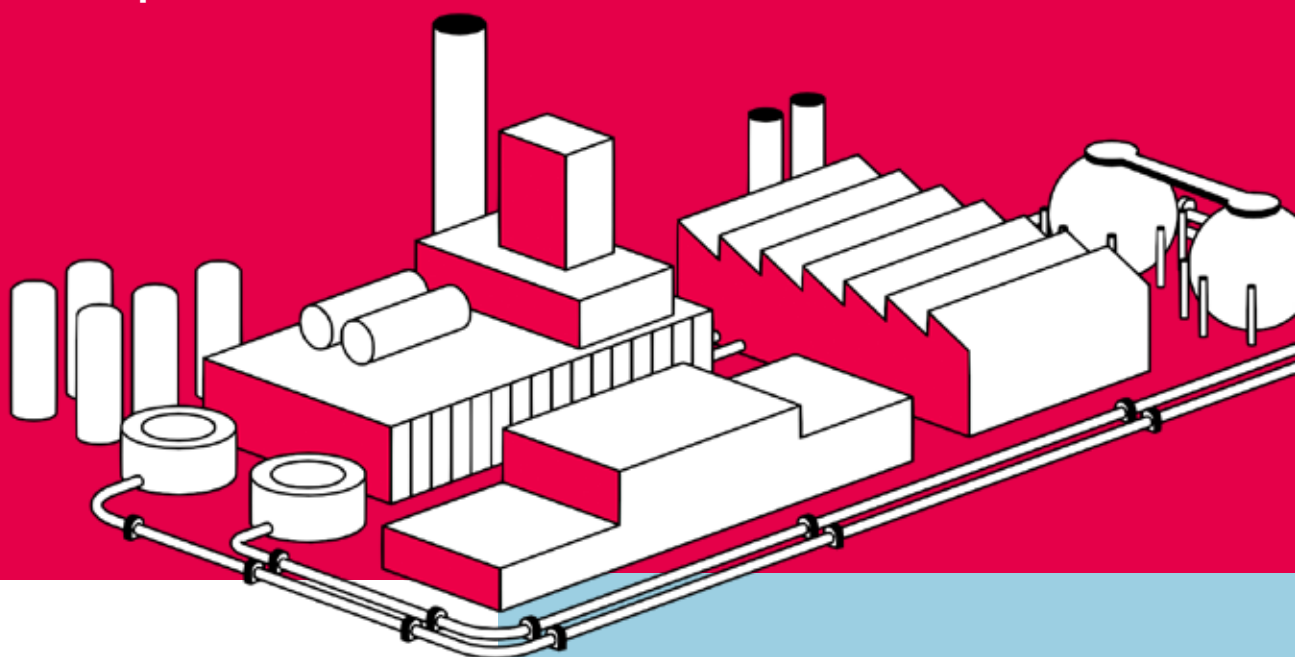


Heat pumps for process industries

Leading the process heat transition -
tailored, efficient, profitable



Some of the energy consumed by process industries goes into heat production, with fossil fuels dominating as the energy source. This results in high CO₂ emissions, high operating expenses, and rising carbon taxes. But there is a simple way to make process heat more efficient, economical, and environmentally sustainable: our industrial heat pumps can turn waste heat from your plant into high-quality heat and steam, lowering carbon emissions and making fossil fuel feedstocks available for other processes.

Everllence

Decarbonizing industry with heat pumps

Efficient low-carbon heat for industry

Heat production is important in the energy-intensive process industries. High-precision steam is used for boiling, steaming and drying processes in many industries, including chemical, refinery, pulp and paper, automotive, tires, mining, pharmaceuticals, and food and beverage. The highest temperatures are applied in the chemical and petrochemical industries, where processes are usually served by conventional steam boilers. These can be replaced by Everllence industrial heat pumps, generating steam at different pressure levels according to the individual process requirements and lowering the emission of greenhouse gasses.

Environmentally and economically sustainable

Heat pumps are one of the most practical ways to lower heating costs and CO₂ emissions. Powered by renewable electricity, a large-scale heat pump is an economical way to fully decarbonize your process heat and cold supply. Heat pumps also enable sector coupling and can help to balance renewable energy surpluses. The technology is well known, extremely reliable, robust, and efficient.

Benefits at a glance

- Efficient process heat supply
- Waste heat recovery
- Efficient use of renewable energies
- Reduction of CO₂ emissions to zero
- Ancillary services and revenues
- Long-term cost savings

Approx.

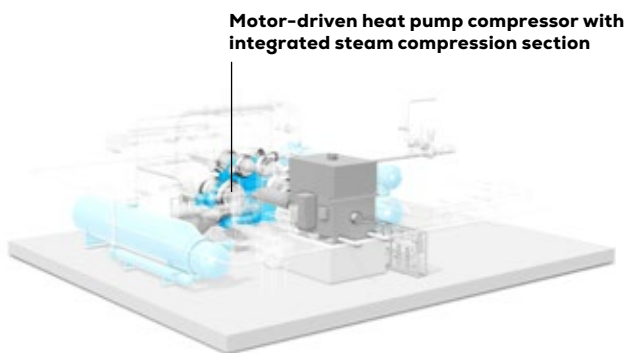
390,000

metric tons CO₂
savings annually

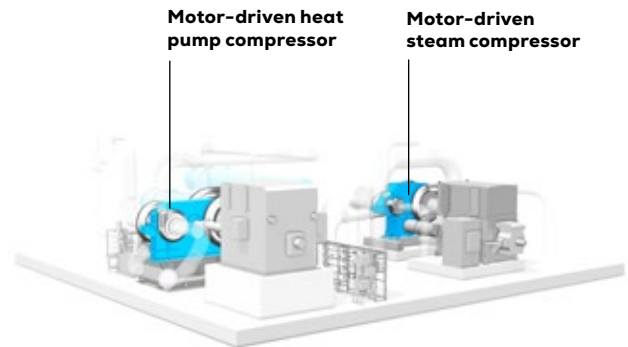


Efficiency for process heating

Vapor compression cycle (VCC) and integral steam compression section



Vapor compression cycle (VCC) and separate steam compression section



Vapor compression cycle (VCC)

VCC high-temperature heat pumps extend the economic and environmental benefits of domestic heat pumps to large-scale industrial applications. To ensure a reliable process steam supply, Everllence offers a combined heat pump and steam compressor (SC) in one package, or a heat pump with a separate SC skid that meets the required process conditions.

The system guarantees dependable hot water production up to 140 °C and steam production up to 300 °C.

[Explore our VCC factsheet →](#)

Choosing the right refrigerant

Selecting the ideal refrigerant depends on the specific application, as no single refrigerant is perfect for all uses. Each type has its own advantages and disadvantages regarding environmental impact, safety, and technological suitability. Our heat pumps are compatible with a variety of refrigerants.

Refrigerants and their advantages:

Ammonia (R717):
High-performance natural refrigerant

Hydrocarbons (e.g., butane):
Non-toxic natural refrigerant (no fluorine)

Synthetic refrigerants (e.g., R1234ze):
Safe refrigerant

Everllence scope of supply

We scale our heat pumps to the temperature and power needs of our customers.

Our services include:

- Consulting
- System efficiency design
- Planning of components such as compressor, pipe-work, etc.
- Testing and installation
- Digital solutions such as Everllence dynamic simulation
- Maintenance

Amplifying and transferring thermal energy

A heat pump extracts heat from low-temperature sources such as cooling water, hot process streams, or other waste heat streams from production processes. This heat is then amplified to a useful high temperature and transferred back to the processes at higher temperature and pressure levels.

The principle is based on a closed-loop refrigerant cycle with compression and expansion of the refrigerant fluid, enabling both heating and cooling. The compressor is driven by a motor. When the heat pump is powered by renewable energy it can provide carbon-neutral process heating.

Versatile working principles

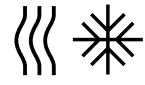


Our heat pump solutions are tailored to meet the specific temperature and pressure requirements of your process. Two optimized thermodynamic working principles are offered:

Vapor compression cycle (VCC) with various natural or synthetic refrigerants to generate hot / cold water or steam.

Transcritical compression cycle (TCC) with carbon dioxide as an environmentally-friendly refrigerant to produce hot or cold water.

Heating and cooling



Large-scale Everllence heat pumps are capable of providing the necessary heating and cooling for industrial processes. Like their domestic counterparts, industrial heat pumps require a heat source. In large-scale systems, water from seas, rivers, or lakes can be utilized. Additionally, harnessing industrial waste heat enhances the efficiency and environmental friendliness of the process.





Benefits of electrification

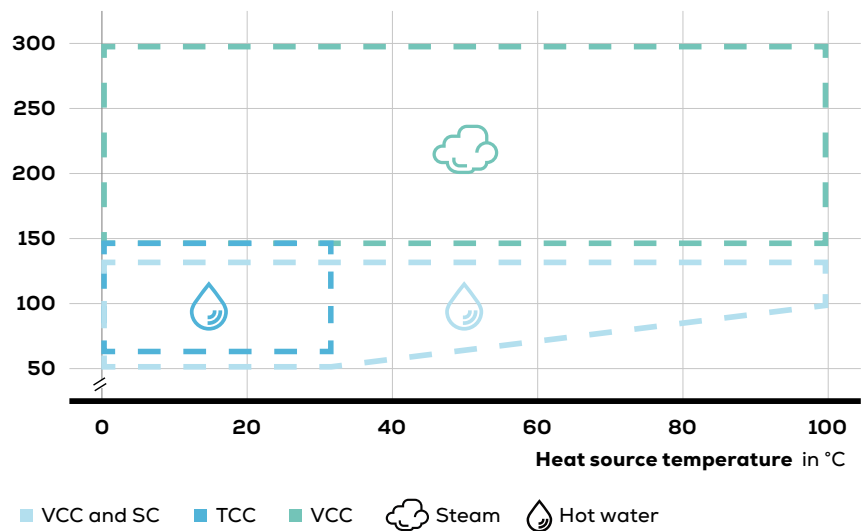


Heat pumps reduce the levelized cost of heat. Although the initial capital expenditure (CAPEX) is higher compared to fossil-fueled boilers, it is quickly offset by the lower operational expenditure (OPEX). Improving energy efficiency in industrial processes leads to substantial primary energy savings and reduced CO₂ emissions. Electrifying heat production also opens up new business opportunities, such as, in combination with a thermal storage solution, providing balancing power to electricity grids. The thermal storage solution means you can store the generated energy for an extended period and access it whenever needed.

[Explore our white paper →](#)

Working principles for different temperature grids

Heat sink temperature in °C



Our experience of heat pumps in industrial sectors

High-performance technologies

Compressors are the key component of heat pumps. The high quality and performance of Everllence compressors are well known in the chemical and petrochemical industries, with hundreds of units installed worldwide, many of which have been running for decades. Almost every ammonia production plant has a heat pump to liquefy the product.

Everllence refrigerant compressors are used in refinery processes such as propane dehydrogenation (PDH), fluid catalytic cracking (FCC) and alkylation. Our open-cycle heat pump compressors are also commonly used for mechanical vapor recompression.

Everllence compressor technology is based on proven, reliable, low-maintenance oil & gas industry standards, and offers the highest efficiencies to optimize overall performance.





70%

energy savings when fossil fuels
are replaced by heat pumps

Industrial process know-how

Everllence has many years of experience in providing technology and consulting expertise to industrial customers. Our compressors are integral to many production processes. We specialize in delivering complete machine trains including instrumentation and controls, heat exchangers, auxiliaries, and other services for customers in sectors such as chemicals, refineries & petrochemicals, pulp & paper, fertilizer, industrial gases, iron & steel, and power generation. Everllence heat pumps help make these processes more sustainable and economical, reducing dependence on fossil fuels.

Industrial reference projects

Our industrial reference projects include heat pump compressors for propane dehydrogenation and fluid catalytic cracking in the petrochemical industry, heat pump compressors for propylene production in the chemical industry, and open heat pump systems for steam production in the food & beverage sector, for example, in vodka and maize starch production processes. Since 2024, Everllence has been supplying and maintaining a large-scale heat pump for an electric vehicle factory in the USA, serving both cooling and heating needs.

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