



Role of institutional entrepreneurship in the creation of regional solar PV energy markets: Contrasting developments in Gujarat and West Bengal



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ABSTRACT

With political initiatives, such as the National Solar Mission by Government of India, rapid development of grid connected solar PV energy in India has occurred in the recent times. However, an interesting puzzle is with respect to significant regional differences in Indian states despite similar levels of solar radiation, government support and regional level policy and regulatory initiatives in the states. The paper discusses the implementation of grid-connected solar PV energy in two Indian states – Gujarat and West Bengal – under the national-level program Jawaharlal Nehru National Solar Mission by the government of India. The paper offers empirical insights into implementation barriers involved in regional sustainable energy initiatives by using insights from the institutional entrepreneurship literature. The study concludes by describing the reasons for successful implementation in Gujarat and less successful implementation in West Bengal by discussing regional similarities and differences of institutional entrepreneurship of three key actors: government officials within regional government, regional regulatory agencies and regional industry associations.

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Introduction

The purpose of this study is to shed light on regional differences in sustainable energy initiatives at the sub-national level in India. In particular, the paper focuses on differences in implementation of grid connected PV solar in Indian states under the Jawaharlal Lal Nehru National Solar Mission launched in 2010. In a large country like India, with diverse economic and political dynamics, the central government has a limited role in affecting the decisions of sub-national governments in influencing sustainability initiatives. Historically, Indian states have had significant differences in economic and industrial growth patterns due to different political, economic and social pre-conditions, pressure from national government and influence of regional political parties and leaders (Sinha, 2003, 2004; Beale and Noronhora, 2014).

Indian states have competed with one another in order to attract national and international investment through several measures, such as lobbying to the national government for resources, becoming business- and investment-friendly, reducing bureaucracy and providing incentives in order to embark on rapid growth trajectories. While some Indian states have had the ability to develop their own policy mandates by being autonomous and not following the mandates from the central government, other Indian states have relied on the central government for policy direction and political support for their initiatives. Furthermore, Indian states have also engaged in using a variety of instruments and policy measures for shaping the business environment such as

improving access to various incentives, infrastructure, legal frameworks for setting up industry, facilitating enforcement of regulations, providing access to natural resources and human capital in order to attract investors (Kennedy et al., 2013; Sud, 2014a). Previous studies have also shown that in a large country like India, with diverse economic and political dynamics, the central government has a limited role in affecting the decisions of sub-national governments in influencing climate change and sustainability initiatives. Indian states have a crucial role in implementing national-level initiatives related to mitigating climate change impacts and transforming the incumbent energy system based on fossil fuels (Jørgensen, 2011).

In the case of grid connected solar PV energy, after the launch of the Jawaharlal Nehru National Solar Mission (JNNSM) [under the National Action Plan on Climate Change], the Government of India gradually started framing solar PV energy as a solution to chronic energy shortages, increasing import dependence on oil, concerns of energy security, energy access and industrialization through the creation of a domestic industry (Shrimali and Rohra, 2012; Ganesan et al., 2014). Before the National Solar Mission, the development of solar PV energy in India was limited to demonstration projects supported by the government, social enterprise models and initiatives by various international organizations (Chaudhary et al., 2014; Quitzow, 2015). Several regional initiatives operating within the framework of the National Solar Mission appeared in Indian states such as Gujarat, Karnataka, Maharashtra, Kerala, Rajasthan, Tamil Nadu and Andhra Pradesh. Due to the concurrent nature of India's energy system, Indian states were also free to devise their own policy and regulatory initiatives, taking into account regional socio-political concerns, availability of adequate solar

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resources, energy situation in the state and other relevant concerns (CEEW and NRDC, 2012; Bhushan and Hamberg, 2012).

Indian states came out with their own policies, regulatory mechanisms and incentives for promoting solar energy apart from the initiatives by the central government in the National Solar Mission. Gujarat continued to be the leading Indian state, with 860.4 MW out of the total installed capacity of 2753 MW in India in 2014. West Bengal was once the leading Indian state with respect to the deployment of solar PV energy. In fact, India's first grid-connected solar PV project was developed and installed in 2009 in Jamuria, Asansol, West Bengal by West Bengal Green Energy Development Corporation Limited, and financed by Power Finance Corporation of India Ltd. After the announcement of the National Solar Mission in 2010 and the change in the state government (from CPI (M) to All India Trinamool Congress), the growth of grid-connected solar PV energy nearly stagnated in West Bengal between 2009 and 2013, when other Indian states were rapidly deploying solar energy. In 2013, West Bengal only had 7.05 MW of grid-connected solar PV installed, and Gujarat went far ahead in terms of deploying grid-connected solar PV energy (Bhushan and Hamberg, 2012). This leads to the main research question of the paper: *How and why was implementation of grid connected solar PV energy different in Gujarat than in West Bengal?*

The research question is answered by using a qualitative case study approach and utilizing the concept of institutional entrepreneurship to understand the differences in implementation of grid connected solar PV energy in Gujarat and West Bengal. Particularly, in this paper I am interested in examining the strategies of regional actors in stimulating regional sustainable energy initiatives while experiencing setbacks and failures and at the same time challenging dominant institutional arrangements. The paper highlights the fact that although a range of factors are important for understanding regional implementation of sustainable energy initiatives, the role of institutional entrepreneurship is crucial. This is due to the fact that even good regional conditions such as good natural conditions, attractive policies and incentives can lead to unsuccessful implementation due to lack of concrete efforts by regional actors in transforming institutional arrangements. The research question in this paper is therefore answered using insights from institutional entrepreneurship literature in regional context which focuses on strategic action of multiple actors in shaping regional institutional environment (Walker et al., 2014; Sotarauta and Mustikkamäki, 2015; Sotarauta, 2016). In answering the key research question, I try to offer insights into institutional entrepreneurship in regional context and reflect on its usefulness for explaining differences in the two Indian states.

This paper is organized as follows. First, I discuss the relevant literature on institutional entrepreneurship in regional context in the section **Theoretical background: Institutional entrepreneurship in regional context**. This is followed by describing the research methods used for the study in the section **Research method**. I then discuss the role of institutional entrepreneurship in the implementation of grid-connected solar PV energy in Gujarat and West Bengal in the section **Findings**. Finally, in the section **Discussion**, I compare developments in Gujarat and West Bengal followed by conclusion in the section **Conclusion**. The paper concludes by answering the research question, discussing relevant empirical insights from the study and relevance for institutional entrepreneurship literature.

Theoretical background: institutional entrepreneurship in regional context

Regional differences in implementation of sustainable energy initiatives

Several studies have looked into the role of a large number of factors influencing regional sustainable energy transitions, such as natural resource endowments in the region, regional income level, structure of electricity markets and consumer profile, political discourses around

renewable energy, presence of ideologically motivated citizens and regional economic growth. Other factors include mismatch between consumer demand and available technical potential, access to transmission and grid infrastructure, availability of land, and regulatory and policy instruments initiated by the government (such as renewable purchase obligations, power purchase agreements, feed in tariffs, financial incentives, tax benefits, and regional permitting and planning procedures) to encourage the development of sustainable energy technologies (e.g., Fischlein et al., 2010; Delmas and Montes-Sancho, 2011; Ferguson-Martin and Hill, 2011; Holburn, 2012; Sawhney and Rahul, 2014; Feurty et al., 2016). Recent accounts have also suggested the need to look beyond examining the effectiveness of different policy and regulatory instruments and explore the actions of various actors and the different strategies along with the broader institutional context that trigger the implementation of policies and regulations. For instance, few studies have emphasized the role of collective actors – such as regional champions such as entrepreneurs, regional associations and entrepreneurial associations – in strategically shaping regional development paths while being shaped by the regional institutional context (Feldman, 2014; Lippmann and Aldrich, 2015).

Studies considering a public policy perspective have suggested that while indeed a number of broader environmental, social, economic, political and technical factors can lead to significant regional differences in the implementation of sustainable energy programs, public policy plays a crucial role in attracting investment into the regions (Holburn, 2012). Moreover, the success of regional initiatives depends, to a large extent, on the collective action between various regional stakeholders during the implementation of policies and requires coordinated efforts from multiple stakeholders, despite the presence of legal mandates for implementing them. Furthermore, implementation of regional policies and regulations often leads to resistance from opposing regional political coalitions and requires continuously adapting policies and regulations as a result of ongoing rapid technological changes (Marcus and Fremeth, 2011; Stokes, 2013).

In this respect, the innovation system perspective has been used by few scholars to study regional differences in implementation of novel innovations as it is useful for mapping the role of relevant actors, networks and institutions (e.g. Goess et al., 2015). Recent studies have even used insights from innovation system perspective to study regional energy transitions for analyzing spatial aspects of energy transitions and understand how change is brought by different organizational actors and supportive regional institutional arrangements (Mattes et al., 2015). Studies have also utilized the Technological Innovation System (TIS) perspective to study differences in implementation of solar PV energy in Germany. This particular study highlights that new regional markets for solar PV energy in Germany emerged as a result of supportive local institutional context and presence of local supportive consumer user groups i.e. solar civic initiatives. The presence of local supportive user and civic initiatives contributed to more successful implementation of solar PV energy in few German federal states such as Bavaria and Baden Württemberg that other states (Dewald and Truffer, 2012).

However, the innovation system perspective has also been criticized for not paying adequate attention to agency in endogenously driving institutional change despite its merits in emphasizing the role of actors, networks and institutions for mapping emerging innovations (Hung and Whittington, 2011; Sotarauta and Mustikkamäki, 2015). Furthermore, the Innovation Systems (IS) and Technological Innovation System (TIS) perspectives have also been criticized for not emphasizing the role of micro level activities such as role of different activities of actors in development of the innovation system. Recent studies in this respect have even indicated the need for more focus on understanding the role of key actors and system builders in creating novel sociotechnical system for emerging innovations (Markard et al., 2015; Kukk, 2016; Kukk et al., 2016).

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