Diffused regulation of India's electricity distribution: A case study of a distribution region in Uttar Pradesh

Authors: Kanika Balani[1], Bharat Sharma[1] and Shalu Agrawal[1]

Abstract

Even after two decades of structural reforms, the governance and regulatory outcomes in the Indian power sector remain far from the expectations. In Uttar Pradesh (UP), the most populous Indian state, the electricity regulator is yet to emerge as an independent watchdog of the sector. Central ministry, state energy department and the parent holding company of the distribution companies (discoms) continue to partake in the sector's regulation.

The regulatory vacuum, so created, has allowed local actors to influence the governance outcomes. However, the existing literature does not adequately capture these developments. This paper investigates the influence of these actors vis-à-vis governance of electrification, supply quality and discom's revenue recovery operations. Using focus group discussions and interviews with electricity consumers and the discom staff in 15 villages, we study the case of Malihabad electricity sub-division in UP.

Our assessment highlights a diffusion of the rule-making powers, with instances of the central and the state governments overriding the regulator. The pre-existing power dynamics constrain the regulator from enforcing compliance, even as the discom continues to flout performance standards on supply quality, metering, billing and payments. Lack of an informed consumer base also prevents a bottom-up demand for accountability. As a result, local actors (discom staff, contractual agents, political representatives, etc.) create new norms, such as charging a facilitation fee to manage supply quality or resolve consumer grievances.

Our findings underscore the need to strengthen the role of the state regulators in the governance of distribution sector by closely engaging them in all policies affecting consumers' interests. Further, mechanisms for greater public accountability of discoms' and

[1] Kanika Balani, Programme Associate, Council on Energy, Environment and Water (CEEW);
Bharat Sharma, Research Analyst, CEEW and
Shalu Agrawal, Senior Programme Lead, CEEW

regulators' compliance with regulations need to be instituted to reduce the implications of the conflict of interest within. Finally, the policies governing the sector must account for the drivers and incentives for local actors to align their interests with the policy objectives.

Chapter 1: Introduction

Over the past three decades, the power sector across the developing world has undergone substantial transformation, initially occasioned by the Latin America's debt crisis and later championed by the World bank (Lee & Usman, 2018; Urpelainen & Yang, 2019). The reforms either led to complete privatisation of the utilities or unbundling of the sector with continued public ownership and creation of an independent regulatory regime (Urpelainen & Yang, 2019). The objective was to depoliticise the sector, bring operational efficiency, cost-reflective pricing, enhance energy supply quality and ensure sector's financial sustainability (Foster & Rana, 2020; Jamasb et al., 2017; Lee & Usman, 2018). However, the reforms have produced mixed results in achieving these objectives, as is also evident in India.

Following the economic liberalisation during early 1990s, India witnessed a slew of legislative reforms in the electricity sector, culminating in the Indian Electricity Act 2003. With an aim to address the deep-seated inefficiencies in the sector, the reforms unbundled the erstwhile state electricity boards into separate entities for generation, distribution and transmission, and created independent state electricity regulatory commissions (SERCs). As the quasi-judicial bodies, the SERCs were expected to de-politicise decision making and promote financial stability of the power distribution sector (Dubash & Rao, 2008; Swain, 2016). However, despite reforms, the sector continues to struggle with the fundamental challenges of providing affordable and quality electricity to all consumers, and ensuring timely revenue recovery for electricity distribution companies (discoms) and their financial sustainability.

In the fiscal year (FY) 2019, the public discoms' average aggregate technical and commercial (AT&C) losses in India stood at 22%, predominantly on account of inefficiencies in billing and collection (PFC, 2020). The situation is grimmer in Uttar Pradesh (UP), the most populous state in India, where the AT&C losses of the discoms stood at 33% in FY 2019 (PFC, 2020). Nearly two-fifth of power consumers in UP have never paid their electricity bills since receiving the connection (Shah & Chauhan, 2020). The gaps in revenue recovery are intricately linked with the poor electricity service delivery (Ganesan et al., 2019). According to a nationwide household survey, consumers in UP face the longest power outages in the country —8 and 4 hours of average daily outage in rural and urban areas,

respectively (Agrawal et al., 2020).The poor state of compliance in UP's electricity distribution sector underscores the need to study the contributing factors.

In UP, the state electricity regulator has apparently been unable to emerge as an effective independent watchdog of the discoms. The existing literature attributes such gaps in regulation to the limited autonomy (both financial and tenurial) vested with the SERCs, the intervention of the state government in the regulatory space and the broader political economy of free or cheaper electricity (Bhatt & Singh, 2020; Kale et al., 2018; Pargal & Ghosh Banerjee, 2014). Even the erstwhile state electricity board, as discom's parent holding company, continues to be key player in sector's regulation (Kumar, 2020). Besides these well-recognised factors, local actors (discom staff, contractual staff such as meter readers, public representative, etc.) also informally partake in the sector's governance, facilitated by the regulatory vacuum (Mahadevan et al., 2020; Sharma et al., 2016). However, this aspect is less explored in the literature, primarily because past studies rely predominantly on secondary literature, even though the ground situation is constantly evolving.

With the aim to fill this knowledge gap, this study attempts to respond to the following questions:

1. How does the regulatory command flow in the electricity distribution network of Uttar Pradesh?
2. What is the role of the local actors in influencing the governance outcomes in a local electricity distribution region vis-à-vis electrification, quality of supply and discom's revenue recovery?

To investigate these research questions, we adopt a case study approach, focussing on Malihabad -- a rural electricity sub-division in the MVVNL discom of UP. We choose a rural sub-division as the governance challenges in the distribution sector are more prominent in rural areas (Agrawal et al., 2020; Jain et al., 2018). Our findings are based on primary surveys with consumers, meter readers, and discom staff, as well as focused group discussions in 15 villages in Malihabad, which were conducted in October and November 2019.

Our study highlights that every stakeholder in a local electricity distribution ecosystem influences the regulation of the sector differently, given their diverse vested interests. These

stakeholders could include the discom staff at various levels in the hierarchy, its contracted agents undertaking various operations, the political representatives, and even the consumers representing various socio-economic groups

The structure of the paper, against this background, is as follows. Chapter 2 critically reviews the existing literature analysing the impact of regulation on electricity sector outcomes and identifies the key gaps in the Indian context. Chapter 3 offers a detailed description of the data, methods, the analytical tools that the study employs, and the socio-economic context of the distribution region of Malihabad. Chapter 4 is devoted to the key findings from our research. Finally, Chapter 5 discusses the key aspects of regulatory inefficiencies in the sector and proposes measures to improve the governance outcomes.

Chapter 2: Literature Review

In the aftermath of the economic crisis in the early 1990s, Independent regulatory agencies (IRAs) emerged in India, as the nation embarked on its journey of neoliberalism. The IRAs embedded in the existing macrostructure, led to an asymmetric dispersion of power among varied actors, further leading to different regulatory arrangements (Kumar, 2020). In this chapter we review the literature on the governance structure regulating India's electricity distribution sector and how the gaps in regulation make way for de facto dispersion of powers among actors.

2.1 Regulatory framework for governance of electricity distribution sector in India

Electricity is a concurrent list subject in the Indian Constitution, with both the centre and states exercising legislative jurisdiction over the sector (Bhattacharyya, 2007; Mahalingam et al., 2006). However, since independence, the sector's governance framework has been predominantly directed by central legislation (Mahalingam et al., 2006). The Electricity supply Act, 1948 paved the way for the establishment of vertically-integrated State Electricity Boards (SEBs), owned by the state governments. SEBs operated as the extended arms of the state energy departments. Such institutional arrangement, with service provisioning and regulatory powers vested in a single authority, led to a conflict of interest (Dubash & Rajan, 2001).

In late 1990s, owing to poor service provisioning by the SEBs and huge financial losses, a number of reforms were initiated with the support of the World bank (Dubash & Rajan, 2001; Singh, 2006). These reforms culminated in the institutionalisation of a new legislation — Indian Electricity Act, 2003 (referred as the Act here onwards). The Act sought to bring competition and transparency in the sector, and promote consumer interests through unbundling and corporatisation of SEBs.

The Act made it mandatory for the states to set up electricity regulatory commissions (ERCs) (Mahalingam et al., 2006; Pargal & Mayer, 2014; Singh, 2006).[1] There were expectations of depoliticisation of economic decision making with ERCs delegated the authority of tariff determination, licensing and market development (Swain, 2016). However,

the Act also mandated the state governments to participate in the sector's governance impacting ERCs' autonomy (Chitnis et al., 2018).

Among other objectives, the Act intended to achieve the three policy goals, that are the focus of this study - ensuring electricity access to all consumers, reliable quality of supply, and improving discoms' revenue recovery. Since India's Independence, achieving these objectives has particularly been a challenge in rural areas.
Historically, the SEBs' deteriorating finances with politicisation of electricity tariffs and low revenue recovery from rural areas led to poor governance outcomes in rural areas (Palit & Bandyopadhyay, 2017). To address these challenges, the central government has introduced various policies and programmes, specifically focused on rural areas (Annexure 1).

Rural electrification in India has been accomplished at scale under the *Rajiv Gandhi Grameen Vidyutikaran Yojana* (RGGVY) launched in 2005 and more recently through *Deendayal Upadhyaya Gram Jyoti (DDUGJY)* and *Pradhan Mantri Sahaj Bijli Har Ghar Yojana* (SAUBHAGYA). Recently, there has been an equal emphasis on improving quality of supply both under *24X7 Power for All* and DDUGJY, and compensating consumers for breach of supply standards. Finally, policies such as the *Ujwal Discom Assurance Yojana* (UDAY) have been devised to ensure distribution sector's financial stability.[2] However, barring improvements in rural electrification, remaining goals have been difficult to accomplish as discussed in subsequent chapters.

In line with the Act's provisions, the SERCs formulated the Supply Codes and the Standards of Performance (SoP) regulations to safeguard consumers' interests and ensure timely electrification, reliable supply and appropriate revenue recovery operations (Mandal et al., 2019). Recently, the Ministry of Power formulated the Electricity (Rights of Consumers) Rules, 2020, directing the discoms and SERCs to initiate actions in favour of consumers' interests. These provisions largely define the formal regulatory framework within which India's discoms operate.

2.2 Key actors influencing distribution sector governance and their performance

While the sector has made substantial progress in achieving near universal electrification, the discoms' performance continues to be uninspiring with ensuring reliable supply to consumers and timely revenue recovery for its operations (Agrawal et al., 2020; ICRA, 2021). Poor governance and political economy have been the key impediments to the sector's financial wellbeing. While the ERCs have instituted regulations as obligated by the legislation, their substantive enforcement has been lacking (Mandal et al., 2019; Shahi, 2020). ERCs' role has remained limited to tariff determination while the issues around service and supply provisioning and discoms compliance against regulatory orders have largely been ignored (Chitnis et al., 2018).

The SERCs also issue directives as part of the tariff orders instructing the discoms to improve their metering and billing operations. However, these directives are generally found to be repetitive year after year and their compliance is barely ensured by the SERCs (Mandal et al., 2019). Mandal et al. (2019), on reviewing the SoP compliance by seven states[3] finds that the discoms in only two states submit the SoP reports. The lack of compliance can be attributed to factors including limited autonomy of ERCs (both financial and tenurial), constrained staff capacity with high dependence on consultants and deputed staff from utilities, and limited accountability to consumers (Chitnis et al., 2018; Pargal & Mayer, 2014).

The broader political economy of the state and the political risks or rewards associated with reforms also impact the effective implementation of the reforms (Kale et al., 2018). The EA 2003 itself has provisions for state governments to intervene in the regulatory process. For instance, it allows the state governments to issue directions to the ERCs in public interest. The state governments, at several instances, have used this route to hinder tariff revisions and ensured cheaper electricity to secure votes (Bhatt & Singh, 2020; Pargal & Mayer, 2014).

According to EA 2003, a selection committee consisting of nominees of state and central government and headed by a high court judge has to make recommendations for each vacancies in the ERC. The state government has a final say in the appointments. Such processes open up avenues for political interference in the regulators' appointment (Ministry of Power, 2003; Pargal & Mayer, 2014). Consequently, the ERCs have witnessed delay in filling up of vacancies, with the appointees largely drawn from the administrative

services (PEG, 2011). Chairpersons of the SERCs have generally been secretary-level bureaucrats in the state government (Chitnis et al., 2018). Besides, most of the ERCs are dependent on the state budgetary support for operational needs (Pargal & Mayer, 2014). These factors subsequently constrained the ERCs' ability to function independently.
Also, since power discoms are generally state-owned, they sometimes are more powerful than the regulator. This also hinders the regulator's ability to ensure discoms' compliance with the regulations (Pargal & Ghosh Banerjee, 2014; Pargal & Mayer, 2014).

While the formal institutions have a critical role in shaping the sector's governance, some local players also influence governance outcomes. Several studies discuss the role of politicians in influencing the electricity supply and tariff revisions to secure vote banks in the Indian context (Chatterjee, 2018; Golden & Min, 2012). Sharma et al., (2016) discuss the employee angle to electricity theft and emphasise on various psycho-social factors that trigger theft. Mahadevan et al. (2020) discuss the role of politicians in encouraging lower revenue collection in their constituencies, and influencing the billing agents to manipulate consumer bills in the state of West Bengal.

The discom employees are also found to collude extensively with the consumers, giving way to 'street level' decision making (Sharma et al., 2016). Electricity theft has often been promoted by local discom staff, union leaders and senior discom officials. On many occasions, the replacement of defective meters and feeder-metering have been postponed to prevent accurate billing (Gulati & Rao, 2007). Discom employees also exercise discretion in providing connections to consumers, and revising electricity bills (Gulati & Rao, 2007).

2.3 Uttar Pradesh: A case of governance failures in the electricity distribution sector

The evolution of the electricity distribution in UP runs parallel with that of other states. The state-owned UP State electricity board (UPSEB) was established in 1959 with the objective to expand access to electricity at affordable prices (Gurtoo & Pandey, 2001). However, persistent losses of the SEB since the 1980s and state's fiscal crises, led to the initiation of the reform processes. As part of the reform package, the UPSEB was restructured into three entities each for thermal generation, hydro-generation, and transmission and distribution in 2000. The latter entity named UP Power Corporation Limited (UPPCL), was further

unbundled into five discoms and continues to enjoy the control over these discoms (Balls, 2018; Maurya, 2020). Also, the UP Electricity Regulatory Commission (UPERC) was established in 1999 to regulate the state's power sector.

However, the operational inefficiencies have persisted even after two decades since the reforms. The finances of state discoms continue to be in doldrums, with AT&C losses of nearly 33% in FY 2018-19 (Ministry of Power, 2016b; PFC, 2020). Factors such as poor billing frequency, trust deficit between the consumers and the discom, and poor enforcement of disconnection due to delayed payments or penalties for theft have contributed to high levels of non-payment by consumers in the state (Ganesan et al., 2019). As per a pan-India survey, 6.8% of the households in UP are still unelectrified, with electrified households receiving on an average 17 hours of electricity supply (Agrawal et al., 2020). In addition, 28% of the UP households faced at least one of the three supply quality issues - blackouts, low voltages, or appliance damage owing to voltage fluctuations.

Several of these issues in the electricity distribution sector are embedded in the political economy of the state. Competitive politics have ensured that the state government, through the energy ministry, has intervened in the regulatory process to keep tariffs low for its constituents and UPERC restrained from effective tariff hikes, particularly before the elections (Balls, 2018; S. Sharma et al., 2018). Min and Golden (2013) identified a strong linkage between the increase in electricity theft in Uttar Pradesh with the electoral cycles. Besides the political class, the power engineer's union has emerged as an influential entity defining the progress and pace of the reforms. They have often halted the government's moves towards privatisation and have extracted benefits from the state in support of reforms (Balls, 2018).

UPPCL has also emerged as a politically important body with the state energy secretary serving as its chairman (S. Sharma et al., 2018). The body makes decisions on tariff, staffing and power purchase on behalf of the discoms that were expected to operate as independent commercial utilities (Balls, 2018). As a consequence, there have been instances of open conflict between UPERC and UPPCL (Shah, 2016).

Past studies shed light on the ways in which different actors influence the electricity sector's governance in UP. However, there has been a limited focus on the interplay between various actors and the role of other socio-economic factors in determining the governance outcomes at local level. Often studies have viewed discoms as a homogenous entity, overlooking the power dynamics and role of officials at different hierarchies in the decision-making process. Further, a reliance on secondary research methods in the past has prevented a proper consideration of the role played by the local staff of the discom, the meter readers, the linesmen, consumer groups, etc. This study aims to bridge these knowledge gaps in the literature through a primary research in a select electricity sub-division in Uttar Pradesh.

3. Data and methodology

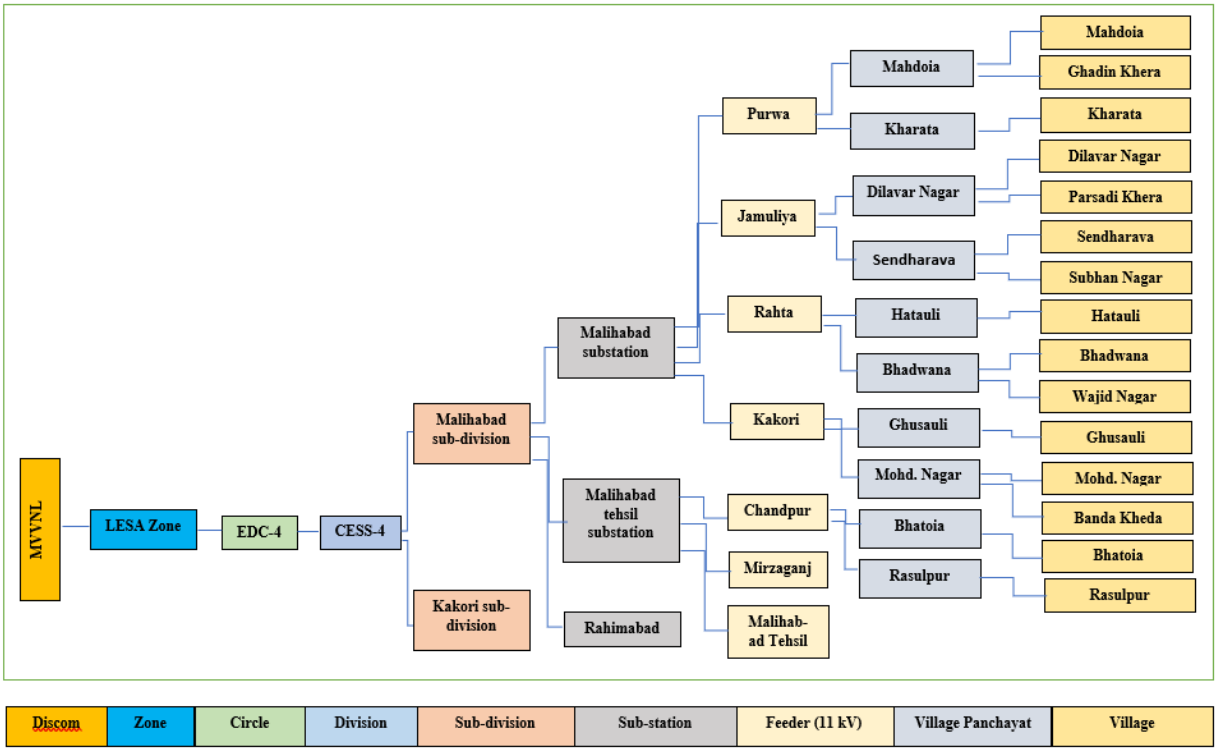
We have explored the research questions through a case study of Malihabad electricity sub-division of MVVNL discom in Uttar Pradesh. We collected data through focused group discussions (FGDs) with 130 electricity consumers and structured interviews with key stakeholders in 15 villages of Malihabad, during October and November 2019.

3.1 Sampling and data collection

The distribution network of MVVNL comprises five zones spanning across various administrative blocks and districts. Each zone is further divided into distribution circles, which in turn comprise divisions, sub-divisions and feeders (11 kV lines). Feeders branch out into distribution transformer regions, typically supplying electricity to 10-15 panchayats. For our study, we sampled 10 panchayats served by four distribution feeders in the Malihabad electricity sub-division. For every panchayat with more than one village, we sampled one majority and one minority village to understand the influence of socio-political nuances in the governance of the electricity distribution sector.[2] Figure 1 illustrates how the selected sample is situated within the larger electricity distribution network in UP.

[2] A village panchayat is a local self-government body responsible for governing a village or a group of villages in a rural area. A village is a small human settlement which may or may not coincide with the area governed by a gram panchayat.

Figure 1: Hierarchy in the electricity distribution network for selected sample



Source: Authors' compilation

Table 1 summarises the data collection modes for the study that include a combination of FGDs, and interviews (structured and semi-structured) with various stakeholders influencing governance outcomes in Malihabad sub-division.

Table 1: Modes of primary data collection used in the study

Category	Description
FGDs with consumers	10 FGDs in 10 big villages[3] captured responses from ~130 consumers on their perception of the electrification process, supply quality, discoms' responsiveness to supply restoration, billing concerns, payment modes, grievance redressal mechanism, etc.
Structured interviews with key informants	15 structured interviews with 10 panchayat headmen and 5 key informants (teachers and other

[3] The big villages mainly include the villages sharing the same names as their village panchayats in Figure 1.

	members of panchayat) in minority villages, to understand progress and gaps in electrification, supply hours, metering, billing and payment mechanism.
Semi-structured interviews with discom staff and agents	9 semi-structured interviews with linesmen in-charge for each of the feeders (4), a meter-reader, a junior-engineer, a sub-division officer, an executive engineer for CESS-4 division and the Managing Director for MVVNL, to understand the monitoring mechanisms deployed by the discom and operational challenges in policy implementation.

Source: Authors' compilation

In the small villages, we conducted interviews instead of FGDs due to small population base and difficulty in getting enough participants during the harvesting season. We hired two field enumerators and imparted them a month-long training for the data collection exercise. To supplement the primary data, we have studied the administrative data on billing and revenue collection for the rural CESS-4 division, and reviewed the regulatory orders, circulars by UPPCL and other publicly available material.

3.2 Socio-economic context in Malihabad

Malihabad is also the name of the administrative sub-district of UP, geographically coinciding with the electricity sub-division region. Table 2 summarises the key demographic parameters for UP, Malihabad and the sampled panchayats. Hindus are the dominant community, both in UP and Malihabad, with around one-fifth of the population belonging to other religions. Among the sampled panchayats, the Muslims represent a fourth of the population. The sampled panchayats have a lower share of scheduled caste population (historically the most socio-economically deprived caste group) than the sub-district, and an equivalently low literacy rate (Census 2011). Low literacy rates indicate low capacity of the consumers to hold discom and other state actors accountable.

Table 2: Socio-economic profile of sampled panchayats, Malihabad sub-division and Uttar Pradesh

Socio-economic parameter	Category	Share of total population (%)		
		Uttar Pradesh	Malihabad	Sampled Panchayats (weighted average)
Religion	Hindu	80	84	73
	Muslim	19	15	27
	Others (Sikh, Christian, Jain, etc.)	1	1	0
Caste	General and other backward castes	79	58	64
	Scheduled Caste	21	42	36
Literacy rate[4]		68	56	56
Occupation category based on work-type	Cultivators	29	31	38
	Agricultural labourers	30	37	26
	Household Industry workers	6	8	8
	Other workers	35	24	28

Source: Authors' collation from Census 2011 data

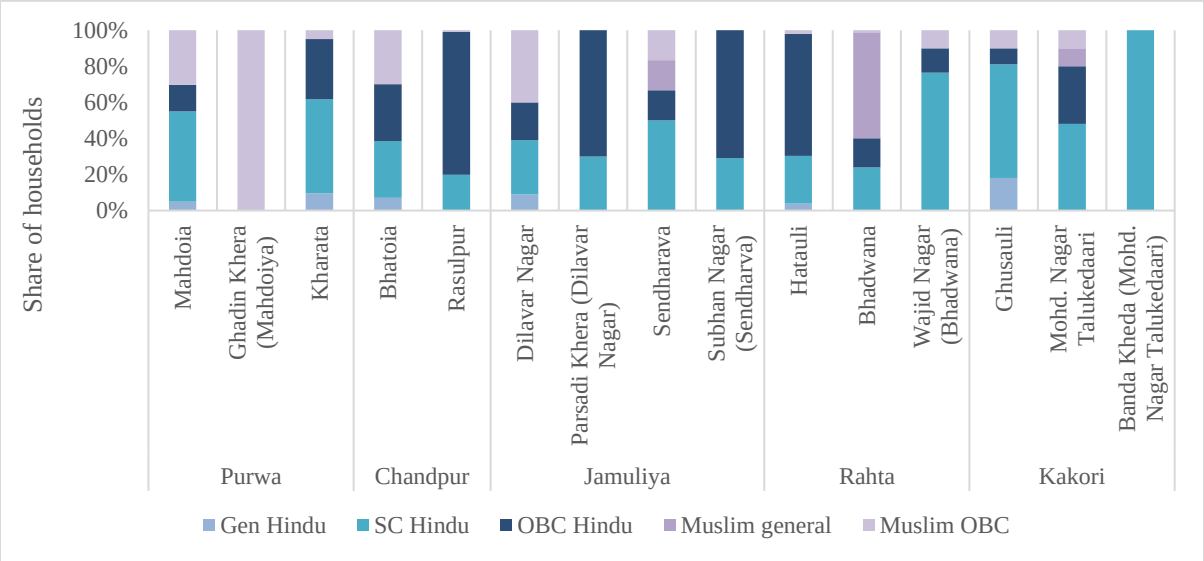
Further, the panchayats and the sub-district represent a high share of population dependent on cultivation and agricultural labour, indicating an intermittent flow of income that may affect the frequency of electricity bill payments. Thus, despite general resemblance, the

[4] A literate, as per the Census of India, is defined as a person above the age of seven who can read and write in any language.

sampled panchayats and the sub-district have a relatively higher share of socio-economically backward population as compared to the state-level trends.

In some sampled villages, most households belonged to a single religion and caste group (Figure 2). Often such homogeneous composition of villages results in the exclusion of households belonging to minority socio-economic groups from decision making, access to information on public announcements, and redressal of electricity grievances at the village panchayat level.

Figure 2: Religious and caste-profile of villages in Malihabad



Source: Authors' analysis based on data collected from panchayat headman[5]

4. Gaps in governance and role of actors in influencing governance outcomes in the electricity distribution sector

In this chapter, we discuss in detail the performance of Malihabad sub-division along electrification, quality of supply and discom's revenue recovery parameters. We highlight the issues resulting in sub-optimal outcomes and the key actors influencing the regulation of services in the sector.

[5] The census data does not provide information on villages/ hamlets. Hence, data for villages/hamlets was sought from village headmen during the interviews.

4.1 Household electrification

In April 2018, all inhabited villages were declared electrified by the Power Ministry. In the study sample, the bigger villages were electrified at least two decades ago, whereas most smaller villages were electrified in the past decade.

As per our interviews and FGDs, nearly all willing households in the sampled villages are electrified, with most obtaining connections under the *SAUBHAGYA* Scheme. However, many willing households in two villages, were not electrified as of October 2019, despite the UP Government declaring 100% household electrification in December 2018. For instance, about 60% households in Gaddin Khera were informed to be unelectrified during the conduct of this study. We discuss the key reasons behind the electrification gaps in Table 3.

Table 3: Key factors behind electrification gaps in Malihabad sub-division

Key issues	Situation in Malihabad
Connections denied	Many unelectrified households were located at more than 40 metres distance from existing poles, indicating the need for new poles. Many such households were denied connections by contractual agents due to time crunch in fulfilling policy targets, as well as lack of adequate Distribution Transformers (DTs) and poles to extend new connections.
Information asymmetry during electrification camps	Households in villages with predominantly minority population, such as Gaddin Khera, didn't receive timely information about electrification drives in the panchayat. Households attributed this to politico-religious differences between the villagers and the village administration.
Incomplete installations	In two villages, the contractual agency did not provide sealing certificates to many consumers after installing meters.[6] In another village, several consumers were simply handed over the meters and

[6] A sealing certificate includes information such as the consumer's name, meter number, meter seal number, etc. and is essential to update consumer information in discom's database and generate electricity bills.

	wires after electrification. The local discom staff attributed these gaps to the rapid pace of electrification drive.
Consumers inappropriately charged for connections	Under the *SAUBHAGYA* Scheme, connections were to be given free of cost to households who match the deprivation criteria as per the Socio-Economic Caste Census (Ministry of Power, 2019a). However, consumers across all the sampled villages were charged INR 500 (to be paid in 10 monthly instalments in their electricity bills), indicating a lack of due diligence to check consumer's deprivation status. Some consumers in six of the sampled villages also mentioned being charged a facilitation fee by the metering agents for meter installation.

The gaps in the governance of electrification operations highlight the inadequacy of monitoring mechanisms. The Rural Electrification Corporation (REC) - the nodal agency of the Ministry of Power for managing the electrification drive in India - directly appoints the contracting agency for connection installations across states. REC had appointed a committee at the national level to monitor progress of *SAUBHAGYA* scheme. It had also institutionalised a two-tier Quality Assurance Mechanism by discoms, and third-party Quality Monitors for random inspections of villages. The minutes of REC's Monitoring Committee meetings highlight that monitors have inspected less than half the number of stipulated villages (Rural Electrification Corporation, 2020).

We don't find the local discom officials involved in the monitoring electrification processes, particularly due to lack of incentives and ownership in the scheme's implementation. Also, UPERC did not play any role in the scheme's implementation even though the National Tariff Policy (2016) mandates SERC to devise a trajectory for 24X7 power for all by 2021-22. Further, the Electricity Act 2003 and the Rural Electrification Policy 2006 mandate setting up of District Level Committees to monitor the progress of electrification. However, no such committees have ever been instituted in UP. The information on household electrification at the village level cannot even be verified as the Saubhagya Dashboard only provides for aggregate district level figures. Due to this missing decentralised system of checks and balances, we find the local actors such as the panchayat headmen and the contractual agents could strongly influence the electrification outcomes on the ground.

4.2 Quality of supply

The state government's commitment of 24X7 power supply to all households under *SAUBHAGYA* and *DDUGJY* programmes have ensured improvement in supply hours to rural consumers. Rural households in Malihabad receive around 21-22 hours of supply. However, the consumers there continue to face several supply disruptions as listed in Table 4.

Table 4: Key supply quality gaps in Malihabad sub-division

Key issues	Situation in Malihabad
Unscheduled outages due to faults	Tree fall and bird-hit emerged as important reasons behind power outages. Most 33kV and 11kV lines pass through mango plantations, making them susceptible to damage by tree branches. Consumers also reported crashing of 11kV cables on 400 V lines due to absence of appropriate conductors to guard the cables. These depict inadequate planning by the discom while laying the cables and gaps in periodic inspection of the network by the field staff. DT burnouts are quite prevalent due to inequitable distribution of consumer load across DTs, which results in DT-overloading during the summer and monsoon months, when the power demand rises. Procurement of poor-quality DTs and negligence by the discom's field staff in checking electricity theft and theft of oil from DTs also contribute to DT burnouts and associated service disruptions.
Persistent low supply voltage in a few villages	Consumers in 3 of the panchayats complained about regular low voltage supply during summers, particularly in households located far off from DTs. Appliances, thus, cannot be used without a stabiliser. The distribution network is not planned well enough to handle the demand rise during summers. For instance, In Kharata panchayat, low voltage is mainly due to uneven distribution of load across DTs.

Delay in repair and maintenance (R&M)	Supply restoration by local discom staff, including the linesmen, in case of DT failure takes around a week as against SoP mandated 48 hours. Further, often field staff demands consumers to make payment for DT replacement, although regulations do not permit the same.

Source: Authors' analysis

The National Tariff Policy (2016) mandates SERC's role in devising a trajectory for 24X7 power for all by 2021-22 (Ministry of Power, 2016a). But no such orders have been issued by UPERC. UPERC also has a formal responsibility to ensure discom's compliance with supply quality regulations through quarterly monitoring of SoP compliance reports by discoms. The Act even authorises UPERC to revoke discom's license in case it does not conform to the supply quality standards. However, no such reports by UP discoms (except by Noida Power Company Limited) are available in the public domain (UPERC, n.d.). Also, there is no publicly available documentation on UPERC's follow-up action.

On the ground, the JE and the substation officer are responsible for outage management. However, our interviews with the discom staff suggested that the timelines for supply restoration as per the UP-Electricity Supply Code are unknown to them, let alone to consumers. We also find that typically a linesman, along with a team of two contractual staff, is responsible for R&M of an entire feeder, covering 30 villages (on average) in Malihabad. However, a low remuneration of around INR 8,000 (including travel allowance) for contractual staff, lack of safety gear, and disproportionately high workload led to delay in R&M operations. As a result of poor incentives, in three of the villages, the linesmen were accepting facilitation payments from consumers against continuation of illegal supply.

Further, low literacy rates also emerged as an impediment to the resolution of the supply quality issues. The consumers were also unaware about their entitlement to claim compensation if supply issues are not resolved within allowable duration and lacked information on call centres for complaint resolution. This is despite UPERC's direction to the discoms to inform consumers of the means to redress complaints (UPERC, 2018).

4.3 Inefficiencies in billing and collection operations

In UP discoms are marred with poor revenue recovery, particularly due to poor payment collection from the rural domestic consumers. According to the discoms' administrative data for October 2019, only 10% of the rural consumers in UP had paid their monthly bills. Though, CESS-4 division's payment rate at 23% is relatively better than the aggregate figures of rural UP, but it is still far from the desirable level. In line with the discom data, we also found the prevalence of non-payment in sampled villages. As per the FGDs and interviews, in 8 out of 15 villages, more than half the consumers had pending dues for more than six months.

Timely bill payment is linked with receiving accurate and timely bills. Though the discom's data depicts all rural domestic consumers in CESS-4 to be billed in October 2019, however, consumers reported multiple billing-related issues. These include irregular/untimely billing, incorrect/faulty billing, meter reader not visiting the villages, fast meters resulting in exorbitant bills, and no proper redressal of bill-related grievances (Table 5). These issues make it difficult for the consumers to make bill payments.

To verify discom's data, we randomly selected 16 consumers and found details of 3 of the consumers not matching with the discom's data. Remaining 13 consumers, who denied receiving any bills in October 2019, had received bills based on metered-units, as per discom data. This substantiates the difference between the on-ground situation and the one reported to the higher management through discom data.

Besides, billing-related issues, limited accessibility of the bill payment mechanisms, infrequent disconnection drives leading to low-deterrence against non-payment and theft, and regular announcement of One-time settlement scheme also adversely affects regular bill payments by consumers (Table 5).

Table 5: Issues resulting in billing and collection inefficiencies in Malihabad

Key issues	Situation in Malihabad sub-division
Faulty meters and improper metering	Consumers across all villages suspected their meters to be running fast and found the bill amounts exorbitant. Several consumers had

	complained about their faulty meters at the discom office but the redressal process was protracted. Some newly electrified consumers didn't receive meter sealing (discussed in section 5.1), and therefore were not eligible for billing.
Infrequent and improper billing spot billing	Meter readers had never visited 3 of the sampled villages and in 7 of the villages, consumers are billed less frequently that once in two months. Some consumers reported about their complaints to discom field staff going unheard. Consumers, thus, had to traverse long distances to sub-division office for bill generation. On not receiving bills, consumers are also unaware of their billed arrears and find it difficult to make after accumulation of arrears from several months. In 8 of the villages, consumers spoke of their distrust in the meter readings and various charges in their bills. For instance, in Kharata, a few consumers complained of disproportionately high bills compared to their consumption. Consumers from 5 villages complained that the meter readers generate bills without even reading the meters, partly because some meters are inaccessible (located too high). As a result, consumers spoke about refraining from bill payments. Also, a few consumers in Rasulpur admitted to paying a facilitation fee to the meter readers to get their bills reduced.
Inaccessible easy payment modes	Six of the villages do not have a Consumer Service Centre (CSC) in their panchayat. Consumers are also not aware of the CSCs in the nearby villages too. Consumers mostly visit the collection counter at the sub-division office, the distance to which ranges from 5 to 15 kms from their villages. In the remaining villages, most consumers do not trust making payments at the CSC and doubt whether the payment has been correctly made.

Low deterrence to non-payment and electricity theft	Disconnection drives against non-payment are conducted less frequently than once a year. Linesmen and consumers suggested that illegal reconnection (through hooking of wires and meter-bypass) after disconnection was a practice prevalent in at least 6 of the villages. In 7 of the villages, live wires are still present, allowing easy access to wire-hooking. Theft-raids are also rarely conducted in the sub-division, allowing consumers a greater leeway. Consumers collude with the linesmen and local discom staff by paying a small facilitation fee and are pre-informed by the linesmen about discom's planned raides.
One-time settlement (OTS) schemes[7]	In 8 of the villages, consumers reported paying their pending bills at the OTS camps for the past 4-5 years. Consumers await the announcement of OTS every year as their interest surcharge is waived, and hence avoid making payments regularly. In one of the villages (Gaddin Khera), consumers complained that they have never been informed of OTS by the panchayat headmen due to socio-political conflicts.

Source: Authors' analysis

The role of UPERC is limited to seeking data from the discoms on distribution losses during the tariff determination process and deciding on the pass-through of allowable losses in consumers' tariff. On consumer centric issues such as metering, UPERC has not been proactive. It has not followed up on the discom's metering plans or set up meter testing facilities, as envisaged by the National Electricity Policy (2006).

[7] Discom announces OTS once or twice a year, allowing consumers with accumulated dues above INR 10,000 to pay their bills in instalments, while the interest surcharge on dues is waived.

Though UPERC issues directives to the discoms in its tariff orders, these directives are rarely complied with. For instance, UPERC has directed the discom to ensure 100% metering, including metering of agriculture and discom employees, yet unmetered consumption among agriculture consumers has witnessed a huge spike (UPERC, 2019b, 2019a,UPERC, 2020). Similarly, in FY 2019, UPERC directed the discoms to submit a trajectory for improving its collection efficiency (UPERC, 2019b). However, the discoms have not submitted any such trajectory yet.

UPERC also exercises limited say in the issue of non-payment. The discoms have been annually introducing OTS for domestic consumers. This is despite UPERC (Multi Year Distribution Tariff) Regulation (2014) mandating launching of no such scheme to recover arrears after 31st March 2017 (UPERC, 2014b). UPERC has also consistently stated that OTS discourages regular payments and is detrimental to discom's financial health (UPERC, 2014a, 2016, 2017). Thus, it has not allowed the waiver to be passed on to consumers' tariffs and refused to allow OTS post March 2017 (UPERC, 2017).

The review and monitoring system of Central schemes such as UDAY and DDUGJY further bypasses the SERC in ensuring discoms' compliance with targets on consumer indexing, GIS mapping, metering of the distribution infrastructure, etc. This adversely impacts consumer participation and outcomes in metering and billing as seen in Malihabad. The targets for billing and collection efficiency of the UP discoms are regularly set by UPPCL. Weekly monitoring sessions are organised virtually between the Chairman, UPPCL, the managing directors (MD) of all discoms and the zonal engineers (chief-engineers) to discuss the progress of the discoms performance and deliberate on key action points.[8] Monthly virtual sessions are also organised between the division level in-charges (executive engineers) and the respective MDs of the discom. At the bottom end of the discom's value chain, the junior engineer (JE) and the sub-divisional officer (SDO) are held responsible for ensuring proper revenue recovery for the sub-division. On the billing front, the JE and SDO claim to organise weekly meetings with the meter readers to discuss the progress of billing in the sub-division. However, despite these claims on regular follow, the inefficiencies in billing persist.

The discom's administrative data for October, 2019 suggests that a meter reader in CESS-4 division earns an average of INR 6,000 which includes their travel allowance. This leaves

[8] Communicated by the discom staff during our interaction

little incentives with them to travel to distant and dispersed villages. The discom staff also informed us of the high attrition rate among meter readers during the period of this study, affecting the continuity in billing operations. To ensure timely collection from consumers, the discoms are authorised to disconnect consumers' supply, after giving a notice of at least 15 days, in case consumer defaults on payments. We, however, found that the frequency of disconnections in Malihabad is very low and consumers have alternatives available to illegally reconnect with the supply by colluding with the local linesmen. This reflects a lack of monitoring mechanism for last mile actors.

Further, there are only two JEs and one SDO, who are responsible for managing a consumer base of 35,000 in Malihabad. They need to attend numerous tasks including maintenance of supply operations and distribution infrastructure, resolving consumer complaints on metering and billing, organising camps to collect bill payments, and undertaking disconnections drives for defaulting consumers, among others. In a nutshell, the limited staff capacity, workload and poor rewarding system has led to lax supervision of billing and collection operations in the sub-division.

6. Discussion and conclusion

The Electricity Act 2003 together with various policies and regulations have envisaged a crucial role for the state electricity regulators in enforcing discoms' compliance. However, in practice, the state regulator in UP has largely restricted itself to tariff setting operations with a limited focus on regulating processes concerning electrification, quality of supply and discom's revenue recovery. This study sheds light on various regulatory inefficiencies in UP's electricity distribution sector and highlights how the regulatory vaccum allows local actors to adversely influence sectoral outcomes. Below we discuss the key findings and our proposals to improve regulatory outcomes.

Firstly, the state regulator has largely failed to ensure discoms' compliance with the provisions in the Supply Code, the SoP and its own directives in the tariff orders. This is evident in various service gaps observed in Malihabad and highlights the need to strengthen the regulatory ecosystem, as has also been advocated by various studies in the past (Mandal et al., 2019; Pargal & Mayer, 2014). To this end, the Forum of Regulators (FoR) in India should periodically assess and address the institutional and resource capacity of the state

regulators, and propose contextual measures to insulate the regulators from political influence.

Secondly, at the state level, the role of UPPCL – the holding company of discoms - in regulating and monitoring distribution sector performance is overwhelming and ridden with conflict of interest. The highest authority in the executive body of the state – Principal Secretary (Energy), reports to the democratically elected Energy Minister of the state, and is also the chairman of the commercially run holding company. The Chairman of UPERC is typically a former associate of the state's executive body. In addition, the state government is empowered by the Act to specify the salaries, allowances, other terms and conditions of members of the SERC. Thus, former members of the executive are expected to regulate the executive with an upper-hand, which compromises regulatory independence and raises questions about balance of power (Dubash and Rajan 2001). Creating mechanisms for greater public accountability by regularly publishing the data on discom's performance and compliance with regulations could help reduce the implications of the conflict of interest within.

Thirdly, an absence of regulatory supervision in some cases can be traced to lack of clear delineation of roles and responsibilities for the regulator in the key policies and schemes, such as SAUBHAGYA. The performance metrics for such policies are mostly defined by the central and the state government, without adequately consulting or involving regulators in the decision making. To ensure sustained regulation of a dynamically evolving power sector, it will be crucial to closely engage regulators in all policies that affect consumers' interests.

Finally, as observed in Malihabad, the presence of regulatory vacuum often enables local actors like village headmen, linesmen, meter readers, etc. to exercise discretion in matters of last-mile service delivery. This finding substantiates Dubash (2012)'s argument that the regulatory outcomes are incompletely explained unless defined by the micro-details of the local realities. Consumer awareness about their rights concerning service quality must also receive due attention, as awareness gaps can result in lack of bottom-up demand for accountability of the discom officials and linesmen. Policies need to account for the motivations and drivers for the key actors by involving them in the decision-making or studying their interests (Bhatt and Singh, 2020).

In recent years, there has been a strong thrust on addressing the compliance gaps in India through technological solutions such as smart and prepaid meters. While such solutions could be effective in certain contexts, often their proponents underplay the importance of behavioural and institutional dynamics in enabling successful rollout of technology, akin to their role in addressing regulatory lags. Therefore, the future research must delve deeper into the role of local actors in influencing the regulatory outcomes and explore innovative measures to address the regulatory lags, including behavioural nudges and consumer engagement.

Annexure 1: Central government policies on electrification, quality of supply and improving discoms' revenue recovery

Law/ Policy/ Programme	Provisions
1. Ensuring electricity access to all	
Electricity Act, 2003 (Section -5, 6, 43 and 166(5))	● Joint responsibility of the centre and state government to formulate policies on rural electrification and manage local distribution in rural areas ● Constitution of district committees to review and coordinate extension of electrification ● Discom to provide electricity supply to consumers within one month of receiving application, with exemptions for villages with no supply. Discoms liable to be penalised if it fails to meet the stipulated timeline.
National Electricity Policy, 2005 (Sections 5.1.1 and 5.1.3)	● Special attention to household electrification to dalit bastis, tribals areas and other marginal sections
Rural Electrification Policy, 2006	● State governments should prepare the Rural electrification plan with electrification delivery mechanisms. ● Ministry of Power to constitute a coordination mechanism between agencies to ensure village selection is in line with policy objectives
RGGVY, 2005 (later converted to DDUGJY, 2014)	● Free of cost service connection to all Below Poverty Line families ● Constitution of a district-level committee having public representatives from the district as members to monitor programme implementation

***SAUBHAGYA*, 2017**	● To achieve universal household electrification by providing electricity connections to remaining un-electrified willing households by 31st March 2019
2. Quality of supply	
Electricity Act, 2003: (Sections 24,50,57(1), 57 (2), 79 and 86)	● SERC authorised to specify standards of performance for the licensees, including the electricity supply code with timelines for electricity supply restoration, maintenance of electric lines and other equipment including meters ● SERC authorised to suspend the discom's license in case it fails to conform to the electricity supply standards
National Electricity Policy, 2005 (Section 5.4.6)	● SERC to specify standards for reliability and quality of supply in line with international practices
National Tariff Policy, 2016 (Sections 8 and 8.3 (5))	● SERCs to devise a trajectory for 24X7 uninterrupted power supply to all consumers by 2021-22 or earlier ● Management of local distribution network by discoms through franchises with involvement of panchayat institutions, user associations, etc
24x7 Power for All, 2018	● Strengthening of transmission and distribution network to improve supply quality ● Reliable 24x7 supply to all consumers by 2019 ● Multi-tier monitoring framework to be constituted at central government, state government and departmental level and a Project Monitoring Unit (under an external independent agency) to monitor works undertaken
DDUGJY, 2014 (erstwhile RGGVY)	● District-level committee to review quality of power supply and consumer satisfaction, with members as public representatives

Electricity (Rights of Consumers) Rules, 2020	● SERCs to notify regulations to establish automatic compensation mechanism for consumers against monitorable standards of performance
3.Improving discom's revenue recovery	
Electricity Act, 2003 (Sections 50, 55(1), 56, 126, 127 and 153)	● All consumers to be metered by discoms within two years, except when ERC provides relaxation ● State ERC to specify electricity supply code for recovery of electricity charges, and defining billing intervals, supply disconnection on non-payment and preventing electricity theft, etc. ● Discom authorised to disconnect supply, after prior notice, in case consumer defaults on payments ● Discom empowered to investigate unauthorised use of electricity or its theft and penalise the consumers Setting up of special courts for trial of theft
National Electricity Policy, 2005 (Sections 5.4.6, 5.4.9, 5.4.10 and 5.8.10)	● State government and SERC to draw a time bound programme for loss reduction ● Improved enforcement, incentives for employees and consumers, and community participation required for loss reduction. Centre to provide performance-based incentives to states in line with loss reduction achieved. ● SERC may obtain, approve and monitor the metering plans of the discom and should set up third-party meter testing arrangements. ● Implementation of modern technology for theft detection and correct billing and collection with special emphasis on consumer indexing and mapping in a time-bound manner
National Tariff Policy, 2016 (Sections 8.1 (1), 8.2 (1) and 8.4 (3))	● SERCs to incentivise loss reduction by linking returns with specified trajectory. SERCs can also introduce local level incentives for staff to achieve desirable loss reduction ● SERC may provide incentives to encourage metering and billing based on metered tariffs and widely publicise such incentives.

DDUGJY, 2014	● Discom to ensure reduction in AT&C losses as per trajectory set by the centre after consultation with states. ● Discoms to ensure metering across the sub-transmission and distribution network ● Monitoring to be undertaken by a high-level committee under the Chairmanship of Secretary (Power) and representatives from REC and other ministries.
UDAY, 2015	● Reduction in AT&C losses to 15% by 2018-19 as per the trajectory decided by Ministry of Power and states ● States and discoms to ensure compulsory metering of feeder and distribution transformer, consumer indexing and GIS mapping of losses, Information, Education and Communication (IEC) campaign to reduce theft, and increased supply in areas with reduction in AT&C losses ● Three tier review structure - Monthly reviews at central, state and discom levels; one-to-one review meetings with states and Quarterly ranking of states and discoms. Dedicated UDAY cell under REC for regular monitoring.
Electricity (Rights of Consumers) Rules, 2020	● No connection shall be given without a meter and discom should ensure that the meter is tested and sealed. ● Meter should be read at least once in every billing cycle. ● The discom should prepare the bill for every billing cycle based on actual meter reading. ● The discom shall not generate more than two provisional bills for a consumer during one financial year. In case of provisional billing for more than two billing cycles, consumers may refuse to pay dues till bill is raised on actual meter reading. ● Consumer should have the option of both online and offline payment with discom providing sufficient collection centres or drop boxes.

Source: Authors' collation from Indian Electricity Act, 2003, National Tariff Policy 2016, National Electricity Policy 2005, Electricity (Rights of Consumers) Rules, 2020, and DDUGJY, SAUBHAGYA, 24X7 Power for All and UDAY programme documents.

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