

# Thermal Battery™ Storage-Source Heat Pump Systems

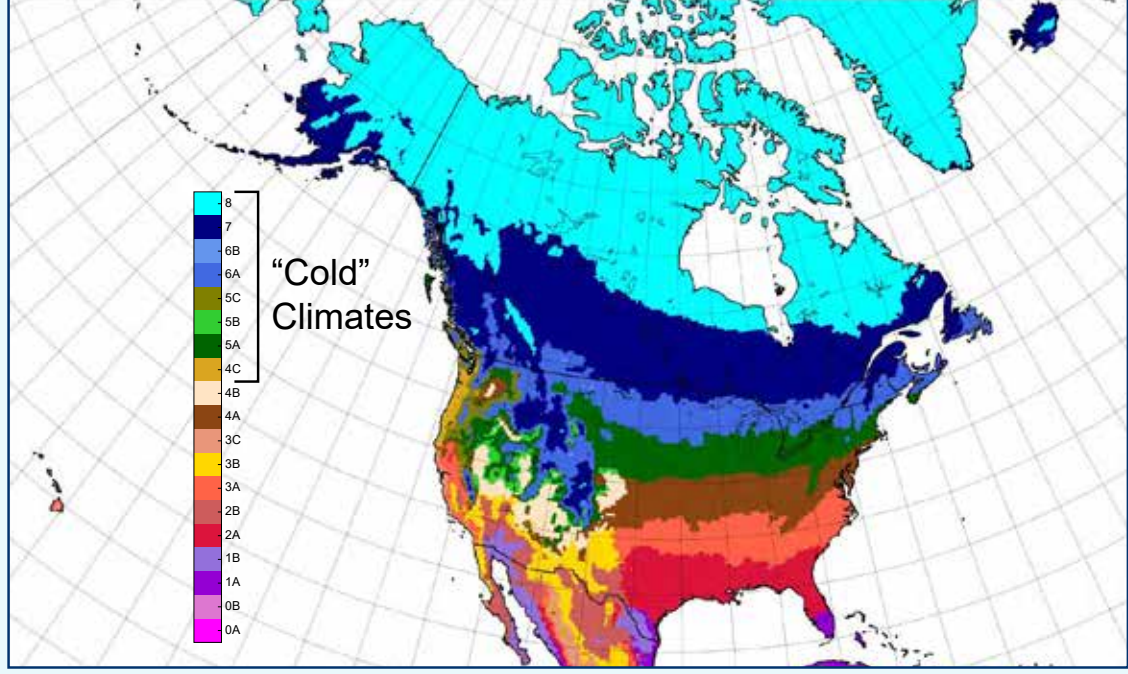
## Harnessing the flexibility of electrified ice heating



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.



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

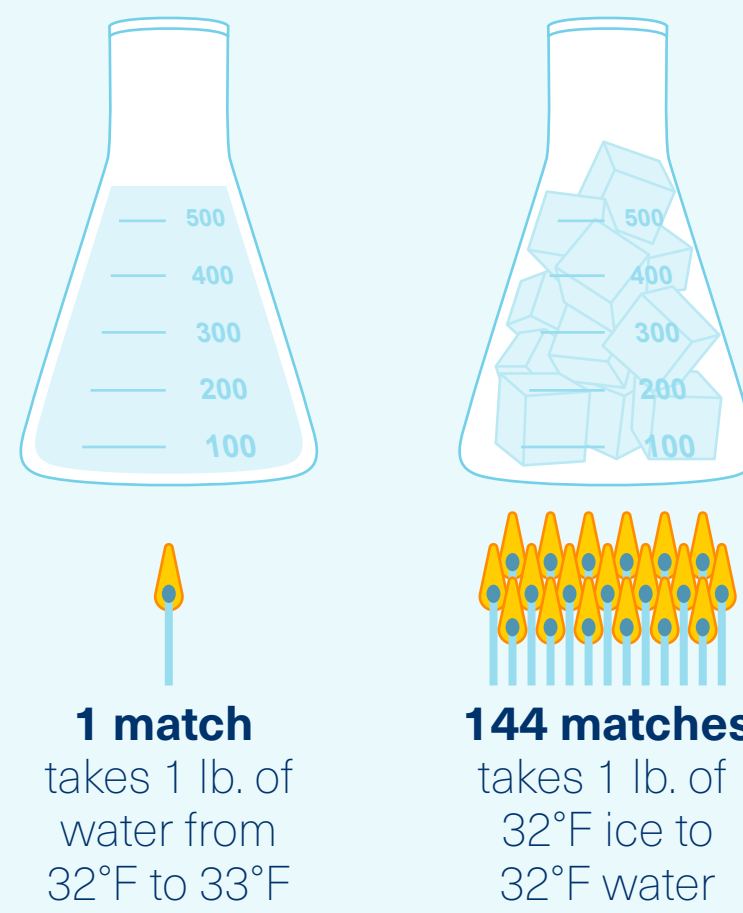
#### Collect heat from the outdoor air to immediately heat the building

- 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.
- 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



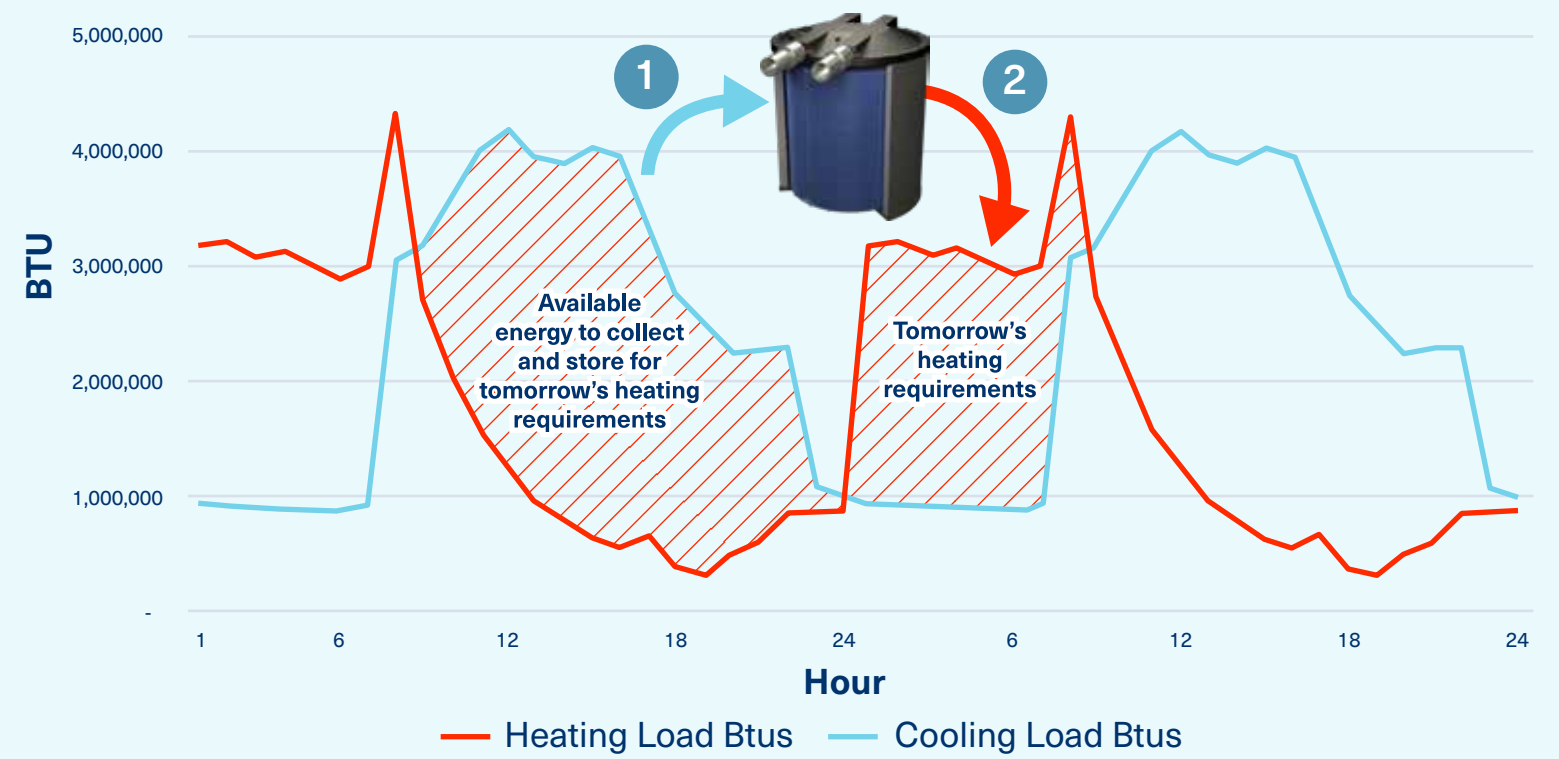
Each thermal energy storage battery has the same Btu's of heat as:

- 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

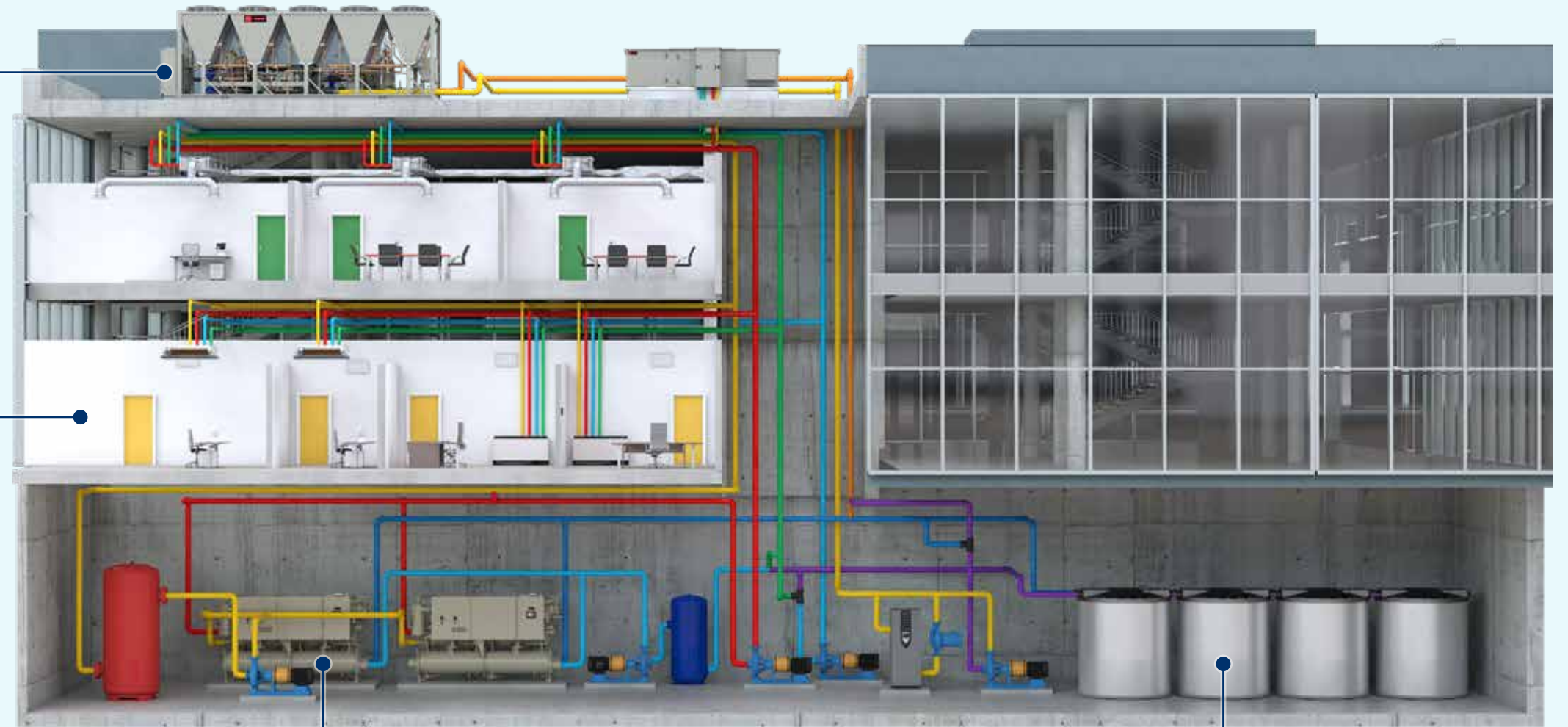
**Air-to-Water Heat Pumps:** Collect heat from outdoors to heat building immediately or stores the heat in thermal energy storage tanks for later use.

**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-Heater:** 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.

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

Heat is stored between 28 and 40°F. The Chiller-Heater pumps the energy to a higher temperature for comfort heating.



Visit [trane.com/chiller-heater-system](https://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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