

Getting smart

Smart meters can pare discom losses, boost efficiency

July 2020



The case for a smart switch

A great reform opportunity presents itself in the beleaguered power distribution sector – *en masse* transition from traditional to smart meters.

Earlier reform footprints, together with availability of resources, a renewed thrust to ‘aatmanirbhar’ manufacturing, and the need to pull power distribution companies (discoms) out of the current crisis, make the ground ripe for such a switchover.

With the Covid-19 pandemic and extended lockdowns diminishing demand and collections, and loss-making discoms slipping deeper in the red, CRISIL Research expects power demand to contract 3-5% on-year this fiscal compared with a compound annual growth rate (CAGR) of 3.8% between fiscals 2015 and 2020.

A simple and effective way to firefight this dismal situation is to ramp up collection efficiency quickly – through large-scale adoption of smart metering solutions.

What makes it smart

Investing in smart metering solutions would drastically improve metering, billing and collection (MBC) efficiencies, and thereby maximise revenue. It would enable two-way communication between the meters and discoms for real-time and remote monitoring and control, eliminating the need for physical readings and bringing down the margin of error.

These advantages are borne out by data from public sector undertaking Energy Efficiency Services Ltd (EESL), according to which, utilities with smart metering infrastructure reported 95% billing efficiency in the first quarter of this fiscal, when the lockdown was in force, and generated additional revenue of 15-20% per meter.

This, EESL estimates, would amount to additional revenue of over Rs 100,000 crore annually from unbilled electricity – a result of MBC inefficiencies. The efficiency is likely to be more evident in regions with high aggregated technical and commercial (AT&C) losses.

Apart from improving MBC efficiencies, smart meters can help trim discoms’ commercial losses. Although these have narrowed in recent years, the power sector still faces high AT&C losses, pointing to inherent inefficiencies.

The national average of AT&C losses for 26 states (excluding Nagaland, Andaman and Nicobar Islands, and Lakshadweep) was 18.90% as on July 17, 2020.

The losses are even greater in states experiencing high demand: Jharkhand (33.96%), Bihar (34.32%), Uttar Pradesh (30.3%), Rajasthan (22.47%), Madhya Pradesh (24.9%), and Maharashtra (21.32%).

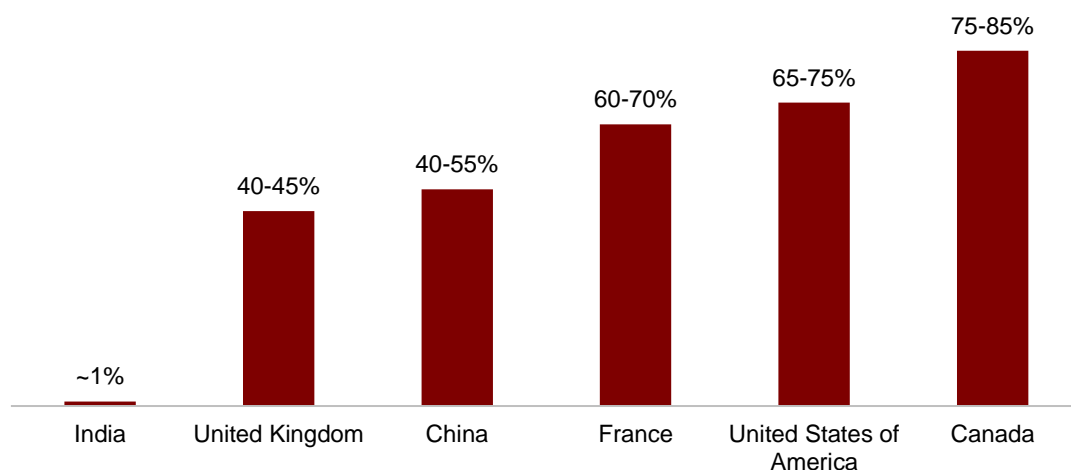
Smart metering can help stanch at least the commercial losses with the following changes in the MBC process:

- Eliminating physical meter readings and inspections, leading to savings on the cost of inspection teams
- Better load scheduling based on real-time consumption patterns
- Continuous monitoring, leading to targeted inspection and lower metering errors
- Reducing electricity theft and unbilled consumption
- Seamless billing and payment mechanism for consumers

Despite the benefits, only ~3 million smart meters are operational in India compared with ~270 million traditional meters.

Thus, smart meter penetration is barely ~1%, which is much lower than in mature markets of Europe and North America, as the following graph shows.

Penetration of smart meters in mature markets



Notably, for the majority of Indian discoms that rely on physical meter readings, billing efficiencies actually came down during the lockdown as they billed on the basis of a consumer's average reading, or on the basis of the year-ago consumption.

Clearly, making the switch to smart meters is desirable – but is it feasible?

What would the switch cost?

Discoms' financial status at a glance

- As of May 2020, discoms' outstanding dues to gencos stood at Rs 1,16,656.36 crore
- The government's Aatmanirbhar Bharat Abhiyan stimulus package provided Rs 90,000 crore liquidity support to discoms in view of the pandemic and ailing financials
- This support is subject to state government guarantees for loans
- The government has announced privatisation of discoms, starting with the union territories and eventually targeting states with high AT&C losses

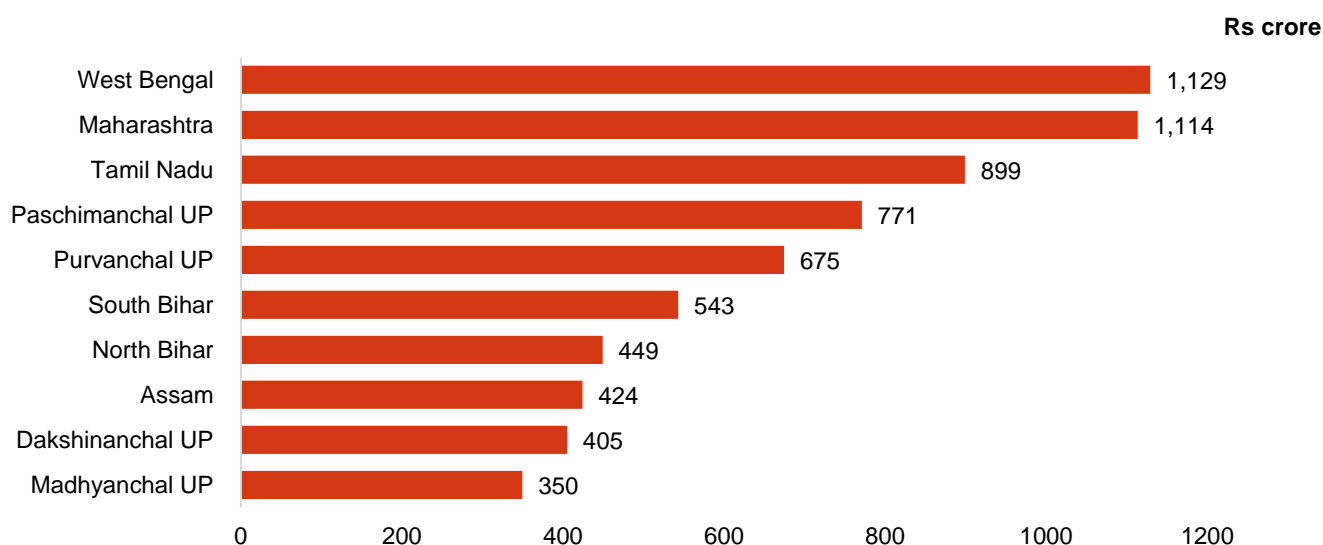
CRISIL Research estimates that the country would need to invest ~Rs 65,000 crore to transit from traditional to smart meters entirely, assuming a substantial reduction in current meter prices coupled with rising volumes.

This is achievable, as sufficient funds are available under various government schemes for a phased deployment. This includes both the recent Aatma Nirbhar Bharat Abhiyan stimulus package and the Rs 22,000 crore allocated in the Union Budget 2020 to state discoms for implementing smart meters over a three-year period.

Additionally, the government has implemented various smart meter schemes, such as the Smart Meter National Programme and the Integrated Power Development Scheme (IPDS).

The Ujwal Discom Assurance Yojana (UDAY) also aims to improve the discoms' overall financial health along with the implementation of ~10% of the country's total smart metering requirement. However, as on July 17, 2020, UDAY has only achieved 6% of the targeted smart meters for connections above 500 kWh and 7% of the target for connections between 200-500 kWh.

Cumulative funds released under IPDS till March 2020 for discoms in top 10 states



Till date, the government has released Rs 12,760 crore to 3,644 towns under the IPDS scheme, out of a planned allocation of Rs 28,260 crore for strengthening sub-transmission and distribution networks, metering of distribution transformers, feeders and consumers, and enabling information technology in urban areas.

Despite this, discoms in some states have been billing consumers on the year-ago consumption or monthly average consumption during the lockdown, highlighting the overwhelming prevalence of traditional metering and its attendant problems. Apart from affecting the discoms' billing efficiency, traditional metering also impacts consumers who have invested in energy-efficient solutions over the past few years.

On the other hand, by adopting the metering as a service (rental model), discoms can not only reduce their deployment costs but also generate higher revenues on account of MBC efficiencies. This is widely prevalent in mature markets globally.

The government has also announced privatisation of discoms in the union territories in order to reduce pilferage of revenue. The aim is to improve the distribution utilities' operational efficiency, besides reducing the burden on debt-ridden government entities.

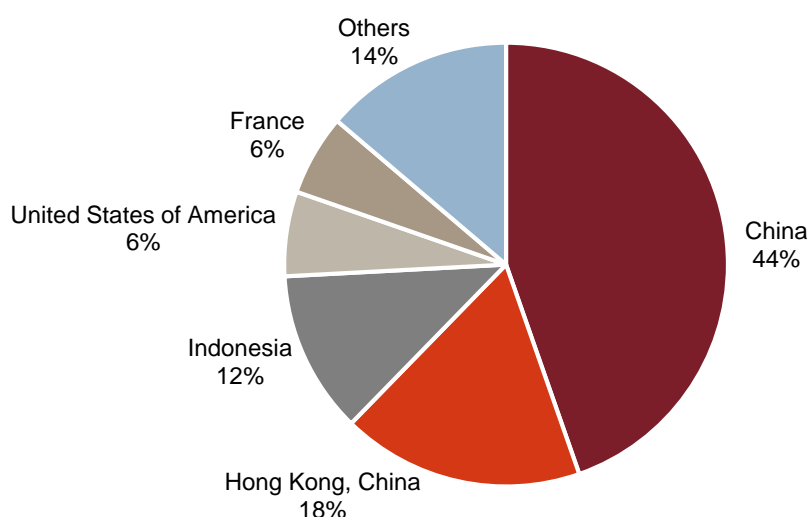
In cities like Mumbai and Delhi, the private discom model has already resulted in increased competition, better service and faster adoption of new technologies. Moreover, reforms such as direct benefit transfer (DBT) of subsidies to consumers can lead to an improvement in discom receivables from the subsidised consumer category, once implemented.

The 'aatmanirbhar' thrust and economies of scale

Currently, a locally manufactured smart meter is priced between Rs 6,000 and Rs 7,500. At this price, the cost of replacing all existing traditional meters would be over Rs 180,000 crore. Plus, additional investments would have to be made in upgrading technology at the discoms.

Over the years, increased focus on smart meter implementation in the country has attracted international participants, including Chinese manufacturers. Over 60% of the electricity meters, parts and accessories imported in CY 2019 were from China, due to lower cost of meters and components compared with those manufactured domestically.

Indian imports of electricity meters/ parts/ accessories in 2019



Source: International Trade Centre

However, government has initiated steps to check the prices of smart meters and boost domestic manufacturing. In its March 2020 report, the Parliamentary Standing Committee on Energy emphasised the need for greater participation by local manufacturers to enhance competition in the smart meter market. This is also in keeping with the government's 'aatmanirbhar' thrust on self-reliance and reduction in imports.

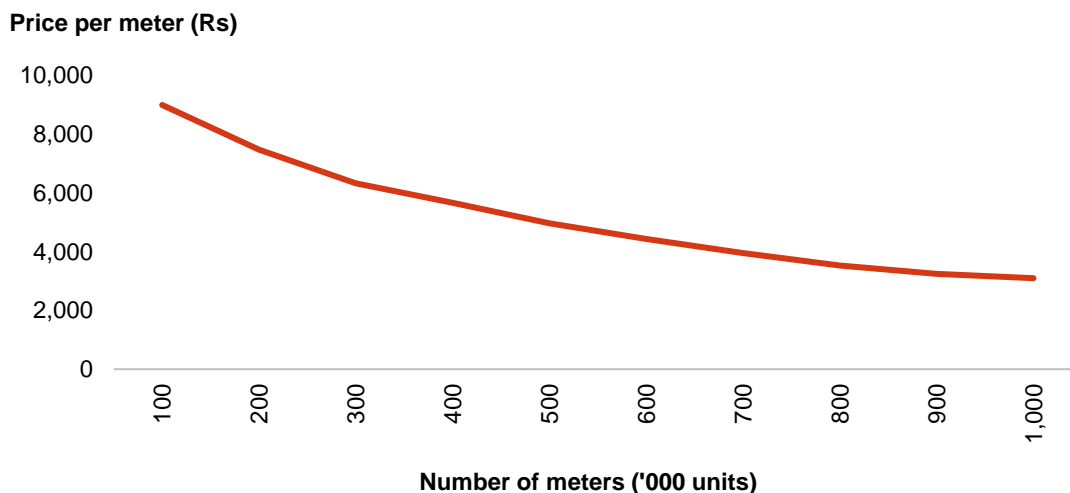
Indeed, just like the government's push for the adoption of energy-efficient light emitting diode (LED) lighting spawned local manufacturing, the thrust on smart metering and self-reliance could provide a fillip to domestic manufacturing of smart meters.

Thus, CRISIL Research believes this is an opportune time for Indian manufacturers to ramp up production of smart meters and related infrastructure. That could bring down the effective cost of meters to Rs 2,000-4,000 for bulk procurement – which is on a par with the cost of Chinese imports – thus bringing the cost of replacing all traditional meters to ~Rs 65,000 crore.

In fact, the government's increased scrutiny of equipment imports to check cyber threats and ensure adherence to Indian standards and specifications initiated in June this year is expected to create a level playing field for domestic manufacturers. The imposition of additional import duties would also ensure cost parity of imported equipment and domestic equipment.

Meanwhile, bulk procurement would lead to greater research and development activities among domestic manufacturers, and greater participation by technology players and other stakeholders such as third-party service providers, all of whom would aid in the implementation of smart metering across the country.

Bulk procurement reduces smart meter costs



Source: CRISIL Research

The capital outlay on smart metering can also be brought down by implementing it in a phased manner. Areas with higher inefficiencies can be metered first, before scaling up to other regions.

How much smarter are smart meters really

A lot more, but not without challenges. Even where implemented, these meters are not utilised to their full potential by state discoms. This is because of interoperability issues with existing and/or legacy MBC systems. Discoms need to address this by upgrading to better meter data management systems and technologies. It is also imperative for meter manufacturers and implementers to provide equipment that is compatible with various transmission and metering infrastructure.

Moreover, the legacy MBC system is not equipped to cater to new-age demands from distributed generation – residential rooftop solar, electric vehicle charging infrastructure, and digitalised customer management systems. That’s where the benefits of smart meters show up.

With smart metering infrastructure, discoms can introduce time-of-day tariff by tracking real-time consumption. This will also enable consumers to select economical and convenient time slots. For instance, by charging electric vehicles during off-peak hours, consumers can enjoy substantial savings, while this will also help discoms to manage peak load.

In addition, net metering data from distributed generators can be efficiently processed with advanced systems, which are equipped to handle and analyse large amounts of data, unlike traditional metering systems. This will ensure proper billing and help improve grid security by maintaining records of usage patterns for efficient energy injection and withdrawals at the grid.

Smart metering systems could also help allay concerns regarding security risks arising from data leakages for discoms and over data privacy at the consumer end. Thus, smart metering infrastructure can offer a range of benefits – from grid and asset management to consumer engagement – as outlined below:

Grid management	Asset management	Workforce management	Metering, billing and collection	Consumer engagement
<ul style="list-style-type: none"> • Load analytics and management • Outage management systems • Net metering for prosumers • Integration of renewables and EV infrastructure • Demand forecast and planning 	<ul style="list-style-type: none"> • Asset monitoring – health and performance • Maintenance planning • Inventory management 	<ul style="list-style-type: none"> • Workforce mobilisation • Workforce safety and optimisation • Virtual inspections 	<ul style="list-style-type: none"> • Remote meter reading • Theft detection • Remote operation of meter 	<ul style="list-style-type: none"> • Usage analysis • Maintenance notification • Meter performance monitoring

Globally, utilities are implementing technologies like blockchain for data security, transparency and management, resulting in efficient MBC for new-age consumers.

In India, too, a private discom has conducted a pilot using blockchain – and others are likely to follow suit. This will generate huge demand for communication and network infrastructure and IT solutions along with smart meters.

Conclusion

India’s traditional power metering system is clearly inadequate, resulting in MBC inefficiencies, high commercial losses and revenue leakages. Smart metering could empower discoms by improving billing efficiencies, enhancing customer services, and reducing leakages, thus enabling financially distressed discoms to maximise revenues. It could also help meet the need for robust metering systems, given the rising dependence on renewable energy will result in a growing tribe of distributed generators with net metering requirements.

However, several stumbling blocks remain, including the scale of financial investment required. While the need for smart metering provides an opportunity for domestic manufacturers, they will have to ramp up production to compete with cheaper Chinese imports. State discoms with high MBC efficiencies may believe that they can postpone the switch to smart meters. But the pandemic has shown, Indian discoms need to be better prepared to tackle such events. And smart meters could help ensure that they are future-ready.

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