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State-of-the-Art for the use of Phase-Change Materials in Tanks Coupled with Heat Pumps

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Highlights

- Analysis of systems that combine latent heat thermal storage with heat pumps.
- Applications of space heating, cooling and hot water production.
- Limited reduction of storage size with the use of phase change materials (PCMs).
- Necessary to evaluate the cost-effectiveness of implementing PCMs.

COP: Coefficient of Performance

DHW: Domestic hot water

PCM: Phase-change material

TES: Thermal energy storage

TRESE: Triple-sleeve energy storage exchanger

VSD: Variable speed drive

ABSTRACT

With the goal of increasing heat storage in the same accumulation volumes, phase-change materials are considered. There are different substances with different phase-change temperatures that can be used for storing heating or cooling implemented in heat pump systems for applications of space heating and cooling, ventilation or domestic hot water production. Reducing the size of the buffer tanks used with heat pumps, avoiding the oversizing of heat pumps or detaching thermal energy production and consumption are among the benefits that could result from the combination of heat pumps and latent heat thermal energy storage. In addition, this form of thermal energy storage allows enhancing the use of renewable energy sources as heat sources for heat pump systems.

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