

Decline in U.S. Turbine Exports

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U.S. exports of turbines and turbine generating sets¹ (“turbines”) for power generation and mechanical drive applications fell 40 percent during 2014–18. Excluding parts, the decline was more significant, with exports falling 56 percent. This briefing will discuss export trends and the reasons for the decline in exports.

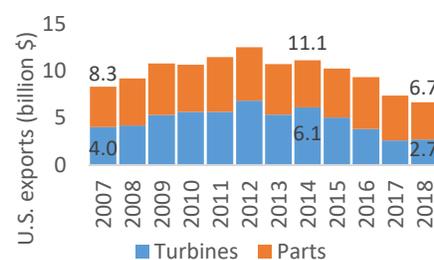
U.S. industry

The U.S. industry produces all major types of turbines, including gas, hydro, steam, and wind turbines. The largest producers are multinationals (e.g., GE, Mitsubishi Hitachi Power Systems (MHPS), Siemens, Solar Turbines, Vestas), though small firms also produce domestically. U.S. production capacity increased during 2006–11, with firms opening new gas and wind turbine nacelle² plants. After 2012, however, more than a dozen gas, steam, and wind turbine nacelle plants closed. These closures were due to lower turbine demand (with some firms shifting production for the U.S. market to existing foreign plants), and mergers and acquisitions that led to the consolidation of operations.³ U.S. turbine shipments totaled \$14.5 billion in 2016, and employment was 29,874.⁴

Declining U.S. exports

U.S. turbine exports totaled more than \$10 billion annually during 2009–15, but declined to \$6.7 billion in 2018 (their lowest level since 2006) (figure 1). Exports of complete turbines accounted for 76 percent of the decline in exports during 2014–18. In 2018, U.S. exports to all major regions were lower than in 2014, and only exports to Asia, Australia/New Zealand, NAFTA partners, and sub-Saharan Africa were above 2007 levels. In North America, a rise in exports to Mexico offset a decline to Canada. Gas turbines and parts accounted for 82 percent of 2018 exports. U.S. exports of wind-powered generating sets reached \$667 million in 2014, but fell to \$135 million in 2018.⁵

Figure 1: U.S. turbine exports, 2007-18



Source: USITC [DataWeb](#)/USDOC.

The closure of U.S. plants and localization measures have contributed to the decline in exports

Production capacity: The closure of U.S. plants (some of which closed prior to the decline in exports) led to less sourcing from U.S. plants for foreign projects. Further, wind turbine nacelle plants are operating at high capacity utilization levels to meet U.S. demand, which has recovered from its 2013 low.

Pressures to localize manufacturing: Preferences for local content in some large markets led U.S. exporters to establish local manufacturing. Gas turbine producers, for example, opened plants in Saudi Arabia,

¹ Turbines convert the kinetic energy from a moving gas or liquid into mechanical energy. This mechanical energy can drive equipment (e.g., pumps or compressors in oil and gas applications) or, when the turbine is connected to a generator (a turbine generating set), be converted to electrical energy. This briefing will not cover propulsion turbines (e.g., aircraft turbines).

² The wind turbine nacelle houses the main power generation components, such as the gearbox and generator.

³ GE stated that it moved production to other countries due to the lack of Export-Import Bank reauthorization. GE [Website](#); Parrott, Jason, “[Siemens Closing Burlington](#),” Tri States Public Radio, April 24, 2018; Epstein, Jonathan D., “[250 Dresser-Rand Workers](#),” *The Buffalo News*, February 20, 2018; Pulsinelli, Olivia, “[GE to Move Turbine Packaging](#),” *Houston Business Journal*, September 12, 2016; Pare, Mike, “[Once Home to 6,000 Workers](#),” *Times Free Press*, June 22, 2017; USDOE, [2018 Wind Technologies Market Report](#), August 2019; Scoles, Samantha, “[Siemens Cutting](#),” *Mount Vernon News*, February 4, 2016.

⁴ Census Bureau, [2016 Annual Survey of Manufactures](#).

⁵ U.S. wind turbine export data, when reported separately in this briefing, are mirror import data due to a change in U.S. classification that makes it difficult to compare U.S. exports over time. The term “wind-powered generating sets” refers to nacelles and other components traded with the nacelles. IHS Markit, [Global Trade Atlas](#); USITC [DataWeb](#)/USDOC.

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where state-owned Saudi Aramco encourages localization. U.S. turbine exports to Saudi Arabia averaged \$842 million during 2007–16, but fell to \$184 million in 2018. Similarly, wind turbine producers localized production in Brazil due to domestic content requirements and a tariff increase. Brazil’s imports of wind generating sets from the United States declined from \$229 million in 2013 to under \$1 million in 2018.⁶

Falling global gas turbine demand is contributing to lower exports

Oil and gas sector demand: Foreign demand for gas turbines used by the oil and gas industry declined. The fall in oil and gas prices from mid-2014 led to a reduction in capital expenditures, with global (excluding Canada and the United States) upstream spending declining 44 percent during 2014–17 (figure 2). Some U.S. turbine producers derived a substantial share of revenue from foreign oil and gas demand.⁷

Decline in gas turbine orders for power generation: There was a significant decline in investment in new gas power plants in 2017 and 2018, which led to a decline in new orders for gas turbines. Global gas turbine orders (with a power generating capacity >30 MW) generally ranged from 45 to 56 GW during 2010–16 (except for a surge in 2011), but fell to 34 GW in 2017 and 29 GW in 2018. Orders through the first half of 2019 totaled 20.5 GW.⁸ With renewable energy installations rapidly increasing, the trajectory of demand over the next decade may depend on the extent to which generators need to invest in gas peaking plants that can quickly ramp up to compensate for the intermittency of renewable generation.⁹

Shift in demand to China: China’s share of global gas turbine demand substantially increased during 2016–18. The Chinese government is encouraging more natural gas plants given that they emit fewer pollutants than coal plants, and the number of natural gas plants starting construction doubled during 2016–18.¹⁰ However, since some U.S. manufacturers also produce in China, Chinese demand growth has a more limited impact on U.S. exports.

Prices: Excess global gas turbine production capacity is putting downward pressure on global prices.¹¹

Figure 2: Factors contributing to lower gas turbine exports



Notes: Global capex excludes Canada and the United States. 2018 capex data are estimates. Plants “starting construction” are those for which a final decision was made to start construction. Barclays E&P spending data compiled from various sources; McCoy Power Reports data from GE, “[2019 GE Investor Outlook](#),” March 14, 2019 and Crooks, Ed, “[Gas Turbine Competition](#),” *Financial Times*, August 16, 2018; IEA, [World Energy Investment 2019](#), May 2019.

⁶ DLA Piper [Website](#); Straathof, Joep, “[Doing Business with Saudi Aramco](#),” October 9, 2014; Siemens [Website](#); *Utilities Middle East*, “[GE Rolls Out](#),” October 13, 2016 and “[MHPS Announces National Program](#),” April 26, 2019; USITC [DataWeb/USDOC](#); David, Andrew and Dennis Fravel, “[Wind Turbine Export Opportunities](#),” July 2012; IHS Markit, [Global Trade Atlas](#) database.

⁷ O’Connor, Tim, “[Solar Turbines](#),” *Manufacturing Today*, n.d.; Barclays E&P spending data compiled from various sources.

⁸ McCoy Power Reports data cited in GE, “[2019 GE Investor Outlook](#),” March 14, 2019; Crooks, Ed, “[Gas Turbine Competition Heats Up](#),” *Financial Times*, August 16, 2018; GE [Website](#).

⁹ BloombergNEF projects a significant increase in installations of gas peaking plants after 2021. BloombergNEF [database](#) and [New Energy Outlook 2019](#), June 2019.

¹⁰ IEA, [World Energy Investment 2019](#), May 2019; Gas Processing & LNG, “[China’s Growing Natural Gas Demand](#),” n.d.

¹¹ Bureau of Labor Statistics, [Producer Price Indexes](#); Crooks, Ed, “[Gas Turbine Competition](#),” *Financial Times*, August 16, 2018.

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