

Thermal Battery Storage-Source Heat Pump Systems

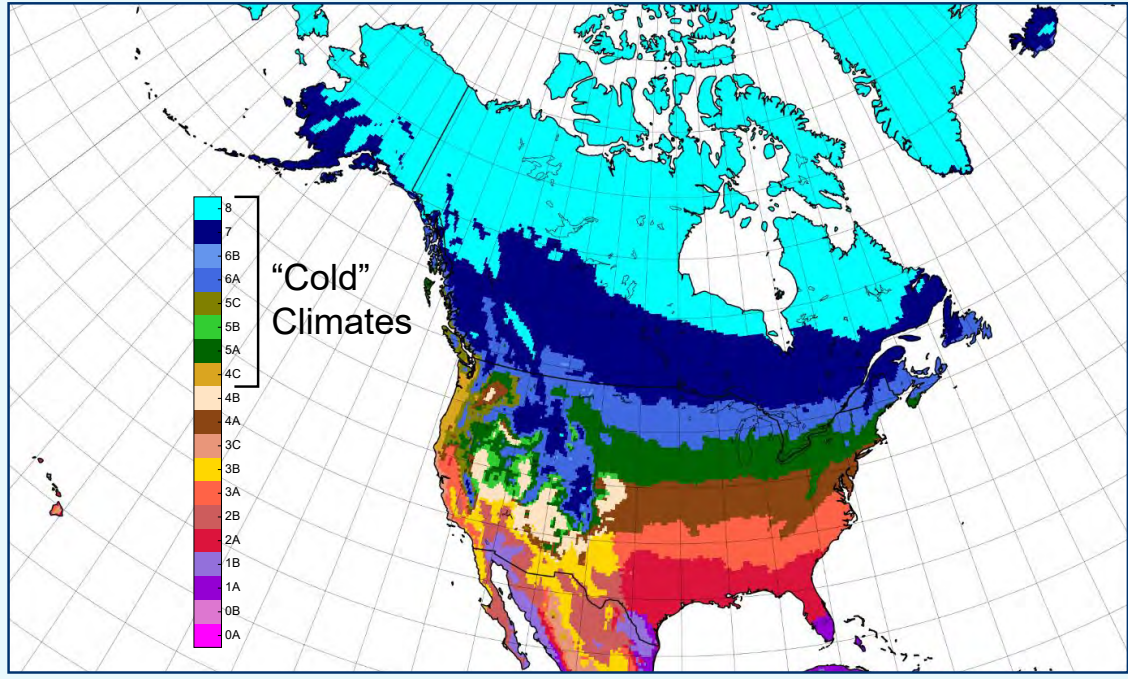
Harnessing the flexibility of electrified ice heating



Trane's® Thermal Battery Storage-Source Heat Pump System provides an innovative, all-electric way to reliably and affordably heat and cool buildings using thermal energy storage, commonly known as ice storage tanks.

Make electrified heating possible in cold climates

Heat your building even when temperatures drop below 0°F (-18°C).



Source: ANSI/ASHRAE Standard 169-2021. Climate Data for Building Design Standards, pp.244, 250. Georgia, ASHRAE, 2021.

How does it work?

Exploit all possible sources of heat and use it immediately or store it. Turn your building into your own low-carbon heating source.

Reclaim excess building heat

- Solar energy collected through curtain walls and windows
- Computers and people in building core
- Heat from domestic hot water in piping

Collect heat from the outdoor air to immediately heat the building

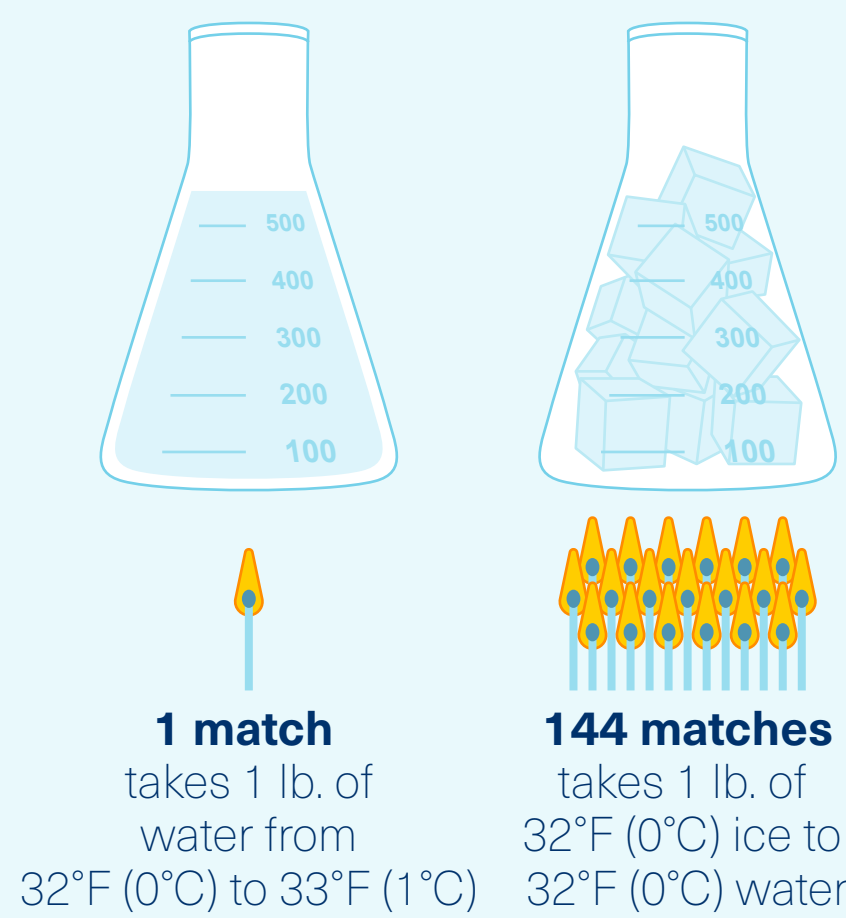
- Heat from outdoor air collected on rooftop by air-to-water heat pump

Limited roof space for air-to-water heat pumps? Store heat in ice storage tanks to go all-electric in urban environments.

Gaining Heat from Ice Storage Tanks: Store a Tremendous Amount of Energy (Heat).

Due to the natural properties of water, a tremendous amount of heat is stored when water changes from its solid phase (ice) to liquid phase (water).

- Each thermal energy storage tank contains 13,812 pounds of water (1655 gallons).
- One pound of water releases 1 BTU of energy when its temperature is reduced 1°F (-17°C).
- That same pound of water releases 144 BTUs when it changes from its liquid phase (water) to its solid phase (ice).
- Each thermal energy storage battery can store **2 million BTUs** - 13,812 lbs. of water times 144 BTUs/lb. = 2 million BTUs



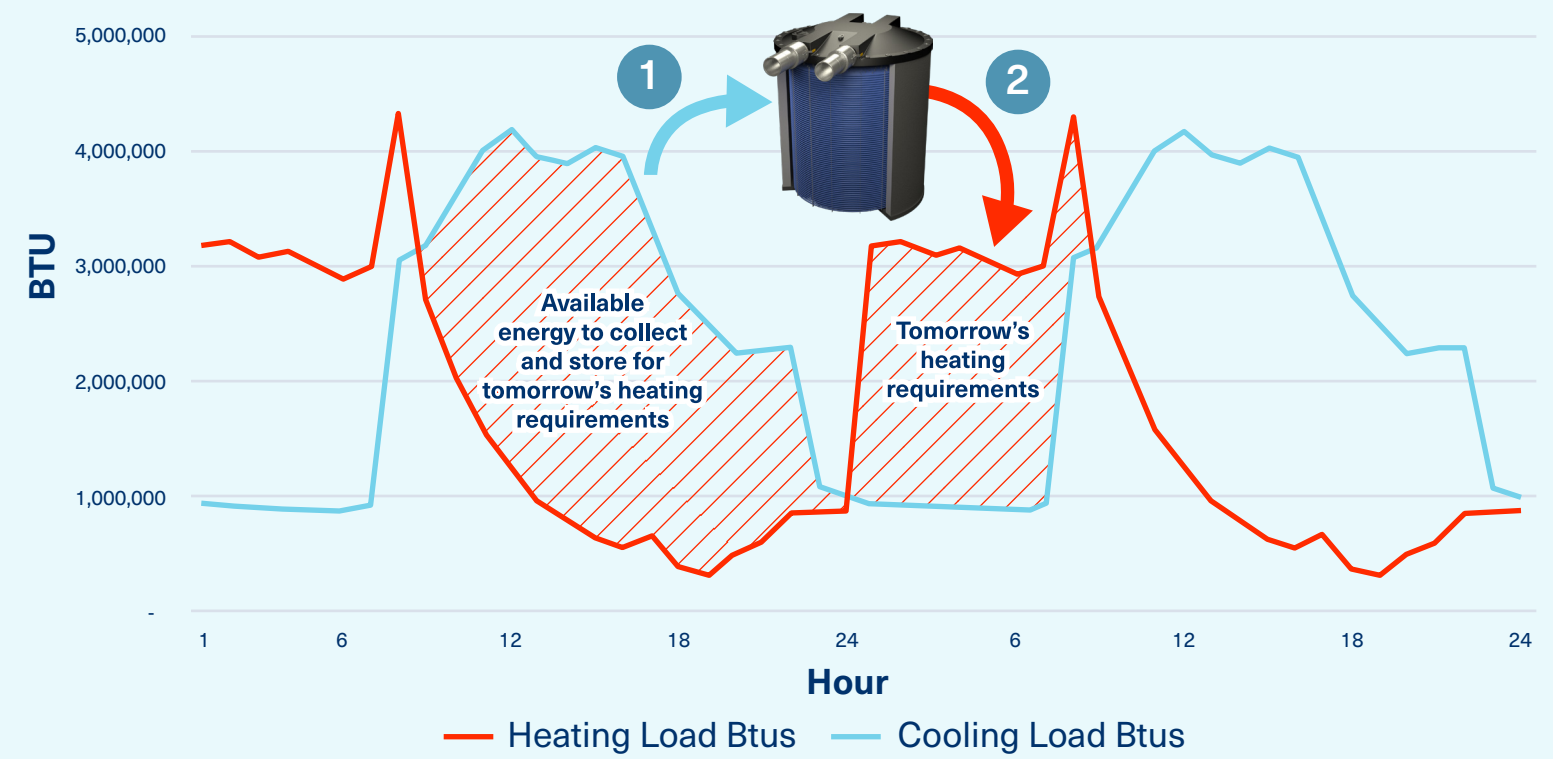
Each thermal energy storage battery has the same Btu's of heat as:

- 14 gallons of fuel oil
- 2000 lbs. of steam
- 20 Therms of natural gas

Heat or Cool with Ice-based Thermal Energy Storage Tanks

Building and cooling needs fluctuate throughout the day. This allows reclaimed heat to be used from one day to next.

- 1. Heat Storage = Comfort Cooling.** When comfort cooling is required, the building heat is transferred to the ice (in the tanks), the ice melts and changes to water. A tremendous amount of heat is stored in the water for later heating use.
- 2. Cooling Storage = Comfort Heating.** When comfort heating is required, the heat is removed from the water (in the tanks) to heat the building. Meanwhile, the water changes back to ice for later cooling use.



System Components

Air-to-Water Heat Pumps: Collect heat from outdoors to heat building immediately or stores the heat in thermal energy storage tanks for later use.

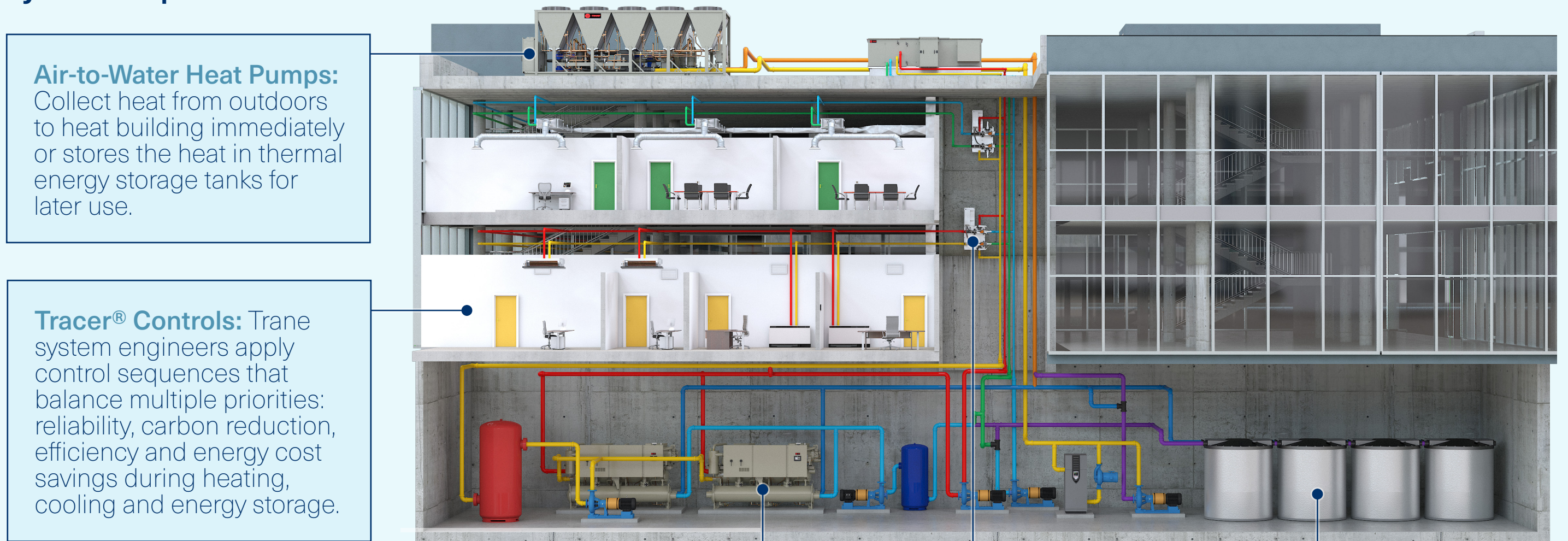
Tracer® Controls: Trane system engineers apply control sequences that balance multiple priorities: reliability, carbon reduction, efficiency and energy cost savings during heating, cooling and energy storage.

Chiller Heat Pump: Serves as the heater for the building by providing direct heat recovery, and dispatching energy from the thermal energy storage tanks or air-to-water water heat pumps then lifting the energy to a usable temperature.

Hydronic Branch Conductor: Directs the flow of hot or cold water to a thermal area, using built-in control logic. Enables adequate heating with a dual-purpose coil at a milder hot water temperature for a more resilient system solution.

Thermal Energy Storage: Stores reclaimed waste heat in form of cold water for later use.

Heat is stored between 28°F (-2°) and 40°F (4°C). The chiller heat pumps lifting the energy to a higher temperature for comfort heating.



Visit trane.com/chiller-heater-system
Engineers—Learn more in our Application Guide.

Up to 50% Tax Credit available for Thermal Energy Storage.
Contact your local Trane Account Manager to Learn More.



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