

Energy Finance Conference – 2019
[IIT Madras-16/17 August]

**India's Power Sector: Trajectory
and Policy changes**

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India's Power Sector-Evolution

- Electricity Utilities in India were neither designed nor structured as entities amenable to a modern managerial or commercial culture.
- They are the products of an evolution from 'Unregulated competition' prior to Independence, to 'Unregulated monopoly', soon after.
- Then they moved on to a 'Regulated monopoly' and has now emerged into an era of 'Regulated competition'.
- Under this evolutionary process generation, transmission and distribution of electricity took place in a haphazard and reactive manner responding to sectoral demands and socio-political compulsions.
- Since Utilities were near-totally owned by Government, electricity was treated as one more goods/service that an all-pervasive State should provide to its citizens.
- This explains the absence of stakeholder participation in managing this essential service.

Sector's Distinct Characteristics

1. The Establishment

- Electricity Entities-vertically integrated with centralised decision making.
- Centralised generation and long grid
- Controlled by Government and protected from competition
- Engineering oriented. Principles of Economics hardly applied
- Lopsided in favour of 'Wire' functions;
- Serving large marginal/poor consumers with low capacity to pay
- Subsidising consumers without full support from State Govt.
- Poor Revenue integrity and Customer relationship
- Low labour and capital productivity;
- Resultant high cost and uncompetitive tariff

Distinct Characteristics

2. Electricity as a product

- Being incapable of product/service differentiation, not amenable to commercial pricing and competitive market
- Delivered cost inversely proportional to 'capacity to pay'.

3. Socio-economic milieu

- Electricity is economic/commercial/social/political good rolled into one.
- Marginal/poor consumers depending on electric power for livelihood and basic comforts, unable to access or afford high costs
- Farmers, suffering from adverse terms of trade, depend on subsidies to survive in an occupation full of odds.
- Villages far removed from the grid have no access to electric power.
- Tiny, small and medium industry smarting under high tariff/unreliable power. Unable to face stiff competition opened up by globalisation.

Major Policy Initiative: The 'Reform'

- **In this milieu WB-driven Power Sector reforms initiated in the mid-nineties was the major policy initiative since Independence.**

Market oriented 'Management Model' (1996):

- 'Structural' vs 'Efficiency'
- 'Creating 'Independent organisations' with 'unbundled functions'- Generation, Transmission and Distribution-replacing SEBs.
- To turn into 'privately owned firms' with "the quest for profit and greater commercial orientation" than Govt-owned SEBs"
- Efficiency was to be achieved by a 'trickle down' process passing through the layers of restructuring, unbundling, privatisation and tariff rationalization on cost-plus basis.
- Priority for Generation NOT Distribution where the major ailments were
- Huge World Bank/ADB funding to implement the 'Model'. IPPs to pluck the low-hanging fruit, not to heal power sector.

The Reform

- Generation to be privatised first with cost of power pegged high.
- While sovereign guarantees and special escrow mechanism were provided to pay for high-cost IPP power, embargo was placed on NTPC and SEBs not to create additional generation capacity
- Hoping to pluck low-hanging fruits, IPPs, came in droves.
- Due to the near-bankruptcy of SEBs, this did not work. Instead scandals like ENRON happened.
- World Bank/ADB panicked and withdrew from power sector in 2002. IPPs also trooped back in droves!
- Despite Electricity Act-2003, to facilitate private investment and PPP power sector continued its descent into chaos.
- Despite number of experiments in electricity reform, none of them had established 'a viable model'.

Electricity Legislations

- Indian Electricity Act, 1910 – Use of electrical energy and its **supply through Licensees**.
- Electricity (Supply) Act, 1948 and Amendment Act 1959 - Creating State Electricity Boards and **dispensing with Licensees** with the state assuming monopolistic control
- Electricity Laws (Amendment) Act, 1991 - Private participation in Generation, Supply and Distribution
- ERC Act, 1998 – setting up of CERC and SERC to determine tariff, lay down performance standards and facilitate private participation
- Energy Conservation Act, 2001 – Energy Efficiency
- Electricity Act, 2003, repealing above laws except EC Act, **Dismantling SEBs, establishing Regulatory Commissions, restoring Licensees and unleashing market forces through ‘Open Access’**

Electricity Act, 2003: Salient Features

1. National Electricity Policy and Tariff Policy in consultation with States.
2. Rural Electrification - Stand alone DDG-No requirement of license
3. Generation free from licensing. Captive Generation is free from controls
4. Renewable Purchase Option
5. Transmission utilities and Load dispatch centers with Government.
6. Distribution to be licensed by SERCs.
7. Retail tariff determined by ERCs. Metering mandatory. Open access.
8. Consumer Protection–ERCs to specify supply code and standards
9. Trading as distinct activity with licensing. ERC to promote market
10. ERCs tariff principles-efficiency, commercial viability, cost to serve
11. Curbing theft -Focus on revenue realization, not criminal proceedings.
12. Restructuring of SEBs-States given flexibility to adopt reform path.
13. Constitution of CERC, SERCs and Appellate Tribunal

Regulatory Framework

Key Regulatory Institutions

- Central Electricity Regulatory Commission;
- State Electricity Regulatory Commission;
- Appellate Tribunal (APTEL) and Forum of Regulators

Main Task

- Regulate tariff etc of central/state government utilities/companies
- Guiding principles for determination of Tariff: (a) 'progressively reflect cost of supply of electricity' (b) 'reduce cross-subsidy' (c) 'safeguard consumer interest' (d) 'recover the cost in a reasonable manner'.
- State Government to provide subsidy in advance through budget for target groups if tariff is to be set lower than that determined by ERCs.
- Laying down Tariff Setting Process and Order
- APTEL to hear appeals against the orders of Central/State ERCs; to exercise supervision and control over them and issue directives.

Power Sector- Fundamental Flaws

- Absence of realistic demand estimation and projections
- Non-usage of Integrated Resource Planning / Least-cost Utility Planning methods to evaluate OPT-AUG options.
- Augmentation fix instead of Optimisation
- Centralised Gen – Long Grid. High cost & wastage
- Coal sector mismanaged. Perfunctory fuel linkage.
- No DSM / EE culture in Utilities
- Non-compliance of legal and regulatory mandates
- Non-application of Principles of Economics
- Blind Tariff / Subsidy setting without cost-to-serve analysis
- Subsidy not prudently managed
- Poor Revenue Integrity
- Regulatory capture
- DDG lacks appropriate technology mix and utility commitment

Crisis Response – MPPs and UMPPs

‘Reforms’, meant to rectify these flaws, brought about crisis.

Instead of Utility-oriented, efficiency-driven measures, Govt. pursued market-oriented, big-ticket (generation)-driven policies.

Merchant Power Plants (MPPs)

- Unlike traditional utilities, MPPs compete for customers and absorb the full market risk. MPPs each of a capacity up to 1,000 MW could avail of the open access in transmission for wheeling of power to customers.

Ultra-Mega Power Plants in Coal [13 of them incorporated]

- Projects with capacity of about 4000 MW each both at pitheads and coastal locations. Tariff based competitive bidding route on BOO basis.
- SPVs for each UMPP for bid management and obtaining approvals.

UMPPs in Nuclear: through lobbying route. Indo-US Nuclear Deal (15560 mw-2005). France-Areva (9900 MW-2009), and (2015). Not One MW has come up.. Russia’s KKNPP (6000 MW) would be flop show or disaster.

Fresh Diagnosis & Policy Prescription

World Bank Review-2014

- Power supply unreliable. 300 million people (mostly poor) lack electricity. Focus on Distribution & Delivery
- Sector finances are weak, with distribution utilities in huge losses.
- Utilities taken huge commercial debt to finance operation. Poor power sector performance spilling over to financial sector and economy.
- SEBs and Discoms depend on government support. High opportunity cost on the economy. Preempts other development spending.
- **Bring basic efficiencies** to operations before long term investments
- Ring-fence urban and rural customers and license, franchise, or PPP models only in urban areas. State Discoms responsible for rural supply.
- Urban franchises to gradually expand their services to rural areas.
- Rationalize domestic tariff, improve targeting and reduce fiscal burden
- Promote electrification in a responsible manner. Diversify delivery

Policy Implementation for Revival

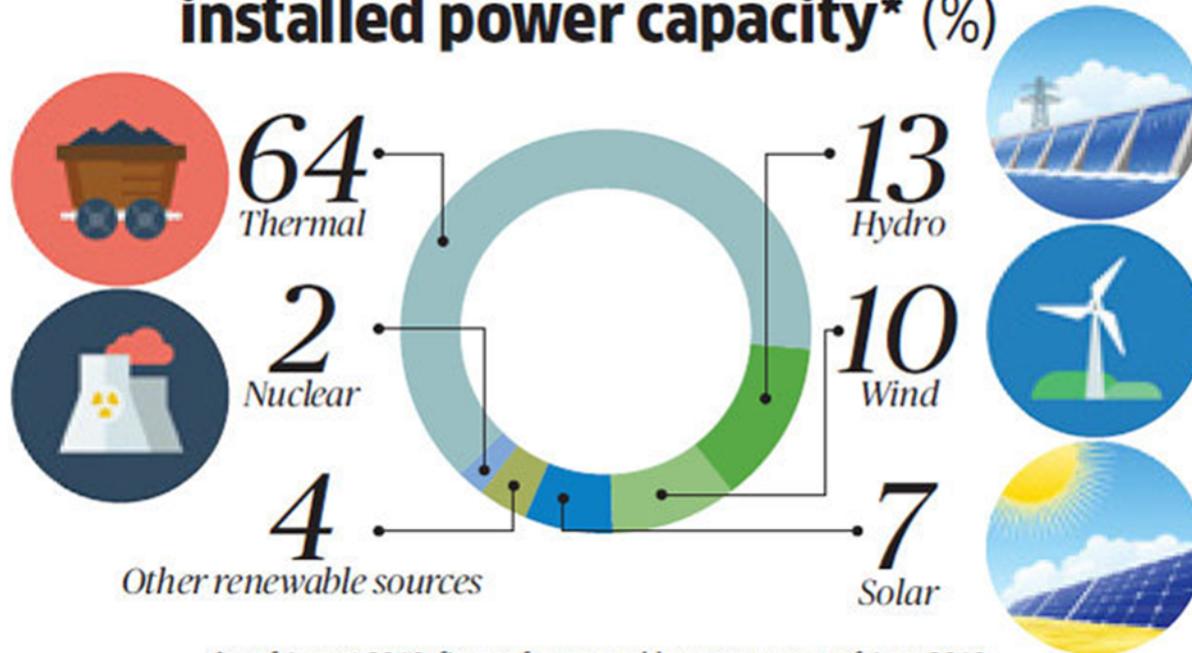
- Multiple supply licensees on the consumer-end to compete with each other and retail consumers having the option to migrate.
- DISCOMS to be broken into a wire company and an intermediate supply company. SERCs to issue Multiple supply licenses.
- Retail supply to consumers opened up to multiple players, mostly private to usher in competition, providing choice to the consumers.
- **UDAY**: Financial restructuring and efficiency enhancing programme-to reduce the debt burden of Discoms - approx Rs. 4.3 lakh crore (2015).
- Four initiatives: (i) Improving operational efficiencies; (ii) Reduction of cost of power; (iii) Reduction in interest cost of DISCOMs; (iv) Enforcing financial discipline through alignment with State finances.
- States to takeover 75% of DISCOM debt as on 30 September 2015 over two years - by 2016-17. Centre will not include the debt taken over by the States as part of fiscal deficit of respective States.

India Power Surplus?

- In 2015 CEA declared that country will have a surplus of 3.1% during peak hours and 1.1% during non-peak hours during 2016-17
- Electricity shortage down from 4.2% (demand) in 2014 to 0.7% in 2017
- Total power capacity up 31% from 243GW to 320 GW - 2014 to 2017
- During the 12th Five-Year Plan, private firms added 54,279MW of capacity (of the total 99,209MW added), achieving 116% of the target.
- India exported power in 2017-5,798 MU to Nepal, Bangladesh, Burma.
- During 2017-18, India added more capacity in renewables (11,788 MW) than thermal and hydro sectors combined (5,400 MW).
- **Power surplus has its fall-outs:** 34 thermal power projects with 40,130 MW of assets and Rs 1.74 lakh crore in debt in risk of going bad and top banks staring at 80% haircut on loans given to power plants.
- Added to this is the massive overdues from DISCOMs to IPPs as of now amounting to Rs. 60,000 crores!

The Power Mix (2018)

Thermal is two-thirds of India's installed power capacity* (%)



*as of August 2018; figures for renewable energy are as of June 2018
Source: Central Electricity Authority (CEA)

Policy Predicament: Coal Vs RE

- India is projected to add 170 GW of new coal capacity through 2043 when total capacity will peak at 289GW. By 2050, that will drop to 235GW accounting for 10% of total power capacity.
- Target of reaching 175 GW of installed capacity from RE 2022-100 GW solar 60 GW wind. Up from 70 GW 2017-18.
- Through new wind-solar hybrid plants and hybridization of existing plants. Capacity of battery storage to be added. The main objective - promotion of large grid connected wind - solar PV hybrid system.
- With India on course for a 285% increase in electricity generation by 2050, traditional energy sources will prove crucial. RE alone will not be able to meet those needs.
- The near-term future of RE requires that alternative power sources are integrated into dynamic grids alongside fossil fuels.
- Coal-wind-solar hybrid is being suggested to bring about Energy transition.

Centralised Solar Grid: Wrong Policy!

- Decentralising energy generation and supply would also call for decentralised grid. A power system designed around RE must both be flexible and allow for power storage.
- Conventionally electricity is 'secondary energy' derived from the primary sources of fossil fuel etc. Has to depend on centralised grid.
- RE, particularly solar, primary source is distributed. So, the grid should be decentralised. Forcing solar into an inefficient centralised grid has serious ecological and economic consequences.
- Demand for power is decentralised. With the advent of RE, particularly solar supply has also become so. **Therefore generation and supply should be through roof-top and decentralised local grid.**
- It was with this intention provision for Decentralised, Distributed Generation (DDG) was made in the E Act-2013 for rural power supply.
- **But the reverse is taking place with the setting up of mega and ultra-mega solar plants.** This is not Energy Transition.

Perils of Solar Grid

- When Load dispatch centers receive injection request into the grid by various generators with quoted price, they arrange those requests in ascending order of their prices.
- Preference to supply power is given to least price power plant, then second least and so on. Continues till demand required is matched with supply from generators. Known as **Merit order dispatch**.
- Government has been handholding renewables so it promulgated **renewables as must run power plants** no matter they make up in merit order dispatch or not. Power generated from renewables will never be **curtailed** unlike gas and thermal power plants.
- This has created a crisis for power utilities. TANGEDCO is a typical case and is being forced to buy grid solar power at Rs. 7.01 kWh based on PPA while RE power is available for around Rs. 3 kWh.
- Faced with 'curtailment complaints' MNRE has written to Chief Secretaries to ensure 'must run' status. This is perilous!

Policy Needed: Energy Transformation

- RE have grown at an unprecedented rate in the last decade and have consistently surpassed expectations. The growth of their deployment in the power sector has already outpaced that of any other energy source, including fossil fuels. RE forms the leading edge of energy transition.
- This ongoing transition to RE is not just a shift from one set of fuels to another. It involves a much deeper transformation of the energy systems that will have major social, economic and political implications.
- Fossil fuels have been the foundation of the global energy system, economic growth and modern lifestyles. Exploitation of fossil fuels lifted global energy use fifty-fold in the last two centuries. Energy transformation driven by RE could bring similar radical changes.
- **What is more, RE will be a powerful vehicle of democratization because they make it possible to decentralize the energy supply, empowering citizens, local communities, and cities. This is Transformation.**

Impact on Economy

- Under a centralised long-grid energy supply system development gets concentrated leading to regional disparities and acute inequities.
- With energy supply getting decentralised, empowering citizens and communities, development would get democratic and distributed.
- This could return India to its original 'economic idea' of equity envisaging independent India as *sui generis*, a society unlike any other, in a class of its own that would be a people's economy charting out a distinct course in economic growth, which would be need-based, human-scale, and balanced while conserving nature and livelihoods.
- Citizens across India would get the strength, resource and opportunity to stand on their feet and earn livelihood with honour instead of depending on corporate trickle-downs and government charity.
- Natural resources would form the base for such an equitable economy. DDG and supply of energy will be **the critical catalyst**.

Way Forward

- **Transition** to an energy portfolio dominated by renewable energy. Final goal is abolition of fossil and other non-RE sources.
- RE encompassing wind, biomass, hydro, solar, geothermal and ocean power are to serve as an alternative to fossil and nuclear fuel.
- This calls for a significant change in energy policy - a shift from centralized to distributed generation, avoidable energy consumption with energy-saving measures and increased efficiency.
- In a broader sense this transition also entails democratisation of energy sector-from large centralized power stations owned by a few to DDG owned by many-citizens, communities, panchayats and municipalities.
- **Implies** long-term structural change in energy systems. The new system can make up most, if not all, of India's energy production in 30 years. **The time to start is now.**
- **An abiding way to usher in an equitable economy in a diverse country as ours.**