Solar Power as a Source of Ecologically Sustainable Growth in Rajasthan

Pallavi Pathak*[1] and Abhijeet Singh[2]

ABSTRACT

This paper highlights how factors which were once considered curse for Rajasthan have turned into boon. Two critical resources that are essential to solar power production namely high level of solar radiation per square inch and large amounts of contiguous, relatively flat, undeveloped land is abundant there. In order to tap the huge potential of Rajasthan for solar energy, the state government has constituted a separate entity, Rajasthan Solar Park Development Company Limited, for better development and management of solar parks. Solar industry is expected to be an economic engine in Rajasthan creating jobs across the State and spur billions in economic growth and tax revenue along with powering remotely connected households. Barmer, Bikaner, Jaisalmer and Jodhpur are the key regions with best solar radiation in the State.

Seeing the market attractiveness the State has stimulated interest among several developers to commit a pipeline of generation projects. Rajasthan has highest allocation of projects including both Solar Photovoltaic and Concentrated Solar Power under Phase I of National Solar Mission. Rajasthan has competitive advantage based on the availability of relatively low cost land for industrial use. Adequate availability of electricity enables the development of solar manufacturing industry, which is energy intensive. The State has a comparative advantage on labor cost compared to its peer states. Proximity to NCR helps in access to industrial labor and managerial talent. Rajasthan has excellent proximity to end user market as well as supplier base for raw material, providing logistics cost advantage as well. The State has excellent medical facilities, it has a peaceful environment, good social infrastructure and strong tourism brand thus providing better quality of life.

The new investor friendly Solar Policy aims to establish Rajasthan as a national leader in solar energy in phased manner by creating the policy frame work for promoting use of solar energy in various applications. Various incentives provided under the policy by the State Government include exemption from electricity duty, grant of incentives available to industries and availability of water for power generation. The Government has also announced special scheme for setting up of new enterprise, expansion, modernization and diversification, and projects set-up for common social good. Various Subsidies and Exemption from Taxes under various categories of investment are also being provided

***Key Words*- Solar Power, solar radiation, solar parks, investment.**

1. INTRODUCTION

Solar energy is the most readily available source of renewable energy and is the most important of the non-conventional sources. India is densely populated and has high solar insolation, an ideal combination for using solar power in India. India is already a leader in wind power generation. In the solar energy sector, some large projects have been proposed, and a 35,000 km2 area of the Thar Desert has been set aside for solar power projects, sufficient to generate 700 GW to 2,100 GW. In July 2009, India unveiled a US$19 billion plan to produce 20 GW of solar power by 2020. Under the plan, the use of solar-powered equipment and applications would be made compulsory in all government buildings, as well as hospitals and hotels. On 18 November 2009, it was reported that India was ready to launch its National

1.* Pallavi Pathak, Senior Lecturer, School of Management Sciences, Varanasi, India. E-mail : pallavi412@gmail.com

2 Abhijeet Singh, Associate Professor, FMS, BHU, Varanasi. E-mail : abhijeetnil@gmail.com

Solar Mission under the National Action Plan on Climate Change, with plans to generate 1,000 MW of power by 2013.

Rajasthan is blessed with two critical resources that are essential to solar power production: high level of solar radiation per square inch and large amounts of contiguous, relatively flat, undeveloped land. Rajasthan is uniquely placed to tap solar radiations with 300-330 clear sunny days and average daily solar incidence of 5-7kWh/m2 that is comparable to the Deserts of California, Nevada, Colorado and Arizona.

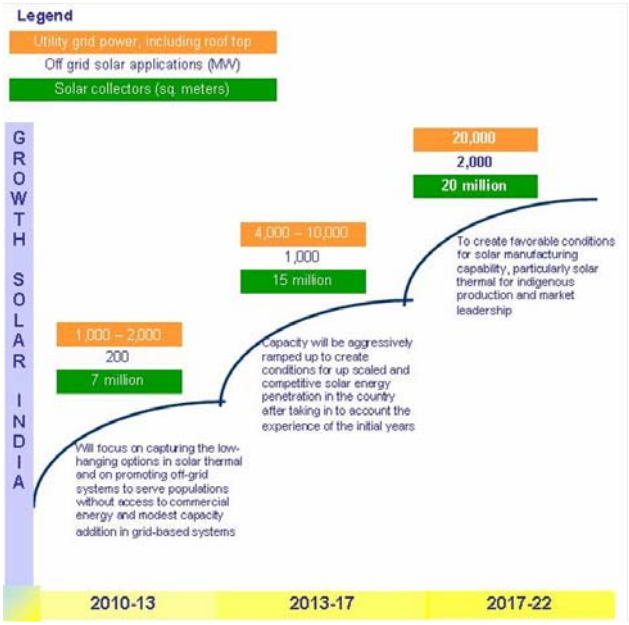

Fig.1. National Solar Mission in India

Rajasthan has a huge potential for solar energy and the state government has constituted a separate entity for better development and management of solar parks. Solar industry is expected to be an economic engine in Rajasthan creating jobs across the State and spur billions in economic growth and tax revenue along with powering remotely connected households. Barmer, Bikaner, Jaisalmer, Banswara and Jodhpur are the key regions with best solar radiation in the State. Daily average radiation ranges between 5kWh/m2 in north-eastern hilly areas and 7kWh/m2 in western regions. The average daily solar radiations translates into 1600-2000 kWh/m2 leading to generation potential much higher than its present and expected yearly consumption. (Source: RRECL)

The state has a huge potential for solar energy and the state government is trying its best to tap it to the fullest through a liberal solar energy policy where ample facilities are extended to investors on priority basis. The state government has constituted a separate entity, Rajasthan Solar Park Development Company Limited, for better development and management of solar parks.

899 companies have so far registered themselves with the government for setting up solar power projects with installed capacity of 18,476 MW all put together. 873 of them have been sanctioned, out of which projects with an installed capacity of 484 MW have already been established and rest are in process. The district of Jodhpur leads with 42 projects totaling 293 MW, followed by Jaisalmer and Bikaner. In total there were 84 projects with installed capacity of 512.9.

2. RAJASTHAN - THE IDEAL DESTINATION FOR LOCATING SOLAR POWER PLANTS

Rajasthan is one of the leading states of India in the field of solar energy There are several reasons which make Rajasthan most sought after for locating solar power plants. Some of these are as follows -

2.1 Market Potential

Rajasthan is uniquely placed to tap solar energy and is comparable to the highest solar radiation in the world (Deserts of California, Nevada, Colorado and Arizona). The State is endowed with 300-330 clear sunny days and average daily solar incidence of 5-7 kWh/m2. With a strong solar resource potential, the State has stimulated interest among several developers to commit a pipeline of generation projects. Rajasthan has the highest allocation of projects (both Solar Photovoltaic - PV and Concentrated Solar Power - CSP) under Phase I of National Solar Mission.

The State accounts for 81% of the allocation under the Grid-connected scheme of National Solar Mission (NSM). Rajasthan has got highest number of projects

(12 projects of 1MW each) under Rooftop & Small Solar Generation Programme. 52% of the total sanctioned projects are under Off-Grid Solar Application scheme of NSM. (Source: National Solar Mission)

2.2 Infrastructure

Rajasthan has competitive advantage based on the availability of relatively low cost land for industrial use. Adequate availability of electricity enables the development of solar manufacturing industry, which is energy intensive. The peak (3-5%) and average power deficits (1-2%) in State are reported to be lowest in the country.

2.3 Human aspect

The State has a comparative advantage on labour cost compared to its peer states (~20-30% lower). Proximity to NCR helps in access to industrial labour and managerial talent. Skills required in general manufacturing industry (such as glass) are easily transferable to solar manufacturing and related industries (specialized glass for Solar PV and Solar CSP), except high end R&D skills.

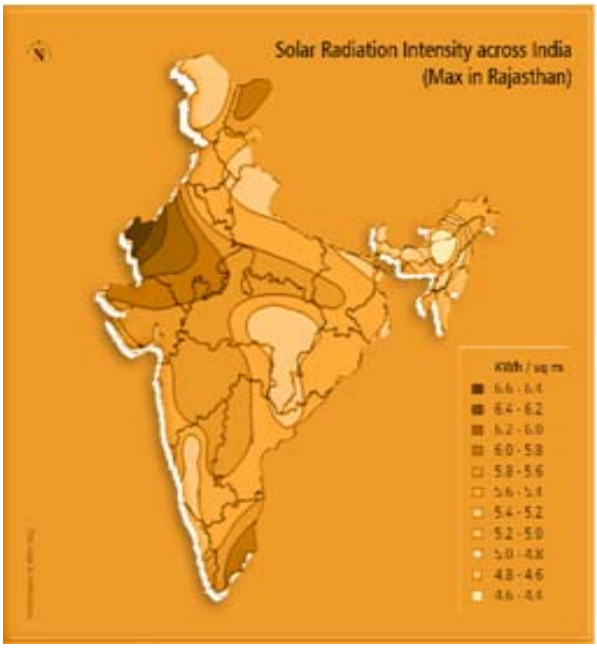

Fig.2. Solar Radiation Intensity across India
(Source: www.riico.co.in)

2.4 Availability of Raw Materials

The State has abundance of minerals such as zinc, quartz and salt (necessary for Solar CSP).The State accounts for about 99% of the country's production of zinc concentrates. The zinc concentrates are used for galvanization of mounting structures for Solar PV and CSP technology.

Rajasthan has huge potential to become a solar glass manufacturing hub. Presently, around 500 operating ceramic units, covering glass and mineral, grinding units, etc. are present in the State. The State is the third largest producer of salt in India. The molten salt is used as a heat transfer fluid in the CSP technology. Rajasthan has got high concentration of building material industries such as steel, cement, stone and other chemicals in and around the State.

2.5 Logistics

Rajasthan has excellent proximity to end user market as well as supplier base for raw material, providing logistics cost advantage. The State is well connected to major cities and towns of the State through railways. The State is strategically placed on proposed Delhi Mumbai Industrial Corridor (DMIC). Nearly 60% of the State's area falls under the Project Influence Area (PIA). The major districts such as Jaipur, Alwar, Kota, Bhilwara and Dausa are expected to benefit from the DMIC.

2.6 Better Living Conditions

Jaipur and other cities host a large number of primary and secondary schools. The State is a home to several prestigious academic institutions as well. The State has excellent medical facilities, including Fortis Escorts Hospital, Soni Group of Hosptials, Aravali Hospitals, Santokba Durlabhji Memorial Hospital, Bhagwaan Mahaveer Cancer Hospital & Research Centre and Narayan Hrudayalaya Health City. It has a peaceful environment, good social infrastructure and strong tourism brand.3.

3. ROLE OF STATE GOVERNMENT IN REALIZING RENEWABLE ENERGY POTENTIAL

Many steps have been taken to integrate renewable energy as a more significant part of Rajasthan's energy mix. Among the most important steps being taken by the Government for promotion of renewable energy, the progressive Solar Policy aims to drive forward reforms and prepare the State for Renewable energy integration in partnership with the private sector.

3.1 Solar Policy 2011

An investor friendly Solar Policy is already in place which aims to establish Rajasthan as a national leader in solar energy in phased manner by creating the policy frame work for promoting use of solar energy in various applications. Various incentives provided under the policy by the State Government are as follows:

3.2 Exemption from Electricity Duty

The energy consumed by the Power producers for own use will be exempted from payment of electricity duty.

3.3 Grant of Incentives available to industries

Generation of electricity from Solar Power Plants shall be treated as eligible industry under the schemes administered by the Industries Department and incentives available to industrial units under such schemes shall be available to the Solar Power producers.

3.4 Availability of water for power generation

Water Resource Department will allocate required quantity of water from Indira Gandhi Nahar Project (IGNP) canal/the nearest available source for development of Solar Thermal Plants subject to the availability of water for power generation.

Power producer will intimate estimated water requirement to RREC along with source of water. After assessment/scrutiny, case of water requirement shall be forwarded to the Water Resource Department. The modification(s) required, if any, in the existing canal system shall be done by the Water Resource Department at the cost of the power producer.

3.5 Rajasthan Investment Promotion Scheme (RIPS) 2010

The Government has recently announced RIPS 2010 for setting up of new enterprise, enterprises going for expansion, modernization and diversification, and projects set-up for common social good. All kinds of investments are eligible under this scheme. The new scheme also simplifies the procedure for grant and disbursement of subsidy, and introduces transparency in system, by introducing the system of online disbursement of subsidy.

3.6 Subsidies

Investment subsidy and Employment generation subsidy have been introduced.

- The maximum amount of subsidy shall be 50% of the tax deposited, i.e. VAT and CST or SGST(whenever introduced).
- RIPS 2010 provides investment subsidy to all eligible investors of an amount equal to 30% of the tax deposited, without any linkage with payment of interest and wages.
- Employment generation subsidy has been announced @ 10,000 per employee/annum. For women, SC/ST and persons with disability this amount has been enhanced to 12,000 per employee/annum.
- For entrepreneurs belonging to Women, SC/ST, or person with disability category, an additional investment subsidy amounting to 10% of the taxes deposited has been kept.
- These subsidies have been announced for 7 years, but to give boost to the MSMEs in thenotified area, time limit has been extended to 10 years.
- Procedure for subsidy disbursement has been simplified by introducing a Challan for Adjustment through Treasury (Form VAT-37B).

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3.7 Exemption from Taxes

The RIPS 2010 scheme announces exemption from payment of various taxes under the following categories of investment:

1. New Enterprise and Project for Common Social Good
2. Investment made for Modernization / Expansion / Diversification

3. Sick Industrial Enterprise for its revival

The type, extent and period of exemption are as follows:

Types of Exemption from Taxes/Duties/Charges	Extent of % of Exemption	Period of Exemption
Luxury Tax	100%	7 years from the date of issuance of Entitlement Certificate. However for MSME located in the notified area the period of exemption shall be for 10 years.
Electricity Duty	50%	
Entertainment Tax	50%	
Land Tax	50%	
Mandi Fee	50%	
Stamp Duty on purchase or lease of land and construction/ improvement on such land	50%	One time for each such transaction for the same project.
Conversion charge payable for change of Land use	50%	

Fig. 3. Types, Extent and Period of Exemption (Source - RIICO)

Rajasthan State Industrial Development and Investment Corporation popularly known as RIICO is a premier agency of Government of Rajasthan that has played an important role in the industrial development of Rajasthan. It has come forward to provide financial assistance to the entrepreneurs to set up solar power plants.

4. KEY PLAYERS

Few existing players in the State are:

Ajit Solar, REIL, Tata Power, Reliance Power, Welspun Energy Ltd, Kiran Energy, Godawari Power & Ispat Ltd , Rays Power, Dhirubhai Ambani Group, Mahindra EPC, Fonroche, Areva Solar etc.

Few of the existing plants

1. 1.50 MW plant in North west Rajasthan
2. 55 MW solar energy plant at Ravra village
3. At village Patodi of Barmer district
4. 40 MW at Dhursar Village in Jaisalmer district
5. 35 MW solar thermal plant at Mathania near Jodhpur
6. Two solar photo voltaic based power plants (5 MWp and 15 MWp) at Gajner Village in Bikaner

5. THE FUTURE AHEAD

Rajasthan laid the foundation stone of the world's biggest solar farm with generation capacity of 3,000 MW. The Rajasthan Solar Farm in an area of 10,000 MW will have a dedicated zone for solar research and development and solar installations for pumping of water from Indira Gandhi Canal along with providing power to the grid. The ultimate objective of the policy initiatives by state government is to develop a global hub of solar power of 10,000 MW to 12,000 MW capacity in the next ten to twelve years to meet increasing energy needs. Some of the propped plants include 1000 MW solar power plants in Phalodi near Jodhpur and 4000 MW near Sambhar salt lake in Jaipur.

6. CONCLUSION

Rajasthan is not only a pioneer but has become a hub of solar energy production in the country. The state government has used the solar potential in innovative ways to harness the renewable energy source. The objective of the solar policy is to establish Rajasthan as a national leader in solar energy in a

phased manner by creating a framework for promoting the solar energy applications. Some noted think-tanks recommend that India should adopt a policy of developing solar power as a dominant component of the renewable energy mix, since being a densely populated region in the sunny tropical belt, the subcontinent has the ideal combination of both high solar insolation and therefore a big potential consumer base density. In one of the analyzed scenarios, India can make renewable resources such as solar the backbone of its economy by 2050, reining in its long-term carbon emissions without compromising its economic growth potential.

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