

Leading three manufacturers providing two-thirds of turbines for gas-fired power plants under construction

Through joint ventures and corporate partnerships in key global regions, leading gas turbine manufacturers are seeking opportunities to become linchpins of the energy transition. They have strategically marketed themselves as crucial to the transition by providing flexible, hydrogen-ready turbines.

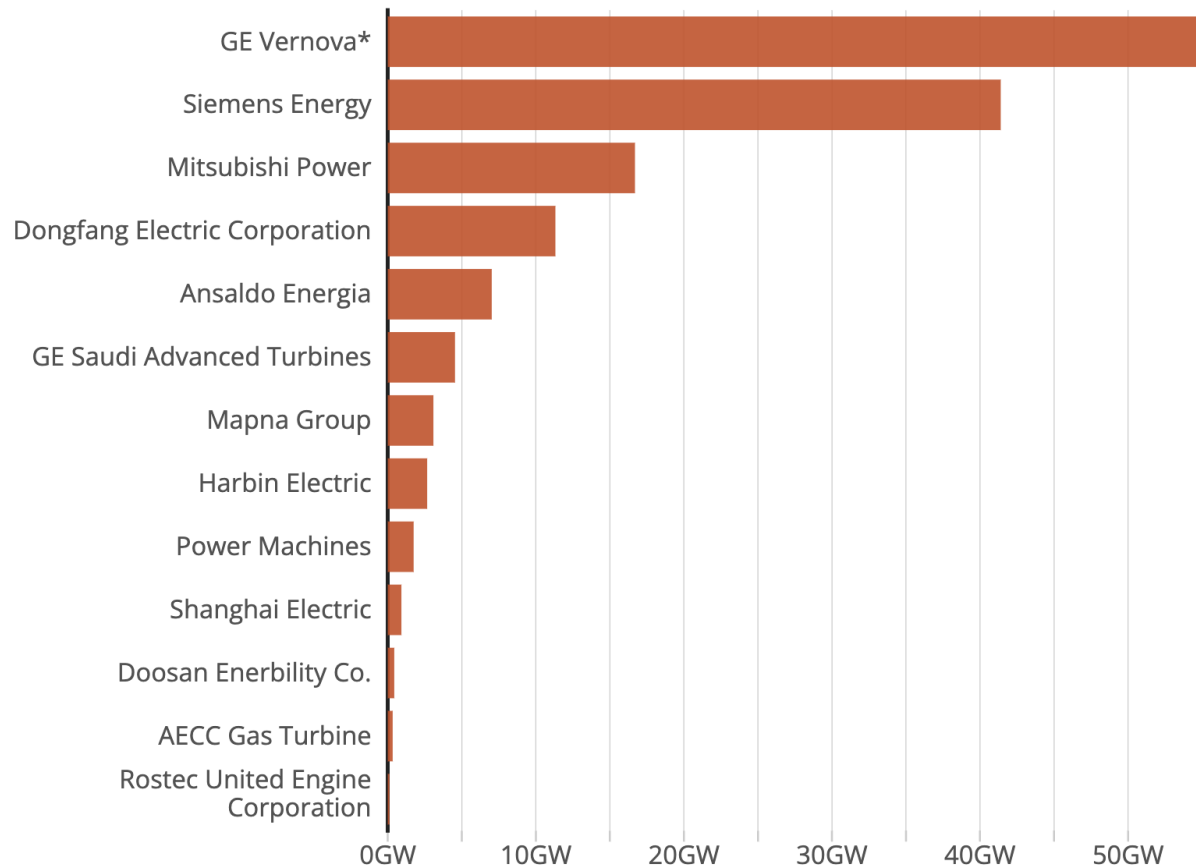
According to data researched by Global Energy Monitor,¹ the top three leading gas turbine manufacturers — GE Vernova, Siemens Energy, and Mitsubishi Power — dominate the global gas turbine market for gas-fired power plants under construction, with two-thirds of the market. GE Vernova leads the global market with almost 55 gigawatts (GW) of turbines under construction.

But a business model that relies on the continued buildout and maintenance of gas plants as well as the provision of service contracts relies on shaky foundations. The rapid expansion of partnerships by leading manufacturers, coupled with heavy investments in unproven hydrogen technology, may expose these market players to geopolitical and financial risks, as looming global gas power overcapacity and the clean energy transition gather pace.

¹ Methodology: Gas turbine manufacturer and model data was collected for projects in pre-construction and construction status with technologies of gas turbine or combined cycle. Unavailable data accounted for 17% of construction plants and 69% of pre-construction plants.

Which companies are building the most gas turbine capacity?

Gas turbine capacity in construction by manufacturing company, in gigawatts (GW)



Source: Global Oil and Gas Plant Tracker, August 2024, Global Energy Monitor

*GE Power rebranded and spun off as "GE Vernova" in April 2024.

Note: Based on data collected for gas-fired power plants with technologies of gas turbine or combined cycle in construction. Data on gas turbine manufacturer and model was not available for 17% of plants under construction



Leading regional trends among turbine manufacturers

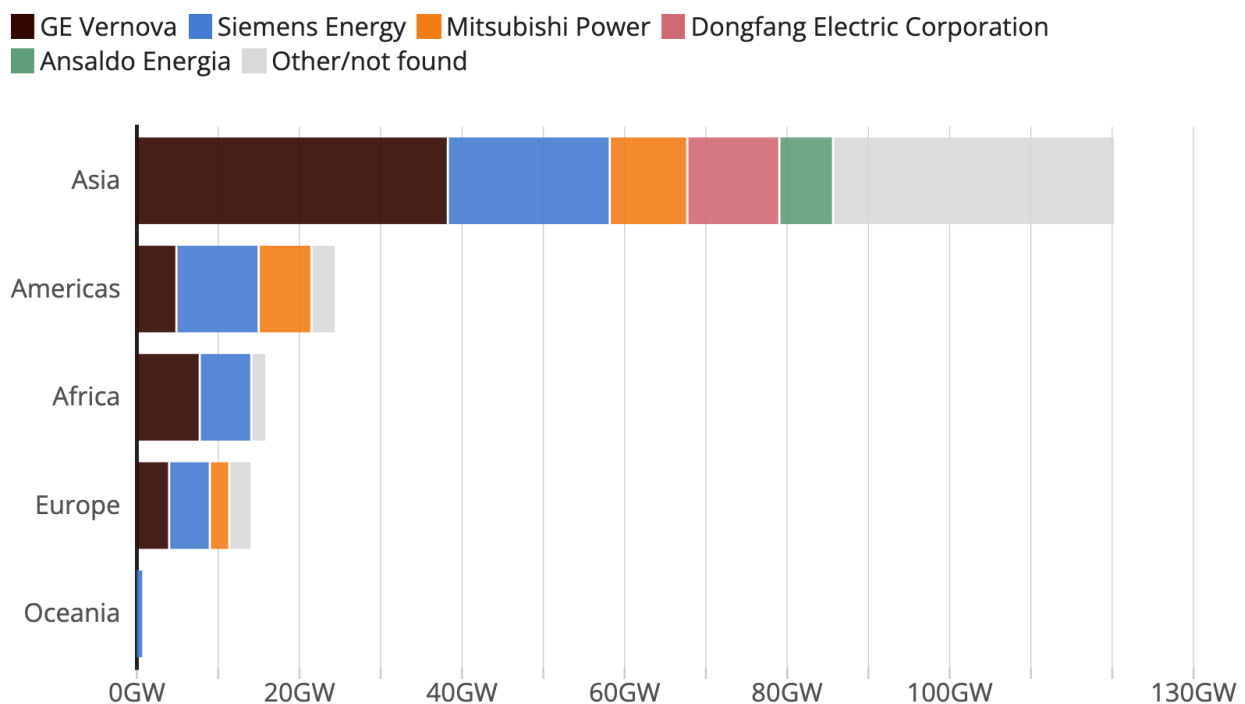
The company GE Vernova has focused heavily on Asia, where more than two-thirds of the world's gas-fired capacity under construction is located. GE Vernova² dominates

² GE Vernova or its joint ventures, Harbin Electric General and GE Saudi Advanced Turbines

this region with 38% of Asia's gas turbine market under construction, followed by Mitsubishi³ with 17%, and then Siemens Energy at 16%, according to GEM data.

Most gas turbine capacity is being manufactured for Asia, led by GE Vernova

Gas turbine capacity in construction by manufacturing company, in gigawatts (GW)



Source: Global Oil and Gas Plant Tracker, August 2024, Global Energy Monitor

Note: Based on data collected for gas-fired power plants with technologies of gas turbine or combined cycle in construction. Data on gas turbine manufacturer and model was not available for 17% of plants under construction globally.



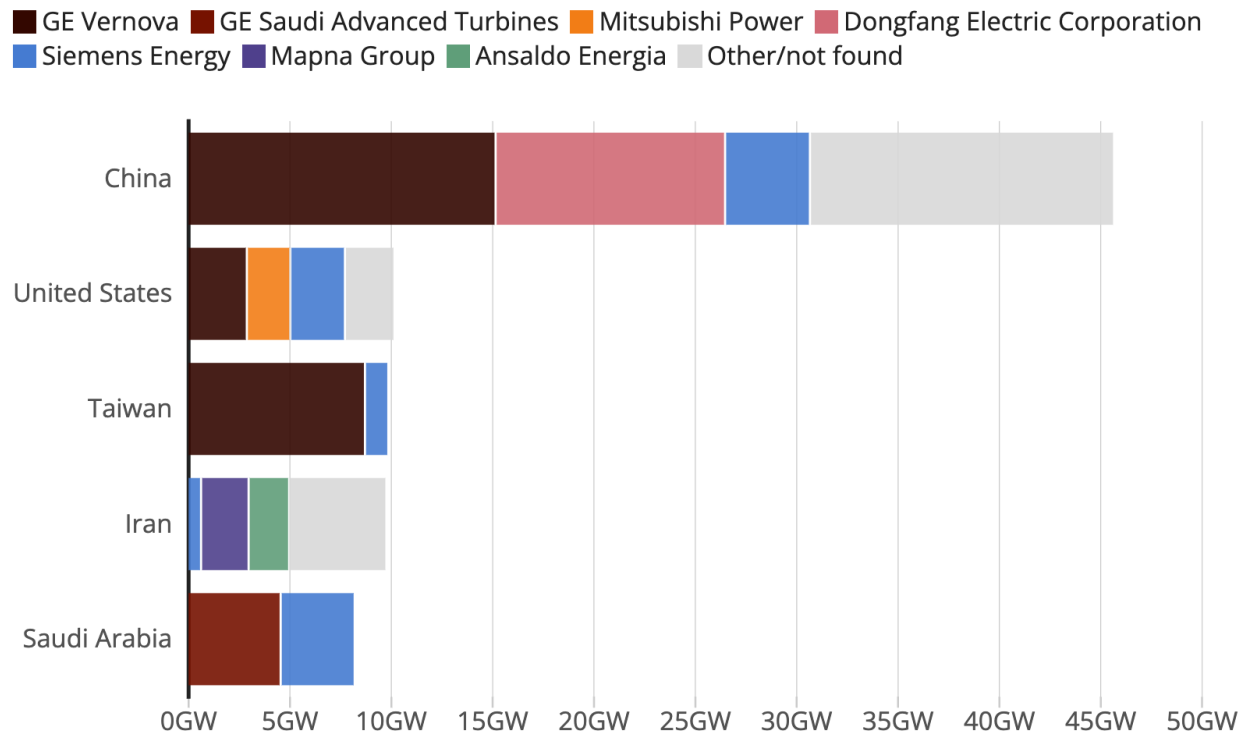
China has the largest share of gas-fired capacity in development within the Asia region,⁴ 151 GW, and approximately 46 GW under construction.

³ Mitsubishi or its joint venture, Dongfang Electric Corporation

⁴ Projects in announced, pre-construction, or construction status using gas turbine or combined cycle technology.

Where are turbine manufacturers leading construction for gas-fired capacity?

Gas turbine capacity in construction by manufacturing company for selected locations, in gigawatts (GW)



Source: Global Oil and Gas Plant Tracker, August 2024, Global Energy Monitor

Note: Based on data collected for gas-fired power plants with technologies of gas turbine or combined cycle in construction. Data on gas turbine manufacturer and model was not available for 17% of plants under construction globally.



Strategic partnerships expose manufacturers to broader geopolitical risks

Leading turbine manufacturers have focused partnership development efforts in China, due to its large gas power market. GE Vernova provides 39% of gas turbines for in-construction gas plants in China — either directly, or through its joint venture,

Harbin Electric General.⁵ Dongfang Electric Corporation,⁶ Mitsubishi's joint venture in China, accounts for nearly 25% of gas turbines in construction in China. While Siemens Energy does not have a joint venture in China, it [signed](#) an MOU in 2018 with China's State Power Investment Corporation (SPIC), [followed](#) by a strategic partnership agreement in 2019 to support technology cooperation with a goal of SPIC developing its own heavy-duty gas turbines.

Other notable partnerships include [GE Saudi Advanced Turbines](#) (GESAT), a joint investment between GE Vernova and Dussur, the first facility in Saudi Arabia and the region to manufacture H-Class gas turbines and components. GESAT recently [rolled](#) out its first H-class gas turbine manufactured at its Saudi Arabia facility, and GE Vernova also [announced](#) its largest order in the Middle East and North Africa region to date — eight turbines as well as a 21-year service contract agreement.

While these partnerships have helped turbine manufacturers expand market presence and enhance technological capabilities in key regions, they have also exposed these companies to broader geopolitical risk.

For example, in 2011, Siemens Energy [formed](#) a joint venture, Siemens Industrial Turbomachinery, with a Russia-based company called Power Machines but had to subsequently [sell](#) its 65% stake to local Russian state company InterRAO in 2022. Additionally, GE Vernova was forced to [abandon](#) its joint venture with Russia-based InterRao in 2023. GE even noted in its [2023 Annual Report](#) that its "RPO [was]...partially offset by decreases due to the impact of expanded sanctions on Gas Power contractual services in Russia." More recently, in July 2024, Germany's government [blocked](#) the sale of MAN Energy's gas turbine business to China-based CSIC Longjiang GH Gas Turbine Co., citing national energy concerns.

⁵ In 2017, the companies entered a strategic partnership to build a gas turbine manufacturing joint venture in Qinhuangdao.

⁶ In 2004, the companies [formed](#) a joint venture to build a gas turbine factory in Guangzhou. This partnership was bolstered by an MOU [signed](#) in 2018 to bring Mitsubishi's latest J-series gas turbine to Sichuan province.

Hydrogen is a false solution to gas power

Leading gas turbine manufacturers have [focused](#) their research on developing advanced turbines that can support flexible power generation and are capable of burning hydrogen. In the last few years, corporations have increasingly been justifying the construction of new gas-fired power plants by suggesting that these “hydrogen ready” gas plants could be converted to using hydrogen at a future date.

However, lack of hydrogen supply, pipeline infrastructure, and storage capacity for hydrogen are significant and costly barriers to overcome, as detailed in a recent Institute for Energy Economics and Financial Analysis (IEEFA) [report](#). Currently only 1% of the world’s [hydrogen](#) is derived from renewable sources, and the costs of this green hydrogen have been [rising](#). Due to its lower energy content, even using green hydrogen in power production provides little CO₂ emissions benefit until it is blended at high levels. For example, a 30% hydrogen blend by volume achieves a 12% reduction in CO₂ emissions and a 75% hydrogen blend only [reaches](#) a 50% emissions decrease. Moreover, blending high levels of green hydrogen [consumes](#) large amounts of renewable energy that would more efficiently be used to directly replace existing fossil fuel generation.

According to GEM data, 47%, or approximately 82 GW, of turbines in gas-fired plants under construction are capable of blending 50% hydrogen. Top turbine models include GE Vernova’s 9HA turbine, which makes up 20 GW of turbines under construction.

Hydrogen capabilities of popular turbine models

Turbine manufacturer	Model	Hydrogen capability	Future hydrogen plans
GE Vernova	7HA, 9HA	Up to 50% hydrogen blend	100% hydrogen capability by 2030
Siemens Energy	SGT-800	Up to 60% hydrogen blend	100% hydrogen capability by 2030
Siemens Energy	SGT5-4000F	Up to 30% hydrogen blend	100% hydrogen capability by 2030
Mitsubishi Power	M701JAC	Up to 30% hydrogen blend	Developing 100% hydrogen combustion

Source: Global Oil & Gas Plant Tracker



As the speed and scale of the energy transition accelerate, turbine manufacturers' profits hinge on risky forecasts and uncertain asset utilization

[GE Vernova](#), [Siemens](#), and [Mitsubishi](#) all posted record Q2 2024 profits driven by strong gas turbine sales. However, only six years ago, prospects were [looking](#) grim — manufacturers failed to see the growth of renewables and were faced with a steep decline in gas turbine sales. GE Power's profits [fell](#) 45% in 2017, and its shares [plunged](#). [GE and Siemens both](#) cut thousands of jobs. Siemens [considered](#) selling its gas turbine business or [merging](#) the unit with Mitsubishi. These events show how quickly investments can erode in a rapidly evolving energy landscape.

If history is any indication, during this time of [record-setting](#) renewable generation and [falling](#) gas share in the energy mix, turbine manufacturers could once again be [misreading](#) the [speed](#) and depth of the energy transition. These investments contravene corporate climate targets⁷ and will become underutilized stranded assets, exposing manufacturers to large financial risks.

⁷ GE Vernova has [committed](#) to net zero carbon emissions by 2050. Siemens [aims](#) to have a net zero carbon footprint by 2030. Mitsubishi [aims](#) to achieve net zero carbon emissions by 2040.

GE [states](#) optimistically in its most recent annual report that it “...expect[s] the gas power market to remain stable over the next decade with gas power generation continuing to grow [in the] low single digits.” However, the International Energy Agency (IEA) is [projecting](#) that fossil fuel demand will peak by 2030, and there are already signs of a rapid shift. Wind and solar generation [overtook](#) fossil fuel generation for the first time in the EU in the first half of 2024, even as energy demand rebounded. In fact, data is [pointing](#) to renewables replacing gas-fired generation in Europe, as gas-fired generation hit a two-decade low for 2024 thus far. In China, the growth of renewables has [displaced](#) coal generation. Renewables capacity buildout is [booming](#), and China is on track to [meet](#) its 2030 energy target six years early.

The incentive for manufacturers extends beyond securing initial turbine orders — locking in more lucrative long-term service agreements and equipment upgrades or servicing of existing gas plants provides a [steady](#) revenue stream after equipment has been sold. GE [has](#) approximately 1,700 gas turbine units under long-term service agreements with an average remaining contract life of ten years, and services make up 70% of GE’s revenue. Thus, revenues from long-term service contracts are heavily [dependent](#) on the utilization of an asset,⁸ making underutilized gas plants a risk.

This is not the first time turbine manufacturers have misread the market. In 2017, GE Power Services was responsible for 98% of GE Power’s reported profits and all its operating cash flows. But its reported profits were a result of GE’s reductions in estimates for the cost to complete its multi-year service contracts, such as providing repairs and services to turbines. Since GE had failed⁹ to see the market decline, they

⁸ “Customers generally pay us based on the utilization of the asset (per hour of usage for example) or upon the occurrence of a major event within the contract such as an overhaul or major outage. As a result, a significant estimate in determining expected revenues of a contract is estimating how customers will utilize their assets over the term of the agreement. The estimate of utilization, which can change over the contract life, impacts both the amount of customer payments we expect to receive and our estimate of future contract costs. Customers’ asset utilization will influence the timing and extent of overhauls and other service events over the life of the contract.” [GE 2023 Annual Report](#)

⁹ “GE Power Services acknowledged internally that it had increased risk that its service agreements would need to be renegotiated due to lower than anticipated power consumption and increasing competition from other companies that offered servicing and repair of the power turbines after GE

used alternative accounting methods — altering assumptions of costs required to fulfill their service contracts — in order to meet financial targets. As renewables continue to gain market share, gas turbine utilization rates will presumably continue to decline, posing new threats to turbine manufacturers' bottom lines.

Gas turbine manufacturers are gambling on gas power remaining a significant part of the future energy mix by continuing to develop partnerships and invest in hydrogen technology. As the threat of gas overcapacity and geopolitical risks rise, a swiftly transforming energy transition may once again upend this bet.

About the Global Oil & Gas Plant Tracker

The Global Oil and Gas Plant Tracker (GOGPT) is a worldwide dataset of oil and gas-fired power plants. It includes units with capacities of 50 megawatts (MW) or more (20 MW or more in the European Union and the United Kingdom). For internal combustion units, or those units that have multiple identically sized engines, the 50 MW capacity unit threshold applies to the total capacity of the set of engines. The GOGPT catalogs every oil and gas power plant at this capacity threshold of any status, including operating, announced, pre-construction, construction, shelved, cancelled, mothballed, or retired. Units often consist of a boiler and gas or steam turbines, and several units may make up one power station.

Power had sold them to customers. The business also faced the prospect that customers would exercise termination clauses in the service agreements if they did not receive price and terms concessions from GE Power, which created further risk to GE Power Services.” [SEC Order](#)

Background on Global Energy Monitor

Global Energy Monitor (GEM) develops and shares information in support of the worldwide movement for clean energy. By studying the evolving international energy landscape and creating databases, reports, and interactive tools that enhance understanding, GEM seeks to build an open guide to the world's energy system. Follow us at www.globalenergymonitor.org and on Twitter [@GlobalEnergyMon](https://twitter.com/GlobalEnergyMon).

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