

## Heat Pump Water Heater Observation

This is a simple observation of heat pump water heater impact on home energy usage, without detailed monitoring. The charts below show three years of consumption history using the local utilities' online consumption history. The charts show a line that represents a comparison of similar homes (size and location) and another line that represents similar homes that are considered efficient. The blue line shows the home that is being tracked. The home in question has high efficiency gas heat and average efficiency central AC and is located in southeast Pennsylvania. No other significant changes were made to the envelope, the equipment, or occupancy during the three year period.



The first year April 2011 – March 2012 shows the consumption pattern before the standard electric water heater was replaced. The home's electric usage follows the pack of similar houses with slightly better performance. The electric water heater has an EF of .91, typical of many homes.

The heat pump water heater was installed in June 2012. The unit was installed to operate using hybrid mode, which allows the unit to select the heating mode that meets the hot water demands as calculated by the control program. The heat pump had a refrigerant leak that started in February 2013 and was finally repaired October 2013. This problem was not identified until the unit control electronics threw out an error code and set off an alarm in July 2013. The unit was repaired in August 2013, then failed again and was finally repaired in September. During this failure period the unit started using more resistance heat, and in some months only resistance heat.

A clear trend or pattern is visible - the home electric consumption is noticeably lower when the heat pump water heater is operational. These periods are July 2012 to January 2013 and September 2013 to April 2014. Note the extreme cold period of Dec 2013-March 2014.

The HERS index on this house was 77 with conventional .91 EF electric WH, and 71 with the 2.3 EF heat pump WH.