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Project: Experimental Evaluation of a Novel Phase Change Material Heat Exchanger for HVAC
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Sponsor: U.S. Department of Energy



Background



Laboratory for Energy
Transport and Storage



- Buildings contribute to 31% of US emissions.¹ Increased flexibility is needed to decarbonize the grid.²
- Phase change material (PCM) thermal energy storage (TES) can shift electrical loads of HVAC equipment, enabling flexibility.
- In this project, the PCM TES shifts loads by running in place of the outdoor coil in summer (condenser) or winter (evaporator), using the PCM as a moderate temperature heat sink or source.
- Project will lead to advancements in PCM TES designs and improve HVAC integration.

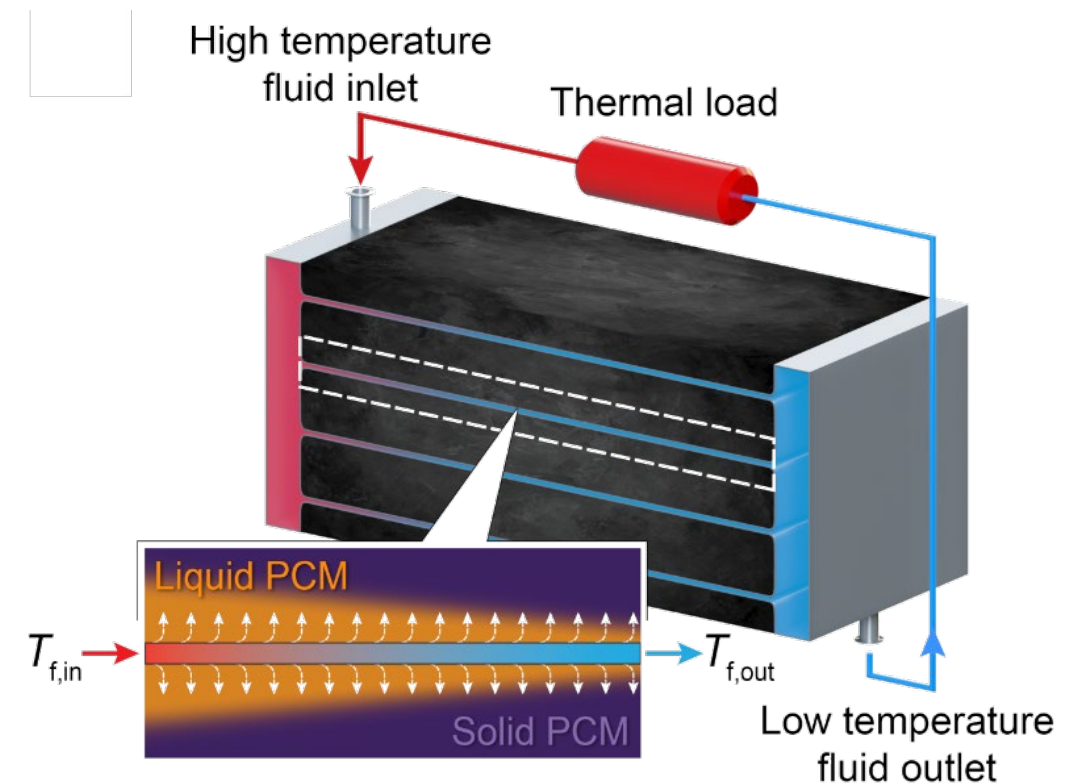


Figure 1: A PCM TES in condenser mode.³



Project Goals



Laboratory for Energy
Transport and Storage



Goal: Experimentally characterize PCM TES heat exchanger for multi-split heat pumps.

Methods: Build refrigerant loop (Figure 2) that can:

1. Control inlet state to TES heat exchanger to mimic conditions in HVAC system.
2. Measure outlet state of TES during charge and discharge.

Outcome: Compare results to computational models and identify future design changes.

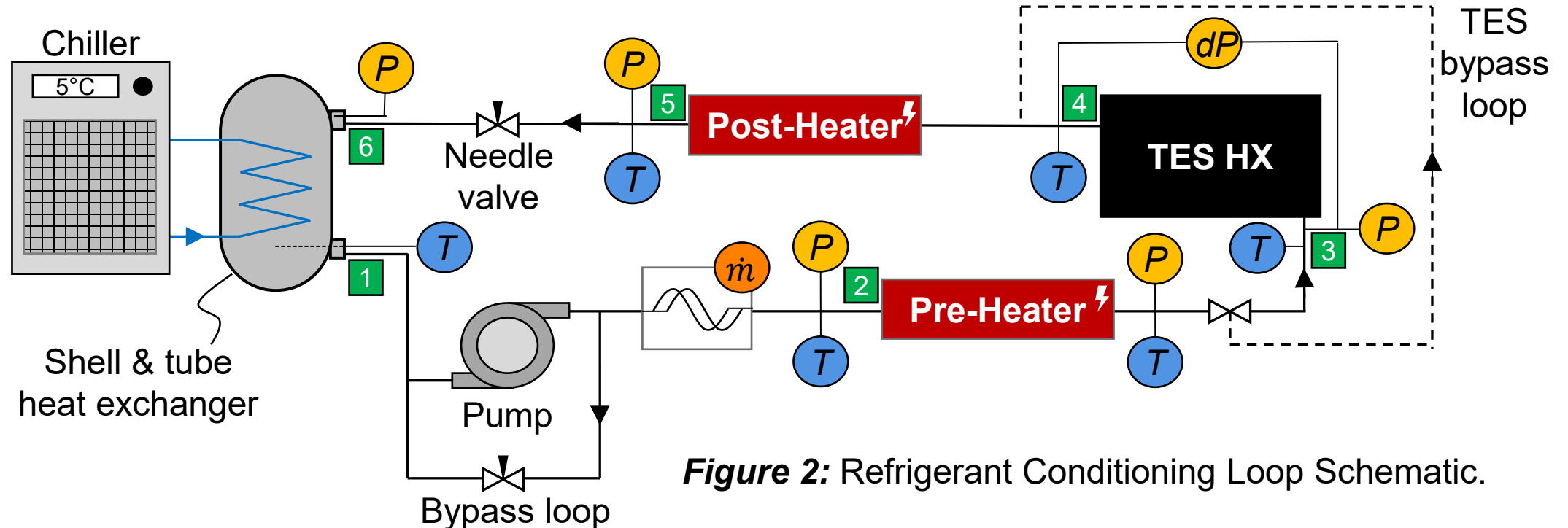


Figure 2: Refrigerant Conditioning Loop Schematic.