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Steam Turbine Global Market Insights 2025, Analysis and Forecast to 2030, by Manufacturers, Regions, Technology, Application, Product Type

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Abstracts

Introduction

The steam turbine market encompasses the design, manufacturing, installation, and servicing of steam turbines used primarily for electricity generation and industrial cogeneration applications. Steam turbines convert thermal energy from pressurized steam into mechanical work, which is subsequently transformed into electrical energy through generators. These turbines operate across utility-scale thermal power plants, nuclear facilities, combined-cycle power plants, and industrial cogeneration systems. The technology remains fundamental to baseload power supply despite the global energy transition, with applications spanning coal-fired plants, natural gas facilities, nuclear power stations, biomass installations, waste-to-energy plants, and industrial combined heat and power systems. Steam turbines are classified into impulse and reaction designs, with capacity ranges from small industrial units below 40 MW to large utility-scale systems exceeding 300 MW.

Market Size and Growth Forecast

The global steam turbine market is estimated to reach 17-24 billion USD in 2025, with projected compound annual growth rates of 2%-4% through 2030. Growth is supported by increasing electricity demand in developing economies, modernization of aging thermal power infrastructure, expansion of combined-cycle power plants, industrial cogeneration adoption, and integration with renewable energy systems including biomass and geothermal applications.

Regional Analysis

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Asia Pacific dominates the steam turbine market with estimated growth rates of 2.4%-3.0% annually. The region benefits from massive power infrastructure development in China and India, expanding manufacturing capabilities, growing electricity consumption driven by industrialization and urbanization, and significant investments in both fossil fuel and renewable energy power generation. China maintains the largest market share with extensive thermal power capacity and domestic manufacturing strength, while India demonstrates rapid growth through infrastructure development and industrial expansion. Japan and South Korea contribute through technology advancement and equipment modernization programs.

North America demonstrates growth rates of 2.1%-3.6%, led by the United States where aging infrastructure replacement, efficiency upgrade programs, and industrial cogeneration expansion drive sustained demand. The region benefits from established utility infrastructure, advanced combined-cycle technology adoption, growing industrial CHP installations particularly in refining and petrochemical sectors, and modernization initiatives targeting emission reduction and efficiency improvement. Canada contributes through industrial applications and infrastructure development.

Europe exhibits growth rates of 2.0%-2.9%, with Germany, France, and the United Kingdom maintaining significant installed capacity and focusing on efficiency upgrades, emission compliance, and integration with renewable energy systems. The region emphasizes environmental standards, advanced technology development, and transition toward sustainable energy solutions while maintaining reliable baseload power generation capabilities.

South America shows growth potential of 3.5%-4.2%, with Brazil and Mexico leading due to expanding industrial development, infrastructure investment, and growing electricity demand. The region benefits from increasing manufacturing activities and energy security initiatives.

The Middle East and Africa region demonstrates growth rates of 2.7%-3.5%, driven by power infrastructure development in Gulf nations, industrial expansion, and growing electricity demand across major urban centers. South Africa maintains established power generation infrastructure and ongoing capacity enhancement programs.

Application Analysis

Power Generation Application: This segment dominates with projected growth of

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2.5%-3.5%, encompassing utility-scale electricity generation across coal, gas, nuclear, and combined-cycle power plants. Growth drivers include electricity demand increase, infrastructure modernization programs, efficiency improvement initiatives, and integration with renewable energy sources. The segment benefits from large-scale capacity additions in emerging markets and replacement cycles in developed economies.

Petrochemical Application: Expected to grow at 3.0%-4.0%, this segment serves refineries, chemical plants, and processing facilities requiring both power and process steam. Growth is supported by industrial expansion, energy efficiency initiatives, and cogeneration adoption enabling simultaneous electricity and thermal energy production.

Metallurgy Application: Projected growth of 2.5%-3.5% includes steel mills and metal processing facilities utilizing waste heat recovery and cogeneration systems. The segment benefits from industrial efficiency programs and emission reduction requirements.

Marine Application: Growing at 2.0%-3.0%, this segment serves naval vessels and specialized marine propulsion systems, particularly nuclear-powered submarines and aircraft carriers requiring reliable power generation.

Pulp and Paper Application: Expected growth of 3.0%-4.0% encompasses paper mills and processing facilities where cogeneration provides both electricity and process steam, achieving high overall efficiency and reducing energy costs.

Others Application: This segment includes biomass power plants, waste-to-energy facilities, geothermal installations, and specialized industrial applications, projected to grow at 3.5%-4.5% driven by renewable energy integration and sustainable technology adoption.

Type Analysis

Small Size Steam Turbine (Below 40 MW): This segment demonstrates projected growth of 4.0%-5.7%, driven by industrial cogeneration expansion, biomass and waste-to-energy installations, distributed generation systems, and small modular power plants. Applications include industrial facilities, district heating, food processing, and specialized manufacturing operations requiring combined heat and power.

Medium Size Steam Turbine (40-150 MW): Expected to grow at 3.0%-4.0%, this

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segment serves mid-scale power generation, industrial cogeneration, and biomass power plants. Growth is supported by distributed generation trends, industrial efficiency programs, and infrastructure development in emerging markets.

Large Size Steam Turbine (Above 150 MW): Projected growth of 2.0%-3.0% includes utility-scale power plants, large combined-cycle facilities, and nuclear installations. This segment maintains the largest market share, driven by baseload power requirements, large-scale capacity additions in Asia Pacific, and modernization programs in developed markets.

Key Market Players

GE Vernova: Following completion of the spin-off from GE in April 2024, this American energy technology company maintains global leadership in steam turbine manufacturing through advanced technology platforms and comprehensive service capabilities. GE Vernova operates major production facilities globally and serves utility and industrial customers with extensive installed base and aftermarket services.

Toshiba: The Japanese conglomerate maintains significant steam turbine manufacturing capabilities through advanced engineering and established technology platforms, serving both domestic and international markets across utility and industrial applications.

Siemens Energy: Following the spin-off approved in July 2020, this German energy technology company specializes in advanced steam turbine systems through chloride process expertise and comprehensive service offerings. Siemens Energy maintains strong market presence across Europe, Middle East, and Asia Pacific regions.

Everllence: Formerly MAN Energy Solutions until the name change announced in June 2025, this European manufacturer focuses on industrial and marine steam turbine applications through advanced engineering capabilities and comprehensive product portfolios.

Dongfang Electric: This Chinese manufacturer represents significant production capacity and domestic market leadership, with reported 2024 sales of 24,246 megawatts of power station steam turbines. The company serves both Chinese and international markets through competitive pricing and expanding technical capabilities.

Shanghai Electric: The Chinese power equipment manufacturer reported 2024 steam

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turbine sales reaching 20,615 megawatts, demonstrating substantial market presence. Shanghai Electric benefits from integrated manufacturing capabilities and strong domestic market position.

Harbin Electric: This Chinese state-owned enterprise maintains major steam turbine production capacity serving domestic power generation projects and expanding international markets through cost-competitive offerings and technical development.

Fuji Electric: The Japanese manufacturer specializes in industrial and mid-scale steam turbines through advanced engineering and established technology platforms, serving Asian and global markets.

Doosan Enerbility: The South Korean manufacturer focuses on utility-scale and industrial steam turbines through advanced technology development and comprehensive project execution capabilities.

Mitsubishi Heavy Industries: This Japanese conglomerate maintains global steam turbine leadership through advanced engineering, extensive installed base, and comprehensive service networks across utility and industrial segments.

Kawasaki Heavy Industries and Sumitomo Heavy Industries: These Japanese manufacturers maintain specialized steam turbine capabilities serving industrial and marine applications through advanced engineering expertise.

Elliott Group: This American manufacturer specializes in small and medium-sized industrial steam turbines serving petrochemical, refining, and industrial cogeneration applications through customized solutions and technical support.

Ansaldo Energia: The Italian manufacturer focuses on large utility-scale steam turbines and power plant applications through advanced technology and European market presence.

Hyundai Heavy Industries Turbomachinery (HHI-TMC): The South Korean manufacturer serves utility and industrial markets through advanced engineering capabilities and project execution expertise.

Beijing BEIZHONG Steam Turbine Generator: This Chinese manufacturer serves domestic and regional markets through industrial and mid-scale steam turbine production.

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Hangzhou Turbine Power Group (HTC): The Chinese manufacturer reported 2024 sales of 361 steam turbines, demonstrating significant domestic market presence and expanding production capabilities.

Jin Tong Ling Technology Group: This Chinese manufacturer focuses on industrial steam turbines and specialized applications through domestic market development.

Triveni Turbine Limited (TTL): The Indian manufacturer specializes in small and medium industrial steam turbines serving domestic and international markets through cost-competitive offerings and technical support.

Industry Value Chain Analysis

The steam turbine industry value chain encompasses engineering design, component manufacturing, system integration, project execution, and long-term service operations. Upstream activities include specialized component production such as turbine blades, rotors, casings, and control systems requiring advanced materials and precision manufacturing. Critical components undergo stringent quality control and performance testing to ensure reliability and efficiency.

Manufacturing involves complex assembly operations integrating mechanical systems, control technologies, and auxiliary equipment. Large turbines require specialized production facilities with heavy machining capabilities, precision assembly areas, and comprehensive testing infrastructure. Quality management systems ensure compliance with international standards and customer specifications.

Engineering and project execution encompass detailed design, site preparation, installation supervision, commissioning, and performance optimization. Manufacturers provide comprehensive technical support including site surveys, engineering studies, and customized solutions for specific applications. Project management capabilities ensure on-time delivery and successful commissioning.

Distribution channels include direct sales to utility companies and industrial customers, engineering procurement construction contractors, and regional representatives. Technical service providers offer installation support, commissioning assistance, and operator training programs.

Aftermarket services represent significant value creation through maintenance

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contracts, spare parts supply, performance upgrades, and life extension programs. Predictive maintenance technologies utilizing digital sensors and analytics enhance reliability and optimize performance. Service networks provide rapid response capabilities and technical expertise supporting installed base throughout operational lifecycle.

End applications span utility-scale power generation, industrial cogeneration, marine propulsion, and specialized energy systems. Growing emphasis on efficiency improvement, emission reduction, and operational flexibility drives technology advancement and service innovation throughout the value chain.

Market Opportunities and Challenges

Opportunities

Emerging Market Infrastructure Development: Rapid industrialization and urbanization in Asia Pacific, Middle East, and Latin America create substantial long-term growth opportunities. Expanding electricity demand and infrastructure investment drive steam turbine installations across utility and industrial applications.

Industrial Cogeneration Expansion: Growing emphasis on energy efficiency and cost reduction drives industrial CHP system adoption. Steam turbines enable simultaneous electricity and thermal energy production, achieving high overall efficiency particularly in energy-intensive industries including refining, petrochemicals, pulp and paper, and food processing.

Efficiency Upgrade and Modernization Programs: Aging thermal power infrastructure in developed markets requires extensive modernization. Advanced ultra-supercritical technology, digital control systems, and performance optimization create premium market segments with significant upgrade opportunities.

Biomass and Waste-to-Energy Growth: Renewable energy integration and sustainability initiatives drive biomass power plants and waste-to-energy installations. These applications utilize steam turbines adapted for challenging fuel characteristics, representing expanding market opportunities.

Aftermarket Services Expansion: Large installed base creates sustained

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demand for maintenance services, spare parts, performance upgrades, and life extension programs. Digital technologies including predictive maintenance and performance optimization enhance service value and customer relationships.

Challenges

Energy Transition and Competition from Renewables: Global shift toward renewable energy and decarbonization initiatives create long-term uncertainty for fossil fuel-based power generation. While steam turbines remain essential for baseload power and industrial applications, market growth faces pressure from wind, solar, and energy storage technologies.

Environmental Regulations and Emission Standards: Stringent emission requirements and carbon pricing mechanisms increase operational costs and regulatory compliance complexity. Retrofit requirements and efficiency mandates necessitate technology upgrades and performance improvements.

Overcapacity in Key Markets: Significant production capacity additions particularly in China create competitive pricing pressure and margin compression. Balancing supply and demand while maintaining profitability requires strategic capacity management and differentiation through technology and service.

Long Project Cycles and Capital Requirements: Large steam turbine projects involve extended development timelines, significant capital investment, and complex project execution. Economic uncertainty and financing challenges can delay projects and impact order intake.

Current Trump Administration Tariff Policy Uncertainty and Global Supply Chain Restructuring Impact

The current trade policy environment under the Trump Administration creates significant uncertainty for steam turbine manufacturers and project developers. Potential tariffs on steel, specialized alloys, and finished equipment could substantially increase component costs and project economics. Steam turbines require extensive use of high-performance alloys and specialty steels, making them particularly sensitive to metal tariffs.

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Global supply chain restructuring driven by geopolitical tensions affects component sourcing strategies, manufacturing location decisions, and international project execution. Companies may need to establish regional manufacturing capabilities, diversify supplier networks, and adapt to changing trade flows. Chinese manufacturers holding significant market share face potential market access restrictions in certain regions, while Western manufacturers may encounter challenges in cost competitiveness.

Trade restrictions could fragment the global market, reduce economies of scale, and increase costs throughout the industry. Project developers may face higher equipment prices, extended delivery timelines, and increased complexity in international projects. However, policies encouraging domestic manufacturing and infrastructure investment could benefit regional suppliers and create opportunities for supply chain localization. Companies with flexible manufacturing footprints, diversified supply chains, and regional production capabilities are better positioned to navigate evolving trade policies and maintain competitive advantage across global markets.

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