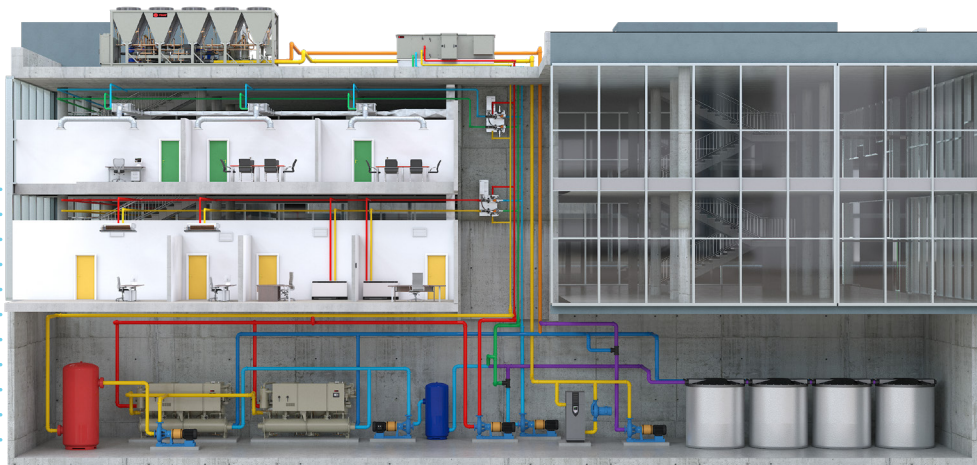


Thermal Battery Storage-Source Heat Pump Systems

Making reliable electrified heating possible in cold climates



Trane's Ice Bank™ energy storage tanks stores yesterday's energy for today's heating like an HVAC battery.

The push to decarbonize buildings is posing new challenges that require creative solutions. Trane's Thermal Battery Storage-Source Heat Pump System (SSHP) is an innovative electrified heating solution that reduces carbon emissions even in cold climates. It works within the space constraints of urban environments, too.



Reclaim and store existing heat.

Our innovative approach reclaims excess building heat. It can also collect heat from the outdoor air to immediately heat the building or store it for tomorrow's heating. So, any building can be its own low-carbon heating source.

Energy to heat your building can come from a variety of heat sources that build up during the day:

- Solar energy collected through curtain walls
- Internal heat gains such as computers and people working in the core of building
- Heat from waste and domestic hot water can be reclaimed



Collect heat from the outdoor air.

With Trane's Thermal Battery Storage-Source System, all-electric chiller heat pumps can recover and recycle heat in the building to support air-to-water heat pumps. When there is no more heat to recover, thermal energy storage can make up the difference. Integration of thermal energy storage can provide a source of heat when conditions are not favorable for air-source heat pump operation, such as extreme cold climate and defrost cycles. In addition, thermal energy storage provides flexibility in design, to reduce air-to-water heat pump size and lower first costs, while still maintaining design load requirements.

Electrified heating becomes practical and affordable.

Reliable operation. Enables electrified heating in climates where typical air-to-water heat pumps are limited, below 0°F (-18°C). Now buildings in northern regions can electrify heating without hesitation.

Urban scaled. Limited rooftop space for air-to-water heat pumps? No room for a ground-source geothermal system? No problem. Thermal energy storage and chiller heat pumps can provide an option that works within urban limitations.

Cost-effective. The ability to reclaim, collect, and store heat at different times of the day allows us to optimize the size of the heat pumps required. This reduces the first cost of the system and provides flexibility to use lower-cost electricity in winter.

Grab the financial incentives.

Up to 50% tax credit is available for thermal energy storage.

Uncharted territory? Not for Trane®.

We've been using ice-based thermal energy storage in cooling buildings for decades. Now, we're applying the technology to heating. We'll provide all the equipment and controls you need to specify, install and operate your system—and ensure that it works.

Thermal energy storage is commonly referred to as “ice storage.” Each ice storage tank is filled with 1655 gallons of water and can phase change from water to ice. The ice is used for cooling; however, the energy stored in cold water can also be used for heating.

When heat is stored in the ice tanks the ice melts, providing a heat source (two million BTUs) in the form of water. Heat is transferred from the water by a chiller heat pump which raises the heat up to a usable level to heat the building. As the heat is removed from the water, the water changes back to ice and the process repeats, allowing you to heat or cool, or both. An air-to-water heat pump provides thermal balancing, by rejecting excess heat in the summer and adding heat in the winter. Building controls complete the system for a reliable, efficient, space optimized system.



Harness the thermal energy in ice storage tanks

System Components

Ice Storage Tanks



When heat is stored in the Ice Bank™ thermal energy storage tanks, the ice melts, providing a heat source (two million BTUs) in the form of water. As the heat is removed from the water, the water changes back to ice, and the process repeats, allowing you to heat or cool, or both.

Chiller Heat Pumps



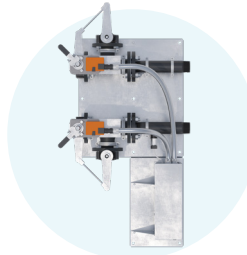
Heat is transferred from the water in the tanks by the helical rotary screw model RTWD, which pumps the heat up to a usable level to heat the building.

Air-to-Water Heat Pumps



Ascend® and Thermafit® Modular air-to-water heat pumps provide thermal balancing, by rejecting excess heat in the summer and adding heat in the winter.

Hydronic Branch Conductor



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

Controls



Symbio® equipment controllers provide access to performance data at anytime to monitor, troubleshoot, schedule and control equipment. The Tracer® SC+ building automation system coordinates these elements to deliver better control over comfort and efficiency, and enhance overall building performance.

Sustainability is the mission

As more renewables are added to the grid, emissions in the electric power sector will continue to go down. This means emissions in buildings will go down too, ONLY if you are using electricity to power your building.

To decarbonize and learn about innovative solutions to electrify your building as the grid gets greener, please contact your local Trane sales account manager or visit www.trane.com/chiller-heater-system.



Trane – by Trane Technologies (NYSE: TT), a global climate innovator – creates comfortable, energy efficient indoor environments through a broad portfolio of heating, ventilating and air conditioning systems and controls, services, parts and supply. For more information, please visit trane.com or tranetechnologies.com.

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