

## India's Power Sector Requirements - Policy Recommendations

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1. The Energy sector is characterized by three components - (1) management of natural resources used at various stages of energy production and for ancillary use, (2) management of oil, gas, and petrochemical products across production to retail value chain, and (3) management of power across production to retail value chain. This paper chiefly focuses on the first and third components of the energy sector.
2. India is the sixth largest global economy in absolute terms based on the March 2018 data. The Indian gross domestic product (GDP) of \$2.6 trillion is growing between 5% and 8% every year in this decade. The Government of India is preparing for a \$10 trillion economy by 2032. Sustainable management of an annual GDP growth rate of more than 8% over fifteen years needs several policy interventions. There is nothing more important than a focused National Energy Policy across the three areas mentioned in Paragraph 1 to support this economic growth.
3. As an overarching design principle, the Government of India should adopt the World Energy Council concept of "Energy Trilemma" as the basis of its energy policy. This index has three dimensions - Security (ability to ensure uninterrupted energy availability), Equity (ability to ensure accessible and affordable energy for citizens), and Sustainability (ability to achieve security and equity in an environmentally successful manner). The policies for the power sector should optimize all these three dimensions.
4. The first stage in the power sector value chain is the selection of the natural resource used to generate power. There are two aspects to it - the installed power base and the consumed power.
  - a. As of March 2018, India's total installed power generation capacity was 344 Gigawatts (GW). Of this, 223 GW was thermal (coal, gas, diesel), 7 GW nuclear, 114 GW renewable (hydro, solar, wind, others). All figures are rounded off upwards to the nearest whole number.
  - b. The government has an ambition of achieving 100 GW solar and 75 GW wind power installations by 2022. This target is unlikely to be achieved by the stated year, but the policy focus should be to amplify this area further.
5. India's thermal power plants have been running at capacity utilization between 50% and 75% in the last few years. This is measured via plant load factor (PLF). The PLFs for the plants owned by central public sector enterprises (CPSE) has been higher at around 70%. For the state government owned plants and for the functioning private plants, these PLFs have been much lower.
6. Taking paragraphs 5 and 6 into account, the government should set the following ambition on thermal power generation -
  - a. The National Thermal Power Corporation (NTPC), the main CPSE, should be the only central firm to operate in the thermal power generation space. NTPC should invest only in large power plants which are 1 GW and above.
  - b. All state government power generation companies should transfer their plants to NTPC in a phase manner over a decade.

- c. All thermal plants older than 25 years in operation should be retired.
  - d. The thermal power policy should eventually lead to a few large plants owned by NTPC with power purchase agreements (PPAs) with states. The PPAs should have clauses to build states' trust on third party supply and to ensure future requirements are taken care of.
  - e. No new power plants should be allowed to set up without guaranteed coal linkages. This should apply to private players too, where they buy coal mines in auctions or ensure the right deal with Coal India, before setting up new plants.
  - f. The state government PPAs with private players should factor in the cost of coal, with productivity and efficiency improvement clauses built in over the years.
  - g. The Coal India monopoly on coal mining should be ended in a time-bound manner. All coal mines allocations should be via transparent auctions.
  - h. Rather than making a multi-step transition to greater renewable focus via gas-fired power plants, renewable sources should be directly promoted. Natural gas is not in abundance in India and buying it internationally is subject to geopolitics. The gas use should hence focus on retail requirements for industries, vehicles, and individual consumers.
7. The government should announce a time-bound two-year process to resolve the problems faced by private thermal power producers. A proper framework must be created for it with judicial approval, so that the financial stress in this sector is resolved over a fixed two-year period.
8. The policy certainty for the solar and the wind power generation industry must increase. As mentioned in Paragraph 4(b), India has already set installed base targets for both solar and wind power. There should also be yearly targets set for actual use of these sources in national power consumption.
9. The current target of 40% of actual power consumption coming from renewable sources by 2030, as agreed in India's Intended Nationally Determined Contributions (INDCs) in the 2015 Paris United Nations Climate Change Conference should be extended to nuclear power as well.
- a. India should invest in local manufacturing capabilities for solar panels and create a R&D policy to keep pace with changing technology in this sphere. Between 2019 and 2022, the government agencies should not chase low solar tariffs. Instead, they should focus on creating a sustainable and viable solar manufacturing ecosystem, which should scale to match the 2030 generation targets.
  - b. Both solar and wind power generation should be given the status of core infrastructure sector, so that land acquisition and availability of utilities like power, water for these projects becomes easier across the country.
  - c. India should come up with a National Energy Storage Policy, which encourages research and development in the battery technology space. India should aspire to create a uniform storage framework for all renewable power projects by 2025.
  - d. After 2022, all renewable projects must be bid with storage bundled in. This will help extend the use of renewable sources outside of the peak generation hours as well.
  - e. Nuclear power should be promoted. India should take up 3-4 large nuclear projects in coastal states and near large river water sources. The control of nuclear power should partially move away from the Department of Science and Technology to Ministry of Power, to ensure that there is proper source integration in national plans.

10. Power transmission is the next area after power generation in the value chain. Power transmission should have two distinct functions - the utility function of carrying power and the engineering and commissioning function of setting up transmission networks.
  - a. The monopoly of Power Grid Corporation has been reducing over the years. This CPSE should be split in two parts - a government owned utility firm which provides the assurance function of carrying power, and a government owned but widely held engineering firm, which can compete with private sector for engineering contracts on commercial basis.
  - b. There should be a 100% feeder separation for agriculture use. Currently the infrastructure which supports industrial, consumer, and agriculture use is common in many cases. This arrangement does not lend itself well to customizing specific parts of the power value chain. If agriculture feeders are separated -
    - i. It will be easier to use renewable sources and infrastructure like solar pumps for farm use.
    - ii. It will be easier for the state governments to subsidize the power use for agriculture with full accountability of subsidies used and distributed.
11. The Indian government should invest in full interoperability across the national grid. Constant investment should be made in transmission utility function to ensure power surplus states and generation rich areas (usually North, East, and North East) are connected with power consumption areas (usually West and South). The transmission investments should be made alongside generation plans, so that power evacuation capacity is not a bottleneck and states have more flexibility in signing optimal PPAs.
12. After power transmission, power distribution is next step in the value chain. This function is mostly a state government monopoly. Most state government distribution companies (discoms) are heavily indebted and make operational losses every year. Since the passage of the 2003 Electricity Act which helped create these discoms, three efforts have been undertaken by the central governments to clean up the financial and operational aspects of discoms. These three attempts have only solved the issues related to discoms partially.
13. The Government of India should create a fifteen year roadmap for state governments to exit the commercial operations of discoms. This policy should be binding on state governments, though it will need a consensus building approach and not a hard legislative approach, as electricity distribution is a state subject.
14. The discom privatization roadmap should be based on the principle of separating content from carriage. The state governments should continue to own the carriage function. This is a utility function, and it should be the responsibility of the state to guarantee carriage, without prejudice or commercial considerations. The state discoms should essentially morph into regional power transmission utilities and infrastructure providers.
15. The content, which implies the last mile power distribution to actual consumers, should be a completely private function over the next fifteen years. Consumers should be able to switch between private providers in the way they can today change between mobile operators. Consumer facing functions like metering,

billing, customer service, and complaints should be owned by the private players. These players should also introduce pre-paid vouchers to ensure small ticket consumers make the best use of power access.

16. The Government of India should take a one-time exercise of refurbishing power infrastructure for top 50 Indian cities. Today India urban centres, which are the real engines of economic growth, do not get reliable power supply at retail level, despite abundance of power supply. The main reason is the creaking city power infrastructure, which has not been renewed and overhauled for many decades. A one-time refurbishment exercise led by the central government capital expenditure funding, will make it easier for the state governments to sell the separation of content and carriage locally. More private players will be attracted to the content business if the supply backbone is robust.
17. Smart power meters should be made mandatory for all classes of consumers. This is a humongous task needing large capital outlay. However, smart metering should be achieved in a time-bound manner nationally. Global manufacturing companies should be incentivized to manufacture smart meters in India.
18. Once content and carriage separation as well as feeder separation for agriculture purposes starts, the National Load Dispatch Centre (NLDC) will be able to plan for power procurement and routing using better technology. The NLDC should invest in the technology capability in the areas of preparing better load curves and using data analytics to match demand with supply in a more cost-effective manner.
19. The Central Electricity Regulatory Authority (CERC) should become the nodal agency for all power policy formulation. The corresponding state bodies or the SERCs should focus only on local tariff setting function along with consumer grievance redressing function. The CERC should take on the mantle of the true power sector think tank looking into the future, while the SERCs should take up the operational mantle for respective states.
20. Various classes of consumers (industrial, retail, agriculture, etc.) should pay the same tariff equalized for the generation source and transmission infrastructure used. The current policies of industrial consumers subsidizing other classes of consumers should end over a period of five years.
21. The state governments should be allowed to retain tariff subsidization as a lever for attracting industrial investments in their respective states. However, any subsidization should be made good via mandatory direct benefit transfers (DBT) rather than playing on actual tariff reductions or customizing tariffs for individual projects. The tariff setting should thus become a SERC controlled function only with no political intervention.
22. All big consumers of power like Indian Railways and Metro Rails should be given discom licenses. This will allow them to negotiate and change their PPAs more efficiently and cost effectively.
23. Power exchanges should be promoted, with reduced capital requirements for setting up new exchanges. This will allow effective routing of power from surplus to shortfall regions cost effectively and ensure that all spot demand is fulfilled.

24. The power financing CPSEs like Power Finance Corporation and Rural Electrification Corporation should change their operational structure to finance utility projects (transmission, state networks, and expansion to new demand areas) and renewable power generation rather than the current model of financing state discoms.
25. India should clearly state an international aim and position in leading the renewable energy revolution. There should be specific investments made in three areas.
  - a. A CPSE like the Energy Efficiency Services Limited (EESL) should shape itself as a global corporation focusing on research and development, patenting, consultancy, and promoting the use of renewable energy.
  - b. International Solar Alliance (ISA), the first multilateral body to be based out of India, should be shaped to allow India to take global energy policy leadership, on the lines of Organization of the Petroleum Exporting Countries (OPEC). The ISA should be India's own OPEC.
  - c. Indian CPSEs should be allowed to and funded for exploring minerals like lithium and cobalt and buying mines internationally. Controlling the supply of these minerals will be critical for sufficiency in the era of battery-driven storage and energy use.
26. The power sector revamp should be led by international ambition, cutting edge technology deployment, reducing the role of the government in non-critical area, and ensuring that the past financial and operational issues are resolved once and for all in a time-bound manner.