# What makes Gujarat a hotspot for solar energy investments?

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With over 300 days of sunshine and solar radiation of 5.6–6.0 kWh/m$^2$/day (refs 1, 2), the state of Gujarat has a potential of generating 750 GW from solar energy[3]. To capture this huge potential, in January 2009, the Government of Gujarat (GoG), introduced the 'solar power policy (SPP) 2009' as a commitment to climate change initiatives, to address energy security, to support India's National Solar Mission (NSM) and to provide favourable environment for implementation of solar energy[4]. The SPP 2009 with an overarching aim of promoting alternative sources of energy through investment from private developers, was an important step for solar power development in the state[5]. From the release of the SPP in 2009 to early 2013, the state contributed to about 850 MW (including 224 MW Charanaka Solar Park) of the total installed 1600 MW (approx.) grid-connected capacity in the country[6]. The 'Charanaka Solar Park' was initially planned in two stages – phase I dedicated to solar power generation and phase II for both generation and manufacturing facilities[7]. Phase I of the project, implemented in 1080 ha of land with a power generation capacity of 224 MW (commissioned on 19 April 2012) and an investment cost of about US$ 280 million, has become the world's largest solar park beating China's 200 MW Goldmud Solar Park[8]. It was also awarded by the Confederation of Indian Industry (CII) for being the most innovative and environment-friendly project. After the completion of phase II, the project is expected to generate about 500 MW of solar energy. All this growth in the solar generation in Gujarat was largely achieved after the release of SPP in 2009, a year before the release of NSM. Even after the release of NSM in 2010, Gujarat has emerged as a favourite destination for the business developers. Why are the business developers inclined towards Gujarat? What brings them to the state? In fact, through my personal interviews with them, I found a wide variety of issues.

The state with a solar insolation of 5.8–6.0 kWh/m$^2$/day and with availability of vast tracts of land in Banaskantha (in north Gujarat region), Kutch and Saurashtra regions, naturally proved to be the hotspot for the developers. One of the interviewees from KfW, Germany said: 'Due to land availability and excellent irradiation coupled with effective implementation mechanism and FiT-based policy structures, Gujarat emerged as a popular destination for investment'. Though NSM is the major driving force for promoting solar energy in India, many developers highlighted that NSM's reverse bidding process – where the business developers bid a tariff for the development of a PV project – was a disadvantage compared to Gujarat solar policy, where a preferential tariff is fixed by the Government for the policy operation period. The tariff was emphasized as the most important criterion and game player in the decision-making of the developers to choose a specific policy (national or state policy). The high tariff of Gujarat (Table 1) compared to NSM made the business developers lean towards Gujarat solar policy. 'I know that there would be lot of response for JNNSM, in fact there was lot of response but how much have been successful? So many of the projects sites are vacant, people have not even cleared the land ... this is a common policy and PPA is a standard document and the price is same for everyone, it's a regulatory price and there is no bidding rule, so that's the interesting part of Gujarat policy. On the other hand under JNNSM, they are going for the reverse bidding' said a business developer from GMR energy infrastructure.

The Gujarat solar policy was announced a year before NSM came into force.

**Table 1.** Comparison of Gujarat solar power policy with the national policy (source: extracted from ref. 9 and national and Gujarat solar policies)

| | Gujarat's solar policy | NSM phase I (2010–13) |
|---|---|---|
| Effective period of operation | Up to 31 March 2014 | Up to 31 March 2013 |
| Capacity of installed system | Maximum of 500 MW solar power generation to be allowed | Maximum capacity of 50 MW earmarked |
| Capacity limit per project | Maximum project capacity to be 5 MW each | 1 MW, but projects in a modular fashion also allowed |
| Eligible units | Any company or body corporate or association (whether incorporated or not) can set up an SPG facility | All existing registered companies, central and state power generation companies and public/private sector project developers |
| Type of use allowed | For self-use or for sale of power to grid/sale to third party. Captive use is not allowed. | – |
| Tariff for PV projects (US$/kWh) | | |
| Projects commissioned before 31 December 2010 | 0.26 (for the first 12 years)<br>0.06 (from 13th to 25th years) | – |
| Other projects commissioned after 2010 and before 31 March 2014 | 0.26 (for the first 12 years)<br>0.06 (from 13th to 25th years) | Based on competitive bidding |

Note: 1 US$ = Rs 50 here.

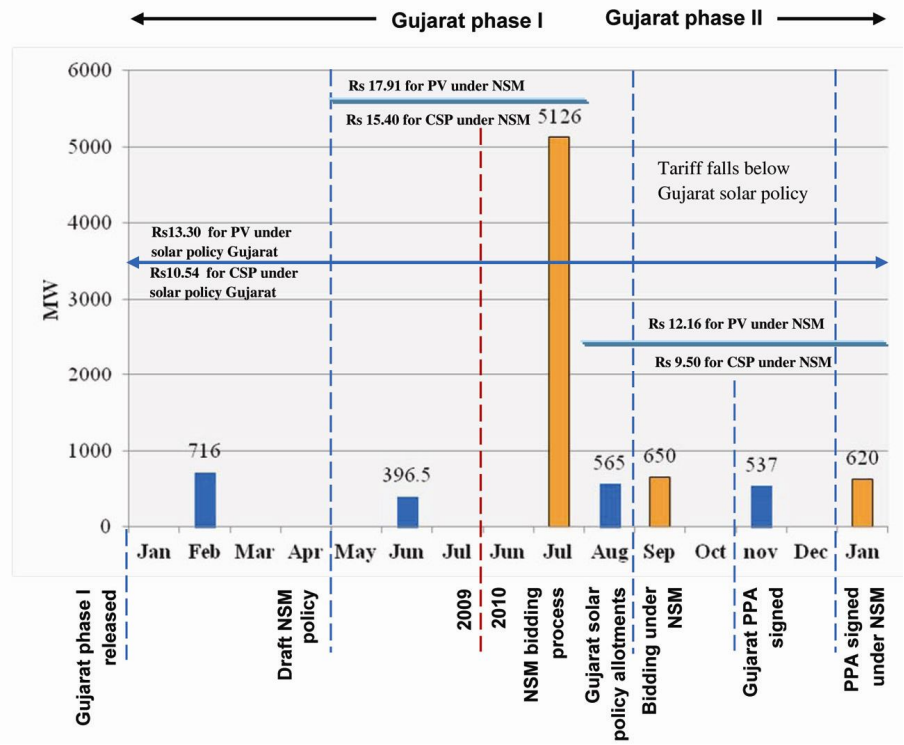


**Figure 1.** Gujarat Phase I and II versus NSM (phase I and batch I) event timelines.

As no timelines or guarantees were required from developers to sign PPAs, initially many developers took interest in the Gujarat solar policy. After the NSM policy was formalized in December 2009, developers moved away from Gujarat to NSM. The enormous interest from developers in NSM led to competitive bidding for the projects and this situation led to decrease in power generation tariff. The steep fall in the NSM tariff below the levellized tariff (This refers to the average fixed and variable tariff over the entire term of the PPA or Power Purchase Agreement adjusted for inflation. In the case of Gujarat, it is the fixed tariff floated by the Government to the developers unlike the NSM. Hence levellized tariff = (Arithmetical average of tariff over the life of the plant/PPA)/ Discount factor. The discount factor could be linked to an appropriate inflation index such as the wholesale or retail price index) of Gujarat resulted in developers' sudden interest in Gujarat solar policy. Compared to the NSM, the Gujarat policy has longer timelines for the execution of projects (Figure 1). For example, it can be noted from Figure 1 that after the release of NSM in 2010 (dotted red line), there was a sudden rush to NSM bidding process. The total amount of capacity that was bid under NSM in July 2010 was as high as 5126 MW. However, within months due to steep fall in NSM tariff, the bid capacity was reduced to as small as 650 MW (in September 2010). Of the total 5776 MW capacity bid under the NSM in 2010, about 620 MW capacity projects only had reached the stage of signing PPAs (in January 2011). This shows that due to fluctuation in tariff prices unlike fixed tariff of Gujarat, the initial rush to NSM declined later. The project developers preferred fixed tariff. It was also stressed that a significantly higher feed-in tariff in the first 12 years in Gujarat matches investors' timelines, as they would look to recover the cost of debt during this period. Furthermore, unlike NSM's phase I (2010–13) project execution timelines, the Gujarat SPP 2009 has longer timelines for execution and commissioning of projects (up to 2014; Figure 1).

Various other business developers also felt that Gujarat, through SPP 2009, is comparatively better in implementation and achieving the targets. A business developer from AES Solar described that 'The international banks are not funding solar projects in India other than Gujarat. All other state governments are not financially very prompt – Karnataka DISCOMs are all in negative cash flow, Tamil Nadu will delay and there is no transparency, this state (Gujarat) has transparency and are investor-friendly.' As Gujarat initiated the policy first and the other states are trying to adopt it, business developers are keen on Gujarat policy. Despite businesses originating from other states such as Andhra Pradesh and Karnataka, the business developers had a strong sense of credibility in Gujarat SPP implementation. This is because payment of such high tariffs under the Gujarat SPP will not be easy for the power distribution utilities in other states which are currently under financial stress. Another business developer from EIT argued that 'Today people come to Gujarat to make investments because you have some set policies, and these policies are always investor-friendly, not exactly 100% but better than the policies in other states'. Issues of strong tariff, transparency, financial stability of the state electricity utilities and government agencies play a major role in drawing business developers' towards Gujarat. It is also important to highlight the state's investor-friendly environment as stated by developers as an important factor for drawing business interests.

The wide variety of incentives, attractive tariffs and single-window mechanism for infrastructure development and implementation have made Gujarat solar policy comparatively profitable over the MNRE scheme and other state policies. These initiatives and policy for harnessing the solar park and making it grid-interactive had also drawn several business developers across the country to set up solar plants both inside the solar park and outside. On a larger scale, the business developers had a positive outward look on the policy. This is evident from the fact that they were looking forward for the extension of phase II of the policy after its lapse in 2014. One of the business developers from ZF Steering mentioned: 'The second phase of solar power policy is also released. Under that the solar park will be implemented in Morvada, near Radhanpur. Already applications are going on for that ... people are interested in the 2nd phase also'. The solar policy extension through a new policy with new tariffs and details is supposed to be released soon and business developers are keen to invest in the second and third phases as well.


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