

Residential Heat Pump (Hybrid) Water Heater Market, Production, and Trade

Brian Daigle, brian.daigle1@gmail.com, and Andrew David, andrew.david@usitc.gov, Office of Industries

U.S. sales of heat pump water heaters (HPWHs)¹ doubled during 2016–20, driven by the energy efficiency benefits and a push for greater adoption by manufacturers, utilities, and governments. The U.S. market for these products, as with the overall water heater market, appears to be concentrated among a relatively small number of firms. The market is primarily supplied from plants in North America, particularly Mexico and the United States, with additional imports from sources such as China, Germany, and Japan.

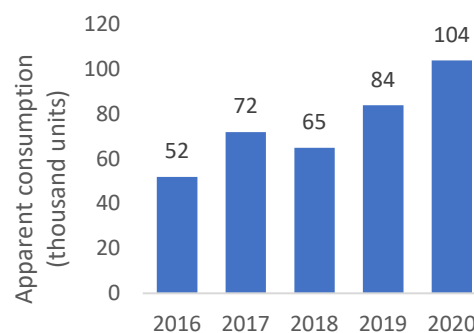
What is a Heat Pump Water Heater?

HPWHs use electricity to pull heat from the surrounding air and use it to heat water, rather than using electricity or gas to generate the heat directly. This process can make such water heaters two to three times more energy efficient than typical water heaters.² Since water heaters generally consume around 19 percent of residential energy consumption, a large-scale switch to HPWHs could result in significantly less energy use and lower greenhouse gas emissions.³ Additionally, HPWHs in large concentrations may, in the future, serve as effective energy storage for electricity grids; in 2019 the California Public Utilities Commission found that HPWHs can provide local energy storage to balance the state’s variable electricity generation, such as solar.⁴

U.S. HPWH market doubled in size over the last 5 years

The U.S. HPWH market doubled in the last five years, with apparent consumption of Energy Star⁵-certified units increasing from 52,000 units in 2016 to 104,000 in 2020 (figure 1). However, HPWHs account for a relatively small share of the water heater market, with 2020 sales accounting for only 2 percent of the overall market.⁶ There are several factors that have driven the growth of the market in the last five years: (1) an increase in new home construction; (2) new energy-efficiency codes and requirements; (3) more incentives from manufacturers and various utility incentives; and (4) customer preferences for a more efficient product and/or one with a lower cost of operation.⁷

Figure 1: U.S. HPWH market, 2016-20



Source: USEPA, [Energy Star Unit Shipment and Market Penetration Report](#), 2016–20 Reports.

¹ HPWHs are also referred to as hybrid water heaters.

² However, in order to work properly, the water heater must be installed in a location that remains at a temperature of between 40- and 90-degrees Fahrenheit. U.S. Department of Energy, [“Heat Pump Water Heaters,”](#) accessed October 15, 2021.

³ EIA, [“2015 Residential Energy Consumption Survey,”](#) Table CE3.1: End-use Consumption in the U.S.

⁴ HPWHs can use electricity to heat water during the day when solar generation peaks and store that energy in the form of heat for evening hot water needs. California Public Utilities Commission, [“Decision 19-09-027,”](#) September 2019, 68. For more on residential energy storage, see David, Andrew, [“Residential Energy Storage,”](#) July 2021.

⁵ The Energy Star program is a DOE- and EPA-backed energy efficiency certification program for a variety of energy-using devices. Energy Star, [“About Us,”](#) accessed October 15, 2021.

⁶ USEPA, [Energy Star Unit Shipment and Market Penetration Report](#), 2016–20.

⁷ Census Bureau, [“New Residential Construction”](#); Cadeo, [Northwest Heat Pump Evaluation Report #4](#), September 27, 2018, 2–4, 39–41; NMR, [Northwest HPWH Initiative Evaluation Report #5](#), November 4, 2019, 1.

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.

Despite the rapid growth in demand for HPWHs, there are a number of barriers that have slowed more widespread adoption. These include the space required to absorb surrounding heat, the need for proper drainage for built-up condensation, higher prices and installation costs than conventional water heaters, the noise from compressors, and other installation challenges. In addition, there is a lack of knowledge and familiarity with HPWHs among both customers and installers. For emergency replacements, when an existing water heater fails, HPWHs can be more difficult to acquire as fewer distributors keep HPWHs in stock and consumers are often hesitant to switch to HPWHs in emergency replacement situations.⁸

Competition in the U.S. market

There are at least eight firms that compete in the U.S. residential HPWH market. A. O. Smith and Rheem, which combined supplied more than 70 percent of the overall U.S. water heater market in 2020 and have the most Energy Star-certified HPWH models, appear to be strongly positioned in terms of retail HPWH sales.⁹ A. O. Smith is the sole supplier to major national and regional home improvement and hardware retailers such as Lowe's, True Value, Do It Best, and McCoy's Building Supply. Rheem is the sole supplier to Home Depot and Menards.¹⁰ The wholesale channel appears to be more diverse, with distributors selling models from more than one manufacturer, including suppliers other than A. O. Smith and Rheem.¹¹

U.S. HPWH manufacturing and imports

There are several U.S. manufacturers of residential HPWHs, including Bradford White (the third-largest supplier to the overall U.S. water heater market), Vaughn, and Nyle Systems. U.S.-manufactured HPWHs appear to be primarily sold through the wholesale channel.¹²

The largest source of U.S. imports of HPWHs appears to be Mexico, where A. O. Smith and Rheem have HPWH manufacturing plants.¹³ This is similar to the import pattern for electric water heaters overall, for which 88 percent of U.S. imports originated in Mexico in 2020.¹⁴ Other sources of HPWH imports include China, Europe, and Japan, with several companies supplying the market from China, Stiebel Eltron shipping from Europe, and ECO₂ Systems importing from Japan.¹⁵ Given the strong positions of A. O. Smith and Rheem, the retail channel appears to be supplied largely through imports from Mexico.

⁸ South Central Power, "[Pros and Cons of Heat Pump Water Heaters](#)," October 2016; Cadeo, [Northwest Heat Pump](#), September 27, 2018, 5–6; NMR, [Northwest Heat Pump Water Heater Initiative Market Progress Evaluation Report #5](#), November 4, 2019, 11–12, 21, 27, 34, 39–41; Navigant, [Heat Pump Water Heaters Impact Study: Volume 1](#), 2017, 4; DNV and NMR, [Impact Evaluation of Water Heating Measures](#), June 16, 2021, 9, 41, 45

⁹ A. O. Smith, [Summer 2021 Analyst Presentation](#), 2021, 7; Energy Star, [Energy Star Certified Water Heaters](#), accessed September 28, 2021; review of retailer websites; Trade Data Services, [Import Genius](#), accessed various dates.

¹⁰ A survey of purchasers in the Northwest found that 73 percent of respondents purchased their HPWH at Home Depot or Lowe's in 2017. Cadeo, [Northwest Heat Pump](#), September 27, 2018, 40; review of retailer websites.

¹¹ Based on staff review of distributor websites.

¹² Based on staff review of company plant locations and the products manufactured at these plants.

¹³ The HTS for HPWHs also includes other goods, so trade data are not included. Water heaters, including HPWHs, enter duty free under Column-1 general rates, but imports from China, except electric water heaters, are subject to 25 percent Section 301 duties. Section 301 duties on electric water heaters are 7.5 percent. A. O. Smith also manufactures residential water heaters in the United States, but primarily manufactures HPWHs for the U.S. market in Mexico. A. O. Smith, "[About A. O. Smith Corp.](#)," accessed December 29, 2021; Trade Data Services, [Import Genius](#) accessed various dates.

¹⁴ General imports in HTS 8516.10.0040. USITC [DataWeb](#)/Census, accessed December 20, 2021.

¹⁵ Staff research on plant locations; USITC [DataWeb](#)/Census, accessed June 14, 2012; Trade Data Services, [Import Genius](#), accessed various dates.

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.