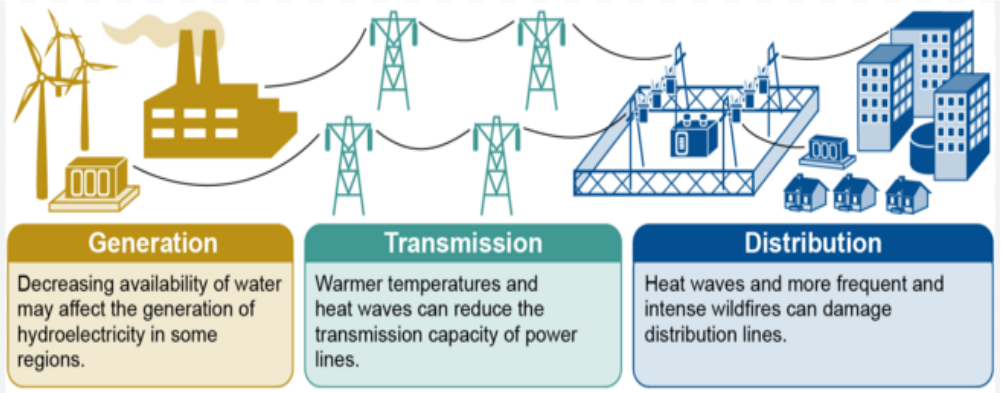
Climate Change and Electricity

Why in news?

The Power Ministry needs to reassess the National Electricity Plan (NEP) due to increased electricity demand and consumption from rising heat waves and humidity in recent years.

What are the impacts of climate change on electricity?

- **Higher demand & consumption** - Warmer temperatures lead to increased use of air conditioning, raising overall electricity demand, especially during peak summer periods.
- **Increased transmission Losses** - Elevated temperatures increase resistance in power lines, leading to higher transmission losses.
- **Cooling water shortages** - Reduced water availability can lead to operational restrictions or shutdowns.
- Thermoelectric and nuclear power plants require significant amounts of water for cooling.
- **Damages infrastructure** - Hurricanes, storms, and floods can damage power lines, substations, and generation facilities, leading to outages and costly repairs.
- **Risk of blackouts** - Extreme weather increases the risk of blackouts and requires investments in grid resilience.
- **Reduces efficiency** - Higher temperatures reduce the efficiency of power plants.



What is National Electricity Plan (NEP)?

- **Launch** – The first NEP was *formulated in 2005*.
- **Preparation** - *Electricity Act, 2003* mandates that the central government shall prepare the NEP in consultation with the state governments and the Central Electricity Authority.
- **Aim** – To meet the energy needs of high economic growth & electricity consumption of about 1.3 billion people.

- The capacity additions forecasts considered the impact of factors like
    - Energy efficiency
    - Penetration of electric vehicles
    - Production of green hydrogen on peak and energy demands.

Status of Electricity in India (2005-2021)
• **Generating capacity** – Between 2005 and 2021, generation capacity (inclusive of renewable capacity) has *gone up by about 251 GW*. • **Renewable energy** – The renewable generating capacity has *gone up to 94 GW* (from wind, solar, small hydro and biomass) from almost nothing. • **Per capita consumption** – It has *almost doubled* from 630 units to *approximately 1,200 units today*. • **Rural electrification** – It is almost complete with *near 100% electricity access* to households (not necessarily 24 hours supply).

- **Policy revision** – The Ministry of Power revisits the NEP every five years to forecast the country's power generation, transmission and demand trajectory for the coming decade.
- In May 2023, the Central Electricity Authority notified the NEP (Vol-I Generation) for the period 2022-32.

Why NEP needs to revised?

- The *constantly-evolving weather patterns* have skewed the government's electricity demand projections.
- **In 2024** – There has been an *exceptional rise of weather-related energy consumption*.
- April-June was marked by sweltering temperatures coupled with intense heat waves across North India leading to a higher requirement for pushing up electricity demand.
- **Increased power consumption** - During April 2024 power consumption rose 11% year on year.
    - The growth in May was steeper at 15% and in June, the usage rose roughly 9%.
- **Mismatch in the demand projections** – For instance, the Ministry projected a peak demand (day) of 235 GW during May, but it hit an all-time high of 250 GW on May 30.
- The projection for June was 240 GW, but the demand went up to over 245 GW.
- **Sector wise changes** - Farm sector is experiencing changes in consumption patterns because the country is trying to meet agriculture demand during the day, which means that *demand will shift from night to day*.

What lies ahead?

- **Evaluate requirements** – On how our demand is evolving and what sectors are likely to contribute significantly.
- **Assess overall capacity requirement** – This can address varying levels of demand on monthly, weekly, daily and hourly bases, including seasonal variations.
- This is crucial for ensuring grid stability and reliable power supply.
- **Analyse the mix of power plants** – Both scheduled and intermittent plants have to be analysed.
- **Increase the capacity** – The peak demand could surpass 400 GW by 2032 and thus we need to have 900 GW of total installed capacity by 2031-32 and that

- **Save energy** – Individuals and companies can take many actions to save energy.
    - For example, look for ENERGY STAR certified products, such as appliances and electronics.
- **Expand access to clean technologies** –Promote wind and solar power, so that all communities benefit.
- This transition will help reduce the emissions contributing to climate change.
- **Modernize infrastructure** - Utilities and government agencies can update energy infrastructure, such as *leak-prone pipelines and aging power lines*.
- These actions increase resiliency, improve safety, and protect public health.
- **Ensure energy equity** - Policymakers, industry leaders, and communities can take steps to improve energy affordability and ensure all people have a voice in energy planning.
- **Make infrastructure local** - Utilities, urban planners, and government agencies can use microgrids.
- These systems and other decentralized energy infrastructure help make electricity supplies more resilient to extreme weather.

References

1. The Hindu BusinessLine| Reviewing National Electricity Plans
2. EPA| Impacts of Climate Change on Electricity

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