

ELECTRIFICATION



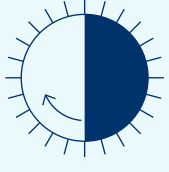
What is it?

“Electrification of heat” is a building decarbonization strategy that uses HVAC equipment powered by electricity instead of fossil fuels like natural gas, coal or oil to heat buildings.



Why is electrification of heat necessary?

The nation's power grid is transitioning to carbon-free energy sources, such as solar and wind.¹ The environmental benefits are maximized when buildings switch from using emissions-producing natural gas heating and hot water systems to innovative and efficient electrified solutions.



Low carbon sources will provide **more than half** of total electricity generation by 2040.²

20+

More than **20** states have established mandated decarbonization goals.⁶

45+

More than **45** states have utility incentives for the use of electrified equipment in buildings.⁷

141

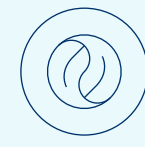
In the US, **141** cities have committed to 100% clean renewable energy.⁸



Buildings account for **38%** of global energy-related CO₂ emissions and HVAC accounts for **40%** of building energy use.³



The replacement of fossil fuel-based heating systems with efficient all-electric technologies will reduce energy use by more than **40%** and carbon emissions by more than **75%**.⁴



Sustainability is an important priority for many businesses



State and local policies are encouraging—even mandating—decarbonization efforts.⁵

92% OF S&P 500 companies have committed to sustainability.⁹

83% of global companies have also made this commitment.¹⁰



How do we do it?

Four key HVAC technologies to support electrification

1 HEAT PUMPS

Heat pumps are a key enabler for decarbonization because they can use electricity to heat or cool from a single unit. Heat pumps are up to **3 times** more efficient than other forms of electrified heating.¹¹ **180 million** heat pumps were used for heating in 2020.¹² The International Energy Agency (IEA) estimates heat pumps could satisfy **90%** of global heating needs with a lower carbon footprint than gas-fired condensing boilers.¹³

2 HYBRID SYSTEMS

These HVAC systems combine gas and electric heating, switching between the two for the highest efficiency based on outdoor conditions.

3 HEAT RECOVERY

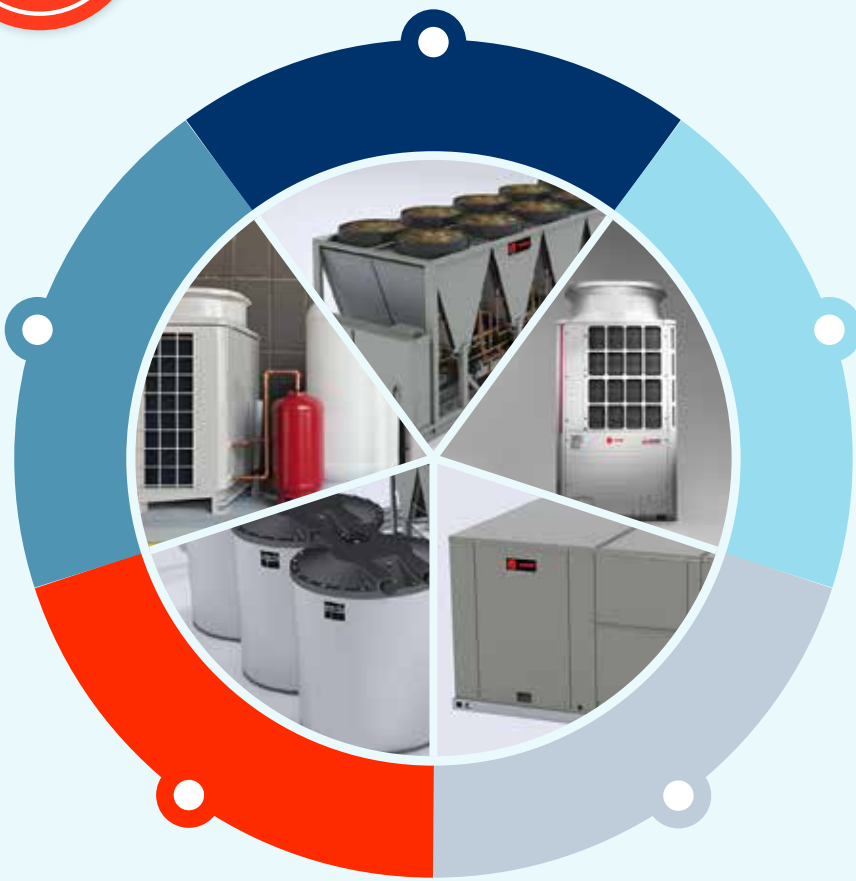
One of the most efficient ways to heat is to recover waste heat from other systems and reuse it to heat the building. An estimated **20 to 50%** of industrial energy input is lost as waste heat.¹⁴

4 THERMAL ENERGY STORAGE

Store and dispatch waste heat like a battery to deliver heating and cooling. Thermal energy storage increases the utilization of renewable energy by up to **50%**.¹⁵



Electrification: A solution for every building type



CHILLER-HEATER SYSTEMS

Common in many large buildings, electric chillers can also serve as heat pumps or provide heat recovery.

VARIABLE REFRIGERANT FLOW (VRF) HEAT PUMP AND HEAT RECOVERY SYSTEMS

VRF is an efficient, versatile, all-electric zoned heating and cooling solution.

PACKAGED UNITS AND SPLIT SYSTEMS

These units, with integrated heat pumps, are efficient and effective for many small and mid-sized commercial buildings.

STORAGE SOURCE HEAT PUMP SYSTEMS

Energy storage is typically used as a financial tool to reduce energy costs and can also store energy to be used for heating and cooling.

COMMERCIAL DOMESTIC HOT WATER

A highly efficient, all-electric heat pump water heater system designed to produce high volume domestic hot water (DHW) for commercial facilities.

Trane's total-system design approach (How can Trane help)

There are many options to consider for electrification. Trane experts take a holistic view of a building's systems to design an electrification plan that meets the owner's sustainability goals, budget and building requirements.

ASSESS

- Project the future of the space
- Identify goals and key regulatory drivers

MITIGATE

- Develop application-centric strategies
- Implement the solutions
- Improve energy efficiency and sustainability

MANAGE

- Ongoing optimization and proactive maintenance
- Continuous managing and monitoring

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