost.

The refinement of off grid rooftop solar model will lead to its growth manifold. The solar energy which is much costlier than conventional energy available in power grid but with passage of time the solar power rates may drop by 15% in next three years and solar power will becomes more competitive especially in off grid mode. In the off grid mode solar power rise will be exponentially.

Prices are coming down because solar companies could set up larger projects. Under the National Solar Mission, no bidder could put up more than 50 MW, and again, not more than 20 MW at a single location. Now, Andhra Pradesh allowed 100 MW for a single bidder and **Karnataka** went as high as 500 MW. Economies of scale have helped.

Initially there were very few takers for solar power but with the new governments thrust on solar power it is going to become lucrative business with huge subsidies. Local design and engineering will play a major role in solar market and this will reduce cost and bring the solar tariff in competition with grid tariff in next 10 years.

Solar Energy Commission of India has prepared the revised draft power sale agreement at fixed rate of Rs. 5.50 per unit for long term power purchase agreements. The power utility will take necessary technical clearances and pay applicable charges.

### RECENT ACTIVITIES

Union minister of state for power, coal and new and renewable energy Piyush Goel announced to set up 2,000 MW solar power plants in Punjab. Out of 2,000 MW solar power generated in the state, 1,000 MW would be bought by the National Thermal Power Corporation. NHPC is setting up its first 50 MW grid connected solar power project at a cost of Rs. 400 crore at Parson **Uttar Pradesh** and will be completed by mid 2016.

The government of **Rajasthan** has come up with the **Rajasthan** Solar Energy Policy, 2014 to create an enabling environment for development of solar power. The policy sets an ambitious target of installing 25,000 MW of solar power through state or private enterprises or through public private partnerships.

The Ministry of new & Renewable Energy has planned to set up grid connected rooftop solar power plants with aggregate 250 MWp capacity in **Delhi** and has sought around Rs. 636 crore from National clean energy fund. As per proposal grid connected rooftop solar plants will be installed ranging from 200 Wp to 500 KWp. For setting up these plants individuals can avail 80% cost of project as loan with 7% interest subsidy.

Punjab to harness solar energy in a big way, the **Punjab** Government has notified the Net Metering Policy for installation of grid interactive rooftop solar power projects in homes, institutions, commercial/private/governmental buildings, warehouses and industries in the state.

According to **Punjab** Energy Development Agency (PEDA), the state government's nodal agency for promotion of renewable energy, there is a potential to generate over 100 Mw of solar power from rooftop solar projects.

Tata Power Solar, a JV between Tata Power and British Petroleum (BP) Solar has commissioned a 2 MW solar power plant in Tamil Nadu, considered to be the largest rooftop facility in South India. The plant, situated across three buildings would help displace approximately 2,500 tons of carbon dioxide per annum.