U.S. DEPARTMENT OF ENERGY | Pacific Northwest NATIONAL LABORATORY

Heat Pump and Heat Pump Water Heater Field Database

Heat Pump and Heat Pump Water Heater Database

Last 5 digits of project number | 1.4.1.19

Principal Investigator (PI) | Fatih Evren
Lead Organization | Pacific Northwest National Laboratory
PI Email | Fatih.Evren@pnnl.gov


Image courtesy: energy.gov/energysaver

BACKGROUND AND IMPACT

Unlocking Real-World Performance Insights

- Heat pumps (HP) and heat pump water heaters (HPWH) are critical technologies to decarbonize buildings that can reduce electricity use by up to four times*.
- The Decarbonization Blueprint requires rapid acceleration of the replacement of traditional systems with HP and HPWH.
- The increasing collection of field data for HP and HPWH is essential to better characterize their long-term performance, and this remains a known gap.
  - This gap is identified under the Late-Stage Research Development and Demonstration (LSRDD) initiative, Barrier 3
- Pacific Northwest National Laboratory (PNNL) provides data-sharing capabilities to the U.S. Department of Energy, industry, and other research entities through a centralized database for all heat pump and heat pump water heater field validation studies.

*energystar.gov

KEY PRODUCTS

Database:

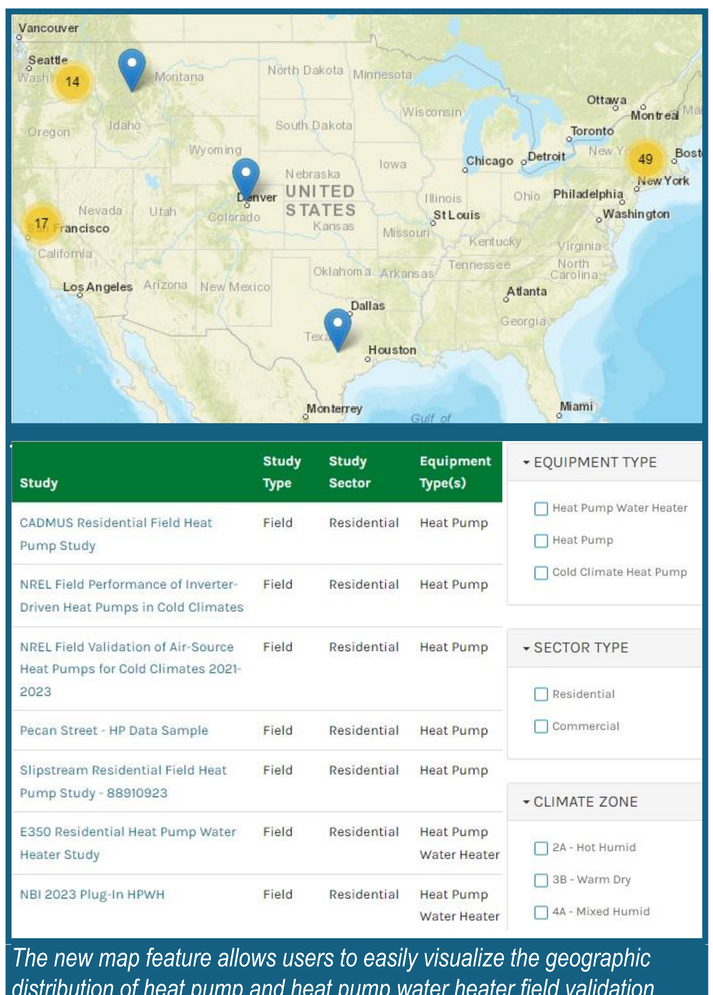
- A database and catalog for heat pump (HP) and heat pump water heater (HPWH) field performance data have been developed.
- Currently, 171 sites are included, with more being added as data collection progresses.

Data accessibility:

- The database is open and accessible, with options for limited access if data sensitivities exist.

User-Friendly Interface:

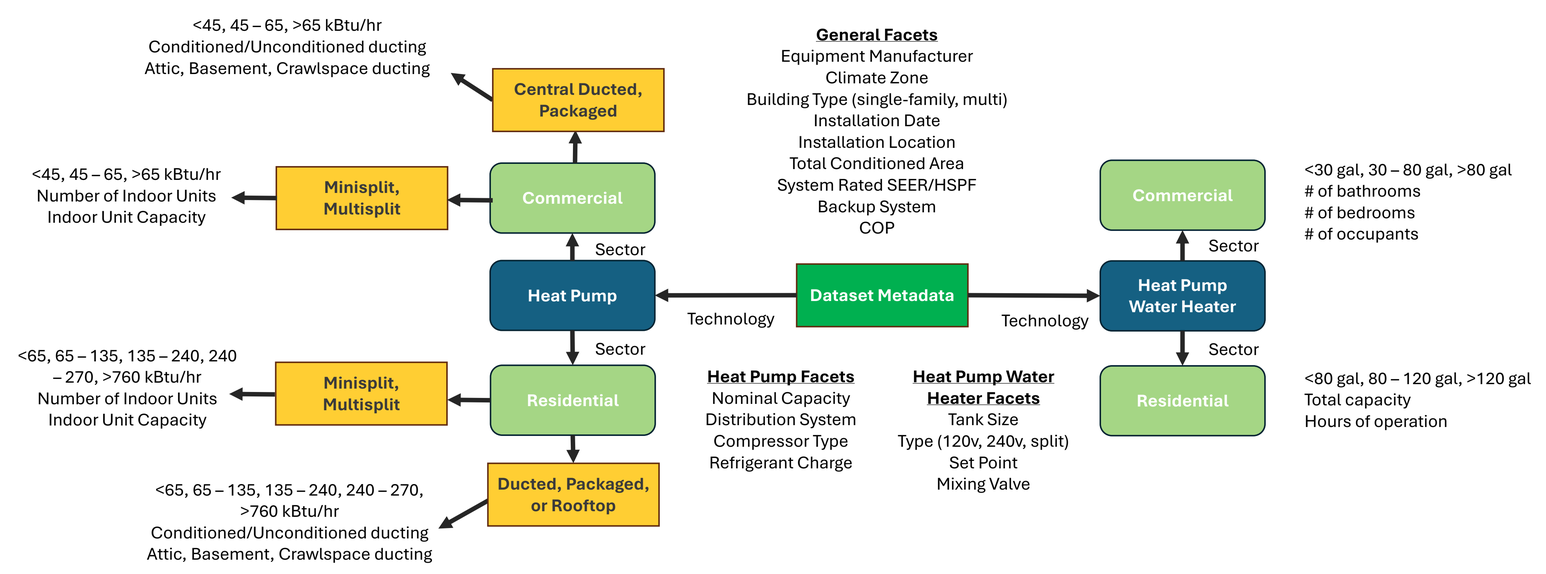
- It collects and shares performance data from HP and HPWH field validation studies.
- Easy-to-use features allow users to upload datasets and link external datasets.
- User-friendly visualizations of key metrics are available to enhance data understanding.
- Filtering options are provided, allowing users to sort data by climate zone, location, equipment type, and size.



The new map feature allows users to easily visualize the geographic distribution of heat pump and heat pump water heater field validation studies across the U.S. Users can refine data searches by filtering key characteristics like equipment type, sector, climate zone, size, and year.

CONCLUSION

- The HP and HPWH database is critical for addressing the challenge of limited data availability for field performance which will enable:
  - Improved understanding of the long-term performance of HP and HPWH systems in real-world conditions, including cold climate regions.
- The outcomes of this project directly support the Decarbonization Blueprint mission by enhancing access to reliable performance data. This project aims to reveal the full potential of HP and HPWH technologies across the nation, ultimately improving quality of life and reducing emissions.



The schema represents the dataset structure. Both residential and commercial HP and HPWHs are stored in the database with several key facets including capacity, system size, and performance metrics.

PROGRAM OFFICE LEAD | Alex Rees

PROJECT TEAM | Fatih Evren (PNNL), Abinesh Selvacanabady (PNNL),Cheryn Metzger (PNNL).

Visit: heatpumpdata.energy.gov