

Solar Energy policy and Economic Development in India context to Charanka Solar Park Gujarat.

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Abstract

Energy is the basic requirement for the development of the country. India is facing huge shortage of electricity, as total demand and supply gap more than 11 percent. Shortage of electricity needs to shift towards renewable energy like solar, wind, geothermal and others. Due to change in energy sources, it reduces the environment gas emission and provide sustainable development to the country. As per records in 2006 India has around 80000 electrified villages. To meet the electricity demand to provide electricity to every household government of India launched Jawaharlal Nehru Solar Mission with an objective to provide clean and cheap energy to every household. The objective of this plan is to generate 20 Gig watt (GW) energy by 2022. In context to achieve the target of solar energy Gujarat government, draft a plan for development of Solar Energy Park in state known as Charanka solar power park with energy generation capacity more than 500 megawatt (MW).

This paper discusses the contribution of solar energy in the economic development of India as well contribution of Gujarat in the context of solar energy with reference to Charanka Solar Park.

Keywords: Solar Energy, Charanka Solar Park, Development, Sustainable energy.

Introduction

Rapid economic growth of country demands basic infrastructure such as transport, communication, sewage water and affordable electricity with a continuous power supply. Since independence Government of India has promoted energy sector to reduce the shortage of electricity. Before liberalization, government focused on large thermal and hydro power projects for energy generation. The liberalization process has increased the industrial and commercial activities in the country. Due to the increase in such activities the energy demand has been increased. Hence Government of India's shift paradigm of energy towards renewable energy sources such as solar, wind, geothermal and others.

According to Central Electricity Authority data 2013, India power sector still depend on the coal based thermal power plant. The total capacity of energy in India from various sources are like coal base power plant 132288 Mw (58%),oil-based plant 1200 Mw (0.5%),natural gas 20381 Mw (8.6%),nuclear power 4780 Mw (2%) and renewable energy contribution 71,600 Mw (30%).While solar power production is 2647 Mw(1%) of total energy.(Ministry of Power,2013).There has been a significant addition in total energy production since 1947.However, the supply could not achieve the target of the demand. During 2012-13, the energy shortage was 70,232 Mw (6.7%) and peak hour shortage was 3261 Mw (2.3 %).

Potential of Renewable Energy in India

Renewable energy (RE) sources include winds,solar,biomass,biofuels and others. Among RE sources solar energy power contribution is less than 1 percent including (off grid+ on grid).India is situated between tropic of cancer and equator, due to location benefit the average temperature ranges from 25 degree c to 27.5 degree c throughout the year. India receives nearly 300 sunny days every year, likely to generate 5000 trillion kilowatts of energy.

Solar Energy Policy and Achievement in India

Government of India has begun to acknowledge the importance of solar energy to enhance the economic development in India. Blessed with 300 sunny days receiving 200 Mw/Sq Km radiation throughout a year, India is well placed to enhance solar energy potential. However, around 12.5 percent of India land mass or 413000 square kilometer land could be used for

development of solar energy. To recognizing the need for solar energy, central government launched a mission under National Action Climate Change and formally launched Jawaharlal Nehru National Solar Mission (JNNSM) in 2010.the mission has set out to achieve 1000 Mw of grid-connected solar project at 33 Kw with solar photovoltaic or SPV and concentrated connected solar thermal,100 Mw of rooftop and small projects and 200 Mw of off-grid by 2013 (Phase I),4000 Mw grid connected and 2000 Mw of grid project by 2017 (Phase II).2000 Mw grid project by 2022,(Phase III)

Jawaharlal Nehru National Solar Mission (JNNSM)

Jawaharlal Nehru National Solar Mission is the major initiative of the Government of India with a significant participation of state to promote eco energy and sustainable energy growth. It plays a significant role towards contribution to fighting the global climate challenges issues. The JNNSM launched on 11 January 2010 by Prime Minister Dr. Manmohan Singh with the target of developing 22,000 (MW) of solar energy capacity by 2022. (Deshmukh et al. 2011).

Objective and Target

The goal of JNNSM is to establish India as a global leader of solar energy by spreading awareness and promoting investment by the policies initiatives. The mission has set to generate 22,000 Mw energy in a three phased manner. The first stage (2010-2013), 2nd phase in between (2013-2017) of the 12th plan, and 3rd phase in between (2017-2022) of 13th plan. The immediate aim of the mission was to focus on setting up a friendly environment for solar technology. The first phase focuses upon two aspects : promotion and the grid system; and the modest capacity of the grid. The second phase targets on aggressive capacity addition and improving the solar penetration. Primary goals are discussed below:

- To create a policy for the generation of solar energy 22,000 MW by 2022.
- To create a friendly environment for solar manufacturing capability, particularly in solar thermal and market leadership.
- This plan target is off-grid applications likely 1,000 Mw by 2017 and 2,000 Mw by 2022.

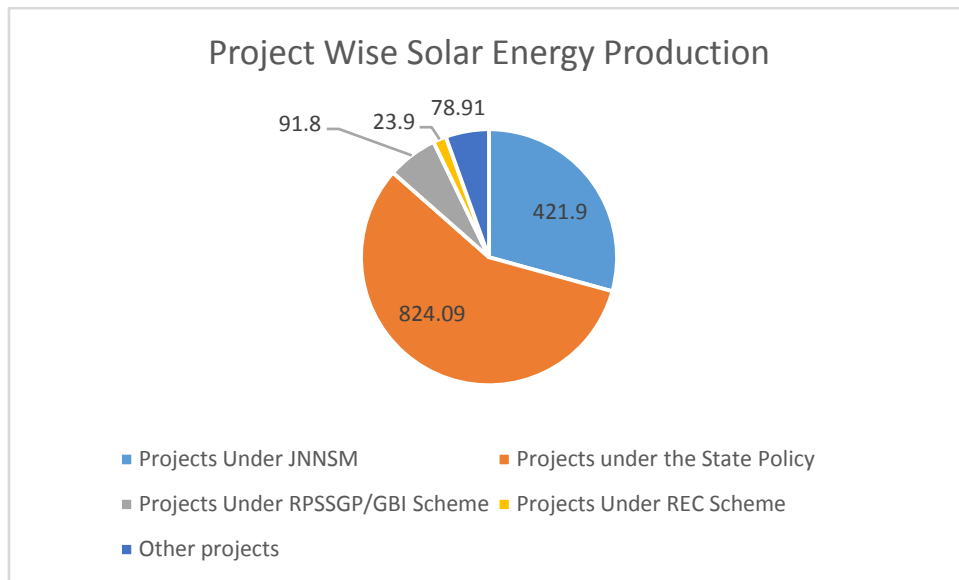
- To achieve 15 million square meters solar thermal area by 2017 and 20 million area by 2022.
- To deploy 20 million solar lighting in rural areas by 2022.(PIB,2009)

Table 1: Solar Energy Projects in India (State Wise)

State	Production
Andhra Pradesh	23.15
Arunachal Pradesh	0.025
Chhattisgarh	4
Delhi	2.525
Goa & UT	1.68
Gujarat	824.09
Haryana	7.8
Jharkhand	16
Karnataka	14
Kerela	0.025
Madhya Pradesh	11.75
Maharashtra	34.5
Odisha	13
Punjab	9.35
Rajasthan	442.25
Tamil Nadu	17.055
Uttarakhand	5.05
Uttar Pradesh	12.37
West Bengal	2
Total	1440.62

Source: The data is compiled on the basis of information obtained from IREDA, NVVN, State Agencies and Project Developers

Graph: 1. Project Wise Solar Energy Production



Source: The data is compiled on the basis of information obtained from IREDA, NVVN, State Agencies and Project Developers

The table and graph imply the highest solar energy production in India by two states namely Gujarat (57%) and Rajasthan (31%). These states contribute the highest energy due to the high level of solar radiation in the desert area.

Gujarat Solar Power Policy

The challenge of global warming and climate change has become a threat to the world. The Government of Gujarat recognized that there is urgent need to tackle the problem of global climate change. Volatile price of energy is binding the Gujarat Government to shift the paradigm towards solar and fossils energy. The solar energy provides not only cheap energy but provides clean and green energy. Hence, the Government of Gujarat encourages stakeholders and promoters to use their technology and innovation to promote solar energy. No doubt Gujarat is the front runner to support the renewable energy technology in the country. The biggest factor of contribution in renewables is the solar policy of Gujarat. To

promote the promoters, Gujarat government has passed a resolution and draft a plan to focus on solar energy.

In 2009 and 2015 Gujarat Government moved towards solar power system with following objectives:

- Generation of clean and green energy in the state through solar energy.
- To create a friendly environment to promote the investment in solar energy.
- Maximum and efficient use of waste land leads to socio-economic transformation.
- Employment generation and skill enhancement for local youth.
- To promote investment, employment generation, and skill enhancement in the renewable energy sector.
- To promote to use barren and cultivable land
- Promotion of research and development (R&D) facilities.
- Promotion of local manufacturing facilities.
- Create an environment consciousness among citizens.(GOG,2009&2015)

Rooftop Solar Power Projects

Government of Gujarat is the key entity who has taken a keen initiative and lead to promote rooftop solar power projects as part of Clean Climate Initiative. The Energy & Petrochemicals Department has formulated this program in consultation with other participants. To harness maximum solar energy, this program aims to set up Solar Photovoltaic (SPV) Systems on the rooftops and terraces of civil structures including residential and commercial buildings. The SPV systems will directly convert solar energy into the electrical energy and feed into the electricity grid system. This Project provides an opportunity to property owners in Gandhinagar City for participation in this Project with the objective to encourage green energy by offering their rooftop or terrace for installation of Solar Photovoltaic System for solar power generation. The owner of the property will be paid a "Green Incentive," which shall be based on the units (kWh) of electricity generated by the SPV system installed on their property.

Under this Project, the Government of Gujarat has targeted to set up SPV installations aggregating to 5 megawatts (i.e. 5,000 kilowatts) within Gandhinagar City.

Charanka Solar Park

The Asia largest Multi-developer, Multi facilities, Multi-technology, Multi-beneficiary, and the eco-friendly solar park is located in Charanka Village District Patan, Gujrat. The sun is the primary source of energy production in this plant. The plant is spread over 2000 hectares of waste land in the Run of Kutch. The location is well connected by the road and rail network. The total capacity of the production of energy from the plant is more than 500 Mw. The 17 developers have established their solar plants in the park and produce energy through solar photovoltaic plants.

Table 2 the plant Performance

Company	Mw	2012	CUF	2013	CUF	2014	CUF	Avg CUF
GMR Gujarat solar power pvt.ltd	25	31813	17	42426	19	15744	22	19
Sun Clean Renewable pvt.ltd	6	8229	19	10332	20	3751	21	20
Emami Cement Ltd	10	13157	18	16644	19	6113	21	19
Solar field Energy Pvt. Ltd.	20	27164	19	33661	19	12147	21	20
SEI Solar Power Gujarat pvt.ltd	25	32847	18	42768	20	15679	21	20
GSPC Pipavav Power Company Ltd.	5	6774	19	8831	20	3263	22	20
AES Solar Energy Gujarat Pvt. Ltd	15	14907	14	24497	19	8793	20	18
Alex Astral Power pvt.ltd	25	33693	18	43324	20	15625	21	20
9 NKG Infrastructure Ltd	10	13803	19	17562	20	6417	22	20
Palace Solar Energy pvt.ltd	15	20649	19	26350	20	9480	22	20
Roha Dyechem pvt.ltd	25	34285	19	43521	20	15345	21	20
Lanco Infratech Ltd.	15	13814	13	22921	17	7427	17	16
Surana Telecom & Power Ltd.	5	6437	18	7797	18	2890	20	19
GPCL	5	5908	16	7853	18	2984	20	18
ZF Steering Gear (India) pvt.ltd	5	6018	16	8711	20	3109	21	19
Yantra eSolar India Pvt.ltd	5	1088	15	7374	17	2545	17	16
Avatar Solar Pvt. Ltd	5			5344	12	2903	20	16
Total	221							

Source: Elavarthi (2014)

Most plants in operation for a period of one-year exhibit CUFs that are in line with what was expected of the regulations. Initially, the policy called for an average CUF in the line of 18% of a year of operation. A vast maximum (theoretical) possible generation of a power system. Since the CUF calculation is time dependent (hours of operation), the power plants considered here have been categorized based on the time operation. The majority of the plants (for which the data is available) fulfill this criterion. The plant that ranks first in the list has an estimated average CUF of 20.79%.

Solar Energy and Economic Development

The generation of energy through the renewable energy reduces the dependency on the fossil ; reduce the carbon emission and shift the economic paradigm to sustainable development. The solar energy contributes, to reduce the gap between supply and demand of energy. The solar plant effects on the environment, economy and on the society. The solar energy increases the provision of jobs because the installation and production of solar plates increase the manufacturing labor sources and enhance the income status of the people. In concern to the environment ,the solar energy provides the clean and ecological energy ,reduce the carbon emission. The Charanka Solar Park reduced 3,42,400 tons of Carbon Emission Reductions (CERs), which is one of the largest CERs contributing project in the renewable energy sector. Hence, the economic and environmental factors are considered while planning and predation of energy. As per 2011 census as per the 2011 Census, almost 85% of ruralhouseholds were dependent on traditional biomass fuels for their cooking energy requirements. National Sample Survey 2009-10 reveals the continued dependence on firewood in rural areas for cooking. Solar energy is also a sustainable source of energy that is produced without any type of pollution, greenhouse effect or any other adverse effect on the environment. The development of low-cost solar technologies can be a potential alternative to distributed energy generation consisting of a cluster of a local grid of electricity network. It could be a cheap and environment-friendly alternative to the centralized powergrid system having long distance, expensive wires delivery system.

Conclusion

In India, to reduce the gap of supply and demand of energy, renewable energy contribution has increased rapidly. The Jawaharlal Nehru National Solar Mission (JNNSM) helps and promotes the developers to establish the plants and produce solar energy. The long term results show that the maintenance cost and production cost reduced the cost of energy. The Gujarat government solar policy attract the investors to establish their unit in Gujarat. India has huge potential to develop and generate the solar energy to fulfill the gap of energy.

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