

## Installation Of Solar Energy Tamilnadu – A Study

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*Abstract: Electricity plays a dominant role in the growth of any economy. Electricity is a special good and its generation and consumption have to be simultaneous, it cannot be economically stored. Another special feature of electricity is that its demand varies on hourly, daily, weekly, monthly and yearly basis. Its availability is one of the biggest inputs necessary for the sustained growth. This becomes even more important for a state like Tamil Nadu, which is one of the most industrialized and urbanised state in India. In Tamilnadu the Consumers for electricity are classified as domestic, agriculture, commercial, industrial, public utilities, miscellaneous and others. There is major government initiative to provide free supply of electricity to agricultural sectors as well as for SC/ST households. It is the most readily available source of energy. It does not belong to anybody and is, therefore, free. It is also the most important of the non-conventional sources of energy because it is non-polluting and, therefore, helps in lessening the greenhouse effect. Solar Power generation in grid interactive mode is also encouraged by TNEB based on the policy initiative taken by the government of India. Power generation using SPV has not gathered momentum due to the fact that the capital cost is very high even after the subsidy component provided by the Ministry of New and Renewable Energy(MNRE). The paper tries to study the state wise installed capacity of solar power in India of the year 2015 and to suggest solar power as an alternative source of energy to solve energy deficit in the state of Tamilnadu by stating solar power policies and subsidies given for the solar power implementation provided by the Tamilnadu government.*

**Keywords:** *Electricity, solar power.*

### I. INTRODUCTION

With about 300 clear, sunny days in a year, India's theoretically calculated solar energy incidence on its land area alone, is about 5,000 trillion kilowatt-hours (kWh) per year (or 5 EWh/yr). The solar energy available in a year exceeds the possible energy output of all fossil fuel energy reserves in India. The daily average solar power plant generation capacity over India is 0.25 kWh per m<sup>2</sup> of used land area, which is equivalent to about 1,500–2,000 peak (rated) capacity operating hours in a year with the available commercially-proven technologies.

On 16 May 2011, India's first 5 MW of installed capacity solar power project was registered under the Clean Development Mechanism. The project is in Sivagangai Village, Sivaganga district, Tamil Nadu. In January 2015, the Indian government significantly expanded its solar plans,

targeting US\$100 billion of investment and 100 GW of solar capacity by 2022. In Tamilnadu the domestic and agricultural categories consumes around 50% of the power and they contribute only around 20% of the revenues. For the promotion of solar energy, ministry of new and renewable energy has framed policy guidelines in January 2008. The incentive offered to solar power generation were turned to generation based. A maximum amount of Rs. 12.00 per kwh was given as incentive for electricity generated from solar photovoltaic and Rs.10.00 per kwh to that of solar thermal is being offered. All the registered, existed companies can avail this incentive. The paper tries to study the state wise installed capacity of solar power in India of the year 2015 and to suggest solar power as an alternative source of energy to solve energy deficit in the state of Tamilnadu by stating solar power policies and subsidies given for the solar power implementation provided by the Tamilnadu government.

## II. METHODOLOGY

This paper mainly attempts to study the state wise installed capacity of solar power in India of the year 2015 and to suggest solar power as an alternative source of energy to solve energy deficit in the state of Tamilnadu by stating solar power policies and subsidies given for the solar power implementation provided by the Tamilnadu government.

For this, the study mainly depended on secondary data which is collected for 20 years from 1992-93 to 2011-12 from the following sources:

- ✓ TNEB, statistics at a glance , 2008 Report
- ✓ Statistical handbook of Tamil Nadu
- ✓ Tamil Nadu economic appraisal
- ✓ Directorate of statistics

### OBJECTIVES

- ✓ To study the state wise installed capacity of solar power in India of the year 2015.
- ✓ To suggest solar power as an alternative source of energy to solve energy deficit in the state of Tamilnadu. by stating solar power policies and subsidies given for the solar power implementation provided by the Tamilnadu government.

States	Installed solar PV
Andaman & Nicobar	5.10
Andhra Pradesh	475.74
Arunachal Pradesh	0.26
Bihar	5.00
Chandigarh	5.04
Chhattisgarh	73.18
Daman & Diu	4.00
Delhi	6.71
Gujarat	1024.15
Haryana	12.80
Jharkhand	16.00
Karnataka	104.22
Kerala	12.02
Lakshadweep	0.75
Madhya Pradesh	678.58
Maharashtra	378.70
Odisha	66.92
Puducherry	0.02
Punjab	300.32
Rajasthan	1264.35
Tamil Nadu	562.94
Telangana	392.39
Tripura	5.00
Uttar Pradesh	140.00
Uttarakhand	5.00
West Bengal	7.21
Others	0.79
<b>Total</b>	<b>5547.21</b>

Table 1: Solar Pv Installation In The Year 2015

Rajasthan and Gujrat are the states which has installed the highest capacity with 1264.35 MW and 1024.15MW respectively but from the above table NO.1 we can see that puducherry is the state which has installed the lowest capacity

with 0.02 MW among all the states. Madya Pradesh and T.N has installed more than 500MW of capacity with 678.58 MW and 562.94 MW respectively.

A.P, Karnataka, Punjab, Telungana and U.P has installed more than 100 MW and all other remaining states are below 100 MW.

To suggest solar power as an alternative source of energy to solve energy deficit in the state of Tamilnadu by stating solar power policies and susidies.

As an alternative sources of energy to overcome the demand and supply gap the implementation of solar energy is Suitable which will be the immediate solution to solve the growing energy demand.

Solar energy is radiant light and heat from the sun harnessed using a range of ever-evolving technologies such as solar heating, solar photovoltaics, solar thermal energy, solar architecture and artificial photosynthesis.

It is an important source of renewable energy and its technologies are broadly characterized as either passive solar or active solar depending on the way they capture and distribute solar energy or convert it into solar power. Active solar techniques include the use of photovoltaic systems, concentrated solar power and solar water heating to harness the energy. Passive solar techniques include orienting a building to the Sun, selecting materials with favourable thermal mass or light dispersing properties, and designing spaces that naturally circulate air.

In 2011, the International Energy Agency said that "the development of affordable, inexhaustible and clean solar energy technologies will have huge longer-term benefits. It will increase countries' energy security through reliance on an indigenous, inexhaustible and mostly import-independent resource, enhance sustainability, reduce pollution, lower the costs of mitigating global warming, and keep fossil fuel prices lower than otherwise. These advantages are global. Hence the additional costs of the incentives for early deployment should be considered learning investments; they must be wisely spent and need to be widely shared".

Solar energy provides the best viable solution to ensure long term energy sustainability with the following advantages:

- ✓ Abundant, constant and perennial source, predictable
- ✓ Solar resource in much more evenly distributed across the state
- ✓ Low gestation period
- ✓ Available during day time
- ✓ Helping in peak demand
- ✓ Can be generated at the point of consumption
- ✓ Reduced Transmission and Distribution losses
- ✓ No fuel cost
- ✓ Clean & green power i.e no emission of CO<sub>2</sub>, Sox, Nox etc,
- ✓ Much firmer and complements wind energy.

Government-funded solar electricity in India was approximately 6.40 MW per year as of 2005. India is ranked number one in terms of solar electricity production per watt installed, with an insolation of 1,700 to 1,900 kilowatt hours per kilowatt peak (kWh/KWp). 25.10 MW was added in 2010 and 468.30 MW in 2011. As of 31 December 2015, the installed grid connected solar power capacity is 4,879.00 MW

and India expects to install an additional 10,000 MW by 2017, and a total of 100,000 MW by 2022.

#### INCREASING RENEWABLE ENERGY WOULD YIELD MANY BENEFITS

Tamil Nadu achieved its current level of renewable energy development largely through government subsidies, such as depreciation benefits and generation-based incentive mechanisms. The state also boasts many large electricity consumers—industry and manufacturing accounted for nearly 50 percent of GDP from 2013-2014. These companies are increasingly using renewable energy because it's becoming more cost-competitive and reliable compared to traditional power sources. This private demand can spur renewable energy development throughout the state and India, helping to reduce emissions and shift the country onto a low-carbon growth path in line with Prime Minister Modi's recent climate action commitments.

BUT THERE ARE REASONS BEYOND THESE TO EXPAND TAMIL NADU'S RENEWABLE ENERGY SUPPLY, SUCH AS

#### INCREASING POWER SUPPLY

In a country where 300 million people still lack access to electricity, Tamil Nadu's availability of reliable electricity supply attracted many industries to the state. Yet even in Tamil Nadu, the electricity demand-supply gap is now a chronic problem. During the year 2014, the gap between peak demand and supply was over 8 percent, with an unmet peak demand of more than 1,000 MW.

The government has responded by imposing a 20 percent demand restriction on industrial and commercial electricity users. During the peak usage hours, this restriction may be as high as 90 percent of demand, resulting in severe shortages in an economy that depends on robust manufacturing and technical services. Getting more power sources online—namely, wind and solar—could close the demand-supply gap and allow businesses to thrive.

#### FINANCIAL BENEFITS AND SUPPLY STABILITY

Despite increasing costs, the Tamil Nadu Generation and Distribution Corporation Limited (TANGEDCO) did not revise its electricity tariffs for seven years (2004-2011). The tariffs were eventually raised by 37.5 percent in 2012 and 15 percent in 2014. However, the significant revenue gap of USD \$4.24 billion is still hurting TANGEDCO's ability to contract for power and meet the supply gap.

Allowing large consumers to have greater access to energy in the form of renewables, coupled with improved balancing and storage, might help bring on a more stable supply of power quicker. Plus, renewables are becoming increasingly affordable, creating a financial benefit in generation costs that can be passed on to consumers. Recent research shows that generating power from wind and solar in India will likely fall below the cost of generating power from imported coal by 2020.

Coal is dirty, oil and natural gas are scarce, nuclear power is dangerous--and then there is solar energy: safe, clean, abundant, and free. Within a two-week period, the earth gets as much energy from the sun as is stored in all known reserves of coal, oil, and natural gas. One day of average sunlight on Lake Erie surpasses the total energy used by the U.S. in a day. Although questions have been raised about the safety and environmental soundness of a few proposed large-scale solar collection devices, in general the collection and use of solar energy appear to be far safer, both for the environment and for human beings, than nuclear power and the collection and use of fossil fuels.

Moreover, solar heating and cooling do not require transporting energy hundreds or thousands of miles, with resulting loss of energy, added expense, unpredictability, and dependence on large energy networks.

#### ESTABLISHMENT OF SOLAR POWER PLANTS BY GENERATION BASED INCENTIVE (GBI) SCHEME

- ✓ Generation Based Incentive scheme (GBI) was announced by MNRE for Grid Interactive Solar power generation projects during the year 2009.
- ✓ The power purchase price fixed under the above scheme is Rs.15 per unit.
- ✓ Generation based Incentive (GBI) will be payable to the Utility for the power purchased from solar project. (i.e.,) as far as the state of Tamil Nadu is considered, TANGEDCO has to bear Rs.4.50/- (which is the maximum tariff fixed by TNERC for every kind of renewable energy other than solar). Then the remaining amount Rs. (15.0 – 4.50) = Rs.10.50/- will be borne by the MNRE.
- ✓ Under the above scheme, M/s. Sapphire Industrial Infrastructures Private Limited have been selected by MNRE to establish 5 MW SPV power plant at Rettai Pillai Iynarkulam village, New Kallatthur, Sivagangai Tk, Sivagangai district.

#### TO PROMOTE SOLAR ENERGY IN TAMILNADU, THE TAMILNADU GOVERNMENT HAS FRAMED THE FOLLOWING POLICIES TO ENCOURAGE THE IMPLEMENTATION OF SOLAR ENERGY IN TAMILNADU

The Government of Tamilnadu has a vision of developing Tamilnadu as a world leader in solar energy by establishing 3000 MW by 2015.

#### III. SOLAR PURCHASE OBLIGATION (SPO)

The state will mandate 6% SPO (starting with 3% till December 2013 & 6% from January 2014) for the following category of consumers:

- ✓ HT consumers (HT Tariff 1 to V)  
This category will cover all HT consumers including:
  - Special Economic Zones (SEZs)
  - Industries guaranteed with 24/7 power supply

- IT parks, Telecom Tower
  - All colleges & Residential schools
  - Building with a built up area of 20,000 sq.m. or more
- ✓ LT commercial (LT Tariff V)  
The following categories of consumers will be exempted from SPO:
- Domestic consumers
  - Huts
  - Cottage and tiny industries
  - powerlooms
  - LT Industrial consumers
  - Agriculture consumers
- The SPO will be administered by TANGEDCO

#### PROMOTING SOLAR ROOF TOP SYSTEMS

The government of Tamilnadu will promote solar Roof tops through the following measures:

All domestic consumers are encouraged to put up roof top solar installation for which a Generation Based Incentive (GBI) of Rs. 2 per unit for first two years, Re.1 per unit for next two years and Re.0.5 per unit for subsequent 2 years will be provided for all solar-wind hybrid rooftops being installed before 31 March 2014. A capacity addition of 50MW is targeted under this scheme. Consumers desirous of availing GBI shall necessarily install separate meters to measure rooftop generation. This policy may reduce the growing demand for electricity by domestic sector.

#### *DOMESTIC ROOFTOP GBI TAMIL NADU SOLAR – RS.20,000 /KW SUBSIDY FOR DOMESTIC ROOFTOP PROJECTS ANNOUNCED*

Tamil Nadu Solar – Rs.20,000 /kW subsidy for domestic rooftop projects announced The Chief Minister of Tamil Nadu announced that a subsidy of Rs. 20,000/kW will be provided to 10,000 applicants in the first phase of this scheme. This is in addition to the 30% subsidy for PV systems from MNRE. Users can avail this subsidy OR can opt for the Generation Based Incentive (GBI) proposed in the Tamil Nadu Solar Policy. This incentive of Rs. 20,000/kW is similar to Kerala's 10,000 rooftop programme, which also provides an additional capital subsidy. In case of Kerala, the subsidy is almost double at Rs. 39,000.

#### PROMOTING ROOFTOPS IN GOVERNMENT

- ✓ Solar home lighting is being installed in 3 lakhs houses under the Chief Minister's Solar Powered Green House scheme (CMSPGHS) and will be completed by 2015-16.
- ✓ Energization of street lights with solar energy. The state will be energizing 1 lakh street lights through solar energy by 2015-16.
- ✓ All new government/local body building shall necessarily install solar roof tops.
- ✓ Existing government/ local body will be provided with solar roof tops in a phased manner.
- ✓ All street lights & water supply installation in local bodies will be energised through solar power in a phased manner.

#### PROMOTION OF SOLAR WATER HEATING SYSTEM

##### *PUBLIC BUILDING*

The government of Tamil Nadu has issued amendment to the Building Rules through the government order, making use of solar water heating system mandatory for all designed new houses, buildings, marriage hall hotels etc.,

- ✓ G.O. MS. NO. 112, Municipal Administration and Water supply (MAI) Dept. Dated 16.8.2002.
- ✓ G.O. Ms No. 277, Housing and Urban Development (UD 1) Dept dated 14.11.2002.

##### *INDUSTRIES*

Installation of solar water heating system will be mandatory for industries having hot water boilers / steam boiler using fossil fuel.

- ✓ Development of solar park is also encouraged by the government with a capacity of about 50 MW will be targeted in 24 districts.
- ✓ Incentive to manufacturers: Appropriate tax incentives as per the Tamilnadu Industrial Policy will be provided to attract investors from India and abroad.
- ✓ Net metering facility will be extended to solar power systems installed in commercial establishment and individual homes connected to the electrical grid to feed excess power back to the grid with "power credits" accruing to the photovoltaic energy producer.
- ✓ Exemption from payment of electricity tax to the extent of 100% on electricity generated from solar power projects used for self- consumption / sale to utility will be allowed for 5 years.
- ✓ Tax concession as per the Tamilnadu Industrial Policy will be provided.

##### *FINDINGS*

Gujrat and Rajasthan has installed solar power at a large extent, it is found from the study that Gujrat was facing huge power crisis so with the help of solar energy the power deficit was fully met. Similar to this state the state like TamilNadu which faces huge power crisis if it installs solar energy at a largest extent by utilising the subsidies and incentives given by the government which is discussed above the power demand can be fulfilled.

#### IV. CONCLUSION

To control power deficit in the state of TamilNadu, implementation of solar energy is the best suitable solution and also it helps to reduce carbon emission and in providing clean pollution free environment. The government has provided many subsidies and incentives for all sectors and also the recent research shows that generating power from wind and solar in India will likely fall below the cost of generating power from imported coal by 2020 so its better to adopt solar energy as an alternative source of power instead

of concentrating more on other sources of electricity generation in TamilNadu.

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