Energy for Sustainable Development 45 (2018) 66–78

Contents lists available at ScienceDirect

Energy for Sustainable Development

Analyzing solar auctions in India: Identifying key determinants

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ARTICLE INFO

Article history:
Received 9 March 2018
Revised 10 May 2018
Accepted 10 May 2018
Available online xxxx

Keywords:
India
Solar
Auctions
Effectiveness
Regression

ABSTRACT

Solar technology has been identified as a key tool to fight climate change. The sector, promoted by several policy enablers, has seen a rapid growth in terms of deployment, with the global capacity reaching 390 GW at the end of 2017. In recent years, an increasing number of countries are adopting auctions to award solar contracts, resulting in steep tariff reductions. Researchers, while analyzing solar auctions, focused on ground level deployment, without capturing other factors influencing the investors' decisions. India, with its ambitious solar plan, has seen numerous contracts being awarded under auction schemes run by its federal and state agencies. We regressed eleven variables across thirty-two solar tenders issued in India between 2014 and 2017. Analysis of these auctions brought out a different set of determinants for federal and state programmes. On an overall basis, factors like solar targets, utilities' credentials and the level of subscription came out as strong determinants. Additionally, cost of funds and module price figured as drivers in the federal bids. Possible recommendations include spatial and temporal spacing of bids, sale to multiple off-takers and provision of risk guarantee funds. These factors may be taken into consideration by Indian Policy makers while designing solar tenders.

Introduction

The solar photovoltaic sector has witnessed rapid growth during the last decade, with the total global installations reaching 390 GW at the end of year 2017. The top five solar markets were China, the United States, Japan, India and the United Kingdom, accounting for 85% of all increments. Rapid declines in module costs (as indicated in Fig. 1), use of auctions and increased efficiency levels have led to economic competitiveness of solar photovoltaic (PV), with average levelized tariff falling to US 10 ¢ per kWh. Fig. 2 provides the average solar power generation cost for the period 2010 to 2017.

India is among the top five countries in terms of greenhouse emissions, even with a low level of per capita emissions.[1] Over 70% of India's emissions are attributed to the energy sector[2] due to the preponderance of fossil-fuel generators in its energy sector. Classified as a tropical country, India is endowed with enormous solar potential, estimated at 5000 trillion kilowatt hours, or kWh; refer Fig. 3. The total solar potential has been estimated at 750 G watts, or GW, spread evenly across the country.[3] Theoretically, a small fraction of the total incident solar energy can meet India's power requirements. Solar technology also enables energy access to rural India under decentralized and distributed modes.

Looking into the above perspectives, the Indian government launched the National Solar Mission[4] in the year 2010 under its National Action Plan on Climate Change to promote ecologically sustainable growth, while addressing India's energy security challenge. The Mission proved to be a milestone for the growth of solar in India. It coincided with a global focus on solar technologies, abetted by a rapid scale-up of photovoltaic module manufacturing facilities across the globe. In line with India's commitments towards climate change mitigation, the solar capacity targets were revised upwards by the Ministry of New and Renewable Energy, MNRE, in the year 2015 from 20 GW to 100 GW, to be achieved by the year 2022.

Doing away with the prevalent feed-in-tariff model, or FIT, the Indian government used auctions as an instrument to award solar capacities. Due to interplay of market forces and growing interest of

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[1] GHG Emission Report, World Resource Institute, 2012.
[2] India Biennial Update Report to UNFCCC, Government of India, December 2015.
[3] Indian Solar Atlas, Government of India, November 2014.
[4] Mission Document can be seen on link http://www.mnre.gov.in/file-manager/UserFiles/mission_document_JNNSM.pdf.

https://doi.org/10.1016/j.esd.2018.05.003
0973-0826/

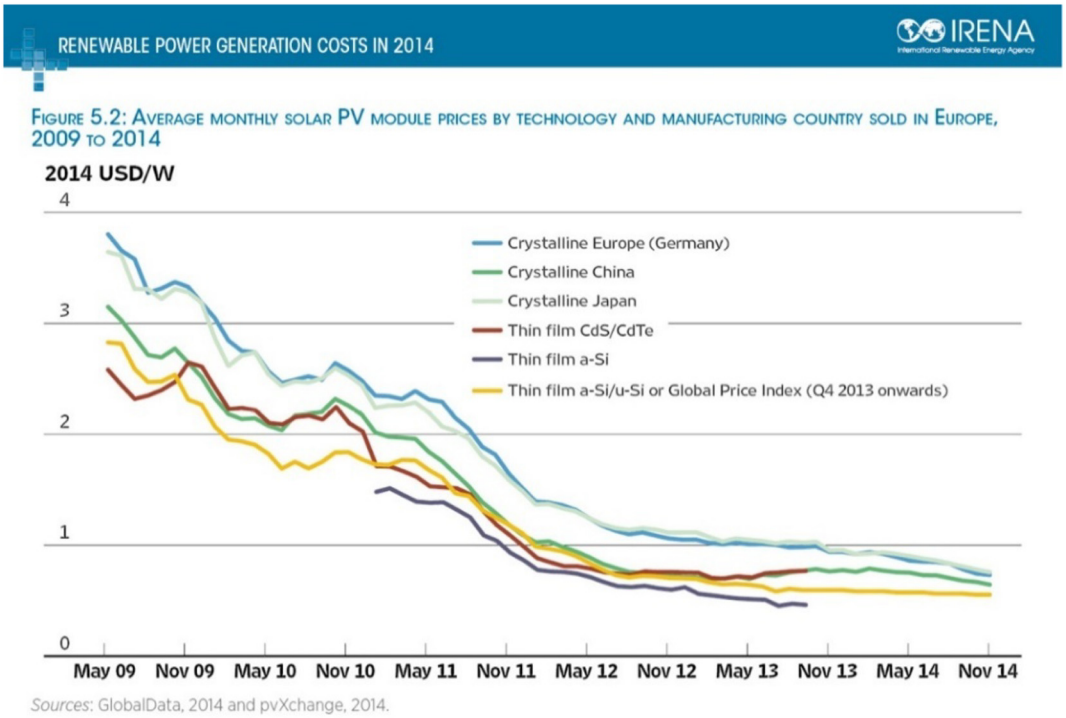

Fig. 1. Trends of solar PV module cost (PV Exchange, 2014[a]). [a]Solar Module Rates, https://www.solarserver.com/service/pvx-spot-market-price-index-solar-pv-modules.html accessed on March 05, 2018.

the investor groups, significant reduction in solar tariff over the applicable FIT was observed in about fifty auctions conducted since the launch of the Solar Mission. When compared with established policy instruments like FIT, renewable purchase obligations, or RPO, and tax credits, auctions have been a recent phenomenon and is yet to be researched upon in detail.

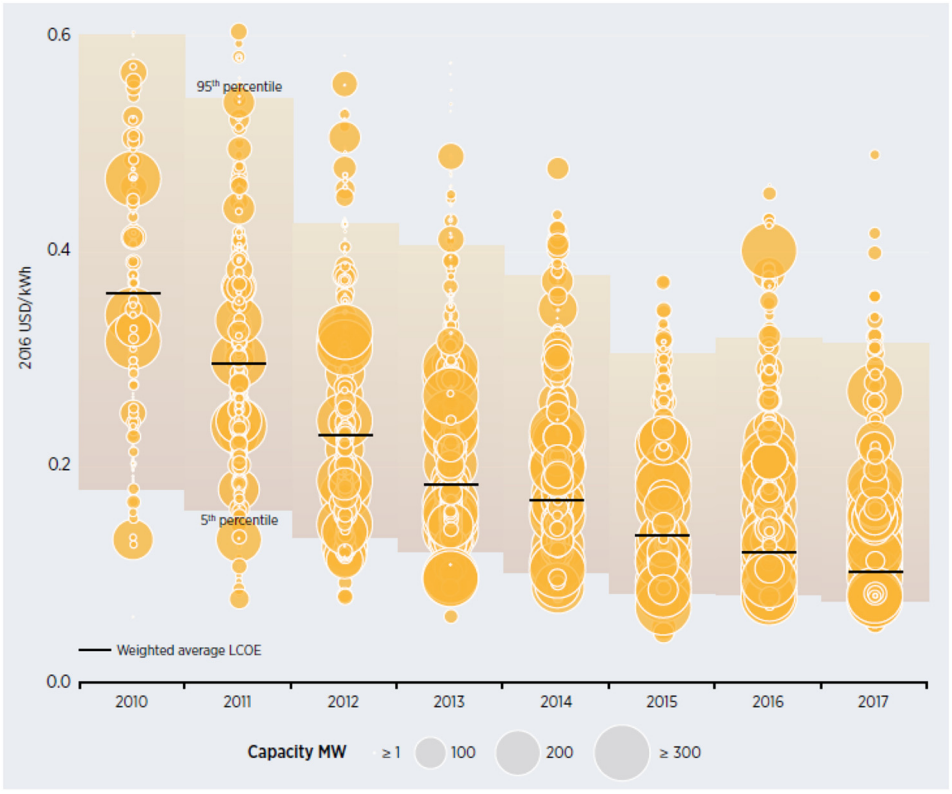

Fig. 2. Average solar tariff (IRENA, 2017a, 2017b).