**Sai teja**

Thermal power plants contribute the highest level of emissions among the power generation sources, causing air quality and other environmental concerns.

Also, these plants have the highest age with an average approaching 40 years.  These older coal and gas plants contain older designs and technologies designed for fixed baseload operation.  Operating at partial loads exacerbates many issues.

To overcome these issues and increase the efficiency of the plant we need new equipment with upgraded components and new technologies. Some of the latest technologies around the world that are being implemented are,

**Mudit**

As u know Thermal Power is the main source of electricity generation in India. It stands at around 230.6 GW out of which approx. 198.5 is from coal alone.

Coal fly ash is an industrial by-product produced from the burning of pulverized coal, during electricity generation in the thermal power plants. Fly ash is considered a major global pollutant due to the surplus amount of generation and hazardous nature

Indian fly ash has high ash content in comparison to other countries. Due to high physical, chemical, mineralogical and elemental properties it has progressively gained applications in the fields of recovery of metals, mining, road constructions and fillers. Among all one of the major application is in the form of cement, which constitutes 30-50% total utilization of fly ash every year. Some recent applications include bricks, tiles panels and composite materials. The government directives have also played an important role in the progressive increase in the utilization of fly ash. Present scenario of fly ash in India assures that fly ash utilization has better scope in future.

According to the new standards thermal power plants are expected to cut emissions and usage of water measurably. It is not clear what the penalties for failure might be, especially in the short-run. One of the biggest challenges in the thermal power sector is variance. The coal power plants vary in age, technology, size, location, ownership, load factor, etc

Siddhartha

New technologies and studies to improve thermal power plant performance include :

1. Continuous combustion tuning with artificial intelligence
2. Optimizing turbine operations in real time using machine learning
3. Predictive maintenance to avoid unplanned downtime using machine learning
4. Remote monitoring to detect unexpected operational variations

Oxyfuels are also being tested to provide lower emissions and increased power output.

The oxygen-fired pulverised coal power plant technology assists in removing completely (reported: 90% CO2 removal efficiency) the CO2 generated in the combustion process with very little air pollutant.

teja

**AdvX™** **Heat Recovery Technology –**

* AdvX™Auxiliary Heat technology is built to recover and utilize additional heat from flue gas, maximizing efficiency and saving cost significantly in both the short and long-term.
* AdvX™ Stack Gas Reheat is the most efficient way to clean and dry stack. The AdvX™ Stack Gas Reheat system will capture and utilize excess heat from flue gas, enhancing the operational efficiency and add to cost saving significantly.
* AdvX™ Upgrade solutions are the easiest way to improve thermal plant’s efficiency. The technology has been purposefully designed and built to enable the most efficient operation of thermal plants. With advanced configurations that increase efficiency with a low draft loss, AdvX™Upgrade Solutions push boundaries so that thermal plants can reach their goals.

**mudit**

Today’s modern technology-based power plant control systems allow integrating both process and electrical control into one consistent system providing a couple of benefits to generation companies:

* One user interface
* Access to all data from screens
* Data recording and archiving
* Lower training cost
* System administration
* System security, etc..

**Ultra super critical (USC) conditioning -**

* For conventional thermal power plants, each unit capacity has been increased and high-temperature and high-pressure steam conditions have been promoted to improve the thermal efficiency.
* The Hirono No. 5 Thermal Power Station of Tokyo Electric Power Company is a coal-fired thermal power plant adopting the ultra-super critical (USC) conditions of 24.5 MPa × 600/600°C, the highest level in the world, and has continued highly reliable operation since it started commercial operation in July, 2004.
* This most sophisticated coal-fired thermal power plant has the efficiency of 43% at generator terminal (HHV base), and reduces CO2 emissions intensity by 3% of conventional plants.

**siddhartha**

**Digitalization Technology -** Continuous combustion tuning with artificial intelligence

* Turbine operational optimization in real time using a combination of first principle analytics and machine learning
* Predictive maintenance to avoid unplanned downtime using machine learning
* Reducing stresses during variation on load to avoid failures and reduce maintenance needs
* Remote monitoring for visibility and analysis