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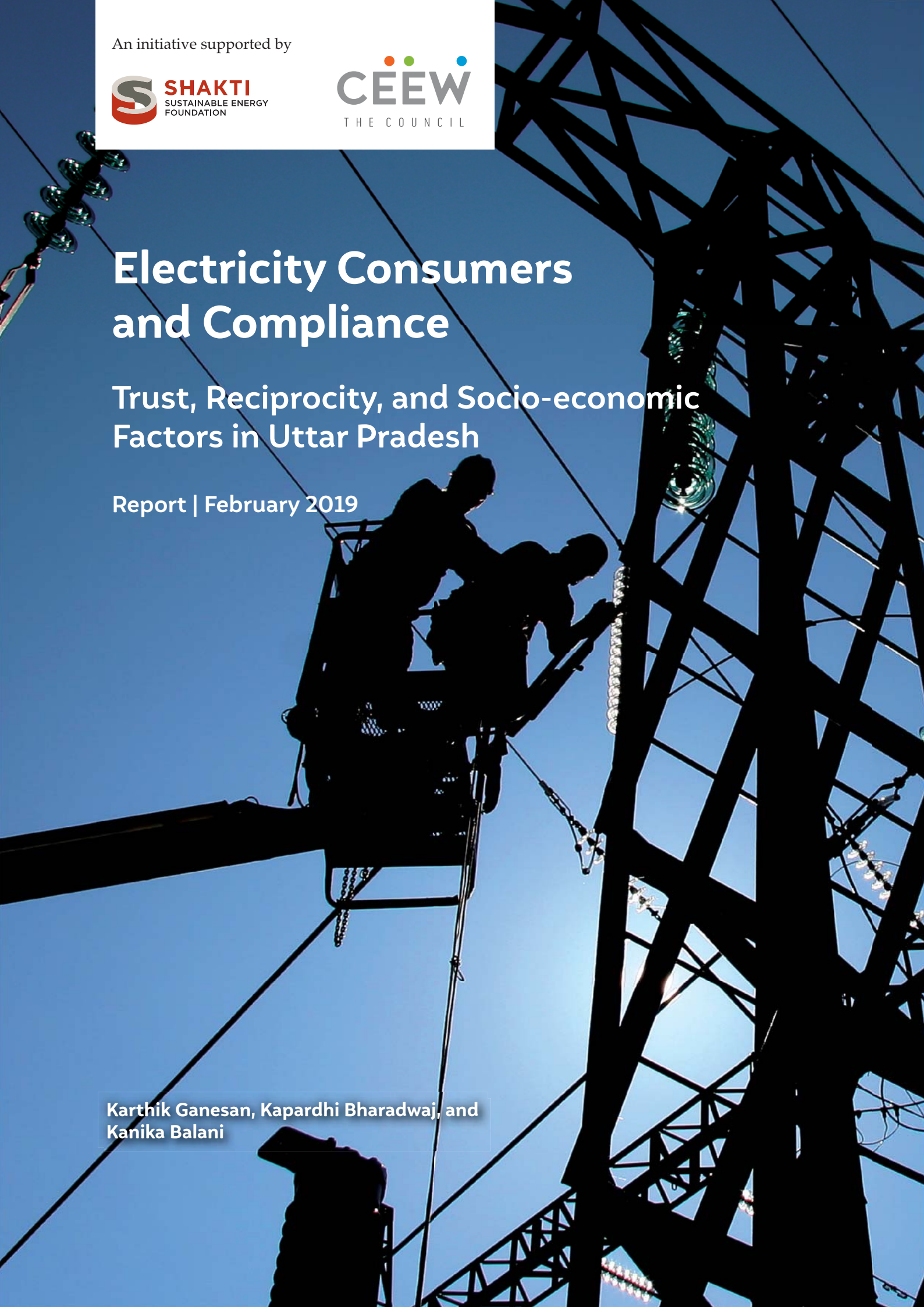


# Electricity Consumers and Compliance

## Trust, Reciprocity, and Socio-economic Factors in Uttar Pradesh

Report | February 2019

Karthik Ganesan, Kapardhi Bharadwaj, and  
Kanika Balani







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Report  
February 2019  
ceew.in

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Report on 'Electricity Consumers and Compliance: Trust, Reciprocity and Socio-economic Factors in Uttar Pradesh'.

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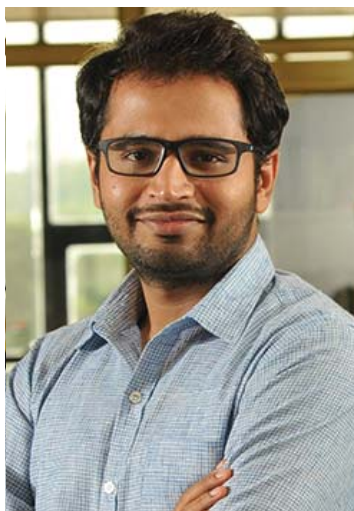


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*“The challenges for Uttar Pradesh are in managing a large system with varying degrees of capacity at different levels of the electricity value chain. The most important step will be to communicate to consumers that the discoms are committed to cost recovery and service delivery”.*



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*“Uttar Pradesh can alter the perception of success in power sector reform. With the single largest addition of consumers under the Saubhagya scheme, it presents some unique challenges. We have attempted to prioritise the tasks that lie ahead, for the discoms of UP, as they make strides in achieving and sustaining 24x7 power for all”.*



**Kanika Balani**

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Kanika is a Research Analyst at CEEW. She has been working in the power sector for over three years. Her past work includes conducting a study on ‘Regulatory Oversight of Discoms Under UDAY Scheme’ and conducting an on-field exploratory study on the regulation of electricity theft with IIT-Kanpur. She has a BA (Honours) in Political Science from the University of Delhi and an MA in Regulatory Governance from the Tata Institute of Social Sciences, Mumbai.

*“The interactions with the stakeholders establish that the power sector has been looked at as an isolated system. With public sector utilities, inefficiencies are passed on to consumers – either directly or indirectly. Consumers are both rate-payers and tax-payers in the system, and policies to govern the sector must be cognisant of this”.*



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## ABBREVIATIONS

ACCESS	Access to Clean Cooking Energy and Electricity Survey of States
ACoS	average cost of supply
AMR	automated meter reader
AMI	advanced metering infrastructure
ARR	annual revenue requirement
AT&C	aggregate technical and commercial
CEA	Central Electricity Authority
DDUGJY	Deen Dayal Upadhyaya Gram Jyoti Yojana
Discom	distribution company
DVVNL	Dakshinanchal Vidyut Vitaran Nigam Limited
ESMI	Electricity Supply Monitoring Initiative
FY	financial year
GCI	Global Corruption Index
GJ	Gujarat
HT	half the time
IEA	International Energy Agency
KA	Karnataka
kW	kilo watt
kWh	kilo watt hour
HH	household
INR	Indian Rupees
MBC	metering, billing and collection
MoP	Ministry of Power
MoU	Memorandum of Understanding
MH	Maharashtra
MT	most of the time
MVVNL	Madhyanchal Vidyut Vitaran Nigam Limited
PEG	Prayas Energy Group
PVVNL	Paschimanchal Vidyut Vitaran Nigam Limited
PuVVNL	Purvanchal Vidyut Vitaran Nigam Limited
R-APDRP	Restructured Accelerated Power Development Reforms Programme
Saubhagya	Pradhan Mantri Sahaj Bijli Har Ghar Yojana
ST	some of the time
T&D	transmission and distribution
TPL	Torrent Power Limited
UDAY	Ujwal Discom Assurance Yojana
UP	Uttar Pradesh
UPERC	Uttar Pradesh Electricity Regulatory Commission
UPPCL	Uttar Pradesh Power Corporation Limited
USD	United States Dollar



**~42%**

of the total electricity  
supplied by all the  
discoms is consumed by  
households



Electricity is supplied for

**17** hours in urban areas

**12** hours in rural areas



**55%**

of rural consumers are  
unmetered



Paying consumers  
making one-time  
bill payments in full

**86%** When billed  
monthly

**73%** Bi-monthly  
or longer

Source: CEEW analysis

Image: iStock

## EXECUTIVE SUMMARY

# Uttar Pradesh

## An opportunity to alter the national debate

In September 2017, the Government of India announced its ambitions to achieve 100 per cent household electrification through the *Saubhagya* scheme. Under this, Uttar Pradesh (UP) will have added the largest number of households to its existing consumer base – as many new consumers as being served by state distribution companies (discoms) before the launch of the scheme. Discoms, already plagued by high under-recovery, face the onerous challenge of serving a large consumer base that has low capacity to pay. A lion's share of the electricity consumption in UP – about 42 per cent of the total electricity supplied by all discoms – is attributable to domestic consumers (households). More than two-thirds of the total subsidy earmarked (for discoms) for 2017–2020 is targeted at rural consumers. That is the size of public spending needed to enable the incremental universal energy access. Household consumption significantly impacts the overall financial position of discoms and the state.

Any discussion on losses and theft calls for an evaluation of services provided by discoms. Electricity loss other than that attributable to technical reasons may be broadly classified into *hard theft* and *metering, billing, and collection (MBC) losses*. Hard theft refers to theft as defined under Section 135 of the Electricity Act-2003 (referred as Act) and entails, mainly, theft due to hooking of wires (*katiya*), meter tampering, and unauthorised electricity usage, and includes wilful misrepresentation of electricity consumption. MBC losses are a 'soft' form of theft, arising from lax operational diligence of the discom and the consumer's lack of awareness, which precipitates consumer indifference or alienates them. This soft theft includes *inter alia* losses due to incorrect recording or wrong accounting of energy consumption at the discom's end, billing irregularities, and non-timely payment or non-payment of outstanding amounts by consumers as per bills.

Overwhelmingly, households believe that the government should oversee energy provision and management, but the provision of electricity beyond the limited levels required to promote development outcomes must be on commercial terms, where the full value of electricity is realised by every stakeholder in the value chain. As an evaluation of the *Ujwal Discom Assurance Yojana* and *Power for All* is undertaken in 2019–2020, the experience in UP will shape the policy discourse. We carried out our study to improve the understanding of the discom–consumer relationship and of how this relationship manifests in supply outcomes for the consumer.

This study aims to

- unpack the commercial losses attributed to domestic consumers;
- capture the consumer perspective and actions (or lack thereof) in the midst of the administrative reform under way; and
- explore how this reform can help drive targeted activities to improve compliance, satisfaction, and create a virtuous cycle for the utility business in the state.



This study aims to capture the consumer perspective and actions (or lack thereof) in the midst of the administrative reform under way

## Sampling, survey, and data

In addition to relying on administrative data, stakeholder interviews and interactions, CEEW undertook a consumer survey to capture the finer details of electricity distribution in UP. The survey captures information on the electricity supply situation, compliance metrics, perceptions on trust and prevalence of theft and most importantly, social and economic endowments of households in rural and urban areas. The survey was supported by Shakti Sustainable Energy Foundation and conducted in association with the Initiative for Sustainable Energy Policy at the School of Advanced International Studies, Johns Hopkins University. Extending across 10 districts of the state in both rural and urban areas, the survey was undertaken over a three-month period from April 2018 to June 2018.

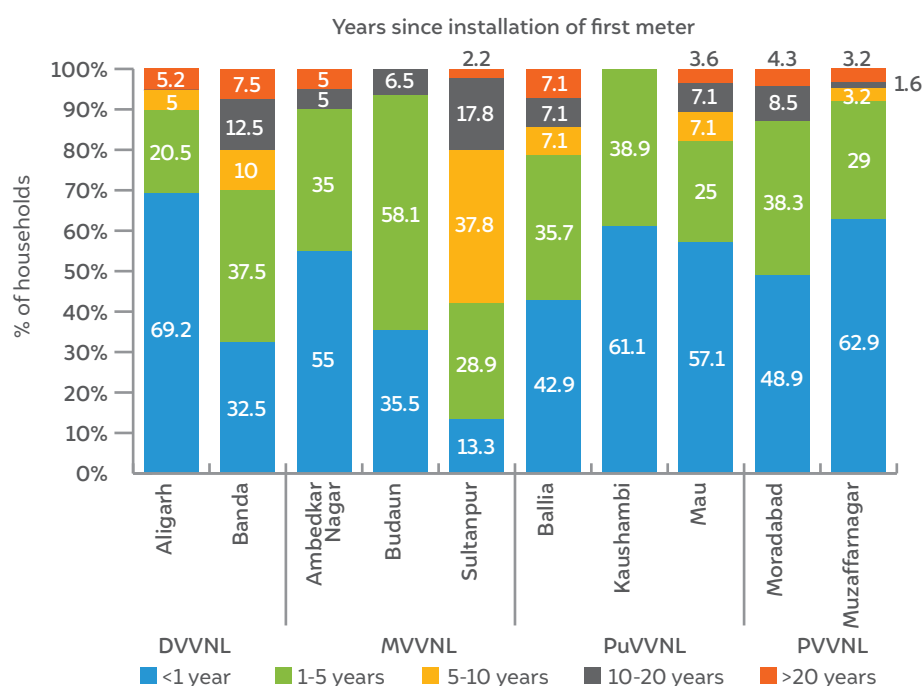
The sampling design is representative of rural and urban areas. The findings can be extended to the state as a whole. The 10 districts (Aligarh, Ambedkar Nagar, Banda, Ballia, Budaun, Kaushambi, Mau, Moradabad, Muzaffarnagar, and Sultanpur) cover the operating areas of four of the five public distribution companies – Dakshinanchal Vidyut Vitran Nigam Limited (DVVNL), Paschimanchal Vidyut Vitran Nigam Limited (PVVNL), Purvanchal Vidyut Vitran Nigam Limited (PuVVNL), and Madhyanchal Vidyut Vitran Nigam Limited (MVVNL). We surveyed a total of 90 villages (rural), 90 wards (urban), and around 1,800 households – 900 each in rural and urban areas.

## Discom services through the consumer's lens

Electricity is supplied for 17 hours in urban areas and 12 hours in rural areas (median figure). Both rural and urban households experience the highest gap between availability and requirement from 5 pm to 11 pm. Supply during evening and late evening hours is highly valued by consumers, especially urban consumers. Their satisfaction with supply is linked to availability during this period.

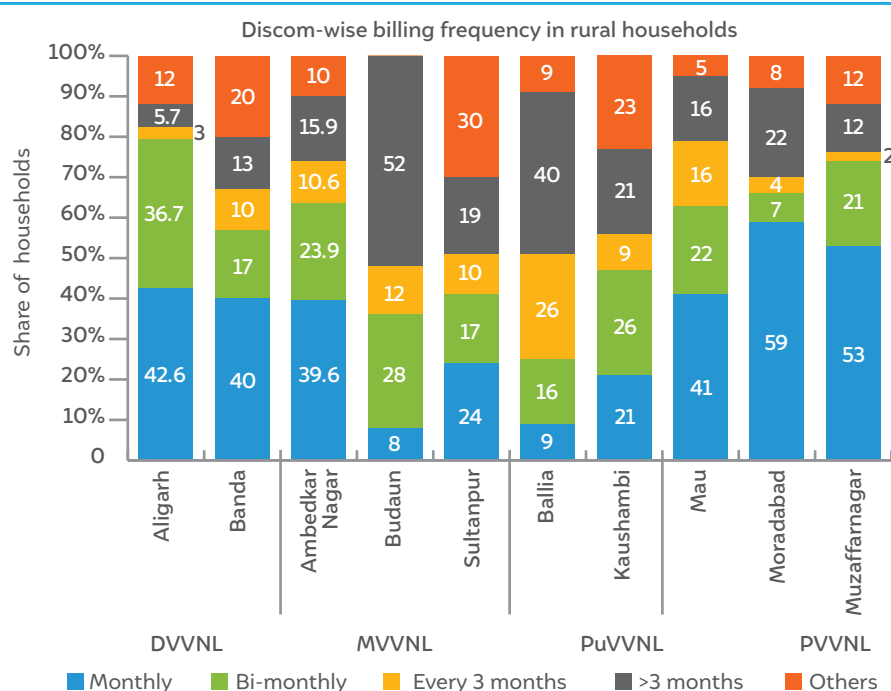
The lack of metering among residential consumers is one of the major contributors to discom losses. The share of unmetered consumers in rural areas is expectedly high – 55 per cent. The standout observation is that 10 per cent of urban consumers are unmetered. In rural households, meters are relatively new (see figure next page). The median age of meters installed in rural areas of three of the discoms (barring MVVNL) is less than one year. Metered connections are much older in most urban areas. In the PuVVNL service area, however, the median age of meters in urban areas is only three years. Many urban areas are well short of complete metering as well.

Billing is a key part of the discom service value chain, but discoms find the exercise administratively and financially draining. Apart from technical challenges (IT systems, ledgerisation, indexation of consumers), discoms in UP lack the manpower to cover the vast region they



Metering exercise relatively recent for rural households

Source: CEEW analysis



Billing in rural households is infrequent

Source: CEEW analysis

serve, and their administrative cost of reading meters manually and issuing bills is high. Billing is more frequent in PVVNL areas than in others, but it is lax in the MVVNL control area (see figure above).

The financial burden of accumulated bills is significant on rural households, especially those with low and seasonal incomes; they find it difficult to set aside large sums in the anticipation of bills. The significance of monthly billing is evident in the bill payments made by consumers. When billed monthly, 86 per cent of paying consumers make one-time bill payments in full, but this figure falls to 73 per cent if the billing frequency is bi-monthly or longer. We also find that when billed frequently, rural households pay their dues just as much as urban households do. A delay in payments from consumers affects discoms' working capital flows, and they are forced to resort to commercial borrowing to finance day-to-day operations – yet another avoidable cost.



When billed frequently, rural households pay their dues just as much as urban households do

	RURAL	URBAN
Surveyed HHs	900	900
Share of grid-connected HHs	85%	95%
Share of metered HHs	45%	90%
Share of metered and billed HHs	33%	85%
Share of metered billed and paying HHs	28%	79%

Source: CEEW analysis

Declining efficiency  
from supply to  
collection

Source: CEEW analysis

The table above shows the progressive decline in discom efficiency from supply to billing. Despite this, nearly 63 per cent of all legally connected consumers pay some non-zero amount in lieu of their dues.

## Trust, compliance, and hard theft

Losses arising from indifference to proper metering, billing, and collection – on the part of both discoms and consumers – are large enough to significantly dent utility finances. When measurement is absent to such a large degree, speculation gives rise to alternative explanations that promote the notion of extensive hard theft, to explain high levels of discom losses. With such entrenched issues, it is unlikely that aggregate technical and commercial (AT&C) targets can be met soon. A more pragmatic approach that gathers support for metering and provides resources for extensive billing and collection infrastructure, is needed. Curbing hard theft of electricity has been one of the key goals of the present administration in the state, and efforts are under way to improve monitoring and reduce discom losses from electricity theft. That said, we take a look at the socio-economic drivers of electricity theft in the state.

To assess how they view the utility business, we asked households to rate the importance of four attributes of a utility – quality of electricity service, method and frequency of bill collection, communications with the utility employee, and good financial management of the utility – on a scale of 1 (least) to 5 (most). An overwhelming share of rural and urban households valued supply quality (70 per cent rating of ‘important’ or ‘very important’). The method and frequency of bill collection was considered important by 51 per cent of rural respondents but 67 per cent of urban residents. Good financial management was considered important by 57 per cent of rural residents and 59 per cent of urban residents. Many people who consider supply quality important do not consider the financial management of the utility important; that suggests that the commercial aspects of the utility business are not widely understood.

Metered consumers exhibited a lesser acceptance of *katiya* among other consumers. An increase in the perceived importance of the utility’s financial management results in lesser acceptance. More than 84 per cent of respondents find *katiya* either unacceptable or highly unacceptable, but more than 52 per cent of them would issue only a warning to anyone found using a *katiya*. This is in line with the official position for the most part where criminal proceedings have rarely been undertaken. Levying heavy punishments is, however, not the only contributor to discouraging dishonest behaviour; the perceived likelihood of being punished must also increase commensurately.

Overall, consumer trust in the utility (the principal) and its actors (agents – discom officials, linesmen, bill agents) is low – less than 20 per cent of consumers trust these entities.



In rural areas, the median monthly payment is INR 60 to the linesman and INR 250 to the discom, and in urban areas it is ~INR 100 to the linesman and INR 600 to the discom



The principal is particularly distrusted. Given the distrust, is the consumer exploiting the principal–agent asymmetry to their benefit? Overall, nearly 23 per cent of all grid-connected rural households make a monthly non-zero payment to the linesman. This share drops to 15 per cent in urban areas. A majority of households reporting payments to the linesman report that they regularly pay their utility dues too. In rural areas, the median monthly payment is INR 60 to the linesman and INR 250 to the discom, and in urban areas it is ~INR 100 to the linesman and INR 600 to the discom. For households that make an informal payment to the linesman, the sum is substantial relative to their formal payment to the discom.

However, it would be difficult to attribute these payments as indicators of theft. Documented accounts suggest that the utility lacks the manpower to carry out various operational and maintenance works, and that households have to pay the linesman to attend to faults in their homes or investigate power outages. Payments to bill agents are reported by only 2 per cent of the population.

An econometric assessment of the drivers of compliance (in paying bills) shows that lack of trust in the utility and perception of corruption are significant deterrents. Frequent billing is the most important and consistent driver. Households that are billed more frequently are 57 per cent more likely to pay on time and 72 per cent more likely to pay in full than households that are not. The findings suggest that, both principal and agent need an image makeover. To maintain service standards, and persuade consumers of the intent for reform, increased engagement with consumers through targeted outreach and communication will be essential.



Households that are billed more frequently are 57 per cent more likely to pay on time and 72 per cent more likely to pay in full than households that are not

## Uttar Pradesh has not one but a diverse set of challenges in dealing with losses

Uttar Pradesh is not a singular entity - in terms of the extent of the various challenges faced by the power sector. The four discom regions present significant diversity in geographical spread, economic status, demographic mix, and prevailing social norms. The Purvanchal region in the state is the poorest performer on most of the discom service parameters. In part, some of this can be attributed to the consumer mix as well. PuVVNL has the most skewed residential consumer mix with 70% being in rural areas. While the rest have a higher share of urban consumers, as compared to rural, MVVNL will see a near tripling of its consumer base, as per recent tariff orders. Many of these rural consumers are unmetered, and not surprisingly, our study reveals consumers of MVVNL and PuVVNL service areas are more accepting of the practice of katiya. The share of paying – industrial and commercial, consumer base is expected to decrease for all discoms and even at present PuVVNL and DVVNL have a disproportionately low share. The power sector scenario could improve when the expectations from the discom reflect the situation on the ground. Madhyanchal discom, despite benefiting from housing the seat of political power, has also come up short on performance. The drivers of issues in each of these discoms arise from dissimilar endowments – political capital, economic progress, social norms and, most importantly, the discom's competency to administer the region under their control. Both state and central government agencies must acknowledge that all discoms in UP cannot function under one efficiency improvement trajectory. The targets under UDAY are paced much more aggressively for poorer performing discoms.

A true separation of discoms, and autonomy for each, is not on the cards. The immediate focus must firmly be on augmenting resources for metering and delivering bills periodically and etching in the consumer's mind that payment is mandatory, and non-negotiable. Driving this common agenda is important, alongside the need to provide context-specific incentives – to both consumers and discom agents. It would be important, especially in areas with a significant new-consumer base, to conduct awareness-raising campaigns on consumers' financial responsibility to discoms and the implications of losses on the quality of supply. Bill-paying consumers must also be in a position to hold the discom to account for supply quality and service levels, as envisaged in the supply code.

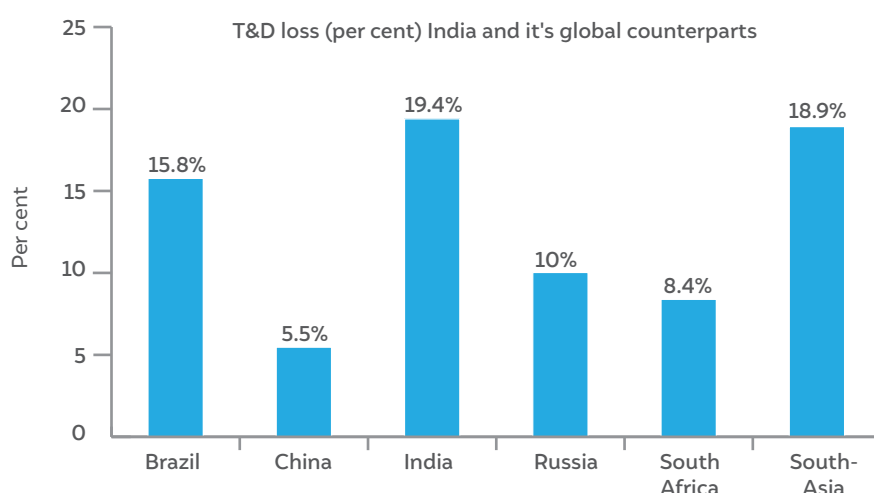






# 1. Introduction

Arguably, the standout feature of India's power system is the scale of annual losses – in both energy (kWh) and financial terms (INR) – of the utilities involved in supplying electricity (discoms). The share of electricity injected into the network but not accounted for in final billing is nominally defined as the transmission and distribution (T&D) loss. This T&D loss comprises technical and non-technical loss incurred in the wires and through various transformations that electricity undergoes as it reaches end consumers.<sup>1</sup> Technical loss is due to energy dissipated in T&D equipment. The T&D loss is higher in India than in its neighbours in South Asia, Brazil, China, Russia, and South Africa (IEA, 2018) (Figure 1).



**FIGURE 1:**  
Electric power T&D  
losses (% of output)

Source: Electric power T&D  
losses (% of output), IEA  
Statistics © OECD/IEA 2014

In developing countries, the losses owing to lacunae in the electricity distribution utility's energy accounting – metering, billing, and collection (MBC) practices – and pilferage of energy form a significant chunk of T&D loss. In most parts of the developed world, T&D loss is essentially technical loss, as utilities are competitively operated; they move electricity efficiently, and they bill clients for their level of consumption. Technical and governance challenges plague the electricity distribution sector in India, and public utilities lack the capacity and resources to monitor their vast consumer base.

Metering is poor at various points in the network – interface, distribution feeders, and end consumers – and estimating input energy and energy billed is difficult. The measure of

<sup>1</sup> In the case of India, the IEA data represents the difference between net generation and consumption (from utilities and captive). In effect, it subsumes all underlying losses into the T&D component. The overall loss figure is 20 per cent because captive consumption does not experience the same kind of losses – technical or non-technical – that utility supply does. Many captive plants are on-site and do not traverse much of the T&D network.

aggregate technical and commercial (AT&C) loss was introduced to account for discom loss arising from MBC inefficiencies; AT&C loss indicates the amount of electricity injected into the distribution network but not paid for. Thus, AT&C loss is considered to be a better representation of power theft, when understood in its broad sense, than T&D loss.

Particularly in the state of Uttar Pradesh (UP), discom loss has crippled the power sector since the 1980s. Consumers suffer from the poor power supply and unplanned outages (Balls, 2018). Public discoms in UP ranked 35–39 out of 41 discoms assessed in the Ministry of Power's annual rating of discoms, and last among discoms in the northern region (Care Ratings, 2018).

## 1.1 Non-technical losses

Significant energy is lost in the T&D system in India due to non-technical factors: wrong accounting of energy due to defective meters, errors in meter reading and in estimating unmetered consumption of energy, false readings taken due to collusion between consumers<sup>2</sup> and meter readers/billing agents, and pilferage of electricity by consumers in one form or the other. Losses incurred due to these reasons are called non-technical losses.

In India, it is difficult to accurately apportion losses to various causes. Studies and anecdotal evidence show that discoms often mis-account losses and attribute higher consumption to unmetered connections than in reality, thus obscuring loss figures. For instance, a case study<sup>3</sup> of a distribution circle in Maharashtra establishes the difficulty in determining losses in an unmetered agricultural feeder. It highlights the utility's practice of inflating consumption by nearly 100 per cent over and above actual consumption (Feedback Ventures, 2010). Energy accounting is all the more problematic as there is little or no data on energy input into feeders, in locations with unmetered connections. The push for better metering technology and smart meters, to improve data accounting, is a welcome move, but it would make little sense if the data obtained is not utilised effectively.

Losses due to inaccuracies in metering and billing may occur due to involuntary factors, but a key component of the discourse on electricity loss in the developing world and, in particular, in India is theft in the distribution network as understood in its most conventional sense. Globally, electricity supply utilities lose around USD 25 billion each year owing to non-technical losses; India's share is nearly 20 per cent (Depuru, Wang, & Devabhuktani, 2011).

The Electricity Act, 2003 (the Act) defines electricity theft mainly as hooking of wires (*katiya*), meter tampering and bypassing, and usage of electricity for unauthorised purposes.<sup>4</sup> Smith (2004), on the other hand, incorporates billing irregularities and non-payment of bills, too, in his definition. Reinforcing this definition, Jamil and Ahmad (2013) sum up theft



The losses owing to lacunae in the electricity distribution utility's energy accounting – metering, billing, and collection (MBC) practices – and pilferage of energy form a significant chunk of T&D loss

<sup>2</sup> In this study, 'consumers' refers to household (or domestic) consumers, unless otherwise specified.

<sup>3</sup> The Maharashtra Electricity Regulatory Commission appointed Feedback Ventures as a third-party evaluator to estimate technical and commercial losses within Solapur district in Maharashtra and identify and estimate the factors contributing to losses. An important part of the assignment was the estimation of energy supplied to unmetered agricultural consumers.

<sup>4</sup> Section 135 of Electricity Act, 2003 defines theft as: Whoever, dishonestly,  
 (a) taps, makes or causes to be made any connection with overhead, underground or under water lines or cables, or service wires, or service facilities of a licensee or supplier as the case may be; or  
 (b) tampers a meter, installs or uses a tampered meter, current reversing transformer, loop connection or any other device or method which interferes with accurate or proper registration, calibration or metering of electric current or otherwise results in a manner whereby electricity is stolen or wasted; or  
 (c) damages or destroys an electric meter, apparatus, equipment, or wire or causes or allows any of them to be so damaged or destroyed as to interfere with the proper or accurate metering of electricity, or  
 (d) uses electricity through a tampered meter; or  
 (e) uses electricity for the purpose other than for which the usage of electricity was authorised ...

in three Rs: improper *recording* of electricity, due to illegal abstraction through hooking of wires and meter tampering; inaccurate *reporting* of electricity consumption due to collusion between employees and consumers; and low *recovery*, due to non-payment of bills by consumers. These activities are not all voluntary in nature – or wilful acts of commission on the part of the consumer or discom – but they all contribute to the discom’s energy and revenue loss.

Electricity loss not attributable to technical reasons may be classified into hard theft and MBC loss. ‘Hard theft’ refers to theft as defined under Section 135 of the Act, which entails theft due to hooking of wires (*katiya*), meter tampering, unauthorised electricity usage, and wilful acts of misrepresenting electricity consumption; MBC losses refer to losses arising from lax operational diligence of the discom or the consumer’s lack of awareness, which precipitates consumer indifference or alienates them, and are outside the wilful actions mentioned under Section 135 of the Act. Metering, billing, and collection losses are a subtle form of theft, which include *inter alia* losses due to incorrect recording or wrong accounting of energy consumption at the discom’s end, billing irregularities, non-payment of outstanding amounts by consumers as per bills, and non-timely payments by consumers.

Electricity utilities mis-account energy consumption by unmetered consumers to mask inefficiencies and their inability to operate in a financially prudent manner (Swain and Charnoz, 2012). Discoms need to institute stringent metering and billing practices; mis-accounting lets them put it off. Non-timely payment of bills results in debtor days, which affect the discom’s collection rate and adds to their operational burden. Consumers and discom officials are culpable in both hard and soft theft.

Activities defined as ‘Hard Theft’ - wilful acts	Activities resulting in metering, billing, and collection losses
Hooking of wires	Lack of metering or appropriate recording of consumption
Tampering and bypassing of meter	Billing irregularities
Damaging meter and other electricity apparatus and wilful misrepresentation of consumption	Non-receipt of bills by consumers
Using electricity for unauthorised purposes	Non-payment, partial payment, or irregular payment of bills

**TABLE 1:**  
Classification of  
non-technical losses

Source: CEEW analysis

## 1.2 The case of Uttar Pradesh

Uttar Pradesh has the largest population, the largest number of households added under the *Saubhagya* scheme, and the highest commitment to reforms under the *Ujwal Discom Assurance Yojana* (UDAY); and, therefore, the greatest need to address discom losses. Electricity utilities in UP ran up approximately INR 30,000 crores in losses in FY 2015–16, the largest in any state (PFC India, 2017). That figure is 75 per cent of the state’s power purchase cost for that year (PFC India, 2017; UPERC, 2015). The multi-year tariff order for the period 2017–2020 had a loss target of 11.96 per cent for the terminal year of the order, and this is more aggressive than what Uttar Pradesh had committed to in the UDAY MoU (14.86 per cent) (Ministry of Power, 2016; UPERC, 2017, p. 162). However, the state’s AT&C losses stood at 33.08 per cent (as of December 2018), which accentuates the socio-economic realities peculiar to the state,



Electricity utilities in UP ran up approximately INR 30,000 crores in losses in FY 2015–16, the largest in any state



within which its electricity distribution sector operates, and suggests that the state faces challenges in delivering on past promises (Ministry of Power 2018).

The Uttar Pradesh Power Corporation Limited (UPPCL) manages power procurement and bulk sales in the state. Its data shows that by the end of the first six months of FY 2018–19, the cash gap of UP discoms was INR 8,000 crores. Almost 6.15 lakh urban consumers each had billing arrears above INR 10,000 during the period. Rural consumers number 163 lakh, but only 115 lakh are metered. Only 32.58 lakh rural metered consumers were issued bills, and 33.6 lakh rural consumers (or 20.60 per cent of the total consumer base) had paid their bills by the end of six months (UPPCL, 2018). The deterioration in coverage from metering to collection is stark. Inefficiencies in MBC practices drive this quantum of ‘soft theft’.

CEEW’s ACCESS Survey (2018) highlighted that 37 per cent of rural households in UP reported that hard theft was prevalent in their villages, and that 94 per cent of respondents were aware that it is illegal (Jain, et al., 2018). In the first round of the ACCESS Survey (2015), 46 per cent of rural households felt that theft was prevalent in their village (Jain, et al., 2015). This drop in the perception of theft suggests progress in limiting unlawful consumption. In their commentary on power theft (as understood in the Act) and losses in UP, Golden and Min (2012) highlight that unsanctioned connections (*katiya*) to the grid constitute the way most of the electricity is stolen in the state. These connections are easily detached when discom engineers or bill agents arrive. In some cases, employees and consumers (or non-consumers) act in collusion, and users stay illegally connected to the grid indefinitely. The Hindi documentary *Katiyabaaz* (2014) focuses on how a *katiya*-man, or the person facilitating *katiya* connections, becomes a Robin Hood-like figure for the masses – enabling the poor and needy to consume electricity at will, at the cost of the state and the utility, which is shown to be not concerned with the plight of those needing electricity when they want it.

A common practice for consumers who indulge in metering fraud is to make facilitation payments to meter readers for reporting less than the actual reading. Meter tampering or bypassing is another common practice, wherein users use more electricity than they pay for (Golden and Min 2012). The level of metering is low in rural areas, and meter bypassing is a smaller issue to contend with. Even when bills are sent to consumers, they are sometimes not paid, and discom revenues are affected. There are several reasons – not always related to corruption on the part of discom employees – for non-payment; one is inconvenience. In rural parts of UP, if consumers want to pay their bill, they need to travel a long distance to the discom office or a facilitation centre (Golden and Min 2012).

Hard theft is quite prevalent, but since there is no clear documentation of the scale of the issue, it has become the go-to straw man for explaining the abnormal levels of loss faced by UP discoms. Theft may be prevalent, but it is only one driver of loss, and other drivers of discom losses must be ascribed due importance before theft is addressed. If discoms are held accountable, and they improve their MBC practices, attempts to access electricity illegally should automatically go down.

### 1.3 Non-technical losses and associated impacts

Non-technical losses – driven by hard theft or MBC losses – cost discoms energy or revenue and impair discoms from providing reliable and adequate supply even to honest consumers. The already overloaded existing distribution infrastructure experiences high technical losses



By the end of the first six months of FY 2018–19, the cash gap of UP discoms was INR 8,000 crores



If discoms are held accountable, and they improve their MBC practices, attempts to access electricity illegally should automatically go down

and interruptions, which in itself undermines the quality of service provided. It affects the overall productivity of assets and deters much needed investments.

Hard theft of electricity creates a vicious spiral where poor investments and poor returns reinforce each other to drive the system into the ground (Gaur and Gupta, 2016). If the understanding of current patterns of electricity consumption is poor, projections of demand will be incorrect; and poor demand projections drive sub-optimal procurement practices and force discoms to resort to unscheduled power outages at peak periods. The unpredictable amount of additional load also imposes uncertainties on the generation assets that are requisitioned by the discom.

In a regulated return environment, discoms pass on a significant portion of the losses to consumers as tariffs. Discoms borrow to tide over the rest of the losses, and pass the interest on borrowings to tariff-paying consumers. Every consumer, sanctioned or otherwise, pays taxes indirectly to the system, and they pay for government bailout schemes – such as Financial Restructuring Plan 1 and 2 and UDAY – to turn discoms around.

## 1.4 Drivers of compliance and theft

Every electricity system has distinct characteristics. These characteristics are linked to the socio-economic realm within which the system operates, and these need to be understood to address the problem of theft (Smith, 2004). Factors such as corruption levels, human development indicators, income, religion and caste dynamics, and tariff interact with one another in various ways and manifest themselves in different forms of theft (Saini, 2017). For instance, billing disputes constitute a significant issue as evinced in the petitions filed in the consumer grievance redressal forums, and this is an issue that discoms need to address urgently. Consumer behaviour is affected by (*inter alia*) social and economic determinants such as purchasing power, corruption, trust in the utility, and trust in society.

### 1.4.1 Purchasing power

Uttar Pradesh, with a population of more than 200 million, has one of the lowest per capita incomes in the country (Census, 2011; MOSPI, 2017). The per capita energy consumption in UP is 524 kWh, against the all India average of 1,075 kWh (Ministry of Power, 2017). The rural household electrification level was 65 per cent for the state as on 6 June 2018; this figure is the third lowest in India (Ministry of Power, 2018).<sup>5</sup> Of all the rural households in UP that are not connected to the electricity grid, 46 per cent have no interest in applying for new connections (Jain, et al., 2018). In a few districts, un-electrified households using kerosene as their primary source of lighting were of the view that grid electricity is expensive, even though they were spending as much on kerosene.

The Ministry of Power introduced the universal household electrification programme, *Saubhagya*, in September 2017. Under the *Saubhagya* scheme, willing and poor households were to be given free connections, and other households could avail a connection for a nominal payment in monthly instalments. This provision should have resolved the challenges associated to high upfront cost, but the perception that recurring costs will be high and supply unreliable still persist.



Of all the rural households in UP that are not connected to the electricity grid, 46 per cent have no interest in applying for new connections

<sup>5</sup> Though electrification rates have subsequently increased, on account of the *Saubhagya* programme.

ACCESS 2018 highlighted that at least 40 per cent of the electrified households (Jain, et al., 2018) were not paying for the electricity they consumed, up from 27 per cent in 2015 (Jain, et al., 2015). That payment rates have dropped further, and exacerbated discoms' financial woes, is at least partly because many households cannot afford to pay.

## 1.4.2 Corruption

The level of electricity theft correlates with governance indicators; theft is higher in geographies with ineffective accountability, political instability, low government effectiveness, and high corruption (Smith, 2004). India was ranked 81 out of 180 countries and territories in the Global Corruption Index (GCI), 2017 by Transparency International, based on the perceived levels of public sector corruption (Transparency International, 2018). Interestingly, out of the total GCI 2017 survey respondents in UP, about 21 per cent said that corruption levels had reduced in the state in comparison to the previous year. In another study, 59 per cent of residents in UP admitted to have paid facilitation payments/bribes to get their work done, out of which 38 per cent gave bribes (directly or indirectly) once or twice and 21 per cent gave bribes (directly or indirectly) several times (Transparency International India, Local Circles, 2018).

Electricity is a source of considerable rent-seeking for discom employees (Jamil and Ahmad, 2013). The agent (discom employee) is constrained by the ability of the principal (discom, as an institution) to set rules for them to function and closely monitor them. Generally, rules allow employees some discretion, since thorough monitoring is exorbitant. The extent of imprecision in the implementation of rules, and the cost of monitoring the employees in a utility, may determine the level of corruption and, thus, the level of power theft in the system.

Adding the opportunity cost element to the theory, Jamil and Ahmad (2013) state that theft occurs if its perceived cost is less than the subjective gains. A consumer can steal electricity by bribing either the discom employee or the meter reader; whether they will depends on the cost and benefit of doing so. Similarly, for a discom employee, the perceived cost of colluding with a consumer could be the fine imposed in case of apprehension or job dismissal.

## 1.4.3 Trust in the utility

Power theft originates from distrust between utility and consumers, high tariff rate, and consumers' unwillingness to pay for the service (Never, 2015). People's degree of compliance with the law depends upon their perception of the utility, their evaluation of co-inhabitants, and their wider concerns (Winther, 2012). In the consumer–utility relationship, consumers should be seen not merely as passive recipients of electricity but as agents interacting continually with technologies (such as meters) and actors (such as bill agents and meter readers). Consumer compliance is determined by their constant interaction with discom infrastructure, officials, and agents and by the view consumers take of their attitude.

Power theft creates a vicious theft–loss spiral. Theft impairs discoms' ability to supply electricity reliably to consumers, increases honest consumers' dissatisfaction, and negatively impacts willingness to pay for the service. The panel data set in the ACCESS study from 2015 and 2018 provides some evidence. Median supply hours for rural electrified households increased from 8 hours per day in 2015 to 12 hours per day in 2018; however, about two-thirds of all households receive only three hours of supply between sunset and midnight, almost 36 per cent of electrified rural households were dissatisfied with their electricity supply, and



**In the consumer–utility relationship, consumers should be seen not merely as passive recipients of electricity but as agents interacting continually with technologies and actors**

about 76 per cent of them complained also about frequent voltage fluctuations that led either to sub-optimal use or damage of appliances (Jain, et al., 2018).

As per the UP's *24X7 Power for All* Roadmap document, the state government and discoms had committed 24 hours of electricity in all supply areas by October 2018 (Ministry of Power, 2017), but they have not met their commitment. The UPERC's Tariff Order for FY 2017–18 states that the projections for discoms' annual expense for FY 2018–19 will consider 24 hours of supply, and consumer tariff shall be determined accordingly (UPERC, 2017, p. 139), but in that case consumers are paying for 24X7 electricity while not actually receiving the service.

### 1.4.4 Trust in society

The literature on regulatory compliance suggests that trust nurtures compliance in society. If citizens are not compelled to comply and, instead, they volunteer compliance, they choose to do the right thing, and they persuade themselves that their actions are 'virtuously right' (Braithwaite and Makka, 1994). The relational aspects and levels of trust between consumers and counterparts matter in determining their compliance with the law (Fjeldstad, 2004). Consumer compliance is determined by three dimensions of trust. The first two dimensions echo the earlier notions of trust in the utility to use revenues to provide expected services and to establish fair procedures for revenue enforcement and distribution of services. The third dimension is the trust consumers have in other citizens (their peers, so to say) to pay their share of the service charge. Consumers might not comply if they do not find others complying.

The discoms' performance on the second dimension of trust can be inferred from the ACCESS study findings on metering and billing status of households in rural UP. Less than 15 per cent of the grid-connected households had meters installed (Jain, et al., 2018); at least 25 per cent of electrified households, metered and unmetered, were not paying their electricity bill; and 25 per cent of metered households were receiving fixed bills, as opposed to variable bills based on their electricity consumption. This could be because the meters are not working, or discoms were not reading them regularly; operational inefficiencies lead to MBC losses for discoms and affect their consumers' trust.

ACCESS 2018 findings on the third dimension of trust suggest 37 per cent of rural households held that theft is prevalent in their village; 85 per cent of unmetered rural households and 25 per cent of total connected households do not make any payments to the utility for their consumption (Jain, et al., 2018). This perpetuates the social norm that it is acceptable for consumers not to pay for utility services and that non-payment has no consequences.

This implicit social norm is a manifestation of path dependence – a concept rooted in historical institutionalism. The literature suggests that years of conditioning electricity users to certain attitudes, also results in power theft. The idea that electricity is one's fundamental right, and must be provided regardless of their ability to pay for it, could further embolden people to indulge in theft. The mindset seems to be built on the impression that the lives of the poor and development opportunities for them would improve if the government makes electricity readily available to them and that, therefore, it is the government's responsibility, not that of other consumers or service providers (Rao, 2002). Another related notion among illegal consumers is that it is dishonest to steal something from their neighbour but not from the government or the discom (Depuru, Wang, and Devabhuktani, 2011).

Losses arising from electricity theft (hard and soft) constitute a contextual phenomenon; to

study and address these, it is necessary to adopt a nuanced approach that is grounded in studying the psycho-social and psycho-economic determinants of theft.

## 1.5 Motivation and objectives

Under the *Saubhagya* scheme, the Government of India plans to achieve 100 per cent rural household electrification by early 2019. Under the *24x7 Power for All* Scheme, the government of UP committed to supply 24 hours electricity to all consumers (except agricultural) by October 2018, but it has failed its commitment. Nearly 74 lakh consumers were added under the *Saubhagya* scheme in UP, and nearly all of them in rural areas. If the current situation of recovery from rural areas is anything to go by, AT&C losses of discoms are likely to increase steeply, as will their financial and administrative burden.

The UPERC's tariff order for FY 2017–18 indicates that a lion's share of consumption is attributable to domestic consumers (households) in UP – about 42 per cent of the total energy supplied by all the discoms in the state. Of the total state government subsidy earmarked for the three financial years 2017–18, 2018–19, and 2019–20, 67.5 per cent or INR 9,780 crores was apportioned for providing rural domestic consumers electricity. The figure shows the size of public resources required in enabling (incremental) universal energy access. Household consumption significantly impacts the discom and state's financial position.

Losses and power theft can reduce the expected benefits of the promised 24x7 supply and 100 per cent household electrification. For discoms to be able to deliver reliable and sufficient supply to all its consumers as per the performance standards in the UPERC's Electricity Supply Code (2005), it is essential to cut hard and soft theft. With the 'right to electricity' narrative gaining traction in recent years, it is important to create a responsible base of consumers and utility staff who duly value the electricity infrastructure service.

To curb theft and cut losses, state discoms have

- introduced better metering technology, by installing Automatic Meter Reading (AMR)-based meters and smart meters as per UDAY's mandate;
- installed armoured cables in areas that see high levels of 'hard theft';
- improved vigilance by appointing raid teams;
- instituted stringent penalties for those indulging in theft of any form; and
- put naming and shaming practices in place for discom engineers who cannot contain AT&C loss in their jurisdiction.

In the past, UPPCL had introduced monetary rewards for officials who cut losses in their jurisdiction and fines for those who failed (UPPCL, Letter No. 101 & 829, 2018). The state government had planned to privatise the distribution business in Lucknow, Meerut, Moradabad, Varanasi, and Gorakhpur through the franchisee model, but they later scrapped the plan (Jainani, 2018).

In the year 2008 distribution franchisees were planned in Kanpur and Agra, after which Torrent Power Limited (TPL) took over the distribution business in Agra, in 2010. TPL was expected to cut AT&C loss in Agra to 15 per cent by the end of FY 2016–17 as per the distribution franchisee agreement (DFA) it signed with UPPCL, but its loss by the end of FY 2015–16 was 31.68 per cent, according to an expert committee report submitted to the UPERC (UPERC, 2012). In August 2016, the last month for which losses were recorded in the report, TPL's loss



was 22.4 per cent. The report found it unlikely that TPL could achieve its loss targets.

Attempts to address the issue of power theft have used conventional approaches: improved metering (automated or manual), new methods for inspection and control, or private participation (Winther, 2011). The current tariff regime enforces a uniform retail tariff across the discoms for each consumer category, but the variation in the consumer mix and socio-economic profile is enough to justify a differentiated tariff regime.

PuVVNL incurs high losses, and it is weighed down by a low industrial consumption base and a lower urban (domestic) consumer base. In discoms like PVVNL that have a mix of consumers that pay higher rates, the overall financial performance has been better despite little effort.

Socio-economic conditions vary between western, southern, and eastern UP; therefore, purchasing power will likely be higher in some regions, as will reliance on government support in others. Since these utilities are government owned, there is no incentive to improve performance as long as minimum benchmarks are met.

The discom-wise AT&C loss data for FY 2016–17 (Table 2) for four of UP's discoms reflects the difference in performance of each of these discoms. Given the different endowments, the drivers of theft and MBC losses are also different; and a unified approach in handling this important issue for all discom regions is certain to be sub-optimal.

Discom	AT&C Loss (%; FY 2016–17)
Dakshinanchal Vidyut Vitaran Nigam Limited	43.3
Madhyanchal Vidyut Vitaran Nigam Limited	52
Pashchimanchal Vidyut Vitaran Nigam Limited	26.9
Purvanchal Vidyut Vitaran Nigam Limited	51.1

**TABLE 2:**

AT&C loss (%) of discoms in Uttar Pradesh

Source: Care Ratings, 2018

The financial turnaround schemes and discom loss reduction plans are governed centrally. In imposing similar targets on all states and discoms, the needs specific to states and discom regions have been disregarded. The UDAY expects the state to cut losses to historically low levels, but the *Saubhagya* scheme commits it to ensure 100 per cent rural electrification and increase subsidy outlay to ensure meaningful consumption for those with new connections. The consumer base has increased recently, but AT&C loss was 33.08 per cent even after two years of participating in the UDAY agreement (Ministry of Power, 2018).

The roots of hard theft lie in people's socio-economic backgrounds; therefore, a nuanced, contextually sensitive, bottom-up approach is needed (Saini, 2017; Winther, 2012). The CEEW conducted a representative state-level survey of 1,800 households (both rural and urban) in 10 districts of UP with support from the Shakti Sustainable Energy Foundation and the Initiative for Sustainable Energy Policy at the School of Advanced International Studies, Johns Hopkins University.

The study aims to analyse the perception of households – those connected to the grid and those yet to be connected – towards hard theft and its contribution to MBC losses. It aims also to understand the psycho-economic and psycho-social determinants of power theft. The study attempts to analyse power theft as a multifaceted phenomenon and understand its interdependency with variables such as purchasing power, level of trust in the utility, level of



The study aims to analyse the perception of households – those connected to the grid and those yet to be connected – towards hard theft and its contribution to MBC losses

trust in a society, and metering and billing status.

Based on insights obtained from the literature, and on the need to design an appropriate strategy for curbing theft practices in UP, the study attempts to answer three research questions.

- How significant is hard theft and MBC loss individually in overall discom loss?
- What determines consumer compliance? Is it a socio-economic construct or does the discom have a role in improving compliance?
- Should a plan to curb theft be formulated for the whole of UP or for specific parts?



Image: Kanika Balani/CEEW





Image: Nrateek Agarwal/CEEW



Image: CEEW



Image: Morsel



Image: Morsel



Image: Morsel

## 2. Methodology and Framework for Assessment

**T**his study uses both quantitative and qualitative data comprising household survey in both urban and rural areas of UP, secondary data sources, and semi-structured interviews with stakeholders. The research tools used for data collection have been described below.

Household survey in urban and rural areas – A survey questionnaire was designed to solicit consumer perceptions on services provided by discoms. A preliminary version of the questionnaire was tested in the pilot phase with limited households. The feedback from pilot phase was used to fine-tune the questionnaire. The final version was deployed in 10 districts of the state, the sampling technique for which is discussed later in this chapter.

Secondary data sources – An extensive review of existing data in the public domain on service provision of distribution companies and their losses was first carried out. The review was extended to elements of trust, social norms, and determinants of theft. The sources reviewed include published literature – academic journals and peer-reviewed policy reports, data portals of the Ministry of Power, Government of India, and public data sources hosted by other research groups.

To incorporate views of the officials involved in the distribution sector in the state of UP, semi-structured interviews were conducted with officials of four public distribution companies and the state electricity regulatory commission. The other set of stakeholders interviewed include sector experts active in the state and fellow researchers with an active interest in the power sector. The interviews were conducted in two phases. The first phase of interviews was aimed at soliciting views on first version of the survey questionnaire. The feedback was used to refine and make additions to the instrument. The second phase of interviews were conducted to solicit officials' views on the survey results and in some sense ground truthing some of the survey results.



## 2.1 Survey of households in UP

### 2.1.1 Questionnaire design

This study aimed to understand the losses of discoms and the contribution of operational aspects and socio-economic factors to these losses. The survey questionnaire was developed based on the results from pilot testing of the survey. The questionnaire was reviewed by sector experts. The final questionnaire consisted of 104 questions. We designed it to be completed within 35 minutes on average. It encompassed six broad sections.

- Household background and socio-economic information
- Status of electricity supply
- Elements of trust
- Attitudes on crime and the demographic variation of these attitudes
- Consumer preferences on electricity rates and payment method
- Consumer perception on electricity theft

### 2.1.2 Sampling of districts and villages

The sampling strategy was aimed at arriving at results that are representative of rural and urban households across the state, thereby eliminating the need for sampling weights. The sampling approach is a stratified cluster-based random sampling. The state of UP was divided into five geographic regions. The districts within the region were picked while ensuring a geographically representative sample. A total of 10 districts, two districts from each region, were picked for conducting the survey. Sample weights, however, were used in state-level findings, as the rural-urban share is not equal across the districts. Based on census 2011 data, rural-urban population figures were used as weights.

Using 2011 census data, the districts were split into two groups – large and small, based on their population size. Five wards, villages were randomly chosen from the large group. Similarly, four wards, villages were chosen from the small group. A sum total of 90 wards and villages were picked up for sampling. Finally, 10 households were randomly selected from each village/ward, to form a sample of 1,800 households (Table 3).



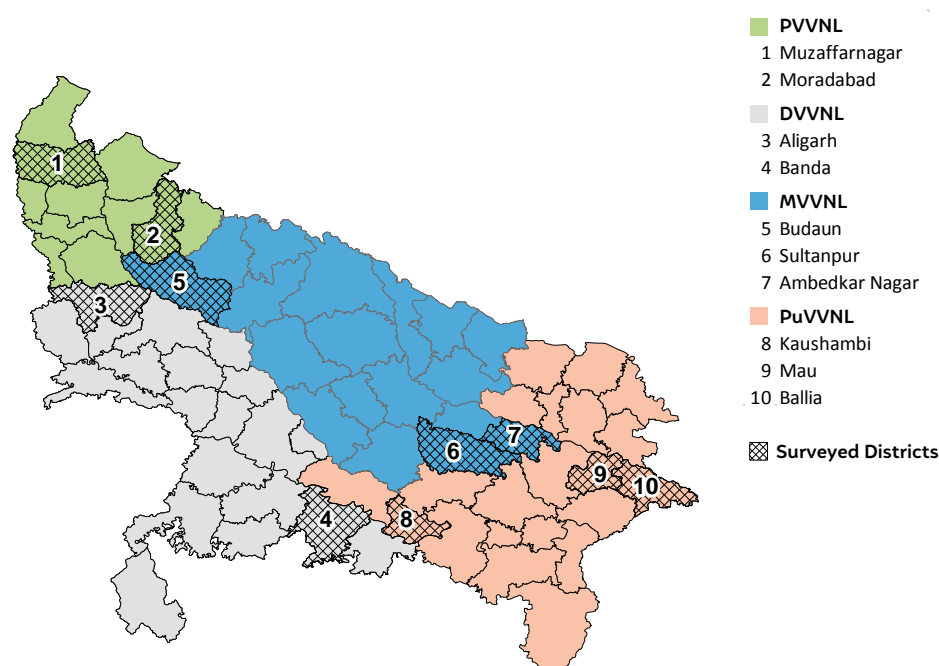
The sampling strategy was aimed to arrive at results that are representative of rural and urban households across the state

Discoms	Districts
Dakshinanchal Vidyut Vitaran Nigam Ltd	Aligarh
	Banda
	Ambedkar Nagar
Madhyanchal Vidyut Vitaran Nigam Ltd	Budaun
	Sultanpur
	Ballia
Purvanchal Vidyut Vitaran Nigam Ltd	Kaushambi
	Mau
	Moradabad
Paschimanchal Vidyut Vitaran Nigam Ltd	Muzaffarnagar

**TABLE 3:**  
Districts sampled for survey and respective discom areas

Source: CEEW compilation





**FIGURE 2:**  
Surveyed districts in  
the state map

Source: CEEW analysis

### 2.1.3 Data collection and cleaning

To facilitate data collection, and ensure consistency in the process of soliciting responses, we conducted in-person training sessions for enumerators over two rounds – one at the beginning and one mid-way through the survey – to reiterate some of the key nuances of the enumeration. The enumerators were picked after various rounds of role-playing exercises. The enumerators were trained on the questionnaire structure to avoid any confusion during the survey.

One pilot survey was conducted in both rural and urban households to check for the reliability and validity of the responses. Consequently, the questionnaire was modified based on the results of the pilot survey. The enumerators recorded responses on an application made available on hand-held devices. Near real-time data acquisition was made possible on account of the mode of survey, and we were able to monitor oddities in the conduct and also in the nature of responses coming through. We carried out quality checks on the data for incorrect recording of responses, outliers, and missing values prior to analysis.

### 2.1.4 Data analysis

Exploratory data analysis was carried out using MS-Excel tool and further statistical analysis using STATA. We use Fisher's-p values to establish the significance at 95 per cent confidence levels in all econometric tests. Descriptive analysis forms the core of the early insights derived from the study. Correlations were tested between variables of interest, to ascertain a suitable set of predictor variables and comprehensively explain the drivers of key actions such as consumer compliance and acceptability of illegal tapping of electricity wires to gain supply.

## 2.1.5 Semi-structured interviews

We carried out a series of stakeholder discussions with officials of UPERC, power sector experts active in the state, and other researchers. We also discussed the survey questionnaire and relevance to the situation in power sector of UP. We solicited the views of officials of MUVNL, PuVVNL, and DUVNL on the challenges faced by discoms in providing better services. The outcomes of these discussions are discussed in brief in the relevant sections of the findings chapter. The objective for interviewing discom officials was to capture views of all stakeholders involved in the decision making of discom activities. In addition, the interviews were used as a validation exercise on findings from the survey.



The objective for interviewing discom officials was to capture views of all stakeholders involved in the decision making of discom activities

## 2.3 Framework for assessment of survey findings

The survey questionnaire was aimed at capturing perception of discom services, accounting for electricity charges and losses, and socio-economic factors contributing to losses of discoms. The framework for assessing the survey was developed based on multiple stakeholder discussions to uncover nuances in discom activities. The issues we attempt to uncover through the survey findings are captured under the broad umbrella of AT&C losses of discoms.

Some factors of AT&C losses are evident and captured in the existing literature, but certain factors are hidden. This report aims at capturing these hidden factors in detail to help focus the efforts of state government and discoms in limiting the losses. The framework for assessment is divided broadly into four sections: electrification and power supply situation; metering of households; billing and collection and accounting of losses; and trust, perceptions, and their role in aiding and abetting theft.

### Electrification and power supply situation

Information from existing data sources is used to describe the status of electrification in the districts and the power supply position as reported by consumers. This information is compared with other information available in the public domain, power supply, and temporal trends power supply position in the state. Further, the consumer value attached to power supply based on time-of-day, for example, value of electricity supplied during evening hours vis-à-vis morning hours and consumer satisfaction on supply situation is also explored. This forms the basis for assessing losses and the role for various stakeholders in bringing down electricity losses.

### Metering of households

The biggest challenge facing the power sector in UP is the share of unmetered household connections. The disparity between urban and rural consumers, the share of unmetered connections, and the scale of losses arising from unmetered connections are other challenges.

### Billing and collection and accounting of losses

The cycle of billing and collection prevalent in urban and rural household in UP, and the effect of the discom's financial performance on inefficiencies, is discussed in this section, as are the socio-economic factors of the consumers' attitude towards paying electricity bills.

## Trust, perceptions, and their role in aiding and abetting theft

Consumer perception of electricity theft influences its prevalence. Consumer trust in other consumers and the discom drives compliance. State and central government initiatives in curbing electricity theft are also discussed.

## 2.4 Limitations of the survey

The survey has several limitations.

The survey relies on recall of respondents on services provided by discoms; for example, the recall of supply hours in the state could be the actual supply over the previous month or season. To improve interpretation, the findings section attempts to compare survey results with alternative datasets.

The questionnaire was designed to interpret consumer responses in the best manner possible. Some questions are repeated in different points during a survey to test consistency in responses and enumerator bias in recording responses. In some cases, responses are inconsistent, but we rely on what we believe is likely to have been a more ‘realistic response’ after comprehending the question entirely. For instance, there were three different questions pertaining to billing. Consistency in responses to these and the conditionality imposed in these questions were used to then choose the most appropriate question to determine the suitable question for interpretation.

The enumerators were rigorously trained to eliminate bias in recording responses, but some inconsistencies were identified, and the survey was re-conducted for an entire district (180 responses).<sup>6</sup>

The respondents were asked to reflect on the prevalence of electricity theft in their area. Such responses require them to be aware of their neighbourhoods and to be active participants in society. The education level and understanding of the socio-political situation in their area varies across respondents. This limitation is unavoidable, but it makes for interesting analyses on the variation in such responses and the implications of their background on their responses.

On bill payments, we use only four sets of questions on expenditure on electricity or alternative sources to establish the respondent’s spending. We also have a question that solicits overall household expenditure. This is unlike the National Sample Survey, which estimates the monthly expenditure in an itemised manner. Owing to this, and after analysing the responses, we decided not to use the responses on monthly expenditure.

The central and state governments are trying aggressively to improve electrification and the quality of supply. Therefore, the state of play as recorded in this study is subject to rapid change. But systemic issues pertaining to metering and billing are unlikely to have changed since the survey, as these require significant institutional changes, and there is no evidence that such change has taken place in the intervening months.

<sup>6</sup> Survey response times were much lower than the median in this district. There were also specific enumerators who were identified to have carried out the survey inconsistently and as a result the exercise was redone in the early phase. A repeat training was carried out for a new team and some enumerators were also dropped after observing their performance.





## 3. Survey Findings

The political commitment to providing 24×7 power to all consumers by March 2019 has resulted in better supply of electricity across the state. Combined with rapid household electrification efforts, this is a promising move towards universal access to electricity and reliable supply for all. In this context, the survey instrument sought consumer views on the rate of electrification, improvement in electricity supply situation, and quality of supply. This section draws on findings on MBC and electricity theft and also on interviews with discom employees on the issues of discom losses and improved accountability.

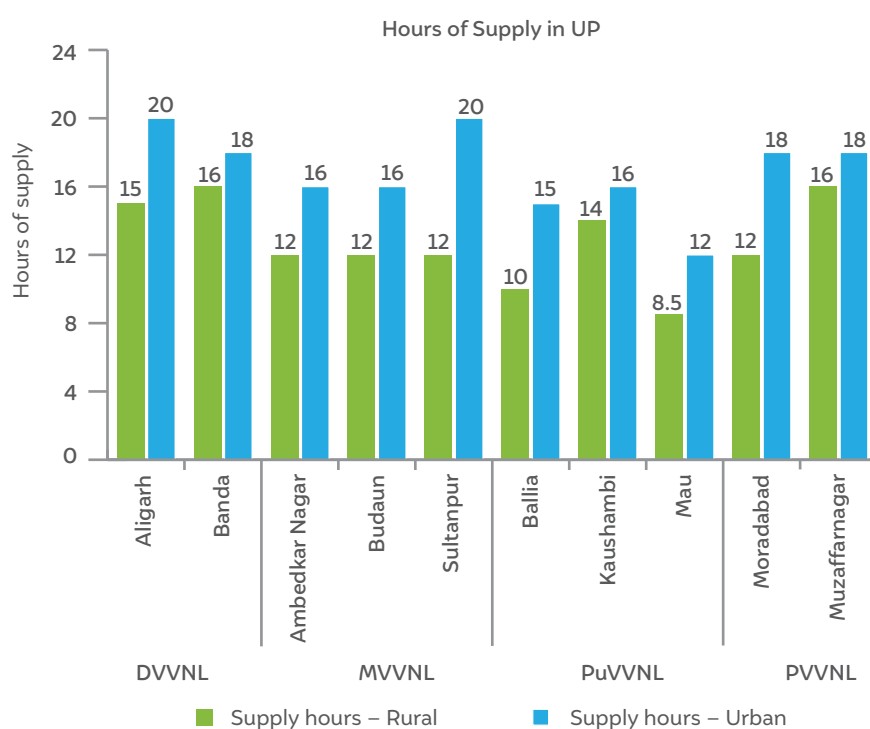


The median hours of supply experienced in urban households is 17 hours and the median hours of supply experienced in rural households in the state is 12 hours

### 3.1 Power supply and consumer satisfaction

#### 3.1.1 Supply hours – Moving towards a 24×7 supply for all

The number of hours of supply has improved in both rural and urban areas, driven primarily by the political ambition to provide 24×7 electricity for all. The median hours of supply experienced in urban households is 17 hours and the median hours of supply experienced in rural households in the state is 12 hours. Figure 3 shows the supply hours for all the districts and discoms.

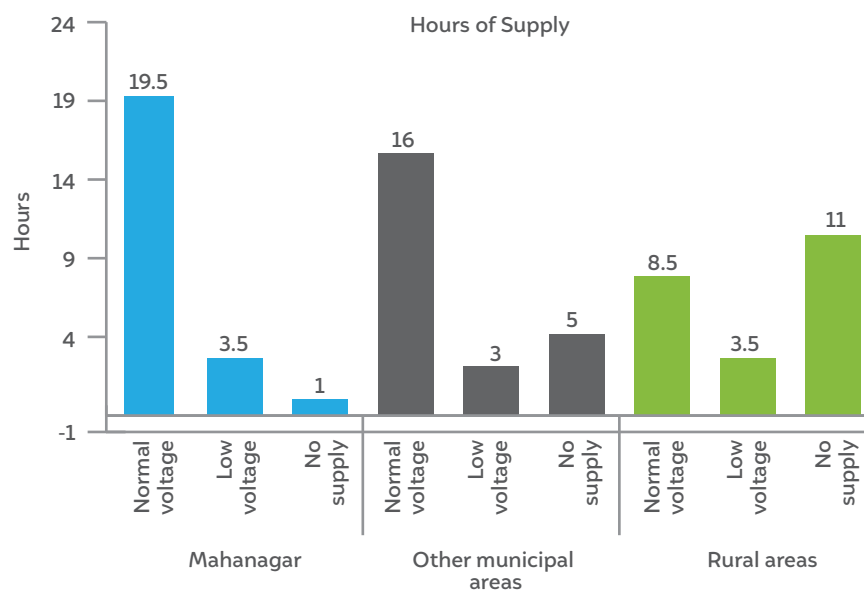


**FIGURE 3:**  
Improving power supply situation in UP

Source: CEEW analysis

The districts in Purvanchal discom fared the poorest on this metric as well. It is worth reiterating that the survey relies primarily on respondent recollection, which is likely to be influenced by their most recent experience of supply – last month or season. There are alternative sources to verify these findings on the supply situation.

An initiative of the Prayas Energy Group, Electricity Supply Monitoring Initiative (ESMI), is one such source of data. Prayas has deployed sensors to measure supply hours and power quality in 416 locations across 23 states, and the highest concentration of these sensors is in the state of UP. Figure 4 shows the average supply hours for the months of April and May in UP. The ESMI data is commensurate with the survey findings on median hours of supply experienced in the urban and rural areas of the state, which indicates that the respondents' recollection is a fair reflection of the supply position. Figure 4 shows the aggregated data for 85 locations across UP; the hours of supply were rounded off for ease of representation.



**FIGURE 4:**

Power supply hours measured by sensors deployed across the state of UP

Source: Prayas Energy Group, ESMI Data, 2018

Discom officials attribute the poor supply (provided to households) in Purvanchal to the relatively poor economic status of households. This indeed came across as counter-intuitive, as the literature suggests that electricity consumption has a causal relationship with development outcomes, especially in low-income households of developing countries (Niu, et al., 2013; Khandker, Barnes, and Samad, 2010). Low level of energy consumption keep households mired in income poverty.

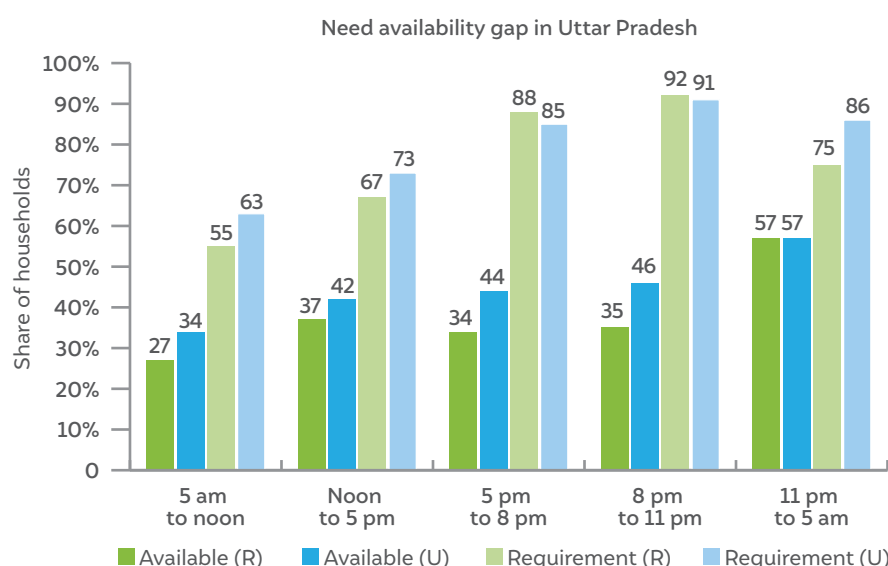
### 3.1.2 Time of the day and hours of supply

While the supply situation has certainly improved over the years, the average of daily supply hours does not provide insight into the needs of electricity at various times during the day. Figure 5 shows the time of day when electricity is needed vis-à-vis its availability.

Gap between availability and requirement is highest in the evening hours (5–8 pm) and night hours (8–11 pm) for both rural and urban households. Electricity demand in the evening hours coincides with typical peak demand period of India. The need–availability gap during evening hours and late evening hours for rural areas is higher for rural households.

In the late-night hours, most households report having maximum availability. Supply during evening and late evening hours is highly valued by consumers, especially urban consumers.



**FIGURE 5:**

Demand-supply gap in electricity supplied in rural and urban areas

Source: CEEW analysis

Their satisfaction with supply is linked to availability during this period; 83 per cent of urban consumers are satisfied with electricity supply when electricity is available for evening and night hours, and 63 per cent of rural consumers are satisfied with supply if electricity is available during evening and night hours.

### 3.1.3 Income disparity between the regions

Data on monthly household expenditure based on the National Sample Survey 68<sup>th</sup> round for the 10 districts surveyed in UP is given in Table 4. Though monthly expenditure details were solicited in the survey, it was not an itemised enumeration of expenses. As a result, the authors found it difficult to interpret the stated overall household expenditures.

Average monthly per capita expenditure (MPCE) in rupees			
Discoms	Districts	Rural	Urban
DVVNL	Aligarh	1,182	2,553
	Banda	815	1,206
MVVNL	Ambedkar Nagar	1,117	993
	Budaun	1,119	1,374
	Sultanpur	1,403	2,658
PuVVNL	Ballia	1,006	1,656
	Kaushambi	891	1,169
	Mau	1,016	1,481
PVVNL	Moradabad	1,161	1,462
	Muzaffarnagar	1,545	2,490

**TABLE 4:**

Income disparity across discom regions

Source: MOSPI, 2014



83 per cent of urban consumers and 63 per cent of rural consumers are satisfied with electricity supply when electricity is available for evening and night hours

The income disparity between urban and rural areas is stark. The difference in expenditures can be observed between the various regions of UP. Incomes are lower in Purvanchal and Dakshinanchal than in Paschimanchal and Madhyanchal.

The discussion thus far on supply metrics – total hours of supply, evening hours of supply, blackout days, and the satisfaction levels associated with the supply – sets us up for a deep dive into the status of MBC in the state and the role it plays in the accounting of losses.

## 3.2 Metering and billing – the building blocks

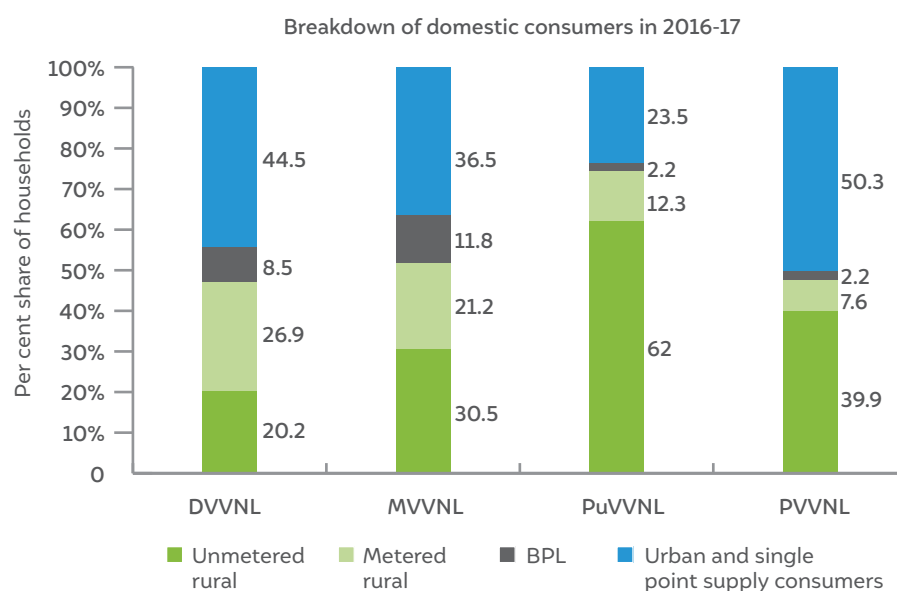


Even in urban areas the metering levels are only 90 per cent

### 3.2.1 The curious case of unmetered consumers of UP

The UP discoms have a large portion of unmetered domestic consumers. Only around 40 per cent (70 lakh) of the registered domestic consumers in UP were unmetered in FY 2016–17 (UPERC, 2017, pp. 144–145). Unmetered consumption is a major contributor to high losses of discoms.

Figure 6 below shows the share of unmetered consumers for all four discoms. The share of unmetered consumers in the surveyed households was around 55 per cent. The drop from FY17 is apparent and indicates that efforts have been made to increase metering and also ensure metering of newly added consumers. Even in urban areas the metering levels are only 90 per cent. The discoms plan to achieve 100 per cent metering by April 2019 (UPERC, 2017).



**FIGURE 6:**  
High share of unmetered consumers in discoms of UP

Source: Tariff filings of respective discoms for FY 2017–18

Before the introduction of *Saubhagya*, electricity connections were set up by discom officials, whereas meters were typically installed by a contracted private metering agency.<sup>7</sup> Discom officials hold that discom losses have increased since third-party agencies were hired. Periodically, new metering technology is introduced, and older meters need to be replaced, but it is difficult for deployment to keep pace with technological changes.<sup>8</sup> While advancement in metering technology presents an operational challenge for discom officials, it is also an adoption challenge for consumers. Consumer dynamics in embracing new technologies affects consumer participation in the system (Foroudi, Gupta, and Sivarajah 2017).

Interactions with discom officials indicate that metering is a challenging task given the inertia involved in changing consumer behaviour towards meters and also vested interests at various levels that benefit from unmetered consumption. Under the erstwhile tariff structure, there was little incentive to move to a metered connection. While consumers have a role to play in getting metered connections, discoms have an equal role expanding their capacity to

<sup>7</sup> Based on interviews with officials of PuVVNL, DVVNL, and MVVNL.

<sup>8</sup> This is the view of discom officials of PuVVNL and MVVNL when they were asked to reflect on the challenges in metering consumers in their supply areas.

install meters. However, there are also vested interests in turning a blind eye to unmetered consumers.

As of FY 2016–17	DVVNL	MVVNL	PuVVNL	PVVNL
Load up to 2 kW	488,931	930,614	2,122,866	1,223,134
Load above 2 kW	122,233	232,653	530,717	305,784
<b>Total unmetered consumers</b>	<b>611,164</b>	<b>1,163,267</b>	<b>2,653,583</b>	<b>1,528,918</b>

**TABLE 5:**

**Profile of unmetered domestic consumers in UP**

Source: Tariff filings of respective discoms for FY 2017–18

The extent of unmetered consumers in the UP discoms is given in Table 5. An unmetered 1 kW connection costs INR 400 (or INR 800 for 2 kW), whereas a metered connection could cost around between INR 200–250 for low consumption. Low-income households are easier to convince – the benefits of metering are straightforward, as unmetered consumption is costly – but it is harder to persuade high-income households that see an upside in masking their true consumption of electricity. One of the biggest problems is consumers' lack of an understanding of tariffs. It has led to incorrect notions on electricity consumption and associated charges.<sup>9</sup>

Discom employees and pensioners, numbering more than 98,000 in FY 2015–16, are not obligated to have a meter associated with their own connections in their residences (UPERC, 2016). This is a legacy of the agreement between the employee unions and the discom at the time of breaking up the erstwhile UP State Electricity Board into the constituent elements to-day. However, starting January 2016, the tariff for consumers who are departmental employees and pensioners was made equal to that of other metered domestic consumers. Through its tariff order dated 18 June 2015, UPERC allowed discoms to provide rebate to its employees in their electricity bills from its own resources.<sup>10</sup> Unless we see a significant number of discom staff taking up metered connections, the importance of metering in running an efficient utility cannot truly be communicated to all stakeholders.

Discoms compute electricity consumption based on normative consumption levels associated with various connections as approved by the regulatory commission (UPERC, 2016). As per the multi-year tariff regulations, they are expected to conduct a study to get a clearer picture of consumption attributable to unmetered consumers. This study is yet to be conducted (UPERC, 2017, p. 144 & 154). Accounting for consumption of electricity under unmetered category is evidently unfounded. This case could be higher for unmetered consumers above with load above 2 kW. In this context, the findings from this study on metered consumers is shown in Figure 7.

The share of metered consumers is lowest in rural areas of Purvanchal discom. Rural unmetered household consumption for five discoms of UP is 36 per cent of total household consumption,<sup>11</sup> whereas the expected revenues from this category is only 8 per cent of the total revenue anticipated from total household consumption. In contrast, rural metered household consumption for all five discoms is 22 per cent of total household consumption, whereas the expected revenues from this category is 16 per cent of the total revenues anticipated from households (UPERC, 2017, p. 493).

By UPERC orders, all urban consumers are metered, but the survey findings show that the share of metered urban households in the Purvanchal supply area is only around 85 per

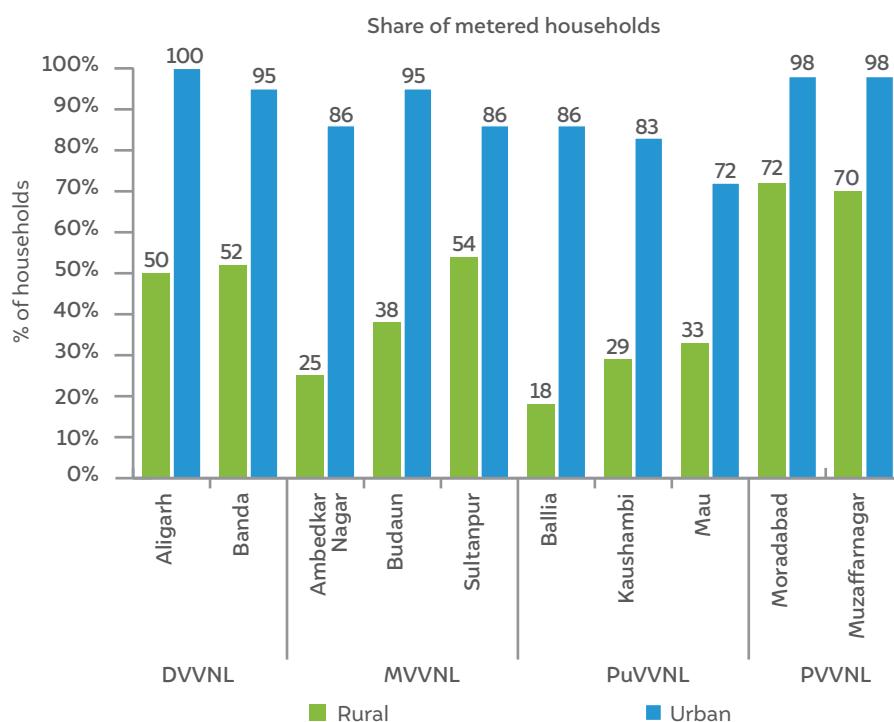


It is harder to persuade high-income households that see an upside in masking their true consumption of electricity

<sup>9</sup> Based on interviews with officials of PuVVNL, DVVNL and MVVNL.

<sup>10</sup> There is no evidence of whether this order has been implemented in practice. Preliminary analysis did not throw up any evidence of employees being subsidised from their own resources.

<sup>11</sup> Referred in the tariff order as LMV-1 category.



**FIGURE 7:**  
Low metering in  
rural areas

Source: CEEW analysis

cent. The same is the case with Madhyanchal districts of Ambedkar Nagar and Sultanpur. Discom officials are cognisant of this challenge of unmetered urban consumption. The extent of unmetered consumption in urban areas is not captured in any of the regulatory hearings or tariff orders. Recognition of this can help address the issue of losses better.

### 3.2.2 Lag in metering in rural areas leading to losses of discoms

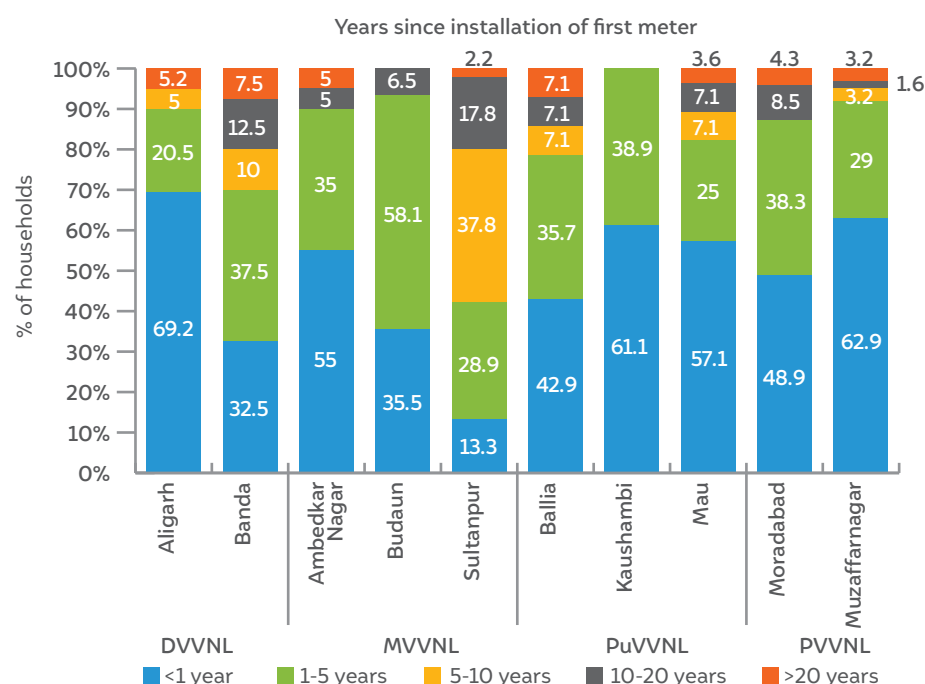
Metering of households hold the key to curbing losses to this consumer category. As a policy intervention, metering has received a significant push from the central government under the schemes of R-APDRP for urban areas and DDUGJY for rural areas. These initiatives are intended to help reduce discom losses, but the time and effort spent on existing metered connections needs to be measured, and how the move to advance metering infrastructure pans out must be tracked. The results of the implementation of the R-APDRP in UP in the five-year period from 2010 to 2015 shows an improvement (bringing down AT&C losses below 25 per cent) in 4 out 12 districts (IPDS, 2016, p. 6). The AT&C loss reduction for UP was achieved for only 47 per cent of the feeders in this period. The pace of improvement in urban areas of UP is slow, considering UP had highest losses among the 14 states evaluated in the report. Therefore, the solutions to bringing down losses of discoms should go beyond technology upgradation schemes.

Metering in rural areas is a relatively recent exercise, implemented with impetus from central government schemes. Figure 8 shows the profile of rural metered consumers: 83 per cent of all meters for rural connections were installed over the last five years and 46 per cent of the meters in the last one year. In urban areas, the share of first-time meters installed in the last five years is nearly 49 per cent and only 14 per cent of the households got their meters in the last year.

The losses of discoms thus far can be attributed to limited accounting of power supplied to rural areas. UPERC has approved a 33 per cent increase in tariff for unmetered consumers, with effect from April 1, 2018. Given the disincentives for unmetered consumption, the



46 per cent of the meters for rural connections were installed in the last one year. For urban connections, only 14 per cent of the households got their meters in the last year



**FIGURE 8:**  
Metering exercise relatively recent in rural households

Source: CEEW analysis

consumer-end resistance to metering is likely to subside going forward. However, this will require efforts for billing and collection to be stepped up to impose a credible threat to those consumers still holding onto an unmetered connection.

## 3.3 Metering, billing, and collection losses

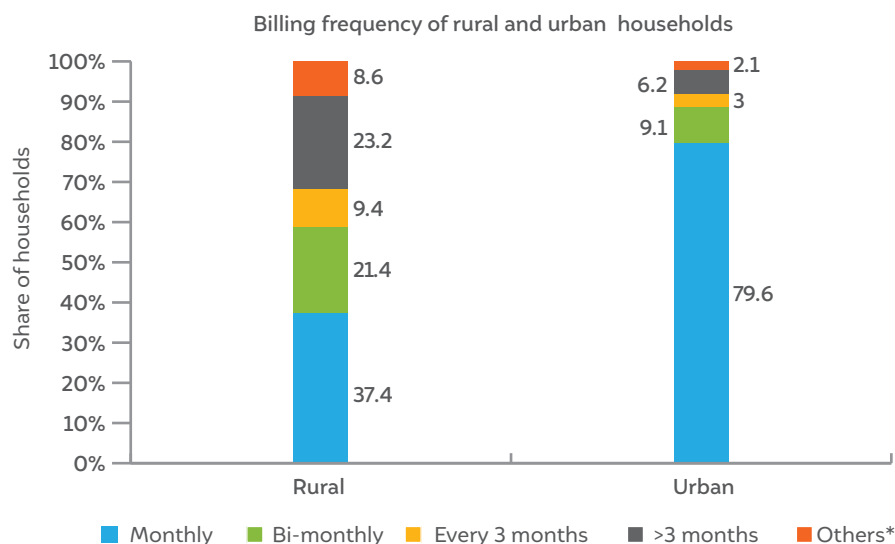
### 3.3.1 Electricity billing – long road to achieving complete automation

Electricity billing is an activity of discoms contracted to external agencies. Billing involves three major activities – meter reading, generating bill, and delivering the bill to consumers. Meter reading can be automated through automated meter reading (AMR) or advanced metering infrastructure (AMI). While the transitions to above-mentioned technologies will improve metering, they need to translate to better billing and upgradation in IT systems to enable the linkage to the metering. In addition, advances in metering are confined to parts of urban areas (Ministry of Power (MoP), 2018). Billing in urban and rural connections of UP comes with its own set of challenges, and these nuances are discussed below.

Frequency of receiving bills is a direct reflection of billing efficiency of discom. This varies between rural and urban areas. The billing cycle is shown in Figures 9 and 10.

There is a marked difference in billing practices across discoms, with Paschimanchal coming out as the best of the four public discoms. MVVNL and PuVVNL, in particular, indicate poor billing frequencies. Frequency of billing in rural areas is low. The financial burden of accumulated bills is significant on rural households, especially those with low and seasonal incomes. Setting aside large sums in the anticipation of bills is a problem for these households. Billing is more difficult in rural areas than in urban areas because households are dispersed over a larger area, which raises the administrative costs of manual meter reading and issuance of bills, and because discoms lack the manpower.

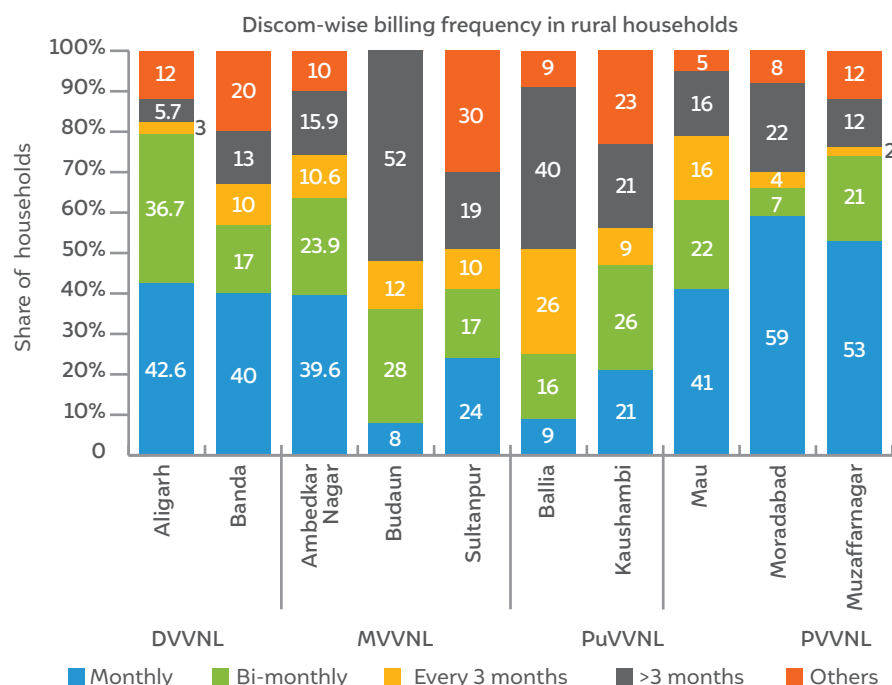




**FIGURE 9:**  
Infrequent billing in rural households

Source: CEEW analysis

\*Others represents those consumers who were not clear on what their billing frequency was



**FIGURE 10:**  
Differences in billing frequency across UP discoms for rural households

Source: CEEW analysis

Respondents were asked to recollect when their first bill was delivered after their electricity connection was installed. The median delay (in months) after getting a connection was captured to represent the inefficiency in first billing (Table 6).

Discom	Rural (in months)	Urban (in months)
DVVNL	3.5	2
PVVNL	2	2
MVVNL	N.A.	3
PuVVNL	3	3

**TABLE 6:**  
Efficiency in issuing first bill is low even in urban areas

Source: CEEW analysis

Surprisingly, very few respondents in the rural areas of the MVVNL control area were able to recollect when their first bills actually came in. This is a possible indication of the lax implementation of billing in rural areas of MVVNL. Urban areas see more efficient billing in terms of delay in the first bill reaching the consumers. This needs to be addressed as a priority. With *Saubhagya*, all connections go with a meter and their linking to a billing system is also likely to benefit from this improved and on spot metering infrastructure roll-out. The billing process being adopted now also relies on online connectivity with the billing system and bill agents are able to generate a bill as soon as a meter reading is taken.

### Box 1–UP Discoms – Where is the manpower?

An assessment of employee costs (Tables 7 and 8 below), consumer numbers, and geographic expanse of the states suggests how low the annual spend on employees is relative to some comparable discoms in the country. Maharashtra (MH), with only 30 per cent more consumers, spends nearly three times as much as UP discoms on its employees. Karnataka (KA) too shows a similar trend when compared to UP. Gujarat (GJ), in comparison, resembles UP in employee expenditure but its consumer base and land area are both 20 per cent lower.

The under-resourcing of the staff base has its origins in a 1997 decision to cut discom expenses, which in turn was necessitated by poor state finances. Subsequent challenges with implementation of promotions – based on affirmative action policies and the delays in the adjudication of cases pertaining to this – meant that capacity addition to discoms at various levels were stalled for significant periods from the early 1990s to the late 2000s.

Outsourcing can significantly affect spending on employees, but we are not able to offer insight – this issue needs to be explored.

Employee cost of discoms (INR crore)	UP	MH	KA	GJ
2013–14	1,282	4,028	1981	1,009
2014–15	1,215	4,551	2,053	1,021
2015–16	1,312	4,187	2,227	1,293

**TABLE 7:**  
Employee costs of discoms

Source: PFC report on state of power utilities

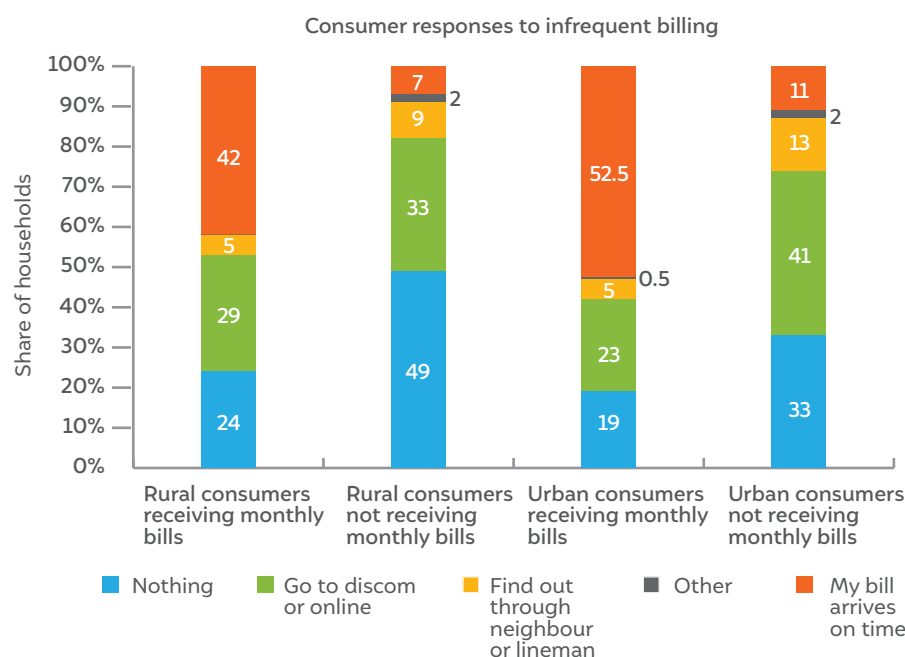
Total consumers as on 31 March	UP	MH	KA	GJ
2014	1,17,91,176	1,95,06,124	1,52,13,370	1,17,41,438
2015	1,38,04,128	2,02,30,903	1,53,17,302	1,21,02,062
2016	1,56,70,000	2,09,45,728	1,66,38,087	1,24,41,115
Geographic Area (sq km)	243,290	307,713	191,791	196,024

**TABLE 8:**  
Domestic consumers of states

Source: CEA General Review, UPPCL ARRs, and World Atlas

### 3.3.2 What do consumers do when the electricity bill does not arrive on time?

Discoms are responsible for billing and collection and for losses owing to inefficiencies in the billing and collection process. Discoms finance working capital shortages by borrowing and increasing their overall cost of operation. If consumers demand to be billed regularly, and if they pay their bills in a timely manner, discoms would not incur undue costs or pass these on to the consumer. Figure 11 documents how consumers respond to the non-arrival of a bill.



**FIGURE 11:**  
Proactiveness of consumers in the face of non-receipt of a bill

Source: CEEW analysis

Nearly 49 per cent of rural households and 33 per cent of urban households who do not receive monthly bills would choose to do nothing when they do not receive bills. When asked to respond if they would choose to complain, if not satisfied with the electricity bill, 90 per cent of the rural consumers and 87 per cent of urban consumers said they would not complain. This is a matter of concern. This lack of consumer oversight shows that the consumer base is not empowered to claim their rights. Infrequent billing may cement consumer indifference towards discoms.

Discoms provide first recourse to redress consumer grievances. Consumers can register complaints at toll-free helplines. Independent bodies, like the consumer grievance redressal forum and the electricity ombudsman, provide the next level of recourse to consumer grievances. But these avenues will find few takers if the awareness of procedures and the avenues remains low.

According to discom officials, billing will improve over the next year. Upgrading meters and installing new meters is being taken up on a large scale, as represented by the large orders placed for meters. The reliance on technology to bridge the gap and decrease human intervention is significant.<sup>12</sup> But however immense the reliance on technology, and however positive the step, it cannot overcome other lacunae in the system. To communicate the need for compliance on bill payments, and the implications for utility finances, consumer engagement is a prerequisite.

<sup>12</sup> Based on interviews with discom officials

### 3.3.3 Trust-billing and trust your billing

In May 2016, UPERC issued the seventh amendment to the UP Electricity Supply Code, 2005 to carry out trust billing in urban areas where online billing facilities were available (UPERC, 2016, p. 3). This was followed by another order to extend the facility of trust billing beyond online payments – consumers can self-assess bills and pay at discom billing counters.<sup>13</sup> Trust billing helps in areas where discoms face human resource limitations in providing billing services.

A significant share of metered consumers do not believe that the bills generated are based on their meter reading. A significant driver of this perception is the frequency of billing. Nearly 77 per cent of rural households who are not billed monthly do not believe their bill is based on the meter. In urban areas this is a lot lower – 40 per cent. Despite this, more than 67 per cent of such households choose to make their monthly bill payments in full. This unexpected high level of compliance, could be attributed (based on interactions with civil society groups) to their desire to avoid any punitive steps that the discom may initiate against them. Their lack of understanding of the bill generation process, the prevalence of faulty meters and the understanding that in such cases notional bills are generated are all signs that consumers lack trust in their bills. Among households who are billed monthly, only 39 per cent (rural) and 10 per cent (urban) have this perception of their bill. Clearly, monthly billing improves overall levels of confidence in the process of billing.

This issue with billing is corroborated by conversations with discom officials. According to DVVNL officials from the Mathura zone, cases related to wrong billing are prevalent mostly in rural Agra. Due to shortage of discom staff, meter readers are hired via a contracting agency. Such contracts are given out through tendering, wherein the lowest bidder gets the contract. Personnel expenses are kept low, and meter readers find ways to make money through other means, such as by colluding with consumers and falsifying meter readings.

As much as 59 per cent of rural respondents and 74 per cent of urban respondents indicated that they do not trust their bill agents/bill man. Discoms need to ensure that their consumer base retains trust in the billing process and does not resort to any underhanded practices to resolve their billing concerns. To improve the perception of billing, discoms must make the billing process transparent. They must also explain how they compute bills and to provide information on past payments.

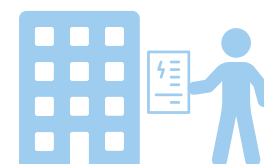
For example, it is possible upon meter reading to enable instant notifications to consumers of a provisional bill subject to reconciliation of records. That would signal to consumers that there is no additional layer between reading and bill generation that could distort their dues. Trust billing would increase consumer payments, improve consumer perception of the meter itself, and become the practice until a regular, meter-based, automated billing mechanism is put in place.

### 3.3.4 Consumer preferences to bill payments

Electricity consumers are obligated to make timely payments upon receiving their bills; a late payment surcharge is levied. The survey instrument tested consumers on proactiveness in paying bills. Figure 12 shows consumer preferences in paying electricity bills prior to the due date.

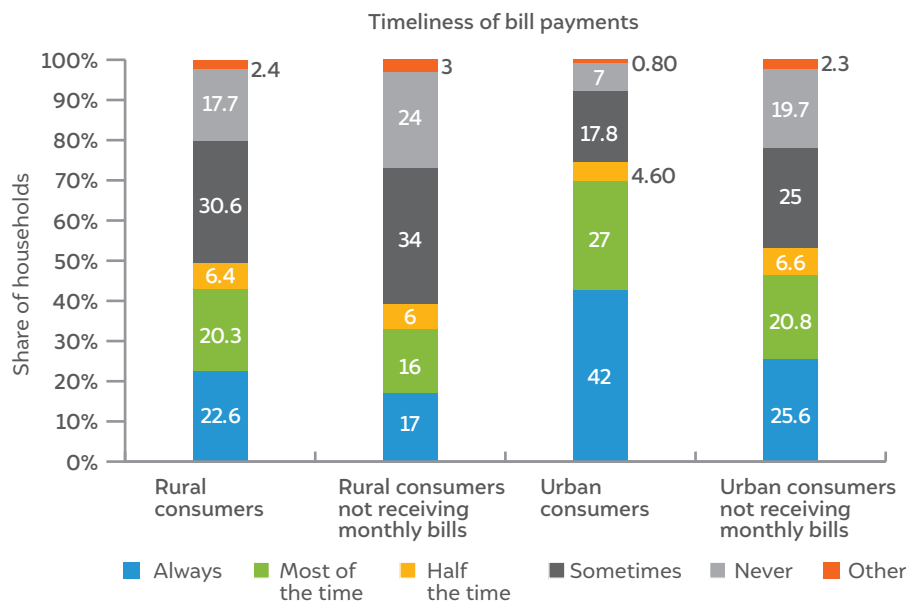


Nearly 77 per cent of rural households do not believe their bill is based on the meter



59 per cent of rural respondents and 74 per cent of urban respondents indicated that they do not trust their bill agents/bill man

<sup>13</sup> Based on reports from local newspapers.

**FIGURE 12:**

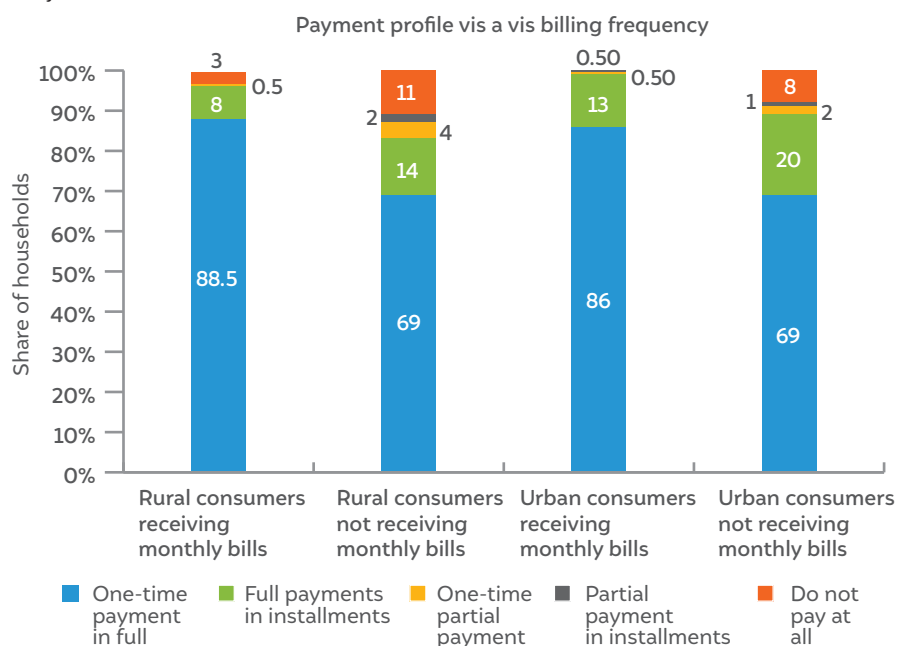
About half of rural consumers and a quarter of urban consumers do not pay their bills ahead of due date

Source: CEEW analysis

Nearly 70 per cent of urban consumers make their bill payments ahead of the due date, as compared to 43 per cent of rural consumers. Figure 12 also illustrates that consumers who are billed less frequently also do not pay up on time, as compared to the average consumer.

The data on payments made by consumers does not necessarily mean that payments are made in full. A sizeable chunk of consumers prefers to pay their bills in instalments, while some of them make partial payments against their bill amount, adding to the losses of discoms. The lumpiness in issuing bills for two or multiple months at one go is a significant issue. Incomes in rural households follow agricultural seasons and may not coincide with periods when bills are presented.

Figure 13 shows the impact of infrequent billing on payments. The figure indicates the profile of paying consumers in both rural and urban areas, by capturing their payment mode, based on billing frequency. Full payment is more likely when billing is monthly; else, payments are likely to happen in instalments or in part. *The equally revealing finding is that as many rural households pay in full as urban households when billed properly. Rural consumers are no more wilful defaulters than are urban consumers.*

**FIGURE 13:**

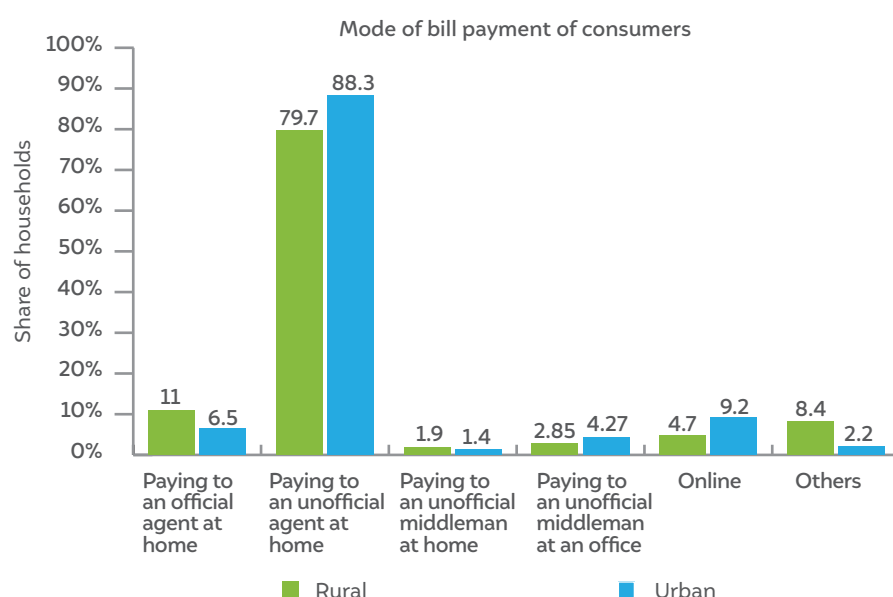
Consumers facing infrequent billing are less likely to make complete payments

Source: CEEW analysis



Same share of rural households pay bills in full as urban households, when billed properly. Rural consumers are no more wilful defaulters than are urban consumers.





**FIGURE 14:**  
Low preference for  
online payments  
in urban and rural  
areas

Source: CEEW analysis

Electricity bills are delivered to consumer premises by hand or a digital copy is sent by SMS or email to the consumers. Collection of the billed amount is a more complicated task than dispatching the bills. Most consumers pay their bills at service centres or local offices of discoms that also double up as collection points. The distribution of the mode of payment of consumers is shown in Figure 14.

The transition in bill payments to digital modes is a long way away for the state of UP – most urban consumers pay at discom collection centres. Collection efficiencies could improve if more consumers opt for digital modes of payment. As per MoP data published in the URJA portal for the state of UP, the share of urban consumers making e-payments was 12.4 per cent for the month of June 2018, against the national average of 19.9 per cent.<sup>14</sup> Evidently, UP is lacking behind in bringing consumers to digital platforms.

Over the years, and as recently as 31 December 2018, UP discoms have been waiving the late payment surcharge, under the one-time settlement (OTS) scheme. UPPCL launches the scheme occasionally<sup>15</sup> for consumers to settle unpaid bills (UPPCL, 2018, UPPCL, 2017 and UPPCL, 2016). Clearly, discoms have had a challenge with collection and payments. In our survey, nearly 12 per cent of consumers have participated in the scheme at least once. Discoms launch the scheme to encourage consumers to settle accumulated bills and cut collection losses, but frequent use of the scheme reprieves defaulters and discourages consumers who otherwise pay on time. Of the consumers who participate in the OTS scheme, nearly 25 per cent have availed it twice. If the same consumers are defaulting on their bills, the scheme is being misused. Disconnecting frequent defaulters or not pardoning dues the second time would prevent misuse. Discoms face the hard choice of disconnecting repeat offenders.

In absolute terms, monthly average expenditure per household on grid electricity is INR 364

<sup>14</sup> <https://urjaindia.co.in/discom-state.php?state=33&month=jul18&active=2>

<sup>15</sup> 2016 announcement – [http://upenergy.in/site/writereaddata/uploadedCirculars/C\\_201612151201004874.pdf](http://upenergy.in/site/writereaddata/uploadedCirculars/C_201612151201004874.pdf)  
2017 announcement – [http://upenergy.in/site/writereaddata/uploadedCirculars/C\\_201704181228318323.pdf](http://upenergy.in/site/writereaddata/uploadedCirculars/C_201704181228318323.pdf)  
2018 announcement – [http://upenergy.in/site/writereaddata/uploadedCirculars/C\\_201808231813574173.pdf](http://upenergy.in/site/writereaddata/uploadedCirculars/C_201808231813574173.pdf)

in rural areas but INR 862 in urban areas.<sup>16</sup> The median expenditure ranges from INR 300 per month in Purvanchal and Madhyanchal to as high as INR 700 a month in Paschimanchal.

## 3.4 Electricity theft

### 3.4.1 Losses to discoms and the role of electricity theft

It will be useful to recap the overall status of the MBC at this point to gather the extent of losses attributable to this ‘soft theft’.

	Surveyed HHs	Share of connected HHs	Share of metered HHs	Share of metered and billed HHs	Share of metered billed and paying HHs
RURAL	900	85%	45%	33%	28%
URBAN	900	95%	90%	85%	79%

**TABLE 9:**  
Summary of the  
status of MBC

Source: CEEW analysis

The only silver lining is that a total of 63 per cent of all legally connected consumers (60 per cent for rural and 84 per cent for urban), including unmetered, pay some non-zero amount to the discom in lieu of their dues, despite infrequent billing and lack of metering. This is really down to some form of compliance on the part of these consumers, who pay despite not receiving any specific bills periodically.

Losses arising from discom and consumer indifference to proper metering and from poor billing and collection are already large enough to significantly dent utility finances, in addition to hard theft, and explain the high losses. When measurement is absent to such a large degree, speculation gives rise to alternative explanations for discom losses.

To assess how households viewed the utility business, they were asked to rate (on a scale of 1–5, least to most) the importance of four attributes of the utility – quality of electricity service, method and frequency of bill collection, communications with the utility employee, and good financial management of the utility. The overwhelming takeaway was that a large share of rural and urban households (70 per cent rating important or very important) valued supply quality. Few rural respondents gave importance (51 per cent) to method and frequency of bill collection, while a much larger share of urban residents (67 per cent) viewed this as being important. Good financial management was considered important by a similar share of residents in rural and urban areas (~57 per cent–59 per cent). Clearly, the chasm between the importance given to financial management of the utility and the supply quality suggests that there is a lack of understanding of the commercial aspects of the utility business.

The issue of ‘soft theft’ leads us to the key question – What does all this mean for the prevalence of hard theft and people’s attitude towards losses of discoms and the blatant stealing of electricity?



**Only 63 per cent of all grid-connected consumers pay some non-zero amount to discoms**

<sup>16</sup> Some outliers on reported expenses towards electricity and overall expenses were left out. The median expenditure on electricity was INR 600 in urban areas and INR 250 in rural areas. This suggests significant disparity between the expenditure of rich and poor households in both settings. To compare this against administrative data, we looked at average expenditure of each household in the survey; it worked out to INR 475 per month. Administrative data on collections and number of domestic consumers came from the PFC report and the CEA General Review. For 2015–16, the average revenue collected from each consumer amounted to INR 570. In 2014–15 this was INR 668 and in 2013–14 this was INR 481. Growth in consumer base has negatively impacted collections per consumer, while increasing tariffs has raised collection per consumer, and the figures obtained in the survey are reasonably representative of the changes that the sector has witnessed.

### 3.4.2 *Katiya* connections – acceptance, punishment, and prevalence

As a window into the views of the respondents on the matter of *katiya* connections, we asked them about their acceptance of illegal hooking; 84 per cent of the respondents (82 per cent rural and 89 per cent urban) responded that *katiya* was either unacceptable or highly unacceptable. Some questions attempt to establish the respondent's moral compass, and some responses could be labelled disingenuous. The responses to several questions peppered throughout the survey show the low acceptance for *katiya* overall.

By way of an introduction to the issue of 'hard theft', consumers were asked to estimate the share of households in their village/ward indulging in theft. The median response from rural households was that 20 per cent of the houses in their village possessed a *katiya* connection. In urban areas, the median response was that no households in their area possessed an illegal connection. Households that were accepting of *katiya* (only 4 per cent of all respondents) had markedly higher perceptions of theft; they indicated that 31 per cent of households in their locality indulged in *katiya*.

To understand the drivers of the response, we carried out a regression analysis of the ordinal responses on the acceptability of *katiya* against various attributes of the respondent. These ranged from educational attainment, electricity availability at various hours of the day, views on the need for financial management of the utility, the discom service region the consumer belonged to, levels of trust in agents of the discom, and perceived corruption levels.

The ordered-logit analysis presented explains the impact on the dependent variable (acceptance of *katiya*) through the use of an odds ratio. We are comparing the people who are in groups greater than  $k$  versus those who are in groups less than or equal to  $k$ , where  $k$  is the level of the response variable. The interpretation would be that for a unit change in the predictor variable, the odds for cases in a group that is greater than  $k$  versus less than or equal to  $k$  are the proportional odds times larger.

	Acceptability of <i>Katiya</i> (1: very unacceptable to 5: very acceptable)
	Odds ratio
Education – Secondary school	0.91
Education – Higher than secondary school	0.73
Daily supply hours (0–24)	0.99
Unavailability of electricity between evening hours 5–8 pm (1-unavailable, 0-available)	0.42*
Unavailability of electricity between late evening hours 8–11 pm (1-unavailable, 0-available)	0.43*
Importance of financial management of utility (ranked 1–5, 1-least important, 5-highest importance)	0.83*
Type of survey—urban or rural (1-rural, 2-urban)	0.80
Meter installed in the household (0-no meter, 1-meter installed)	0.66*
PVVNL (2)	1.08
MVVNL (3)	0.98
PuVVNL (4)	1.72*

**TABLE 10:**

Financial management of utility and perceived personal cost important drivers of *katiya* acceptance

Source: CEEW analysis

	Odds ratio
Trust on your utility company (1–5, 1- strongly trust to 5-strongly distrust)	0.94
Electricity bill payments (1–5, 1-one-time payment in full, 2-full payment in instalments, 3-one-time partial payment, 4-partial payment in instalments, 5-do not pay at all)	1.10
Trust on discom officials (1–5, 1- strongly trust to 5-strongly distrust)	1.27*
Trust on linemen/servicemen (1–5, 1- strongly trust to 5-strongly distrust)	0.99*
Corruption among linemen/servicemen (1–5, 1-very little to 5-very heavy)	0.90
Corruption among discom officials (1–5, 1-very little to 5-very heavy)	0.91

\* indicates statistically significant at 95% confidence interval, N=1,125,  $\chi^2=261$ . Errors clustered at village level

**TABLE 10:**  
Continued from  
page 33

Using this interpretation, the most significant finding is that metered households are less accepting of *katiya*. We also see that an increase in the perceived importance of the utility's financial management results in low acceptance of *katiya*. This is intuitive as well – people do understand the financial consequences of *katiya* for the utility. At the same time, the impact of availability in the evening hours suggests that respondents are less accepting of *katiya* if they experience outages in the evening (5–8 pm) and late evening hours (8–11 pm).

This finding needs nuancing. *Katiya* is seen or projected as the forcible claiming by consumers of their right to electricity in response to poor supply from the utility. This analysis suggests that people understand that *katiya* has consequences for their own consumption, and that it excludes (if not immediately, at least in due course) their own consumption from the grid. The model also suggests that households that distrust their discom official are also likely to condone theft.

This insight is significant – the discom–consumer interaction needs a balancing force. If consumers feel they cannot trust discom officials, they become indifferent to the discom's challenges. Another insight is the significance of the discom region a household belongs to in determining the acceptability of *katiya*. Consumers of PuVVNL, which encompasses some of the poorer parts of the state, are more likely to have a higher acceptance of *katiya*.

Surprisingly, consumers are reluctant to impose any significant punishment on offenders. About 52 per cent of consumers who find *katiya* unacceptable indicated that they would issue a warning to anyone found using a *katiya*, while 20 per cent of the consumers feel a small fine is appropriate punishment. Only 5 per cent of respondents who find *katiya* unacceptable are in favour of more severe punishments, involving jail time. Levying heavy punishment is not the only way to discourage dishonest behaviour; the perceived likelihood of being punished should increase (Becker, 1968). Dishonest behaviour increases as expected benefits increase and decreases as the severity and perceived likelihood of punishment increases.

The UP state government has taken steps to reduce losses from electricity theft. Special police stations in all districts have been sanctioned to help discoms crack down on theft (Times of India, 2018) (Times of India, 2018b). One of the measures suggested to meet the loss reduction targets under the UDAY scheme is conducting a name-and-shame campaign.



Discom officials hold that hard theft can be tackled by a carrot-and-stick approach. Consumers must be educated in becoming responsible and in their role in improving service quality for all. To drive the message home, discom officials must engage with political and community leaders in areas where discoms make high losses. In Mathura and other areas in Agra zone, vigilant and empowered raid teams have cut losses perceptibly.<sup>17</sup> They found more than 100,000 consumers indulging in hard theft (Hindustan Times, 2018) in the past six months. This number is a very small percentage of the 180 lakh consumers in the state (UPERC, 2017, p. 153), and more such teams are needed.

This survey was referred to as the ‘theft survey’ during the study period, but its intention was to understand the drivers and perception of theft – not estimate its prevalence. Technical authorities can objectively assess the prevalence of theft once they evaluate all consumer groups across the state and conduct a detailed assessment based on measurement at various stages in the distribution system.

However, given the representative nature of the survey, it would be amiss not to comment on the theft encountered by our enumerators. The findings show that about 13 per cent of the surveyed households were found to possess an illegal connection, based on *prima facie* inspection of the connection;<sup>18</sup> 63 per cent of these households did not show their electricity bills when requested. The respondents were asked to show their recent electricity bills to confirm enumerators’ suspicion of *katiya* usage. Hence, we estimate that at least 8 per cent of the total surveyed households may have been in possession of a *katiya* connection.

Of these households, 92 per cent did not have a meter in their house and 77 per cent do not make monthly utility payments. When asked to estimate of the share of households in their area in possession of an illegal connection, the median value of the response of these households was as high as 30 per cent – a household indulging in theft perceives that a significant number in their locality are indulging in theft.

There are no documented sources of the number of such *katiya* connections unearthed over time to clearly capture the scale of the problem. These comparisons clearly illustrate that the problem of hard theft may not be the lion’s share of losses attributable to the domestic/household sector.

### 3.4.3 Principal-agent-client problem and *quid pro quo*

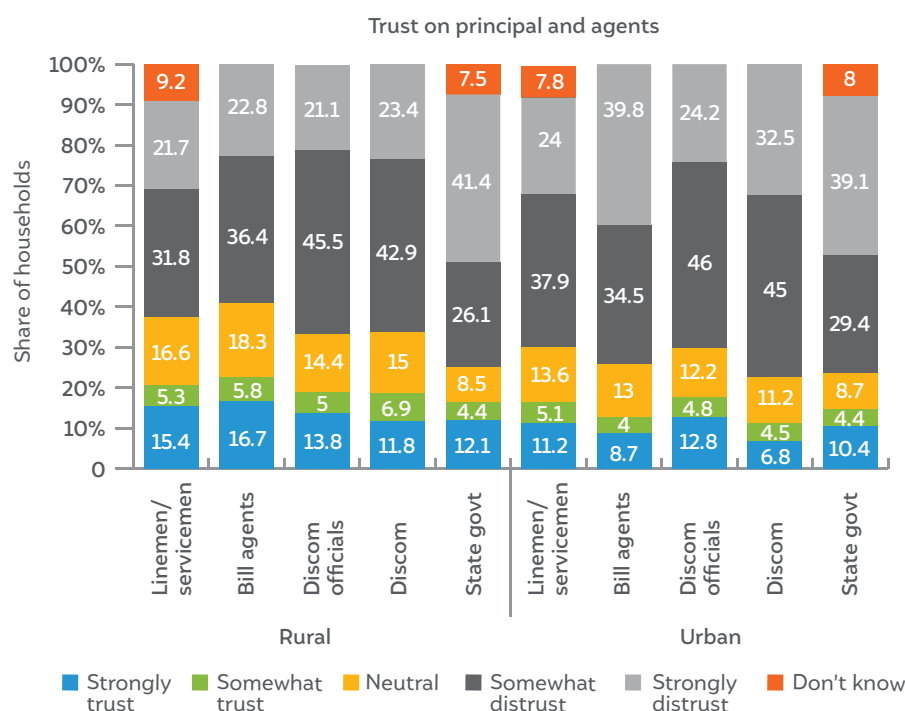
Discom employees – linemen, technicians, billing agents, engineers, or other officials – act as agents of the discom and directly interact with consumers. Agents may collude with consumers in hiding the actual electricity consumption by accepting bribes from them (Jamil & Ahmad, 2013). This is the *quid pro quo* in the electricity system (or any public provision system) that benefits both consumer and agent at the principal’s cost.

To understand the dealings between agents and clients, we analyse the trust of consumers (clients) in discoms (the principal), their agents, and the state (Figure 15). Consumers distrust discoms and state governments more than agents. More than 70 per cent of respondents view these two agents of discoms as being moderately to highly corrupt.

Is the theory that linesmen collude with households, which in turn results in a significant

<sup>17</sup> Based on interview with discom officials of DVVNL supply area.

<sup>18</sup> Tell-tale signs of wires directly running from the electricity pole through to the household. These could also be attributed to poor workmanship while installing a formal connection, which did not need a meter in the first place.

**FIGURE 15:**

Low trust levels on discom officials, discom agents, and state government

Source: CEEW analysis

loss for the principal, supported by the survey responses? Overall, nearly 23 per cent of all grid-connected rural households make a non-zero monthly payment to the linesman on a basis. This share in urban areas drops to nearly 15 per cent. Most households that report making payments to linesmen also report that they regularly pay their dues to the utility too. Their median payment towards linesmen is about INR 100 in urban areas and INR 60 per month in rural areas. Across the entire consumer base, the median monthly payment to the discom is INR 250 in rural areas and INR 600 in urban areas. Households that make an informal payment to linesmen pay in the range of 16 per cent to 23 per cent of their bill.

However, it would be difficult to attribute these as having enabled theft of electricity. Documented accounts suggest power outages and that utilities lack the manpower to carry out operational and maintenance works. Often, households need to make a case for the utility to address faults in their areas or homes – even if it is not on priority – and this requires a monetary payment to the linesman. In a few villages, villagers were responsible for repairing and replacing failed equipment. Our survey instrument did not explicitly ask about contributions towards replacing capital assets, it is possible that some of this monthly payment goes towards upkeep.

On consumer relationship with agents, particularly with billing agents, 83 per cent of consumers feel it is important to have a good relationship with their billing agents, although about 67 per cent distrust bill agents. This could be thought as a way of extracting favours from bill agents, but the total extent of informal payments to bill agents was paltry – less than 2 per cent of households reported making any payment to billing agents. Survey responses show that collusion with billing agents occurs, but it is not significant.

### 3.4.4 Trust and its role in driving compliance

The theory on electricity theft and its impact on the losses of discoms has been discussed at length in the previous chapters. Fjeldstad (2004) refers to three dimensions of trust that affect consumer compliance:

1. trust that the utility will use revenues to provide promised services;
2. trust that utilities will establish fair procedures for revenue enforcement and service distribution; and
3. trust in other citizens to pay their share of the service charge.

Discom losses from *katiya* connections are hard to ascertain. The responses and our interpretation of the responses do not provide any a specific physical or financial loss value attributable to *katiya*, but hints at its prevalence (or lack of it). Households believe that other households in their villages/wards indulge in *katiya*; that suggests a trust deficit. When combined with indifference to a utility's financial health, it could impact their compliance and responsibility to the utility.

The survey instrument attempted to ascertain (explicitly) consumer trust in a range of entities – the average individual (a), strangers (b), family members (c), other members of the local community (d), the utility company (e), and officials and lower functionaries in the utility (f). There were also implicit questions that gave a glimpse into the levels of trust in other individuals – prevalence of theft in the village (g), the level of corruption among discom officials and lower functionaries (h), and the importance accorded to proper financial management of the discom (i). These various attributes can be mapped to the trust-drivers that influence compliance – in any manner – expected of an electricity consumer.

An econometric analysis of consumer compliance (dependent variable), represented by two proxies – timely bill payment and the extent of bill payment – was carried out. A range of variables likely to be drivers of compliance – based on the literature, in addition to the trust dimensions – were also used to make the model more robust. An ordered-logit model which looks at compliance as an ordinal variable was used to explain the significance of the various drivers (independent variables). Table 11 highlights the relationship between the above-mentioned elements.

	Payment type (\$)	Payment promptness (#)
	Odds ratio	Odds ratio
Level of education (2-secondary school)	0.85	0.89
Level of education (3-above secondary school)	0.64*	0.54*
Unavailability of electricity between evening hours 5–8 pm (1-unavailable, 0-available)	0.6*	0.93
Unavailability of electricity between late evening hours 8–11 pm (1-unavailable, 0-available)	0.79	1.22
PVVNL (2)	0.79	1.00
MVVNL (3)	1.05	1.60
PuVVNL (4)	0.38*	0.72
Trust on strangers (1–5, 1- strongly trust to 5-strongly distrust)	0.82	0.92
Trust on your utility company (1–5, 1- strongly trust to 5-strongly distrust)	1.21*	1.11*

**TABLE 11:**  
Frequency of billing more important than trust and corruption perception in driving compliance

Source: CEEW analysis

	Payment type (\$)	Payment promptness (#)
	Odds ratio	Odds ratio
Trust on lineman (1–5, 1- strongly trust to 5-strongly distrust)	0.99	0.99
Importance of financial management of utility (ranked 1–5, 1-least important, 5-highest importance)	0.95	1.02
Type of survey–Urban or Rural (1-rural, 2-urban)	0.90	0.59*
Corruption among linemen/servicemen (1–5, 1-very little to 5-very heavy)	0.70*	1.13
Corruption among discom officials (1–5, 1-very little to 5-very heavy)	1.25*	1.18*
Meter installed in the household (0-no meter, 1-meter installed)	0.89	0.56*
Frequency of receiving electricity bill (1–4, 1-monthly, 2-bi-monthly, 3-every three months, 4-greater than three months)	1.57*	1.72*

\* indicates statistically significant at 95% confidence interval, N=938, Chi2=100, 204. Errors clustered at the village level  
 \$ 1 Full payment 2 Full payment in instalments 3 Partial payment 4 Partial payment in instalments 5 No payment at all  
 # 1 Always before due date 2 Mostly before due date 3 About half the time 4 Sometimes before the due date 5 Never before due date

**TABLE 11:**  
Continued from  
page 37

The econometric analysis suggests that trust in the utility is a significant driver of compliance on the part of consumers. For both models, corruption level associated with discom officials turns out to be a significant driver. Both these findings underscore the importance of an image makeover needed for principal and agent. Increased engagement with consumers – through targeted outreach and communication – will be essential in convincing them of the intent for reform and to maintain standards of service.

More importantly, a household belonging to higher socio-economic stratum<sup>19</sup> (if educational achievements are a proxy) is also a consistent driver of compliance. Most importantly, and the biggest driver of compliance across both models, is the importance of being billed frequently. This is indeed a telling finding, as it suggests that consumers respond to frequent and timely billing. This is something that is clearly missing in the current repertoire of discom capacity. The implications of this analysis are that the conventional elements of trust as described in Fjelstad (2004) are perhaps not all consistently important drivers of consumer compliance. The socio-economic context of the state and the incentives for the agents muddles the trust equation significantly.

Overall, only 39 per cent of the consumers are metered, billed, and pay their bills. This figure drops to 19 per cent for rural UP if we consider the share of households that are metered, *billed frequently*, and pay their bills in full. This is in line with the most recent order from UPPCL (UPPCL, 2018) that suggests that only 20 per cent of the overall rural consumer base has paid up its entire dues for the first six months of the 2018–19 financial year by the end of October. *This is an important outcome for the discom. It suggests that their focus must shift to improving their billing rates and improving the perception among the consumers that bills reflect their metered consumption.*



**Focus must shift to improving their billing rates and improving the perception among the consumers that bills reflect their metered consumption**

19 Household expenditure was not used as a proxy for income because many households reported incomes inconsistent with their asset base and expenditure on electricity. Overall, there were indications of under-reporting,



## UP – Heterogeneity in issues

It would be amiss to not highlight that the very notion of UP (much like many other states of the country) was a post-Independence creation. While addressing the problems associated with the power sector, it might help to look back to the time it was the United Provinces. The four broad discom regions are nothing more than a united front under the UPPCL for the distribution of electricity. But the underlying social context and diversity – on account of entrenched historic endowments and other differences – have persisted despite seven decades of economic growth and evolution with political regimes. Geographically, climatically, politically, socially, economically, and demographically, these show a fair bit of diversity.

The Purvanchal region in the state is the poorest performer on most of the discom service parameters evaluated. When it comes to daily supply hours, supply during evening and night hours, some areas of Dakshinanchal compete for the tag of poorest performer with Purvanchal districts. Daily supply hours of 8.5 hours in rural areas of Mau and 10 hours in rural areas of Ballia (both in Purvanchal) are lowest among the districts surveyed. The urban regions of Mau and Ballia also experience lowest supply hours at, respectively, 12 hours and 14 hours. In rural areas, lowest levels of dissatisfaction were for households in Paschimanchal (14 per cent) and highest in Purvanchal (31 per cent).

Metering in rural areas is a recent exercise. A significant share of meters in rural areas of three out of four discoms (barring Madhyanchal) were installed in the past year. In urban areas, the median age of meters is highest in Dakshinanchal (10 years), followed by Paschimanchal (7 years) and Madhyanchal (5 years). The Purvanchal discom rates lowest in this category as well, with a median age for urban areas at 3 years.

Urban areas fare marginally better across the discoms when it comes to delays in first billing – the time gap between the installation of meter and first bills received. Few respondents in Madhyanchal could recollect the time gap; in other regions, respondents indicated a median value of 3 months. Madhyanchal discom has failed to convert the head start on metering in rural areas into revenues. This indicates the importance that should be accorded to billing as an activity and, potentially, persistent challenges. The key challenge that discoms will face will be from the increased household consumer base (Table 12).



**The Purvanchal region in the state is the poorest performer on most of the discom service parameters evaluated**

Parameters/ Discoms	Domestic consumers projected for FY2017–18 <sup>1</sup>	Domestic consumers projected for FY2019–20 <sup>1</sup>	AT&C Losses in FY 2016–17 <sup>4</sup>	Distribution losses allowed by UPERC for FY 2017–18 <sup>2</sup>	Distribution losses allowed by UPERC for FY 2019–20 <sup>2</sup>	Loss in recovering from domestic consumers for FY 2014–15 in Rs/kWh (ACoS-thru rate) <sup>3</sup>
DVVNL	35,57,063	72,52,804	43.30%	20.07%	12.10%	4.77
MVVNL	47,01,042	1,13,48,493	52%	19.16%	11.80%	4.93
PuVVNL	46,46,365	66,48,501	51.1%	19.73%	12.20%	5.32
PVVNL	46,71,158	1,13,31,624	26.9%	18.18%	11.80%	4.9

**TABLE 12:**  
Disparity across UP  
discoms

Sources: 1–(UPERC, 2017, pp. 154–160), 2–(UPERC, 2017, p. 164), 3–(UPERC, 2017, pp. 122–123), 4–(Care Ratings, 2018)

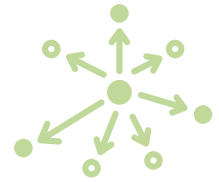
In terms of non-recovery of costs from households, Purvanchal discom is ranked lowest among the four discoms. Madhyanchal discom has the highest AT&C losses. Madhyanchal and Purvanchal discoms score poorly on many consumer-attributed metrics. The Madhyanchal discom faces an uphill task of achieving efficiency gains, given the significant growth likely in its consumer base, but it does not have the same foundation as Pashchimanchal,

which is also faced with similar growth prospects. While domestic consumers are not the only category serviced by discoms, they form a significant portion (39 per cent to 47 per cent) of sales. The losses approved by UPERC for the next few years are much lower than the actual losses of discoms. The losses in recoveries will depend upon how well the discoms improve their service provision by way of billing and collection.

The analysis on acceptance of *katiya* has also thrown out the interesting finding that consumers in the MVVNL and PuVVNL jurisdictions are more likely to condone theft. As areas that already experience high levels of losses, it is indeed concerning that the acceptance of *katiya* is also higher in these regions.

Uttar Pradesh is not a singular entity in terms of the challenges faced by its power sector. Given the socio-economic status of eastern UP (the Purvanchal control area), the power sector scenario could improve if the expectations of the discom reflect the on-ground situation. Madhyanchal discom, despite benefiting from housing the seat of political power, has come up short on performance, due perhaps to proximity to power. Payment dues from public sector undertakings and urban local bodies are significant; Lucknow, being the largest such area, has been a drag on Madhyanchal.

State and central government agencies must acknowledge that all UP discoms cannot function under one efficiency improvement trajectory. The issues in each of these discoms arise from dissimilar endowments – political capital, household and societal economic progress and, most importantly, the discom's competency to administer the region under their control. What is common from the state-level analysis is that consumers are more likely to pay up if metered and billed frequently. The first step, then, would be to ensure that discom capacity across all regions is geared up to face this common goal. True separation or autonomy is not on the cards; therefore, driving this common agenda is important alongside the need to provide both consumers and discom agents context-specific incentives.



**State and central government agencies must acknowledge that all UP discoms cannot function under one efficiency improvement trajectory**

## 4. Conclusion and Way Forward

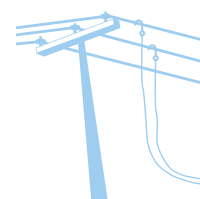
In the context of reforming the power sector in India, technical and commercial losses have been debated for a very long time. In UP, there has been little evidence on the true extent of each of these components of loss. The dominant narrative within commercial loss has been one of blatant theft and rampant illegal consumption of electricity by consumers across the board. The study aimed at understanding the drivers of such commercial losses and factors that lead to acceptance and prevalence of hard theft in the state.

Consumers who are metered and billed and who pay their bills in full make up only 39 per cent of all consumers in the state and only 19 per cent in rural UP. As the domestic consumer base grows, discoms will increasingly need to focus on improving their metering, billing, and collection practices. Technical authorities can objectively assess the prevalence of theft only after they extensively assess all the distribution infrastructure in the state (or at least a representative sample) and measure losses at various stages in the distribution system.

The issue of hard theft will continue to grab headlines in the popular media, but it is unlikely that it is the single biggest contributor to discom loss. Our survey points to only 8 per cent of households potentially indulging in blatant theft. A much larger dent is made on discom finances by losses arising from the indifference of both discoms and consumers to proper metering and to poor levels of billing and collection. As the discoms move closer to ensuring 24×7 power for all, it is important to consider the cost of providing uninterrupted and universal electricity supply.

The diversity in social, economic, demographic, and political-capital endowments of the various regions of the state is reason enough for the state government to adopt a tailored strategy to address the malaise within each. Targets and incentives for performance-driven schemes must be aligned with the wiggle room that each region has. With the transitions that the power sector is likely to witness over the next two decades – market reforms in bulk procurement, competition in distribution, and decreasing cost of alternatives – there is a pressing need to leave behind the baggage of the past and leapfrog into newer paradigms. The basis for such a leap must certainly start with increased accountability and responsibility – of consumers and discoms, to each other.

Based on the key findings from the survey and interactions with stakeholders, we have proposed a list of measures to help discoms prioritise their strategies, classified into short-term (0–2 years) and medium-term (2–5 years) (Table 13).



The issue of hard theft will continue to grab headlines in the popular media, but it is unlikely that it is the single biggest contributor to discom loss

Recommended measures/ timelines	Short-term (up to 18 months)	Medium-term (beyond 18 months)
<b>Electricity supply</b>	Increasing the evening and late evening hours of supply will improve consumer satisfaction and increase compliance levels.	Target 24×7 electricity supply to all.
<b>Universal metering of consumers</b>	An effort equivalent to that required for 100% electrification is needed for universal metering. Procurement, product and technology standardisation and raising consumer awareness on benefits of being metered must be the immediate goal.	Installation of advanced metering infrastructure (AMI) to limit manual intervention in meter reading and bill generation is necessary to reduce administrative costs in the long run.  Enabling time-of-day consumption meters
<b>Billing</b>	Trust billing to be made universal to enable recovery for newly metered consumers.  Frequent reminders (sms/ email/ texting apps) to consumers on bills and creating a demand for timely billing.  Increasing the outlay for contractual billing and linking payments to timely bill delivery. IT infrastructure spending to link billing with metering systems  Clear specification of recent payments, dues cleared, and outstanding dues in bills. Educative bills that provide clarity on determination of dues.	Shifting to frequent billing – monthly, in all areas.  Leveraging AMI to have frequent billing and shifting bill delivery to online modes.
<b>Collection</b>	The OTS scheme must be withdrawn to indicate a credible threat to defaulters. Given the multiple rounds of the OTS, even paying consumers are likely to start defaulting.  Increasing touchpoints with the discom to enable easier payments.  Leveraging public infrastructure such as post-offices, to perform the role of point of sale entities  Offering attractive pricing options for pre-paid consumption and for consumers willing to sign-up for auto debit (ECS) payment modes	Shifting bulk of the payments to online modes  Enabling
<b>Curbing electricity theft</b>	Awareness raising and engagement with consumers will bridge the trust deficit and also reduce acceptance of katiya in the short term. Vigilance squads only to target key areas of rampant non-compliance and theft.	Extensive metering at all levels and accounting will result in easier identification of theft cases and reduce the effort involved in deploying squads and personnel.
<b>Targeting improvements in AT&amp;C loss</b>	Revising the AT&C loss targets for UP discoms and identifying specific action items and commensurate impact that each can have.	Reducing commercial losses to levels that meet the benchmarks set by other discoms in India or international best practices.

**TABLE 13:**  
Policy roadmap for sustaining reliable electricity supply in Uttar Pradesh

Source: CEEW analysis

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