National Electricity Plan for 2022-27

For Prelims: Central Electricity Authority, Electricity Act, 2003, Battery Energy Storage Systems, Lithium-ion batteries.

For Mains: National Electricity Plan for 2022-27.

Why in News?

The latest draft of the **National Electricity Plan (NEP),** which covers the period 2022-27, marks a **significant departure from its previous edition**, which had focused primarily on renewable energy.

What is the National Electricity Plan?

- **About:**
  - The NEP is a crucial document that **guides the development of the power sector** in India. It is formulated by the **Central Electricity Authority (CEA)** every five years under the **Electricity Act, 2003.**
  - The CEA formulates **short-term (5-year) and prospective plans (15-year)** to assess the demand for planning capacity addition and coordinate the activities of various planning agencies for the optimal utilization of resources.
  - The NEP provides a review of the last five years (2017-22), capacity addition requirements for 2022-27, and **projections for the period 2027-2032.**
  - The first **NEP was notified in 2007**, the Second Plan in December 2013, and the third plan which covers the detailed Plan for 2017-22 and the perspective Plan for 2022-27 was notified in 2018.
- **New Draft:**
  - It recognizes the **need for additional coal-based capacity**, ranging from 17 GW to nearly 28 GW, till 2031-32, over and above the 25 GW of coal-based capacity that is currently under construction.
  - The draft Plan also highlights the need for significant investments in battery storage, with an estimated requirement of **between 51 GW to 84 GW by 2031-32.**
  - It projects an increase in the Plant Load Factor (PLF) of coal-fired power plants from 55% up to 2026-27 to 62 % in 2031-32.
  - It also emphasizes the challenges posed by the **increasing reliance on renewables,** which will require careful management and planning in the years ahead.

What is the Power Scenario of India?

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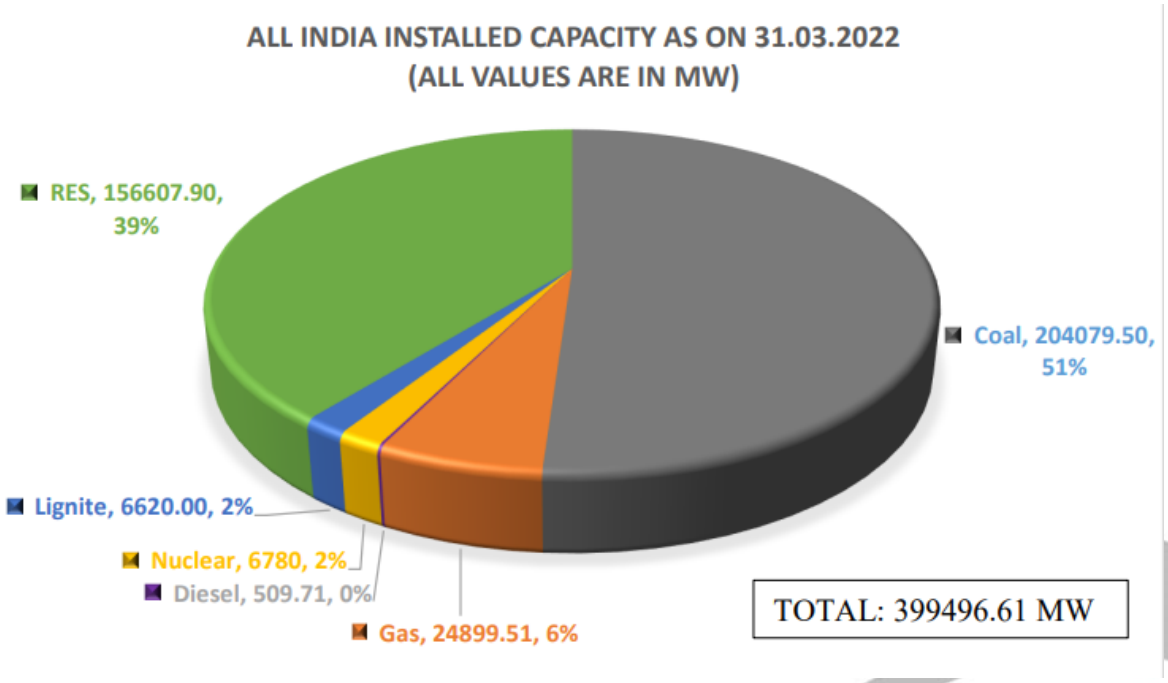

What are the Related Challenges?

- **Reliance on Old Plants:**
  - India's fleet of coal-fired thermal power plants is over 25 years old and runs on outdated technology, which **raises concerns about grid stability and power interruptions.**
- **Difficult to Manage the Renewables-Dominated Grid:**
  - While there has been a pronounced reliance on renewable generation for meeting capacity additions, **there is a lack of clarity on how the grid will be managed.** The slow development of hydropower and zero-inertia solar generators has resulted in a decrease in inertia, **which provides stability to the grid.**
- **Inadequate Funding:**
  - If battery storage is to be relied on to back up renewable generation, **it requires significant investments.**
    - The CEA report estimates that the total fund requirement for **Battery Energy Storage Systems (BESS)** between 2022-27 is approximately 14.30 lakh crore. However, the CEA has only allocated a budget of 8 lakh crore for BESS development for a 10-year period.
- **Lack of Evaluation:**
  - There is no evaluation of the ramping rate for thermal plants under different solar generation scenarios.
    - The ramping rate is the rate at **which a power plant can increase or decrease its output.**
  - Without proper assessment, it could **lead to issues such as overloading, underloading,** or power interruptions.

How can the Related Challenges be Addressed?

- **BESS** based on **Lithium-ion batteries** offer a cost-effective solution to balance the grid against load fluctuations and intermittency in generation. The energy storage can provide energy time-shifting, allowing power to be used when it is needed rather than being wasted when it is generated.
- It is important to continue investing in the development of battery storage technology, as well as exploring new solutions such as water-based systems. This will help address the challenges **outlined in the National Electricity Plan for 2022-27** and ensure a stable and reliable power supply in India.
- Additionally, increasing the use of hybrid generation models will help to transition to renewable

energy sources while ensuring backup power is available when needed.

Source: IE