

China Emerges as a Major Exporter of Wind Turbine Nacelles

Andrew David, Office of Industries, Andrew.David@usitc.gov

China emerged as a major exporter of wind turbine nacelles during 2011–20, a significant shift from the prior decade when almost all Chinese production was sold domestically. Both China-headquartered and Western original equipment manufacturers (OEMs) increased nacelle exports from China.

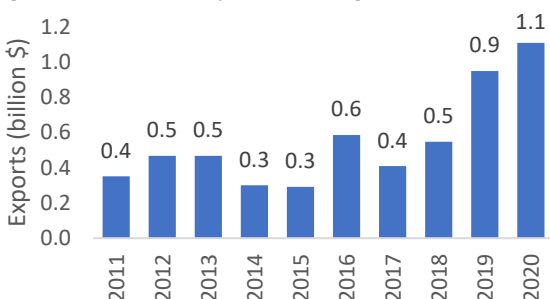
Wind turbine nacelles

This EBOT covers Chinese exports of finished nacelles, the major power generation component of wind turbines, which house the gearbox and generator.¹ Export values in this EBOT are based on trade in HS 8502.31, wind-powered generating sets (gensets), which typically includes finished nacelles.²

China emerges as one of the leading exporters of wind-powered generating sets

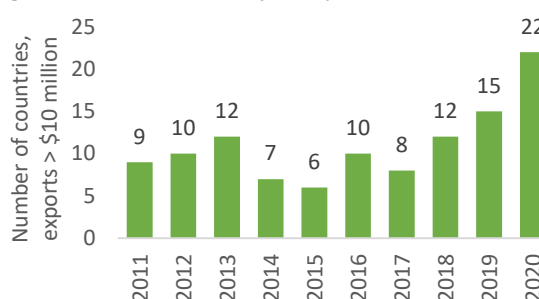
Chinese exports³ of wind-powered generating sets increased from \$351 million in 2011 to \$1.1 billion in 2020, with exports rising even amidst record domestic demand in 2020 (figure 1). China is also exporting to an increasing number of countries, with the number of markets to which China exported more than \$10 million in a particular year increasing from 9 in 2011 to 22 in 2020 (figure 2). However, Chinese exports accounted for less than 10 percent of the nacelle market outside of China in 2019.⁴

Figure 1: Chinese exports, wind gensets, 2011–20



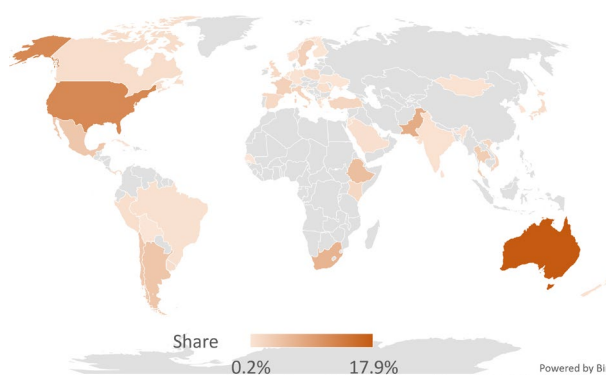
Source: IHS Markit, [Global Trade Atlas database](#).

Figure 2: Number of major export markets



China exports turbines to all regions, including some markets historically dominated by local suppliers such as Europe. The largest export destinations during 2011–20 were East Asia & Pacific (26 percent), Europe & Central Asia (21 percent), Latin America & the Caribbean (17 percent), Sub-Saharan Africa (14 percent), and North America (13 percent). Australia was the largest single country export destination (18 percent), followed by the United States (12 percent), and Pakistan (7 percent) (figure 3). However, the main export destinations vary by year.

Figure 3: Largest export markets, 2011–20



Source/notes: IHS Markit, [Global Trade Atlas database](#); markets accounting for at least \$10 million in exports; share is the percent of Chinese exports during 2011–20.

¹ This EBOT does not cover wind turbine blades, hubs, towers, or parts of nacelles.

² China's share of global exports is not included in this EBOT as countries differ on the extent to which other products (e.g., blades) are classified in HS 8502.31.

³ This section covers all exports from China. The next sections break out exports by Chinese and Western OEMs.

⁴ USITC staff estimate based on Chinese export data and estimates of nacelle shipments.

The views expressed solely represent the opinions and professional research of the individual authors. The content of the EBOT is not meant to represent the views of the U.S. International Trade Commission, any of its individual Commissioners, or the United States government.

Chinese OEMs are increasingly supplying foreign markets

Exports by Chinese OEMs increased from 213 megawatts (MW) in 2011 to 1.6 gigawatts (GW) in 2019 (figure 4).⁵ Despite the growth in exports, however, Chinese OEMs account for only a small share of the market outside of China.⁶ The largest export destinations were Australia, Pakistan, the United States, South Africa, and Panama during 2007–20 (figure 5).⁷

Figure 4: Exports by China-based OEMs, 2011–19

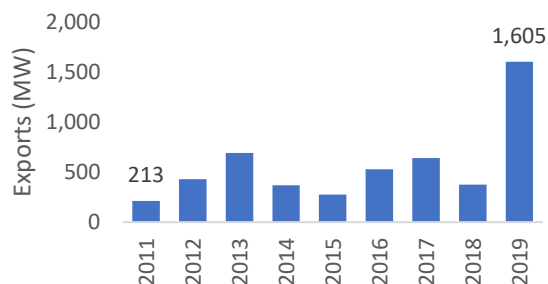
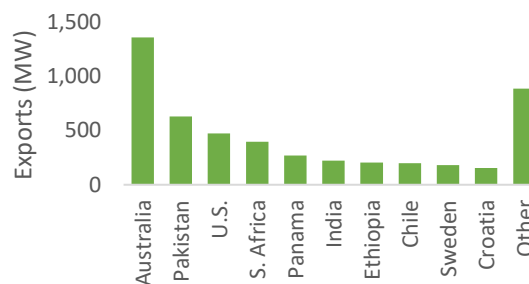


Figure 5: Exports by China-based OEMs, 2007–20



Source: Chinese Wind Energy Association (CWEA) [industry data](#) (left); BNEF, “[2019 China Wind Turbine Supply and Demand Update](#),” Jun. 4, 2019 (right). BNEF totals differ from CWEA; 2019–20 BNEF exports are based on a May 2019 forecast.

Chinese OEMs expanded exports by buying and developing their own projects abroad, thereby overcoming export barriers such as their lack of a track record in foreign markets. Many of these investments were supported by financing from Chinese lenders, such as the China Development Bank. Chinese OEM sales to unrelated parties were driven by low prices, the improving quality of their turbines, and more international activity by Chinese developers, contractors, and financial institutions.⁸

Western OEMs source nacelles from their plants in China for foreign projects

The U.S. and European OEMs with nacelle production in China (GE, Siemens Gamesa, and Vestas) also export from China.⁹ A majority of Chinese exports of wind gensets during 2019–20 originated in Tianjin, where Siemens Gamesa and Vestas have nacelle plants.¹⁰ China has become the primary location from which some OEMs serve certain foreign markets.¹¹ The factors likely driving the growth in nacelle exports from China by Western OEMs include the geographic diversification of demand and lower production costs in China. Also, Western OEMs historically struggled to generate sales in China, resulting in significant unused production capacity at their Chinese plants.¹²

⁵ Chinese OEMs were not major exporters prior to 2011, with exports of 54 MW during 2008–10. CWEA [data](#).

⁶ Global installations, excluding China, totaled 34.2 GW in 2019. GWEC, [Global Wind Report 2019](#), 2020.

⁷ CWEA export data for 2020 are not yet available. CWEA [industry data](#); BNEF, “[2019 Global Wind Turbine Market Shares](#)”; BNEF, “[2019 China Wind Turbine Supply](#),” Jun. 4, 2019.

⁸ Chinese manufacturers pursued exports, in part, due to weakness and overcapacity in the domestic market. Hinata, Yusuke, “[Global Expansion](#),” Nov. 10, 2020; BNEF, “[2019 China Wind Turbine](#),” Jun. 4, 2019; Kessler, Richard A., “[Sany to Commission](#),” Dec. 21, 2012; Lee, Andrew, “[In Depth](#),” Oct. 6, 2015; Steel, William, “[China Makes](#),” Sep. 6, 2017; Radowitz, Bernd, “[Wind Turbine](#),” Oct. 12, 2018; Stromsta, Karl-Erik, “[European Wind](#),” Sep. 27, 2018; Stromsta, “[China’s Goldwind](#),” Jan. 16, 2018; Zimmermann, Jorg-Rainer, “[Is China Stirring](#),” Apr. 16, 2018; BNEF, “[2019 China Wind Turbine Supply](#),” Jun. 4, 2019; Steiner-Dicks, Katherine, “[China Fund](#),” May 12, 2015; BNEF, “[China’s Wind Turbine Exports](#),” Aug. 20, 2018.

⁹ The volume of exports by Western OEMs is not available. Some OEMs are also increasing exports from India. Upadhyay, Anindya, “[Foreign Firms](#),” Jul. 30, 2019; company earnings calls; Verma, Sneha, “[Siemens Gamesa’s](#),” Apr. 11, 2019.

¹⁰ Only one Chinese OEM with production in Tianjin exported nacelles during 2019–20, according to BNEF. IHS Markit, [Global Trade Atlas database](#); BNEF, “[2019 China Wind Turbine Supply](#),” Jun. 4, 2019.

¹¹ IHS Markit, [Global Trade Atlas database](#); Trade Data Information Services, [Import Genius](#) database.

¹² GE, Siemens Gamesa, and Vestas had a combined annual nacelle production capacity of 2.9 GW in China in 2018 and 2019, compared with 0.9 and 1.0 GW in installations each year, respectively. Renewables Now, “[Analysis-Wind Turbine](#),” Nov. 2018; Radowitz, Bernd, “[Wind Turbine OEMs](#),” Oct. 12, 2018; Yu, Yuki, “[Siemens Gamesa, GE](#),” Mar. 19, 2019; Yu, Yuki, “[Chinese Sweep](#),” Apr. 3, 2019; BNEF, “[China’s Top 10 Wind Turbine Manufacturers in 2019](#),” Feb. 13, 2020; BNEF, “[2019 Wind Turbine Nacelle Manufacturing Capacity Dataset](#)”; company financial reports.

The views expressed solely represent the opinions and professional research of the individual authors. The content of the EBOT is not meant to represent the views of the U.S. International Trade Commission, any of its individual Commissioners, or the United States government.