Creating Solar "Parks" in Cities

POLICY NOTE

Context

Rooftop Photovoltaic (RTPV) systems are expected to contribute 40 GW out of India's target of 100 GW of solar. While there is considerable momentum in case of utility-scale solar PV projects – the cost has decreased to INR 2.44/kWh – RTPV uptake has been tepid; comprising only 1.46 GW of the total 12.5 GW installed solar capacity. This is paradoxical, considering that RTPVs offer many advantages – generation is close to load centres, meeting consumers' demand and avoiding T&D losses. The main reasons for sluggish growth are:

Techno-economics

RTPV systems cost INR 60,000–75,000/kWp (almost 1.5–2 times the cost of utility scale plants). There is lack of economies of scale as the developers have to order modules and balance of system components at kW levels. Therefore, the consumers require net-metering (NM)/gross-metering (GM) rates of INR 6–7/kWh to have viable business cases. Most distribution companies (DISCOMs) in India are suffering financially (with a few exceptions) and are unable to pay these tariffs. They usually provide an Average Pooled Power Purchase Cost (APPC), which hovers around INR 4/kWh rendering the business case infeasible. Hence, banks also perceive these investments as high risk and refuse to lend easily to prospective consumers.

Lack of accurate potential assessment

Prospective RTPV consumers are not convinced about the realistic potential for solar generation or revenue from solar. Most available tools do not consider shading aspects of neighbouring buildings and obstacles, and present users with skewed and inaccurate business cases. DISCOMs have also not carried out detailed analysis of their distribution transformers (DTs). This leads to arbitrary restrictions such as allowing only 30% loading on the DT and fixing RTPV capacity at sanctioned load.

Complex processes and procedures

RTPV is a highly decentralised application, involving individuals, SMEs and commercial establishments. These consumers expect stable returns and minimal hassles. The customer does not want to incur the harassment of irregular DISCOM revenues, working with bureaucracy to avail subsidies or cumbersome procedures for approvals. The customer also does not want the complications of operation and maintenance (O&M), apart from cleaning the panels regularly.

Policy Suggestion

The success of RTPV depends on two factors: (1) Reducing the capital cost of systems to a level where DISCOMs are comfortable, and (2) Reducing the hassles faced by prospective consumers. Therefore, we propose a model, similar to solar parks. A city can be divided into 4–5 "solar zones" and each zone can be tendered out to 1–2 developers, for installing RTPV systems. We believe this model can address the above-mentioned issues. The broad contours of this model are:

1. The approximate RTPV potential of a city can be relatively easily estimated. For instance, Delhi and Bangalore have realisable RTPV potential of about 2,400 MW and 3,600 MW respectively. This information can be used to divide the city into zones with approximately similar potentials. Each zone can be tendered to 1–2 developers. This way, each developer will have cumulative capacities in hundreds of MWs instead of individual kW systems. Therefore, the bulk procurement at MW level should lead to a significant reduction in capital costs of these systems. Solar Energy Corporation of India (SECI) recently tendered out 1.5 GW RTPV for government buildings and witnessed this expected reduction. It can be extended to other consumer categories as well.
2. The State Nodal Agency (SNA) for renewable energy, in collaboration with respective DISCOMs can undertake an accurate potential assessment in the zone using 3D imaging and Geographic Information System (GIS) with aerial photography to accurately calculate the potential on each rooftop. The corpus arising from the 30% capital subsidy scheme of the Ministry of New and Renewable Energy (MNRE) can be used for these potential assessment studies since the aforementioned reduction in RTPV costs should remove the need for capital subsidies. The study will also include all major government buildings. The list of geo-referenced suitable rooftops can be made available to successful developers in each zone thereby reducing customer acquisition costs. The developer can then approach each interested consumer and develop business cases based on energy consumption data.
3. The developer can then proceed to procure and install RTPV systems on selected rooftops. They can also provide O&M services to consumers for a fixed duration, making it convenient for individual homeowners.
4. There are two possibilities for the revenue model:
   a) The developer can enter into a Power Purchase Agreement (PPA) with the DISCOM and pay suitable rent to the rooftop owners.
   b) The DISCOM can fix the NM/GM rate on the discovered capital cost and allow consumers to invest and get the revenue.

POLICY NOTE

Proposed Pilot for Delhi

We propose a pilot project in Delhi with a capacity of 150 MW. This includes the three DISCOMs – BSES Yamuna Power Limited (BYPL), BSES Rajdhani Power Limited (BRPL) & Tata Power Delhi Distribution Limited (TPDDL). An aerial LiDAR survey of Delhi should be conducted by Energy Efficiency and Renewable Energy Management Centre (EE&REMC) to accurately estimate the RTPV potential of each rooftop. CSTEP is implementing a similar project in Bangalore city on behalf of the Karnataka Renewable Energy Development Limited (KREDL) and Bangalore Electricity Supply Company (BESCOM).

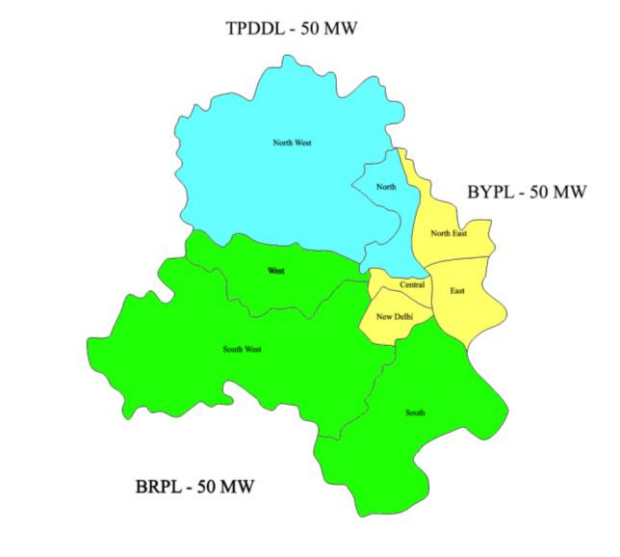

Figure 1: 150 MW tender proposal for Delhi's three DISCOMs

Each tender could be for about 50 MW. The identified developer should bid for the PPA rate and capital cost through the tender. The developer should complete the project within one year. Based on the experience with this pilot for 150 MW, it could be scaled up to 1,000 MW in Delhi.

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