



DISCUSSION PAPER

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RESOLVING THE CRISIS IN POWER DISTRIBUTION IN INDIA

Ajay Shankar and TCA Avni



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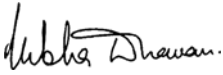
FOREWORD

The power sector in India has undergone a number of landmark transitions. In addition to completing the integration of regional grids into a single national grid and providing near-universal electricity access, India commenced with ambitious programmes for expanding capacity for renewable energy and promoting energy efficiency.

At TERI, we have been closely involved with the power sector, having worked with stakeholders across its value chain on issues on increasing supply and integration of renewable energy, improving energy access and promoting energy efficiency. However, in the context of the rapidly changing electricity landscape, ensuring the sustainability of the distribution sector, and the financial health of the sector becomes of paramount importance.

As we move towards ensuring reliable and affordable power to all our citizens, it is vital that we resolve the operational and financial challenges facing distribution companies. Recognizing the challenges of political economy facing reforms, this report provides an overview of the challenges facing the distribution sector, their historical context, and suggests ideas for a way forward.

We look forward to continue working closely with the sector over the coming years, and working towards achieving India's energy ambitions.



Dr Vibha Dhawan
Director General,
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ABSTRACT

The power sector in India has seen significant evolution since the turn of the millennium, access to electrification has increased from less than 60% of the population to near universal access; the country moved from power deficit to surplus; and was able to put in place a robust all-India grid that allows electricity to flow smoothly across states and regions. However, the financial health of the distribution sector has become increasingly precarious; barring a few exceptions, the finances of distribution companies have steadily deteriorated despite periodic bailouts. In this paper, we trace the historical reform efforts and discuss the legacy challenges facing the sector. Given the context of the current pandemic, which threatens to precipitate the long brewing crisis in the sector, we conclude with a discussion on the distortions, and some ideas on the way forward.

Introduction

India has been giving high priority to the development of the power sector. Electricity is an essential pre-requisite for all modern economic activity. Extending electrification and having adequate generating capacity have been the key goals of our development strategy. In both India has now succeeded. From having an installed capacity of 1.4 GW at the time of Independence, where electricity access was largely limited to industrial centres and big cities, the sector has grown to an installed capacity of 382 GW (as on 30 April 2021¹), with nearly 97% of all households connected to the electricity grid (95.7% of rural households and 99.2% of urban households having electricity connections) (Agrawal, 2020). India has also transitioned from being power deficit to power surplus, and has spare generating capacity required for ensuring reliability of supply for the first time. It has also put in place a robust all-India grid, which enables electricity to flow smoothly across states and regions.

The completion of household electrification has been a huge achievement. Between 2004 and 2019, 125,000 villages were electrified and over 500 million people have gained access to electricity since 2000 (IEA, 2017). The completion of household electrification has been coupled with improved reliability of supply. A CEEW study on the state of electricity access found that Indian households receive an average electricity supply of 20.6

hours per day, with urban households receiving supply for 22.3 hours and rural households receiving supply for 19.9 hours (Agrawal, 2020). While the averages hide a wide disparity between reliability of supply (which varies from an average of 24 hours in metros and most state capitals to 16 hours in rural Jharkhand and UP), even the weaker performing states of Uttar Pradesh, Jharkhand, Madhya Pradesh, and Bihar have seen an average daily increase of 6 hours in supply over the last five years (Agrawal, 2020).

Despite these historic achievements, the sector is in a highly precarious state financially. Distribution is the Achilles heel of the sector. Barring exceptions, the financial and operational sustainability of distribution companies have been deteriorating despite periodic bailouts by successive governments. Even before the COVID-19 pandemic, according to the government's PRAAPTI portal, distribution companies faced financial liability of nearly Rs 1 lakh crores (<https://praapti.in/>). Devaguptapu, (2020) points out that this amount is likely to have been an underestimate as the information available is limited to only those participating generating companies that have submitted information to the platform. Other dues owed by distribution companies (such as to vendors providing equipment and services) are not captured. Further, the number of participating generating companies is less than half of the total number of central, state, and private non-RE generators². The aggregate losses of distribution

¹ Details available at <https://powermin.nic.in/en/content/power-sector-glance-all-india>

² As of 18 November 2020, Praapti captured the dues of only 228 participating generating companies for March 2020, a figure which is substantially lower than the 548 generating companies which supply non-renewable power alone (Devaguptapu & Tongia 2020)

companies have been increasing, and were Rs 49,623 crore in 2018-19 (PFC, 2020). The gap between cost of supply per unit of electricity and the revenue realized per unit is Rs 0.5; a near bankruptcy situation (UDAY platform, as on 02/07/2021³).

The challenges facing the finances of the distribution companies have only been exacerbated by the COVID-19 crises. The impact of the nation-wide lockdown in 2020, which shuttered commercial and industrial enterprises was severe for their finances as revenues from historically subsidizing consumers decreased, even as supply to subsidized consumers, agricultural and residential consumers, either increased or remained the same.

In this paper, we start with a discussion on the experience of past reform efforts. We look at the complex and difficult challenges facing distribution utilities. We then explore some ideas on feasible ways of going forward to achieve the imperative transition to financial health.

History of Reform Efforts

The power distribution sector has seen continuing reform attempts to promote efficiency and commercial viability. The central government has provided three financial bailouts. A new reform package has just been announced. The Ministry of Power has been promoting reforms aimed at reducing system losses in distribution with technical modernization and commercial losses; Aggregate Technical and Commercial (ATC) losses. However, despite these persistent efforts over the years financial losses in the distribution sector have continued to rise.

A 2019 review of the distribution sector by the NITI Aayog classified reform attempts into structural, operational, and financial measures (CRISIL, 2019). These are discussed below.

Structural and Operational Reforms

1. Establishment of Regulatory Commissions

Following the early success of the macro-level far-reaching economic reforms of 1991, sectoral reforms were taken up. The power sector became a major focus, and efforts at attracting private sector in generation were initiated. It was felt that creating Independent Electricity Regulatory

Commissions, which would be responsible for regulating the power sector and setting tariffs, would bring about better management, improve quality of service, and provide commercial viability. The sector would be distanced from the politics, and the difficulties that political leaders faced in making decisions on necessary tariff increases. This would generate greater confidence in potential private investors, domestic as well as foreign. Independent regulation in the economic sphere featured prominently in the wish list of US investors.

This was also a key component in the template of power sector reforms that was being promoted by the World Bank (Lee & Usman, 2018). The World Bank was encouraged to work with willing state governments. The idea was that power is a major area in the sphere of state governments. They needed to assume leadership. If results were positive, other states would have an example of success to consider for emulation. Odisha became a pioneer enacting its own Reform Act in 1995 and then unbundling of its State Electricity Board and setting up its State Electricity Regulatory Commission. The distribution business of the state-owned entity was divided into four companies and these were privatized in 1999. The privatization did not succeed for a variety of reasons, the critical one being some fundamental errors in the business case that was offered to the private bidders. The DISCOMs were being managed by administrators appointed by the SERCs for many years after privatization was stalled. Now new private players have taken over the DISCOMs (Nair, 2021). For a detailed analysis of the experience and causes of failure of these early reforms, please see Prayas Energy Group (2017) and Das & Nayak (2018). A timeline of their reform efforts is available at (Government of Odisha, n.d.).

A meeting of Chief Ministers was called in 1996 to discuss power sector reforms. Based on the consensus reached, the Electricity Regulatory Commissions Act, 1998 was enacted. It established the CERC (Central Electricity Regulatory Commission) and enabled the states to set up their SERCs (State Electricity Regulatory Commissions). The states were empowered but not mandated to set up their SERCs and few did. The later Electricity Act, 2003 made the setting up of SERCs mandatory. Thereafter, the

³ Details available at https://www.uday.gov.in/acs_arr_india.php

states had to comply with the law and did set up SERCs (CRISIL, 2019).

The central government in 1996 felt that privatization of distribution in cities was the way forward for reforming distribution and setting it right. The premise was that agriculture was politically sensitive, and power supply for irrigation was heavily subsidized in the states. But the feasible potential for efficiency gains and commercial turn around was in cities with the induction of the private sector in managing distribution. To incentivize privatization of distribution by the states, the Mega Power Policy was introduced in 1995 (Ministry of Power, 1995). Large mega power projects, which would have the advantage of lower costs due to economies of scale, were given major benefits, including income tax, excise duties and import duties exemption to be able to generate substantially cheaper power. This cheap power was offered to the states, which privatized distribution in all cities with a population of a million and above (Ministry of Power, 1995). However, the mega power policy that was intended to attract private investment in generation did not succeed in attracting investors' interest. The central government counter guarantee provision for payment of dues to foreign private investors in generation, starting with Enron, had by then run into difficulty and was given up. The Power Ministry, thereafter, did not actively promote privatization/private sector participation in distribution till 2020. Years later, NTPC availed the benefits of the mega power policy and got commitments from the state governments to privatize distribution in cities of over a million. The states had no real intention of doing so and made the commitment only to get cheaper power. The Power Ministry thereafter went to the Cabinet and this condition was dropped accepting political realities.

2. Accelerated Power Development Programme (2000–2002)

Conceptualized with the objective of bringing about a turnaround in the performance of the State Electricity Boards, the Accelerated Power Development Programme (APDP) was launched. It aimed at modernizing old

thermal and hydel power plants; as well as investing in the upgradation of the sub-transmission and distribution network, below 33 kV or 66 kV, through a combination of grants and loans provided by the Ministry of Power through its financial institution, the Power Finance Corporation (PFC) (Ministry of Power, 2001).

3. Electricity Act, 2003

The Electricity Act of 2003 was a major landmark. It replaced the three existing laws related to electricity and created a new legal framework for the power sector. The Act mandated the unbundling of State Electricity Boards into Generation, Transmission and Distribution Companies with Generation being delicensed and fully competitive, Transmission and Distribution remaining licensed regulated activities, and the setting up of independent SERCs. It provided for open access for consumers over 1 MW and introduced power trading. The Electricity Regulatory Commissions were given the responsibility to set electricity tariffs and in doing so to progressively reduce cross-subsidies, protect consumer interests, and at the same time maintain commercial viability of the sector.

The key reforms envisioned through the Act are enumerated in Table 1.

4. Accelerated Power Development and Reform Programme (2002–2008)

In the 2001 Chief Minister's conference taken by the Prime Minister, there was a consensus on the road map for reforms, turnaround, and development of the power sector. The centre agreed to the request for a bailout package for the outstanding dues of the State Electricity Boards (see section below). This was to be a one-time special dispensation. It was the first of its kind. It went so far as to provide for direct deduction from a state government's account with the Reserve Bank of India; the first time such a dispensation was put in place⁴ (Prabhu, 2002).

⁴ In response to 2002 parliamentary question, the conditions of the one-time settlement scheme were described. This included "For ensuring timely payment of current dues in future, defaults in current payment for power/fuel shall attract a graded reduction in the supply of power from central power stations and in coal supplies. **Payments that remain outstanding after 90 days from the date of billing shall be recovered, on behalf of the CPSUs, by the Ministry of Finance through adjustment against releases due to the respective State Government on account of plan assistance, States' share of Central taxes and any other grant or loan**" (emphasis added).

Table 1: Key reforms in EA 2003

Key reform areas	Strategies
Introduction of competition	<ul style="list-style-type: none"> • Unbundling of State Electricity Boards into generation, transmission, and distribution companies • Delicensing of generation, facilitating open access, and enabling captive generation • Introduction of power trading
Increased transparency	<ul style="list-style-type: none"> • Establishment of Regulatory Commissions and national Appellate Tribunal • Corporatization of utilities
Cost recovery and commercial viability	<ul style="list-style-type: none"> • Strict provisions to reduce power theft • Ensure competitive procurement • Rationalization of tariffs • Progressive reduction and elimination of subsidies • Push for 100% metering
Rural electrification and electricity access	<ul style="list-style-type: none"> • Ensure universal access • Affordability and availability
Improve customer satisfaction	<ul style="list-style-type: none"> • Reduce losses • Establish service standards
Promotion of renewable energy and energy efficiency	<ul style="list-style-type: none"> • Introduction of renewable power purchase obligations • Incentives for increased renewable energy generation

Source Modified from Swain, (2016)

In pursuance, the APDP was re-cast as a more incentive-based programme called the Accelerated Power Development and Reform Programme (APDRP), with the aims of improving financial viability, reducing AT&C losses to about 15%, improving customer satisfaction, increasing the reliability and quality of power supply, energy audit, adopting a systems approach to management information systems, and improving transparency through computerization (Khurana, 2015).

The reality of large commercial losses in many states was recognized in the concept of AT&C losses. Technical losses are inherent in the movement of electricity. Since lower voltage levels are subject to greater technical losses, reducing the length of LT (Low Tension) lines, and having more efficient transformers and adequate transformation capacities have been important to reducing technical losses. Through efficient urban DISCOMs in India, technical losses have been brought down to well below 10%.

Commercial losses comprise theft that ranges from those tapping into the network and consuming electricity without having a connection at all and, therefore, not

paying to those who have metered connections and have ways of consuming much more than they are billed and pay for. Then there are shortfalls in meter reading, billing, and collection. In many states, these commercial losses are the main problem. These generate a stable and powerful equilibrium in the realm of the political economy. To illustrate, Delhi had AT&C levels of nearly 50% at the time of privatization of distribution in 2002. These have been brought down to under 10% as per the 2018–19 PFC Report (Kaladharan, 2017).

5. Restructured Accelerated Power Development and Reforms Programme (2008–2014)

The R-APDRP aimed at reducing AT&C losses to 15% in selected urban areas by supporting baseline data collection and the adoption of IT applications and by providing grant funding to renovate, strengthen, and modernize operational, technical, and service delivery mechanisms for distribution. The scheme required participating utilities to demonstrate performance improvements over a measured baseline in order to receive financial assistance. The scheme supported both the preparation of baseline data and the

distribution-strengthening projects such as renovation, modernization, and strengthening of 11 kV substations and transformers/transformer centres, reconductoring of lines at the 11 kV level and below, load bifurcation, feeder separation, load balancing, installation of high-voltage distribution systems (11 kV), use of aerial bunched conductors in densely populated areas, replacement of electromagnetic energy meters with tamper-proof electronic meters, and installation of capacitor banks and mobile service centers (Mani Khurana, 2015).

6. Integrated Power Development Scheme

The IPDS was launched in November 2014 with the aim to increase the quality and reliability of power supply in urban areas by strengthening the sub-transmission and distribution network, metering feeders, distribution transformers, and deploying smart meters and advanced metering infrastructure. DISCOMs were required to renovate existing substations, deploy new substations, undertake expansion of existing substation infrastructure, and deploy higher capacity transformers (Powerline, 2017).

Financial Reforms

1. 2001 Scheme for Repayment of SEB Dues

The first bailout package was intended as a one-time settlement of outstanding dues till September 2001. Based on the recommendations of the Committee constituted under Montek Singh Ahluwalia, in May 2002, the government circulated a tripartite agreement between the RBI, Central and State Governments, which formed the basis of the bailout package. As per this scheme, states were to implement reforms such as setting up SERC, metering distribution feeders, and improving revenue realization, in exchange for which 60% of interest/surcharge on delayed payments was waived for participating states, and additional cash incentives were offered for compliance. The principal and remaining 40% of interest/surcharge were securitized through 15-year bonds issued by the state governments and through the RBI, which carried a tax-free interest rate of 8.5% per annum. The bonds were issued with a moratorium of 5 years on repayment of principal. What was novel in this scheme was the mechanisms to ensure timely payments; defaults attracted a graded reduction in the supply of

Table 2: Loss reduction and reform programmes

Name of programme	Accelerated power development programme	Accelerated power development and reform programme	Restructured accelerated power development and reforms programme	Integrated power development scheme
Period	2000–2002	2002–2008	2008–2014	2014–Present
Eligible areas	63 distribution circles	Selected urban areas	Urban areas with population >30,000	All urban areas
Budget allocation (in grants) (Rs Crore)	1,042	6,991	28,424	25,354
Funds released (Rs Crore)	547	3,426	8,175	8,648 (July 2019) ⁵

Source Modified from Prayas Energy Group (2017)

⁵ Details available at <http://loksabhaph.nic.in/questions/QResult15.aspx?qref=4491&lsno=17>

coal and power from central power stations, and payments outstanding after 90 days were to be recovered by the Ministry of Finance by adjusting against the state's share of Central taxes, and other grants and loans (Prabhu, 2002).

2. 2012 Financial Restructuring Plan (FRP)

Despite the 2002 bailout, within a decade mounting losses by distribution companies resulted in the Central government promulgating another financial restructuring plan for state-owned DISCOMs. Factors including non-revision of tariffs, non-payment of subsidies, high cost of power purchase and high distribution losses resulted in DISCOMs accumulating heavy losses and facing difficulty in financing operational losses (Ministry of Power, 2012). Under the bailout, 50% of the outstanding short-term liabilities (STL) were to be taken over by state governments, and converted into bonds which were to be issued to banks and backed by state government guarantees, with the remaining debt restructured by banks with a three-year moratorium. A transitional finance mechanism was set up by the Central Government, which provided grants equal to the value of savings by AT&C loss reduction beyond the trajectory specified, and capital reimbursement support when the liability was taken over by the State. The financial support for the scheme was conditional and to be accompanied by actions to improve the operational performance of state utilities. The conditions included (Ministry of Power, 2012)

- a. state governments to ensure DISCOMs eliminate ACS-ARR gap during the moratorium period and not borrow from the banks to fund operational losses;
- b. state governments to ensure SERC prepare and notify road maps for reduction in cross-subsidy
- c. adjustment of fuel costs to offset increase in power procurement costs; timely revision of tariffs to allow revisions to be fully realized during the financial year; submission of a time-bound road map for liquidation of regulatory assets and their carrying costs;
- d. payment of shortfalls as equity or interest free loans by state governments if annual projections in FRPs are not achieved;
- e. progressive reduction in purchase of short-term power by DISCOMs and future power procurement to be through competitive bidding;

- f. compulsory prepaid metering for government and large consumers who had defaulted on payments, and a time-bound plan for metering of all categories.

3. Ujwal DISCOMs Assurance Yojana (UDAY)

The FRP's objective of gap elimination proved difficult to achieve, with most of the eight states (Uttar Pradesh, Tamil Nadu, Rajasthan, Haryana, Bihar, Jharkhand, Telangana, and Andhra Pradesh) who signed the FRP being unable to meet the requisite performance criteria, curb losses, and reduce the outstanding debt of their power utilities (Reserve Bank of India, 2016). The UDAY scheme was introduced in 2015 with the objective to improve the operational and financial efficiency of state DISCOMs. The scheme allowed state governments to take over 75% of outstanding DISCOM debt over two years. Incentives offered to participating states included access to additional/priority funding through Central Government schemes such as DDUGJY, IPDS, Power Sector Development Fund (PSDF), etc.; exempting the dues taken over from Fiscal Responsibility and Budget Management (FBRM) limits for those two years, increasing supply of domestic coal, coal linkage rationalization, liberally allowing coal swaps, and allocation of coal linkages to states at notified prices (Ministry of Power, 2015; Lok Sabha Question, 2016). The scheme required participating states and utilities to achieve improvements in operational efficiencies in the prescribed timelines, which were to be measured through the reduction in AT&C losses and elimination of gap between ACS and ARR (Ministry of Power, 2015).

4. Atmanirbhar Bharat Abhiyan Package

As part of the package announced to mitigate the impact of the COVID-19 pandemic on the economy, liquidity support of Rs 90,000 crore in the form of concessional loans from Power Finance Corporation and Rural Electrification Corporation; rebates by Central Public Sector Gencos to DISCOMs; and relaxation of conditions of existing loans and relief from certain late payments and surcharges were announced. The borrowing limits for states were also relaxed, with part of the increased borrowing linked to reforms on power distribution (PIB, 2020; PRS, 2020; Lok Sabha Question, 2021).

5. Reforms-based Result-Linked Power Distribution Sector

Announced in the 2021 Budget Speech and approved by the Union Cabinet on 30 June 2021 is a revamped

reforms-based result-linked power distribution sector scheme to target infrastructure creation and system up-gradation, which subsumes the existing schemes of IPDS and DDUGJY (PIB, 2021).⁶ The scheme is projected to have an outlay of Rs 303,758 crore over 5 years, of which the central share was proposed to be Rs 97,631 crore (Union Budget, 2021; Singh, 2021). The objectives of the scheme are to reduce AT&C losses in the country to levels of 12–15% and eliminate the ACS-ARR gap by 2024–25, develop institutional capabilities and improve quality, reliability, and affordability of power. In the guidelines issued, major works under the scheme include 100% consumer metering, covering agriculture, through pre-paid and smart metering; works relating to technical loss reduction and system strengthening, including augmentation of substation, segregation/bifurcation of feeders, additional HT lines, etc.; priority solarization of agricultural feeders under KUSUM. The scheme imposes pre-conditions for qualification for the scheme; these require

- a. DISCOMs to publish quarterly un-audited and annual accounts as per the mandated timelines and ensure no new regulatory assets are created
- b. state governments to release advance subsidy payments, and subsidy arrears
- c. government bodies to clear all electricity dues for the year under evaluation.

In addition, the action plans of pre-qualified DISCOMs will be assessed on the basis of financial sustainability; infrastructure works and their outcomes; and policy and structural reforms, capacity building, and IT/OT enablement (Ministry of Power, 2021).

Despite these many attempts, DISCOM financial sustainability has steadily deteriorated, with accumulated losses rising to over Rs 488,000 crores by 31 March 2019 (see Figure 1).

Table 3: Past electricity sector bailout schemes

Period	Name of scheme	Scheme magnitude	Source
2001	2001 Scheme for Repayment of SEB Dues	41,473 crore	Prayas (Many Sparks, Little Light)
2012	Financial Restructuring Plan	1.19 lakh crore	Prayas (Many Sparks, Little Light)
2015	UDAY	2.01 lakh crore on July 2016	Prayas (Many Sparks, Little Light)
2020	Atmanirbhar Bharat Abhiyan Package	90,000 crores	(PRS, 2020)
2021	Reforms-based Result-Linked Power Distribution Sector	3 lakh crore	2021 Budget Speech

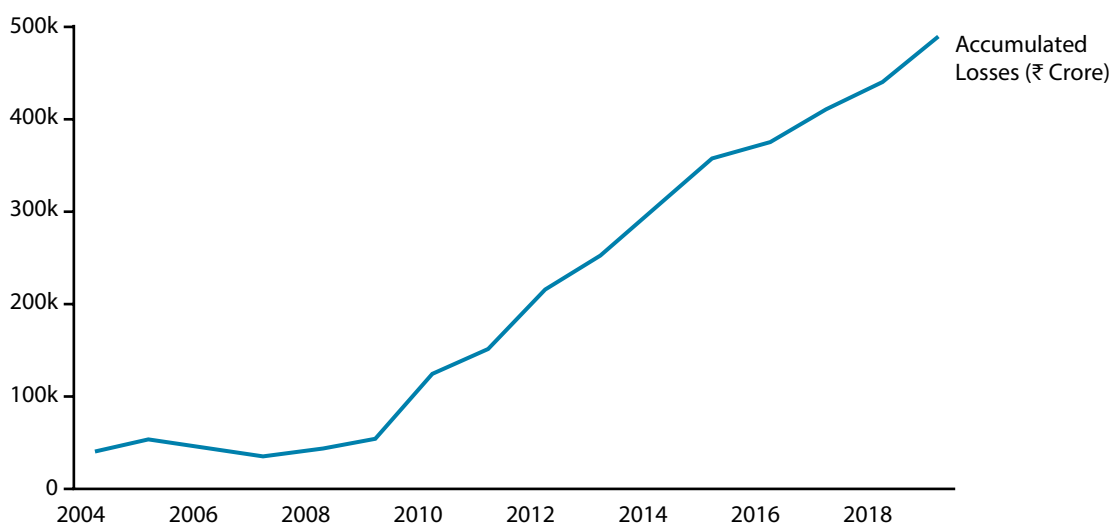


Figure 1: Accumulated losses of state utilities

Source: PFC reports

⁶ Details available at https://powermin.gov.in/sites/default/files/webform/notices/OM_Revamped_Distribution_Sector_Scheme.pdf

Causes for the Current Crisis

While the extent of DISCOM performance varies between states, there are some fundamental issues which have persistently plagued utilities. These are discussed here.

1. Lack of Cost-reflective Tariffs

DISCOMs calculate tariff using an 'average' cost of supply, a metric that assigns equal costs to each unit of electricity sold. The distortion inherent in the metric is that it does not consider the highly variable costs actually incurred in the supply of electricity to different consumers. Even though the costs of supplying high-voltage consumers is significantly less than that of supplying to lower voltage consumers (for whom more transformations are needed, requiring both greater infrastructure and resulting in larger electricity losses), the costs for all consumers are considered at the same average rate of the cost of supply, resulting in an implicit cross-subsidy by higher voltage consumers.

The complexity of tariff determination is accentuated by the existence of multiplicity of categories in the tariff structures, with numerous subcategories and slabs. There is significant variation in this between states. In an analysis of selected states by CRISIL, the variations resulted in the total number of categories and sub-categories ranging from as few as 14 in Delhi to as many as 72 in West Bengal (CRISIL, 2019).

2. Distorted Cross-subsidies

The distortion inherent in using the 'average' cost of supply is enhanced by the additional explicit cross-subsidy through tariffs, with households and agricultural consumers paying less than the average cost of supply and to make up for this, tariffs for commercial and industrial consumers are higher (Aggarwal 2020). By contrast, in most countries ranging from the US at one end and China at the other end, high voltage industrial consumers have the lowest tariff reflecting lower costs. This increases industrial competitiveness by lowering energy costs. The Indian industry has been seeking removal of this distortion in vain. The EA Act and its policy provisions on reducing cross-subsidies remain unimplemented.

With DISCOM finances heavily reliant on a healthy industrial and commercial base, DISCOMs in states with poor industrialization tend to correspondingly have

larger losses. Figure 2 compares DISCOM losses per unit of electricity in states with different shares of contribution of industry and agriculture to the net state value added. As can be seen, there is a reasonable degree of correlation, which is negative in comparison to losses to the industrial base of the state, and positive for agriculture .

Another consequence of the skewed reliance on subsidizing consumers has meant that the uneven growth between consumer categories has had an impact on DISCOM finances. Increased domestic consumption due to expanded electrification and rise in per capita incomes and increased agricultural consumption due to increased demand for irrigation have not been matched by a similar growth in subsidizing consumers. As a consequence, while the compounded annual growth rate over the last decade for agricultural and residential consumers has been 7.09%, it was only 5.3% for industrial and commercial consumers (see Figure 3). According to an analysis by CEEW, the revenue deficit from FY 2016 to FY 2019 on account of domestic and agricultural consumers grew from Rs 117,824 crore to Rs 174,391 crore (48% increase), while the cross-subsidy inflow increased by only 11% (from Rs 67,785 crore to Rs 75,027) (Aggarwal 2020). As seen in Figure 3, the slower than average growth in subsidizing consumers, especially industrial, increased the dependence on state subsidies.

The mismatch between costs and revenues for different consumer categories has had other unintended consequences. Consistent losses have meant that distribution companies do not have the financial capacity to invest in necessary capital expenditure, resulting in paying consumers needing to invest on their own in independent sources of power to meet their needs when they face power cuts, which increases the costs of doing business in India. Additionally, the high difference in the tariffs of different consumer categories impacts consumer behaviour; while the high cost of electricity has made investments in energy efficiency and energy alternatives (through both renewable and non-renewable captive generation) attractive for subsidizing consumers, access to cheap, or free, but unreliable supply of electricity to agriculture meant that farmers' investments in pumps and motors were driven more by low cost than efficiency,⁷ as appliances would burn out at significantly higher-than-normal rates (Dubash, 2007).

⁷ Resulting, as a consequence in both greater energy and water wastage

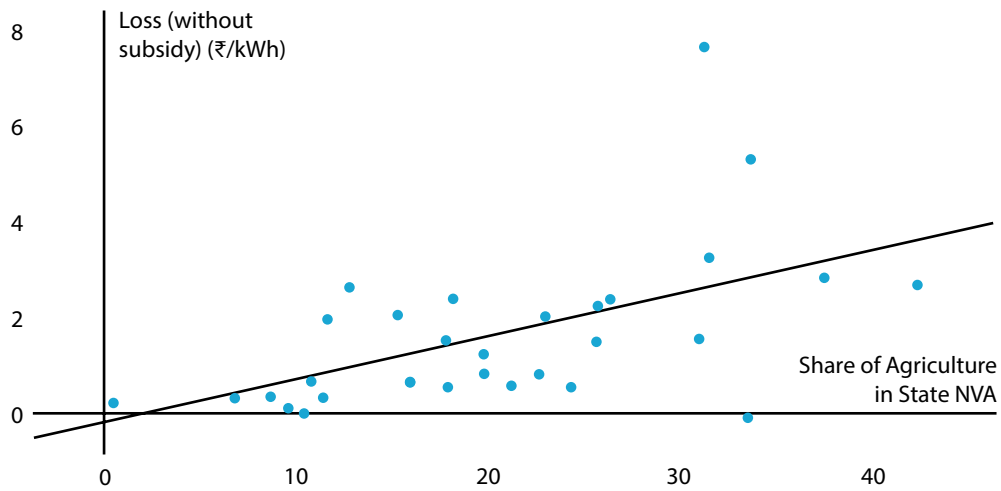
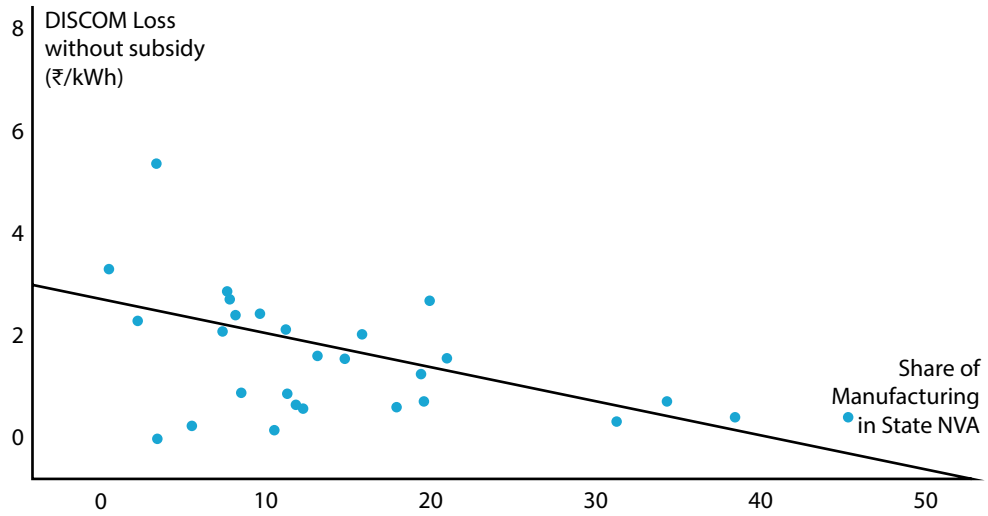


Figure 2: Comparison of DISCOM losses and share of manufacture in 2018–19 and agriculture

Source: PFC report, 2020 and RBI Handbook of Indian Statistics

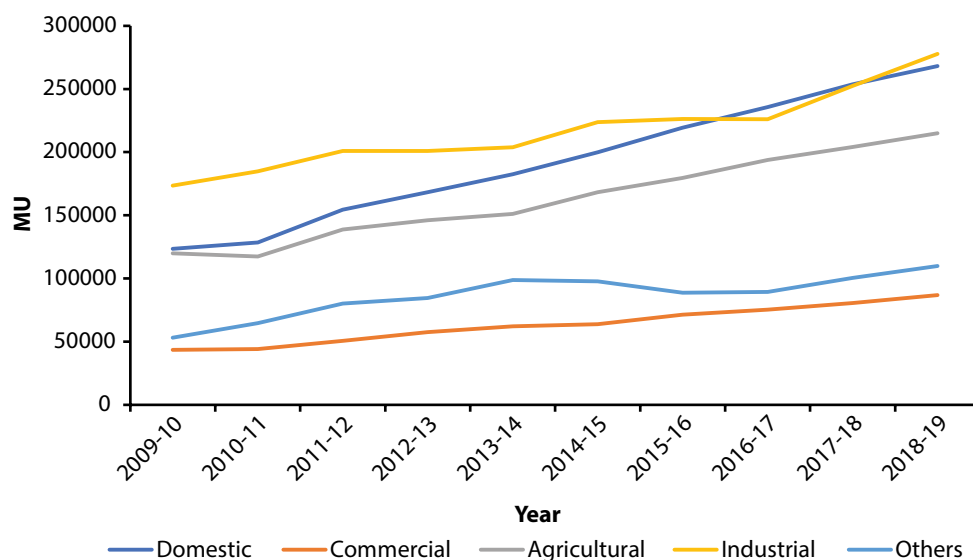


Figure 3: Sale of power by utilities to different consumer categories

Source: PFC Reports

3. Misaligned Political Incentives and Mismanagement

The sector has also faced a dysfunctional combination of poor finances of distribution companies that have limited their ability to ensure quality of electricity supplied by making required investments in system improvements and an operating environment that encouraged mismanagement and theft.

First, let us take the case of tariffs. Regulatory commissions could use the average cost of supply to fix tariffs so that revenue per unit would cover the actual cost with a margin for the prescribed rate of return. It could also declare the extent to which tariffs would become lower as AT&C losses were brought down. Consumers would pay more than necessary to the extent AT&C losses were higher. They would then demand AT&C loss reduction and this could arguably be the best way to get the government to improve management in state-owned DISCOMs and lower AT&C losses.

The first tariff order of the Andhra Pradesh Electricity Regulatory Commission did in fact adopt this principle, with the Commission adopting a 'true cost of supply' principle for determining retail tariffs as compared to the earlier 'nature and purpose of use' basis (TERI, 2007). While the DISCOMs registered efficiency gains, the public focus remained on the accompanying tariff hikes. There were widespread protests and pressure on the state government. Though the orders were not

rolled back, and the Supreme Court upheld the tariff orders, subsequent tariff hikes were minimal despite projections that further increase in tariffs were required (Dubash, 2007). According to some these tariff hikes may have contributed to the electoral defeat of the ruling party in the subsequent assembly election in 2004 (Swain 2018, Prayas Energy Group, 2002). This became the precedent for the conduct of all State Electricity Regulatory Commissions since, with the quest being for a sense of politically acceptable tariff increase irrespective of the actual numbers and what they logically required; a far more difficult call for an independent regulator to take than for an actual political executive. This has turned out to be the bane of 'Independent' regulation.

De-metering of agricultural consumption has been another example. It is considered to have encouraged 'a culture of unaccountability in the sector, leading to theft and line losses being hidden within the agricultural category' (Dubash, 2007). It becomes easy to show rising commercial losses in urban areas as increase in agricultural consumption. In many states, the need for disguising commercial losses frustrates attempts at implementing credible energy audit of actual supplies through metering of feeders. It also comes in the way of full implementation of feeder separation, which would result in accurate metering of supply for irrigation through agricultural feeders.

4. Lack of Regular Tariff Increase

Another major cause of the high financial losses has been that tariffs do not increase commensurate to increase in costs in many states. Since the 1990s, revenue recovered by DISCOMs had been, on average, 30% lower than the cost incurred, resulting in approximately Rs 1.15 lakh crores of costs, which were not recovered through tariffs (Prayas Energy Group, 2017). In the case of Andhra Pradesh, the average revenue receipts, used as a proxy for tariff increases, appear to have increased steadily over the years in nominal terms (Figure 4). However, when they

are deflated by the inflation index for the corresponding period (Figure 5), far from increasing the trend has remained broadly flat with a marginal decline from initial assessment to latest data available.

Due to a variety of reasons, including state government interventions or a lack of preparedness, DISCOMs do not file petitions in a timely manner (Aggarwal 2020). Even state ERCs, who are mandated to initiate the proceedings for tariff determination suo-moto in the case of delays, very often do not revise electricity tariffs, resulting in sustained gaps between the costs and the revenues

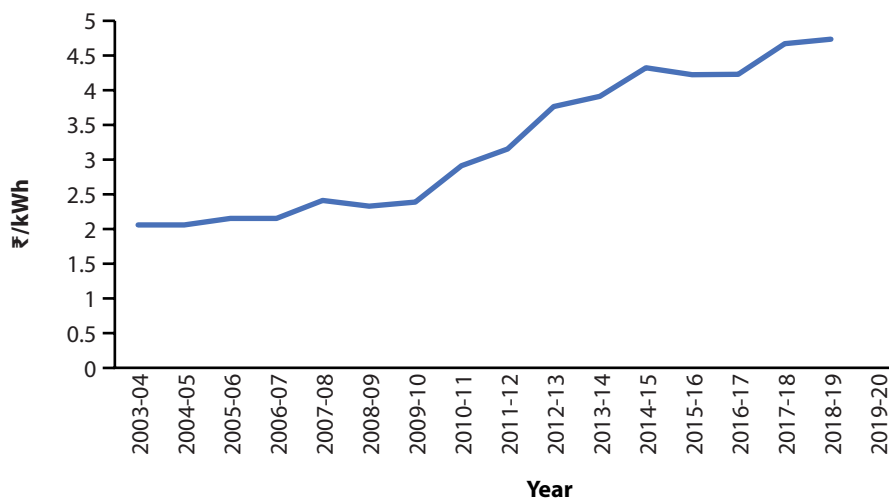


Figure 4: Average revenue received (without subsidy) in current prices for Andhra Pradesh DISCOMs

Source: PFC reports

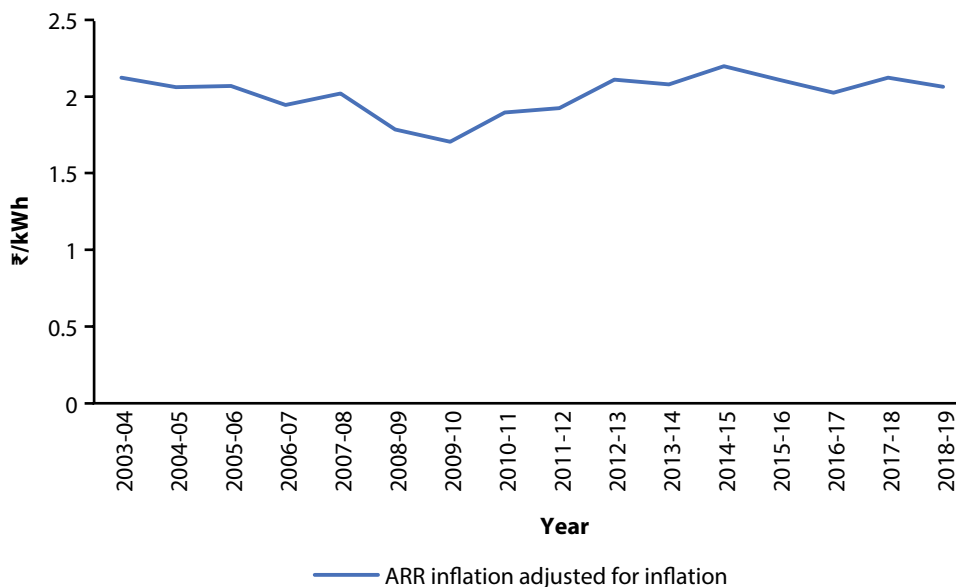


Figure 5: Average revenue receipts, adjusted for inflation. Inflation captured using State GDP deflator

Source: RBI Handbook of Indian Statistics; ARR data from PFC reports

(Prayas Energy Group, 2017). Political concerns over 'tariff shocks' to consumers further compound the issue. Tariff increases are kept consistently below required levels, widening the gap between operation costs and revenue flows. The delays in recovery of costs then force DISCOMs to raise money from alternative sources, often borrowing at high costs, in order to sustain operations (Devaguptapu, 2020). Continuous cash short-falls hinder the DISCOMs ability to invest in system improvements and deliver quality supply.

the years, non-payment would have created cash-flow issues for DISCOMs necessitating high cost borrowing.

According to the PFC Report on Utilities Performance for FY 2018–19, the un-paid subsidy was Rs 11,738 crore for FY 2018–19 (the latest year for which data is available). However, as Devaguptapu (2020) points out, adding up the sum of unpaid subsidies over the years provides more important context given the cumulative impact on DISCOM finances. Table 4 provides details of unpaid

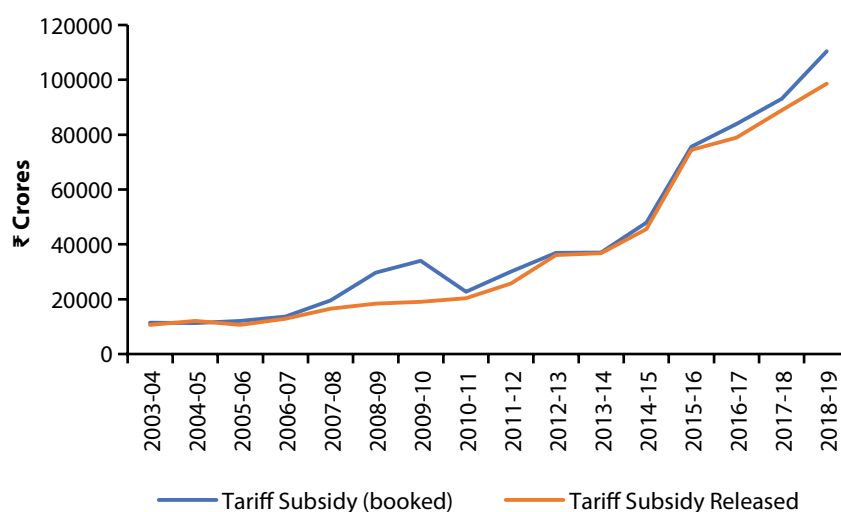


Figure 6: All India aggregate booked subsidy vs realized for DISCOMs, indicating unpaid subsidies over time, and contribution to discom losses

Source: PFC reports

5. Delays/non-payment of Subsidy Amounts and Dues by State Governments

The rapid rise in subsidized consumers and increased populist announcements of greater subsidies have meant an increase in the requirement of subsidies from the state governments (see Figure 6). Delays in release of subsidies, as well as underpayment of committed subsidies (the difference between subsidy booked and subsidy released) impact the ability of DISCOMs in managing operating costs. Moreover, since the fraction of the cost structure meant to be covered by subsidy payments has risen over

subsidies from 2003–04 onwards. The earliest year for which PFC data is available, from FY 2003–04 to FY2018–19, the cumulative unpaid subsidy was Rs 63,447 crore (Devaguptapu, 2020). Factoring in a hypothetical 10% interest rate, the carrying costs of the unpaid subsidy would be an additional Rs 85,738 crore, **taking the actual aggregate to Rs 149,185 crore**, a sum which certainly exceeds the reported dues owed to generation companies (as per the PRAAPTI portal), and would account for a significant portion of the overall dues owed by DISCOMs.

Table 4: All-India aggregate booked subsidy vs realized for DISCOMs

Year	Tariff subsidy (booked) (Rs Crore)	Tariff subsidy (released) (Rs Crore)	Unpaid subsidy (Rs Crore)
2003–04	11418	10660	758
2004–05	11271	12014	-743
2005–06	12013	10558	1455
2006–07	13590	12836	754
2007–08	19518	16472	3046
2008–09	29665	18388	11277
2009–10	34014	19074	14940
2010–11	22705	20334	2371
2011–12	30009	25771	4238
2012–13	36885	36100	785
2013–14	37052	36758	294
2014–15	47965	45584	2381
2015–16	75608	74515	1093
2016–17	83856	78938	4918
2017–18	93061	88919	4142
2018–19	110391	98653	11738
		Cumulative	63447

Source: PFC reports, methodology from (Devaguptapu, 2020)

Moreover, government departments often also do not release payments for outstanding dues in a timely manner. While the Ministry of Power estimate of electricity dues owed by state government departments was around Rs 41,700 crore in 2019 (PTI, 2019), subsequent media reports have reported even higher out standings. A news report in January 2020 (Bhaskar, 2020) reported them to be over Rs 82,000 crore. Assuming the dues are spread over a number of years and that late payment charges have not already been factored in, their carrying costs could be yet higher.

Way Forward

Access to electricity is a basic human requirement, similar to that of clean water or food. India has achieved the goal of providing electricity to all its households. The next challenge lies in providing reliable quality electricity supply without the interruption to meet increasing demand fully. To be able to do so, the distribution companies need to be seen in the market as credible buyers of electricity who make timely payments of their

dues. The gains of having sufficient generating capacity in the country, largely through private investment in recent years with renewable energy capacity being almost fully created by private investment, runs the risk of being put in jeopardy if markets lose faith in a financial turnaround of the distribution sector being achieved.

The financial problems of the distribution sector have persisted notwithstanding efforts of the central government over almost three decades. In our view it is more of a political economy challenge than one that is amenable to a legislative or a technocratic solution driven from the centre. Nor is there any quick fix like opening up the sector to retail competition as is often seriously considered. We have in our paper (Shankar & Avni, 2021) argued why this is an idea that is not suitable for India at this stage of her development and its energy transition towards renewables. Setting distribution right would need patience and persistence.

The adverse impact of COVID-19 has made matters more difficult. The Power Ministry gave some timely relief to

DISCOMs last year. Fortunately, electricity demand has been picking up. However, state government finances continue to be under stress and would improve only when the economic recovery after the second wave gathers momentum. The necessary tariff increases would be easier if they are undertaken gradually in small amounts as was done earlier when diesel prices were brought nearly at par with petrol prices in the early years of the last decade. Or, as has been happening with petrol and diesel prices over the last few months. Some creative ways could be evolved by the SERCs for monthly increases in tariffs, which may present fewer difficulties. There is, however, no alternative to restoring the financial health of DISCOMs at the earliest by eliminating the gap between revenue and cost.

DISCOMs have been able to cope with the sustained gap between cost and revenue per unit due to the willingness of the financial institutions of the central government, the PFC (Power Finance Corporation), the REC (Rural Electrification Corporation), and the public sector banks to keep providing what have been essentially working capital loans without any modicum of due diligence on how these would be repaid. The implicit guarantee of the state government was considered adequate. This was an error, and should certainly not have been repeated after the benefits of the first bailout package began petering out. This must stop forthwith. Such a hard budget constraint would compel state governments to give the requisite political attention and make the hard decisions needed.

The situation across states is quite varied, as can be seen by the variation in the extent of ACS-ARR gaps in different states. While the gap in costs to revenues on a subsidy received basis at an all-India level was Rs 0.52 in 2018–19, the gap in individual states varied from Rs 0.23 (Delhi) to Rs 2.67 (Andhra Pradesh) (PFC, 2020).

The central government has policy space to reduce the average cost of power being supplied to the states through thermal power plants, which account for 70% of the electricity in the country. Cost of power purchase accounts for more than 75% of the total cost. There are significant distortions that increase the cost of supply.

If the central government were to make decisions to remove these distortions, the magnitude of the gap that the states need to eliminate would come down. Further through its own example, the central government would be better placed to get the states to act. Thermal power accounts for 70% of the electricity generated in the country. There is considerable potential for reducing the cost of coal. These are:

- a. Coal India supplies coal on a cost-plus basis. This means that the price enables full recovery of all its costs along with a margin to make it reasonably profitable. As per news reports, 158 underground mines employ 43% of the workforce but contribute only 5% of the total production (PTI, 2021). Closing down these mines and rationalizing this workforce through a combination of retrenchments and redeployment would reduce the costs of coal and, in turn, electricity tariffs.
- b. Coal is the largest freight commodity in terms of both revenue and volume transported by the Indian Railways. The dependence of the Railways on coal transport for revenue has fostered several distortions. As Kamboj and Tongia (2018) note, the Indian Railways explicitly overprice coal freight by 31% to offset subsidized passenger travel in an internal cross-subsidy, which increases the cost of power on average by 10 paise per kWh on an all-India basis. In more distant states, this amount can rise as much as threefold. Even within freight transport, the 'class system', which the Railways uses to charge different commodities, the freight rate of coal is 45% higher than the commodities in the 'break-even' class. As a consequence, 'the transportation cost of coal by railways per unit of electricity generated is as low as Rs 0.13/kWh for 100 km and as high as Rs 1.85/kWh for 2,000 km' (Kamboj and Tongia, 2018). Rationalizing these cross-subsidies to charge freight on actual cost basis would reduce the costs of coal, and in turn the cost of power supply, especially in more distant states.⁸
- c. A cess was imposed on coal in 2010 at Rs 50 per tonne. It was to be used for promoting clean energy and carbon mitigation. Conceptually it was the equivalent of a carbon tax being advocated globally

⁸ The rationalization would also improve the share of traffic by Railways in total freight traffic, which fell from 89% in 1950–51 to 30% in 2011–12 (PRS, 2018) and would follow through benefits for both the environment and for commodity prices.

by environmentalists. This was increased thrice till 2016. After the introduction of GST, the carbon cess at Rs 400 per tonne was surprisingly earmarked for making up for the shortfall in actual GST collections. It is being used for making the guaranteed payments to the states under the compact with the states for the introduction of GST (Sahu, 2020). Coal is not a luxury good on which a cess for compensating states appears legitimate. With the declining costs of renewables, the cess is also no longer required for its original purpose of supporting the deployment of expensive renewable energy power. The cess can be withdrawn. This would further lower the cost of power purchase.

- d. The setting up of coal washeries was mandated on environmental considerations for coal being transported over long distances. Indian coal has ash over 40% and with washing it would come down by about 15%. So there would be lower energy consumption and lower carbon emissions as a result. However, washeries have not come up. This mandate has now been withdrawn in recognition of reality. Further, the cost of freight would also decline if washed coal were carried. The business case for setting up washeries has not been seen as coal cost is a passthrough. Thermal power stations have traditionally been acting as if they could do nothing about reducing the cost of coal. It may turn out that over certain distance setting up washeries makes commercial sense. The central government can get the policy and regulatory regime to go into this issue and provide the right incentives for the least cost outcomes.

The policy initiatives of the Ministry of Power, focusing on pre-paid and smart metering that would prevent commercial losses, improve transparency in billing and empower consumers to control consumption, directly transfer benefits of subsidies to affected consumers, and ensure timely payments in the electricity supply chain (both by state governments to DISCOMs and by DISCOMs in turn to GenCos) are all welcome steps in the right direction.

A major cause of the financial challenges facing DISCOMs is the service to agricultural consumers. Table 5 provides a simplistic analysis of the costs to DISCOMs in serving agricultural consumers, calculating the cost of service from publicly reported data by regulators and distribution companies. Comparing the cost of service to the total revenue from agriculture, including tariff subsidy, on a subsidy booked basis appears to show that DISCOMs are often not adversely affected by serving agricultural consumers. The picture changes when the comparison is made to total revenue for subsidy actually received⁹. It is important to note that DISCOM losses are reported on accrual basis, which is calculated based on subsidy booked. As this subsidy is often not released in its entirety, the losses are actually higher than reported. The political difficulties in metering and raising tariffs for agricultural consumers are a reality. These create space for distortions in reporting of operational efficiencies. The absence of metering allows distribution companies to hide distribution losses and theft. Feeder separation of agricultural supplies was used successfully in Gujarat to supply electricity to rural households around the clock and to efficiently supply electricity for agriculture when needed. The space for overstating agricultural consumption ended (Prayas Energy Group 2017). Reform efforts of the central government have been urging separation of feeders. Feeder segregation has been completed in Gujarat, Andhra Pradesh, Punjab, Rajasthan, Haryana and Madhya Pradesh, among other states (PowerLine, 2017). This needs to be completed in agricultural states as well at the earliest. External technical audit of metering and real time recording actual supply to agricultural feeders would be a major milestone towards better governance.

Where feeder separation is complete another option opens up. Agricultural supply for the state can be ring fenced in a separate SPV. Excluding subsidized/free supply for agriculture, the remaining electricity supply business faces no real political requirement for not being commercially viable. Cross-subsidies could also be reduced.

⁹ A common criticism of agricultural subsidy and consumption data stems from the absence of metering of agricultural consumers. As Sharma (2021) notes, nearly 92% of agricultural consumers in Punjab and more than 35% in Maharashtra, Madhya Pradesh and Gujarat are un-metered, which allows DISCOMs to overestimate agricultural consumption, and hide theft and/or distribution losses. A counterbalancing force at play, however, is that agricultural consumption is typically more expensive to serve than the average cost of supply data. To what extent each of these factors affects the data is difficult to say, as in the absence of data, the criticisms are necessarily qualitative and these elements are counterbalancing in their effect.

They could still be used to provide for concessional tariffs for lifeline consumption. With LED lighting and energy efficient fans the consumption requirement of life line consumption has come down substantially. It may even be feasible for the regulator to move towards merging all other consumer categories and charging them the average cost of supply. As the average cost of supply already includes an implicit cross-subsidy for smaller consumers (domestic consumers in rural and urban areas, LT commercial and industrial consumers, etc.), electricity tariffs would become more equitable not only for domestic consumers, but also for commercial and industrial establishments, whose high electricity tariffs lower their competitiveness.

In some states, governance and efficiency have been at reasonable levels. There is a cycle where tariffs are not raised, the financial situation deteriorates, tariffs are raised and, thereafter, for some years there are no, or nominal tariff increases till the next crisis. In others, modest but inadequate tariff increases take place. Sustained profitability of the DISCOMs is not a priority for the political leadership in most states. Survival of the sector and reasonable service are adequate. It would be prudent for the Centre to leave these states alone and let them manage as they wish. Most of these are the better performing and relatively prosperous states. However, the flow of funds for working capital needs to the DISCOMs by central financial institutions without due diligence should stop forthwith. The state political leadership would then have no option but to take the necessary political decisions regarding increase in tariffs, increase in subsidies from the state budget, and/or improving operational efficiency. The easier option of leaving difficult decisions for the future would not be available. At best some enhanced borrowing by the state government may be permitted for three to five years for transforming the sector through higher subsidies till revenues rise adequately through the mix of tariff increases and efficiency gains

Then there are a few states that account for the major share of losses and outstanding dues and debt. The central government should focus on these and work out with them a tailor-made state-specific turnaround strategy. Pragmatism would require that while a strategy could be evolved conceptually, a buy in and implementation of politically difficult decisions by a state government would be feasible only in the early part of the political term of a state government.

Where overall governance culture is weak, private sector participation through privatization on the successful Delhi model, or through the subsequent franchisee model, may be the only way forward. There are efficient private groups, who can take over distribution in states in a competitive manner. It would be easier for the central government to first demonstrate success in a state where the same party is in power in the state. The central government through its financial institutions has considerable leverage should it wish to use them. A DISCOM unable to repay its debts can be taken to the IBC by its creditors and put up for sale. The central government can get its PSUs to form a distribution SPV, which can take over a state DISCOM and turn it around. It may be recalled that the NTPC was set up by the central government to make up for the shortfall on the generation front by the states.

Further, central government-supported debt for investments in smart/pre-paid meters would be in continuation of past efforts. The conditions for financial support have emerged from learnings of past experience and are aimed at achieving a breakthrough. Even though stricter conditionalities based on past experience are envisioned, it may still turn out that on their own such financial support may not yield desired outcomes in states where problems are acute. It could be argued that investments in distribution that yield financial returns through higher efficiencies can be financed commercially with the financial gains being escrowed and going first to repay the debt. This has been done successfully for energy efficiency investments. Concessional terms of financing would reduce the payback period of viable investments.

If state governments need transition financing to give higher subsidies to moderate the trajectory of tariff increases, then they need to borrow and not the DISCOMs. The Electricity Act envisages subsidies from the state government on welfare and other policy objectives and a commercially viable distribution business. This needs to happen. A trajectory over the next three years of eliminating the gap between revenue and cost per unit with specific numbers for tariff increases and AT&C loss reduction with tariff increase being higher in case loss reduction was lower would, in our view, be the right way to proceed. The approval of the trajectory of tariff increases over the next few years in alternative scenarios by the SERCs should be a pre-condition for the concessional financing that the central government may provide for meeting transition financing needs.

Table 5: Comparison of costs of serving and revenue by agricultural consumers in selected states, and impact on DISCOM finances tariff subsidy data

States	Gross energy sold, agricultural (%)	Revenue from sale of power to agriculture (Rs Crore)	Subsidy share of agriculture (approximate)	Tariff subsidy as % of total revenue	Revenue from tariff subsidy (booked) for agriculture (Rs Crore)	Estimated revenue from tariff subsidy received for agriculture	Total revenue from agriculture (on subsidy booked basis)	Total revenue from agriculture (on subsidy received basis)	Average cost of supply (Rs/kWh)	Cost of serving agriculture (Rs Crore)	DISCOM loss on accrual basis (Rs Crore)	Loss from serving agriculture (on subsidy received basis) (Rs Crore)
Andhra Pradesh	27.8	1033.416	100%	18.16%	6,054	227	7,087	1,260	7.61	11544.09	11,934	10,284
Uttar Pradesh	18.28	4551.228	62%	17.52%	6,242	1,764	10,793	6,315	6.39	10290.31	6,032	3,975
Karnataka	38.76	188.0688	95%	30.33%	11,289	3,054	11,477	3,242	6.11	13815.58	-970	10,573
Punjab	23.66	0	61%	28.24%	5,267	2,844	5,267	2,844	5.94	6668.08	38	3,824
Tamil Nadu	17.18	0	50%	17.63%	3847.7	1,775	3,848	1,775	6.69	8749.481	12,623	6,974
Telangana	35.62	899.4848	79%	17.84%	4463.725	1,796	5,363	2,696	6.36	13950.98	8,019	11,255

Source PFC reports and from Aggarwal (2020)

DISCOMs function completely within the domain of the states. They are regulated by the State Electricity Commissions who also fix consumer tariffs. While in theory they are independent of the state governments with their members having fixed secure terms, in practice they have been sensitive to prevailing political realities. A decision by a DISCOM to seek an increase in consumer tariffs as well as the subsequent decision of the SERC to do so has generally needed a political green signal.

A large sub-continental nation, India has a huge diversity in political, social, and governance practices and cultures

across states. As the experience of the last two decades bears out, this diversity creates limitations for a uniform approach for all states for a commercial turnaround.

The central government would need to consider a two-track approach: one, a uniform approach for all states, and, second, a state-specific approach. Within the states, the political executive at the highest level needs to assume responsibility and give the financial turnaround of the sector priority. The sector needs political leadership.

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