Environmental Security Technology Certification Program (ESTCP)

SOLUTIONS TO IMPROVE SPACE HEATING AND WATER HEATING EFFICIENCY

OBJECTIVE
Solutions are sought to improve the energy efficiency of, and reduce greenhouse gas (GHG) emissions associated with, space and water heating systems in DoD buildings. The DoD owns and operates hundreds of thousands of facilities across a wide range of climate zones where space and water heating can contribute to over 45% of a building’s energy consumption\(^1\). Solutions are sought that are life-cycle cost-effective and broadly applicable to DoD buildings. Of particular interest are solutions to expand the use of air-source heat pumps (HP) and heat pump water heaters (HPWH). The DoD has many electric air-source HPs in its current inventory of heating, ventilation and air-conditioning (HVAC) systems and continues to consider HPs when replacing packaged HVAC units. However, new HP technology and changing economic factors are expanding the conditions where HP systems are economically and technically feasible. ESTCP seeks proposals for demonstrations of new HP and HPWH technologies, or solutions that accelerate the deployment of traditional HP technologies\(^2\).

ESTCP is open to all proposals relevant to the objective of the topic; however, solutions with the following characteristics are of particular interest:

- Use of low global warming potential (GWP) refrigerants.
- Simple integration with incumbent facility HVAC and water systems.
- Improved air-source HP performance in colder climates.
- Integrated electrical peak demand management.
- Low operations and maintenance costs

BENEFITS
The Executive Order released on December 8, 2021, on Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability, has set a goal for the federal government to achieve a carbon pollution-free electricity sector by 2035 and net-zero emissions economy-wide by no later than 2050. As part of this goal, agencies are required to prioritize improvements in energy efficiency and reduction in greenhouse gas emissions to achieve net-zero emission buildings. With over 150,000 space heating and cooling units and over 70,000 water heaters installed in DoD buildings, HP and HPWH solutions not only offer tremendous energy savings potential, but also offer GHG emission reduction by switching fuel to electricity.


\(^2\) See solicitation Topic B12 for related background on packaged HVAC system management
BACKGROUND
The DoD owns nearly 300,000 buildings across its 500 installations, accounting for nearly 33% of DoD’s total energy use. It has over 150,000 space heating and cooling units and over 70,000 water heaters installed. Air-source HPs make up a small but measureable portion of the packaged HVAC unit inventory, especially in mild climates (ASHRAE Climate Zones 2-4); however, they are still not the default choice when procurement decisions are being made to replace aged or failed packaged HVAC units. More performance data and more thorough analysis would help DoD make informed procurement decisions that include overall life-cycle considerations. Additionally, air-source technology continues to evolve, increasing efficiency and improving performance in colder climates. The Department of Energy (DOE) launched the cold climate heat pump (CCHP) challenge in November 2021 and DoD looks forward to evaluating the new products that result from the DOE challenge.

With respect to water heaters, ESTCP is interested in solutions for commercial-scale water heaters across a variety of applications. Of the total water heaters on DoD installations, over 80% are storage type water heaters, of which the majority are electric resistance. New commercial-scale HPWHs to replace electric resistance and fuel-fired water heaters offer tremendous potential to improve energy efficiency, reduce costs, and reduce GHG emissions associated with water heating.

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For pre-proposal submission due dates, instructions, and additional solicitation information, visit the ESTCP website.