



Ductless Heat Pump Engineering Analysis: Single-Family and Manufactured Homes with Electric Forced-Air Furnaces

The Bonneville Power Administration is pleased to publish the results of our latest Emerging Technology study on Ductless Heat Pumps (DHP). BPA is undertaking a multi-year effort to identify, assess, and develop emerging technologies that have significant potential for contributing to efficient use of electric power resources in the Northwest. In 2011, BPA contracted with Ecotope to study the impact of Ductless Heat Pumps (DHP) in Single Family (SF) and Manufactured Home (MH) applications with an Electric Forced Air Furnace (FAF).

For this study Ecotope monitored 20 homes (10 SF FAF and 10 MH FAF) for a full year. The monitoring results were compared to previous electric bills and verified using SEEM. The study found annual savings averaging between 5000 and 6000 kWh. The driver of these savings was the occupant's FAF and DHP control strategy. Occupants who made the DHP their primary heat source saved more energy than those who retained the FAF as their primary heat source. The savings resulted from a combination of DHP efficiency, reduced energy waste from duct losses, and a change from heating the whole house to keeping the main part of the house comfortable with the DHP. The results of this study will allow BPA to add these new applications to the DHP measure list as BPA qualified, effective April 1, 2013.

This analysis builds upon BPA's earlier study from 2007 through 2011 with existing single-family homes with zonal electric heat (the Monmouth study) of 14 sites, all existing single-family homes with zonal electric heat. That study concluded that the initial savings estimate associated with DHP in single-family zonal electric homes is about 4,000 to 4,500 kilowatt hours (kWh) per year (Geraghty et al., 2009; Geraghty et al., 2010; Baylon et al., 2012).

In October 2008, BPA and NEEA initiated a DHP pilot targeting 2,500 single-family, site-built homes with zonal electric heating systems. This study drew from a broad base of sites across the Pacific Northwest and found average savings of approximately 3,049 to 3,850 kWh per year (depending on measurement technique) across three heating climate zones (Baylon et al., 2012).

The current Emerging Technology Report Ductless Heat Pump Engineering Analysis: Single-Family and Manufactured Homes with Electric Forced-Air Furnaces can be found at;

http://www.bpa.gov/energy/n/emerging_technology/DHP.cfm

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