with stringent Government regulations, are anticipated to incentivise investments in the establishment of captive power plants. These investments will ensure uninterrupted power supply, fostering sustainable industrial operations.

Captive power generation is becoming increasingly indispensable for many manufacturing firms, particularly those vulnerable to disruptions in grid-supplied power. Factors such as improved coal supply, growing awareness of renewable energy options, and implementation of eco-friendly power generation policies are poised to boost the captive power additions in the country.

The Industrial sector constitutes the largest market for captive power generation, driven primarily by the escalating electricity demand from energy-intensive industries, such as Cement, Steel, Petroleum Refineries, and Chemicals. Captive power generation units are equipped with the flexibility to utilise both fossil fuel and renewable fuel sources. Renewable fuel sources encompass non-thermal options, such as hydro, solar photovoltaic (PV) and wind energy, as well as thermal sources like bio-power, waste-to-energy (WtE), waste heat, concentrated solar power, and geothermal power. The significance of captive power generation in India's manufacturing sector is getting accentuated, mainly on account of the high industrial power costs, driving a projected increase in captive power generation capacity of 31 GW during the period 2021 to 2026.

Notably, the cumulative installed renewable energy capacity in India (as on March 2024) is around 11 GW, which is majorly contributed by biomass (bagasse based) cogeneration, followed by biomass (non-bagasse based) cogeneration, waste-to-energy, and waste-to-energy (off-grid).

ADVANTAGES OF TRIVENI TURBINES' STEAM TURBINES IN COMBINED HEAT AND POWER APPLICATIONS (CHP)

Steam turbines have an edge in terms of combined heat and power requirements

Triveni Turbines provides steam turbine solutions that use low pressure steam, generated through extraction turbine for heating applications by producing both heat and electric power. The cost of power generated through this process is 14-15% lower as against the power generated through IPPs (Independent Power Producers).

While solar renewable energy is used as a utility power plant only during the day, power produced through CHP/ cogeneration benefits the plant throughout the day by addressing its combined heat and power requirements. This gives the latter a strong edge. As a result, the ongoing rapid increase in electricity consumption, coupled with the growing focus on electricity generation through biomass energy sources, thermal treatment of waste and recovery of waste heat, is expected to unleash sustainable power generation through the cost-effective approach of combining both heat and power.

Strategic global presence

Reinforcing its customer-centric business approach, the Company has strategically located its service offices across India, along with international offices in Europe, West Asia, Southeast Asia, and Africa. Its association and presence in South Africa have been significantly strengthened with the renewal of an existing contract in the region through a new multi-year rate contract from the strategic services contract for utility turbines, complemented by the collaboration of its team and local talent. The Company is in the process of establishing an office and workshop in the USA, with its team already deputed and engaged in hiring local talents to bolster its presence in the region for all products and services of the Company.

By providing prompt service support in different time zones, the Company is earning the trust of customers in global markets. It is trying to collaborate and forge robust relationships with various stakeholders to advance its offerings in the market, including engaging in discussions and initiatives to cater to other products in terms of manufacturing and servicing for the Oil & Natural Gas and Petrochemical industries.

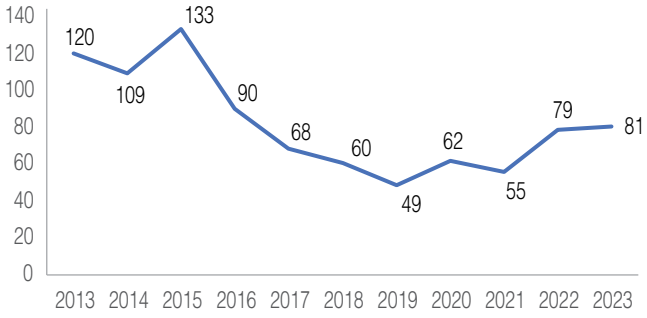
GLOBAL STEAM TURBINE MARKET OVERVIEW

Global steam turbine market grew 2% y-o-y in 2023

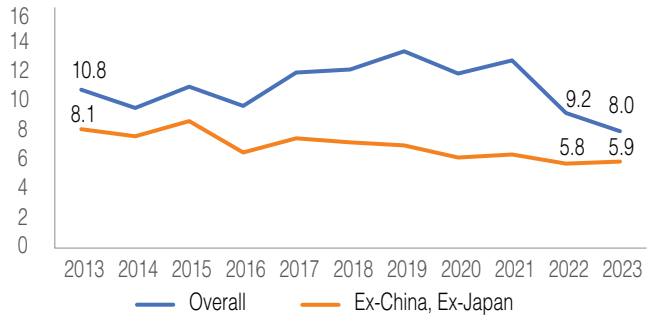
The global steam turbine market has witnessed a decline of 4% per annum, from 120 GW in 2013 to 81 GW in 2023. This is largely attributable to a 5% per annum decline during the period 2013-2023 in the >100 MW market category (utility turbines – accounting for 90% of the overall market). This category decline is attributable to the fast-paced transition to renewable and clean energy technologies from coal-based power technologies in countries across the globe.

In 2023, the global steam turbine market grew by 2% year-on-year, steered by growth in utility turbines and increased global demand.

Global Steam Turbine Market, Full Range (in GW) - 2013 to 2023



Global Steam Turbine Market, Below 100 MW (in GW) - 2013 to 2023



Source: McCoy Report, 2023

Triveni Turbines' addressable market grew by 3% y-o-y in 2023

Triveni Turbines operates in the industrial steam turbines market below 100 MW, and in 2023, this segment ex-China and ex-Japan, grew by 3% year-on-year. Within this, the <30 MW or smaller range market has seen a marginal decline of 0.4% CAGR, while in the 30.1 to 100 MW range, the market has seen a decline of 4.9% CAGR.

However, it is important to highlight that the Company's concentrated market is ex-China and ex-Japan. And in 2023, the global steam turbine market (below 100 MW), ex-China and ex-Japan, grew by 3% year-on-year, on the back of growth in the decentralised steam-based renewable turbines, further driven by the increased global demand in industrial heat and power solutions.

Triveni Turbines operates in the industrial steam turbines market below 100 MW, and in 2023, this segment ex-China and ex-Japan, grew by 3% year-on-year.

Triveni Turbines has outperformed market trends and is among the Top 2 players globally in <100 MW segment

Over the last decade, Triveni Turbines has outperformed the broader market trends owing to the increasing demand for steam turbines in its addressable markets, as well as expansion in the Company's market share. The Company's growing market share has been built on a foundation of strong and continuously evolving research, development and engineering capabilities. Its customer-centric approach to R&D, along with a keen focus on delivering product and life-cycle cost, has allowed Triveni Turbines to set benchmarks in turbine efficiency, robustness, and uptime. As a result, the Company is among the top 2 globally, in a technically challenging field dominated by large multinationals. The Company has also benefited from a leading position in renewable-fuel based segments, such as biomass-based power generation, Waste-to-Energy (WtE), and Waste Heat Recovery (WHR).

Thermal renewable fuel-based power generation increasing

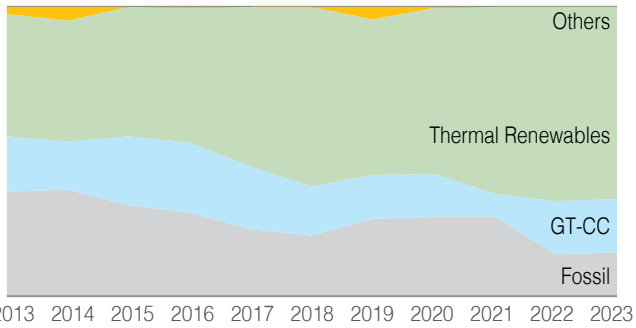
Over the last ten years, there has been a noticeable shift in global reliance on conventional fossil fuels. In 2013, fossil fuel-based power generation accounted for 75% of the global steam turbine market; however, by 2023, this percentage had come down to 67%. At the same time, the proportion of thermal renewable fuel-based power generation has increased significantly during this period, rising from 5% in 2013 to 7% by 2023.

% Share of the Global Steam Turbine Market (Full Range) by fuel type (including China & Japan)

	Fossil	Combined Cycle	Thermal Renewable	Others
2013	75%	17%	5%	2%
2023	67%	18%	7%	9%

According to the McCoy Data analysis, unlike the global steam turbine market where fossil fuel dominates, in the <100 MW range, which is the area of Triveni's operation, the growth of thermal renewables has been quite consistent and strong. The share of thermal renewable (Biomass, Waste-to-Energy, Waste Heat Recovery) fuels is quite significant - at 67% in 2023 compared to 42% in 2013. In contrast, the share of fossil fuel declined to 15% in 2023 from 36% in 2013.

Global Steam Turbine Market, Below 100 MW (in %), By Fuel Type - 2013 to 2023



Source: McCoy Report, 2023
Note: GT-CC stands for Gas Turbine – Combined Cycle

INDIAN STEAM TURBINE MARKET OVERVIEW

Indian Steam Turbine market for sub-100 MW is on growth path

In 2023, the Indian Steam Turbine market for sub-100 MW continued to grow, with the demand for heat and power from the Industrial segment being the key contributing factor.

The market was primarily driven by thermal renewable based power plants (including biomass, waste heat and WtE), followed by fossil fuel fired power plants. Majority of the steam turbines' requirement in 2023 came from power generation applications (using MSW, biomass, waste heat and fossil as the fuel), and from energy-intensive segments like Steel and Cement, besides segments like Sugar, Distillery, Food Processing, Pulp and Paper, Chemicals and Oil & Gas for CHP applications.

With the manufacturing sector on a growth trajectory, the demand for steam turbines is expected to remain robust in the future, owing to investments in increasing the production capacities among industries such as Sugar, Distillery, Steel, Cement, Pulp and Paper, Food Processing and Chemicals.

PRODUCT BUSINESS OVERVIEW

Highest-ever Order Booking in FY 24

FY 24 saw a healthy performance by Triveni Turbines in terms of the overall order booking, which was up by 10% compared to the previous fiscal, and reached ₹ 12.61 billion. The growth in product order booking was primarily driven by finalisation of orders from renewable, industrial customers, power producers and API turbines. The Company touched yet another milestone in its history by recording the highest order booking consecutively for the third year. Notably, this booking has grown at an impressive CAGR of 42% from FY 21 to FY 24.

In the international market, the Company registered growth in product order booking in FY 24 over the previous fiscal. Key milestone orders were closed in both small and large power ranges in regions like Europe, East Europe, Central & South America and North America. In the domestic market, however, the Company registered decline in product order booking growth compared to FY 23. The team at Triveni Turbines managed to offset this decline by increasing the order booking in the international markets - a significant positive development in the current scenario. Triveni's API enquiry base is spreading across geographies, and the Company was able to finalise orders from both drives and power turbines in FY 24 from regions like Asia and East Europe, to name a few.

Robust enquiry pipeline levels; Strong enquiry pipeline spreading across the globe provides confidence for the future

- FY 24 saw a decline of 5-7% in enquiry generation, mainly due to international geopolitical constraints. However, domestic enquiries grew during the year, and overall enquiries remain at robust levels.
- IPP segment was the biggest contributor to the international enquiry base, followed by Process industries, Steel and Oil & Gas segment (API – Drives and Power Turbines).
- Sugar and Distillery together contributed the most to the domestic enquiry base, followed by Process industries comprising Food Processing, Pulp & Paper, and Chemicals etc., and then Steel, Cement, IPPs and Oil & Gas segment (API – Drive Turbines).