



Executive Summary

The Challenge

India has one of the largest and most complex power sectors in the world. Over the past few decades, the country has witnessed a remarkable evolution. Today, almost every citizen has access to grid electricity, power deficiency has decreased sharply, and the installed renewable energy capacity has reached a fourth of the total capacity.

However, the sector still faces significant challenges. Most power distribution companies (or discoms) incur losses every year—the total loss is estimated to be ₹ 90,000 crore in FY 2021.¹

Due to these accumulated losses, discoms are unable to pay for generators on time—as of March 2021 an amount of ₹ 67,917 crore was overdue.² They are also unable to make the investments necessary for ensuring continuous high quality power, or build the infrastructure required to facilitate the transition from fossil fuel to renewable (but intermittent) energy sources, such as solar or wind.

Part of the reason for these losses is the tension between two different outlooks: (a) is electricity an essential public service whose provision at low rates is necessary for citizen welfare, or (b) is it a commodity to be bought and sold on the market like any other?

Many efforts have been made to turn around the distribution sector. Since the '90s, most state electricity boards have been unbundled into separate entities for generation, transmission, and distribution. The Electricity Act (EA), 2003, brought about major changes in the power sector, including delicensing of generation, open access in distribution, and



independent regulators at the state and central levels. A series of schemes was launched, by central and state governments, to upgrade the distribution infrastructure and help the discoms improve their finances. Some of these initiatives include Ujjwal DISCOM Assurance Yojana (UDAY), Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY), and Integrated Power Development Scheme (IPDS). A revamped reform scheme, with an allocation of ₹ 3.05 lakh crore, was also announced in this year's Budget. However, the schemes implemented so far have not been able to ensure a sustainable turnaround of the discoms. A turnaround, in terms of both finances and operations, remains urgent.

The answer lies in significant policy, organisational, managerial, and technological changes. Different states have travelled along different pathways of reforms, giving us a rich set of policy experiments to learn from. Some of these learnings have been described below.

Discom Restructuring

The distribution sector has been largely *vertically unbundled*—the three different functions of generation, transmission, and distribution have now been separated. While there might be *de jure* unbundling, the degree of *de facto* unbundling might vary. In states such as Gujarat, the unbundling was an important step towards improving the performance of discoms.

Most discoms are state-owned, and only about 10 percent of India's population is served by private distribution licensees. For a state-owned utility to succeed, there should be a clear separation between utility and state. Good corporate governance practices, including the use of independent directors, can help ensure such separation.

Higher private participation in distribution holds out the possibility of greater efficiency. *Franchisee* models have been successfully implemented in Odisha and Bhiwandi in Maharashtra, where there have been rapid improvements in metering, billing, and collection.

In Delhi, after power distribution was taken over by three private *licensees*, the Aggregate Technical and Commercial (AT&C) losses have come down from about 55 percent in 2002 to about 9 percent in 2019.

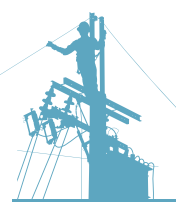
The recent Budget announcement delicenss distribution and proposes to allow *distribution companies* non-discriminatory access to the distribution system. Discoms have a monopoly in their area of functioning. Delicensing distribution can introduce competition and *enable retail choice for customers*. This reform can be challenging to achieve and should be accompanied with careful market design.

A public-private partnership (PPP) model can be especially useful in loss-making areas, where commercial operation might not be feasible without support in the form of *viability gap funding (VGF)* by the government.

Regulatory Reforms

The state governments should promote *autonomy, competence, and transparency of the State Electricity Regulatory Commission (SERC)*. *Tariffs should be regularly revised*





to ensure that they fairly reflect the actual fixed and variable costs. *No new regulatory assetsⁱ* should be created. The existing regulatory assets should be cleared according to a defined schedule over the next three-to-five years through appropriate tariff changes.

One way to insulate regulatory functions from political pressures is to create *regional electricity regulatory commissions* with the participation of the central government.

For consumers, who receive subsidised electricity, direct benefit transfer (DBT) can help improve efficiency and reduce leakages. It has recently been implemented in parts of Madhya Pradesh.³ The respective state government should prescribe the details of the DBT scheme. It could be structured such that consumers do not stand to lose their current benefits, but are paid more for efficient use of electricity, similar to the ‘Paani Bachao Paise Kamao’ scheme in Punjab.

Operational Reforms

The overall AT&C loss figure in India is as high as 24.54 percent.ⁱⁱ Many discoms need to *improve their billing efficiency* through better metering. They should fully utilise the revamped central government reform scheme to achieve 100 percent metering using prepaid or smart meters while being cognisant of cybersecurity threats. Thefts can be reduced through concerted action by the discoms and states. Prepaid metering can help reduce thefts and increase collection, as in the case of Manipur. Another frequent reason for low collection is default in payment by state government departments and municipal bodies.

In Gujarat, discoms were able to significantly reduce their technical losses through investment in improving their grid. Investment in distribution infrastructure is a major component of the revamped central government reform scheme announced in Budget '21, and state discoms should aggressively use this support to *upgrade their distribution infrastructure*.

Many states provide subsidised and sometimes free electricity for agriculture. This can lead to leakages and high losses for discoms. Some states, with large agricultural consumer bases such as Rajasthan, Andhra Pradesh, Gujarat, Karnataka, and Maharashtra, have reduced leakages by *separating feeders for agricultural use from non-agricultural use*. Discoms can significantly decrease their power procurement costs by encouraging the *use of solar pumps for agriculture*.

Discoms have locked themselves into long-term, expensive power purchase agreements (PPAs). As long as the markets continue to provide low-cost power, discoms should not sign new expensive long-term thermal PPAs. States such as Chhattisgarh, Gujarat, Maharashtra, and Uttar Pradesh have banned new thermal PPAs till 2022. Where feasible, discoms can exit such expensive and long-term PPAs. Discoms can also reduce the cost

i Often, state electricity regulators may recognise certain costs incurred by discoms, but they may not increase tariffs to match these costs to shield consumers from tariff shocks. Regulatory assets are the costs that are deferred for recovery through future tariff changes.

ii From Uday Portal (uday.gov.in/atc_india.php) as on April 28, 2021.



of power by procuring cheaper power from the exchanges whenever the price on the exchange is lower than the variable cost of the PPA.

Discoms should use *time of day (ToD) tariffs* to incentivise changes in demand patterns. Dynamic tariffs, enabled by advanced metering and a smart grid, can reduce the discoms' power purchase costs and help manage peak loads.

Renewable Energy Integration Reforms

Discoms need to prepare to *accommodate an increasing amount of renewable energy (RE)*, from generators as well as prosumers.ⁱⁱⁱ In order to increase the firmness^{iv} of RE power, reduce power procurement costs, and handle a variety of power sources, discoms may need to deploy large-scale energy storage. Storage can be provided by battery systems or pumped hydro-storage systems. Discoms need to develop better RE forecasting capabilities in order to reduce their deviation costs and reduce the need for real-time balancing.

States and discoms are mandated to meet the targets of renewable purchase obligations (RPOs) every year. However, the must-run status of RE means that some states end up purchasing more than what they need while falling short of their obligations. A *stringent implementation of the RPO mandate* would ensure a fairer distribution of the excess cost of absorbing RE.

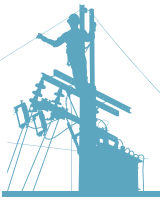
Rooftop solar plants are attractive in many ways. They let consumers meet part of their load from renewable solar energy. Consumers can monetise their rooftops and sell the excess to discoms. However, it does pose some challenges to discoms. They may lose a high-paying consumer; it may not be economical for the discom to purchase power from the prosumer at the prescribed rate;^v and they may need to incur additional expenditure on infrastructure to accommodate the RE sold to them by the prosumer. Discoms should be fairly compensated for the additional expenses they may incur to integrate rooftop solar power generation. Further, tariffs for rooftop solar should be set so that all consumers and producers face fair price signals as relevant to their state. Off-grid solar plants should receive greater policy encouragement, as they can be cheaper and simpler than grid-connected solar plants.

Mini-grids (an electricity distribution network involving decentralised small-scale generation from locally available renewable energy sources) can provide more predictable power in remote and sparsely populated areas. They can also be used to provide greater resilience to critical infrastructure such as hospitals. A PPP model can be explored in such remote areas, with the government providing VGF in return for the concessionaire supplying power at a specified rate while meeting specified service quality targets. The

iii A consumer who also generates power, for instance, through a rooftop solar plant.

iv Firm power is power which is assured to be available.

v In net metering, the consumer's electricity exports are adjusted against his imports and the consumer has to pay for the balance at the applicable retail tariff. In gross metering, the consumer pays the retail tariff for all the electricity he consumes, and he/she is paid at a specified rate (the feed-in tariff, which is generally lower than the retail tariff) for the energy he/she exports to the grid.



mini-grid could also act as a distribution franchisee. The mini-grid could also be run by a panchayat, if the latter has developed sufficient capacity.

Managerial Reforms

Effective reforms are typically a result of stable leadership and vision sustained over time. Reform journeys in Andhra Pradesh, Gujarat, and New Delhi, were led by elected officials who retained their position in power for at least a decade.

Easily accessible call centres, convenient bill payment facilities, and accurate billing can help *reduce customer dissatisfaction* and increase revenue.

Performance incentives can help align discom employees to the interests of the organisation. Zones or circles in discoms could be treated as profit centres, with employees being given commensurate autonomy as well as responsibilities.

The operation and management of the power distribution business are complex activities. They require expertise in a variety of fields: engineering, finance, billing and collection, HR, administration, etc. There is a need to *augment training and capacity building* in these fields.

Way Forward

The history of power sector reforms tells us that India is too large and diverse for a one-size-fits-all approach. Importing external expertise, structural frameworks, and new technology will be required, but these steps will not be sufficient to drive India's power sector transition. Similarly, implementing retail choice through separation of content and carriage may not necessarily result in the full set of theoretical benefits touted. A flexible and home-grown approach to reform, which is supported by states and the Centre, and allows for 'learning by doing', will be instrumental in determining the success of reforms.



Introduction

1.1 BACKGROUND

India has one of the largest and most complex power sectors in the world. Over the past few decades, the country has witnessed a remarkable evolution. Today, almost every citizen has access to grid electricity, power deficiency has decreased sharply, and the installed renewable energy capacity has reached a fourth of the total capacity.

Crucial to this evolution has been the EA 2003 that enabled a primarily state-owned sector riddled with mounting losses and debt to move towards a more open and competitive system. EA introduced many new policy features such as the introduction of competition through open access, multi-year tariff frameworks, distribution franchisees, de-licensing generation, establishment of renewable purchase obligations, and the creation of independent regulatory bodies.

However, the distribution sector is still mired in difficulties. Most discoms incur vast losses every year, and the situation is only getting worse with every passing day. Unable to pay generators on time, they have accumulated huge debts, and are not able to supply reliable and high-quality power to their customers.⁴ A financial and operational turnaround of the discoms is urgent.

Although discoms as a group are faring poorly, some individual ones are performing better than the others. Over the past few decades, different states and discoms have chosen different reform paths which have resulted in these varied outcomes. This report presents these learnings and best practices to help policymakers and practitioners bring about a financial and operational turnaround in the discoms' performance.



1.2 STATUS OF DISCOMS

The challenges clouding the sector are manifold and involve the whole value chain. Exhibit 2 maps them out into three categories, operational and managerial, regulatory and political, and technological.

Cost optimisation continues to be difficult to achieve due to factors such as legacy PPAs and poor investment in distribution infrastructure.

At the revenue realisation end, underinvestment and line losses, as well as challenges related to billing, metering, and collection, stand out. These elements are aggregated under the larger structural challenges including governance and regulation. They emphasise the need to revamp the underlying sectoral and organisational functioning. The key challenges faced by discoms across the country are highlighted in the sections below.

1.2.1 Operational Performance

Fundamental to discoms' profitability are the activities of metering, billing, and collection. On the whole, continuous improvement in billing and collection efficiency (Exhibit 1) has gradually helped in reducing AT&C losses across the country. The overall AT&C loss has come down to 22 percent. However, when compared at the global level, losses are still high, and much is to be done. Even within the country, there is a sharp difference in performance between states.

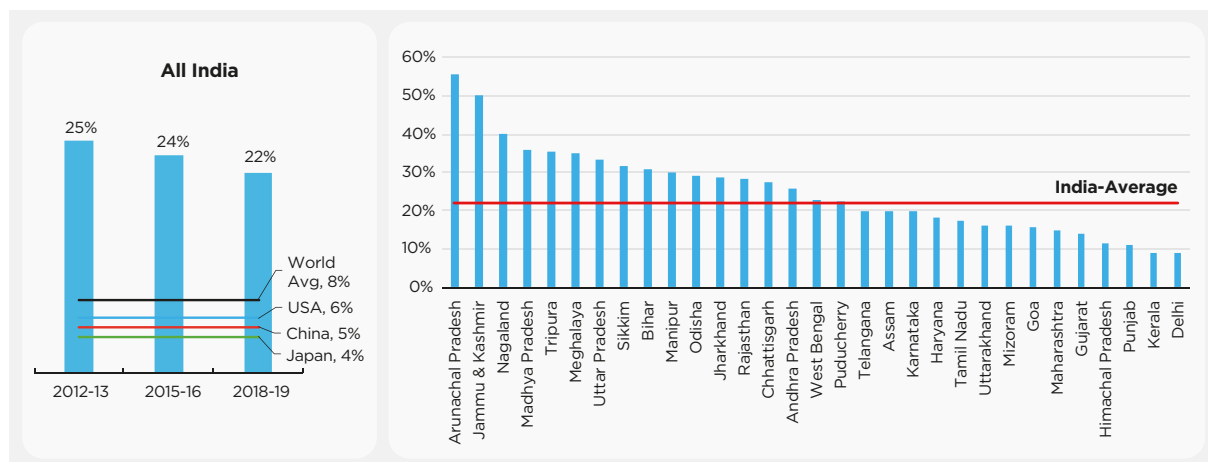


Exhibit 1: National and state-wise AT&C losses for 2018-19
(Source: PFC. See Appendix 3 for details)

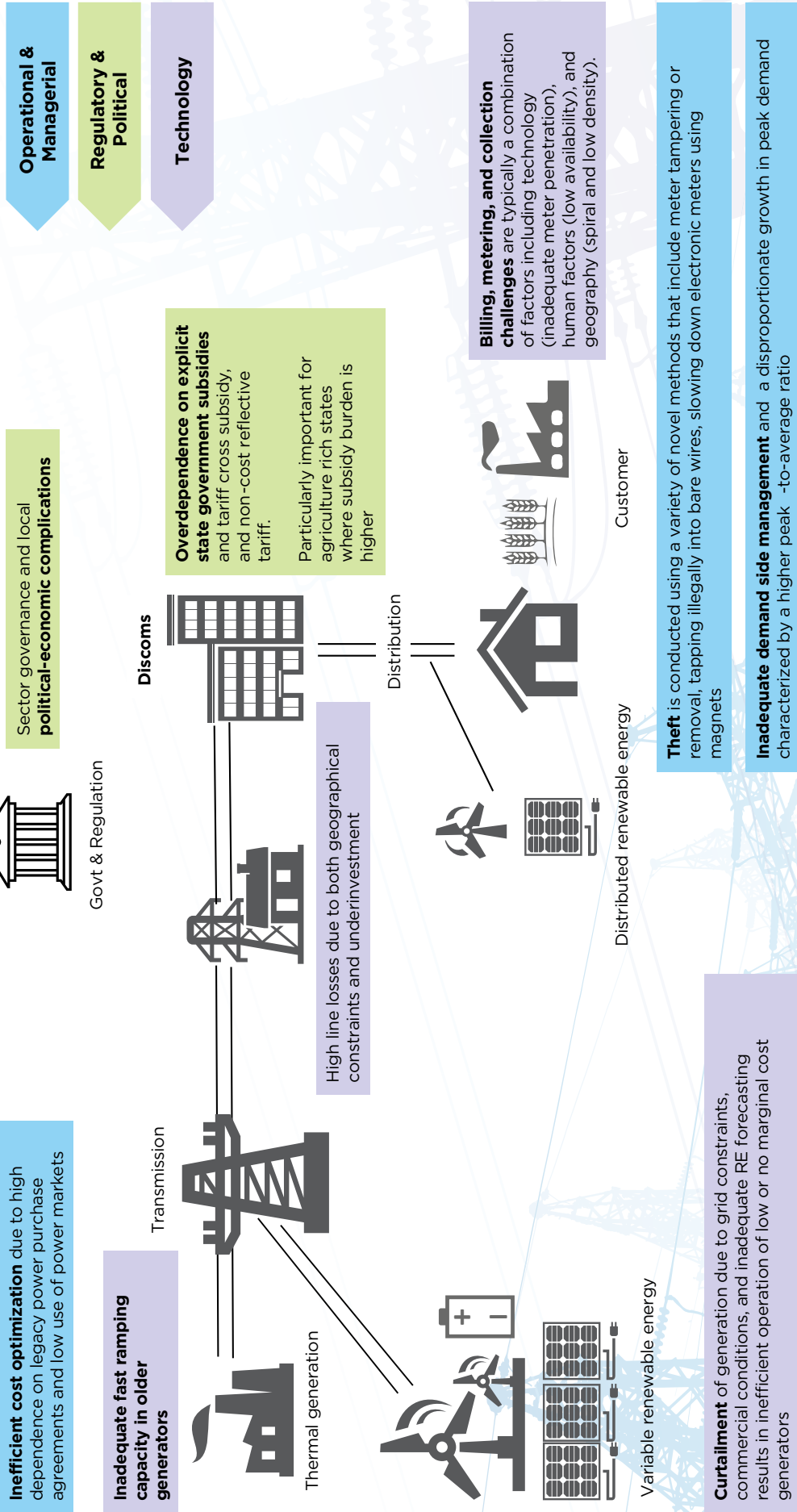


Exhibit 2: Challenges of electricity distribution in India

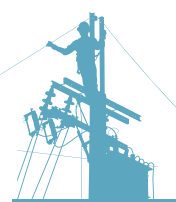


Table 1: Costs and revenue of distribution utilities, in ₹ crore (2018-19, source: PFC)

Cost Structure			Revenue Structure		
Head	Rs Crore	%	Head	Rs Crore	%
Cost of Power	551535	77%	Revenue from Operations	491985	74%
Employee Cost	56804	8%	Tariff subsidy Booked	110391	17%
Interest Cost	47632	7%	Regulatory Income	3872	1%
Depreciation	21887	3%	Revenue Grant UDAY	20570	3%
Other Costs	34752	5%	Others	36275	5%
Total	712610	100%	Total	663093	100%

In 2018-19, distribution utilities incurred a total expenditure of ₹ 7,12,610 crore against a total revenue of ₹ 6,63,093 crore (this is on a subsidy-booked basis with UDAY grants included, see Table 1). About 77 percent of the cost was the cost of power alone. The other major heads of costs included employee costs (8 percent) and interest costs (7 percent). Of the revenue, about 74 percent was from the sale of electricity, and 17 percent from the booked tariff subsidy.⁵

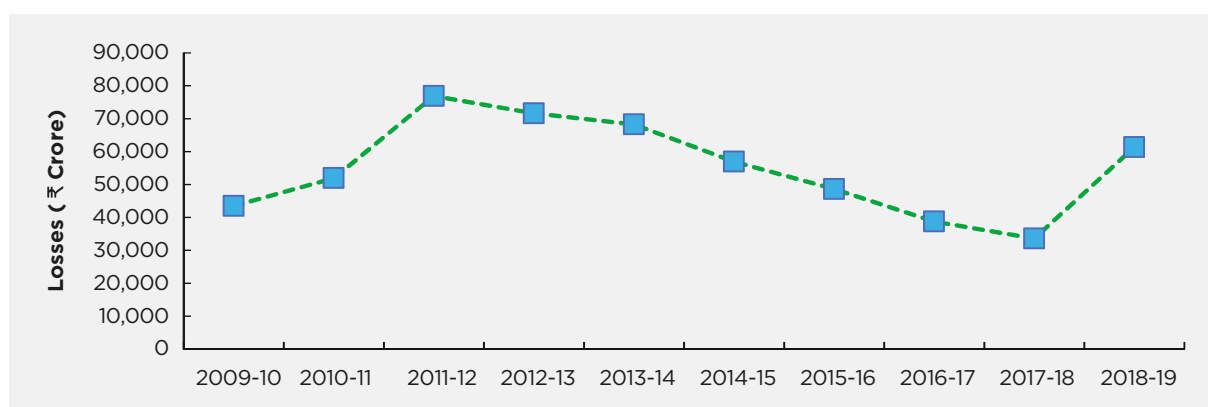


Exhibit 3: Total discom losses (after tax, with tariff subsidy received) over time
(Source: PFC, see Appendix 1 for details)

In Exhibit 3, it is observed that the losses of the discoms declined from a peak of ₹ 76,878 crore in 2011-12 to ₹ 33,596 crore in 2017-18. However, losses increased sharply in 2018-19. The Covid-19 pandemic and the subsequent lockdown further damaged the discoms' finances. Due to its adverse impact, the electricity demand of commercial and industrial (C&I) customers also suffered. It is projected that the total loss could rise to ₹ 75,000 crore in FY 2022.⁶

The gap between the average cost of supply (ACS) and the average revenue realised (ARR) increased from ₹ 0.54 /kWh in 2012-13 to almost ₹ 0.72 /kWh in 2018-19 (see Exhibit 4). Different states performed differently — for example, those with private discoms such as Delhi and those with large hydro resources, with comparative cost advantage, such as Himachal Pradesh and Kerala, fared comparatively better.

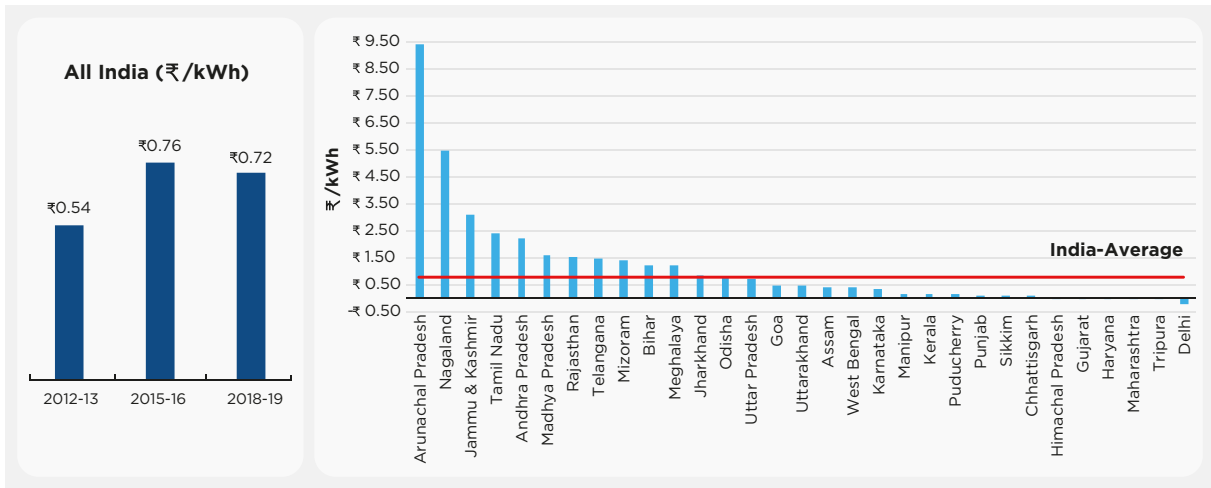


Exhibit 4: Discom profitability normalised as the ACS-ARR gap for 2018-19
(Source: PFC)

1.2.2 Subsidy Dependence

Even while analysing the sector’s subsidy dependence, regional variability emerges clearly. For example, discoms in the north-eastern states and agrarian states are especially dependent on government subsidies (see Exhibit 5).

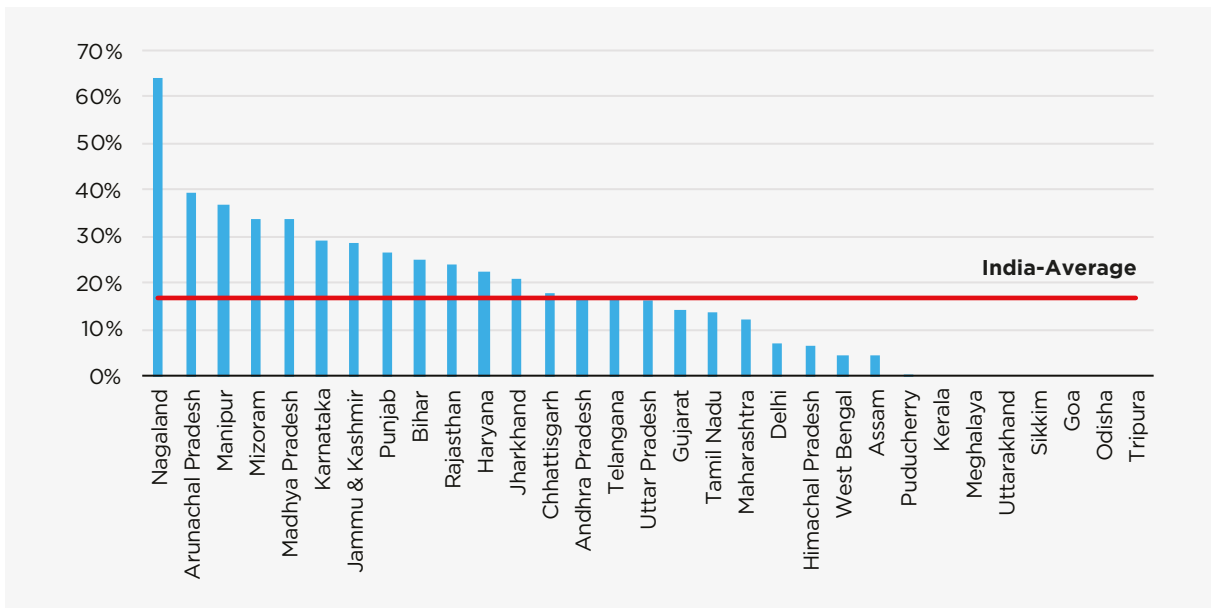


Exhibit 5: Tariff subsidy as a share of discom total revenue for 2018-19
(Source: PFC)

Apart from straining a state’s finances, continued reliance on subsidies disincentivises discoms from making serious structural improvements. Delays in receiving subsidy reimbursements from the government add to the liquidity stresses of discoms.