

GROWTH OF RENEWABLE/SOLAR ENERGY AND GOVERNMENT INITIATIVES FOR ROOF -TOP SYSTEM

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Abstract: *The demand for energy is growing day by day in the whole world. The Conventional energy sources like coal and petroleum are limited. Renewable energy resources will play an important role in the future. The sun can be one of the most possible powerful renewable energy sources. Solar energy is finite energy resources to meet up long term global energy crisis. This paper presents a review about conventional and renewable energy scenario of India. The recent energy crisis and environmental hazards are drawing enormous attention to solar-energy utilization. Solar Thermal (STE) and Photovoltaic Electricity (SPV) technology can be implemented in India as solar resources and large wasteland areas are widely available in the country. This paper provides an overview on Present current status, major achievements and future aspects of renewable energy in India and in Gujarat.*

I. INTRODUCTION

In India there has been a continuous effort in the direction of the use of lesser amount of fossil fuels and increased supply of energy which can only be met by a planned harnessing of more renewable energy sources and the government is serious in the planned development of these sources. "India is a tropical country, where sunshine is available for longer hours per day and in great intensity. Solar energy, therefore, has great potential as future energy source.

About 3300 to 3700 hours of bright sunshine are available in a year in the northwest and West Central regions of the sub-continent and 2900 hours over Central peninsula except Assam, Kerala and Kashmir where it is appreciably lower. About 7.5 Kwh/m²/day of solar energy is received over the country as a whole, for the major portion of the year, of which the maximum about 210 Kwh/m²/month is received during cloud free winter months and pre-monsoon months and the minimum 140 Kwh/m²/month is received during monsoon seasons. During winter, the lowest radiation is received in North India and the highest in the South India. During summer, a reversal occurs with high values in North and low in South.

There are between 300 to 320 days of usual sunshine per year in most parts of the country. Solar energy thus emerges as a positive alternative energy sources with certain unique advantages for the Indian condition. The Jawaharlal Nehru National Solar Mission (JNNSM) was launched on the 11th January, 2010 by the Prime Minister. The Mission has set the targets which includes deployment of 20,000 MW of grid connected solar power by 2022,[1,3]

Installed capacity and growth rate by source in India as on 31 May 2017[2,3]

Installed capacity as on	Total (MW)	% Growth
31-Dec-1947	1,362	-
31-Dec-1950	1,713	8.59%
31-Mar-1956	2,886	13.04%
31-Mar-1961	4,653	12.25%
31-Mar-1966	9,027	18.80%
31-Mar-1974	16,664	10.58%
31-Mar-1979	26,680	12.02%
31-Mar-1985	42,585	9.94%
31-Mar-1990	63,636	9.89%
31-Mar-1997	85,795	4.94%
31-Mar-2002	105,046	4.49%
31-Mar-2007	132,329	5.19%
31-Mar-2012	199,877	9.00%
31 Mar 2017	326,841	10.31%

Table:1 Growth rate by source in India[2]

- Coal: 195,602.88 MW (59.2%)
- Large Hydro: 44,594.42 MW (13.5%)
- Small Hydro: 4,379.86 MW (1.3%)
- Wind Power: 32,279.77 MW (9.8%)
- Solar Power: 12,288.83 MW (3.7%)
- Biomass: 8,311.78 MW (2.5%)
- Nuclear: 6,780 MW (2.1%)
- Gas: 25,185.38 MW (7.6%)
- Diesel: 837.63 MW (0.3%)

II. RENEWABLE ENERGY: INDIA

India is giving a strong push to renewable energy in line with its commitment to cut carbone missions by 35% and increase the use of renewable energy sources to generate at least 40% of its power needs by 2030. India has already installed 6GW of utility scale solar capacity and 740MW of roof top capacity. 25GW of project surrender different stages of development. It added 3019MW of solar power in 2015 which has been an increase of 142% as compared to 2014. With expected new capacity addition of 5.4GW in 2016, India will become the fourth largest solar market globally this year, over taking the UK, Germany and France. A rapid reduction in costs and increased demand for solar installation has fanned tremendous growth over the past 12 months in India. Wind power accounts for 63.2% of the total installed capacity of renewable energy in India. India ranks fourth in the world in wind power installed capacity with an installed capacity of 26,769 MW

III. SOLAR ENERGY:INDIA

Solar power in India has witnessed impressive growth in a short span of time - from just 35MW as of March 2011 to

7,457MW as of March 2016. As of 30 April 2017, the country's solar grid had a cumulative capacity of 12.50 GW. India quadrupled its solar-generation capacity from 2,650 MW on 26 May 2014 to 12,289 MW on 31 March 2017. The country added 3.01 GW of solar capacity in 2015-2016 and 5.525 GW in 2016-2017, the highest of any year.[2]

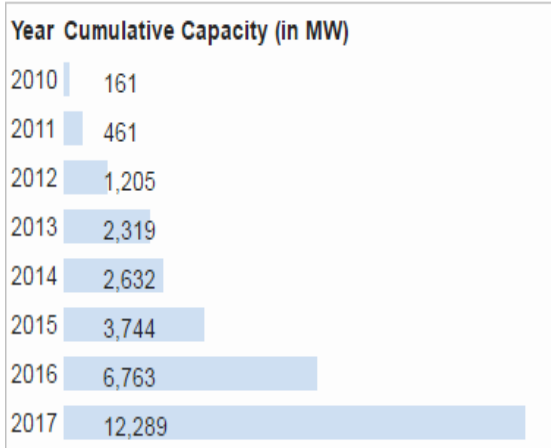


Fig.1 Installed solar PV on 31 March.2017

In addition to its large-scale grid-connected solar PV initiative, India is developing off-grid solar power for local energy needs. The country has a poor rural electrification rate; in 2015 only 55% of all rural households had access to electricity, and 85% of rural households depended on solid fuel for cooking. Solar products have increasingly helped to meet rural needs; by the end of 2015 just under one million solar lanterns were sold in the country, reducing the need for kerosene. That year, 118,700 solar home lighting systems were installed and 46,655 solar street lighting installations were provided under a national program;[11] just over 1.4 million solar cookers were distributed in India[4]

IV. RENEWABLE ENERGY: GUJARAT

Gujarat contributes ~ 15% to India's renewable energy basket. The State has a potential of 35,000MW in wind energy and 69,000MW in solar energy. Gujarat houses one of the Asia's largest solar parks. After a feasibility study of Indian offshore wind potential, Gujarat is one of the two states that has been selected as ideal to feature the first Indian offshore wind farm.

Source	Resource	Energy Generation/Saving Potential
Solar	Solar Radiation 300 days	5.6 -6.0 kwh/m ² / day
Biomass	24 million tones	900 MW of electric power could be generated to meet energy requirements of almost all villages in Gujarat.
Biogas	200 lakh	Could generate 5.6

	cattle population (Dung available at 70% collection efficiency)	million cubic meter of biogas per day to cater cooking gas to 2.8 million families or generate electric power equivalent to 933 MW
Biogas Energy Plantation	67 lakh hectare wasteland	Could yield 67 million tones of Biomass which can sustain power generation to the order of 15000 MW
Wind	Coastline and hilly regions	5000 MWe
Tidal	Gulf of Kachchh Gulf of Khambhat	9000 MWe 9000 MWe

Table.2 showing renewable energy potential of the state of Gujarat;[6]

V. SOLAR ENERGY: GUJARAT

Gujarat plans to generate 5 MW of solar power by putting solar panels on about 50 state-government buildings and 500 private buildings. It also plans to generate solar power by putting solar panels along the Narmada canals. As part of this scheme, the state has commissioned the 1 MW Canal Solar Power Project on a branch of the Narmada Canal near the village of Chandrasan in patandistrict. The pilot project is expected to stop 90,000 litres of water per year from evaporating from the Narmada River. Gujarat Energy Development Agency (GEDA) is implementing a Scheme of subsidy for Grid Connected Residential Rooftop Solar Plants To create the awareness amongst the consumers / applicants of Residential Rooftop Solar PV Systems this to inform that GEDA has registered 41 Empaneled Agencies (EA) to implement the scheme. List of the 41 EAs is available on GEDA web site. It is a responsibility of EA to design the system with all accessories and equipment, supply, Install, Commission and maintain it for 5 years with free replacement of guaranteed parts against manufacturing defects. EA will obtain all necessary approvals from GEDA, concern DISCOM and Chief Electrical Inspector (CEI) for the Residential Rooftop Solar Systems (RRSS). The discover cost of the RRSS is Rs. 69,000/-- per kilowatt (Sixty Nine thousand only) as per the specifications. Following subsidy is available to applicant for the installation of RRSS ; (1)State Subsidy of Rs.10,000/-- per kW subject to maximum of Rs.20,000/-- (2)MNRE subsidy of 30 % of the discovered cost i.e. 30 % of Rs.69,000/--, Rs. 20,700/-- per kW (Without any capacity limit) Accordingly applicant/beneficiary requires to pay only Rs.38,300/-- per kW to EA, which is Rs.69,000/-- (Total cost of 1 kW RRSS) – (minus) Rs.10,000/-- (State subsidy per kW subject to maximum Rs.20,000/--) – (minus) Rs.20,700/-- (MNRE,

New Delhi subsidy) The total cost of the system includes supply of following: Solar PV Panels, Inverters, Bi Directional (net) meter, solar meter, standard wiring, standard structure, Erection, Commissioning, 5 years CMC with replacement of part/s against defect liability, inclusive of all taxes.[4]

VI. CONCLUSION

The step of Indian government to increase the target is a very good one to become India as one of the most solar powered countries in the world. In this paper, we have discussed about the current status of solar energy in India and in Gujarat. The Ministry of Renewable energy resources, government of India is trying to increase the power capacity and achieve the target of 100 GW by 2022. This discussion shows that the status of solar energy is satisfactory in India but pay back for Roof top solar PV is around 4-6 years so some extra effort is required by Government in term of subsidy or reduced interest rate for betterment of solar source to reduce pay back and encourage consumer to install SPV system at home or on shop. It is expensive source of power compared with conventional sources. It is very important to support and subsidize the solar power till it can compete with the conventional sources. Such types of steps will be required in the future.

REFERENCES

- [1] India Renewable Energy Market Reports from EAI
- [2] www.mnre.gov.in/solarmission/jnnsn/introduction-2
- [3] https://en.wikipedia.org/wiki/Solar_power_in_India
- [4] www.geda.co.in/policy
- [5] <http://greencleanguide.com/electricity-scenario-of-the-state-of-gujarat/>
- [6] The Solar Handbook 2016 –A Bridge to India Report, Ministry of Power, Government of India; Ministry of New and Renewable Energy
- [7] Energy & Petrochemicals Department, Government of Gujarat
- [8] www.nise.res.in
- [9] www.gise.in/
- [10] Hydro Power scenario available at:
<http://www.nhpcindia.com>