

**BEFORE THE UTTAR PRADESH ELECTRICITY REGULATORY COMMISSION
LUCKNOW**

December 19, 2018

IN THE MATTER OF

Suo Moto Proceedings (Order dated August 30, 2018) of Hon'ble Uttar Pradesh Electricity Regulatory Commission (UPERC) on True-up for FY 2015-16 & FY 2016-17, Annual Performance Review (APR) for FY 2017-18, Revised Annual Revenue Requirement (ARR) & Tariff for FY 2018-19 in the matter of Distribution Licensees (namely DVVNL, PVVNL, MVVNL, PuVVNL & KESCO).

Submissions from Council on Energy, Environment and Water

The Hon'ble UPERC initiated Suo- Moto proceedings on True-up for FY 2015-16 & FY 2016-17, APR for FY 2017-18, Revised ARR & Tariff for FY 2018-19 in the matter of Distribution Licensees (namely DVVNL, PVVNL, MVVNL, PuVVNL & KESCO). The public hearing in this regard were held on December 10, 2018, December 14, 2018 and December 17, 2018 at Kanpur, Lucknow and Noida respectively, wherein the CEEW made several oral submissions before the Hon'ble Commission. This submission captures the same and elaborates on a few points that were briefly stated during the public hearing, the submissions are most respectfully set out below.

1. Analysing the Current Practice of Levying Interstate Transmission Losses on the Total Energy Requirement and Quantifying its Impact on End-consumers

Discoms source their power requirement from a mix of long-term and short-term sources in order to meet consumer demand in their licence areas. These sources can be categorised broadly into two: those that are connected to the transmission system through the interstate network (and from there to the state transmission system), and those that connect directly to the intrastate network (or state transmission system). In most cases, power-generating sources that are owned by the public sector undertakings (PSUs) of the central government—for example, the National Thermal Power Corporation (NTPC), National Hydroelectric Power Corporation (NHPC)—supply to two or more states as they are allocated in that manner, and they also connect through the Central Transmission Utility (CTU) to the interstate network. Generation stations owned by a state invariably connect through the State Transmission Utility (STU) (or state transmission system), and in most cases supply only to discoms within the state. Privately owned generation stations, depending on their size and power purchase agreements (PPAs), could supply to multiple states or to utilities only within the state; as a result, they can connect either at the CTU or STU level.

Transmission charges and losses are accounted for through the energy balance, based on the quantum of power flowing through interstate and intrastate transmission

lines. While intrastate transmission charges and losses are applicable on all the power procured, it would seem appropriate to levy interstate losses on the power that actually traverses only the interstate network. The methodology used for calculating losses on the interstate network has been changed in recent years, and it has been acknowledged that this methodology is complex. Nevertheless, it has been agreed upon, and interstate losses have been established. However, there is not much clarity on whether interstate losses must be levied on all—or only some—of the electricity procured by a discom.

In order to get a sense of the practices being followed in various states, the tariff orders of Uttar Pradesh and five other states were studied. Among the states mentioned in the table below, UP is the only state levying ISTS losses on total power procured.

The table below summarises the practices of the states being investigated. The details of the accounting practices of each state have subsequently been illustrated, based on the reporting in their respective Annual Revenue Requirement (ARR) filings.

Table 1: Practices in each of the states

Sl. No.	State	Interstate losses levied on total power, or only on interstate purchased quantum
a.	Maharashtra	Levied only on interstate purchased quantum
b.	Tamil Nadu	Levied only on interstate purchased quantum
c.	New Delhi	Levied only on interstate purchased quantum
d.	Telangana	Levied only on interstate purchased quantum
e.	Gujarat	Levied only on interstate purchased quantum
f.	Uttar Pradesh	Levied on total power procured/total energy requirement

Source: CEEW analysis

Further, CEEW did an analysis to gauge the impact on account of levying interstate transmission losses on total power procured/total energy requirement for FY 2017-18, FY 2018-19 & FY 2019-20 and it was observed that approx. Rs. 671.38 crore, Rs. 552.72 crore and Rs. 490.14 crore would be passed on to the consumers if the current practice is followed. **The detailed working draft report / analysis in this matter has been annexed as Annexure I.**

Also, MPERC's True up Tariff Order for FY 2013-14 dated November 30, 2018 was studied, wherein the first impression was, that the interstate transmission losses were levied on the total power procured (same case of Uttar Pradesh). However, in true sense or looking into back calculation, the Commission was levying the interstate losses only on the interstate sources and the percentage of inter transmission loss figure was merely a representation of total power procured.

It is requested that the Hon’ble Commission may analyse the current practice of levying interstate transmission losses on the total energy requirement and may direct discoms to submit their responses in this matter.

2. Delayed True up filing and Fuel Surcharge filing by discoms and its impacts on end consumers

Delayed True – up filings

The Hon’ble Commission analyses all the elements of actual expenses (including power purchase cost, O & M, depreciation, interest charges, etc) and revenue (on account of sale of electricity, misc. charges, etc.) as per the audited accounts for that particular year and thereon decide on the actual expense and revenue. The truing up exercise is often taken up after a gap of 1.5 to 2.5 years, due to delayed filings by discoms. The time lag in recovery of the variation between projected and actual power purchase cost adversely affects the cash flow of the discom and is an additional burden on the discom. This results in the need for borrowing to manage working capital requirements. The impact of this delay, in turn, is passed on to the consumers, in the form of carrying cost. This amount (usually in hundreds of crores) is being paid by the consumers (incorporated in the Tariff) from the date of truing-up.

In the context of UP, the historical timelines for true up done of the state discoms from FY 2000-01 onwards is shown below:

Table 2: Timeline / Delays in True up filing

Financial Year (s)	Trued – Up Date	Delays in Truing up
FY 2000-01 to FY 2007-08	May 21, 2013	Ranging from 5 to 12 years.
FY 2008-09 to FY 2011-12	October 1, 2014	Ranging from 2 to 4 years.
FY 2012-13	June 18, 2015	2 year
FY 2013-14	August 1, 2016	2 year
FY 2014-15	November 30, 2017	2 year

Source: Uttar Pradesh Electricity Regulatory Commission’s Tariff Order’s

It can be observed that there have been significant delays in filing of true- up by the Discoms. The Hon’ble UPERC, in its orders, over the years has pointed out this delay to the discoms and instructed them to file these variations sooner. However, over the last 6 years, there has been little improvement in the frequency of the filing.

Delayed Fuel Surcharge filing

In Uttar Pradesh, filing of Fuel & Power Purchase Cost Adjustment Surcharge (FPPCA) has been tardy and the discoms have not been able to file the FPPCA as per the prescribed timelines This has resulted in accumulation of carrying cost, to be paid by consumers. The timeline of filing of FPPCA for FY 2016-17 (quarter wise), FY 2017-18 & FY 2018-19 (till 2nd Quarter) and the actual filing by the discoms has been shown below:

Table 3: Timelines for Filing of FPPCA for each quarter of FY 2016-17, FY 2017-18 & FY 2018-19 (till 2nd Quarter of FY 2018-19)

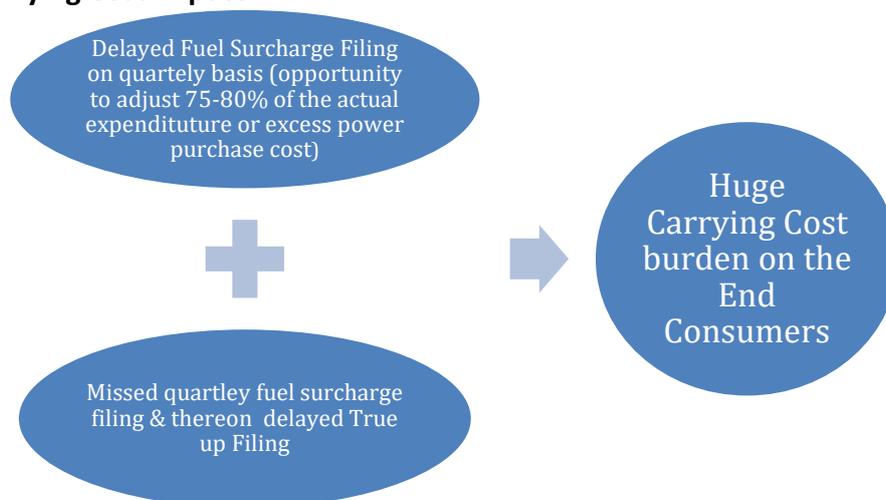
Financial Year (s)	Quarters (Q) FY 2016-17	Timeline for Filing	Applicability of FPPCA	Actual Filing	Remarks
FY 2016-17	Q1 (April' 2016 to June' 2016)	Before September' 2016	October'2016	September 29, 2016	UPPCL / State Discoms failed to file filed FPPCA for 1st and 2nd quarters as per the specified timelines.
	Q2 (July 's2016 to September '2016)	Before December' 2016	January'2017	January 21, 2017	
	Q3 (October' 2016 to December' 2016)	Before March' 2017	April'2017	August 18, 2017	UPPCL / State Discoms again failed to file filed FPPCA for 3rd and 4th quarters as per the specified timelines.
	Q4 (January' 2017 to March' 2017)	Before June' 2017	July'2017		
FY 2017-18	Q1 (April' 2017 to June' 2017)	Before September' 2017	-	No Filing as per the specified timeline	-
	Q2 (July '2017 to September '2017)	Before December' 2017	-		-
	Q3 (October' 2017 to December' 2017)	Before March' 2018	-		-
	Q4 (January' 2018 to March' 2018)	Before June' 2018	-		-
FY 2018-19	Q1 (April' 2018 to June' 2018) ^	Before September' 2018	-		-
	Q2 (July '2018 to September '2018) ^	Before December' 2018	-		-

Source: Uttar Pradesh Electricity Regulatory Commission's tariff order dated 1st August, 2016

^Note 1: - Status as on December 5, 2018

The schematic below shows the impact on the consumers due to delayed fuel surcharge filing and true up filings.

Figure 1: Carrying Cost Impact



The Hon'ble Commission had to initiate *suo-motu* proceedings for the **true - up of FY 2015-16, APR for FY 2016-17 & FY 2017-18** and Revised ARR & Tariff for FY 2018-19 through order dated August 30, 2018. The State Discoms submitted actual data for **True up of FY 2015-16 & FY 2016-17, APR for FY 2017-18** and Revised ARR & Tariff for FY 2018-19. No FPPCA charges were filed for FY 2016-17 it is likely that these will be presented in the true-ups for FY 2016-17, by this time the carrying cost would have also become significant.

Impact on Consumers

For every Rs. 1000 crore of delay in filing of true ups and fuel surcharge, a carrying cost burden at the rate of 12.5% p.a. i.e. Rs 125 crore / annum, would come on the consumers.

In the recent public notice released by UPPCL, the estimated carrying cost is Rs. 12,278.10 Crore on account of True -ups of FY 2012-13, FY 2013-14 & FY 2014-15 and estimated revenue gap of FY 2015-16 & FY 2016-17.

Source: CEEW analysis on State Discoms Tariff filing¹

It is requested to the Hon'ble Commission that Discoms should be held accountable by ensuring timely filings. The Hon'ble Commission may consider disallowing the amount due to untimely filing and losses on this account shall be managed by discoms via improvement in operational & financial parameters. Alternatively, costs claimed under fuel surcharge should not be subject to carrying costs. Unless delay is due to exigent circumstances / delay in action by the SERC.

Also, it is requested that there is a need for public participation to ensure vigilance in passing the costs incurred by discoms and recovery of fuel surcharge.

3. Unsustainable Aggregate Technical and Commercial Losses (AT &C Losses)

¹https://dvn.org/UploadFiles/CurrentNews/Public%20Notice_ENGLISH1.pdf, p.6

AT & C losses have eroded the financial sustainability of the Distribution Utilities and also has major ramifications for retail tariffs.

Status of AT & C loss, Billing & Collection Efficiency across 24 Towns in Uttar Pradesh

The loss levels of discoms are detailed in the table below, six towns in each of the four discoms (PVVNL, DVVNL, MVVNL & PuVVNL) are given². The towns, based on their losses were bifurcated into good³ and bad performing towns respectively. The table below highlights the dynamics across the State.

Table 4: Status of AT & C Loss across various Urban Towns

Discoms		Town Name	AT & C Losses	Billing Efficiency	Collection Efficiency
PVVNL (HQ - Meerut)	Good	Noida	11.79%	97.42%	90.55%
		Ghaziabad	15.13%	92.45%	91.81%
		Meerut	20.25%	90.57%	88.05%
	Bad	Saharanpur	39.30%	84.18%	72.10%
		Kandhla	45.24%	85.87%	63.77%
		Hasanpur	48.73%	78.08%	65.66%
DVVNL (HQ - Agra)	Good	Mathura	25.70%	74.55%	99.65%
		Jhansi	27.26%	77.90%	93.37%
		Aliagrh	27.79%	76.78%	94.05%
	Poor	Etawah	62.07%	53.06%	71.48%
		Kannauj	67.49%	44.18%	73.57%
		Ganj Dundawara	71.02%	37.01%	78.30%
MVVNL (HQ Lucknow)	Good	Lucknow	13.51%	99.14%	87.24%
		Budaun	15.53%	97.60%	86.55%
		Lakhimpur	16.09%	93.28%	89.95%
	Poor	Shahjahanpur	18.02%	92.78%	88.36%
		Paliya Kalan	20.33%	94.33%	84.46%
		Tilhar	23.78%	91.33%	83.46%
PuVVNL (HQ Varanasi)	Good	Varanasi	30.89%	81.60%	84.70%
		Deoria	33.30%	88.83%	75.09%
		Jaunpur	34.32%	75.16%	87.38%

² Data has been sourced from National power portal for the time period 1 June, 2017 to 31 May, 2018.

³ Good and Bad has been defined based on the level of AT & C losses closest or far from 15% target. Also, the performance of MVVNL discom has improved significantly, even in poor column the losses are close to 18% - 23% as compared to other Discoms.

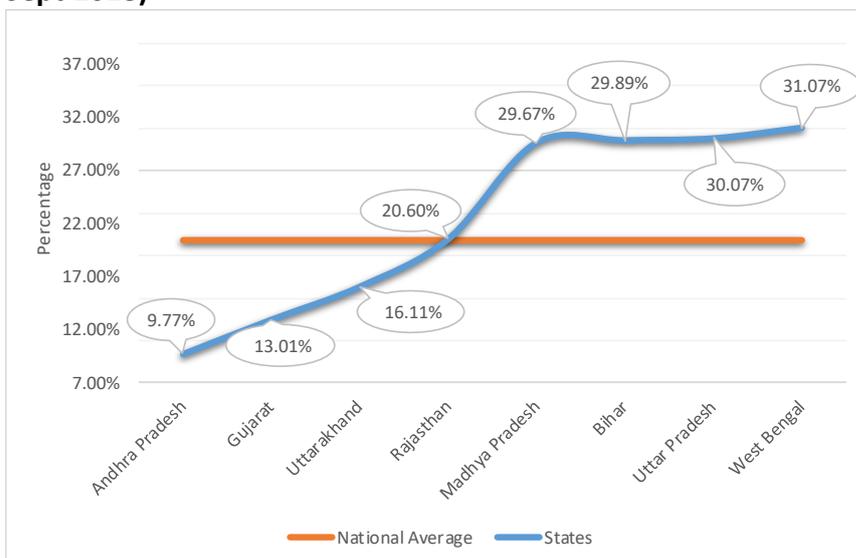
Discoms		Town Name	AT & C Losses	Billing Efficiency	Collection Efficiency
Poor		Gorakhpur	36.52%	78.11%	81.27%
		Bela Pratapgarh	58.35%	67.00%	62.16%
		Mubarakpur	60.59%	64.38%	61.21%

Source: National Power Portal

It can be seen from above that there are areas with AT&C losses above 50% and, areas with losses lower than or close to 15%, in the same discom supply area. This difference in losses within same discom area makes a case for planning for area specific interventions. It shows that discom operations pertaining to metering, billing and collection are not uniform across their service area. Equally, this also suggests widespread non-compliance on part of consumers.

Further, a comparison of AT&C losses of UP with seven other states, reveals that the state has one of the highest AT&C in comparison to other states (except West Bengal) and all India average (see Figure 2). As of September 2018, the AT & C losses for Uttar Pradesh were 30.07 % as compared to the National average of 20.41%.

Graph 1: Comparison of AT & C losses – UP vs. Other States vs. National Average (as on Sept’2018)



Source: Government of India, URJA Portal

The AT&C losses even in a state with difficult terrain (hilly areas) like Uttarakhand are about half of losses observed in Uttar Pradesh. States like Gujarat, MP and AP comparable to UP in terms of population, area, etc. have lower AT & C losses. Such high level of losses completely erodes the competitiveness of the discoms and the state economy.

CEEW's Survey

CEEW has completed a survey on perception of electricity theft and, socio-economic drivers of consumer compliance in the power sector. The survey was conducted in the month of April to June'2018 across 10 districts (namely Aligarh, Banda, Ambedkar Nagar, Budaun, Sultanpur, Ballia, Kaushambi, Mau, Moradabad and Muzaffarnagar).

Based on the survey findings, it was considered necessary to bring to the Hon'ble Commission's notice that only 54% of the consumers are metered, billed and pay their bills. This figure, for rural UP, drops to 19%, if we consider the share of households that are metered, billed frequently and pay their bills in full. Also, this is in line with the most recent Letter from UPPCL⁴ that suggests that only 20% of the overall rural consumer base has paid up its entire dues for the first 6 months of this financial year, by the end of October'2018. It is interesting to note that nearly 80% of the consumers pay their bills in entirety (either in one go or in instalments) when they are billed frequently (monthly or bimonthly). This is an important outcome for the discom and suggests that their focus must shift to improving their billing rates and improving the perception among the consumers that bills reflect their metered consumption.

Based on our understanding of the issue of AT & C losses, we would like to put forward the following action points before the Hon'ble Commission:

A joint effort by officials of distribution utility and consumers could help reduce the AT&C losses of discoms, the action points to reduce losses are discussed below.

Action Points for Distribution Utility

Addressing metering and billing issue

- Expanding the scope of metering to as many of the existing consumers. Current focus is on new connections and the challenge of reaching out to those already connected has been recognised by utilities
- Faster redressal of billing related consumer complaints. A large share of grievances that reaches the CGRF relates to billing.
- Billing frequency must be maintained constant and set an expectation with consumers of regular need for payment
- Collection mechanisms with limited manual intervention and facilitating e-payments directly or through kiosks must be encouraged.
- Defaulting consumers list must be generated on monthly basis and sent to respective section officers to attend and report back within 15 days.

⁴ Letter No. 829 dated October 31, 2018

Addressing Electricity Theft

- Procedure for Regularisation of connections are quite tedious. There is a need to minimise procedure for regularization of consumers.
- Anti-theft police stations must be set up to curb electricity theft and provide suitable reinforcements to anti-theft squads that are deployed by the discoms
- All HT-metered services must be periodically inspected by a special-wing formed for theft detection. There have been significant instances where such large consumers have indulged in malpractices.

Action Points for Consumers

- The importance of periodic and timely payments of bills is an important responsibility of consumers.
- When bills don't arrive in a timely manner, consumers must be proactive in following up with the discom and lodging a documented complaint in the manner so that they are shielded from any future issues that arise from lapses on part of the discom.
- It is important to involve village level SHGs for collection resolving open issues pertaining to bill payment
- Awareness of Theft and the impact on discom finances is also important from a consumer perspective and will provide the right impetus to act when they are witnesses to acts of theft. They could report theft to Discoms officials – data informers
- In equal measure consumers must also hold discom staff accountable and must report to the discom's management, should they find their field staff indulging in malpractices

Also, it is requested to the Hon'ble Commission that it shall ask the State discoms to submit their AT&C loss data for FY 2016-17 & 2017-18 vis a vis their UDAY Targets.

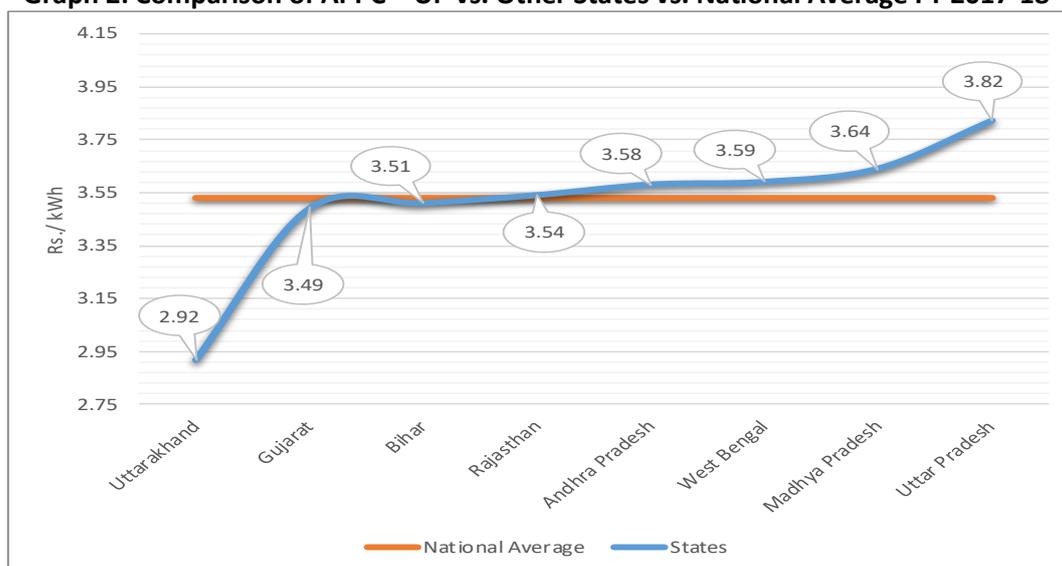
4. High APPC (Average Power Procurement Cost)

Power purchase costs is the single largest contributor (approx. 75 to 80%) to the cost of supply for the Discoms and can have significant impact on the end tariff. It is therefore necessary to weed out inefficiencies in the procurement process to address the issue of revenue gap for the discoms.

Comparison of APPC in Uttar Pradesh vis – a – vis other State and national average

A comparison of Uttar Pradesh with the other seven States⁵ reveals that the State has one of the highest APPC in comparison to other States and all India average (see Figure 2). In FY 2017-18, the APPC for Uttar Pradesh was Rs. 3.82 / kWh which was 8.22% (Rs. 0.29 / kWh) higher than the national average of Rs. 3.53 / kWh.

Graph 2: Comparison of APPC – UP vs. Other States vs. National Average FY 2017-18



Source: CERC Order dated April 11, 2018 in Petition No. 4 / SM / 2018.

In Uttar Pradesh, like in a few other states in the northern region, there is a significant difference between the summer and winter load. The summer load goes up to 19000 MW⁶, whereas in winters it is only around 14500 MW⁷. Given that discoms are meeting their 95% power requirement through long term PPA, they have to bear the fixed charges for winter months (3 – 5 months), without requisitioning some of the generators. The backdown of capacity in states is anywhere in the range of 15% to 30% of the contracted capacity⁸.

Based on our understanding of the issue of High APPC, we would like to put forward the following suggestions before the Hon'ble Commission, to reduce the overall power purchase cost:

- I. The short-term solution to the issue is to ensure that procurement must be prioritised from stations where the variable cost is low.

⁵ To represent an all India comparison, the seven states are chosen from each of the five regions.

⁶ <https://www.rediff.com/money/report/as-temperature-soars-power-demand-across-india-hits-record-high/20180525.htm>

⁷ CEA's Load Generation Balance Report FY 2018-19, Annex – IV (A) (2/14)

⁸ Prayas (Energy Group). (2017, March). The Price of Plenty: Insights from 'surplus' power in Indian States, p.1.

- II. Merit order must be respected in its entirety and issues such as transmission constraints and coal availability must not reduce the ability to procure from these low-cost generation sources.
- III. Newer contracts for longer term requirements must evaluate the impact of low utilisation and needs to ensure flexibility in procurement without locking the discom into a high fixed cost burden. This can be achieved through by getting a greater visibility of generation sources in other parts of the country, where the season demand variation is complementary to Uttar Pradesh or where there is spare capacity in summers.
- IV. The Hon’ble Commission shall initiate redrafting of standard PPAs. A feature that must be explored in these PPAs must suitable provisions should be made in the PPAs for exit from contracts, upon reasonably compensation being paid.
- V. The procurement of short term and medium - term power also needs to be encouraged as the rates discovered in short term and medium-term contract are much closer to the market prices.
- VI. An emphasis on contingency procurement, through banking (non - cash transactions) must be placed. Tenders could be issued for banking of power to meet demand during summer and reduce surplus during winters. While these are interim measures, a longer-term transition to a market-based procurement scenario is a likely way out for the power sector in India as a whole.

5. Perpetual Life of Regulatory Asset

The state discoms in their filing for the Suo – Moto proceedings submitted that at the consolidated level (for 5 Discoms namely DVVNL, PVVNL, MVVNL, PuVVNL & KESCO) from FY 2000-01 to FY 2018-19 (considering trued up revenue gaps for the trued-up years (from FY 2000-01 to FY 2014-15) and provisional revenue gaps for the non - trued up years (from FY 2015-16 to FY 2018-19)), the revenue gaps amount to Rs.74,111 Crore, including carrying cost of Rs. 24,514 Crore. The consolidated revenue gap till FY 2018-19 has been depicted below.

Table 5: Regulatory Asset position across Discoms

Sr. No.	Particulars (Rs Crore)	PuVVNL	PPVNL	MVVNL	KESCO	DVVNL	Total
1	True up Gap of FY 2000-01 to FY 2007-08						-2487.93
2	True up Gap of FY 2008-09 to FY 2011-12	-4208	-1496	-3704	-578	-3863	-13850
3	Revenue (Gap) upto FY 2015-16 (including gap of FY 2012-13)	-2,249	-1,851	-1,577	-159	-2,819	-8,655

Sr. No.	Particulars (Rs Crore)	PuVVNL	PVVNL	MVVNL	KESCO	DVVNL	Total
4	Revenue (Gap) for FY 2016-17 (including gap of FY 2013-14)	-2,417	-1,656	-2,078	373	-3,253	-9,031
5	Revenue (Gap) for FY 2017-18 (including surplus of FY 2014-15)	-3,292	-2,452	-1,135	407	-1,454	-7,927
6	Revenue (GAP) for FY 2018-19	-3,100	-2,965	-1,184	292	-689	-7,646
7	Net Revenue (GAP) for FY 2018-19	-15,266	-10,421	-9,678	334	-12,079	-49,597
8	Carrying Cost upto FY 2018-19	-7,879	-3,526	-5,708	-438	-6,963	-24,514
9	Total (Gap)	-23,145	-13,947	-15,387	-104	-19,042	-74,111

Source: State Discoms filing in the Suo Moto proceedings for FY 2018-19

The Hon'ble Commissions recognised that the total recovery of Regulatory Assets till date is unclear⁹ due to incomplete submissions made by State Discoms. Hence, there is no clarity on the amount recovered under regulatory surcharge heads.

However, considering the revenues from sale of electricity for each discoms and the regulatory surcharge recovered from such sales, the recovered surcharge is not even able to serve the carrying cost that it imposes, let alone addressing the issue of the principal regulatory assets.

It is requested to the Hon'ble Commission that Discoms must be mandated to submit the actual detail of Regulatory Surcharge amount being billed and collection across various categories and sub – categories, from the date of inception.

Further, an improvement plan (reduction in power purchase cost, improvement in AT & C losses, optimised O & M expenses, among others) needs to be chalked out enable the amortisation of the regulatory asset in a time bound manner. It is equally important for the state government to take on the necessary responsibility in liquidating the regulatory asset by identifying those phases when interventions on part of the state government, prevented a suitable raise in tariffs, as needed for the commercial operation of the discom.

6. Abolition of LMV -10 consumers & its Continuation – Impact on other Consumers & Way Forward

In various tariff hearings, consumers of other categories (other than LMV -10 category) made several objections / representations that concessional supply to pensioners should be borne by the state government, through a budgetary support and not as a cross-subsidy imposed on other consumers of electricity.

⁹ UPERC MYT Tariff dated November 30, 2017, p.375

Taking cognizance of the consumers objections / representations, the Commission vide Order dated June 18, 2015 made clear that from January 1, 2016 onwards, the Tariff similar to other Domestic category (LMV -1 category) will be applicable on the existing LMV – 10 consumers (at that time). The Commission’s Order has been reproduced below:

¹⁰RATE (B): (January 1, 2016 Onwards)

Tariff for consumers under this category shall be same as that of “other metered consumers” under LMV-1 category.

The Licensees are permitted to provide the “rebate” as it deems fit to the consumers eligible to get supply under this category. However, the Licensees shall have to bear the burden from its own resources, if it wants to provide the “rebate” to such consumers. The amount of “rebate” given, energy billed and amount billed must be clearly accounted by the Licensees and shall ensure appropriate modification in its billing software in this regard. The actual amount billed plus the rebate so recognized shall be considered as total revenue from this category while undertaking the truing up of the relevant financial year.

However, discoms filing for FY 2016-17 & MYT 1st control period¹¹ (FY 2017-18 to FY 2019-20) and submission by various consumers¹² suggest that implementation of the Hon’ble Commission’s Order has not been done by State discoms. Discoms still have largely un – metered LMV 10 consumers and are given supply at a concessional tariff, which ultimately impacts the other consumers.

Impact on Consumers

For every 700 MUs of electricity supplied to LMV – 10 consumers, a across subsidising impact of approx. 250 crore is being passed on to the other consumers.

Source: CEEW analysis on State Discoms Tariff filing

It is requested to the Hon’ble Commission that Discoms should be held accountable for non-implementation of Commission’s Order and also the impact / revenue burden shall be considered as deemed revenue from the date of non-implementation of Hon’ble Commission’s order and must be adjusted in the tariff filing for the ensuing year.

Also, the Hon’ble Commission may ask the discoms to submit the current status of metering of LMV -10 consumers and also submit the month-wise timeline for

¹⁰ UPERC’s Tariff Order dated June 18, 2015, p.347

¹¹ UPERC’s MYT Tariff Order dated November 30, 2017, p.351-358

¹² <https://www.hindustantimes.com/lucknow/uppcl-staff-still-enjoying-unmetered-supply/story-fv8r3MI9rfFZvCKszfozUP.html>

metering of such LMV -10 consumers, in accordance with the best practices adopted for regular metered consumers.

Also, the State Discoms in an affidavit have submitted to the Hon'ble Commission that there are no urban un-metered consumers left in the system. However, based on our survey across 10 districts, the urban metering stands at 90%. It is requested to the Hon'ble Commission that may ask the discoms to submit the current status of metering of urban consumers.

7. Claim toward Bad & Doubtful Debts

It is submitted that the Licensees in their True up submission for FY 2015-16 and FY 2016-17, APR for FY 2017-18 and Revised ARR for FY 2018-19 have claimed Bad & Doubtful Debts, the amounts claimed in the filings has been depicted in the table below:

Table 6: Bad & Doubtful Debts claimed in filings

		Amount (Rs. Crore)							
Sl. No.	Discoms	FY 2015-16		FY 2016-17		FY 2017-18		FY 2018-19	
		Approved in TO dated June 18, 2015	Claimed in True - up	Approved in TO dated August 1, 2016	Claimed in True - up	Approved in MYT TO dated November 30, 2017	Claimed in APR	Approved in MYT TO dated November 30, 2017	Claimed in Revised ARR
1	DVVNL	0	118.82	0	126.64	0	167.69	0	237.55
2	PVVNL	0	139.69	0	109.45	0	160.59	0	371.85
3	MVVNL	0	119.21	0	140.46	0	164.94	0	255.49
4	PuVVNL	0	161.76	0	190.68	0	204.35	0	261.16
5	KESCO	0	25.64	0	13.30	0	15.75	0	52.74
Consolidated for 5 Discoms		0	565.11	0	580.54	0	713.33	0	1178.80

Source: UPERC's MYT Tariff Order dated November 30, 2017 & State Discoms Tariff filing

Table 7: Bad & Doubtful Debts claimed from FY 2015-16 to FY 2017-18

Sl. No.	Financial Year	Claimed Bad & Doubtful Debts (Rs. Crore)
1	FY 2015-16	565.11
2	FY 2016-17	580.54
3	FY 2017-18	713.33
4	Total	1858.98

It is being submitted that from FY 2015-16 to FY 2017-18, there was no approved Bad & Doubtful policy in existence for the State Discoms. It is requested to the Hon'ble Commission that claim towards Bad & Doubtful debt (burden amounting to Rs. 1858.98 crore for 3 years) shall not be allowed to be passed on to the consumers.

However, the Hon'ble Commission vide its Letter dated March 21, 2018¹³ had approved the Bad & Doubtful policy for the state discoms, the Hon'ble Commission may scrutinise the claim for FY 2018-19 accordingly.

8. Distribution Losses (Actual vs. Claimed) for True -up and APR:

It is submitted that Licensees namely DVVNL, PVVNL & KESCO in their True up for FY 2015-16 & FY 2016-17 and APR for FY 2017-18 have claimed Distribution Losses higher than the actual losses. The same has been shown in the table below:

Table 8: Distribution Losses for DVVNL & PVVNL

Sr. No.	Filing	Particulars	DVVNL			PVVNL		
			Approved in Tariff Order	Actual as per filings	Claimed	Approved in Tariff Order	Actual as per filings	Claimed
1	True - Up filing	FY 2015-16	29.00%	24.45%	29.00%	19.52%	18.65%	19.52%
2		FY 2016-17	23.82%	24.43%	23.82%	20.20%	18.57%	20.20%
3	APR filing	FY 2017-18	20.07%	18.55%	20.07%	18.18%	17.43%	18.18%

Source: DVVNL & PVVNL filing in the suo – motu proceedings

Table 9: Distribution Losses for KESCO

Sr. No.	Filing	Particulars	KESCO		
			Approved in Tariff Order	Actual as per filings	Claimed
1	True - Up filing	FY 2015-16	23.50%	18.34%	23.50%
2		FY 2016-17	22.51%	16.26%	22.51%
3	APR filing	FY 2017-18	15.28%	13.78%	15.28%

Source: KESCO filing in the suo – motu proceedings

It is submitted that the difference in actual and claimed distribution losses will result in the increased Power purchase quantum (MUs) and power purchase cost (Rs. Crore) at the UPPCL / discoms level or vice versa, lesser availability of energy available for Sales (MUs), correspondingly lesser Revenues (Rs. Crore).

¹³ http://www.uperc.org/App_File/Pt-No-1295of2018,dt-04-05-2018-pdf521201854612PM.pdf

It is requested that the Hon'ble Commission may scrutinize the true-up & APR filing of distribution loss, sales, power purchase, etc. based on the actual numbers, which are less / may come less than the claimed for the respective discoms.

9. Compliance of Hon'ble Commission's Order on recovery of Revenue Gap for FY 2016-17 through efficiency improvement measures

a) Proceeding under Hon'ble Commission's Tariff Order dated August 1, 2016

The Hon'ble Commission in the Tariff Orders for FY 2016-17 dated August 1, 2016, after determining revenue gap for DVVNL, MVVNL & PuVVNL, has reduced the same to zero with the remark that Discoms should recover the revenue gap for FY 2016-17 through efficiency improvement measures. The relevant extract of the same has been quoted below:

Quote

8.4.11: Further, the Petitioner has submitted that given the significant amount of revenue gap, the whole impact may not be able to be passed through a revision in retail tariffs, as it may lead to massive tariff shock. In view, of the same the Petitioner has requested the Commission to find out a suitable way in which the Petitioner can recover its revenue gap and also the least burden can be passed on to the retail consumers to protect them from tariff shock. The Commission directs that the Petitioner to optimally utilize its resources and undertake various efficiency improvement measures to recover its revenue gap for FY 2016-17, which is the best way possible to recover the balance gap thereby passing least burden to the consumers.

Unquote

b) Review Petition by State Discoms against Tariff Order dated August 1, 2016 and Commission disposal of Review Petition

I. Review Petition by State Discoms

The discoms filed a Review Petition on October 21, 2016 against Hon'ble Commission's order dated August 1, 2016 for FY 2016-17 on the issue of treatment of Revenue Gap for FY 2016-17 of DVVNL, MVVNL and PuVVNL.

The Discoms submitted that as per revenue gap / surplus figure approved by the Commission PVVNL & KESCo have surplus revenue while other Discoms i.e. DVVNL, MVVNL & PuVVNL have net revenue gaps of Rs 1601.90 Crore, Rs 513.26 Crore & Rs 1050.51 Crore respectively.

It was submitted that the UPERC (Terms and Conditions for Determination of Distribution Tariff) Regulation-2006, in case of under recoveries, recognises creation of regulatory assets and accordingly the Commission, consistent

with past practice, should have recognised regulatory assets of Rs 1,601.90 Crore, Rs 513.26 Crore & Rs 1,050.51 Crore respectively for the DVVNL, MVVNL & PuVVNL and added it to the existing regulatory assets of previous years of DVVNL, MVVNL & PuVVNL to be recovered in future years along-with carrying cost.

II. Commission’s Disposal of Review Petition

Taking into consideration all the submission, the Commission in its Order dated November 30, 2017 disposed the review petition citing that the State Discoms submission lacks merit¹⁴.

c) Claimed Revenue Gap in the true- up for FY 2016-17 (recent filing by State Discoms)

The State Discoms (4 out of 5 i.e. DVVNL, MVVNL, PVVNL & PuVVNL) in their true up filing for FY 2016-17 has submitted a consolidated revenue gap of Rs. 4232.49 crore.

It is requested that the Hon’ble Commission while computing the final trued up revenue gap for FY 2016-17 shall do prudence check and consider disallowing the revenue gap to the extent it was disallowed in the Tariff Order for FY 2016-17 dated August 1, 2016.

10. Tariff Determination: Projected Hours of Supply vs. Actual Hours of Supply

The Discoms in their Multi Year Tariff Petition for FY 2017-18 to FY 2019-20 have submitted the projected hours of supply for a three-year period. Accordingly, the Hon’ble Commission has decided the Tariff for all categories of consumer.

For FY 2018-19, in Rural it was projected 18 hrs of supply for April – Sept’2018 period and 24 hrs for Oct – Mar’2019 period and 24 hrs for Mahanagar, District & Commissioner, the projected supply hours for FY 2018-19 has been shown below:

Table 10: Projected Supply Hours for FY 2018-19

Description	2018-19	
	Apr-Sep	Oct – Mar’19
Mahanagar	24:00	24:00
District	24:00	24:00
Commissionary	24:00	24:00
Rural	18:00	24:00
Bundelkhand	20:00	24:00

Source: UPERC Tariff Order dated November 30, 2017, p.139

CEEW’s Survey

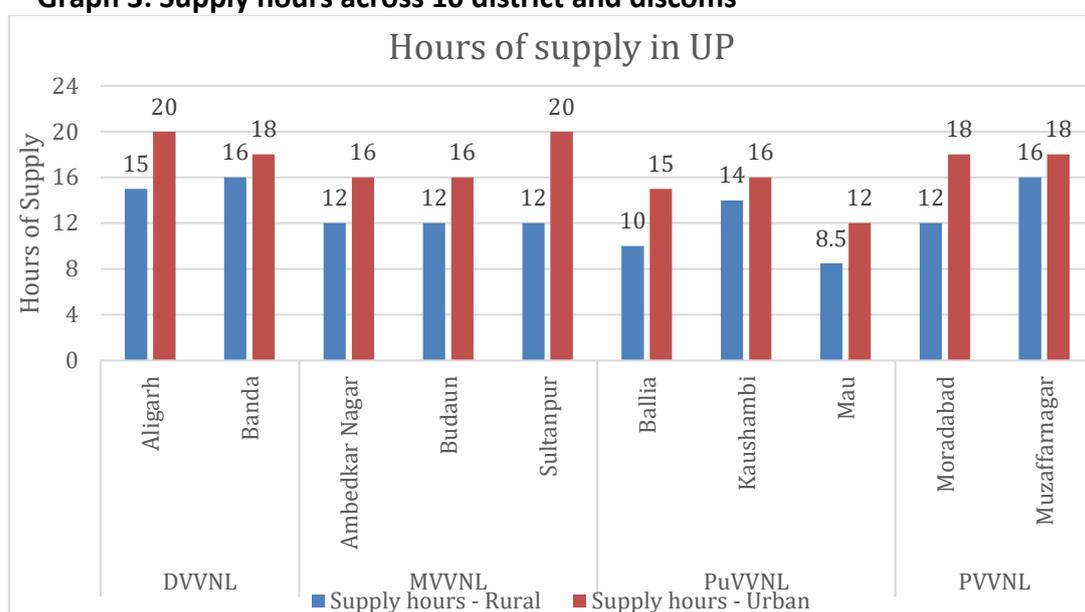
CEEW has completed a survey on perception of electricity theft and, socio-economic drivers of consumer compliance in the power sector. The survey was conducted in

¹⁴ UPERC MYT Tariff Order dated November 30, 2017, p.364-370.

the month of April to June’2018 across 10 districts (namely Aligarh, Banda, Ambedkar Nagar, Budaun, Sultanpur, Ballia, Kaushambi, Mau, Moradabad and Muzaffarnagar).

The survey highlights that the supply situation in both rural and urban areas has improved when compared to the findings of a CEEW survey done in 2015¹⁵, also significant improvement is driven primarily by the governments ambition to provide 24x7 electricity for all. However, 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 1 shows the supply hours across 10 districts and discoms.

Graph 3: Supply hours across 10 district and discoms



Source: CEEW analysis

Based on the survey findings, it was considered necessary to bring Hon’ble Commission’s notice that for the period Apr – Jun’2018, the median rural and urban supply hours were 12 hours and 17 hours respectively, however the projected hours of supply in the MYT Tariff Order (dated November 30, 2017) were 18 hours and 24 hours for rural and urban respectively in the same period.

Further, for the period from Oct – Mar’2019, 24 hrs of supply have been projected across all areas, however the actual supply schedule as provided by UP SLDC talks of 18 hours supply for rural areas¹⁶ and less than 24 hours for other areas¹⁷.

It is requested that the Hon’ble Commission may ask the Discoms, the reason for such huge variation in the supply hours and also appropriate action may be taken against the Discoms due to non-compliance of Commission’s Order. The Hon’ble

¹⁵ https://www.ceew.in/sites/default/files/CEEW_ACCESS_Report_29Sep15.pdf, p 32-34

¹⁶ <http://www.upslcd.org/documents/20182/31002/RL+Schedule+w.e.f.+16-12-18+to+22-12-18.jpg>

¹⁷ <http://www.upslcd.org/documents/20182/0/Supply+Hrs.for+Nov-16/26fb8393-22b0-415d-9b5e-180f0e98579d>

Commission should take cognizance of the supply hours while reviewing/allowing the power purchase cost of the discoms for FY 2017-18 (under APR) and FY 2018-19.

Further, while determining the Tariff for various categories, the ground situation of supply hours shall also be taken into consideration as the tariff based on 24-hour projections is unreasonable for consumers who are not being provided the same amount of supply hours.

We request an opportunity of personal hearing be provided in order to further clarify/explain our submission in the aforesaid Suo – Moto proceedings. The above submission is provided in one original and five copies for kind perusal of the Hon'ble Commission.

Thanking You,

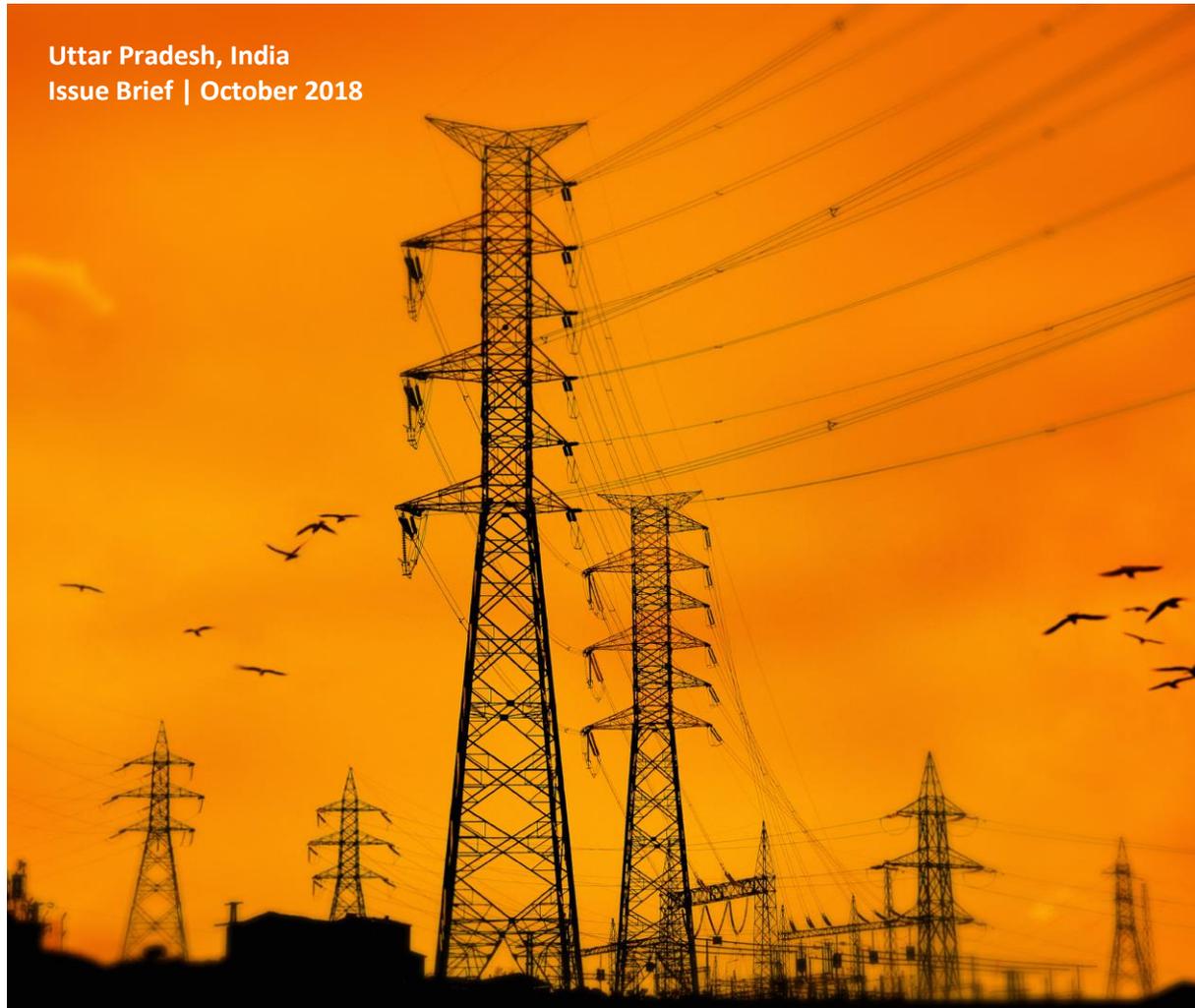
Yours faithfully,
For Council on Energy, Environment and Water

Prateek Aggarwal

Enclosure: Annexure I

Annexure I

Analysing the Current Practice of Levying Interstate Transmission Losses on the Total Energy Requirement and Quantifying its Impact on End-consumers



PRATEEK AGGARWAL AND KARTHIK GANESAN

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Issue Brief on ‘Analysing the Current Practice of Levying Interstate Transmission Losses on the Total Energy Requirement and Quantifying Its Impact on End Consumers, Uttar Pradesh, India’.

Disclaimer: The views expressed in this report are those of the authors and do not necessarily reflect the views and policies of Council on Energy, Environment and Water. The views/analysis expressed in this report do not necessarily reflect the views of Shakti Sustainable Energy Foundation. The Foundation also does not guarantee the accuracy of any data included in this publication nor does it accept any responsibility for the consequences of its use.

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Peer reviewers: Dr Amit Bhargava, Director (Tariff), Uttar Pradesh Electricity Regulatory Commission; Shantanu Dixit, Group Coordinator, Prayas (Energy Group); Nitesh Tyagi, Deputy Manager, ABPS Infrastructure Advisory Limited; and Kapardhi Bharadwaj, Programme Associate, CEEW.

Cover image: istock

Organisations: **Council on Energy, Environment and Water**

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About CEEW

The Council on Energy, Environment and Water (CEEW) is one of South Asia's leading not-for-profit policy research institutions. The Council uses data, integrated analysis, and strategic outreach to explain – and change – the use, reuse, and misuse of resources. The Council addresses pressing global challenges through an integrated and internationally focused approach. It prides itself on the independence of its high-quality research, develops partnerships with public and private institutions, and engages with the wider public.

In 2018, CEEW once again featured across nine categories in the “2017 Global Go To Think Tank Index Report”, including being ranked for the fifth year in a row as South Asia's top think tank (14th globally) with an annual operating budget of less than USD 5 million. In 2016, CEEW was also ranked second in India, fourth outside Europe and North America, and 20th globally out of 240 think tanks, as per the ICG Climate Think Tank's standardised rankings. In 2013 and 2014, CEEW was rated as India's top climate change think tank as per the ICG standardised rankings.

In over eight years of operation, The Council has engaged in 200 research projects, published well over 130 peer-reviewed books, policy reports, and papers, advised governments around the world nearly 500 times, engaged with industry to encourage investments in clean technologies and improve efficiency in resource use, promoted bilateral and multilateral initiatives between governments on more than 60 occasions, helped state governments with water and irrigation reforms, and organised nearly 250 seminars and conferences.

The Council's major projects on energy policy include India's largest energy access survey (ACCESS); the first independent assessment of India's solar mission; the Clean Energy Access Network (CLEAN) of hundreds of decentralised clean energy firms; India's green industrial policy; the USD 125 million India–US Joint Clean Energy R&D Centres; developing the strategy for, and supporting activities related to, the International Solar Alliance; modelling long-term energy scenarios; energy subsidies reform; energy storage technologies; India's 2030 Renewable Energy Roadmap; clean energy subsidies (for the Rio+20 Summit); clean energy innovations for rural economies; community energy; and renewable energy jobs, finance, and skills.

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The Council's major projects on water governance and security include the 584-page National Water Resources Framework Study for India's 12th Five Year Plan; irrigation reform for Bihar; Swachh Bharat; supporting India's National Water Mission; collective action for water security; mapping India's traditional water bodies; modelling a water-energy nexus; circular economy of water; participatory irrigation management in South Asia; domestic water conflicts; modelling decision-making at the basin level; rainwater harvesting; and multi-stakeholder initiatives for urban water management.

About the Authors



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Prateek is currently engaged in the Council's power sector work programme in Uttar Pradesh. Working out of the Council's Lucknow office, his focus is on shaping a responsive consumer base, institutionalising reforms in utilities, and optimising power procurement and retail tariff structures in Uttar Pradesh.

He has been engaging with state utilities, the Forum of Regulators, and various electricity regulatory commissions to understand their operations, the role of regulators, and the governance of the sector as a whole.

Prateek has been actively tracking power sector reforms and exploring cross-linkages between energy, environment, and water. He envisages the Indian power sector to be Clean, Affordable, and Transparent (CAT) by 2030. He holds an MBA in Power Management from the University of Petroleum and Energy Studies, Dehradun, and an undergraduate degree in Power System Engineering.



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An engineer by training, Karthik leads the Council's work on the power sector. His research focus includes the operational reform of distribution companies in India, and the competitiveness of various power generation sources.

In recent years, Karthik has led an independent effort to assess greenhouse gas emissions from the industrial sector and improve transparency in reporting. He has also had an integral role in the establishment of the GHG Platform - India. Karthik has also led a first-of-its-kind evaluation of the impact of industrial policies on the renewable energy sector in India.

He supports ongoing work on the drivers of energy efficiency uptake in industry, and the evaluation of energy access indicators for rural Indian households.

Karthik holds a master's degree in Public Policy from the Lee Kuan Yew School of Public Policy, National University of Singapore. He also holds an undergraduate degree in Civil Engineering and an M.Tech in Infrastructure Engineering from the Indian Institute of Technology, Madras.

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List of Abbreviations

ARR	Annual Revenue Requirement
BST	Bulk Supply Tariff
CTU	Central Transmission Utility
DERC	Delhi Electricity Regulatory Commission
GERC	Gujarat Electricity Regulatory Commission
GT Periphery	Generation – Transmission Periphery
HT	High Tension
ISTS Loss	Interstate Transmission System Loss
LT	Low Tension
MERC	Maharashtra Electricity Regulatory Commission
MOD	Merit Order Dispatch
MSEDCL	Maharashtra State Electricity Distribution Company Limited
MUs	Million Units
MYT	Multi-Year Tariffs
NHPC	National Hydroelectric Power Corporation
NTPC	National Thermal Power Corporation
O&M	Operations and Maintenance
PGCIL	Power Grid Corporation of India Limited
PPA	Power Purchase Agreement
PSU	Power Sector undertaking
STU	State Transmission Utility
TD Periphery	Transmission - Distribution Periphery
TERC	Telangana State Electricity Regulatory Commission
TNERC	Tamil Nadu Electricity Regulatory Commission
TSERC	Telangana State Electricity Regulatory Commission
TSSPDCL	Telangana State Southern Power Distribution Company Limited
UGVCL	Uttar Gujarat Vij Company Limited
UPERC	Uttar Pradesh Electricity Regulatory Commission
UPPCL	Uttar Pradesh Power Corporation Limited

1. Background

For distribution companies (discoms) selling directly to consumers, the power purchase cost accounts for 75–80 per cent of the total cost of supply. Discoms source their power requirement from a mix of long-term and short-term sources in order to meet consumer demand in their licence areas. These sources can be categorised broadly into two: those that are connected to the transmission system through the interstate network (and from there to the state transmission system), and those that connect directly to the intrastate network (or state transmission system). In most cases, power-generating sources that are owned by the public sector undertakings (PSUs) of the central government—for example, the National Thermal Power Corporation (NTPC), National Hydroelectric Power Corporation (NHPC)—supply to two or more states as they are allocated in that manner, and they also connect through the Central Transmission Utility (CTU) to the interstate network. Generation stations owned by a state invariably connect through the State Transmission Utility (STU) (or state transmission system), and in most cases supply only to discoms within the state. Privately owned generation stations, depending on their size and power purchase agreements (PPAs), could supply to multiple states or to utilities only within the state; as a result, they can connect either at the CTU or STU level.

Transmission charges and losses are accounted for through the energy balance, based on the quantum of power flowing through interstate and intrastate transmission lines. While intrastate transmission charges and losses are applicable on all the power procured, it would seem appropriate to levy interstate losses on the power that actually traverses only the interstate network. The methodology used for calculating losses on the interstate network has been changed in recent years, and it has been acknowledged that this methodology is complex. Nevertheless, it has been agreed upon, and interstate losses have been established. However, there is not much clarity on whether interstate losses must be levied on all—or only some—of the electricity procured by a discom.

Uttar Pradesh is particularly of interest in this exercise. Uttar Pradesh Power Corporation Limited (UPPCL) procures power on behalf of five state-owned utilities in the state. The Bulk Supply Tariff (BST)—the rate at which UPPCL supplies power to these discoms—is contingent on the total power procured and the total losses incurred. Higher losses imply higher power procurement (for a given level of requirement at the state periphery) and hence a higher BST. This raises the question of whether the current practice needs to be reviewed, since the additional cost associated with higher losses is passed on to consumers. The analysis below highlights the need for clarity in the practice of levying interstate transmission losses on the entire quantum of power purchased and quantifies the overall financial impact of current accounting practices.

2. Levy of Interstate Transmission Losses in Other States

To get a sense of the practices being followed in various states, the tariff orders of Uttar Pradesh and five other states were studied. It was observed that only one state levies interstate transmission losses on the total energy procurement, and five states levy losses only on the quantum procured from interstate sources.

The table below summarises the practices of the states being investigated. The details of the accounting practices of each state have subsequently been illustrated, based on the reporting in their respective Annual Revenue Requirement (ARR) filings.

Table 1: Practices in each of the states

Sl. No.	State	Interstate losses levied on total power, or only on interstate purchased quantum
a.	Maharashtra	Levied only on interstate purchased quantum
b.	Tamil Nadu	Levied only on interstate purchased quantum
c.	New Delhi	Levied only on interstate purchased quantum
d.	Telangana	Levied only on interstate purchased quantum
e.	Gujarat	Levied only on interstate purchased quantum
f.	Uttar Pradesh	Levied on total power procured/total energy requirement

Source: CEEW analysis

- a) **Maharashtra:** In this state, interstate transmission system (ISTS) losses are levied only on the interstate purchased quantum. This is depicted in Table 2 below, where interstate losses (in percentage) and the interstate quantum (in millions of units—MUs) have been circled.

Table 2: Interstate transmission system loss adjustment in Maharashtra

Energy balance for the third control period approved by MERC					
Particulars	Units	FY 2016 - 17	FY 2017 - 18	FY 2018 - 19	FY 2019 - 20
LT sales	MU	60,624	64,294	68,314	72,713
HT sales	MU	24,524	25,575	26,674	27,823
HT and renewable open access credit	MU	420	420	420	420
Sales to open access consumers (conventional)	MU	6,165	6,412	6,668	6,935
Total sales to consumers	MU	91,733	96,701	1,02,076	1,07,890
Distribution loss	%	17.76%	16.26%	14.76%	13.26%
Distribution loss	MU	18,872	17,941	16,946	15,876
Total energy available for sale at 33kV	MU	1,10,606	1,14,642	1,19,023	1,23,766
Energy injected and drawn at 33kV	MU	458	458	458	458
Net energy available for sale at 33kV	MU	1,10,147	1,14,184	1,18,564	1,23,308
Sales at 66 kV level	MU	195	203	212	221
Sales at 110 kV/132 kV level	MU	3,018	3,148	3,283	3,424
Sales at 220 kV/44 kV level	MU	2,868	2,991	3,119	3,254
Net energy requirement at T<>D periphery	MU	1,16,228	1,20,525	1,25,179	1,30,207
Intrastate transmission loss	%	3.92%	3.92%	3.92%	3.92%
Intrastate transmission loss	MU	4,742	4,917	5,107	5,312

Energy balance for the third control period approved by MERC					
Particulars	Units	FY 2016 - 17	FY 2017 - 18	FY 2018 - 19	FY 2019 - 20
Energy requirement at G<>T periphery	MU	1,20,970	1,25,443	1,30,286	1,35,519
Less: input for OA consumption	MU	6,826	7,099	7,383	7,679
Net energy requirement at G<>T periphery	MU	1,14,144	1,18,343	1,22,902	1,27,841
Power purchase quantum from intrastate sources	MU	81,573	87,001	90,932	94,627
Power purchase quantum from intrastate sources at Maharashtra periphery	MU	32,571	31,342	31,970	33,214
Interstate losses	%	3.66%	3.66%	3.66%	3.66%
Power purchase quantum from interstate sources	MU	33,807	32,531	33,183	34,474
Total power purchase quantum payable	MU	1,15,380	1,19,533	1,24,116	1,29,101

Source: - Recreated from Maharashtra Electricity Regulatory Commission, Case No. 48 of 2016, Order dated 3 November 2016, p. 230 and table 5-19.

- b) **Tamil Nadu:** In Tamil Nadu, ISTS losses are being levied only on the interstate purchased quantum. This is depicted in Table 3 below, with interstate losses (in percentage) and the interstate quantum (in MUs) circled.

Table 3: ISTS loss adjustment in Tamil Nadu

Energy balance approved by the Commission after true-up for FY 2011 - 12 to FY 2015 - 16							
Sl	Particulars	Unit	FY 2011 - 12	FY 2012 - 13	FY 2013 - 14	FY 2014 - 15	FY 2015 - 16
1	Total sales	MU	53,937.87	51,742.99	59,119.91	64,760.14	67,863.00
2	Additional power for Kadamparai	MU	21	33	0	9	1
3	Total energy required	MU	53,958.87	51,775.99	59,119.91	64,769.14	67,864.00
4	T&D losses	%	17.20%	16.80%	16.40%	16.00%	15.60%
5	T&D losses	MU	11,208.85	10,454.77	11,597.69	12,336.98	12,543.58
6	Energy required at state boundary	MU	65,167.72	62,230.75	70,717.59	77,106.12	80,407.58
7	PGCIL losses (only on interstate purchase quantum)	%	4.88%	4.35%	3.98%	3.57%	3.04%

Energy balance approved by the Commission after true-up for FY 2011 - 12 to FY 2015 - 16							
Sl	Particulars	Unit	FY 2011 – 12	FY 2012 - 13	FY 2013 - 14	FY 2014 - 15	FY 2015 - 16
8	PGCIL losses (only on interstate purchase quantum)	MU	1,440.99	1,239.81	1,399.02	1,453.67	1,471.49
9	Power purchase requirement	MU	66,608.71	63,470.56	72,116.61	78,559.79	81,879.07

Source: Recreated from TamilNadu Electricity Regulatory Commission, TP No. 1 of 2017, Order dated 11 August 2017, p. 89. and table 3-9.

- c) **Delhi:** In this state, the ISTS losses are being levied only on the interstate purchased quantum. This has been depicted in Table 4 below, with interstate losses (in percentage) and the interstate quantum (in MUs) circled.

Table 4: ISTS loss adjustment in Delhi

Commission approved - energy balance for FY 2018 - 19			
Sr. No.	Particulars	Unit	Approved
Energy availability			
1	Total energy available (excluding BTPS, SGS and RE plants)	MU	11,605.00
2	Interstate transmission losses	%	1.65%
		MU	191.48
3	Energy available from BTPS, SGS and RE plants	MU	2,379.00
4	Energy available at state transmission periphery (1-2+3)	MU	13,792.52
Energy requirement			
5	Energy sales	MU	12,183.53
6	Distribution loss	%	10.19%
		MU	1,382.36
7	Energy requirement at distribution periphery	MU	13,565.89
8	Intrastate transmission loss	%	0.98%
		MU	134.26
9	Energy requirement at state transmission periphery (7+8)	MU	13,700.15
10	Surplus/(deficit) energy (4-9)	MU	92.36

Source: - Recreated from Delhi Electricity Regulatory Commission's, Petition No. 68 / 2017, Order dated 28 March 2018; p. 347 and table 193.

- d) **Telangana:** In this state, ISTS losses are being levied only on the interstate purchased quantum. This has been depicted in Table 5 below, with interstate quantum (in MUs) circled.

Table 5: ISTS loss adjustment in Telangana

SPDCL - Energy requirement approved by the Commission for FY 2018 - 19 (MU)						
Voltage	Loss (%)	Sales (MU)	LT	11 kV	33 kV	132 kV
LT	5.00%	20,779.61	21,873.27	22,844.15	23,793.51	24,552.17
11 kV	4.25%	5,111.63		5,338.51	5,560.37	5,737.67
33 kV	3.99%	4,074.23			4,243.54	4,378.85
132 kV	3.09%	4,135.12				4266.97
Total		34,100.59	21,873.27	28,182.66	33,597.43	38,935.66
% loss upto said voltage			5.00%	8.13%	10.81%	12.42%
CGS and CSPDCL (MU)		16,175.73				
ISTS loss (%)		3.78%				
Distribution loss (MU)		3631.96				
Transmission loss (MU)		1,203.11				
PGCIL & CSPTCL loss (MU)		611.48				
Total power purchase requirement		39,547.14				

Source: Recreated from Telangana State Electricity Regulatory Commission, OP No.21 of 2017, Order dated 23 March 2018; p. 63 and table 3.3.

- e) **Gujarat:** In this state, ISTS losses are being levied only on the interstate purchased quantum. This has been depicted in Table 6 below, with interstate quantum (in MUs) circled.

Table 6: ISTS loss adjustment in Gujarat

Energy balance for FY 2016 - 17 to FY 2020 - 21							
Sr. No.	Particulars	Unit	2016 - 17	2017 - 18	2018 - 19	2019 - 20	2020 - 21
1	Energy sales	MUs	18,081	18,946	19,836	20,752	21,698
2	Distribution losses	MUs	2,009	2,082	2,155	2,229	2,304
		%	10.00%	9.90%	9.80%	9.70%	9.60%
3	Energy requirement	MUs	20,090	21,027	21,991	22,982	24,003
4	Transmission losses	MUs	804	842	881	920	961
	Transmission losses	%	3.85%	3.85%	3.85%	3.85%	3.85%
5	Total energy to be input to transmission system	MUs	20,895	21,869	22,871	23,902	24,964
6	Pooled losses in PGCIL system	MUs	336	336	336	336	336
7	Total energy requirement	MUs	21,231	22,206	23,207	24,238	25,300

Source: Recreated from Gujarat Electricity Regulatory Commission, Case No. 1622 / 2016, Order dated 31 March 2017 ; p. 125 and table 5.34.

3. The Case of Uttar Pradesh

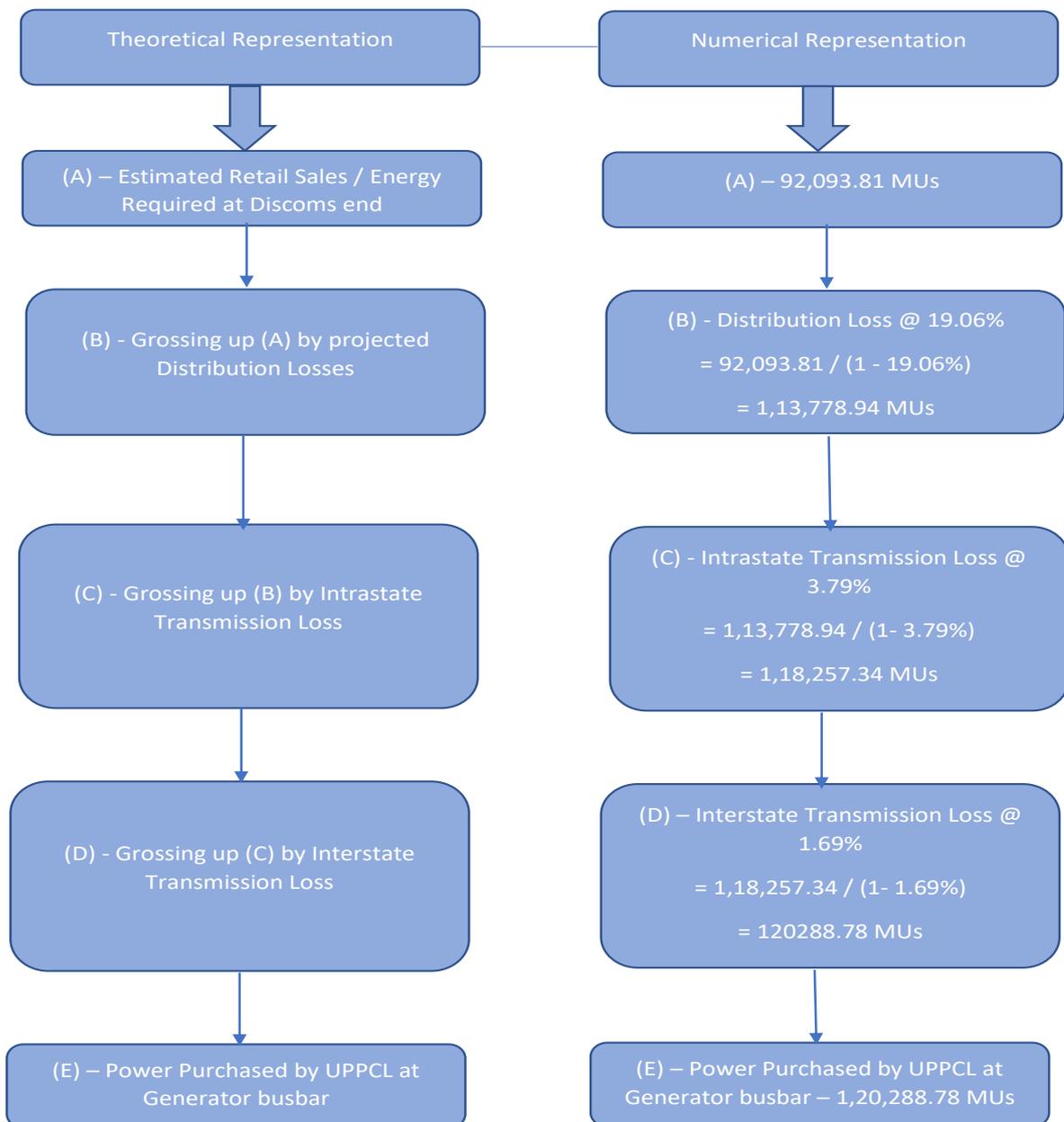
Computation of the power purchase cost payable by discoms as per the BST—the present vs proposed approach

Present approach

The Uttar Pradesh Electricity Regulatory Commission considers distribution losses a controllable parameter, and therefore any losses attributed to the underachievement of the distribution loss target is not allowed to be passed on to the end consumer. During the truing-up of the ARR for previous years, the allowable power purchase quantum is computed by grossing up the actual energy sales with the approved distribution loss (typically a target for a financial year) or the actual loss level, whichever is lower. Intra- and interstate transmission losses are then further added in order to calculate the power supply that is required at the generating station busbar. The BST is then calculated as the total cost incurred in procuring this power, divided by the total number of units available at the state periphery. Clearly, a higher level of losses at the interstate level will result in the procurement of a higher number of units, and ultimately in a higher BST for each of the discoms within the state.

The present approach is depicted below with the help of the flow chart, and illustrated for the power requirement in the most recent filing of UPPCL (consolidated for five state-owned discoms), for FY 2017 - 18.

Figure 1: Present Approach followed by UPERC in computation of total power purchase requirement



Note: Figures/numbers used in the numerical representation are for FY 2017/18 (sourced from the Uttar Pradesh Electricity Regulatory Commission's Multi-Year Tariff (MYT) Order dated 30 November 2017).

The methodology used for computing ISTS losses has been reproduced below, from the Uttar Pradesh Electricity Regulatory Commission's Tariff Order dated 30 November 2017, p. 85. This is for the trued-up year 2014 - 15:

4. 2.15 Accordingly, the Commission has computed the BST based on the UPPCL Balance sheet for FY 2014-15. The Table below summarises the energy balance, power purchase quantum and cost submitted by the Petitioner and as approved by the Commission at UPPCL level and the Bulk Supply Tariff for FY 2014-15:

Table 4-5: ENERGY BALANCE AND BULK SUPPLY TARIFF APPROVED FOR FY 2014-15

Particulars	Unit	Tariff Order	Petition	Actual / Audited	Approved upon Truing up
Power Purchase by UPPCL at Generator Bus	MU	87,178.35	83,045.51	87,571.23	87,571.75
Inter-State Transmission Losses	MU	1,385.65	2,304.74	2,429.86	2,429.85
Inter-State Transmission Losses	%	1.65%	2.88%	2.88%	2.88%
Intra-State Transmission Losses	MU	3,199.94	3,048.24	3,214.36	3,214.36
Intra-State Transmission Losses	%	3.67%	3.67%	3.67%	3.67%
Energy available at Discom End	MU	82,592.76	77,692.53	81,927.02	81,927.02
Power Purchase Cost (including PGCIL charges) for UPPCL	Rs crore	31,668.16	34,941.29	36,855.31	36,855.31
Power Purchase Cost per unit at Generator Bus	Rs /kWh	3.63	4.21	4.21	4.21
O&M Expenses of UPPCL	Rs crore		176.41		0.00
Allowable Power Purchase Cost at discom end after transmission losses	Rs crore		35,117.70		36,855.31
Power Purchase Cost per unit at discom end (BST) after transmission losses	Rs /kWh	3.83	4.52	4.50	4.50

4.2.16 It can be seen from the above that, power purchase approved by the Commission in Tariff Order for FY 2014-15 was Rs. 3.83 / kWh. The Petitioners have claimed the BST as Rs. 4.52 / kWh, against which while undertaking the Truing up of FY 2014-15, the Commission has allowed the BST as Rs. 4.50 / kWh.

Source: Uttar Pradesh Electricity Regulatory Commission's MYT Tariff Order dated 30 November 2017.

It can be observed from the above table that for FY 2014-15 (trued-up), when interstate transmission losses at the rate of 2.88% are considered, the total energy requirement is 87,571.75 MU (circled) at the generator busbar.

Problem Statement - Dichotomy and precedence

The present approach, is seemingly counterintuitive, as there is no clear directive on how interstate transmission losses must be levied. More importantly, the practice used by state utilities must be consistent with the process and accounting that Power Grid Corporation of India (PGCIL) uses to calculate regional losses. What is clear is that if all states adopt the practice of charging interstate losses for their cumulative procurement, then there is likely to be an overestimation of losses, as it is theoretically impossible for all the electricity supplied by utilities in the country to have traversed the interstate transmission network. For states like Uttar Pradesh, where the number of consumers belonging to the lowest economic strata is likely to increase rapidly¹², this method of accounting all losses will result in higher costs being passed on to some of the poorest consumers in the country.

¹ '24x7 Power for All' programme Uttar Pradesh, p. i

² 'Guidelines for Pradhan Mantri Sahaj Bijli Har Ghar Yojana (Saubhagya)' programme Uttar Pradesh, p.29

A clear precedent to the issue being raised in this submission can be found in Order O.P. No. 10 of 2016³ from the Telangana State Regulatory Commission. This states that in the case of a central generation station (operated by NTPC), where the entire power is supplied to the state of Telangana, the connection must be made at the STU level and not at the CTU level in order to reduce the burden of the losses incurred in the PGCIL network and also the Point of Connection (PoC) charges levied on the power that flows through the CTU domain.

Quantifying the impacts

It is therefore important to understand the potentially higher costs that consumers in Uttar Pradesh (UP) incur as a result of the approach used to calculate interstate transmission losses. To present a counterview, we consider a scenario where interstate transmission losses are applied only to that quantum of power procured from interstate sources, and calculate the additional burden—first, as the total additional units of electricity available, and, second, by superimposing the power procurement cost (by replacing high-cost sources as per merit order dispatch) on this quantum to calculate the financial impact. This is discussed in detail below with an illustration using the data of the state discoms and UPPCL for the MYT period from FY 2017 - 18 to FY 2019 - 20, as shown in the below table.

Notes (N) and assumptions (A):

1. N: Based on trends from the last seven years, the total power available to UPPCL comprises:
 - Power from interstate sources – 43 %
 - Power from intrastate sources – 57 %⁴

Table 8: Inter- vs intrastate ratios⁵

Ratios	FY 2017 – 18	FY 2018 - 19	FY 2019 - 20
Interstate source	43%	44%	48%
Intrastate source	57%	56%	52%

Source: CEEW analysis

2. N: All data has been taken from the Uttar Pradesh Electricity Regulatory Commission’s Tariff Order, dated 30 November 2017,
3. N: Normative distribution losses have been considered in the calculation, the same have been considered by the commission.
4. N: MOD - merit order dispatch.
5. N: The impact was quantified by calculating the difference between a) the total energy requirement computed in the commission's order for that particular year, and b) the energy requirement as per the proposed methodology.
6. A: To quantify the impact of ISTS losses on total power procurement, we have considered the marginal power procurement cost (of the high-cost sources as per merit order dispatch) of that financial year.

³ Telangana State Electricity Regulatory Commission (TERC) Order O.P. 10 of 2016, Order dated 30 July, 2016 accessed here:

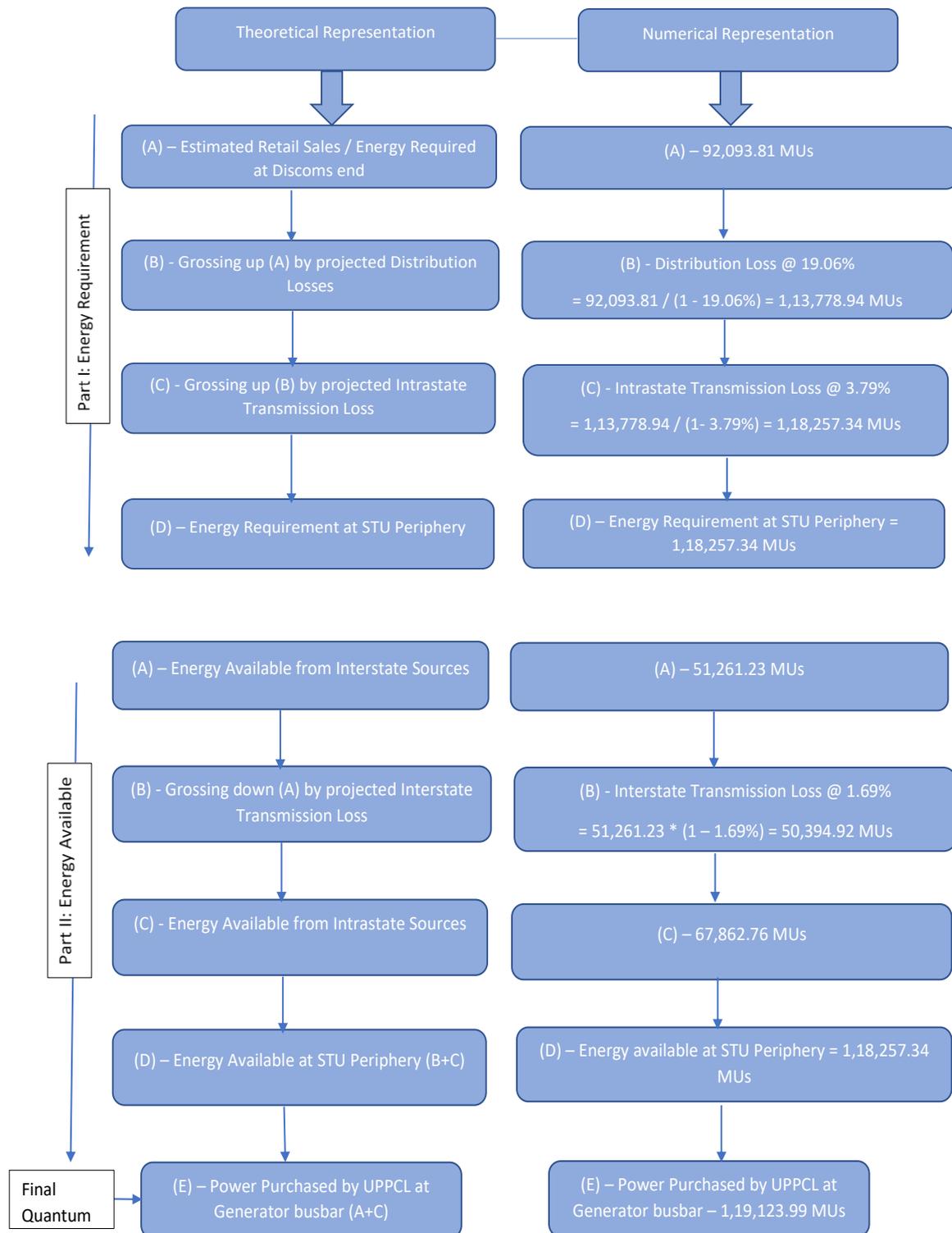
http://www.tserc.gov.in/file_upload/uploads/Orders/Commission%20Orders/2016/orderinOPNo10of2016.pdf

⁴ Details provided as Annexure I.

⁵ All these ratios are based on the availability of power from the various stations and not on the actual quantum procured from each of the stations.

Also, the proposed approach is depicted in the flow chart below:

Figure 2: Proposed approach for calculation of total power purchase requirement



Note: Figures/numbers used in the numerical representation above are for FY 2017 - 18.

Source: Uttar Pradesh Electricity Regulatory Commission's MYT Tariff Order dated 30 November 2017.

Table 9: Quantifying the impact of interstate transmission losses on total power procurement

Sl. No.	Particulars	Formula	Unit	MYT Period		
				FY 2017 - 18	FY 2018 - 19	FY 2019- 20
Energy requirement at the intrastate transmission periphery (or STU periphery)						
1	Sales at discom level	A	MU	92,093.81	118,163.19	144,871.94
2	Distribution losses (approved)	B	%	19.06	15.91	11.96
3	Quantum of distribution losses at discom end	C=D-A	MU	21,681.89	22,361.73	19,680.47
4	Energy requirement at discom end	$D = A / (1 - B)$	MU	1,13,775.70	1,40,524.92	164,552.41
5	Intrastate transmission losses	E	%	3.79	3.79	3.79
6	Quantum of intrastate transmission losses	F=G-D	MU	4,481.97	5,535.70	6,482.21
7	Energy requirement at the STU periphery	$G=D / (1-E)$	MU	1,18,257.67	1,46,060.62	171,034.62
Energy availability at STU periphery						
8	Total energy available from interstate sources (excluding intrastate sources)	H	MU	51,261.23	64,963.94	82,678.29
9	Interstate transmission losses	I	%	1.69	1.41	1.41
10	Quantum of interstate transmission losses	J=H*I	MU	866.31	915.99	1,165.76
11	Energy available from intrastate sources	K	MU	67,862.76	82,012.67	89,522.09
12	Energy available at the STU periphery	L=H-J+K	MU	1,18,257.68	1,46,060.62	171,034.62
Energy requirement at the interstate transmission periphery (or CTU periphery)						
13	Energy requirement at the CTU periphery	M=H+K	MU	119,123.99	146,976.61	172,200.38
14	Surplus/(deficit) energy	N=L-G	MU	0.00	0.00	0.00

Source: CEEW analysis

As can be seen from the above calculations, two different values of “energy requirement at the CTU periphery” have been derived: Table 9 (above) and Table 10 (below). They are circled in each table. The impact of the two can be quantified as:

Table 10: Impact calculation

Sl. No.	Particulars	Unit	Derivation	FY 2017/18	FY 2018/19	FY 2019/20
1	Total energy requirement computed in the commission's order	MU	A	120,288.75	148,145.64	173,005.82
2	Total energy requirement computed as per the above methodology	MU	B	1,19,123.99	1,46,976.61	1,72,200.38
3	Difference/extra interstate transmission losses allowed	MU	C = A - B	1,164.76	1,169.03	805.44
4	Average power procurement cost (as per the merit order dispatch stack)	INR/kWh	D	5.76	4.73	6.09
5	Impact of interstate transmission losses (approx.) *	INR Crore	E = D*C/10	671.38	552.72	490.14

Source: CEEW analysis

*The financial impact figure is open for comments from the discoms/UPPCL.

Approximately INR 500 crore can be saved with the adoption of this approach for FY 2019 - 20. The reduction in the power purchase cost of the UPPCL would be in the range of 0.75–1 per cent of the total power purchase cost for the year, and the benefits could be passed on to the end consumers.

4. The Way Forward

The duality of the methodology used by states in accounting for the levy of interstate losses is evident. Orders and rulings by regulatory commissions on the matter also suggest that both practices are endorsed by various regulators. However, there are financial consequences for the utility, based on their chosen methodology, and this ultimately affects the end-user price as well. Clarity must be established on which methodology ought to be followed, and the reasons for following it. Once this is done, the methodology could be consistently followed by discoms across the country, with appropriate and permitted exceptions.

In order to arrive at a more accurate estimate of the quantum of energy sourced from intrastate and interstate sources, the Uttar Pradesh Electricity Regulatory Commission should direct discoms—specifically UPPCL—to scrutinise their procurements from various stations and designate them as sourced from interstate or intrastate generators. It is imperative that UPPCL provides a clear account of the exact amount of energy procured from specific stations. This illustrative exercise uses an estimate that is based on the amount of energy available from each of the stations, and not the actual quantum procured from these stations.

The procurement breakdown in itself will help to indicate if UPPCL is indeed sourcing power from the cheapest possible sources for the public discoms of the state, given various network and operational constraints.

Source: CEEW analysis

Impact estimation for a seven-year period

An exercise was done for seven years—from FY 2012 - 13 to FY 2018 - 19—and it was estimated that approximately INR 3,800 crores could have been saved by the levy of interstate transmission losses only on the power procured from interstate generation sources.

Bibliography

Maharashtra Electricity Regulatory Commission, Case No. 48 of 2016, Order dated 3 November 2016, p. 230 and table 5-19.

TamilNadu Electricity Regulatory Commission, TP No. 1 of 2017, Order dated 11 August 2017, p. 89. and table 3-9.

Delhi Electricity Regulatory Commission's, Petition No. 68 / 2017, Order dated 28 March 2018; p. 347 and table 193.

Telagana State Electricity Regulatory Commission, OP No.21 of 2017, Order dated 23 March 2018; p. 63 and table 3.3

Telangana State Electricity Regulatory Commission (TERC) Order O.P. 10/2016, Order dated 30 July 2016

Gujarat Electricity Regulatory Commission's, Case No. 1622 / 2016, Order dated 31 March 2017; p. 125 and table 5.34.

Uttar Pradesh Electricity Regulatory Commission, Multi-Year Tariff (MYT) Order dated 30 November 2017.

Bifurcating the power purchase into interstate and intrastate sources

Notes (N) and assumptions (A):

1. N: A total of eight years has been considered: three trued-up years (FY 2013 to FY 2015); three non-trued-up years (FY 2016 to FY 2018); one current year (FY 2019); and one ensuing year (FY 2020).
2. N: All data has been taken from the tariff orders issued by Uttar Pradesh Electricity Regulatory Commission
3. A: The author has made a best estimate of interstate:intrastate ratios. However, this ratio may change after the submission of actual data from UPPCL.
4. A - Once the interstate: intrastate ratio is calculated, the same is applied to the power purchase quantum for the trued-up years. For non-trued-up years, the quantum provided in the tariff orders has been taken.

Annex I: Bifurcating the power purchase among interstate and intrastate sources

Sl. No.	Generating stations	Trued-up year	Trued-up year	Non-trued-up year	Non-trued-up year	Non-trued-up year	Current year	Ensuing year
		FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	FY 2019-20
		MUs available	MUs available	MUs available	MUs available	MUs available	MUs available	MUs available
	Intrastate sources							
1	State thermal	25,127	27,084.17	28,482.20	38,661.16	27,778.38	31,689.56	34,315.13
2	State hydro	1,485	1,484.52	1,489.29	1,195.48	1,009.38	1,009.38	1,009.38
3	Rosa*2 (2 units)	5,307	7,748.40	8,131.04	7,891.88	7,652.74	8,131.04	8,131.04
4	Anpara C	5,918	5,781.60	7,015.01	7,015.01	7,453.45	7,453.45	7,453.45
5	Bajaj Hindustan	2,101	2,323.41	2,982.12	2,806.70	606.96	0	
6	Bara		2,289.51	1,115.24	7,395.39	9,909.82	12,572.16	12,572.16
7	Captive and Cogen/Solar	2,830	2,939.00	2,949.00	2,949.00	3,412.33	3,412.33	3,412.33
8	NTPC Meja	0	0	0	0		2,419.60	6,855.53
9	Lalitpur	0	0	8,021.97	10,107.68	10,625.86	13,895.35	13,895.35
10	Vishnu Prayag	1,752.00	1,684.06	1,622.83	1,622.83	2,082.12	2,082.12	2,296.45

Sl. No.	Generating stations	Trued-up year	Trued-up year	Non-trued-up year	Non-trued-up year	Non-trued-up year	Current year	Ensuing year
		FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	FY 2019-20
		MUs available	MUs available	MUs available	MUs available	MUs available	MUs available	MUs available
	Total intrastate sources	44,520.00	51,334.67	61,808.7	79,645.13	70,531.04	82,664.99	89,940.82
	Interstate sources							
11	Central thermal	25,695.00	27,134.32	29,723.59	29,082.92	26,085.94	25,887.38	26,909.68
12	Central hydro	3,006.00	3,480.12	3,238.05	3,287.05	3,411.04	4,350.08	5,194.80
13	Nuclear	1,962.00	2,142.06	2,269.82	2,338.50	2,196.68	2,456.41	3,089.91
14	Nathpa Jhakri	1,365.00	1,378.23	1,386.86	1,383.25	1,265.14	1,265.14	1,265.14
15	Tala Power	1,241.00	1,849.13	1,811.03	1,808.87	1,343.93	1,679.91	2,587.06
16	Tehri Hydro	350.00	281.72	358.46	354.25	86.72	119.97	119.97
17	IGSTPP Jhajhar	522.00	514.41	569.60	568.94	529.65	696.91	836.30
18	Koteshwar	160.00	159.89	157.68	157.68	173.97	869.87	1,130.83
19	Karcham Wangtoo	0.00	522.29	518.63	518.63	1,135.18	1,261.31	1,513.57
20	Srinagar	0.00	876.00	2,081.38	2,081.38	3,685.77	3,685.77	3,685.77
21	Sasan	0.00	0.00		10,186.13	483.55	967.10	967.10
22	Teesta	0.00	0.00		0.00	1,270.90	2,224.08	2,541.80
23	TRN Energy	0.00	0.00		0.00	4,782.96	6,377.28	6,377.28
24	KSK	0.00	0.00		0.00	2,529.89	2,688.01	2,688.01
25	MB Power	0.00	0.00		0.00	1,995.97	2,423.67	2,423.67
26	RKM Power Gen	5,627.00	3,906.25	4,416.33	216.94	862.48	5,710.53	17,180.95
27	Inter-system exchange (IEX/bilateral)	0.00	0.00		0.00	553.14	1,998.54	3,641.04
28	Renewable energy	0.00	0.00	351.62	351.62	351.62	351.62	351.62
29	NVVNL Coal	0.00	0.00		0.00	374.61	270.06	324.07

Sl. No.	Generating stations	Trued-up year	Trued-up year	Non-trued-up year	Non-trued-up year	Non-trued-up year	Current year	Ensuing year
		FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	FY 2019-20
		MUs available	MUs available	MUs available	MUs available	MUs available	MUs available	MUs available
30	Rampur	40,112.00	42,428.42	47,064.31	52,517.42	53,276.76	65,480.66	83,065.00
	Total interstates sources	25,695.00	27,134.32	29,723.59	29,082.92	26,085.94	25,887.38	26,909.68
31	Total power purchase available	84,632.00	93,763.09	1,08,873.01	1,32,162.55	1,23,807.8	1,48,145.65	1,73,005.82
	% Interstate sources	47%	45%	43%	40%	43%	44%	48%
	% Intrastate sources	53%	55%	57%	60%	57%	56%	52%
32	Total power purchase— calculated on proposed methodology	81,632.47	86,171.32	1,03,902.79	1,26,139.02	1,19,123.99	1,46,976.61	1,72,200.38
	% interstate sources	38,690.35	38,993.09	44,915.75	50,123.85	51,261.23	64,963.94	82,678.29
	% intrastate sources	42,942.12	47,178.23	58,987.04	76,015.17	67,862.76	82,012.67	89,522.09

Source: CEEW analysis

Annex II: Interstate: Intrastate ratio (average of seven years)

Ratios	FY 2013 - 14	FY 2014 - 15	FY 2015 - 16	FY 2016 - 17	FY 2017 - 18	FY 2018 - 19	FY 2019 - 20	Average
% Interstate sources	47%	45%	43%	40%	43%	44%	48%	44%
% Intrastate sources	53%	55%	57%	60%	57%	56%	52%	56%

Source: CEEW analysis

Formats for the adoption of the proposed approach

To enable the discoms to adopt this practice of determination of energy requirement, the format for calculating the energy balance both for the ensuing year and the truing-up year is provided in Annex III and IV, respectively.

Annex III: Consolidated energy balance and BST for the ensuing year

Format for calculating the consolidated energy balance for FY 20xx-xx				
Sl.No.	Particulars	Formula	Unit	Consolidated
Energy requirement at the intrastate transmission periphery (or STU periphery)				
1	Sales at discom level	A	MU	
2	Distribution losses (approved)	B	%	
3	Quantum of distribution losses at discom end	$C=D-A$	MU	
4	Energy requirement at discom end	$D = A / (1-B)$	MU	
5	Intrastate transmission losses	E	%	
6	Quantum of intrastate transmission losses	$F=G-D$	MU	
7	Energy requirement at the STU periphery	$G=D / (1-E)$	MU	
Energy availability at the STU periphery				
8	Total energy available from interstate sources (excluding intrastate sources)	H	MU	
9	Interstate transmission losses	I	%	
10	Quantum of interstate transmission losses	$J=H*I$	MU	
11	Energy available from intrastate sources	K	MU	
12	Energy available at the STU periphery	$L=H-J+K$	MU	
Energy requirement at the interstate transmission periphery (or CTU periphery)				
13	Energy requirement at the CTU periphery	$M=H+K$	MU	
14	Surplus/(deficit) energy	$N=L-G$	MU	

Bulk supply tariff for FY 20xx-xx

Sl. No.	Particulars	Formula	Unit	Consolidated
1	Energy requirement at the discom end	A	MUs	
2	Power purchase cost	B	INR Crore	
3	PGCIL interstate transmission charges	C	INR Crore	
4	Total power purchase cost (including PGCIL charges) for UPPCL	$D = B+C$	INR Crore	
5	Power purchase cost per unit at discom end (BST)	$E = D / A*10$	INR/unit	

Source: CEEW analysis

Annex IV: Consolidated energy balance and BST for true-up year (20xx-xx)

Format for consolidated energy balance for true-up of FY 20xx-xx				
Sl. No.	Particulars	Formula	Unit	Consolidated
Energy requirement at the intrastate transmission periphery (or STU periphery)				
1	Sales at discom level	A	MU	
2	Distribution losses (approved or actual, whichever is lower)	B	%	
3	Quantum of distribution losses at discom end	$C=D-A$	MU	
4	Energy requirement at discom end	$D = A / (1-B)$	MU	
5	Intrastate transmission losses	E	%	
6	Quantum of intrastate transmission losses	$F=G-D$	MU	
7	Energy requirement at the STU periphery	$G=D / (1-E)$	MU	
Energy availability at STU periphery				
8	Total energy available from interstate sources (excluding intrastate sources)	H	MU	
9	Interstate transmission losses	I	%	
10	Quantum of interstate transmission losses	$J=H*I$	MU	
11	Energy available from intrastate sources	K	MU	
12	Energy available at STU periphery	$L=H-J+K$	MU	
Energy requirement at interstate transmission periphery (or CTU periphery)				
13	Energy requirement at CTU periphery	$M=H+K$	MU	
14	Surplus/(deficit) energy	$N=L-G$	MU	

Bulk supply tariff for true-up FY 20xx-xx

Sl. No.	Particulars	Formula	Unit	Consolidated
1	Energy requirement at discom end	A	MUs	
2	Power purchase cost	B	INR Crore	
3	PGCIL interstate transmission charges	C	INR Crore	
4	Total power purchase cost (including PGCIL charges) for UPPCL	$D = B+C$	INR Crore	
5	Power purchase cost per unit at discom end (BST)	$E = D / A*10$	INR/unit	

Source: CEEW analysis

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LUCKNOW

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