

India Steam Turbines Market Segmented By Type (Steam Cycle and Combined Cycle), By Rated Capacity (1-120 Mw, 121-350 Mw, 351-750 Mw and Above 750 Mw), By Exhaust Type (Condensing and Non-Condensing), By Fuel Type (Coal, Biomass, Nuclear and Others), By Region, and By Competition, 2019-2029F

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Abstracts

India Steam Turbines Market has valued at USD 837.91 million in 2023 and is anticipated to project robust growth in the forecast period with a CAGR of 6.19% through 2029. India's industrial sector is experiencing notable growth, with manufacturing industries like steel, cement, chemicals, and textiles expanding their operations. These sectors rely on a substantial power supply for their processes, making steam turbines a vital component of their energy infrastructure. The demand for steam turbines is driven by the necessity of a consistent and uninterrupted power supply to support industrial activities.

Key Market Drivers

Growing Energy Demand and Infrastructure Development

The India Steam Turbines Market is driven by the continuous growth in energy demand and the simultaneous expansion of infrastructure. As India's population continues to increase, so does its electricity consumption. The government has ambitious plans to electrify rural areas, power industries, and meet the escalating energy requirements of urbanization. To achieve these objectives, the country must make significant investments in power generation capacity, with steam turbines playing a crucial role in

this endeavor.

The surging middle class and rapid industrialization in India have resulted in a consistent upward trend in energy consumption. Steam turbines are indispensable for various power generation methods, including coal, gas, and nuclear power plants. Furthermore, they are vital for the renewable energy sector, facilitating the expansion of concentrated solar power (CSP) and biomass power generation. Consequently, the India Steam Turbines Market is poised to benefit from the upsurge in energy demand.

In addition, India's commitment to environmental sustainability is propelling the adoption of cleaner and more efficient power generation technologies. Steam turbines, when coupled with advanced technologies such as supercritical and ultra-supercritical boilers, can enhance the overall efficiency of power plants and reduce greenhouse gas emissions. This aligns with India's climate goals and its focus on carbon emission reduction.

Government Initiatives and Policy Support

Government initiatives and policy support play a crucial role in driving the growth of the India Steam Turbines Market. The Indian government acknowledges the significance of the energy sector in fostering economic growth and has implemented several policy measures to encourage investments in the power generation industry. These policies not only create a conducive environment for steam turbine manufacturers but also promote the modernization and expansion of existing power plants.

One notable initiative is the 'Make in India' campaign, aimed at bolstering domestic manufacturing. Steam turbine manufacturers are incentivized to establish production facilities in India, reducing import dependency and enhancing the country's self-reliance in power generation equipment. This has not only attracted global turbine manufacturers but has also nurtured the growth of indigenous manufacturers, contributing to job creation and skill development.

Furthermore, the government's emphasis on renewable energy development has resulted in the integration of steam turbines into various renewable energy technologies. Schemes like the Ultra Mega Renewable Energy Power Parks (UMREPPs) and the Solar Energy Corporation of India (SECI) have incorporated steam turbines for energy storage and grid stability. These initiatives bolster the demand for steam turbines in the renewable energy sector.

Additionally, various financial incentives and subsidies are provided to projects that adopt cleaner and more efficient technologies, including supercritical and ultra-supercritical steam turbines. This encourages power plant developers to invest in advanced turbine systems, fostering innovation and growth in the India Steam Turbines Market.

Industrial Growth and Expansion

The rapid expansion of India's industrial sector serves as a significant driving force for the Steam Turbines Market. Steam turbines play a crucial role in various industries, including petrochemicals, steel, cement, and textiles. With the continuous growth of these industries, fueled by both domestic consumption and exports, there arises a corresponding need for reliable and efficient power generation.

Industries heavily rely on steam turbines for their captive power generation requirements and process steam in manufacturing operations. Steam turbines contribute to maintaining a stable and cost-effective energy supply, which is vital for ensuring production continuity and competitiveness. This reliance on steam turbines results in a consistent demand from the industrial sector.

Furthermore, the Indian government has introduced initiatives such as the 'Make in India for Defense' and 'National Capital Goods Policy' to enhance domestic manufacturing and bolster the competitiveness of the industrial sector. Consequently, this drives the demand for power generation equipment, including steam turbines, as industries invest in expanding their manufacturing capacities.

In conclusion, the India Steam Turbines Market experiences significant growth due to a combination of factors, including escalating energy demand and infrastructure development, government initiatives and policy support, and the expanding industrial sector. Collectively, these factors create a favorable environment for steam turbine manufacturers and suppliers in the Indian market. As the nation progresses on its path of economic development, the importance of steam turbines in meeting energy needs and sustainability goals remains paramount.

Key Market Challenges

Intermittent Energy Sources and Grid Integration

One of the primary challenges confronting the India Steam Turbines Market is the

integration of intermittent energy sources into the national power grid. India, like many other nations, is progressively incorporating renewable energy sources such as wind and solar into its energy mix to mitigate greenhouse gas emissions and combat climate change. While this transition is praiseworthy, it presents a notable challenge for steam turbine manufacturers and operators.

Steam turbines have traditionally been designed for baseload power generation, operating continuously at a relatively constant output. However, renewable energy sources like wind and solar are inherently intermittent, contingent upon weather conditions. This intermittency raises concerns regarding grid stability and the need to balance supply and demand.

The utilization of steam turbines in conjunction with renewable energy introduces the challenge of rapid load following, necessitating quick adjustments in output to compensate for fluctuations in renewable energy generation. This can result in increased wear and tear on the equipment, reduced efficiency, and potentially higher maintenance costs. Addressing the need to adapt steam turbine technology to better handle load variations and seamlessly integrate with renewable sources is a significant challenge that the industry must confront in order to maintain competitiveness and sustainability.

Environmental Regulations and Emission Control

One of the key challenges faced by the India Steam Turbines Market is the growing emphasis on environmental regulations and emission control. India, like many nations, is dedicated to reducing its carbon footprint and enhancing air quality. As a result, strict emissions standards and regulations have been implemented, particularly for coal-fired power plants that rely on steam turbines.

Compliance with these regulations necessitates the deployment of emissions control technologies such as flue gas desulfurization (FGD) systems and selective catalytic reduction (SCR) systems in steam turbine-powered power plants. The installation and operation of these technologies can be expensive, impacting the overall economics of power generation. Moreover, retrofitting existing power plants with emission control equipment can be a complex and time-consuming endeavor.

In addition, the need to reduce water consumption in power generation processes, a critical aspect of steam turbine operation, adds another layer of complexity. Striking a balance between meeting emission standards and ensuring efficient operation poses a

significant challenge for the industry, necessitating continuous innovation and investment in research and development.

Competition from Alternative Power Generation Technologies

The India Steam Turbines Market encounters intense competition from alternative power generation technologies, particularly gas turbines and combined-cycle power plants. Gas turbines offer numerous advantages, such as faster startup times, higher efficiency at partial loads, and lower emissions compared to traditional coal-fired steam turbines. Combined-cycle power plants, which integrate both gas and steam turbines, provide even greater efficiency and flexibility.

These alternative technologies are gaining momentum in India due to their ability to adapt better to the country's changing energy landscape, including the integration of renewable energy sources and the need for more flexible power generation. Consequently, steam turbine manufacturers must address this competition and explore ways to remain relevant in the evolving energy market.

In conclusion, while the India Steam Turbines Market holds immense potential, it faces several challenges, including the integration of intermittent energy sources, compliance with stringent environmental regulations, and competition from alternative power generation technologies. Overcoming these challenges necessitates innovation, adaptation, and a steadfast commitment to sustainability in the face of an evolving energy landscape.

Key Market Trends

Increasing Adoption of Supercritical and Ultra-Supercritical Steam Turbines

One notable trend in the India Steam Turbines Market is the increasing adoption of supercritical and ultra-supercritical steam turbines in power generation. Supercritical and ultra-supercritical technologies represent the latest advancements in steam turbine design and offer higher efficiency and lower emissions compared to conventional subcritical steam turbines.

Supercritical steam turbines operate at temperatures and pressures above the critical point of water, resulting in improved thermodynamic efficiency. Ultra-supercritical steam turbines push these boundaries even further, achieving even greater efficiency levels. These technologies are particularly attractive in India's pursuit of cleaner and more

efficient power generation.

A key driver behind this trend is the stringent environmental regulations and emission control measures imposed by the government. Supercritical and ultra-supercritical steam turbines produce fewer greenhouse gas emissions per unit of electricity generated, making them a preferred choice for power plant developers aiming to meet environmental standards.

Furthermore, the adoption of these advanced steam turbines aligns with India's goal to reduce water consumption in power generation—an important consideration given the country's water scarcity issues. Supercritical and ultra-supercritical steam turbines require less cooling water, making them more sustainable and resilient in regions with limited water resources.

Growth in the Concentrated Solar Power (CSP) Sector

One notable trend in the India Steam Turbines Market is the emergence of the Concentrated Solar Power (CSP) sector. CSP technology utilizes mirrors or lenses to concentrate sunlight onto a receiver, which in turn generates high-temperature steam for driving a steam turbine to produce electricity.

India's abundant solar resources make it an ideal candidate for CSP technology, particularly in regions with high solar irradiance. As the country strives to expand its renewable energy capacity, CSP has gained momentum as a dependable and dispatchable source of clean power.

Steam turbines play a vital role in CSP plants, converting solar thermal energy into electricity. The inclination towards larger and more efficient CSP installations has fueled the demand for specialized steam turbines engineered to withstand the elevated temperatures and pressures associated with concentrated solar power.

The government's backing for CSP projects, including financial incentives and competitive bidding processes, has further expedited the growth of this sector. CSP offers the advantage of energy storage capabilities, enabling power generation even in the absence of direct sunlight, thereby contributing to grid stability.

Segmental Insights

Type Insights

The Steam Cycle segment emerged as the dominant player in 2023. Combined-cycle power plants, integrating both gas turbines and steam turbines, are gaining popularity in India due to their superior efficiency and reduced emissions. Gas-fired combined-cycle power plants employ the Brayton cycle for the gas turbine and the Rankine cycle for the steam turbine. This sector presents opportunities for steam turbine manufacturers to supply the steam turbine component for these integrated systems.

Steam turbines play a vital role in Concentrated Solar Power (CSP) plants, a renewable energy technology that employs mirrors or lenses to concentrate sunlight and generate steam to drive a turbine. As India continues to invest in renewable energy, including CSP projects, the steam cycle segment in this context offers growth prospects for manufacturers specializing in CSP-compatible steam turbines.

Steam turbines find applications in various industrial sectors such as paper mills, petrochemical plants, and refineries. These industries rely on steam for process heating and power generation. As industries expand in India, there is a continuous demand for steam turbines designed for industrial use. Manufacturers can cater to these specific requirements, including customization for diverse industrial processes.

To summarize, the steam cycle segment within the India Steam Turbines Market is multifaceted and dynamic, encompassing a wide range of applications from coal-fired and gas-fired power plants to renewable energy integration and industrial processes. Manufacturers and technology providers operating in this segment should prioritize innovation, efficiency enhancements, and compliance with environmental regulations to leverage the opportunities presented by India's evolving energy landscape.

Fuel Type Insights

The Coal segment is projected to experience rapid growth during the forecast period. Coal-fired power plants have historically played a dominant role in electricity generation in India, ensuring a reliable and consistent power supply. While the country is actively working towards transitioning to cleaner energy sources, coal is projected to continue being a significant component of the energy mix in the foreseeable future. This sustained dependence on coal presents opportunities for steam turbine manufacturers to deliver efficient and environmentally compliant turbine solutions.

One notable trend in the coal sector is the increasing adoption of supercritical and ultra-supercritical steam turbines. These advanced technologies offer higher efficiency and

lower emissions in comparison to conventional subcritical steam turbines. Power plant developers are progressively investing in supercritical and ultra-supercritical coal-fired power plants to meet the growing energy demand while reducing their carbon footprint. Steam turbine manufacturers can leverage this trend by providing advanced turbine systems tailored specifically for these power plants.

Stringent environmental regulations and emission control measures are driving the demand for cleaner and more efficient coal-fired power generation. Steam turbines utilized in coal-fired power plants must adhere to emission standards, including those related to sulfur dioxide (SO₂), nitrogen oxides (NO_x), and particulate matter. Manufacturers can offer emission control solutions as well as technologies that enhance the overall efficiency of power plants to meet these regulatory requirements.

Regional Insights

South India emerged as the dominant player in the India Steam Turbines market in 2023, holding the largest market share. South India, comprising the states of Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, and Telangana, possesses a distinctive energy landscape and industrial foundation that significantly influence the demand and trends in the steam turbines market. South India is renowned for its rapidly expanding industrial sector, encompassing automotive, IT, pharmaceuticals, and textiles. This industrial growth has resulted in a substantial requirement for dependable and efficient power generation, thus propelling the demand for steam turbines. The industries in this region heavily rely on steam turbines for captive power generation and process steam, thereby establishing a consistent demand for steam turbine equipment.

Moreover, South India benefits from abundant solar and wind resources, making it a focal point for renewable energy projects. States like Tamil Nadu and Karnataka have made substantial investments in wind and solar energy installations. Steam turbines play a pivotal role in Concentrated Solar Power (CSP) plants and can facilitate the integration of renewable and thermal energy sources, thus contributing to energy storage.

To promote the adoption of clean energy, the states in South India have implemented various renewable energy policies and incentives. These policies often necessitate the installation of advanced power generation equipment, thereby presenting opportunities for steam turbine manufacturers to offer cutting-edge technology for renewable energy projects.

Furthermore, South India, particularly urban centers like Chennai and Bengaluru, faces air quality challenges stemming from industrial activities. Consequently, stricter environmental regulations and emission control measures have been enforced. Steam turbines can be equipped with emission control technologies, providing opportunities for companies specializing in environmental solutions.

In conclusion, the India Steam Turbines Market in South India is characterized by a high energy demand driven by industrialization, a strong emphasis on renewable energy, supportive government policies, a thriving ports and shipping industry, pollution control measures, infrastructure development, and the presence of leading educational institutions. These factors create a dynamic environment with numerous opportunities for steam turbine manufacturers and service providers to cater to the unique needs and challenges of South India's energy landscape.

Key Market Players

Exide Industries Limited

Amara Raja Batteries Limited

Tata AutoComp GY Batteries

HBL Power Systems Limited

Luminous Power Technologies

Okaya Power Group

Su-Kam Power Systems

Rocket Steam Turbines

Agni Power & Electronics Pvt. Ltd.:

ACME Cleantech Solutions Pvt. Ltd

Report Scope:

In this report, the India Steam Turbines Market has been segmented into the following

India Steam Turbines Market Segmented By Type (Steam Cycle and Combined Cycle), By Rated Capacity (1-120 Mw, 1...

categories, in addition to the industry trends which have also been detailed below:

India Steam Turbines Market, By Type:

Steam Cycle

Combined Cycle Coal

India Steam Turbines Market, By Rated Capacity:

1-120 Mw

121-350 Mw

351-750 Mw

Above 750 Mw

India Steam Turbines Market, By Exhaust Type:

Condensing

Non-Condensing

India Steam Turbines Market, By Fuel Type:

Coal

Biomass

Nuclear

Others

India Steam Turbines Market, By Region:

North India

South India

West India

East India

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the India Steam Turbines Market.

Available Customizations:

India Steam Turbines Market report with the given market data, Tech Sci 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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