

SOLAR PHOTOVOLTAIC POWER (SPV)

With 1760 MW installed in the country as of 30th June,, SPV was possibly the smallest in terms of supply from any one resource. Most of this capacity is located in the western high solar resource states of Gujarat and Rajasthan. The target for grid connected solar power (PV and CSP) under the National Solar Mission (JNNSM) is set at 20 GW by 2022. However given the present price advantage of PV over CSP, it looks likely that a significant share of the 20 GW would come from PV. Going beyond the JNNSM, the National Tariff Policy (NTP) was amended in 2011 to have a separate solar RPO for all obligated entities in the country. This is expected to begin with 0.25% in 2012 and increase to 3% in 2022. According to MNRE, this translates to a need of roughly 34,000 MW in 2022. Most of the solar PV plants are based on either c-Si or thin film technology. This analysis essentially covers MW scale projects, while Roof-top potential is likely to be undertaken in the next version. SPV holds infinite potential for India, and the present analysis is aimed at offering four scenarios of power supply by this source, upto 2047.

Level 1

Level 1 is the ‘Least effort scenario’ and assumes that SPV capacity addition would be significantly slower than that prescribed under the JNNSM, or as required under the NTP. Costs of solar power would continue to be high while carbon/externalities of power generation would continue to remain un-priced. Similarly reliably integrating variable generation remains a challenge. Capacity would increase to roughly 11 GW by 2022, peak at 37 GW in 2047.

Level 2

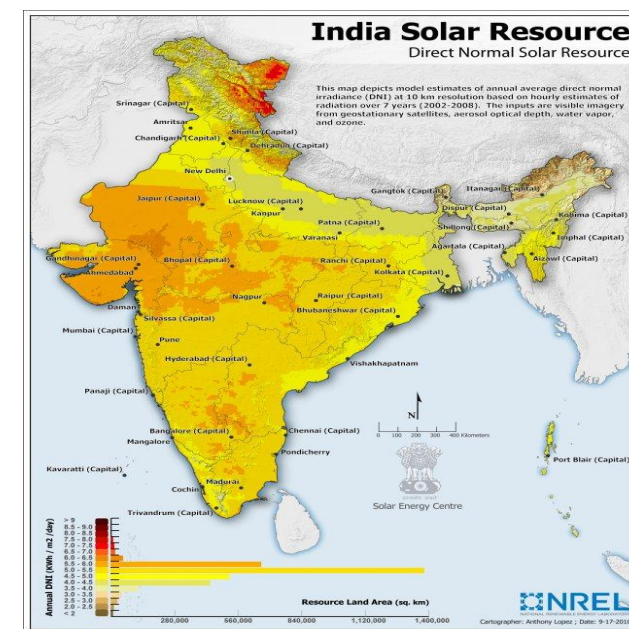
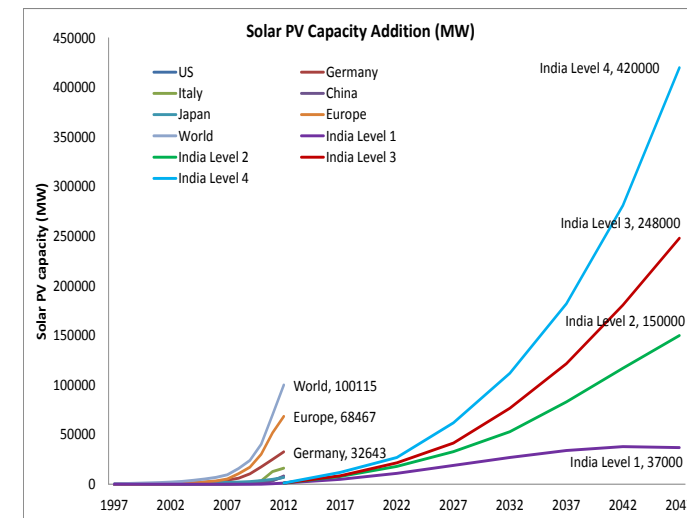
Level 2 assumes that the capacity addition would follow the JNNSM trajectory. By 2017, capacity would reach close to 8 GW in line with the 12th Plan projections, while by 2022 it would reach 17.9 GW. Capacity addition increases strongly thereafter culminating in a cumulative capacity of 150 GW by 2047. This implies a 35 year CAGR of 16% (2012-2047).

Level 3

Level 3 assumes steady drop in solar PV prices and marginal increase in fossil fuels prices, thus making SPV economically competitive. Capacity addition in this scenario would be slightly higher than the JNNSM resulting in 21.5 GW in 2022. It would cross the 100 GW mark by 2035 and finally reach 248 GW by 2047. The resultant generation would be to the tune of 447 TWh.

Level 4

In this ‘Heroic effort scenario’, there is absolutely no barrier (economic, social or technical) to the growth of SPV. There is a sharp drop in solar and wind prices coupled with significant increases in fossil fuel prices, especially coal. Fossil fuel externalities are priced. Smart grids, Demand response and storage are in place. Similarly, forecasting/dispatch and reliable grid integration is taken care of. Energy security is consciously factored in energy planning and land is not a constraint. In this level, capacity increases to 26.9 GW (~ 50 TWh) by 2022 in line with the Renewal Purchase Obligation (RPO) requirement of 3% as directed by the NTP. By 2040 it reaches approximately 250 GW and by 2047, it reaches a potential of 420 GW.



Note: Please see detailed documentation for references.