

Water Heating

Technology Families

- Residential
- Commercial and large multi-family

Technology Area

Water heating electrification using heat pump water heater (HPWH) technologies represents one of the major strategies to achieve deep greenhouse gas emission reductions from buildings. Driven by this strategic goal, there are active research and development efforts underway to advance HPWH equipment, grid-interactive load control technologies, and system integration solutions.

Unique Opportunities and Barriers

Wide adoption of HPWHs in existing single-family homes requires 110V-based models to avoid expansive electric system upgrade. Supporting market development and adoption for retrofit-ready HPWHs (e.g., 110V) presents an ETP opportunity. Central HPWH systems applications require design solutions and guidelines supported by extensive field installation examples. HPWH load controls for single family homes require enhanced field validation. Central HPWH load control solutions are yet to be developed and demonstrated. Most HPWHs use high-GWP refrigerants and availability of products based on low-GWP refrigerants needs to be improved.

Highlighted Priority Areas

<i>Tech Family</i>	<i>Tech Subgroups</i>	<i>Definition</i>	<i>Priority</i>
Residential	High-performance packaged heat pump water heaters and load control technologies for single family and individual multi-family dwelling units.	Electrify water heating by using high-performance HPWHs with low GWP refrigerants; achieve load flexibility to further reduce building GHG emissions and support grid operation.	High
Commercial and large multi-family	Central heat pump water heater systems and load control technologies for multifamily, hotel/motel, and commercial buildings.	Electrify water heating by using high-performance HPWH equipment and central HPWH system designs; achieve load flexibility to further reduce building GHG emissions and support grid operation.	High

Water Heating at a Glance

			Energy Savings Technical Potential				Decarbonization Potential			Codes & Standards Alignment			Demand Flexibility Potential		
Technology Family	Technology Subgroups	Definition	ETP Role	ETP Priority					Technical Performance KI	Market Knowledge Index (KI)	Program Intervention KI				
Residential	High-performance packaged heat pump water heaters and load control technologies for single family and individual multi-family dwelling units.	Electrify water heating by using high-performance HPWHs with low GWP refrigerants; achieve load flexibility to further reduce building GHG emissions and support grid operation.	1-Lead	1-High					1-High	1-High	1-High				
Commercial and large multi-family	Central heat pump water heater systems and load control technologies for multifamily, hotel/motel, and commercial buildings.	Electrify water heating by using high-performance HPWH equipment and central HPWH system designs; achieve load flexibility to further reduce building GHG emissions and support grid operation.	1-Lead	1-High					1-High	2-Medium	1-High				