India's Power Sector in 2030: Shift to Renewables and Coal's Decline

For Prelims: Central Electricity Authority (CEA), Paris Agreement, Targets of Renewable Energy, climate commitments

For Mains: <u>India's energy transition</u> and future power generation mix, challenges faced in the adoption of renewable energy sources, progress of India in achieving its renewable energy targets

Why in News?

Recently, the <u>Central Electricity Authority (CEA)</u> (Ministry of Power) released a new publication titled **Report on Optimal Generation Mix 2030 Version 2.0.**

- This is an updated version of the report published in 2020 titled Report on Optimal Generation Capacity Mix for 2029-30.
- The report highlights the changes expected in India's energy mix, with a decline in <u>coal's share</u> and a rise in <u>renewable energy (RE) sources.</u>
- Earlier, the <u>CEA released the latest draft of the National Electricity Plan (NEP) 2022-27.</u>

What are the Key Highlights?

- Coal Share in Power Mix:
 - Coal's share in the power mix is projected to decline from 73% in 2022-23 to 55% in 2030.
 - Impact on Coal Usage:
 - Although the share of coal in power generation is set to reduce, in absolute terms, coal power capacity and generation will increase between 2023 and 2030.
 - Coal capacity is projected to rise by 19%, and generation is expected to increase by 13% during this period.
- Solar Energy Contribution:
 - **Solar energy** is expected to play a significant role in the power mix, lifting the overall load.
 - Projections indicate a **quadrupling of solar capacity** from 109 GW to 392 GW by 2030.
 - Solar generation is expected to increase from 173 BU to 761 BU in the same period.

Note:

- Power capacity differs from generation. Capacity is the maximum power a plant can produce and is expressed in watts (or gigawatts or megawatts).
- Generation is the actual amount of power produced in one hour, expressed in watt-hours or billion units (BU).

Contribution of Other RE Sources:

- Projections for large <u>hydropower</u> and <u>wind energy</u> remain modest in the future power mix.
 - Large hydro generation is expected to increase from 8% to 9% by 2030.
 - Wind generation, on the other hand, is projected to decrease to 9% in the updated version (from 12% in the previous report).
- Renewable sources, including small hydro, pumped hydro, solar, wind, and biomass, are expected to account for 31% of the power mix in 2030, compared to the current 12%.
- Role of Natural Gas in the Power Generation Mix:
 - Despite aspirations to increase the share of <u>natural gas</u>, its contribution to power generation remains small.
 - The report estimates the likely retirement of 2,121.5 MW of coal plants by 2030, with 304 MW set to be retired during 2022-23.
- Greenhouse Gas Emissions:
 - The power sector contributes approximately 40% of India's total greenhouse gas emissions.
 - Power sector emissions are projected to rise by 11%, reaching 1.114 Gt CO2 in 2030, accounting for 10% of global power sector emissions.
- Climate Commitments
 - In terms of <u>climate commitments</u>, CEA's projections indicate that India is likely to over-achieve on its pledge to the <u>Paris Agreement</u> - to have 50% of installed power capacity from non-fossil sources by 2030.
 - As per the report, India's share of capacity from non-fossil sources will be 62% by 2030. The share will be 64% if <u>nuclear powe</u>r is considered.

What are India's Targets of Renewable Energy Power Generation?

India's Renewable Energy Targets:

- 175 GW Renewable Energy Capacity by 2022:
 - 100 GW of Solar Power.
 - 60 GW of Wind Power.
 - 10 GW of Biomass Power.
 - 5 GW of Small Hydro Power.
 - 500 GW Non-Fossil Fuel Based Energy by 2030:
 - Announced by Prime Minister Narendra Modi at COP26 summit.
 - 50% Electricity from Non-Fossil Fuel Sources by 2030:
 - Pledged in India's <u>Nationally Determined Contributions (NDCs)</u> under the Paris Agreement.

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India's Global Ranking:

- The 4th largest installed capacity of solar and wind power in the world.
- The 4th most attractive renewable energy market in the world.

What is CEA?

- About:
 - The CEA is a statutory organization that advises the government of India on policy matters and formulates plans for the development of electricity systems in the country.
 - It was established in 1951 under the Electricity Supply Act 1948, which has been now superseded by the <u>Electricity Act 2003.</u>
- Functions:
 - Policymaking:
 - Preparing the national electricity plan and tariff policy.
 - Advising the central government on matters relating to the national electricity policy, rural electrification, hydropower development, etc.

• Technical Standards:

- Specifying the technical standards for construction, operation, and maintenance of electrical plants and electric lines.
- Specifying the **grid standards and safety requirements** for operation and maintenance of transmission lines.
- Data Collection and Research:
 - Collecting and recording data on generation, transmission, distribution, and utilization of electricity and promoting r&d in the field of electricity.
- Implementation Monitoring and Coordination:
 - Monitoring the implementation of power projects and schemes.
 - Coordinating with state governments, state electricity boards, regional power committees, etc. on matters relating to electricity.

What are India's Initiatives for Power Generation from RE Sources?

- Solar Power:
 - National Solar Mission
 - International Solar Alliance
 - PM Kisan Urja Suraksha evam Utthaan Mahabhiyan (PM-KUSUM)
- Wind Power:
 - National Wind-Solar Hybrid Policy
 - National Offshore Wind Energy Policy
- Hydropower:
 - National Hydroelectricity Policy
 - Renewable Energy Status: The government has declared large hydropower projects (>25 MW) as renewable energy sources, which will enable them to avail the benefits of renewable energy such as waiver of inter-state transmission charges, renewable purchase obligation, green energy certificates, etc.
- Hydrogen:
 - National Hydrogen Energy Mission
 - National Green Hydrogen Mission

What are the Challenges in Adopting Renewable Energy?

Intermittency and Variability:

- RE sources are intermittent and variable due to weather conditions.
- Matching energy supply with demand and maintaining grid stability becomes challenging.
- Grid Integration:
 - Integrating large-scale renewable energy into existing power grids can be complex.
 - Upgrading grid infrastructure and balancing mechanisms is necessary for reliable power supply.

Land and Resource Availability:

- Scaling up renewable energy installations requires significant land and resource availability.
- Identifying suitable locations, acquiring land, and addressing environmental concerns can be challenging.
- Transition from Coal-dependent Economy:
 - Coal still dominates the power sector in India, as it accounts for about **70% of the** electricity generation.
 - Also, coal sector in India is estimated to provide about 1.2 million direct jobs and up to 20 million indirect and dependent jobs.
 - Transition from it can lead to job losses in the coal sector and ensuring a smooth transition for affected communities needs to be addressed.

UPSC Civil Services Examination Previous Year Question (PYQ)

<u>Prelims</u>

Q. The term 'Intended Nationally Determined Contributions' is sometimes seen in the news in the context of (2016)

(a) pledges made by the European countries to rehabilitate refugees from the war-affected Middle East(b) plan of action outlined by the countries of the world to combat climate change

(c) capital contributed by the member countries in the establishment of the Asian Infrastructure Investment Bank

(d) plan of action outlined by the countries of the world regarding Sustainable Development Goals

Ans: (b)

<u>Mains:</u>

Q. Describe the benefits of deriving electric energy from sunlight in contrast to conventional energy generation. What are the initiatives offered by our government for this purpose? **(2020)**

Source: DTE

PDF Refernece URL: https://www.drishtiias.com/printpdf/india-s-power-sector-in-2030-shift-to-renewablesand-coal-s-decline

the Vision