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CEEW Policy Brief

Agenda for a Reformed Power Sector in India

Risk, Resource, Relay,
and Restructuring

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Authors

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and Arunabha Ghosh

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A policy brief on ‘Agenda for a Reformed Power Sector in India: Risk, Resource, Relay, and Restructuring’.

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The Council on Energy, Environment and Water (<http://ceew.in/>) is an independent, not-for-profit policy research institution. CEEW addresses pressing global challenges through an integrated and internationally focused approach. It does so through high quality research, partnerships with public and private institutions, and engagement with and outreach to the wider public. The International Centre for Climate Governance has ranked CEEW as India’s top climate change think-tank two years in a row. In 2014, the Global Go To Think Tank Index ranked CEEW 1st in India in three categories.

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ABOUT CEEW

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CEEW's major completed projects: 584-page National Water Resources Framework Study for India's 12th Five Year Plan; India's first report on global governance, submitted to the National Security Adviser; foreign policy implications for resource security; India's power sector reforms; first independent assessment of India's solar mission; India's green industrial policy; resource nexus, and strategic industries and technologies for India's National Security Advisory Board; \$125 million India-U.S. Joint Clean Energy R&D Centers; business case for phasing down HFCs; geoengineering governance (with UK's Royal Society and the IPCC); decentralised energy in India; energy storage technologies; Maharashtra-Guangdong partnership on sustainability; clean energy subsidies (for the Rio+20 Summit); reports on climate finance; financial instruments for energy access for the World Bank; irrigation reform for Bihar; multi-stakeholder initiative for urban water management; Swachh Bharat; environmental clearances; nuclear power and low-carbon pathways; and electric rail transport.

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Dr Ghosh has presented to heads of state, India's Parliament, the European Parliament, Brazil's Senate, and other legislatures; trained ministers in Central Asia; and hosted a documentary on water set out of Africa, *Diary of Jay-Z: Water for Life*, honoured at the Webby Awards. His op-eds have appeared in the *Times of India*, *The Hindu*, *India Today*, *Indian Express*, *Financial Express*, *Mint*, *Seminar*, and *Tehelka*. He has delivered public lectures in several countries, and commented on All India Radio, ABC (Australia), BBC, CNN-IBN, NDTV (India) and Voice of America, among other broadcasters.

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1 INTRODUCTION

The Indian power sector is remarkably characterised as one where electricity availability has always lagged behind demand. India still has close to 75 million households (almost 45% of all rural households) with no access to electricity, but the existing system is stumbling in its efforts to even cater to the demand of the population currently connected to the grid. Given this background, the overarching objective of any forthcoming electricity policy must be to provide **24x7 power to all the sectors of the country at adequate price levels, in a cost effective, resource efficient and financially sustainable manner.**

In order to achieve such an objective, there is a need to simultaneously tackle two challenges. The first is to ensure that the entire population base has access to electricity and, thus, the intensive electrification of rural households needs to be a priority. The second is to ensure sufficient availability of power to meet the nationwide demand, in an efficient manner.

Based on our assessment of the challenges facing the power sector, we focus on: i) the low level of utilisation of the stock of generation assets; ii) the inability of power deficit states (or utilities) from being able to procure power owing to their poor financial health; iii) the poor implementation of non-discriminatory open-access that would have facilitated a competitive electricity market; and iv) the overarching issue of the exposure of the banking sector to a flailing power sector and the inability to fund future development of the sector. This policy report, in the following sections, attempts to provide an overview of the issues that have resulted in the status quo of the power sector and provides a time-bound suite of recommendations, which can set future developments on the right course.

2 THE GENUINE NEED TO RAISE THE CAPACITY OF THE INDIAN POWER SECTOR

Does India need to add more generation capacity in order to meet the electricity demand? While answering this question, it is important to be cognizant of the status quo of electricity deficit and future aspirations of the country as a whole. Citing that the shortage in electricity generation was merely 6.7% in 2013-14¹ would risk gross misinterpretation of India's energy deficit. In the same year, the average per capita electricity generation of India stood at around 767 kWh, a quarter of the global average of 3,045 kWh² (in 2011-12).

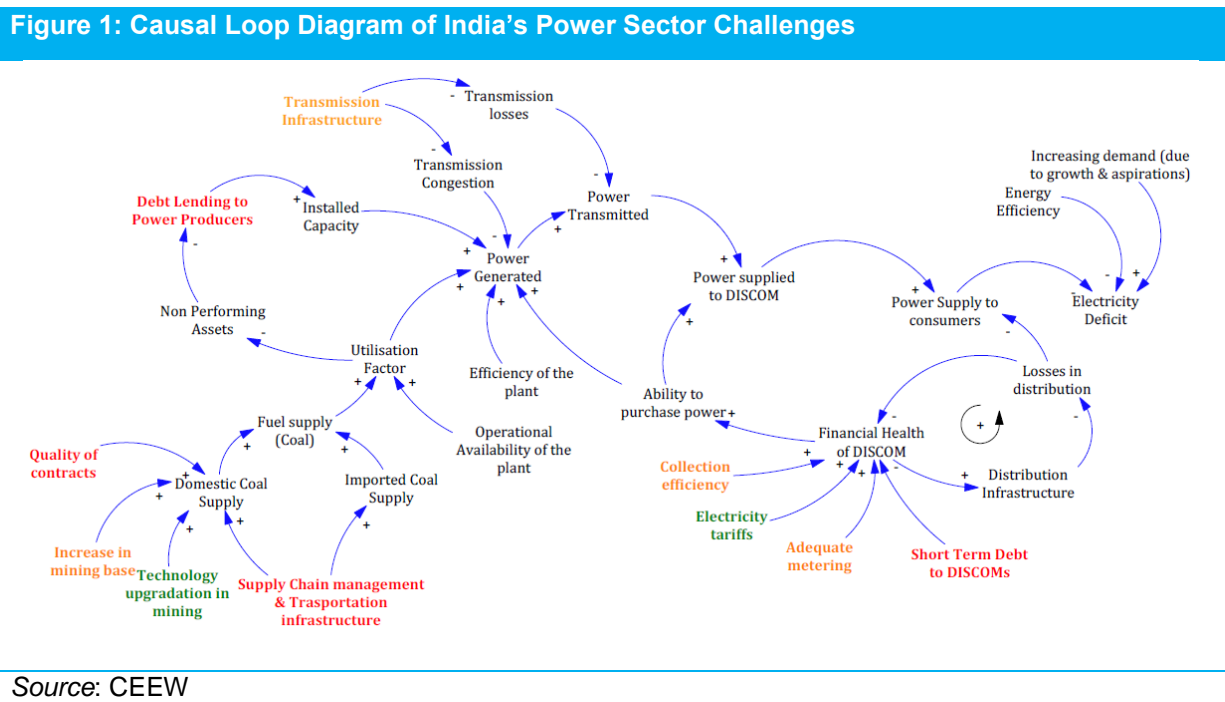
Given the developmental needs of the country, and aspirations around economic growth of the order of 8%-9% per year for coming years, it would certainly not be excessive to push for a per capita electricity consumption target of 2,000 kWh. The theoretical maximum generation, which India could achieve from the existing system assuming no bottlenecks whatsoever, would be around 1,500 billion units (BU) (against 959 BU generated in 2013-14). This would translate to a mere 1,200 kWh of generation per person at current population level. Thus, not only does India need more generation capacity, even in the near term, it is also needs corresponding investment at the transmission and distribution ends, which have lagged to match the pace with generation capacity addition over the last decade.

¹ Central Electricity Authority, Load Generation Balancing Report 2013-14

² World Bank - <http://wdi.worldbank.org/table/5.11>

3 THE PREVAILING CHALLENGES OF THE POWER SECTOR

The challenges in the sector are aplenty: poor financial state of distribution companies (DISCOMs), shortfall in domestic coal supplies, insufficient transmission infrastructure, and rising inventory of Non-Performing Assets (NPAs). Figure 1 demonstrates the relationships between these different factors using a causal loop diagram.³



The ultimate reason for the electricity deficit is the gap between increasing demand (fuelled through rising aspiration levels and growing economic activity in the country) and the low levels of supply. Power supply, in turn, depends on (i) the ability of DISCOMs to procure the necessary power from GENCOs; (ii) DISCOMs’ distribution losses; (iii) congestion in the transmission infrastructure; (iv) low plant efficiency; (v) lower utilisation factor or low plant load factors (PLFs).

On the procurement side, DISCOMs are unable to pay for power owing to their poor financial health. This results from low retail tariffs for most DISCOMs in comparison to cost of power

³ The causal loop diagram is developed and interpreted on the basic premise of ‘*ceteris paribus*’ i.e. while looking at the relationship between any two variables, it is assumed that everything else in the system is constant. The polarity sign associated with the linkage indicates the nature of effect. A positive sign indicates that increase in one variable would lead to corresponding increase in the dependent variable, and a negative sign indicates that increase in one variable would lead to a decrease in the dependent variable.

procurement, delays in disbursement of subsidy, inadequate metering and billing, and lower collection efficiency.

Moreover, the technical distribution losses are large (compared to international standards) due to poor infrastructure, which in turn stems from and contributes to the worsening financial health of utilities.

On the generation side, fuel shortage is the main inhibiting factor. Coal accounts for three-quarters of total electricity generated in the country and will continue to anchor the electricity system for many years to come. The power sector consumes 70% of domestically produced coal, yet dependence on imported coal (20% in 2013-14) is rising year on year. Limited domestic supply is a result of: (i) fuel supply contracts, which favour the coal supplier (Coal India Ltd.) and provide little incentive to upgrade current mining practices or improve operational efficiency; (ii) poor inventory management and transportation infrastructure (particularly railway tracks and shortage of rakes); (iii) inability to increase the overall mining base and rapidly develop allocated mining blocks; and (iv) extant geological challenges.

Consequently, with underutilised assets of GENCOs, the risk against banks' exposure to operating plants and risks of non-payment from project developers increases. A growing base of NPAs could lead to credit shortfalls in the power sector, severely hampering new investment.

4 RISKS FOR BANKS' EXPOSURE TO THE POWER SECTOR

Currently, the exposure of banks to the capital-intensive power sector in India is about INR 3 trillion.⁴ This is of the same order as the total gross non-performing assets (NPAs) (across all sectors) in the banking system (INR 2.52 trillion until 30 June 2014). Nevertheless, it raises the question whether banks and non-banking financial institutions would be willing to expose themselves further to what is increasingly perceived as a risky sector.

Banks face a possible scenario of NPAs (and equity investors on indefinite investment horizons) due to fuel supply uncertainties, unviable operations and cash flow problems of existing GENCOs and DISCOMs. Driven by an initially favourable regulatory regime, banks appear to have been lax in lending to the power sector comforted by their perceptions of low governmental credit risk.

The signs of risk were evident even before the current crisis in the power sector. Funds committed by banks to projects were not being utilised because of the time and cost overruns faced by almost all new power projects and their failure to fulfil stipulated milestones or performance targets, some of them due to contractual issues, delays in securing fuel supply linkages and obtaining governmental clearances. Moreover, the persisting poor financial health of DISCOMs, declining or unpredictable fuel supplies and, most recently, greater uncertainty owing to the cancellation of allocations of 214 coal blocks have raised the spectre of rising NPAs in the power sector.

As this report will outline, there are several steps that would be needed to instil greater confidence among financiers. They include dealing with fuel supplies, a more effective electricity transmission regime, and incremental but continuous improvements in the finances of DISCOMs. More immediately, the task is to reduce the real or perceived risks, so that investment and credit do not dry up exactly at a stage when the power sector in India needs renewed boost.

⁴ Bhaskar, Utpal (2014) "Bad loans may have been understated" *Livemint.com*, 22 August; available at <http://www.livemint.com/Industry/tJ24Yx7RNqgnjg79UQNgfO/Bad-loans-may-have-been-understated.html>

There appear to be limited short-term solutions to improving the quality of credit. But four measures could be considered:

1. **Advance warning and ring-fencing existing debt** – The sudden cancellation of allocated coal blocks might have been necessary to follow the rule of law, but it creates grave uncertainty for investors and financiers. While court judgments cannot be disclosed in advance, if similar measures are being considered by government authorities, banks must be forewarned. In addition, their outstanding exposure could be ring-fenced in an off-balance-sheet account until the due procedures for reallocation of coal blocks have been completed. This would send a signal to the banks that their interests have been kept in mind even as the sector undergoes necessary corrective measures. This mechanism should be announced immediately and operationalised within the next 3 to 6 months to ensure there is no further confusion or uncertainty on the matter.
2. **Corporate debt restructuring** – In order to overcome the crises due to under-recovery of costs, a one-time package, which helps write off a portion of the bad loans, would be required. However, in selecting loans that would qualify for such a write-off, one would have to ascertain that they were indeed a result of factors that cannot be attributed to inefficiencies of the project developer and are rather due to the systemic challenges of fuel supply shortages or non-payments by DISCOMs. In the overall public interest, it may also be pertinent to relook at and renegotiate the high interest rates charged on the extant borrowings to facilitate quicker recovery to better financial health. Any properly conceived CDR package would like take 1 to 2 years to implement.
3. **Pre-disbursement conditions** – Banks also need to limit exposure to projects in States where there have been limited tariff and other power sector reforms. Banks must stipulate Pre-Disbursement Conditions (PDC) in their loan packages, to ensure pre-identified reform measures are implemented by the respective State or GENCOs, thereby stimulating investments and making operations viable. PDCs for loans should be a priority and instituted within the next 6 months.
4. **Discouraging reckless lending** – While the steps described above serve to protect banks' interests, there remains the risk of moral hazard, which could encourage continued reckless lending by banks, especially to a few promoter groups. The RBI should outline clear prudential norms for the power sector, discouraging lending or limiting banks' exposure to groups, which have existing poor credit, too many unfinished projects on hand and very little cash flows from existing operations. Banks should recall loans given to stranded power projects and intervene to insist on management changes in respect of weaker GENCOs and DISCOMs. RBI should announce the guidelines within a year.

5 CHALLENGES IN FUEL SUPPLY

Coal production in the country has virtually remained stagnant in the last five years ranging around 530–550 MT annually. Coal India Limited (CIL) holds a monopoly over the production and sale (80%) of coal in the country. The demand-supply gap for coal is likely to rise to 200 MT by 2017. Three challenges in particular need urgent attention: **Unequal Contractual Provisions, Inadequate Supply, and Poor Transport Logistics.**

5.1 Unequal Contractual Provisions

Despite the slow and uncertain growth in domestic production, new Letter of Assurance (LoAs) and Fuel Supply Agreements (FSAs) are still being signed. Further, the obligations of CIL to honour the contractual terms are limited. The conditions laid out in the contracts favour CIL and provide little recourse to the buyers in case of a default in supply or poor quality of supplied coal. Some of these glaring provisions are discussed below:

1. **Contract elements are more binding on the buyer and imply significant upfront expenditure even before the contract is entered into for the supply of coal.** The glaring difference in the **Conditions Precedent** as applied to Seller and Buyer in the Model FSA are evidence of this. The seller, in effect, delegates all responsibility and liability to the various government agencies and bodies that provide the necessary clearances and infrastructure to mine and transport coal. Should these conditions not be achieved, there is no liability on part of the seller to supply the contracted amount of coal. The buyer, on his part, must complete as much as 50% of the construction works and should have placed an order for BTG (Boiler Turbine Generator) for the plant before the contract takes effect.
2. **In the event of a shortfall from the original source, supply from alternate sources is arranged entirely on terms specified by the seller including the point of delivery.** This leaves limited negotiating space for the buyer to look at more cost effective alternative sources because these decisions are made as and when the shortfall is witnessed - a situation which makes contracting for imported coal more expensive.
3. There is **no penalty on the supplier for up to a 50% shortfall** in supply against the contracted quantity. **The penalty imposed on the seller for supplying ungraded coal is a mere 1 Re/ ton of coal.**
4. Even if the buyer does not wish to accept coal from alternative sources due to variations in quality (in cases of shortfall from indicated source), it is deemed to have been supplied.

5.1.1 Addressing the Contractual Issues

It is imperative that both supplier and buyer be viewed as equal players with equal rights and considerations in the terms of the contract. Given the monopoly that CIL enjoys and the price differential between imported and domestic coal, all buyers are virtually at the mercy of CIL and therefore must accede to the terms as laid out in the FSA.

1. **Level Treatment on Contractual Terms** – Conditions Precedent on both parties must reflect an equitable level of commitment required from both parties in their intentions to honour the contract.
 - a. Although CIL cannot guarantee that it will secure an Environment Clearance (EC) for a proposed mine, it must be mandated to complete the environmental impact assessment (EIA), document submission and public hearing stages of the EC process within the validity period of the ToRs of the mine (two years). Failing this, the contract should be considered void with adequate compensation payable to the buyer.
 - b. CIL must be obligated to communicate the status of clearances and delays in production to the buyers who can then reevaluate their investment plans.
2. **Enforcement of Commensurate Penalties** – Penalties imposed on either party must reflect the actual or material damages caused to the other as a result of violation of terms of the contract.
3. **Threshold performance Levels** – CIL must cumulatively deliver on existing FSAs to a certain threshold level (to be determined) before inking new deals for supply of coal. That said, alternative sources of fuel supply have to be considered simultaneously (see 4.2 below).

5.1.2 Mechanisms and Timelines

1. **Mechanism: Setting up a Coal Regulator and an Appellate Body** – As in the case of the telecom sector, an independent Coal Regulator will be the key driver of the above suggested reforms pertaining to contracting process and enforcement. An appellate body to decide on matters of non-performance will also have to be created to expedite decision-making.
2. **Timeline:** The process of setting up the Coal Regulator must start in the near term and completed within **1 Year**.

5.2 Inadequate Supply

In 2011-12 23.6 billion units⁵ of electricity was not generated on account of shortage in coal supply and poor quality of coal. This corresponds to over 30% of the total loss in generation as a result of forced outages in the same year. In addition to limited production ramp-up in coal supply, the hindered development of fresh supply owing to the delays in development of new mines and rail transport network adds to the challenges of coal shortfall in the country. Out of 195 environmental clearances requests which are submitted in the last 5 years for new mines and expansion of existing ones, 123 are still awaiting clearances.⁶ Also, an estimated 300 MT of coal production capacity remains unrealised in absence of specific railway links.

5.2.1 Increasing the Reliability of Supply

Three major routes should be explored to increase the supply of coal – improve the efficiency of existing mines through advanced technology, increase the quantum of imported coal at competitive prices and spur the development of new supply base. Thus, in order to increase coal supplies, there is a need to address the following:

1. **Increased Production Capacity through Technology Upgradation** – The open-cast mining in India needs improvement in production capacity through technology upgradation. Moreover, a significant portion of India's proven reserves are at depths below 300 metres, which warrants the use of underground (UG) mining technology, notwithstanding higher costs of production. The share of coal derived from underground mining has reduced from 18.5% in 2002-03 to 9.6% in 2011-12.
 - a. UG mining has the twin advantages of lower land/environment footprint and decreased need for additional last mile connectivity to new mining areas
 - b. Further, UG allows for year round production, which is less affected by the monsoons.
2. **Establish a Coal Importing Platform** – A robust Coal Importing Platform (as an entity separate from CIL) for imported coal would ensure the availability of competitively priced imports in sufficient volumes to all consumers.
 - a. The focus of this entity must entirely be on improving supply chains in the import of coal and delivery of coal to power plants and other end consumers.
 - b. Since a long term view on domestic shortages is already available, this should be used to procure the deficit through advance contracts and help reduce the exposure of GENCOs to international coal price fluctuations.

⁵ CEA. *Performance of Thermal Power Stations 2011-12*.

⁶ CEEW analysis based on primary data from MoEFCC, 2014.

3. **Expedited Process for New Project Development** – As new coal mines and associated rail linkages, both face significant delay in environmental clearances, an integrated approach of planning and environmental clearances for coal supply must involve three key stakeholders – MoEFCC, CIL and the Indian Railways. The current process of no time-bound clearance (or denial of clearance) leads to a limbo and systemic uncertainty. Since coal mining is one of the few sectors where clearances take much longer than anticipated (others being thermal power, nuclear power and hydropower), key interventions could involve
 - a. A central Environmental Clearance Service Cell (ECSC) within MoEFCC
 - b. Updating training and accreditation for EIA consultants
 - c. Revising guidelines to include several rounds of public hearings to ensure genuine public participation but within a stipulated time period
 - d. A centralised data bank, which provides state/district-wise availability of land for compensatory afforestation

5.2.2 Mechanisms and Timelines

1. **Mechanism: Advanced Technology in Coal Mining** – International technological expertise is required to improve the efficiency of extraction, both from open-cast and underground mining. This can be spurred through the participation of specialised mining technology companies.
2. **Mechanism: Private Sector Licensee** – A Coal Importing Platform like the Power Exchange will play the pivotal role in driving coal to a market-driven commodity in the long run. The platform should be equipped with the ability to aggregate demand, drive logistics and last mile delivery.
3. **Timeline:** The process of establishing an e-auction platform dedicated for imported coal must start immediately, with a focus of achieving 100% import procurement through this entity in the next **3 years**.

5.3 Poor Transport Logistics for Coal

During 2000-10, there was a tripling of **vendible stocks (accumulated inventory at pit-head)** to levels as high as **15% of the dispatch quantities**. Since 2010 this has come down to about 9% of dispatch quantity. This still is a significant portion and reflects inefficiencies in the inventory management of coal and the lack of sufficient infrastructure for evacuation at the pitheads.

The **Indian Railways (IR)** is the backbone of the coal transport infrastructure in the country. More than **450 MT of coal** was carried on the railways network in the year 2011-12 with an **average distance travelled of 639 kilometres**. Such long haulage leads to increased delivery costs, thefts and life-cycle energy consumption.

5.3.1 Improving Transportation and Inventory Management

1. **Optimise transport for haulage** - There is a need to rationalise the terms of the PPAs to ensure that coal is not hauled over long distances.
 - a. **Standardising coal quality (post-washing) from all mines** will make it easier to find and swap opportunities at times of need
 - b. Further, **locating washeries in the vicinity of mines and mandating the need for washing** before transporting will save on transportation costs and have positive environmental benefits

5.3.2 Mechanisms and Timelines

1. **Mechanism: Private Sector operated Washeries** – CIL did not commission a single washery between 2007 and 2012. The private sector is better placed to carry this out efficiently, given the requisite environmental clearances in a time-bound manner.
2. **The timelines** for these interventions range from **1 year** to the long term. Involving extensive private sector participation to set up new dedicated washeries must be the immediate target. Upgrading road infrastructure in mining areas to have all-weather roads will have to be a continued effort. FDI and technology upgrades in mining will have to be addressed once a decision on the amendment to the Coal Mines (Nationalisation) Act (1973) is finalised to allow private sector participation in commercial mining.

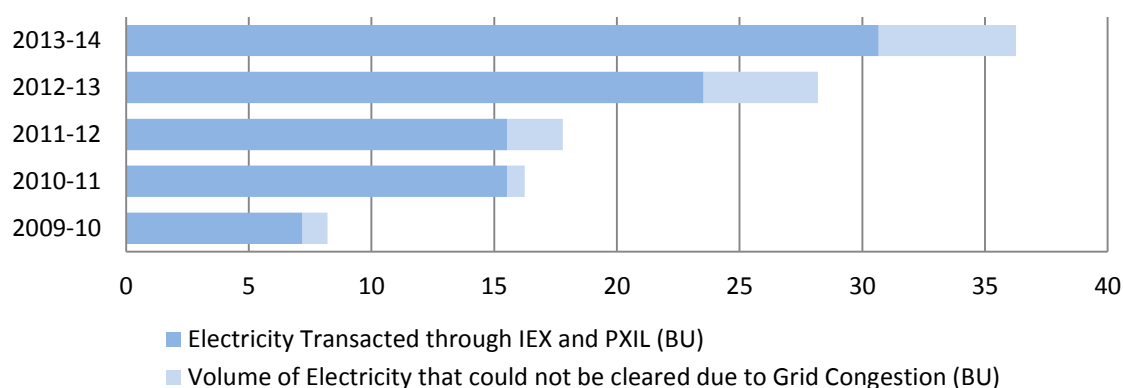
6 CHALLENGES TO OPEN ACCESS

Open access is a key enabler of a competitive electricity market. While all states in India have already notified open access, only 19 have determined all the charges (cross-subsidy charges, wheeling charges, transmission charge) pertaining to open access. The reasons for the slow uptake of open access are elucidated below.

6.1 Grid Congestion and Lack of Transparency in Operation

Removing transmission constraints is imperative for widespread use of open access. In 2013-14, grid congestions prevented 15%⁷ of available power from being transacted at the two main power exchanges, IEX and PXIL. As indicated in **Error! Reference source not found.2**, grid constraints have significantly increased over past years.

Figure 2: Lost transactions in power markets due to grid congestion



Source: CEEW analysis based on IEX & PXIL reported data

All electricity transactions within the state are managed and controlled by State Load Dispatch Centres (SLDCs), which in most cases are controlled by State Transmission Companies. There are instances where SLDCs have delayed the application clearances for open access applications or denied third party access on technical grounds without indicating specific reasons.⁸

⁷ Economics Division – Central Electricity Regulatory Commission, Report on Short-term Power market in India: 2013-14

⁸ Sheoli Pargal, Sudesha Ghosh Benerjee, More Power to India: The challenge of electricity distribution, The World Bank, 2014.1.

6.1.1 Addressing Transmission Challenges

In order to eliminate the transmission constraints and improve the transparency of grid operations, the following measures are required:

1. Improving the transmission infrastructure where grid congestions exist, as an immediate measure to not lose the potential energy, which could be generated.
2. Implementing smart grid technologies in order to improve the monitoring and management of grid operations.
3. Making data on the usage patterns of the transmission grid public.
4. Specifying grid constraints in order to obviate the denial of open access on grounds of technical constraints.

6.1.2 Mechanisms and Timelines

1. **Mechanism: Augmentation of transmission capacity** – Based on the region-wise assessment, planned augmentation of transmission capacity should be carried out under the PPP model, which has seen success in recent years.
2. **Mechanism: Implementation of Smart Metering Technology** - Bulk consumers of power and large generators should be the first to implement smart metering technology (Stage I). Eventually, smart metering should cover all OA users (Stage II)
3. **Mechanism: Real-time Updates on Grid Transactions** – Live updates on transactions should be made public through a collaborative effort from the load dispatch centres and the respective regulatory bodies.
4. **Timelines:** While live updates on grid transactions should be implemented in the next **one year**, implementation of the smart grid technology and augmenting transmission capacity would need to be phased in over the next **2-5 years**.

6.2 Open Access in the Retail Market: Conflict of Interests with DISCOMs

In addition to removing technical barriers, it is essential that existing conflicts of interest of the DISCOMs associated with the loss of bulk consumers (switching to OA) are removed. This, in part, can be solved through the removal of cross-subsidy (see section 7.2). Additionally, there is no rational basis for determining wheeling charges for OA unlike in transmission where transmission charges are determined on the basis of Point of Connection method.

6.2.1 Separating the Wire and Retail Business

Separating distribution (the physical infrastructure) and retail supply (the service) could be pivotal for open access in the retail electricity market. Segregation has the twin advantages of ensuring that there is no conflict of interests and the growth of a competitive retail electricity market, based on consumer choice. The distribution or wire business would retain the responsibilities of development, operation and maintenance of the network, while the retail business would include the wholesale procurement and sale of power along with metering and billing. The retail business would, in turn, pay the wire business for the use of its network. Although similar to the parallel licensing regime, segregation has the advantage of not replicating infrastructure (as in the case of parallel licensing) and avoiding additional financial burden on end-users⁹.

6.2.2 Mechanisms and Timelines

- 1. Mechanism: Roadmap for Rationalising Open Access Charges Reduction** – SERCs should prepare a roadmap for determining the level of charges for OA consumers (other than the cost of the electricity itself) in order for them to opt for cost-effective solutions. The first order of priority is to determine current cost of supply from DISCOMs for such consumers and the elements that constitute it.
- 2. Mechanism: Segregate the Retail and Wire Business** – At the outset, segregating the wire and retail suppliers would require amendments to the Electricity Act, 2003 and related reforms.
- 3. Timelines:** A state-wise roadmap for or determining the level of charges for OA consumers should be formulated within **two years**. Required amendments in the Electricity Act for segregation should be implemented by 2015-16. Progressive reductions in the size threshold of open access should begin now with the aim of achieving the ultimate objective of complete coverage in the **next 5 years**.

⁹ Forum of Regulators and PwC, Introducing competition in Retail electricity supply in India, July 2013

7 POOR FINANCIAL HEALTH OF DISCOMS

The poor financial health of DISCOMs forms the basis of one of the most critical and complex problems in the power sector. DISCOMs are both the aggregators of power demand and the determinants of final revenue to power producers, transmission companies and banks' payback on credit to the sector. The problem of poor finances, though widespread, has affected a limited number of DISCOMs far more than others. Eleven state DISCOMs in the country account for almost 80% of the accumulated losses; three of them account for 50% of the losses. The problems discussed below and corresponding recommendations, although generic, would yield different results in different states.

7.1 *Rising Debt due to Non-realisation of Regulatory Assets*

The increasing pile of 'Regulatory Assets'¹⁰ (RAs) with the DISCOMs is adversely affecting the financial health of utilities. In recent years, overall accumulated RAs have grown to INR 70,000 crore (USD 11 billion). Accumulating RAs are undesirable because:

1. They exacerbate the liquidity crunch of DISCOMs, forcing them to resort to commercial borrowings;
2. The heavy accumulation of RAs in the books of DISCOMs, without a proper plan of their recovery, makes it difficult for DISCOMs to raise the borrowings.

The Ministry of Power's Financial Restructuring Plan aims to liquidate the short-term debt of the most stressed utilities. This plan is still at an inception stage two years post its notification. In addition to having limited applicability to state-owned DISCOMs, it is too generic in its approach, lacking focus on the specific causes of the mounting short-term debts.

7.1.1 *Reducing Existing RAs and Avoiding RAs in Future*

1. The short-term aim should be to shift the debt burden of DISCOMs to lower interest debt, combined with a roadmap to recover the RAs over a fixed time period.
2. It must be ensured through necessary policy amendments that SERCs cannot create new RAs.

¹⁰ Regulatory assets are assets created by the regulators on account of the gap between the expenditure and revenue recovery of the DISCOM, legitimised by the state regulator, but not passed on as increased tariff to the final consumer in order to avoid 'tariff shocks'.

7.1.2 Mechanisms and Timelines

1. **Mechanism – Liquidating RAs:** The RAs of the DISCOMs must be liquidated on a priority basis, either by issuing tax-free bonds by the DISCOMs which are backed by state guarantees (in order to reduce cost of borrowing), or by lending (specifically against RAs) through the Rural Electrification Corporation or Power Finance Corporation. Either mechanism must incorporate a clear and binding plan to recover RAs for respective DISCOMs. In case of non-recovery of RAs, the debt against RAs must be charged to state governments.
2. **Mechanism – Disallowing provisions for new RAs:** Although discouraged, RAs are permitted under the National Tariff Policy 2006. The tariff policy should be amended to disallow creation of any future RAs.
3. **Timeline –** The liquidation structure and RA recovery roadmaps should be developed on an immediate basis (**by March 2015**). Once the plan is in place, the process of borrowing through either of the mechanisms should start in the next financial year. The National Tariff Policy should be also amended ideally by March 2015.

7.2 Issue of Low Tariffs

The cost of power purchase accounts for almost 74%¹¹ of the total expenditure of DISCOMs and these costs vary as a result of fluctuating costs of power generation. As per the tariffs of 2013-14, 14 out of 28 states¹² in India had average electricity tariffs lower than their average cost of power purchased. For Uttar Pradesh and Rajasthan (among the worst performing utilities), the negative spread between the procurement price and the average tariff has been often greater than 25% in recent years and points to one of the core reasons for the financial unsustainability of DISCOMs.

Inclusion of **Fuel Cost Adjustment Mechanism** in retail tariffs was an attempt to respond to this fluctuating power purchase cost. However, different states have different formulae to calculate this as well as differing time periods in which this adjustment reflects in electricity bills. For instance, Maharashtra includes this adjustment on a monthly basis, while West Bengal includes the same on an annual basis.

Another major issue contributing to the issue of low tariffs is the problem of cross-subsidy. **Current tariff structures include high levels of cross-subsidisation across consumer**

¹¹ 74% was the national average for all DISCOMs with a maximum of 98% for GUVNL in 2011-12. CEEW analysis on data from *The Performance of State Power Utilities for the Years 2009-10 to 2011-12*. Rep. New Delhi: Power Finance Corporation, 2013. Print.

¹² India now has 29 states, but no separate historical data exists for the recently created new state of Telangana. CEEW Analysis from India. Planning Commission. Power & Energy Division. *Annual Report (2013-14) on The Working of State Power Utilities & Electricity Departments*. New Delhi: Government of India, 2014. Print.

groups while neglecting equitable access within each group. The true cost of supply for each consumer category is unknown, as the extant practice is to base the tariff off the average cost of supply. Cross-subsidy reductions are also a prerequisite for open access to come into effect.

7.2.1 Making Tariffs More Reflective of the Cost of Supply

1. Voltage-wise data on expenditure and distribution losses needs to be collected and the tariff structure should be reflective of the cost of supply for the particular consumer category. Service quality improvements should precede any tariff increase.
2. In order to rationalise the level of cross-subsidy, it would be preferable to have intra-category cross-subsidisation rather than imposing excessive burden only on one category.
3. Eventually fuel-cost should be included as a direct component of the tariff. However, this should take place only in the event that there are enough available electricity retailers for customer choice to be exercised.

7.2.2 Mechanisms and Timelines

1. **Mechanism: Establish Fuel Increase benchmarks** – Until the establishment of a truly competitive market, an interim solution should be to base tariff increases automatically off a standardised benchmark. A variable component in the tariff structure could be revised on a quarterly basis reflecting the moving benchmark specified by the CEA.¹³
2. **Mechanism: Roadmap for Cross-Subsidy Reduction** – SERCs should prepare a roadmap for reduction in cross-subsidy and induce its implementation.
3. **Timeline:** The process of establishing such a benchmark must begin in the short term and be established **by the end of 2015-16**. The tariff order of the forthcoming year should include the fuel purchase increase formula. Voltage-wise data collection would depend on scaling up metering infrastructure, which would take longer. Roadmap for cross-subsidy reduction should be formulated in the next year.

¹³ Gupta, Sachin, and Satnam Singh. *Indian Power Distribution Utilities*. Rep. Mumbai: Crisil Infrastructure Advisory, n.d. Print.

7.3 High AT&C Losses

In 2011-12, the DISCOMs in India collectively lost an estimated amount¹⁴ of **INR 80,000 crore** in terms of **Aggregate Technical and Commercial (AT&C) losses**. Of this, an estimated amount¹⁵ of **INR 16,600 Crore** (~8% of the actual revenue earned) was lost due to **collection inefficiency** across the country, which is a pure commercial loss. The main causes of AT&C losses include:

1. Unmetered Consumption
2. Low Collection Efficiency
3. High Technical Losses due to insufficient capital expenditure on upgradation of existing infrastructure.

While the Restructured Accelerated Power Development & Reforms Programme (R-APDRP) was conceived as an ambitious and comprehensive scheme to address the high AT&C losses, it has not been successful in achieving its intended impact. The R-APDRP method did not help to distinguish between technical and commercial losses, delinking which could improve the overall efficiency of service.

7.3.1 Pursuing the Distribution Franchise Model on Priority

The Distribution Franchise (DF) model is being increasingly pursued across the country as a solution to reduce high AT&C losses. Initially implemented in Bhiwandi, Maharashtra, the DF model is now being pursued by other states including Rajasthan, Uttar Pradesh and Madhya Pradesh. However, there is a need to standardise the model with clearly defined roles of the stakeholders involved.

The DF model includes a private player in the form of the franchisee, who undertakes the various responsibilities: meter reading, billing and revenue collection; repair, maintenance and capital expenditure to upgrade the distribution infrastructure; and consumer service and maintenance of consumer records.

In order for the DF model to be successful at reducing AT&C losses, it should have the following features:

1. The large customer base and impact of AT&C losses make the input-based DF model most appropriate in urban areas. This involves a pre-decided input electricity rate and AT&C loss level. Any decrease in AT&C losses beyond this level translates to profits

¹⁴ Calculated by multiplying state-wise average tariff (Planning Commission, 2014) with the difference in input energy and realised energy (Power Finance Corporation Ltd., 2013) for all states except Tripura.

¹⁵ Calculated by multiplying state-wise average tariff (Planning Commission, 2014) with the difference in energy sold and energy billed (Power Finance Corporation Ltd., 2013) for all states except Tripura.

for the franchisee.

2. The roadmap and targets for AT&C loss reduction should be specified in the contract. By linking profits to loss reduction eschews the need for further punitive action.
3. Investment in capital expenditure as a proportion of the total revenue billed should also be part of the contract. At the end of the contractual period the franchisee would hand over the assets to the utility at a depreciated value.
4. Once the input rate is fixed, any subsequent increase in tariff (once service quality has improved) or in the consumer base would result in higher profits, which should be shared between the utility and the franchisee, with the utility receiving a higher proportion.

7.3.2 Mechanism and Timelines

1. **Mechanism:** Franchise areas should be identified on priority as the circles with the highest AT&C losses, dense population, and high requirement of input energy.
2. **Timeline:** The process of identifying potential franchise areas should begin with immediate effect, followed by the collection of baseline data, formulation of bid documents and the bidding process. The entire process can be **completed by the end of 2016-17.**

7.4 Subsidised Electricity and Associated Challenges

The extent of commercial losses of DISCOMs at an all India level increases by more than 50% in the absence of subsidy.¹⁶ In some states, such as Rajasthan, 60% of the revenues of DISCOMs are derived from subsidies.¹⁷ Although subsidy on electricity is entirely a state specific subject, two key issues surface across states:

1. Non-payment or delay in subsidy disbursement from the state governments to DISCOMs, aggravating the liquidity crunch of already cash-starved DISCOMs;
2. In the absence of adequate metering infrastructure (an existing problem for many states) for the subsidised consumer groups, the total subsidy burden is hard to calculate, adding to the inefficiency of the DISCOMs.

¹⁶ Based on the data of 'Report on the Performance of State Power Utilities for the years 2009-10 to 2011-12' by Power Finance Corporation

¹⁷ Based on data of 'State of Power Utilities 2014' by Planning Commission

7.4.1 Addressing the Challenges Associated with State Subsidies

1. The responsibility for subsidy disbursement, or the resulting delays, must be borne by the state government, rather than the DISCOM, via a pre-funded escrow account or a tripartite loan arrangement.
2. 100% metering must be mandated and enforced by the states in order to improve estimates of subsidy outlay or potential savings.

7.4.2 Mechanisms and Timelines

1. **Mechanism – Timely payment of subsidies:** Once the annual expected subsidy outlay has been indicated, state governments should create an escrow account and deposit a one-time payment of the expected subsidy outlay. If there are delays in disbursing the quarterly subsidy to the DISCOMs, the latter would be able to draw the sum from the escrow account. If there are no delays, the deposit is carried forward for the next financial year and so on. If some payments have been made from the account, it would have to be replenished at the beginning of the next financial year.

Another option, in case of the non-disbursement of the subsidy in a timely manner, is for the state government, DISCOM and a lending financial institution to enter into a tripartite loan agreement. The loan amount should be disbursed to the DISCOM, but must be charged to the state government.

2. **Mechanism – Mandating 100% metering:** The mandate of 100% metering should be built into the subsidy agreement between state and the DISCOMs and state should provide interest free loans to improve metering infrastructure, if the DISCOM is not subscribing to R-ARDRP.
3. **Timeline:** The enabling mechanism for timely payment of subsidy should be implemented **by end of 2016-17**. The implementation for metering improvements should start by 2016-17 and be completed within 3 years after that.

8 SUMMARISING THE RECOMMENDATIONS

This policy report develops a framework to sieve through the complex challenges facing India's power sector. It identifies four areas of attention, in order of priority in terms of urgency of action. These are: the risks entailed in banks' exposure to the power sector; the resource crunch i.e. limited availability and poor quality of coal supplies (as against what is promised in fuel supply agreements); the challenges in operationalising open access in transmission (relay) of electricity; and the eventual imperative of restructuring DISCOMs and improving the state of their finances and the efficiency of their operations. The agenda for a reformed power sector in India entails efforts over the long haul. The table below summarises our recommendations in line with the priorities.














S. No.	Problems Addressed	Proposed Solution	Timeline	Recommended Actions Under the Proposed Solution
Reducing Risk for Banks				
1.	Cancellation of coal blocks	Advance warning and ring-fencing existing debt	3-6 months	<ul style="list-style-type: none"> – Forewarn banks if significant administrative or policy changes are in the offing – Ring-fence outstanding loans to the affected power projects in an off-balance sheet account until procedures for reallocation of coal blocks have been completed
2.	Exposure to DISCOMs	Corporate Debt Restructuring	1-2 years	<ul style="list-style-type: none"> – One-time package to write off bad loans, which can be attributed to systemic factors rather than project inefficiencies – Renegotiate high interest rates on extant borrowings
3.	Little guarantee of improved future performance	Pre-Disbursement Conditions	6 months	<ul style="list-style-type: none"> – Stipulate PDCs in loans to States and GENCOs with pre-identified reform measures
4.	Not sufficient due diligence	Discouraging reckless lending	1 year	<ul style="list-style-type: none"> – RBI should outline prudential norms for the power sector, discouraging exposure to groups with poor credit, many unfinished projects or little cash flow from existing ones – Recall loans to stranded power assets
Improving Fuel Supply				
5.	Unequal share of contractual commitments between the coal supplier and buyer	Independent Coal Regulator and Appellate Body	1 year	<ul style="list-style-type: none"> – Adjudication and enforcement of contracts that allocate fair shares of commitments between supplier and buyer – Enforcement of penalties in the event of non-

S. No.	Problems Addressed	Proposed Solution	Timeline	Recommended Actions Under the Proposed Solution
				performance on the part of the coal supplier
6.	Insufficient domestic production	Advanced Technology in Coal Mining	5 year	<ul style="list-style-type: none"> – Increase in efficiency of extraction – Technology interventions to make underground mining competitive
7.	Uncertainty in supply and prices of imported coal	Coal Trading Platform	3 years	<ul style="list-style-type: none"> – Platform managed by a private sector licensee to facilitate the sector-wide trade of imported coal at competitive prices and sufficient quantities.
8.	Inadequate quality of coal	Privately Operated Washeries	1 year	<ul style="list-style-type: none"> – Standardise the quality of coal to the extent possible – Will aid in reducing the vagaries in supply – Washing prior to transportation will help ease transportation bottlenecks and costs
Ensuring Open Access				
9.	Lack of transparency of grid utilisation	Implementation of Smart Grid Technology	2-3 years	<ul style="list-style-type: none"> – Progressive coverage of all open access consumers by smart-grid technology – Initial coverage to include bulk producers and consumers
10.	Lack of transparency of grid utilisation	Real-time Updates on Grid Transactions	1 year	<ul style="list-style-type: none"> – Publicly available live updates on grid transactions
11.	High level of Cross-Subsidy	Segregation of the Wire and Retail Businesses	2-3 years	<ul style="list-style-type: none"> – Present structure of DISCOMs will be revised to include multiple retail businesses and a centralized distribution network – Will entail amendments to the Electricity Act, 2003
12.	Low level of competition	Rationalising OA charges to facilitate more OA based consumption	5 years	<ul style="list-style-type: none"> – Progressive reduction in size threshold of open access customers – Ultimate objective to offer the choice of open access to all grid-connected customers
Improving the Financial State of DISCOMs				
13.	Non-realisation of Regulatory Assets (RAs)	Liquidating the Regulatory Assets	1 year	<ul style="list-style-type: none"> – Debt borrowing through tax-free bonds backed by state government – Binding plan to recover the RAs, failing which RAs get converted to subsidy head and

S. No.	Problems Addressed	Proposed Solution	Timeline	Recommended Actions Under the Proposed Solution
				transferred to state
14.	Creation of new RAs	Amendment to the National Tariff Policy (NTP)	1 year	– Forbid the existing provision (8.2.2 of the NTP) which allows the creation of RAs
15.	Low tariffs not reflective of cost of supply	Fuel Increase Benchmarks	1 year	– Revise the tariff determination formula to include a variable component for fuel cost. – Create a moving benchmark for fuel increase which governs the variable fuel cost component of the tariff
16.	High levels of Cross-Subsidy	Roadmap for Reduction in Cross Subsidy	1 year	– The SERCs should formulate a roadmap to eradicate cross-subsidy from the prevailing tariff structures
17.	High Aggregate Technical and Commercial Losses	Institute Distribution Franchise Model for circles with highest AT&C losses	2 years	– Reduction in AT&C Losses – improvement in metering and distribution network – Improved quality of service – minimal interruptions and improved customer servicing
18.	Delay and non-payment of subsidy	Escrow Account replete with estimated subsidy payment OR Tripartite Loan Agreement	3 years	– Timely disbursement of subsidy payments failing which, two alternative routes should be pursued – 1. Escrow Account to tide over the DISCOM in event of delays in subsidy payments 2. Tripartite Loan Agreement between DISCOM, state government and financial institution to pay the DISCOM chargeable to the government
19.	– High Aggregate Technical and Commercial Losses – High Subsidy Burden	100% Metering	3 years	– 100% metering should be mandated in the subsidy agreement – Interest free loans for metering infrastructure to states not availing R-ARDRP



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