Industry is the most energy consuming sector

The World Energy Outlook 2024 also pointed out that the total final energy consumption (TFC) across end-use sectors increased by 1.7% to 445 exajoules (EJ) in 2023. This increase was split between industry (beyond 170 EJ or 38%), buildings (~125 EJ or 28%), transport (~120 EJ or 27%), and agriculture & other non-energy users (around 25 EJ or 7%). The TFC is expected to climb steadily by 1.3% per year till 2030, in line with the trend of the last 10 years.

As the most energy consuming and CO_2 emitting end-use sector, industry accounts for 38% of TFC and nearly 50% of CO_2 emissions globally. Energy-intensive sectors, such as chemicals, iron and steel, cement and aluminium, dominate this demand. Regionally, energy demand growth is concentrated in the emerging economies, while advanced economies are focussing concertedly on efficiency improvements and clean energy adoption.

Strong impetus towards promoting energy efficiency

Recent years have seen a decline in the energy intensity of the global economy on account of technological progress, efficiency improvements, and changes in the structure of the global economy. Growth in renewables and increasing electrification of end-uses play an important role in boosting the efficiency of energy systems. The annual investment in energy efficiency exceeded USD 390 billion in 2023, up from USD 300 billion in 2020. Many major economies have adopted legislative and policy measures to steer further efficiency gains in the coming years. These measures include the Inflation Reduction Act in the United States of America (USA); the Energy Efficiency Directive in the European Union; the revised Act on Rationalising Energy Use in Japan; and the most recent cycle of the Perform, Achieve and Trade scheme in India.

Global Power Sector

Though electricity demand in advanced economies remained subdued in 2024, robust growth in developing countries sustained global consumption. According to IEA's Electricity 2024 report, global electricity demand was projected to reach 29,000 TWh in 2024, driven by an improving global economic outlook and a resurgence in industrial activity across both advanced and emerging markets.

Renewable energy continued its strong momentum, generating an estimated 11,300 TWh, constituting approximately 40% of the global electricity in 2024. This is expected to rise to over 17,000 TWh by 2030, marking a significant milestone toward a cleaner energy future.

Propelled by the rapid expansion in renewable energy, the power generation sector is at the forefront of the global transition towards net-zero emissions. However, reduction of global CO_2 emissions remains a key challenge in this transition.

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In response to growing energy demand and the imperative to cut emissions, the power sector is undergoing a profound transformation towards cleaner, more sustainable energy sources. This marked shift is expected to accelerate going forward, as countries and corporations intensify their climate commitments.

Indian Energy Demand and Indian Power Sector

The significant demand in energy in recent years is attributable to the country's rapid economic growth, industrial expansion and urbanisation. This has catalysed a stronger emphasis on sustainable development and climate-focussed policies.

According to MOSPI's Energy Statistics for India 2024, the country experienced a healthy growth of 6.5% in consumption of energy from 33,018 Petajoule (PJ) in 2021-22 to 35,159 PF in 2022-23(P). India's power sector has also undergone significant transformation, aligning with the global energy trends. As of March 31, 2025, of the country's total installed electricity generation capacity of 475.21 GW, renewable energy accounted for 43%, according to the Central Electricity Authority (CEA). This milestone achievement reflects India's growing commitment to clean energy and steady progress towards a sustainable future.

Biopower, comprising biomass and biogas, has further emerged as a strong driver of the clean energy transition, contributing an additional 11.58 GW, and playing a crucial role in converting agricultural and organic waste into energy and further diversifying the renewable mix.

These developments are reducing India's reliance on fossil fuels, and advancing its shift to a more resilient, low-carbon energy system. They are aiding the nation in its journey towards achieving 500 GW of renewable energy capacity by 2030, with expectations of a continually accelerating transition toward environmentally sustainable "Green Power" solutions.

Indian Manufacturing Sector – Significance of Captive Power Generation

A major energy consumer, the industrial sector requires power for machinery, heating, cooling and various operational processes. Triveni Turbines offers efficient solutions tailored to various industrial heating and cooling needs. The current limited adoption of renewable energy in this sector highlights a significant opportunity to develop robust steam turbine generator systems.

Driven by the Government's 'Make in India' initiative, the industrial sector is emerging as a high-growth area. Rising input costs, particularly energy expenses and stricter regulations, are prompting investments in captive power plants to ensure reliable, cost-effective and sustainable energy supply. Captive power generation has assumed a major significance for manufacturers, especially those vulnerable to grid disruptions. The high cost of industrial electricity, improved coal availability, growing awareness of renewable alternatives, and supportive green energy policies are expected to accelerate captive power capacity expansion in the country.

Industries such as cement, steel, petroleum refining and chemicals, are key drivers of this demand. Captive power units provide operational flexibility, utilising both fossil fuels and renewable sources – including hydro, solar PV, wind, bio-power, waste-to-energy, waste heat recovery, concentrated solar power and geothermal energy.

Advantages of Steam Turbines for Combined Heat and Power Applications (CHP)

Efficient cogeneration solutions

As a key player steering energy transition, Triveni Turbines offers steam turbine solutions that utilise low-pressure steam from extraction turbines for heating applications, enabling simultaneous production of heat and electricity. This cogeneration approach reduces power generation costs by 14–15% compared to Independent Power Producers (IPPs). Unlike solar power, which operates only during daylight hours, cogeneration provides continuous energy, effectively meeting a plant's combined heat and power needs, thus lending a distinct advantage to manufacturers.

The rising demand for electricity, along with a growing emphasis on biomass energy, waste-to-energy solutions and waste heat recovery, is propelling sustainable and cost-efficient power generation through cogeneration technologies. This remains a major area of investment and focus for the turbines industry in general, and Triveni Turbines in particular.

Global Steam Turbine Market Overview

According to industry reports, the global steam turbine market declined at a CAGR of 0.7%, from 108 GW in 2014 to 101 GW in 2024. In 2024, the global steam turbine market, grew by 13% year-on-year, at the back of increased electricity demand and growth in utility turbines. Excluding China and Japan, the market grew by 68% year-on-year, supported by rising demand in industrial heat and power solutions.