



MEASURES TO ADDRESS DISCOMS' RISKS REGARDING THE EXPANSION OF SOLAR ENERGY

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1. Introduction

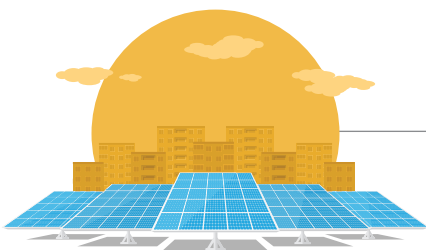
India has substantial potential for harnessing solar energy. India's solar target of 100 GW by 2022 is correspondingly ambitious and is on a progressive path for achieving appreciable solar figures till 2030. Foreign investment in the Indian solar sector holds significance to realize achievement of these targets. The project of Germanwatch and TERI with the further partners—CSTEP, Vasudha Foundation, and CANSA—tries to bring together actors from civil society, financial institutions, and government agencies, and research organisations in a multi-actor partnership to identify instruments for de-risking foreign solar investments in India. The present report focusses on the business model of the distribution companies (DISCOMS) and their risks with and potential benefits of India's expansion of solar energy.

2. The DISCOMs' Business Case and Solar Energy

Power distribution is considered as the most important component in the Indian power sector value chain.

Dominated by conventional sources of energy (coal, diesel, gas, nuclear, and large hydro) and a progressive shift towards renewable sources (wind, solar, bio, and small hydro), India's power sector is saddled with various issues, including electricity demand slowing in tandem with economic growth during 2019, and exacerbated by the impact of COVID-19 in 2020. In order to minimize investors' reluctance to investments in solar and other renewable energy projects, the DISCOMs will have to be rediscovered and redefined consolidating their character, befitting for the renewable energy age.

State-owned power DISCOMs are currently struggling with massive debt to the thermal power sector. According to recent estimates, there are some US\$100bn of non-performing or stranded assets shared between the coal- and gas-fired power plant sectors and DISCOMs. Additional to other struggles, the sharp drop in the price of electricity from solar and wind energy projects, otherwise a beneficial development for reaching India's renewable targets, is prompting their most resourceful commercial and industrial customers to choose to buy electricity from private consumers under the open access scheme. As this current situation is expected to persist under India's expansion of renewable energy, it will be difficult to see how India's DISCOMs can recover. While the government has tried to improve the condition of DISCOMs through relief packages several times, there have been several reports of DISCOMs delaying payments to solar and wind energy developers, particularly in Andhra Pradesh, Tamil Nadu, Madhya Pradesh, and Telangana. This situation causes distrust among enhance the DISCOMs' operational and financial efficiencies, one of the most important aspects that needs action, to make them no longer a barrier for the solar energy extension.



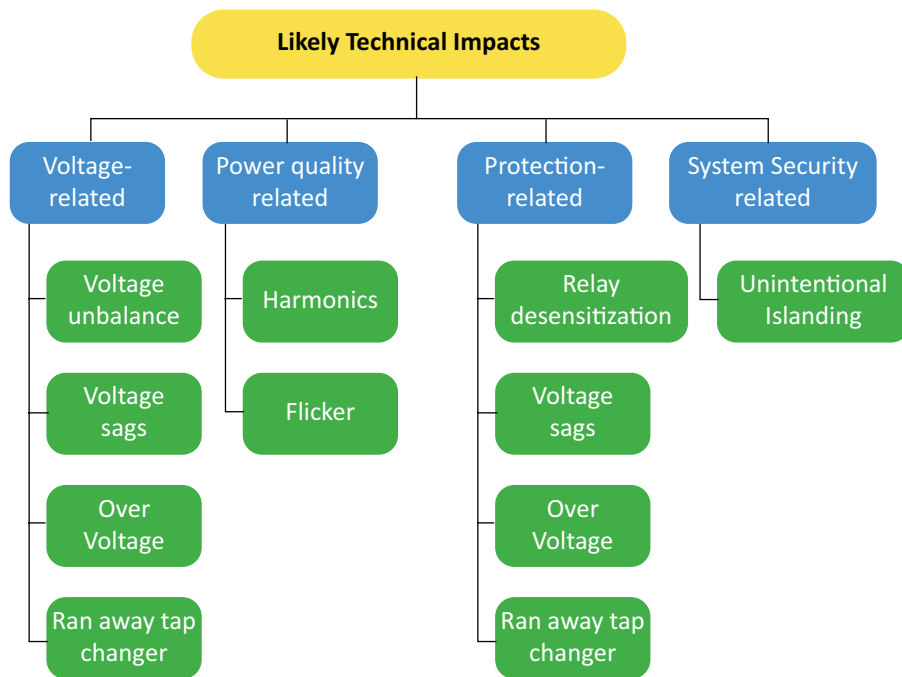
3. DISCOMs' Struggles with and Potential Benefits of Solar Energy

3.1 DISCOM's Challenges

Rooftop and decentral solar—in contrast to ground-mounted, large-scale solar parks— provide DISCOMs with considerable challenges:

1. **Threat to revenue:** DISCOMs usually anticipate substantive revenue loss from decreased energy sales and the amount payable by them for any excess energy generated and injected into the grid.
2. **Charges to be paid for earlier signed power purchase agreements (PPAs):** Despite reduction in power procurement, the DISCOMs will still have to pay the fixed-charges to the generators, as the contracted power cannot be surrendered under their long-term PPAs. Usually, the state energy-generating companies are not in a favour of reducing the power procured by the DISCOMs from them. DISCOMs, therefore, find solar rooftop implementation as a leading reason to unwanted revenue loss.
3. **Added infrastructure:** DISCOMs are faced with an increased burden of additional infrastructure in order to integrate the growing number of rooftop systems into their grid, especially if their existing distribution infrastructure is not in good condition.
4. **Cross-subsidy:** Since it is the high-revenue consumers, with generally larger rooftop space, install solar rooftop systems, the quantum of energy charges realized reduces, while the low-paying consumers, with smaller/ no roof space will continue to depend on DISCOMs for power supply. Thus, there is an increased burden of cross-subsidy on non solar consumers, more so on the low-paying ones.
5. **Operational challenges:** With proliferation of solar rooftop, various studies have anticipated that the utilities may face some operational challenges while integrating these solar rooftop systems into their grid. The operational challenges may vary, from demand balancing and variability of power generation to daily operational burden, such as application processing, inspection and connectivity, metering and billing.
6. **Lack of skilled and trained staff:** The increased administrative burden in the form of application processing, inspection and connectivity, metering and billing due to RTS has its own impact on DISCOMs as the same has not been handled adequately. There are not many personnel present with requisite knowledge on solar rooftop and hence the need for capacity building is required for accelerating deployment of solar rooftop.

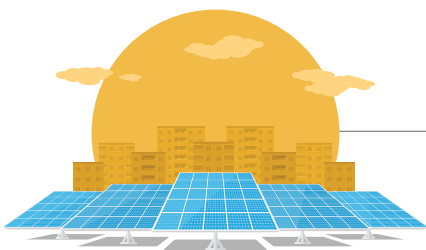
7. **Time-of-day (ToD) framework:** This issue has an impact on both-financial and operational aspects as consumers can use their excess solar generation exported to the grid during off-peak hours to settle energy imported from the grid during peak time. In the process, the utility grid is treated as a back-up power source by these consumers.
8. **Safety and security:** Issues related to safety and security are mainly encountered during operation and maintenance of grid.
9. **Technical impacts:** These are mainly caused as a result of phase imbalance which is principally attributed to the factors such as solar rooftop projects, quality of utility power, voltage-relates difficulties, power quality issues, protection and system security-related difficulties.



3.2. DISCOM's Potential Financial Benefits

A cost-benefit analysis study carried out by CEEW for BSES Rajdhani Power Limited has shown that solar rooftop is beneficial for DISCOMs. The study, which covers a period of 25 years, concludes that the following benefits are realistic:

1. **Avoided generation capacity cost (AGCC) and avoided power purchase costs (APCC):** DISCOMs procure power to meet the daily peak demands through long-term PPAs and via open markets. Since rooftop solar power will reduce the contracted capacity for a new PPA, DISCOMs can dramatically reduce their fixed electricity procurement costs. These savings come with the advantage of avoiding the expense of generating capacity.



2. **Avoided transmission charges (ATRC):** The transmission fees refer to the fixed charges applied for the sharing of the electricity transmission network from far-flung power stations. As higher solar rooftop capacities contribute to the elimination of extra transmission capacity acquisition, these savings are compensated for the gain of the ARTC.
3. **Avoided distribution capacity cost (ADCC):** The DISCOMs are needed to increase their distribution transformer capacity in order to be able to respond to the higher load as the peak demand rises. Through renewables along with storage, this peak demand can be minimized and the infrastructure augmentation charges can be deferred.
4. **Avoided renewable energy certificate cost (ARECC):** Within the DISCOM service area, producing grid-interactive rooftop solar systems contributes to the achievement of their RPO goals. Thus, DISCOMs will reduce the purchase of renewable energy certificates by encouraging the adoption and integration of solar rooftops.

4. Discussion of Identified Challenges and Initial Solutions

DISCOMs need to be equipped, alleviating their concerns, to make them more acceptable, to all the stakeholders' investors in particular. A few of the identified challenges that the DISCOMs face are detailed below, with a view to find potential de-risking measures.

1. DISCOMs' financial health needs to improve.

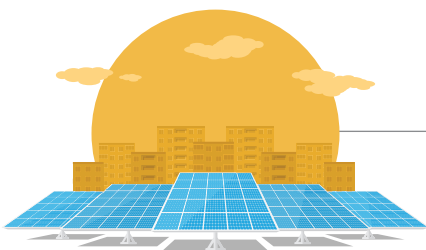
The widening of average cost of supply (ACS)–average revenue realized (ARR) gap, the huge pile-up of accumulated losses and the dismal operational performance of distribution utilities has exacerbated the financial situation of power generators, especially the private independent power producers. DISCOMs form a crucial link in the power sector value chain as they collect payments from multiple categories of consumers against the energy sold to provide necessary cash flows to the generation and transmission sectors to operate. The viability of the power sector spectrum hinges on the financial health and operational efficiency of state distribution utilities.

Even though the book losses of DISCOMs have declined on an overall basis in FY18 as compared to that in FY17, severe financial stress in the distribution sector is evident.

Any stress on their finances is transmitted across the value chain in the form of delays or defaults in payments to generators, which may also result in bad loans (NPAs) for banks. Owing to this interdependence, continued losses on the part of DISCOMs could jeopardize India's renewable energy mission. Infusion of funds by the central and state agencies in order to accommodate the ever-increasing DISCOM losses shall be a good start. Together with this, rapid action at the structural level is required to restore DISCOMs' financial health. In addition, a systemic shift can help establish a robust power sector.

2. Privatization of DISCOMS is on the cards, to start with the UTs.

Considering the fact that the state-owned DISCOMs are in shambles financially, administratively and operationally, privatizing them can be one of the few viable solutions available at hand. Privatizing DISCOMs shall augment their ability to collect revenues, reduce debt, and increase earnings. Through privatization, and by hiring professional and experienced management to lead these distressed utilities, they may be able to fare better. Further, this may enable them to increase revenues, reduce inefficiencies, and provide a better overall consumer experience. Privatization of DISCOMs will assist in reducing transmission and distribution inefficiencies and improving the health of the DISCOMs, which is crucial to attracting long-term capital in the sector. This will also enable the next set of



reforms for the sector towards the disintegration of content and carriage. These measures will ensure that the sector gets long-term stable and uniform policies that will accelerate private sector investments in the renewable energy sector.

3. State governments need to structure their governance towards DISCOMS properly.

The UDAY scheme by the central government in 2015 mainly enabled a reduction in the interest cost for participating DISCOMs, led by debt refinancing and take-over of debt by their respective state governments. However, slow progress in efficiency improvements by DISCOMs and delays in the tariff-determination process remained the areas of concern. Even in the recent Atmanirbhar Bharat package, the funding to each state DISCOMs will be contingent on the respective state government undertaking to clear departmental dues to its DISCOM, and putting in place a credible mechanism to release the subsidies.

There is now an urgent need for the state governments to show strong political will and focus on the financial turnaround of their respective DISCOMs so as to minimize operational inefficiencies and ensuring the viability of operations. The fact that electricity is a concurrent subject; and participation on the part of both state and central governments is needed to benefit the DISCOMs. Hence it is evident that without the support of state governments, the DISCOMs cannot function in the desired manner.

4. Disbursements of subsidies to DISCOMS by state governments need to be taken care.

According to the Ministry of Power's (MoP) payment ratification and analysis portal, PRAAPTI, outstanding dues from DISCOMs to power generators at the end of October 2019 stood at INR 844.45 billion (~\$11.83 billion), up by INR 297.76 billion (~\$4.17 billion) or 54% from the same period last year. A significant challenge faced by DISCOMs in India is the increasing average technical and commercial losses (AT&C), which are primarily caused by power theft, poor payment collection procedures, and inadequate tariff hikes. Meanwhile, there have been multiple reports of DISCOMs delaying payments owed to solar and wind energy developers, mainly in the states of Andhra Pradesh, Tamil Nadu, Madhya Pradesh, and Telangana.

The state governments have regularly failed to pay struggling distribution utilities for free power supplied to farms and unmetered consumers, though states claimed to have made substantive payments. Free electricity to farmers and other such subsidies has burdened DISCOMs and generators, where average aggregate technical and commercial losses are at 21.4%, among the highest in the world.

Support by the state government to DISCOMs in the form of better governance is covered by disbursement of subsidies in a timely manner. The Electricity Act, 2003, states that subsidy declared for any consumer or class of consumers must be paid by the state government in advance to the distribution licensee. However, this has not been practised by state administrations.

The faster the subsidies are released by the state governments, the better shall be the financial condition of the DISCOMs.

5. Competitive sale price of kWh is good for DISCOMS

From the commodity perspective, the core product bought, sold, and traded in the market is electrical energy. In this regard, power plants generate electricity and sell it in the energy market. “Load servers” or suppliers buy the electricity wholesale in the marketplace and supply it to retail consumers. This is the electricity that is bought from the local utility or independent “suppliers”, that is, DISCOMs.

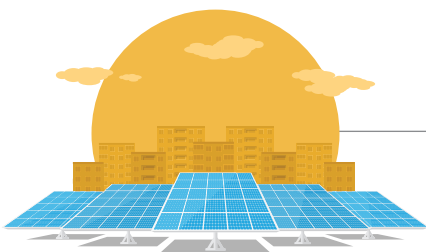
A competitive cost of kWh shall lead to a better average revenue realized (ARR) which in turn shall be beneficial for the DISCOMs. Since most of the DISCOMs in the country are facing a huge gap between average cost of supply (ACS) and ARR, thus a competitive cost of kWh shall lead to reduction in this gap and overall help the DISCOMs to gain financial stability. Moreover, with reduction in aggregate technical and commercial (AT&C) losses over the years and with better billing and coverage by the DISCOMs, a competitive sale price of kWh will result in a profitable business for the DISCOMs.

6. Risk is directly proportional to the newness of technology.

Any move that leads to spending of large amounts of money is undeniably highly risky. However, concentrating on the fact that the condition of DISCOMs in the country is very critical, the risk is worth taking. With the demand of power growing with every passing year, and with the installation of mega solar plants, rooftop PV and wind systems across India, the upgradation of the infrastructure has to take place.

One such example of upgradation of infrastructure in a private DISCOM has been of Reliance Infrastructure Limited (R Infra), which caters to the electricity needs of over 2.9 million customers in Mumbai, has implemented a host of IT and operational technology initiatives such as supervisory control and data acquisition (SCADA), distributed management system (DMS) and outage management system (OMS). Through these initiatives, it has set up an intelligent grid and smart metering infrastructure, undertaken asset management and enhanced operational productivity.

All these actions implemented by the DISCOM have led to increased coverage, security, theft detection and overall better services. Nevertheless, there must have been an initial cost to set up but the results have been quite impressive and hence the risk is justified.



5. Recommendations

The following suggestions are meant to recommend de-risking strategies of different kinds, addressing the struggles of the DISCOMs:

1. Structural changes of the entire power sector, addressing reduction of losses are needed at rapid pace.
2. Privatization of the DISCOMs needs to be expedited.
3. Political will is required towards good governance of the DISCOMS through appropriate structures.
4. State governments need to take serious measures to disburse the subsidies to DISCOMs. Centre can initiate some measures though electricity is a concurrent subject.
5. Competitive pricing of electricity on both sale and purchase by DISCOMs needs to be achieved, by addressing the subsidies to conventional power, phasing out of subsidies to agri-sector, while phasing out and/or trending towards decline of adding new coal thermal power plants will take at least a decade in the country.
6. Upgradation of infrastructure of DISCOMs, with latest state-of-the-art systems, for instance, IT and modern operational technologies (such as SCADA, DMS, and OMS), an integrated programme including creating a robust system, though demand substantial investments from the government's exchequer, is highly warranted.

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