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Thermal Power Plant Market - Global Industry Size, Share, Trends, Opportunity, and Forecast, Segmented, By Fuel Type (Coal, Natural Gas, Nuclear, and Others), By Capacity (400 MW, 400-800 MW, More than 800 MW), By Turbine Type (Simple Cycle, Combined Cycle), By Region & Competition, 2021-2031F

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Abstracts

The Global Thermal Power Plant Market is projected to expand from USD 1.76 Trillion in 2025 to USD 2.22 Trillion by 2031, demonstrating a Compound Annual Growth Rate (CAGR) of 3.95%. These industrial facilities generate electricity by converting heat from fuel sources like coal, natural gas, and oil into steam to power turbines, fundamentally driven by the escalating demand for reliable baseload electricity in rapidly industrializing economies and the necessity to stabilize power grids against the inherent intermittency of renewable energy infrastructure. This ensures continued reliance on thermal generation for consistent capacity output, despite challenges posed by stringent environmental regulations and carbon neutrality mandates that necessitate decommissioning and increase compliance costs, even as global coal consumption, according to the Energy Institute, surpassed 164 exajoules for the first time in 2024. The primary market driver is the rising global electricity consumption and rapid industrialization, particularly in emerging economies where energy security is paramount. As manufacturing sectors expand and urbanization rates climb, the demand for consistent baseload power has surged, necessitating the continued reliance on thermal assets to stabilize grids. This dependency is evident as global fossil fuel generation rose by 244 terawatt-hours (TWh) in 2024 to meet escalating electricity demand, as reported by Ember in May 2025, and the global coal fleet saw a net increase of 18.8 gigawatts (GW) in 2024, largely driven by new commissions in Asia, according to Global Energy Monitor in April 2025. Concurrently, the increasing shift

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towards natural gas as a transitional energy source is reshaping the thermal power landscape, with utilities deploying gas-fired turbines to reduce carbon intensity while maintaining essential dispatchable capacity, projected to account for 40% of total U.S. electricity generation in 2025, as per the U.S. Energy Information Administration in December 2025.

Market Driver

The primary driver of the Global Thermal Power Plant Market is the rising global electricity consumption and rapid industrialization, especially in emerging economies where energy security is paramount. As manufacturing sectors expand and urbanization rates climb, the demand for consistent baseload power has surged, necessitating the continued reliance on thermal assets to stabilize grids against the intermittency of renewable sources. This dependency is evident in the resilience of fossil fuel generation, with global fossil fuel generation rising by 244 terawatt-hours (TWh) in 2024 to meet escalating electricity demand, according to Ember in May 2025. Furthermore, infrastructure development continues to support this growth, preventing a contraction in total capacity, as the global coal fleet saw a net increase of 18.8 gigawatts (GW) in 2024, driven largely by new commissions in Asia, according to Global Energy Monitor in April 2025. Simultaneously, the increasing shift towards natural gas as a transitional energy source is reshaping the thermal power landscape. Utilities are actively deploying natural gas-fired turbines to reduce carbon intensity while maintaining the dispatchable capacity required for grid balancing. This transition allows operators to navigate stringent environmental regulations without compromising power reliability, positioning gas as a critical bridge fuel. Natural gas was projected to account for 40% of total U.S. electricity generation in 2025, as per the U.S. Energy Information Administration in December 2025, underscoring this strategic pivot towards cleaner thermal technologies that sustain market momentum during the broader energy transition.

Market Challenge

A significant challenge impeding the expansion of the Global Thermal Power Plant Market is the enforcement of stringent environmental regulations and carbon neutrality mandates. These regulatory frameworks compel power generation companies to accelerate the decommissioning of carbon-intensive assets, particularly coal-fired facilities, often before they reach the end of their operational lifecycles. Consequently, utilities face substantial financial burdens arising from the premature retirement of assets and the escalation of operational expenditures required to install emission control technologies. This dynamic diminishes the economic viability of maintaining

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existing thermal fleets and deters future investment in fossil-fuel-based infrastructure. The direct impact of these policies is evident in the sharp contraction of thermal generation activity in highly regulated regions. According to the International Energy Agency, in 2024, coal-fired power generation in the European Union fell by 15% due to high carbon prices and the rapid deployment of cleaner alternatives. This significant decline underscores how legislative mandates are actively shrinking the market share of thermal power, effectively overriding the demand for baseload capacity in developed economies committed to aggressive net-zero targets.

Market Trends

The integration of Carbon Capture, Utilization, and Storage (CCUS) systems is becoming a pivotal trend as operators seek to decarbonize assets without retiring them. This technology enables facilities to sequester emissions at the source, thereby maintaining dispatchable power output while complying with net-zero targets. Utilities are increasingly retrofitting plants with capture units to separate carbon from flue gas streams, effectively severing the link between fossil fuel combustion and atmospheric release. Global operational capacity for capturing and storing carbon dioxide reached just over 50 million tonnes, reflecting a significant mobilization of abatement technologies across the power sector, according to Energy Monitor in May 2025. Concurrently, the implementation of biomass and ammonia co-firing is gaining traction as a method to lower the carbon intensity of coal-fired generation. Power producers are modifying boiler systems to blend these low-carbon fuels with conventional coal, reducing the overall greenhouse gas footprint while utilizing established infrastructure. This approach extends the operational life of thermal plants by displacing fossil fuels with hydrogen-derivative alternatives. For instance, China Shenhua Energy Company's co-firing technology achieved stable combustion of up to 30% ammonia, capable of reducing carbon dioxide emissions by over 183,000 tonnes annually per unit, as announced in February 2025.

Key Market Players

Nuclear Power Corporation of India

India Power Corporation Ltd

NTPC Limited

Adani Power Limited

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Maharashtra State Power Generation Co. Ltd

Duke Energy Corporation

American Electric Power Company, Inc.

Siemens AG

General Electric Company

Chubu Electric Power Co. Inc.,

Report Scope

In this report, the Global Thermal Power Plant Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

Thermal Power Plant Market, By Fuel Type

Coal

Natural Gas

Nuclear

Others

Thermal Power Plant Market, By Capacity

400 MW

400-800 MW

More than 800 MW

Thermal Power Plant Market, By Turbine Type

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South America

Brazil

Argentina

Colombia

Middle East & Africa

South Africa

Saudi Arabia

UAE

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Global Thermal Power Plant Market.

Available Customizations:

Global Thermal Power Plant Market report with the given market data, TechSci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

Company Information

Detailed analysis and profiling of additional market players (up to five).

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