



Charging Power Understanding Electricity Pricing and the Willingness to Pay for Electricity in India

To provide useful recommendations for future electricity-pricing debates, this project undertook a comprehensive literature review and interviews to examine and quantify the existing evidence on the Willingness to Pay (WTP) for electricity services in India. It compared these findings with the current electricity-pricing mechanisms to derive recommendations on future electricity pricing and subsidy policies.

Research Findings

For rural household consumers, the defining factor for a higher (or lower) rate of willingness to pay was the share of disposable income assigned to electricity as a service in the overall household income. Based on the surveys examined, the average calculated monthly income of rural households was ₹6,700. The expenditure on lighting was approximately 3% (₹200 a month) of the income. Further, rural households with unreliable or no electricity supply also bore an average 'coping cost' of ₹119 per month for kerosene, paraffin candles, etc.

Based on the review, most consumers expressed a **high willingness to pay for basic lighting services**. This data was primarily for stand-alone, off-grid solutions where alternatives did not exist. The **willingness to pay was found to drop for higher levels of service** as affordability became an issue. For instance, the WTP for Lighting+ services increases only by 12% from basic lighting services, whereas, it increases by 43% when transitioning from kerosene to electricity based lighting, see Figure 1.

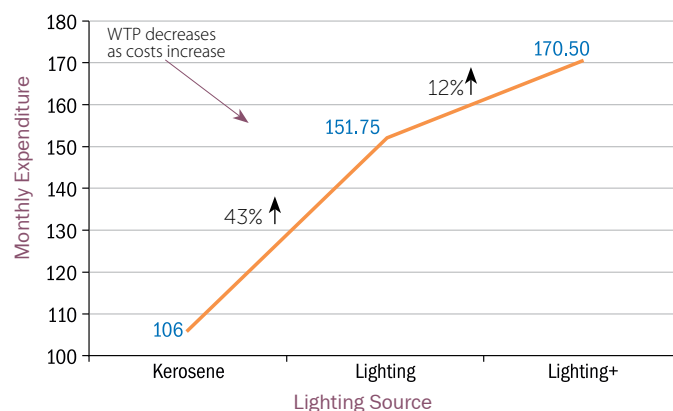


Figure 1 Average WTP: Rate of Increase

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Interestingly, in some cases consumers expressed lower willingness to pay for better grid-connected services. This appears to be due to a sense of consumer entitlement, leading to an **expectation of receiving electricity services at a nominal cost from the government**. If cost-reflective tariffs are to be charged, the expectation of the state as a low-cost / nearly free provider needs to be changed by:

- Helping consumers understand the true cost of supplying electricity
- Making electricity pricing of consumers more independent
- Making subsidy policies more transparent and better targeted



Discussions with the electricity sector regulators revealed that the **consumer's willingness to pay is not currently considered whilst setting tariffs**. Instead, pricing is done on a 'cost-to-serve' basis, using data provided by electricity distribution companies (discoms) and/or on studies undertaken by regulators. When these WTP findings were shared with sector stakeholders they agreed that **WTP assessments would be very relevant inputs for pricing if they were designed in consultation with the regulators**. This would enable evidence-based pricing decisions, better targeting of subsidies to needy consumer groups, and increase the ownership and acceptance of future pricing reforms and policies.

Bridging the Gap: The Case of MVNLT

To understand how consumer willingness to pay can contribute to closing the viability gap between cost of service and revenue for distribution companies, a discom in Uttar Pradesh (MVNLT¹) was chosen for analysis, as a number of WTP studies have been conducted in the State.

The estimated WTP range in Uttar Pradesh shows that the **domestic consumer's willingness to pay cannot**

¹ Madhyanchal Vidyut Vitran Nigam Ltd. is a government discom in Uttar Pradesh

be the sole contributing factor to reducing a discom's revenue gap. In the case of MVNLT, the per unit WTP for grid electricity expressed by lifeline category consumers, ₹3.33, was significantly lower (approximately 56%) than the approved average grid tariff of ₹5.16 for 2015–16. Therefore, based on the existing WTP assessments in the state, the per unit gap between the actual average cost of supply and realized revenues (for 2015–16) would not be "bridgeable" if WTP was the only factor considered.

Therefore, **other simultaneous measures are also required to reduce the gap**. These include:

- Significant **improvements in operational efficiency and reduction in AT&C losses**
- **Conversion of unmetred connections to metred ones**
- **Increase in the hours of supply**

In the case of MVNLT, after accounting for subsidies, a per unit gap of ₹1.98 between the average cost of supply and revenue in 2015–16 will still remain, see Table 1. If MVNLT can reduce its AT&C losses to below 11%², the revenue gap can be reduced significantly, effectively meeting 60% of the existing gap between average cost of supply and average revenue (row 4).

Table 1 Estimated Reduction in Gap for MVNLT, UP

	2013-14	2014-15	2015-16
Parameter	₹/kWh	₹/kWh	₹/kWh
1 Average Cost of Supply (ACS)	6.18	5.49	6.46
2 Average Revenue (without subsidy)	3.32	3.37	5.16
3 Gap (actual realized revenues + subsidy)	1.87	1.80	1.98
4 Gap after reduced AT&C Losses*	1.75	0.98	0.78
5 Gap after unmetred to metred	1.31	0.38	0.06
6 Gap after increased hours of supply	1.37	0.41	-0.09
7 % reduction in Gap	26.79%	77.31%	104.56%

Source: Power Finance Corporation Report on Performance of State Power Utilities, 2015

Note: * MVNLT's AT&C losses in 2013–14, 2014–15, and 2015–16 were 14.32%, 35.18%, and 21.03%, respectively.

The **conversion of existing unmetred connections to metred ones** can also enable discoms to recover nearly three times the revenue it gets from unmetred connections. In the current scenario, for 5 hours of supply, flat-rate charges recover only approximately ₹1.20 per unit, whereas, metred connections would recover ₹3.60 per unit—enabling a further 92% reduction in the gap (row 5).³

² This benchmark is based on DGVCL's performance standards (a discom in Gujarat), taking a realistic estimation of possible percentage reduction in AT&C losses.

³ Calculated WTP is ₹3.33 and it appears that consumers would be willing to pay ₹3.60 per unit if metres were installed.

Finally, increasing the hours of supply from say 5 to 10 hours a day, even at existing tariffs, will result in higher total revenues and contribute towards meeting the revenue gap. In MVVNL's case, this last measure resulted in neutralizing the gap between average cost of supply and revenue and the generation of a surplus (row 6 in Table 1).

Conclusion: When a number of technical-, policy-, and consumer-awareness measures are addressed in conjunction with tariff increases based on supply cost, affordability, and willingness to pay, then it is possible for distribution companies to recover the cost of electricity supply to rural domestic consumers.

Cross-subsidies and their Impact

To understand how cross-subsidies impact consumer categories and the discom's financial performance, a state-wise per unit average price comparison was done for consumer groups across 11 states in India (Figure 2).

The analysis shows the overall importance and impact of tariffs paid by major consumers on the viability of distribution companies; specifically, the high levels of cross-subsidy borne by commercial/industrial consumers and the low revenues recovered from agricultural consumers.

At the all-India level, agricultural consumers account for 23% of the total unit sales, while their contribution to

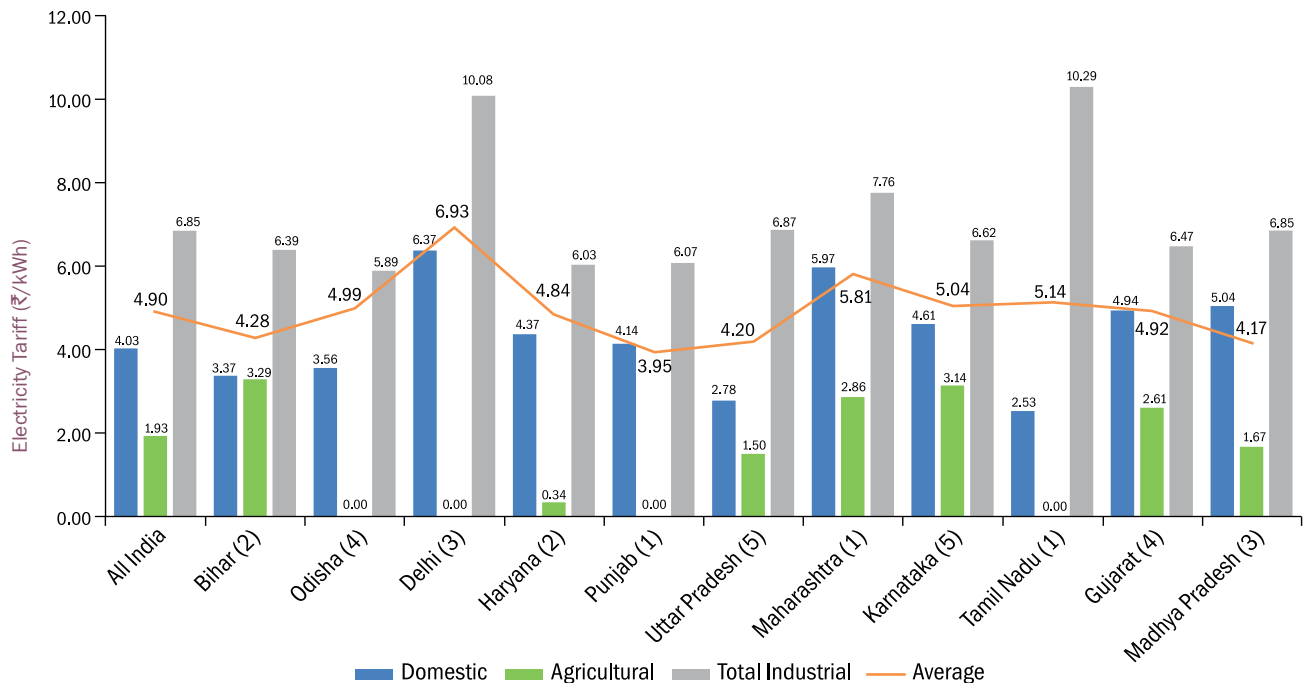


Figure 2 Calculated Average Per Unit Price

Source: Power Finance Corporation Report on Performance of State Power Utilities, 2015

Note: The numbers in the parantheses indicate the number of discoms considered for each state.

revenues is just 9%. Industrial consumers on the other hand consume 30% of total electricity units and generate 42% of total revenues.

A state-wise per unit average price comparison shows that primarily agricultural states, such as Punjab, Haryana, Uttar Pradesh, Tamil Nadu, and Madhya Pradesh were charging very low or no electricity tariffs to farmers. In all

of these states the industrial consumers paid considerably higher tariffs. Sector stakeholders also expressed concern on the degree of cross-subsidization, and the need for a clear policy road map on cross-subsidies at the state level, especially one to limit industrial cross-subsidy and replace agricultural power subsidies with more direct and better-targeted subsidy transfers.

Major Recommendations

- **Prioritize agricultural electricity subsidy reforms**, especially in the states of Punjab, Haryana, Maharashtra, Karnataka, and Madhya Pradesh **to offset the heavy cross-subsidization**
- **Initiate reforms in the domestic sector to justify tariff rises**, especially in Bihar, Tamil Nadu, and Uttar Pradesh. For example, invest to improve the availability, reliability, and quality of supply, and at the same time improve the operational efficiency of discoms
- **Rationalize tariffs across the electricity value chain based on evidence**, to allow discoms to charge cost-reflective tariffs. For example, subsidy reforms that ensure services can be afforded by the poorest without creating perverse incentives; move to direct benefit transfers rather than power subsidies
- **Create awareness and public education** on the costs of energy generation, the need for investment to improve service levels, and the benefits of energy efficiency to support the **transition to cost-reflective pricing**
- Undertake **studies at the state level on tariff schedules** to establish how tariffs can be simplified and consolidated to improve revenue generation, transparency, and reduce transaction costs
- **Electricity needs to be considered as a service independent of its source**. On-grid or off-grid, the best-suited infrastructure should be employed to provide reliable electricity, affordable and sustainable energy for all at the same price and at the same level of service
- Develop '**willingness to provide**' **training for supply-side stakeholders** (specifically discoms) to change the attitudes and skills of staff to increase their willingness to ensure the provision of reliable, affordable, and sustainable electricity for all, especially in rural areas.

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