

Committee Report Summary

Optimal Energy Mix in Power Generation on Medium and Long Term Basis

- The Committee on Optimal Energy Mix in Power Generation on Medium and Long Term Basis (Chair: Chairperson, Central Electricity Authority) submitted its report on January 1, 2018. The Committee was constituted by the Ministries of Power, and New and Renewable Energy in October 2017. Power is generated through various sources of energy such as coal, hydro, natural gas, and renewables (solar, wind). An optimal energy mix is one that uses a mix of these generation sources in the most efficient manner.
- The terms and references of the Committee included: (i) formulating the mission statement for aiming at clean, affordable, reliable and sustainable power for all, (ii) formulating the optimal generation mix for the next 15 years, considering India's targets under the Paris Climate Agreement, economic growth, and environmental concerns, (iii) developing scenarios to integrate renewables at various energy generation mixes, and (iv) suggesting the road map to reduce the dependence on import of fuel for power generation.

Key observations and recommendations of the Committee include:

 - **Optimal generation mix:** As per the National Electricity Plan, for the period 2017-2022, the committed capacity addition for various energy sources is: (i) hydro - 6,823 MW, (ii) gas - 406 MW, (iii) nuclear - 3,300 MW, (iv) renewables - 1,17,756 MW, and (v) coal – 47,855 MW (with a retirement of 22,716 MW of coal based capacity). The Committee noted that only 6,445 MW of additional coal based capacity would be required during 2017-2022, to meet the peak demand and energy requirement in the year 2021-22, as compared to the 47,855 MW that is currently at various stages of construction. The overall efficiency (or plan load factor) for coal based capacity is likely to be 56.5% during 2021-22.
 - The Committee noted that considering all these factors such as: (i) existing and under construction power projects, (ii) targets for renewable energy generation, (iii) energy requirement in 2021-22, and (iv) the availability of domestic gas, there is not much scope in optimizing the generation mix by the year 2021-22.
 - **Scenario building:** The Committee carried out two scenarios to find optimal generation mix, for the period post 2017-22. The first scenario was to achieve India's Intended Nationally Determined Contribution (INDC) targets under the Paris Climate Agreement, and the second was to give impetus to hydro power. India's INDC targets include: (i) reducing the emissions intensity of its GDP by 33% to 35% by 2030, from 2005 levels, and (ii) achieving about 40% electric power capacity from non-fossil fuel based energy resources by 2030. The Committee noted that INDC targets can be achieved with a renewable energy installed capacity of 1,25,000 MW by 2027 (1,00,000 MW by 2022). With such renewable capacity, carbon intensity will reduce by 53% from 2005 levels to 2027.
 - Since renewable energy is variable (weather dependent), high renewable capacity addition will require providing balancing power and ramping requirement (during peak demand). Under the second scenario, giving an impetus to hydro power will help with balancing the power requirement and ramping up of power generation, at minimal cost. If 50% of the total hydro potential of 1,48,000 MW by 2026-2027 is exploited, along with 2,75,000 MW of renewable capacity by 2026-27, coal based capacity can be reduced (from 2,38,150 MW to 2,22,652 MW) resulting in lower carbon emissions.
 - **Integration of renewable energy:** The Committee noted that, to accommodate the variability in renewable generation, the conventional generating plants (coal based) will need to be flexible (provide energy when the renewable plants are unable to). This will help with the balancing and ramping up of grid (when more capacity is required). States can also use a combined cycle gas based capacity for providing peaking and balancing support. Coordinated scheduling and utilisation of hydro generation for providing secondary and tertiary services would also help in integrating renewable generation resources into the grid.
 - **Roadmap to reduce dependency on fuel imports:** The Committee suggested a few actions to reduce dependency on fuel imports for power generation. These include: (i) improving coordination between Railways and coal companies for optimum utilization of resources, (ii) augmenting the production and availability of domestic coal for the power sector, (iii) expediting environmental and forest clearances and land acquisition, (iv) following Coal India Limited's roadmap to substantially enhance production of coal by 2019-20 to one billion tonne, (v) allocating additional natural gas to power sector for better utilization of gas based power plants, and (vi) improving gas pipeline for transportation of natural gas to transport it from remote fields to power plants.

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