

EXECUTIVE SUMMARY

India is one of the fastest growing economies and requires high per capita energy consumption. There is a necessity to reduce the demand supply gap in electricity generation sector in India to have sustainable growth. India's current installed generation capacity of electricity sector stands at 235 GW from all sources (i.e. Coal, Hydro, Solar and Wind etc.). Still, it faces an acute shortage of power consumption with demand and peak demand deficit of 8.5% and 10.3% respectively.

In order to bear out its ever growing electricity demand, India depends heavily on Coal, which leads to high level of GHG emissions. Coal plants releases maximum amount of CO₂ per unit of electricity generated, which has adverse impact on the environment. On the path of sustainable development, there is a need to control the GHG emissions in country.

It is evident and well known that solar energy is a clean source of energy and can contribute a lot in the sustainable development of a country. As a developing nation, India understands its moral responsibility to protect environment and for this, it has been taking initiatives for cutting down its GHG emissions. Government of India announced Jawaharlal Nehru National Solar Mission (JNNSM, 2010) as one of its National Action Plans on Climate Change, with strong objectives to achieve 22,000 MW through grid connected and off grid solar energy installations by 2022. According to CEA report 2014, India has achieved over 2 GW of installed capacity, which has been mostly through grid connected Solar PV power plants.

Out of this 2 GW installed, maximum installation has come up in Gujarat and Rajasthan, in spite of the fact, that there are twelve other State specific solar policies in the country to promote the sector, other than JNNSM, Gujarat and Rajasthan Solar policy.

The researcher attempts to identify various barriers and challenges which hamper the promotion and development of grid connected Solar PV power plants in India. Further, the study also highlights that, in presence of these barriers and challenges, how the States of Gujarat and Rajasthan were able to attract maximum investments in their regions.

An extensive review literature was carried out by the researcher to find the various barriers and challenges that impacted the growth of grid connected solar PV across various countries. It is evident from the entire review that although Government of India has taken various initiatives to promote solar energy across the country but only few states has shown encouraging results. It provides the base for the business problem, which is stated as below;

Despite of having specific policy for solar energy development at National and State level, why Gujarat followed by Rajasthan have been able to attract maximum investments for grid connected solar PV power plants installation in their region?

The objectives of the study are:

1. To identify various barriers and challenges that impact the growth of grid connected Solar PV installations in India.
2. To find out how the State(s) of Gujarat and Rajasthan have responded to the role of identified barriers and challenges on

the growth of grid connected Solar PV installation in their respective region.

This study uses mixed method research design and explains the methods of data collection and tools used for data analysis. The quantitative and qualitative methods have been used in the study, with details given to choice of data collection method along with the considerations to attain overall research quality.

The first objective of study was achieved through identifying nine factors as barrier and challenges that impact the growth of grid connected solar PV installations in India. These factors were extracted through factor analysis, with the help of 279 responses on 34 variables. The various barrier and challenges identified are Financial Barrier, Policy and Political Barrier, Institutional Barrier, Land Information Challenges, Land Acquisition Challenges, Administrative Challenges, Regulatory Barrier, Market and Technology Barrier and Development Cost Barrier.

To achieve the second objective of study, researcher conducted interviews with developers who have experience in executing grid connected solar PV projects in the State of Gujarat and Rajasthan.

During this process researcher got an insight with explicit dimensions on the identified barriers and challenges in context to Gujarat and Rajasthan. The interviews conducted for purpose of the study helped the researcher to create a strong background for developing the case studies of Gujarat and Rajasthan.

The assessment of interviews from all respondents from respective States is shown through an associative network diagrams along with Within-case analysis. This helped the researcher to better understand State's response

to the role of each identified barrier and challenge on grid connected solar PV in their respective region. This process facilitated the researcher to develop a strong base for Cross-case analysis.

Later, it was evident through Cross case analysis that Gujarat had significantly responded to the roles of Policy and Political Barrier, Land Information Challenges, Land Acquisition Challenges, Administrative Barrier and Regulatory Barrier, but could not significantly respond to the roles of Financial Barrier, Institutional Barrier and Market and Technology Barrier.

In case of Rajasthan it is found that it had significant responded to the role of Land Information and Land Acquisition Challenges, moreover it had moderately significant response to the role of Policy and Political Barrier, as it had helped developer in identification of government land for executing their projects. Whereas, Rajasthan failed to significantly respond to the role of Financial Barrier, Institutional Barrier, Administrative Barrier, Regulatory Barrier and Market and Technology Barrier. Due to the fact that, all plants have come under JNNSM and during the study no plant has been executed under Rajasthan Solar Policy, as it lacked the merit to win trust of investor and other stakeholder at large.

It was interpreted from the results that, there are factors which Gujarat and Rajasthan alone cannot answer, moreover a strong national policy measures need to be taken to support the State(s) for mitigating them.

In spite of the fact, Gujarat and Rajasthan are having strong investment environment for solar energy sector, it was understood that, Financial Barrier is market driven and not State driven, which meant that banks /

financial institutions lay emphasis on the project feasibility and its promoters, irrespective of the States, while funding a project.

The Market and Technology Barrier alone cannot be mitigated by the State, as overall manufacturing cost of PV modules is expensive anywhere in the country. The technological competency and R&D in the country is lacking, due to which reductions in cost cannot be not estimated. Hence, the country is and will continue to depend on other countries like China, Japan, Canada and USA for sourcing PV modules and related equipment.

Further, Institutional Barrier can be managed by State, but as of today, the State lacks such facilities to assist stakeholders and contribute significantly to the development of solar sector.

The Development Cost Barrier was negated by developers during the interviews, which was found as one of the nine barriers in the country.

Finally the study concludes that Gujarat as a State, has been more influential in attracting investment for grid connected solar PV in its region, whereas Rajasthan as a State, has not been able to make a mark in grid connected Solar PV installations. It has been purely due to the support of Central government that Rajasthan has gained hype in the industry, but overall as a State, it completely fails to attract investments in its region.