

Indian Electricity Distribution Companies amidst Churn: Understanding Present Challenges and Shaping Future Opportunities

12 February 2024

Ann Josey, Shantanu Dixit, Sreekumar Nhalur, and Manasi Jog

Financial Losses of Electricity Distribution Companies and Their Implications for State Public Finance

State-owned electricity distribution companies (DISCOMs) supply approximately 80% of India's electricity requirement.¹ By the fiscal year 2021–22, these companies had collectively accumulated losses of around Rs. 5.74 lakh crores (PFC, 2023). These losses have been increasing annually by 7% on average since 2015–16. Ujjwal DISCOM Assurance Yojana (UDAY), launched in November 2015, is a financial restructuring package that aims to facilitate the takeover by state governments of the mounting liabilities of DISCOMs from commercial banks and other lending institutions. However, despite the scheme, the loss build-up has been substantial.

In most states, the growing losses and indebtedness of DISCOMs are managed through state government support, which includes a variety of measures:

- **Revenue Subsidies:** These are provided to ensure that certain consumer segments can afford power. In 2021–22, the support amounted to Rs. 1.4 lakh crore for all state-owned DISCOMs (PFC, 2023). On average, such subsidies amount to about 18% of the revenue required by the DISCOMs. However, in Karnataka and Madhya Pradesh, the support is as high as 40% to 50%.
- **Grants or Equity Infusion:** This support is essential for timely and necessary capital investments. A substantial proportion of such grants are central sector grants under electrification and network strengthening schemes, e.g., the Revamped Distribution Sector Scheme (RDSS), Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY), and the Integrated Power Development Scheme (IPDS). A total of Rs. 1.1 lakh crores was provided to DISCOMs in 2021–22 by central and state agencies (PFC, 2023).
- **Annual Loss Takeover:** Eleven states have agreed to power sector reforms under which the borrowing limit is relaxed under the Fiscal Responsibility and Budget Management (FRBM) scheme.²

¹ Private DISCOMs account for about 5% of the supply and captive generating companies for about 15%. Commercial and industrial consumers have invested directly in captive generating companies to procure power from them.

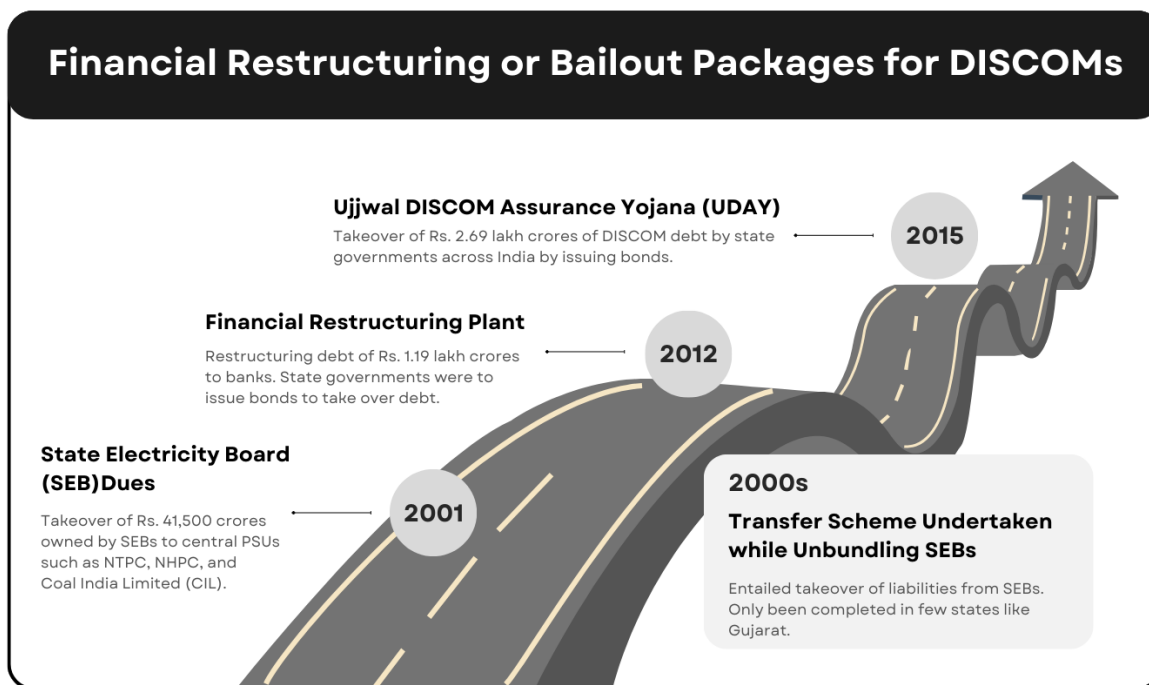
² In 2021–22, on the recommendations of the 15th Finance Commission, the Government of India relaxed the borrowing limit for states subject to improved performance in the power sector, among other conditions. One of the performance improvement criteria was for state governments to agree to take over the losses of DISCOMs each year. It is not clear if all of these states have agreed to this criterion.

These states are Andhra Pradesh, Madhya Pradesh, Goa, Punjab, Rajasthan, Himachal Pradesh, Manipur, Odisha, Telangana, Tripura, and Uttarakhand (DEA, 2023). As part of the power sector reforms, some of these state governments have agreed to take over the losses incurred each year by DISCOMs (DEA, 2022). The approximate estimated total annual loss takeover for these 11 states would be to the tune of Rs. 24,000 crores for FY23 alone.³

The aggregate annual losses of state-owned DISCOMs are comparable to 35% of the aggregate revenue deficit of state budgets in 2021–22 (RBI, 2023; PFC, 2023). There is wide variation in the extent of losses across states but the fact remains that if state governments were to take over annual losses, the impact on state finances would be significant.

The scale and critical nature of DISCOMs’ liabilities have prompted several past attempts at mitigation. Since 2001, DISCOMs have seen four major financial restructuring/bailout packages for past liabilities as shown in Figure 1 (MoP, 2012; Planning Commission, 2001; MoP, 2015). In 2001, 2012, and 2015, each scheme was contingent on many conditions for improvement in the operational performance of DISCOMs. However, with each scheme, the outstanding liabilities identified for takeover grew and in each case were close to 2% of India’s GDP at the time.

Figure 1: Financial restructuring or bailout packages for DISCOMs



The extent of support required in many states is significant enough to transform the DISCOM financial crisis into a public finance challenge. This article discusses the current predicament faced by DISCOMs. However, the main thrust of this piece is on how technological advancements and market structure changes will further adversely impact DISCOMs’ business unless timely actions are taken. Such impacts

³ This estimation is based on the unrecovered expenses from FY22 even after subsidy contribution and assuming a 5% average increase in sales by FY23 and a 4% increase in average per unit cost and similar increase in revenue.

will increase the dependence of DISCOMs on fiscal support, thereby intensifying the public finance challenge. The article also highlights changes that must be made to the role of DISCOMs to help them adapt to the future energy landscape. The aim of such changes is to ensure DISCOM viability, ease the burden on the state exchequer, and protect small consumers who rely on publicly owned DISCOMs for their electricity needs.

Understanding DISCOM Losses: How Did We Get Here?

The significant debt and losses of DISCOMs can be attributed to multiple factors: those that increase the costs of supply and those that result in poor revenue recovery. Table 1 details these factors.⁴ Many of these factors have been highlighted by policymakers over the years (Planning Commission, 2011; MoP, 1980; MoP, 2021; MoP, 2022a).

A key aspect of power sector regulation in India is that pricing, especially in the transmission and distribution segments, is predominantly based on a cost-plus framework. Here, companies are guaranteed a fixed regulated rate of return on prudent costs incurred. This arrangement offers limited incentives for improving efficiency. Another important aspect is that DISCOMs' financial challenges affect the entire power sector value chain. The accumulated liabilities have significantly impacted DISCOMs' ability to make timely payments to generating companies and have heightened the exposure of banks to the financial risks associated with DISCOMs.

Table 1: Factors that contributed to DISCOMs' losses and liabilities till date

Factors	Major Head	Contribution to Increasing Losses
Increase in the cost of supplying power	Power procurement	<ul style="list-style-type: none"> • Accounts for about 70% of costs incurred by DISCOMs. • Poor planning led to investments in high-cost, long-term contracts. • Delays and cost overruns in some projects increased capital costs. • Increase in coal price and inefficiencies in the coal sector. • Contract changes for fuel price risk pass-through to DISCOMs.
	Transmission, distribution works	<ul style="list-style-type: none"> • Accounts for 20% of DISCOM costs. • Delay and cost overruns in projects. • Slow adoption of competitive bidding towards cost efficiency.
	Operation & maintenance (O&M)	<ul style="list-style-type: none"> • Accounts for about 7–10% of the costs incurred by DISCOMs. • O&M and crucial capital investments are often neglected, affecting supply and service quality, which results in poor revenue recovery.
	Energy losses	<ul style="list-style-type: none"> • Increased loss implies lower revenue recovery and higher power costs. • Poor metering, issues with energy accounting, and theft are contributors.
Revenue increase not	Tariff increase to meet	<ul style="list-style-type: none"> • Despite an annual 4% increase in cost, electricity tariffs in many states were not revised regularly. From 2001 to 2020, there

⁴ It is important to note that the factors outlined in Table 1 are often interrelated, and their impact on DISCOM finances varies from state to state. Therefore, conducting state-level assessments of DISCOM finances is crucial to understand and address these financial challenges.

commensurate with expenses	increase in costs.	<p>was no increase for 7 and 10 years in Rajasthan and Tamil Nadu, respectively (PEG, 2020a, 2020b)</p> <ul style="list-style-type: none"> • Delays in recovering legitimate DISCOM dues increased the interest burden. By 2017, only eight states levied quarterly fuel surcharges in their bills to address this (PEG, 2017).
	Change in sales composition	<ul style="list-style-type: none"> • Commercial & Industrial (C&I) consumers with demand >1 MW use third party contracts and invest in captive generators to meet their energy requirement, leading to revenue attrition for DISCOMs. • A shift in the sales mix occurred for a short period with COVID-19-related lockdowns. • Ongoing, gradual shift in the sales mix due to newly electrified consumers in states such as Uttar Pradesh, Bihar, and Assam.
Inefficiency in revenue recovery	Pending dues from consumers	<ul style="list-style-type: none"> • Delays in bill payment led to cash flow challenges for DISCOMs. Typically, collection efficiency is lower for agricultural and residential consumers. • In states such as Karnataka and Maharashtra, build-up of arrears during COVID-19-related lockdowns led to high-interest borrowing.
	Delay in payment of subsidies and bills by government departments	<ul style="list-style-type: none"> • Subsidy support from state governments is significant in most states and delays in payment affect DISCOM finances. • For example, a delay in payment of 15% of the promised subsidy in FY22 implies an annual additional interest cost burden of Rs. 2,000 crores in FY23. • As of 30 June 2022, dues owed by government departments amounted to Rs. 65,300 crores nationally (MoP, 2022a).
Increase in short-term borrowing		<ul style="list-style-type: none"> • DISCOMs incurred high-cost, short-term loans to meet their working capital requirements • The bulk of the liabilities taken over under Ujjwal DISCOM Assurance Yojana (UDAY) were working capital loans by banks that accumulated to Rs. 3.24 lakh crores by 2015 (PIB, 2023a).

In recent years, the power sector has seen several improvements. For instance, annual tariff determination processes have become more regular, with almost all states notifying tariff orders for FY22. States are adopting innovative practices: Maharashtra now announces its tariff trajectory for a five-year period with a provision for mid-term revisions, and Tamil Nadu has linked tariff increases to inflation for automatic annual adjustments (MERC, 2023; TNERC, 2023). By 2023, over 22 states and union territories had started imposing fuel surcharges, a notable increase from just 8 in 2017. Some states initiated levy of the fuel surcharge following amendments to the Electricity Rules in 2022. This change has helped DISCOMs recover costs for power purchase more efficiently. Additionally, there has been an improvement in subsidy payment discipline by state governments in recent years (PFC, 2023). The Ministry of Power's (MoP's) amendments to the Late Payment Surcharge Rules in 2022 introduced stringent penalties, such as reduced access to the national grid in case of overdue payments to generators (MoP, 2022b). Since its implementation, dues to generators (excluding state-owned companies) decreased from Rs. 1.2 lakh crores in June 2022 to Rs. 61,000 crores in July 2023 (PIB, 2023b).

In 2022, the MoP also notified 14 additional prudential norms applicable for all new sanctions and disbursements by lending agencies. These include regular publishing of audited annual accounts, filing of tariff and true-up petitions, and timely payment of government subsidies and government department dues. Borrowing to meet working capital requirements has also been restricted to 35% of the total DISCOM revenue. This norm was revised upwards from the existing norm of 25% after strict mandates to ensure timely payments to generators.

However, sustaining these changes requires concerted and focused efforts. As state governments broaden subsidies to a larger consumer base, fiscal pressures may hamper timely subsidy payments. Upcoming elections in many states could delay tariff revision and fuel surcharge implementation, potentially leading to losses. Additionally, the need to ensure timely payments to central and private sector generators may result in further increase in working capital borrowings, and the interest burden may lead to further financial pressures.

The Era of Consumer Choice and the New Challenges Facing DISCOMs

In addition to these challenges, recent trends have resulted in a new set of financial issues for DISCOMs. Chief among them is the fact that consumers accounting for about 40% of DISCOM sales have the technology option, legal eligibility, supporting framework, and economic incentive to reduce their dependence on DISCOMs and source power from non-DISCOM sources. This is detailed in Figure 2.

Figure 2: Enablers for migration of sales away from DISCOMs

The technology option	Renewable energy (RE) is modular, scalable, and low cost. Unlike coal, it does not require large investments, has shorter gestation periods, and no fuel risk. Most of the cost is for capital works in a competitive, technology-intensive industry, which makes it inflation resilient.
The economic incentive	Commercial and Industrial (C&I) consumers pay about Rs. 8 per unit of energy supplied. Even after paying various applicable charges and duties, third-party consumers and captive users save 17% and 30%, respectively, in comparison with the DISCOM tariff.
The eligibility	Only consumers with demand > 1 MW were eligible for supply via third-party contracts or captive investments. In 2022, the Green Energy Open Access Rules were notified, reducing the eligibility limit to 100 kW for third-party RE contracts. All consumers became eligible to set up RE captive plants and use the DISCOM network.
The support framework	To ensure reliable supply, DISCOMs provide crucial services, especially provision of network services, standby power, and banking (where surplus renewable energy is injected by consumers at one time and equivalent energy is drawn from the DISCOM at another time). Without such services, consumers would not have a choice of supply from alternative sources.

For consumers, the ability to choose their supplier offers a range of benefits, enabling active engagement in the market and the discovery of competitive prices. For DISCOMs, these developments introduce a trifecta of challenges that may adversely impact their financial standing in the medium term:

- **Revenue Challenge:** Now that DISCOM consumers accounting for about 40% of sales can choose alternative suppliers in most states, there is the danger of significant revenue attrition from

segments that pay at or more than the cost of supply and that pay in a timely manner. Charges such as cross-subsidy surcharge, which are designed to compensate for this loss of revenue, are inadequate; moreover, they apply only to third-party open access contracts. The revenue attrition could be substantial with captive consumers, who are exempt from these charges. Many sector commentators have written about the challenge due to the loss of cross-subsidy revenue. As detailed in Box 1, over time, industrial consumers are being charged closer to the cost of supply, thus reducing cross-subsidy revenue. To compensate for this revenue loss, the state government subsidy has been increased.

- **Planning Challenge:** The demand that DISCOMs can expect from consumers who have multiple supply options is uncertain due to the variable nature of renewables and the variable durations of such contracts, which could be a day, a season, or years. This creates major challenges for DISCOMs in scheduling and dispatch as well as in long-term power procurement planning. For DISCOMs that always planned to meet the demand of the entire state, ensuring power availability for its consumers while meeting the reliability requirements of migrating consumers imposes additional costs and risks of overbuilding.
- **Pricing Challenge:** As Figure 2 shows, consumers can choose alternate supply sources only if DISCOMs provide services for wheeling energy through their network, banking services for surplus renewable energy (RE), and standby power in case the consumer's supplier fails to provide power. Currently, the DISCOMs' business model and tariff structures do not price these services in a way that fairly compensates DISCOMs. For example, in Karnataka, the state with one of the largest number of third-party green contracts and captive users, banking services were charged at Rs. 0.06 per unit of energy used in 2020 when the cost of banking was estimated to be 10 times higher, closer to Rs. 0.6 per unit (PEG, 2022). Most other states also have highly concessional frameworks for RE banking.

Box 1: The role of cross-subsidy revenue and state government subsidies

For DISCOMs operating on a cost-plus basis, tariffs are typically set considering the average cost of supply and the cross-subsidy support needed to make electricity affordable for certain consumer categories. In general, residential and agricultural consumers pay less than the cost of supply, a shortfall that is offset by the higher tariffs paid by Commercial and Industrial (C&I) consumers. However, because DISCOMs' costs have increased and more consumers have switched to competitively priced supply sources, the scope for cross-subsidisation has diminished. Also, almost all regulators are now setting tariffs for industrial consumers that are closer to the actual cost of supply.

A study of 10 states, representing 63% of DISCOM sales, revealed that in 2020–21, cross-subsidy revenue constituted less than 10% of the total revenue needed by DISCOMs in seven of these states (ETPI, 2023). In fact, in these ten states, state government subsidies constitute the majority of subsidy support.

Traditionally, consumer tariffs and state government subsidies for agricultural consumers in most states together constituted about 50% of the cost of supply, implying significant cross-subsidy support. However, recent trends in states such as Madhya Pradesh, Rajasthan, and Bihar show that regulators are setting tariffs at more than 80% of the cost of supply, significantly reducing the need for cross-subsidy revenue and requiring a commensurate increase in state government subsidy to maintain free or low-tariff supply for agriculture (BERC, 2023; MPERC, 2023; RERC, 2023).

In Maharashtra, several residential consumer segments are now contributing to cross-subsidisation. For example, while the average cost of supply for the Maharashtra state DISCOM is about Rs. 8.45 per unit, residential consumers using over 100 units pay between Rs. 12 and Rs. 17 per unit of power. Such reductions in cross-subsidy requirement will increase the government subsidy requirement.

To overcome these challenges, DISCOMs have been discouraging third-party contracts and captive consumption through various operational, regulatory, and procedural barriers. Nevertheless, the advent of the Green Energy Open Access Rules in 2022, technological advancements, and the increasing economic viability of storage technologies make sales migration both imminent and inevitable. The impending shift in sales, coupled with the current operational structure of DISCOMs, suggests the following implications for the future:

- **Small consumers to rely on DISCOMs, implications for subsidy and service quality:** DISCOMs will predominantly serve agricultural and smaller residential consumers, whose tariff is much lower than the average cost of supply. Without substantial and timely government subsidies and given the limited potential for cross-subsidy, DISCOMs would lose about Rs. 3–4 per unit of supply to these consumers. In such a scenario, DISCOMs may neglect these consumers, and the quality of supply and service for these groups may deteriorate further.
- **Long term power procurement for base load to be challenging with demand uncertainty:** The cost of supply will be considerable if DISCOMs continue procuring power to meet the demand and ensure reliable supply across the state, including for migrating consumers. This approach risks overbuilding capacity, leading to resource lock-ins, inefficient investments, and stranded assets.
- **Crucial DISCOM services will remain underpriced in the current tariff regime:** In the absence of pricing changes for DISCOM services, essential services such as standby and banking will remain underpriced, exacerbating the losses of DISCOMs, which are already burdened by existing challenges.
- **Critical price signals for adoption of new technologies may not be provided:** Because RE, which is variable and intermittent, is managed through underpriced DISCOM services, consumers and investors may not receive accurate price signals. This lack of proper signals could hinder the adoption and scaling of vital technologies for energy storage or the shifting of energy demand to align with the availability of renewables, thereby impeding the transition to RE sources.

To reduce the public finance burden given the financial challenge of DISCOMs, it is crucial that DISCOMs evolve to play different roles with different pricing structures.

From DISCOMs of Today to NETCOMs of the Future

DISCOMs currently fulfil several key roles, chief among them being the primary supplier of power. This also makes DISCOMs the dominant user of the network. DISCOMs have the obligation to supply power to all consumers located within their licence areas. Consequently, DISCOMs currently develop power procurement plans and strategies to satisfy the demand of their entire area of supply. Because most consumers rely on DISCOMs for network access, supply, and additional services such as standby support, the prices of all services are also bundled or consolidated to one tariff for each category of consumer.

However, the landscape is shifting towards a future where the DISCOM will no longer be the principal power supplier. The DISCOM’s role will transition from being the grid’s main user to managing the network for safe and reliable supply.

Even if numerous suppliers operate in the future, there are vital services that only an entity such as the DISCOM can efficiently provide. These services include provision of a robust and reliable network, banking, and supplier of last resort to ensure reliability for all consumers and continued supply for small consumers, who do not have access to alternate supply options. Let us refer to the transformed future DISCOM with different roles as a network service company (NETCOM). Table 2 lists the indicative responsibilities of the NETCOM.

Table 2: The NETCOM’s roles and responsibilities

Reliability and Affordability	Specifically for small consumers, who cannot migrate. Power procurement would focus mainly on fulfilling supply obligations to these consumers.
Network Planning	As multiple buyers and sellers will be users of the network, one entity should be responsible for detailed planning of network expansion and augmentation.
Network Management	Wheeling services to allow consumers to use the network for procuring supply. In addition, NETCOMs would have to continue to reduce outages, maintain technical power quality, reduce accidents, and conduct timely network maintenance.
Energy Accounting	Ensuring accurate metering, monitoring power injection and withdrawal within the network, and accurately estimating network losses.
Standby Services	Guaranteeing reliable supply to consumers when their regular suppliers are unable to provide power.
Renewable Energy (RE) Grid Integration	If a single entity provides banking and balancing services for RE, the cost of integration will drop and the process will be accelerated. NETCOMs will continue to provide banking and balancing services to consumers who opt for renewable supply.

NETCOMs will focus on ensuring reliable supply for small consumers and enabling freedom of choice for other consumers by providing key services. These services must be accurately accounted for and cost-priced to sustain NETCOMs financially. State government support will be essential for transitioning from DISCOMs to NETCOMs, though this support can be gradually reduced.

Transitioning a DISCOM to a NETCOM will require efforts on multiple fronts in the medium term. The following steps will facilitate this transition and reduce the associated financial burden:

- **Unbundle pricing for services:** Identify and price crucial services provided to network users at cost. This can immediately take place for services such as banking and provision of standby power. To price at cost, pricing also needs to be dynamic and detailed because the cost (which is related to changes in price and the quantum of power injected and drawn) will change with time, and investments in technologies for hourly and sub-hourly (15 minute) energy accounting for migrating

consumers are crucial. With cost-reflective charges for such services, it is hoped that procedural barriers hindering sales migration will reduce.

- **Recalibrate Time of Day tariffs:** Tariffs should be calibrated to reflect hourly and seasonal demand and price variations, especially with increased RE use. DISCOMs should consider providing substantial rebates during the day when low-cost solar is available or during high-wind seasons in a bid to be competitive. Such rebates are also specified in the Electricity (Rights of Consumers) Amendment Rules notified by the MoP in 2023 (MoP, 2023). At the same time, tariffs should be substantially higher during peak demand periods in the morning and evening hours and during summer and coal shortage months to reflect the system cost. A large number of consumers should be covered under such dynamic tariffs. The Rules stipulate that consumers with demand greater than 10 kW should be subject to such tariffs (MoP, 2023).
- **Inflation-linked tariffs for small consumers:** Link tariff increases for small consumers to inflation. This will enable timely and reasonable tariff increase for small consumers. DISCOM efficiency gains and government subsidy can help address under-recovery of costs that may persist for a few years.
- **Accelerate RE procurement:** Prioritise and accelerate deployment of low-cost renewables and investment in necessary storage technologies. DISCOMs should ensure that all demand increase is met through renewables. This would also require investment in storage technologies to effectively utilise variable RE. Evidence from production cost modelling exercises in Karnataka, Gujarat, Maharashtra, and Rajasthan demonstrates that meeting 40–50% of the states’ annual energy requirement with renewables and storage is the least cost strategy for 2030 (PEG, 2021a; Idam Infra, 2023a, 2023b, 2023c, 2023d).
- **Solarise agricultural feeders:** Agricultural consumers account for about 25% of DISCOM demand in India and receive the bulk of state government subsidies (PFC, 2023). The Government of India’s KUSUM scheme aims to install solar capacity of 1–2 MW on existing networks at feeders dedicated for supply to agriculture (MNRE, n.d.). Such schemes ensure reliable daytime power to farmers. With low-cost RE, the cost of supply to farmers decreases, which can cut the subsidy burden of the state government by as much as 30%. Despite its benefits, progress under the scheme has been limited (MNRE, 2023). The Government of Maharashtra recently launched Mission 2025 to deploy 7,000 MW, which will solarise about 40% of sales to farmers in the state by 2025 (GoM, 2023). Such efforts to accelerate deployment of these feeder-level solar plants are crucial to reduce the present and future cost of supply and the subsidy burden.
- **Detailed disaggregated network planning:** DISCOMs can start providing detailed circle-wise plans for network investments considering the growing demand, sales migration potential, and the extent of decentralised RE generation embedded in the network. Such detailed planning will help prepare for the NETCOM of the future.
- **Virtual net metering for public bodies:** To mitigate build-up of dues from public bodies that provide essential services, regulatory commissions can allow for virtual net metering (VNM) for these consumers. With this, state governments can set up RE capacity that is large enough to meet the

demand of these consumers. Under VNM, the generation from this capacity can be set off against the consumption of these consumers, reducing their bills to negligible amounts. This would prevent build-up of future dues to DISCOMs from these consumers (PEG, 2021b).

- **Group metering for small consumers:** To provide a wider net of consumers with a choice of suppliers, there should be a provision to allow a ‘group rooftop’ connection, in which a group of small consumers within the same DISCOM’s area of supply can put up or lease part of a rooftop system at a suitable location and get credit for generation from such a system. This arrangement can be extended to consumers with a demand of less than 10 kW. These consumers shall also pay fees, say, about 0.50 paise to Rs. 1 per unit consumed, to compensate the DISCOM for various services provided. Such a measure will extend choice to a range of small consumers and help democratise and unlock huge private investment in rooftop systems. It will also accelerate the transformation of the DISCOM to a NETCOM.

We have listed some key actions DISCOMs could implement in the coming years to evolve into NETCOMs. To stay ahead, a forward-thinking DISCOM should invest in advanced modelling techniques, develop skills in power trading, refine energy accounting practices, and smartly use RE and storage solutions to meet contemporary challenges. Most importantly, DISCOMs need to focus on building excellence in network planning and operation. Such a transformation requires a concerted effort from both central and state policymakers, who must work in tandem, fulfilling complementary roles under a unified vision for the sector’s future. The shift would also require clear regulatory frameworks and supportive policies developed through transparent, participatory processes to promote consumer choice and improve the operational efficiency of DISCOMs and RE.

Without this transformation, a rapid and unplanned sales migration could occur under a concessional regime, leaving the system unprepared for change. This scenario could jeopardise DISCOMs’ financial health, compromise the welfare of small consumers, and significantly increase the state’s fiscal burden for many years.

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