



Enhancing Transparency and Competitiveness in India's Electricity Sector

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The Energy for Growth Hub is a global think tank advancing data-driven solutions to end energy poverty. [PPA Watch](#) is a Hub project focused on power purchase agreements in emerging markets. These complex contracts are the foundation for most power projects and have major consequences on everything from sovereign debt sustainability to energy security. This country summary was prepared based on the Hub's independent research and consultation with key market actors.

Summary

India has made dramatic progress in expanding access to electricity across its population and in closing the power deficit. The Electricity Act, 2003, ushered in an era of competition in energy supply and improved disclosure in contracting and power procurement. In line with its climate mitigation aspirations, renewable energy capacity has increased to more than a quarter of total installed capacity and the government is committed to not accepting new coal proposals in the next 5 years. Although with so many coal plants in the pipeline and still being built, this pause will not have as much effect as coal remains the dominant energy source. India has set an ambitious renewable energy target of 450 GW by 2030. Meeting the target will require \$600 billion in financing for new generation and grid infrastructure, including \$200 billion for PV and wind capacity. Sector financing and contracting must scale rapidly to meet this target.

The country's power sector faces challenges despite ambitious renewable energy plans. The sector's competitiveness depends on addressing financial strain in distribution companies, caused by below-cost prices for residential and agricultural consumers and high technical and distribution losses. Reforms must also create a level playing field for all technologies by regulating central, state-government power generation companies, and IPPs uniformly aimed at reducing debt risk, systemic imbalances, and unfair practices.

This case study offers recommendations on how structural reforms that enhance transparency and promote competitiveness could put the country on a path toward delivering universal access to clean, reliable, and affordable electricity.

Context

Until the early 1990s, power generation assets in India were exclusively owned and operated by the central and state governments. In 2001, about 44% of households in India did not have access to electricity, which underscored the need to attract greater private investment in the power sector including expanding the transmission and distribution network. Following the passage of the Electricity Act, 2003, which was designed to introduce competition in power generation and distribution, various states unbundled generation, transmission, and distribution from vertically integrated State Electricity Boards (SEBs).^{1,2} Section 7 of the Act aimed to delicense non-hydro and non-nuclear generation in order to increase private sector participation. The Act also gave the right of open access to industrial consumers, which would allow them to buy or sell electricity using the transmission and distribution network.

As of May 2023, installed power generation capacity in India stood at 418 GW, of which renewable energy capacity constitutes 30%.³ Approximately 51% is owned by the private sector, 24% by the central government, and 25% by state governments.⁴

¹ There are 28 states and 8 union territories in the country.

² Thakur, T., Deshmukh, S., Kaushik, S., and Kulshrestha, M. (2005). Impact Assessment of the Electricity Act 2003 on the Indian Power Sector. *Energy Policy*, 33(9):1187–1198.

³ <https://pib.gov.in/PressReleasePage.aspx?PRID=1885147>

⁴ <https://powermin.gov.in/en/content/power-sector-glance-all-india>

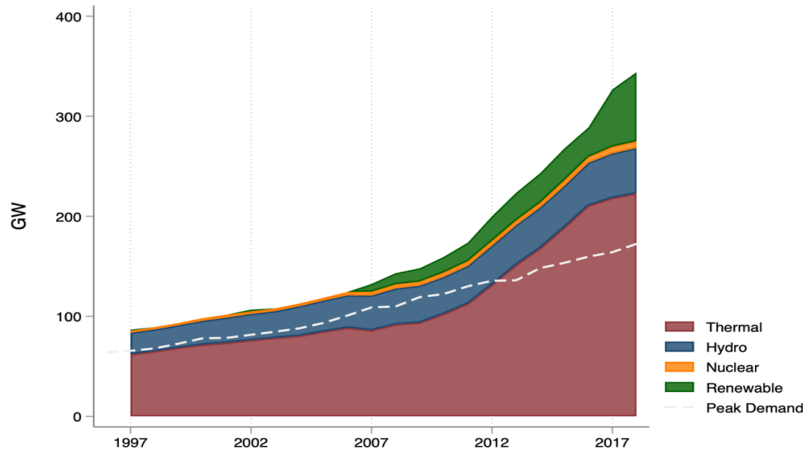
TABLE 1: Installed Capacity (GW) as of March 31, 2022

| Market Structure | Total Installed Capacity (GW) | Percent of Total Installed Capacity | Power Purchase Agreements (PPAs) |
|------------------------------------|-------------------------------|---|----------------------------------|
| Deregulated, multiple buyer market | 418 | Coal: 49.1 Lignite: 1.6 Gas: 5.9 Diesel: 0.1 Hydropower: 11.2 Wind: 10.3 Solar: 16.1 Other RE: 3.8 Nuclear: 1.6 | Unknown |

As shown in Figure 1, installed thermal generation capacity has exceeded peak demand in the country since 2012-13. There has not been a physical shortage of baseload generation capacity in the years since. It is important to note however that outages still happen because utilities in lose money on the units of power they sell and therefore prefer to ration demand instead of supplying power at a loss. It is not because there are any physical shortages of electricity. Furthermore, while installed renewable capacity has been growing steadily since 2007, installed thermal capacity more than doubled during this period and is expected to increase through 2030. There are 39 coal-fired power plants still under construction with 7 GW of new coal-fired generation capacity coming online in 2022-23, the largest annual increase since 2017-18. As part of its Intended Nationally Determined Contributions (INDC), India plans to install 500 GW of renewable energy by 2030, which is expected to meet 50% of the country's installed generation capacity requirement.⁵ In 2023, India's National Electricity Plan halted new coal-fired power plant additions for five years, except those already planned. India has been invited by G7 nations to join the Just Energy Transition Partnership (JETP) for international financing in clean energy, but hasn't committed to a coal phase-out timeline.

⁵ Government of India (2022) [India's Updated First Nationally Determined Contribution Under Paris Agreement \(2021-2030\)](#).

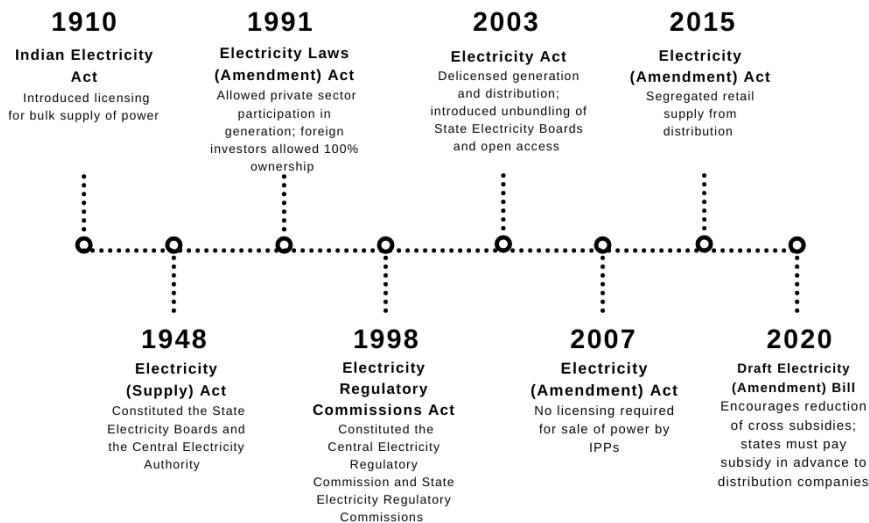
FIGURE 1: Annual installed generation capacity in India by source and annual peak/maximum demand from 1997 to 2019



Overview of India's electricity system

Prior to their unbundling, the State Electricity Boards (SEBs) were responsible for all parts of electricity supply, including generation, transmission, and distribution. The need for bilateral contracting became apparent following a 1991 amendment to the Electricity Supply Act of 1948, which allowed private independent power producers (IPPs) to set up generation stations and sell power to the SEBs. The Electricity Regulatory Commissions Act of 1998 created independent regulatory bodies both at the Central and State levels. The Electricity Laws (Amendment) Act of 1998 was passed to make transmission a separate activity with the intent of inviting greater investment from the public and private sectors. A timeline of historical legislation on the power sector is illustrated in Figure 2.

FIGURE 2: Timeline of national legislation on the power sector



Historically, central government and state government-owned power plants had long-term PPAs covering their total capacity. These PPAs operated under a cost-plus regime, where the regulator assessed the plant's cost structure using operating norms and parameters. A predetermined rate of return was then added to determine the electricity selling price. Section 62 of the Electricity Act of 2003 empowered the Central Electricity Regulatory Commission (CERC) and the State Electricity Regulatory Commissions (SERCs) to set these cost-plus tariffs, balancing consumer and investor interests to promote competition and efficiency. The CERC or SERCS manage the tariff approval process and issue Regulatory Orders with cost-plus tariffs based on whether the producer is a central or state government-owned enterprise.⁶ Section 63 of the Electricity Act introduced competitive bidding for PPAs. The Act aimed to attract bids from private sector power producers to expand the country's power system, including generation and transmission infrastructure, with a focus on minimizing costs.⁷ The Ministry of Power introduced two types of bidding processes for long-term PPAs:

- I. "Case 1": The developer decides the location, technology, and fuel type for the project and is responsible for obtaining the necessary clearances.⁸
- II. "Case 2": The location and fuel type are decided by the distribution licensee beforehand, while the bidder chooses the technology.⁹ The distribution licensee is responsible for land acquisition, water allocation, fuel arrangements, and clearances.¹⁰

If the contract is signed via a competitive bidding route, the Standard Bidding Documents outline the conditions that need to be fulfilled by both the buyer and seller. In either of these two cases, the tariff has a two-part structure, consisting of a fixed capacity charge and a variable energy charge except for renewables contracts that have a per-unit charge. For the length of the long-term contract, the developer becomes the owner of the generating station, and the revenue streams are bound by the terms of the PPA.

Distribution companies self-schedule contracted power plants without disclosing variable costs of the contracted power plant, potentially causing deviations from the merit order.

The Government of India recently proposed the Electricity (Amendment) Bill 2022, which aims to introduce more competition in retail electricity distribution, where multiple distribution licensees can operate the same distribution network.

⁶ Annual tariff regulations released by the Central Electricity Regulatory Commission are available here: https://cercind.gov.in/Current_reg.html.

⁷ Following the enactment of the National Electricity Policy of 2005 and the National Tariff Policy of 2006, the Ministry of Power issued "Standard Bidding Documents", which provide a template for developers to submit bids for long-term PPAs.

⁸ Ministry of Power (2013) Guidelines for Procurement of Electricity from Thermal Power Stations setup on DBFOO basis. https://powermin.gov.in/sites/default/files/uploads/Guidelines_4_procurement_power_on_DBFOO_Nov2013.pdf.

⁹ Ministry of Power. (2013). Guidelines for Procurement of Electricity from Thermal Power Stations setup on DBFOT basis. https://powermin.gov.in/sites/default/files/uploads/Guideline_for_procurement_of_power_of_electricity.pdf.

¹⁰ In the case of Ultra Mega Power Projects (UMPPs), power producers are required to procure plant equipment domestically.

Entry into the Indian power market

The process for setting up cost-plus PPAs involves regulatory approval based on demand forecasts in the Electric Power Survey published by the Central Electricity Authority (CEA) every five years. The distribution company determines the required capacity and seeks regulatory approval through a tender process for any deviations from the forecasted demand.

Competitively bid PPAs in India involve a two-stage process. In the first stage, the buyer or bidder submits a Request for Qualification (RFQ) to the regulatory commission, providing project details and financial, technical, and operational credentials. The National Tariff Policy sets up an index for bid evaluation based on factors like coal and gas escalation rates, inflation rates, discount rates, and exchange rates. Qualified bidders proceed to the Request for Proposal (RFP) stage, submitting a financial bid consisting of a fixed capacity charge and either a variable fuel charge (for non-renewable plants) or a single-part tariff (for renewable projects). The lowest financial bidder receives a Letter of Award, and upon signing the PPA ensures contracted power supply to the buyer, who shares the fixed cost of contracted capacity.

Renewable energy contracts are typically one-part per-kWh tariff based on the levelized cost.¹¹ In the past, feed-in tariffs set by state governments determined the fixed rate at which renewable energy producers could sell electricity to the grid. However, guidelines issued by the Ministry of New and Renewable Energy introduced competitive bidding for solar projects above 5 MW, similar to wind projects.¹² The lowest bidder in the reverse auction mechanism wins the contract. Renewable energy projects also hold a “must-run” status, requiring all generated power to be utilized, with distribution companies liable for curtailing such energy only in technical constraints.¹³

FIGURE 3: Structure of Indian Power Market

| | | | |
|------------------|---|--|-----------------------------|
| Policy Makers | Central Government | 28 State Governments | |
| Regulators | Central Electricity Regulatory Commission | State Electricity Regulatory Commissions | |
| System Operators | National Load Dispatch Centre | Regional Load Dispatch Centres | State Load Dispatch Centres |
| Generation | Central Generating Stations | State Generating Stations | IPPs |

¹¹ As a result, the marginal “contractual” cost of one unit of electricity from a coal plant can be less than the marginal “contractual” cost of one unit of electricity from a renewable plant (Tongia et al, 2020).

¹² Ministry of New and Renewable Energy. (2017). Guidelines for Tariff Based Competitive Bidding Process for Procurement of Power from Grid Connected Solar PV Power Projects. <https://mnre.gov.in/Solar/policy-and-guidelines>.

¹³ https://cercind.gov.in/2010/ORDER/February2010/IEGC_Review_Proposal.pdf.

| | | | |
|--------------|------------------------------|--------------------------------|--|
| Transmission | Central Transmission Utility | State Transmission Utilities | Independent Private Transmission Companies |
| Distribution | State Distribution Companies | Private Distribution Companies | |
| Markets | Bilateral Markets | Power Exchanges | |

In India, each state manages its grid, and distribution companies self-schedule contracted power plants based on day-ahead availability.^{14,15} Any residual demand is met through short-term bilateral contracts or power exchanges with a one-part per-kWh price.¹⁶ Some distribution utilities also use banking or barter arrangements with other utilities to fulfill residual demand for electricity. Long-term contracts have been common, but issues emerged in the past decade when newly built independent power producer-owned thermal plants struggled due to fuel supply and PPA issues. Meanwhile, state-owned producers with cost-plus PPAs continued operating without competitive bidding, potentially causing inefficiencies when newer, more efficient plants entered the market without securing contracts.^{17,18}

PPAs between State and Central governments & IPPs

The role of IPPs

While IPPs account for nearly half of India’s power generation capacity, attracting foreign and private capital to the power sector has been a challenge. In 1991, as part of economic reform efforts, private investors were invited to invest in electricity generation with preferential terms. These included a 16% guaranteed rate of return on equity, incentives for operating at Plant Load Factors (PLF), 100% foreign equity participation, high debt-equity ratios, reduced customs duties on power equipment, waived dividend export requirements, and priority access to External Commercial Borrowing. Central government-backed financial guarantees

¹⁴ The National Load Dispatch Centre manages imbalances closer to real-time by imposing non-market-based penalties for deviations from the schedule through a facility known as the Deviation Settlement Mechanism (DSM) (Kumar and Chatterjee, 2012.)

¹⁵ Kumar, A., and S. Chatterjee. (2012). Electricity Sector in India: Policy and Regulation New Delhi: Oxford University Press.

¹⁶ Tongia, R., Sehgal, A., and Kamboj, P., editors (2020). Future of Coal in India: Smooth Transition or Bumpy Road Ahead? Notion Press and Brookings India.

¹⁷ Ministry of Finance. 2018. "Report in compliance of the order of the Hon'ble High Court of Allahabad dated 31st May 2018 on stress in the power sector."

¹⁸ The inability of investors to raise equity and working capital, tariff related disputes, and delays due to cost overruns also contributed to the creation of stressed assets. [Stressed/Non-performing Assets in Electricity Sector](#).

fast-tracked seven mega power projects to investor concerns about SEB creditworthiness. IPPs were also allowed to negotiate directly with State Governments and SEBs without competitive bidding.

Within three years, state Governments and SEBs signed 243 Memoranda of Understanding (MOUs) totaling over 90,000 MW, exceeding the country's total installed capacity at the time.¹⁹ These led to long-term PPAs locking both parties into 20-year agreements. The guaranteed rate of return led IPPs to inflate project costs for a higher rate of return, raising tariffs and sparking public concerns about the process being politicized resulting in high charges and kickbacks. Rushed SEBs and investor projects lacked careful technical and feasibility studies, making the cost structure suboptimal. Banks hesitated to lend to financially troubled SEBs since IPPs contributed only about 20- 30% of project capital. Many investors failed to secure long-term fuel supply allocations due to the heavy demand for coal blocks, which ultimately rendered their projects unviable. By 1998, only 200 of over 400 MOUs remained and by 2008, just 10,000 MW of the 100,000 MW were operational.

The Enron Controversy

The practice of providing explicit guarantees in PPAs to attract foreign and private investment ended when competitive bidding for IPPs was introduced with the passage of the Electricity Act, 2003, the National Electricity Policy, 2005, and the National Tariff Policy, 2006. However, an important catalyst for these reforms was the Enron Power Project, where in 1992, Enron, Bechtel, and General Electric collaborated to construct a USD 3.1 billion, 2,550MW coal-fired power plant in Dabhol, Maharashtra. However, the project faced numerous issues due to the Maharashtra government's lack of technical and financial viability studies, resulting in excessively high project costs and tariffs compared to similar ventures in India. The Maharashtra State Electricity Board (MSEB) was obligated to purchase all power from the Dabhol plant, even at higher costs, leading to financial strain on the state budget. This annual payout would amount to half of Maharashtra's entire budget expenditure and was counter-guaranteed by the Maharashtra State Government. State elections in 1995 brought to power a government that had actively campaigned against the project, which led to them scrapping the project and Enron filing a lawsuit for the \$300 million it had already invested. Renegotiations led to a new tariff formula and the MSEB agreed to resume the project in 1999. Despite government intervention, a resolution could not be reached, the plant was shut down and the Maharashtra government bought out the foreign investors. The project accounted for 10% of all the FDI the country received between 1992 and 2002.^{20,21}

Although PPAs in general have since improved, thermal IPPs have struggled, with 34 power projects being identified as stressed in 2018, accumulating a significant USD 23 billion in debt. These issues resulted from challenges in obtaining fuel supply agreements and favorable PPAs, along with cost overruns due to delays in land acquisition, environmental clearances,

¹⁹ Sant, G., Dixit, S., and S. Wagle (2001). "India Power Sector Reform Update" Issue 1 (October). Prayas Energy Group: Pune, India.

²⁰ Satyanand, P. N. (2011). Foreign Direct Investment in India's Power Sector. *Journal of Infrastructure Development* 3(1) 65–89.

²¹ Satyanand, P. N. (2011). Foreign Direct Investment in India's Power Sector. *Journal of Infrastructure Development* 3(1) 65–89.

and funding. Consequently, private investment in thermal power projects declined, while the renewable energy sector attracted more private and foreign investment due to the government's ambitious goal of achieving 500 GW of renewable energy by 2030.

State of PPA transparency

During the regulatory approval process, some states require distribution companies to publish tenders in public newspapers. All documents mentioned in the power procurement process, outlined above, except for the PPAs, are publicly accessible on the respective Central or State Electricity Regulatory Commission's websites.

While there are no laws mandating public disclosure of PPAs, some state-owned distribution companies like Uttar Pradesh Power Corporation Limited, the Kerala State Electricity Board, and the Transmission Corporation of Andhra Pradesh Limited have voluntarily shared their PPAs on their websites. The Maharashtra State Electricity Distribution Company Limited has also provided summarized PPA details on its website.²²

In 2016, the Government of India introduced more uniformity and transparency in power procurement:

- I. The Ministry of Power requires buyers to procure short-term power through the DEEP (Discovery of Efficient Electricity Price) e-Bidding & e-Reverse Auction portal, a common platform for power procurement.²³ It aims to reduce costs by sharing power procurement information with a wider stakeholder network.
- II. In partnership with the National Load Dispatch Centre (POSOCO), the Government of India launched the Merit Order Dispatch of Electricity (MERIT) web platform, which provides daily state-wise marginal variable costs of all generators, daily source-wise power purchases of each state with source-wise fixed and variable costs, energy volumes and purchase prices as well as reasons for deviation from merit order such as must-run conditions and transmission constraints.²⁴
- III. To hold state governments and distribution companies accountable, the Government launched the Vidyut Pravah platform, providing real-time power market data, demand, and shortages.²⁵
- IV. Solar Energy Corporation of India (SECI) coordinates renewable auctions, with all auction details, including bidder names, quantities, tariffs, and awarded capacities, posted on their website.²⁶

²² UPCL: <https://upenergy.in/uppcl/en/page/public-notice>; KSEB: [Kerala State Electricity Board Limited - Power Purchase Agreement](https://www.kseb.co.in/power-purchase-agreement); TRANSCO: <https://www.aptransco.co.in/power-purchase>; MSEDCL: <https://www.mahadiscom.in/wp-content/uploads/2022/06/Final-PPA-List-for-31.03.2022.pdf>.

²³ [National e-Bidding Portal for Short/Medium/Long Term Power Procurement](https://www.nepc.gov.in/e-bidding).

²⁴ <https://meritindia.in>.

²⁵ <https://vidyutpravah.in>.

²⁶ [RfS for Selection of Project Developer for Setting up of 8 MW Grid-Connected Waste to Energy Project in Kanpur](https://www.seci.in/selection-of-project-developer-for-setting-up-of-8-mw-grid-connected-waste-to-energy-project-in-kanpur)

- V. The Government launched the Saral Eindhyan Vitaran Application (SEVA) platform developed by Coal India Limited,²⁷ offering coal dispatch information, including quantity, grade, transport, and rake allotment for each mine to power producers.

Key issues affecting IPP participation, power sector transparency and performance

- **The poor financial health of distribution companies has led to severe delays in payments to generating companies, particularly IPPs.** While outstanding dues to state-owned plants may be paid directly out of the state budget, private firms have limited recourse. In 2017-18, the private sector accounted for 31% of total generation, but 56% of outstanding dues.²⁸
- **Policy and regulatory uncertainty and weak contract enforcement contribute to the deterioration of power projects.** The 2014 Supreme Court decision, canceling all but four captive coal blocks allocated since 1992 as these allocations were made on a non-competitive basis, left IPPs with few options for procuring coal, leading to defaults on debt commitments. In 2010, Indonesia's mining law lowered the price of coal exported from Indonesia in line with global prices, which led to an increase in fuel costs for Tata Power and Adani Power which had fuel supply contracts with Indonesian mines to operate their power plants in Gujarat. The companies appealed as higher fuel costs could not be included in variable charges per their PPA terms with state distribution companies. The Court allowed those PPAs to be renegotiated in 2018 after a long-standing dispute. Weak contract enforcement may also have led some firms to "underbid" their fuel costs in order to secure long-term contracts, with firms banking on the option of contract renegotiation in the event of a cost shock.²⁹
- **Attempts to renegotiate tariff rates under PPAs are a serious concern for the renewable energy sector and have affected the viability and credit profiles of wind and solar power projects.** In 2019, the Andhra Pradesh Government ordered the state's Electricity Regulatory Commission to renegotiate tariffs with renewable energy producers due to lower auction prices compared to when the PPAs were signed. However, a 2022 High Court ruling stated that PPAs could not be renegotiated.
- **Due to asymmetric regulation of public and private companies, virtually all publicly owned power plants that exist today were awarded long-term contracts without undergoing a bidding process.** Until the early 2010s, government-owned power producers had exemptions from auctions and secured cost-plus PPAs (with predetermined profit margins). They also enjoyed preferential access to land and fuel supply agreements with major mining companies.

²⁷ <https://elib.cmpdi.co.in/SEVA/>.

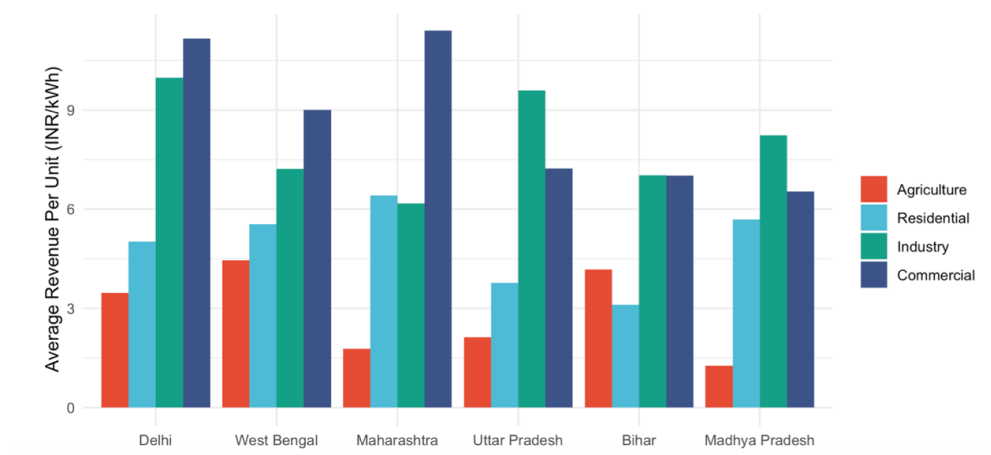
²⁸ <http://www.praapti.in>.

²⁹ Ryan, N. (2020). Contract Enforcement and Productive Efficiency: Evidence from the Bidding and Renegotiation of Power Procurement Contracts in India. *Econometrica* 88 (2): 383-424.

- The need to reform retail electricity pricing.** Restoring the financial health of electricity distribution companies is crucial to improving the competitiveness of India's power sector. Subsidized SERC-regulated retail prices for residential and agricultural consumers, though affordable, strain utility finances significantly. In 2019, electricity distribution companies had accumulated debt equivalent to about 1.9% of India's GDP. Despite state governments taking over 75% of outstanding liabilities of distribution companies under the Ujjwal DISCOM Assurance Yojana (UDAY) scheme, which was launched in 2016 following earlier bailouts in 2012 and 2002, the debts of distribution companies had risen to pre-UDAY levels by 2020. Highly subsidized tariffs, delays in the disbursement of subsidies, and large technical and distribution losses, including high rates of electricity theft and bill non-payment among poorer consumers, hinder cost recovery efforts in many states.

Prices for commercial and industrial consumers are set above the average cost of supply to cross-subsidize agricultural and residential consumers who pay below-cost tariffs. This tariff structure incentivizes utilities to prioritize service quality for commercial and industrial customers, often leading to rolling blackouts, referred to as "load-shedding", for poorer residential and agricultural consumers. Inadequate service quality devalues the service and hinders the rationale to increase rates, while also impeding efforts to meter customers and enforce bill payments. Additionally, widespread use of backups and captive power generation by businesses leave utilities with mostly low-tariff consumers, resulting in overall losses.

FIGURE 1: Average Revenue Per Unit by Customer Category, Delhi and Five Most Populous States, 2017-2018.



Source: Khanna and Rowe (2020)

Conclusion and recommendations

India has made great strides toward increasing transparency around contracting practices and power sector governance. Since the release of the National Tariff Policy, 2016, which required that distribution companies follow merit order-based procurement of power, the

government has launched various web platforms such as PRAAPTI, SEVA, Vidyut Pravah, and Merit India to lower power procurement costs for consumers.

Despite these reforms, retail power consumers often face frequent and prolonged outages. Establishing a robust legal framework for transparent PPAs could drive necessary reforms, reducing technical and commercial losses and enhancing service quality. Recommended reforms include:

1. All PPAs and fuel supply agreements should be allocated through a competitive bidding process. Ensuring equal rules for all parties will attract more investment into the power sector, increase competition, and lower consumer prices.
2. Key details in the PPA, including the capacity, location, project cost, ownership, technology characteristics, pricing formula, taxes, pass-through costs, guarantees, penalties for non-payment, environmental and social impacts, force majeure, and termination options should be provided during the public comment period, and the full PPA should be disclosed after signing.
3. Uniform mechanisms for acquiring land, water, and other clearances are vital for fairness and transparency for both government-owned and private companies.
4. Implement a nationwide market-based economic dispatch for merit-order power procurement and robust ancillary services to ensure grid stability.³⁰
5. Distribution companies must be held liable for delaying payments to power producers as specified in their PPA with no bail-out option. Transparency in the disclosure of liabilities of distribution companies in state budgets is an important first step towards recognizing any potential fiscal risk and taking actions to keep these at prudent levels.

Such reforms will reduce existing asymmetries in regulating central and state-government power generation companies and IPPs, promoting a level-playing field and decreasing debt risk, systemic imbalances, and unfair practices for all technologies.

Implementing a market-based economic dispatch mechanism³¹ can improve dispatch efficiency and facilitate the clean energy transition but may cause significant distributional issues. Coal-dependent states like Jharkhand, Chhattisgarh, and Orissa may face challenges with less competitive coal, whereas diversified economies like Uttar Pradesh, Andhra Pradesh, and Kerala may adapt better to transparency reforms. Ensuring a just transition necessitates compensation, retraining opportunities, and long-term economic diversification reforms.

Transparent PPAs guide investors on needed generation capacity to balance grids with high penetration of variable renewable energy. Ultimately, restoring distribution companies' financial health, especially by ending discriminatory retail pricing, is crucial for improving access to reliable energy.

³⁰ Central Electricity Regulatory Commission (CERC). (2018). Discussion Paper on Market Based Economic Dispatch of Electricity: Re-designing of Day-ahead Market (DAM) in India. https://cercind.gov.in/2018/draft_reg/DP31.pdf.

³¹ A market-based economic dispatch mechanism would ensure that all generators are scheduled based on their short-run marginal cost, allowing for all available renewable energy capacity to be dispatched ahead of fossil fuel generation in the merit order.