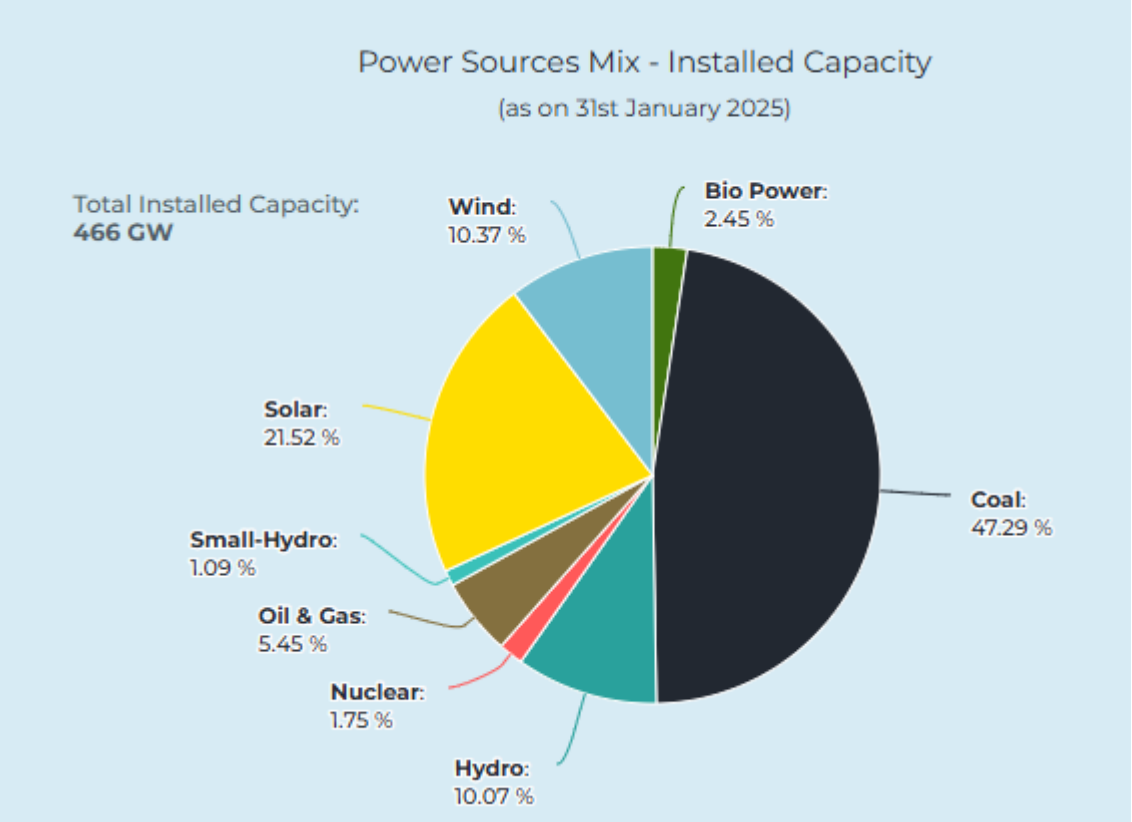
Agricultural Impact of Coal Power

Why in News?

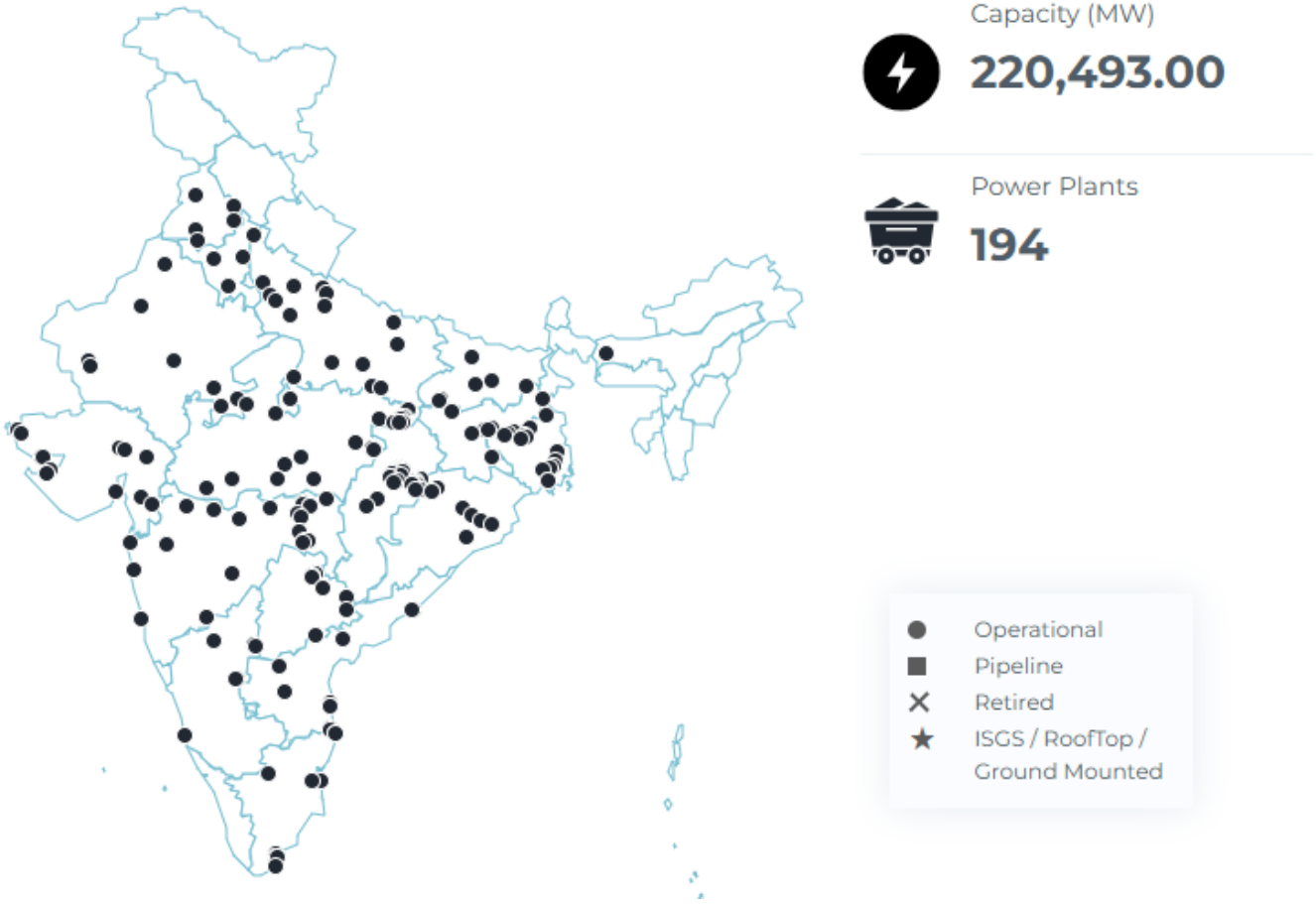
According to a new research led by researchers at Stanford University in the US, coal-fired power plants are quietly depleting India's rice and wheat output.

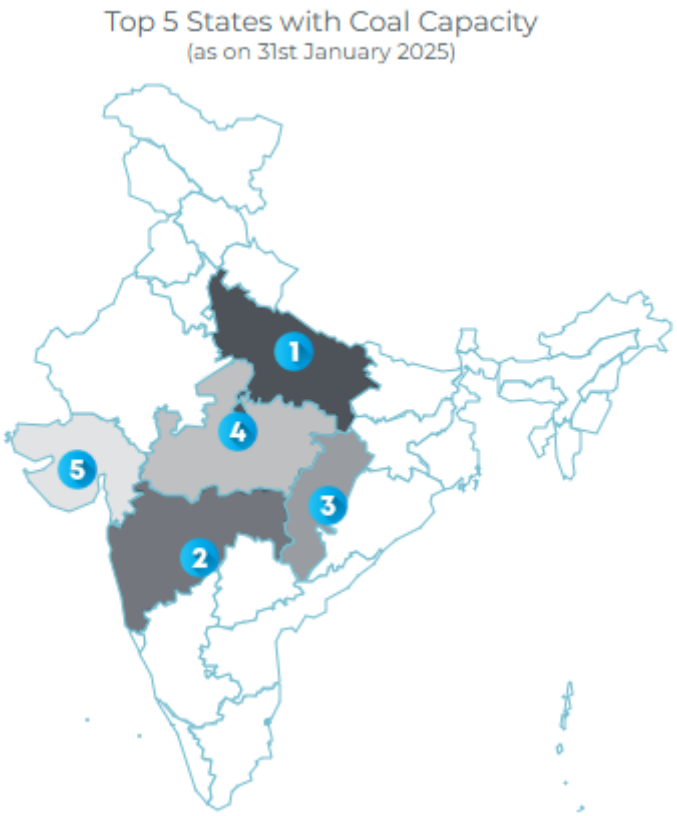
What is the status of coal power in India?

- **Total capacity** – India has total installed capacity of 466 GW.
- **Share of coal power** – Coal power accounts for about 47 %(220 GW).



- **Coal plants in India** – There are about 194 coal powerplants in India.





- **Coal reserve** - According to the National Coal Inventory of 2023, published by Geological Survey of India, the total estimated coal reserve (resource) of India is

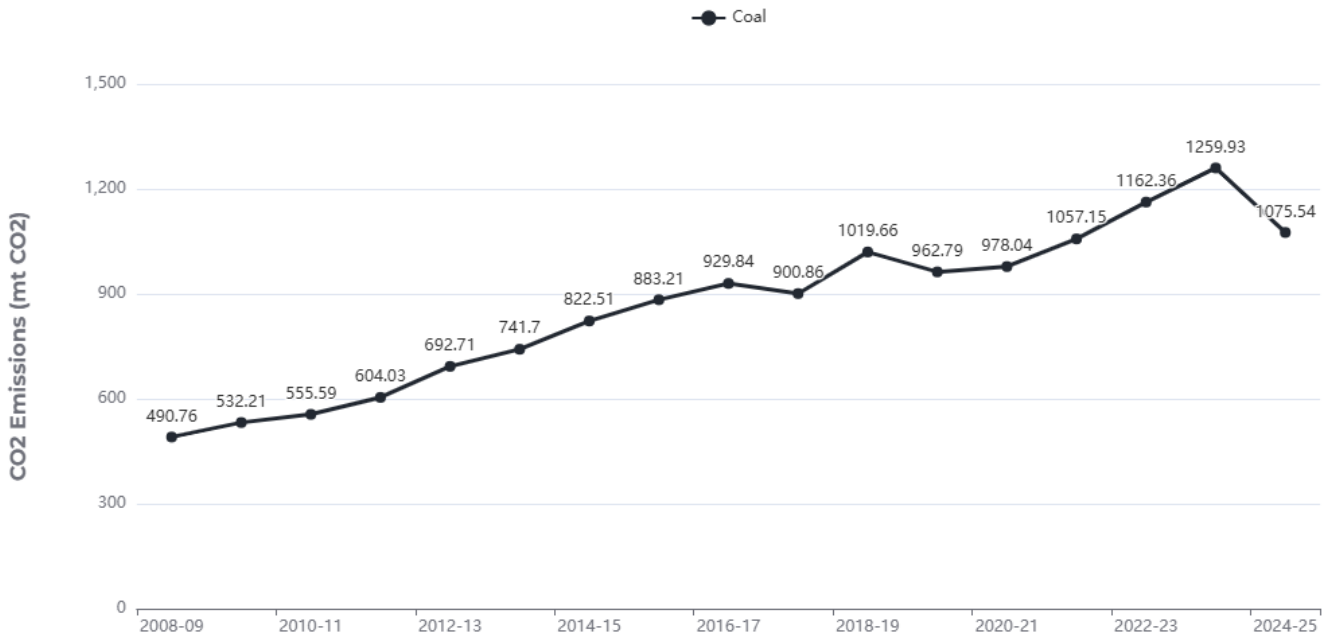
378.21billion tonnes as of 01.04.2023.

What are the pollutants of coal power plants?

- **Coal power plants emission**- It consists of carbon dioxide(CO_2, nitrogen oxides(NO_x), sulphur oxides(SO_x), fly ash, soot, suspended particulate matter, and other trace gases.

Emissions from burning coal	
Pollutants	**Effect**
Sulfur dioxide	Acid rain and respiratory illnesses
Nitrogen oxides	Smog and respiratory illnesses
Particulates	Smog, haze, respiratory illnesses, and lung disease
Carbon dioxide	Primary greenhouse gas produced from burning fossil fuels (coal, oil, and natural gas)
Mercury and other heavy metals	Neurological and developmental damage in humans and other animals
Fly ash and bottom ash	Pollutes air, water , soil.

- Coal-based Thermal Power Plants (TPPs) are responsible for a disproportionately higher share of emissions than the industrial sector .
- **CO_2 Emission** - About 1000 metric tonne of carbon di oxide is emitted from coal plants.



- **Mobility of pollutants -** Once emitted, NO2 can travel long distances, affecting regions up to 100 kilometres away from the source.
- **Varied exposure** - Coal's contribution to air pollution varied by region and those located near fertile farmland with a high emissions exposure caused the most agricultural damage.

Chhattisgarh, a major hub for coal-fired power, had the highest share of NO2 pollution from coal plants: about 19% of NO2 detected in the monsoon season and 12.5% in winter came from coal plants.

Uttar Pradesh had high overall NO2 levels but only a small portion of that came from coal power, while Tamil Nadu had relatively low NO2 pollution but the bulk of it came from coal power.

What are the impacts of coal power on agricultural output?

- **Affects plant growth** - Nitrogen oxides(NO_x) are phytotoxic, meaning they stress plants, and have been known to hinder cellular function and interfere with crucial enzymatic activities.
- **Crop damage** - NO_x also contribute to the formation of ozone, which in turn exacerbates crop damage.
- **Reduces photosynthesis** - Particulate matter limits the amount of sunlight available for photosynthesis.
- **Blocks carbon intake** - Plants with one gram of mining dust on their leaves absorbed around 2-3 grams less carbon per square metre.
- **Yield reduction** - coal-fired power plants are quietly depleting India's rice and wheat output, destroying up to 10% of the yield in several states.
- **Monetary loss** - The monetised loss per gigawatt-hour of electricity generated for wheat and rice touched up to $17,370/GWh and $13,420/GWh, respectively.
- **Seasonal impacts** - About 20% of coal-fired electricity generation during the monsoon season accounted for half of all coal NO2-related rice losses .
- 12% of total winter season generation was linked to 50% of wheat losses.

What can be done reduce the pollution caused crop loss?

- Targeting a relatively small subset of highly polluting power stations could still have significant benefits for agricultural productivity.

The yield of 5.7% of cropland in West Bengal near coal-fired power stations could increase 5-10% while the gains of 1.66% could exceed 10%.

- Considering crop impacts alongside health and greenhouse gas emissions can help policymakers prioritise where pollution control should be effected.
- Install flue gas desulphurisation and electro static precipitator in power plants to reduce the pollutants in the emission gas.
- Use of carbon capture to separate CO2 from emissions sources and recovers it in a concentrated stream.

Reference

The Hindu | Coal power emissions