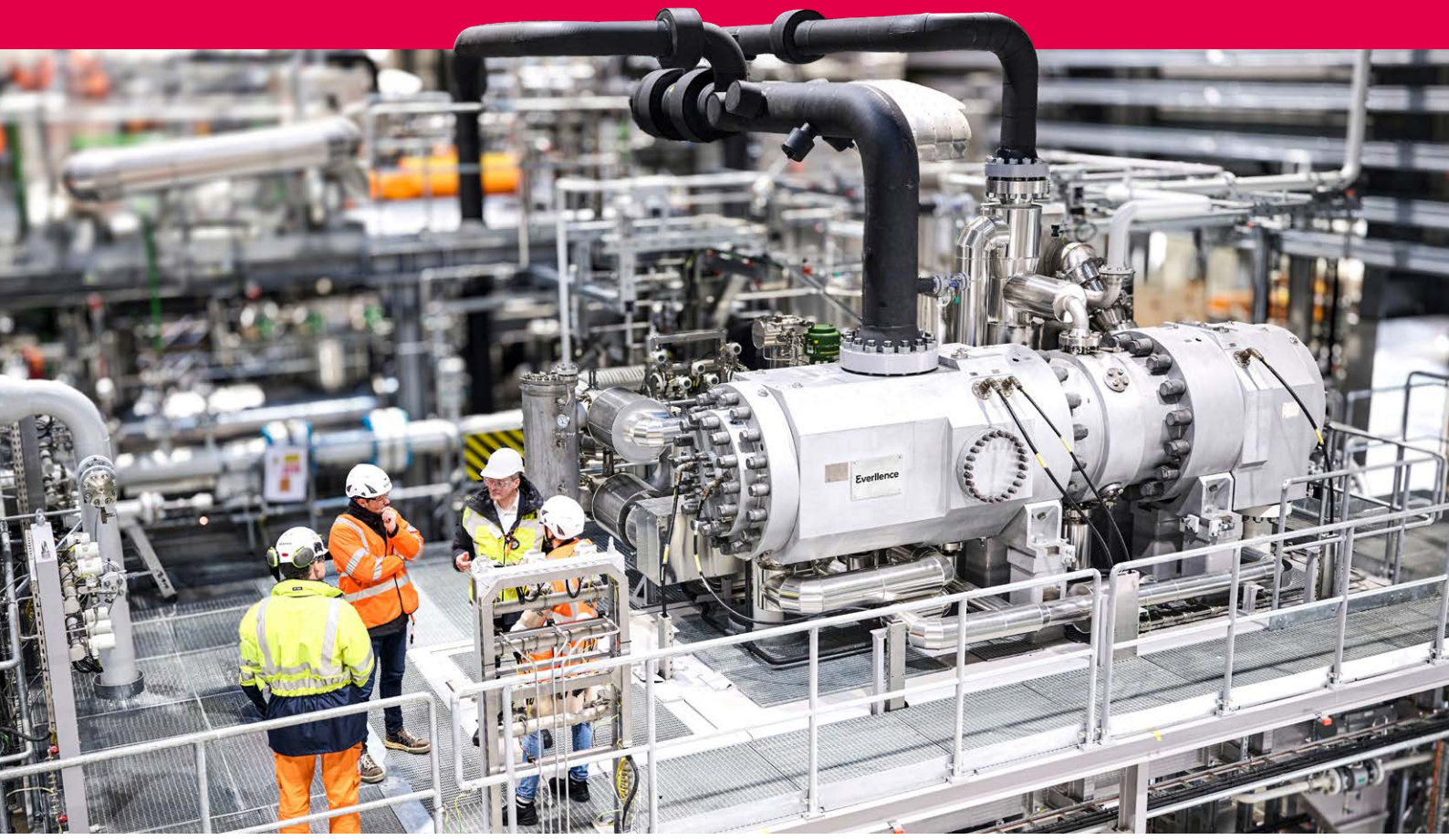
Efficient heating and cooling for a decarbonized future

Energy & Industries

Mega **heat pumps**



Everllence

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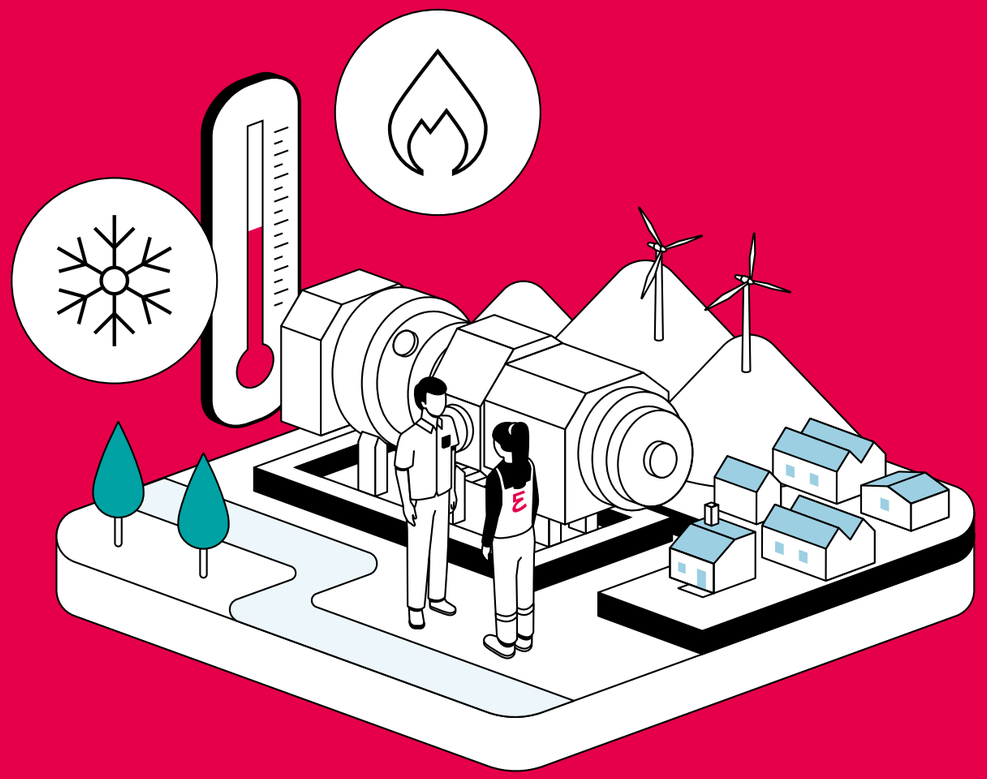


The era of mega heat pumps has begun

Imagine heating and cooling an entire city at the same time – and do it CO_2-neutral. With mega heat pumps from Everllence, this vision becomes a reality. Our large-scale heat pumps provide sustainable heating and cooling solutions for entire industries and urban districts.

Decarbonization is not an option – it's a necessity

The global shift toward net-zero emissions is well underway. Governments, industries, and urban planners are accelerating their efforts to cut CO_2 emissions, and heat pumps are at the forefront of this transformation.

Industrial processes and urban energy networks need heating and cooling, Large-scale heat pumps change the game by seamlessly supplying both, efficiently extracting and distributing thermal energy.

With Everllence's expertise in large-scale thermal energy systems, we help industries and cities turn excess energy into usable heat and cooling, ensuring a sustainable and cost-effective path to decarbonization.

A reliable and sustainable technology

The idea of extracting heat instead of generating it might sound unusual, but it's the key to making industrial heating and cooling more efficient and sustainable.

Everllence heat pumps capture energy from sources like air, water, or industrial waste heat, amplify it to a higher temperature, and distribute it where needed. This process is not only highly efficient but also enables simultaneous heating and cooling while reducing overall energy consumption. When powered by renewable electricity, heat pumps provide heating and cooling without CO_2 emissions—making them a game-changer for decarbonization.

Transforming energy, redefining possibilities

Industrial heating accounts for a significant portion of global energy use, and heat pumps offer a way to reduce both costs and emissions. By lowering primary energy consumption, they help industries cut operating expenses while providing a stable, reliable heat supply. At the same time, they support the integration of renewable energy sources, helping to balance power demand in the grid. With the ability to scale from individual facilities to entire cities, these systems offer a future-proof solution—one 50 MW heat pump alone can provide heat for up to 100,000 households.

60–300°C

temperature range

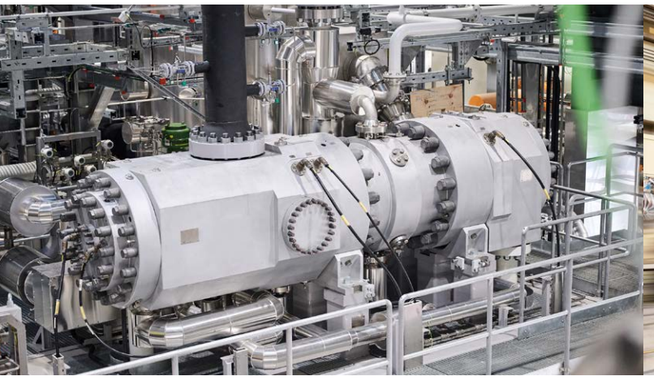


Fig.1: HOFIM® Heat Pump core unit

Fig.2: Integrally geared compressor

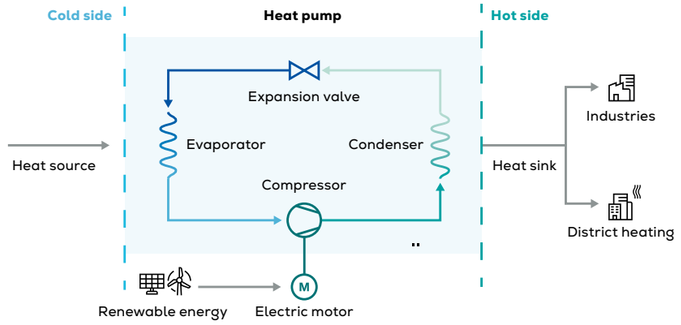


Fig.3: Schematic showing principles of heat pump operation

A smart choice for industries and cities

From district heating networks to energy-intensive industries, Everllence's mega heat pumps are setting new standards in efficiency, sustainability, and operational flexibility. As businesses and cities look for ways to decarbonize, this technology is already making a measurable impact—offering a reliable and scalable path toward a low-carbon future.

Refrigerants

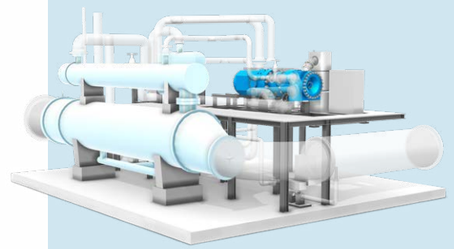
To meet different application and regulatory needs, Everllence heat pumps operate with a range of refrigerants. Our TCC systems benefit from the use of CO_2, a non-toxic option with low environmental impact. Depending on the setup, we also use natural refrigerants like ammonia or synthetic alternatives such as R1234ze – each offering specific advantages in terms of safety, performance, and efficiency.

Benefits at a glance

- Reduce CO_2 emissions to net zero
- Most efficient use of renewable energies
- Access opportunities for ancillary services and revenues
- Long-term cost savings
- Provide heating and cooling
- Reduce complexity of centralized heat generation
- Enhanced use of waste heat/heat sources
- Very good ratio of power input to heat output, also known as coefficient of performance (COP)

Read more →

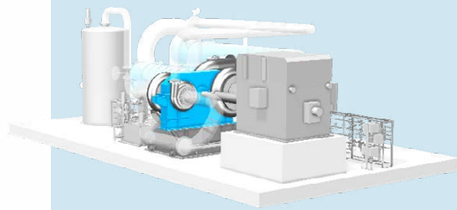
To meet different industrial needs, Everllence heat pumps operate using two advanced thermodynamic cycles:



Transcritical Compression Cycle (TCC) – Ideal for Hot Water

Designed to generate hot water (up to 150 °C) while maximizing energy efficiency.

Explore our TCC factsheet →



Vapor Compression Cycle (VCC) – The Key to Steam Production

Converts excess heat into high-quality process heat or steam (up to 300 °C).

Explore our VCC factsheet →

Mega heat pumps **for district heating**

The demand for sustainable urban heating is rising as cities look for ways to cut CO_2 emissions and reduce reliance on fossil fuels. Large-scale heat pumps offer the perfect solution– delivering clean, efficient heat and are economically and reliable at the same time.

Unlike traditional systems, mega heat pumps run on electricity instead of fossil fuels, making them a powerful tool in the fight against climate change.

When powered by renewable electricity, heat pumps deliver heat with zero emissions, aligning perfectly with urban climate goals.These systems are efficient and economically viable, cutting operational costs by reducing primary energy consumption. In addition to providing heat, they can offer cooling solutions during warmer months, ensuring year-round energy efficiency.

Efficient thermal technologies

Whether supplying hot water and steam, ensuring grid stability, or providing simultaneous heating and cooling, these advanced thermal technologies enable a more resilient, cost-effective, and decarbonized energy system.

50

mega heat pumps could cover the heating demand of Tokyo.

Hot water and steam as heat carriers

Most district heating networks around the world rely on hot water as their primary heat carrier, with steam playing a role in select applications. Our heat pump solutions are designed to meet both requirements, scaling precisely to the temperature and power needs of each network – no matter the level of modernization.

Stabilizing the grid

Mega heat pumps can contribute to grid stability by providing balancing power. The transition to renewable energy sources is challenging the grid's stability because renewable energy sources are sometimes volatile and thus raise the demand for balancing power.

Heating and cooling

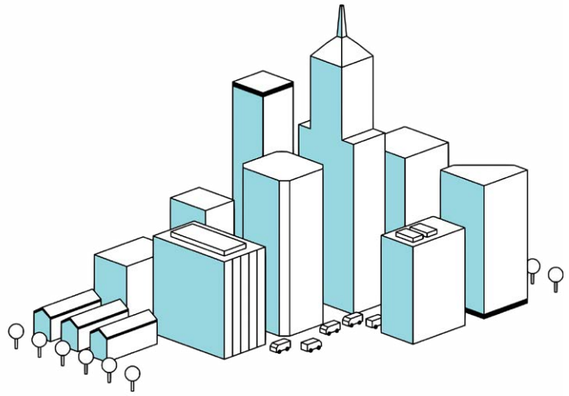
Heat pumps can supply the heating and cooling needed for local residential and industrial or commercial needs. Just like the domestic versions, mega heat pumps need a heat source. In large-scale systems, water from the sea, rivers or lakes can be used. So can sewage and effluent from power plants. Industrial waste heat and geothermal energy can make the process even more efficient and environmentally friendly.

Natural refrigerants

Offering strong performance with minimal environmental impact, natural refrigerants like CO_2, ammonia, or hydrocarbons are ideal for urban and industrial heat pump applications. Their non-toxic and non-flammable properties make them especially safe for use in populated areas. CO_2, for instance, combines excellent heat transfer characteristics with natural availability and low global warming potential – making it a reliable and future-ready choice for sustainable heating and cooling.

Explore our factsheet "Heat pumps for district heating" →

Download our use case Esbjerg →

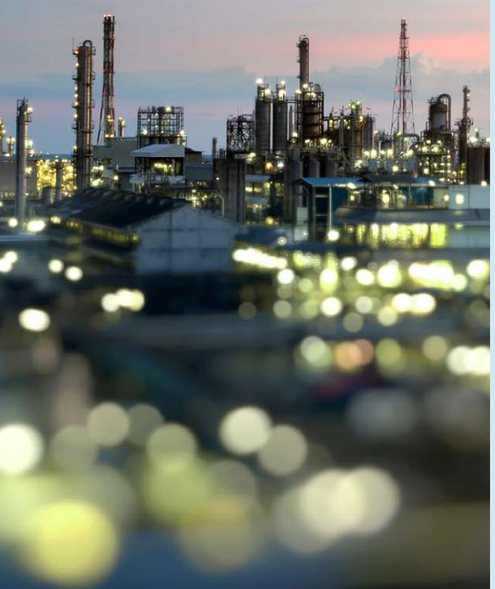


Mega heat pumps **for industrial processes**

Industries like pulp & paper, food & beverage, and petrochemicals rely on high-temperature heat, often produce with fossil fuels. Heat pumps offer a cleaner, more efficient alternative by capturing waste heat and supplying carbon-neutral process steam. This reduces CO_2 emissions, cuts costs, and improves energy efficiency – driving industries toward a sustainable future.

70%

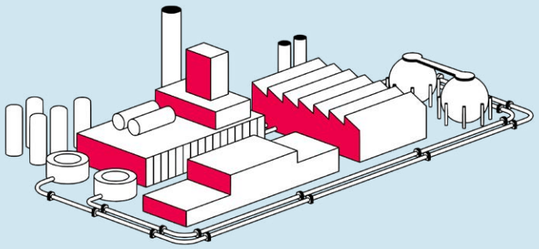
energy savings of heat pumps compared to fossil fuels



Chemical/petrochemical

Everllence heat pumps help the petrochemical industry reduce CO_2 emissions and optimize energy efficiency by transforming waste heat into a valuable energy source. By extracting heat from low-temperature sources such as water, air, or excess process heat, they amplify it to higher temperatures, reducing the need for fossil-fuel-based heating. When powered by renewable electricity, these systems can supply carbon-neutral heating and cooling, cutting both operational costs and environmental impact. With applications ranging from steam production for catalytic cracking and propane dehydrogenation to heating and cooling in industrial processes, Everllence heat pumps provide a flexible, scalable solution tailored to the industry's high-temperature and power demands.

Read more →



Food & beverages

Offering significant advantages to the food and beverage industry, Everllence heat pumps enhance energy efficiency and reduce CO_2 emissions. By capturing and upgrading waste heat from processes such as pasteurization, sterilization, and drying, they provide both heating and cooling solutions, leading to energy savings of up to 70% compared to conventional systems. This dual functionality not only lowers operational costs but also minimizes reliance on fossil fuels, contributing to a more sustainable production process. Additionally, their implementation can result in substantial reductions in CO_2 emissions, supporting global decarbonization efforts and potentially lowering carbon tax liabilities. With the ability to be tailored to specific temperature and power demands, these heat pumps offer a scalable and cost-effective solution for a more efficient and climate-friendly food and beverage industry.

Read more →

Pulp & paper

The pulp and paper industry is one of the most energy-intensive sectors, with heat demand accounting for nearly 70% of its total energy consumption. As the industry moves toward net-zero emissions, the need for efficient, low-carbon heating solutions has never been greater.

By capturing and repurposing waste heat from drying and processing, high-temperature heat pumps provide a sustainable alternative to fossil fuel-based steam generation. This technology enables significant reductions in CO_2 emissions, lowers energy costs, and enhances process efficiency without compromising production quality.When powered by renewable electricity, heat pumps allow pulp and paper manufacturers to fully decarbonize their thermal processes, ensuring compliance with regulatory targets while maintaining long-term competitiveness. With scalable and flexible solutions, they help meet the sector's diverse steam and heat requirements, making them a key driver of sustainability and energy efficiency in pulp and paper production.

Read more →

Explore our factsheet "Heat pumps for industrial processses" →

Interplay of **many benefits**

Increase your COP up to

3-7

By connecting energy flows across sectors, mega heat pumps can maximize efficiency, reduce emissions and costs and open up new untapped business areas. Their ability to recover and reuse excess heat enhances flexibility, stabilizes renewable energy use, and supports the transition to a more sustainable energy system.

As industries and cities move toward more efficient and sustainable energy solutions, mega heat pumps play a crucial role in integrated energy systems. By electrifying heat production and utilizing renewable energy sources, heat pumps reduce reliance on fossil fuels and enable a low-carbon, circular energy system. Additionally, their ability to provide both heating and cooling enhances grid flexibility and energy storage potential, making them a key driver in stabilizing energy supply and demand. In combination with energy storage solutions and smart grid technologies, heat pumps create a resilient, future-proof energy system that minimizes waste and maximizes efficiency.

Sector coupling for a holistic future

Sector coupling connects electricity, heating, cooling, and transport to create a more flexible and efficient energy system. By linking industrial heat demand, district heating networks, and mobility, energy efficiency improves while reducing fossil fuel dependency. The ability to bridge multiple sectors not only lowers costs and optimizes energy use but also accelerates the shift to a more interconnected energy economy.

Maximize efficiency with waste heat recovery

Waste heat represents one of the largest untapped energy sources in industrial processes, with up to 29% of industrial energy demand currently lost as waste heat. Heat pumps enable the recovery and reuse of this thermal energy, transforming it into high-value process heat, district heating, or cooling applications. Industries such as steel, chemicals, food & beverage, and petrochemicals benefit significantly from this approach, as it reduces CO_2 emissions, lowers operational costs.

Thermal energy storage ensures stability

Energy storage is essential for making power generation more flexible, efficient, and climate-friendly. Thermal systems allow heat pumps to store hot or cold water for later use in district heating, industrial processes, or cooling – ensuring reliable supply even when demand or renewable generation fluctuates. Everllenceoffers a broad portfolio of storage technologies that support decarbonized energy management:

- Thermal energy storage
- Electricity storage
- Compressed air energy storage (CAES)
- Liquid air energy storage (LAES)
- Molten salt energy storage (MOSAS)

Grid balancing

Large-scale heat pumps can play a crucial role in stabilizing the electricity grid. By acting as flexible energy consumers, they help balance fluctuations in supply and demand caused by volatile renewable sources like wind and solar. This enhances grid reliability and opens up new revenue opportunities for plant operators.

Reactive power compensation

Large-scale heat pumps can support voltage stability by providing reactive power to the grid. This improves power quality, reduces strain on infrastructure, and helps maintain efficient grid operation – especially in systems with a high share of renewables.

Explore our whitepaper "Stabilizing the grid with industrial heat pumps" →

Download the whitepaper "Sector coupling with mega heat pumps" →

Download the factsheet "Reactive power compensation" →

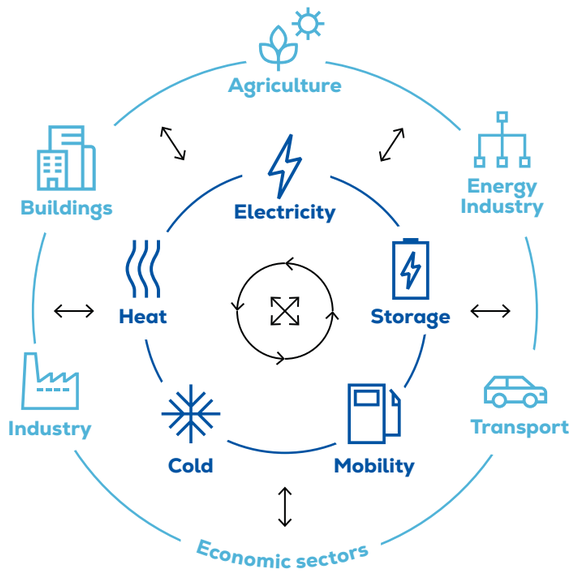
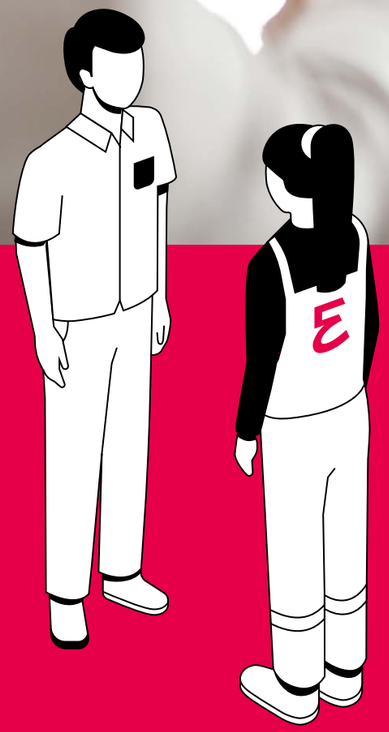


Fig.5: Future integrated energy system



Deploying large-scale heat pumps is a strategic decision with far-reaching impact. Everllence combines deep industry insight with engineering and consulting expertise to help you plan, decide, and implement with confidence.

Consultants of the **energy future**

Strategic consulting for a new energy era

Deploying large-scale heat pumps opens the door to powerful new business opportunities. With decades of experience in energy systems, Everllencesupports you in taking the right next steps – with clarity, precision, and confidence. From feasibility and financing to

Tailored to your goals

Whether you want to stabilize the grid, scale sustainable heat supply, or boost operational efficiency, we align our consulting services with your strategic goals. Our experts support you in identifying the best path forward – backed by technical insight, market knowledge, and regulatory understanding.

Turning complexity into clarity

Integrating heat pumps at scale means navigating many technical and structural parameters. We help you connect the dots – from system design to planning and approvals – and make informed decisions based on facts, foresight, and proven best practices.

Your partner – every step of the way

We don't just advise, we enable. With deep implementation expertise and a global engineering network, we help you translate plans into projects that are robust, future-ready, and economically sound.

Let's talk

Looking to move forward with confidence? Our consultants are here to help you define the right approach, optimize efficiency, and future-proof your operations.

Talk to our experts →

Industries

Keeping you ahead with our **digital solutions**

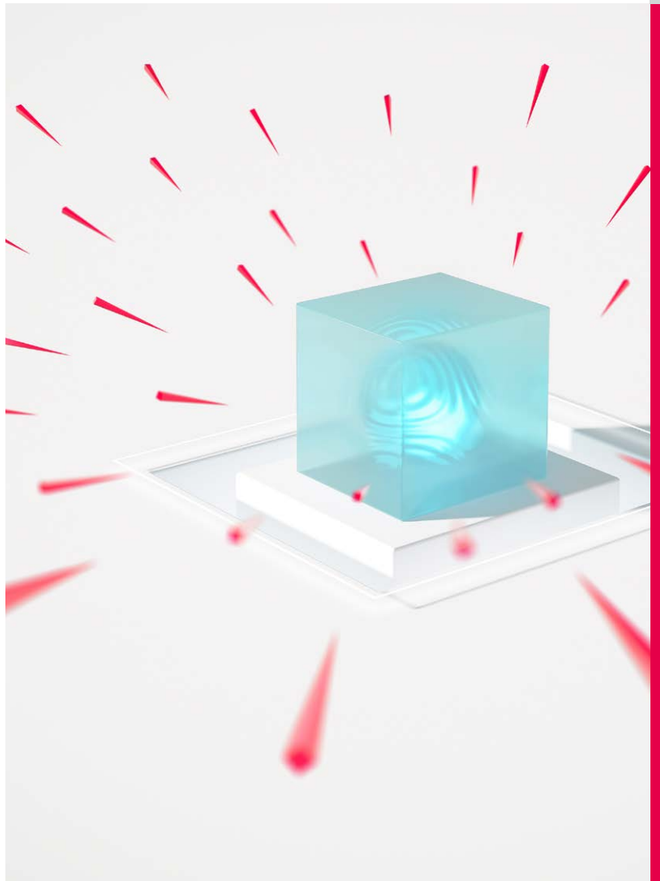
In a time of rapid technological advancement and digital transformation, Everllence is pioneering digital solutions for the entire life cycle of industrial heat pump systems. This innovation will transform design, commissioning, and management of heat pump packages, delivering unmatched efficiency and customer value.

24

hours a day

365

days a year



The digital layer is what transforms heat pump technology from powerful to game-changing. With decades of energy expertise and a full suite of digital tools, Everllence helps you run your system smarter – ensuring 24/7 availability, maximum efficiency, and future-proof reliability. Furthermore future autonomous operation will change the profile of industrial heat pump installations and set a new benchmark for the entire sector.

Connecting insights to impact
We turn complex data into actionable insights. Our digital services monitor all critical components of your system and translate performance data into clear, real-time recommendations – helping you reduce downtime, improve response times, and optimize day-to-day operation.

System visibility – anytime, anywhere
Thanks to our integrated IPC platform and centralized dashboards, you can access key system data from anywhere in the world. Whether on-site or remote, you get full transparency over your energy system – enabling fast decisions, predictive planning, and easy reporting.

Digital solutions that evolve with your needs
Our modular applications adapt as your system grows. Whether you're scaling your heat pump operation, integrating energy storage, or adding sector coupling capabilities, our flexible software modules expand with your needs and help maximize return on investment.

Cybersecurity by design
Digital control requires digital trust. That's why our ecosystem includes built-in cybersecurity features that protect your assets and your network – minimizing risks, ensuring compliance, and keeping your operation safe from external threats.

Always on, always ready
With global 24/7 availability and remote support, our digital solutions keep your system online – no matter when or where. Our intelligent diagnostics and predictive maintenance strategies ensure you stay a step ahead, avoiding costly downtime and running at peak performance.

Learn more →

From vision to operation

Heating an entire city: Esbjerg

Esbjerg, Denmark, is going coal-free with Everllence's large-scale heat pump solution, supplying 280,000 MWh of green heat and reducing CO_2 emissions by 120,000 tons annually.

Read more →

RheinEnergy & Everllence heating Cologne

Europe's largest river water heat pump (150 MW) will supply 50,000 homes with climate-neutral heat from the Rhine, saving 100,000 tons of CO_2 annually and replacing fossil fuel use.

Read more →

World's largest air-water heat pump: Helsinki

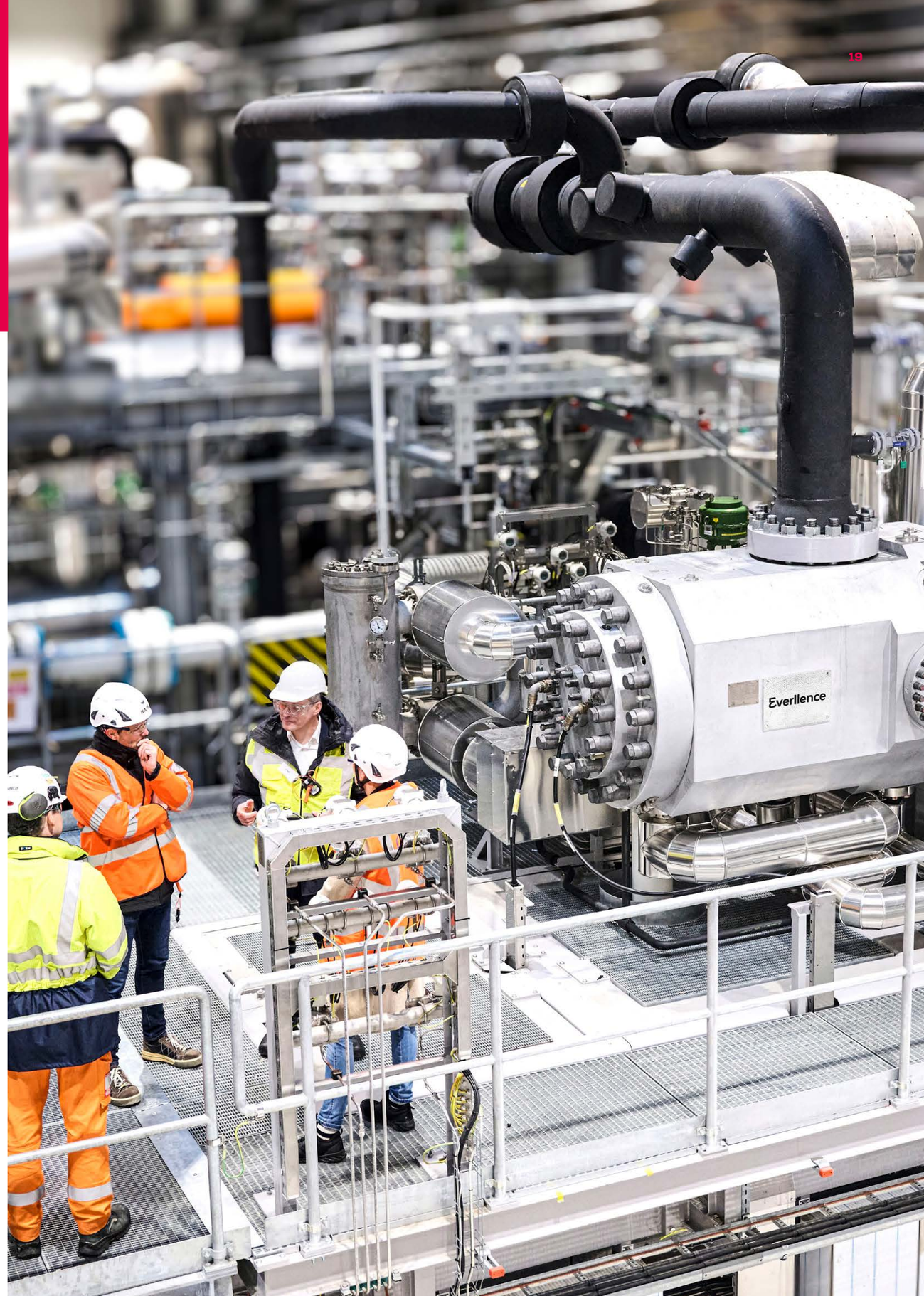
A 33 MW Everllence heat pump in Helsinki uses ambient air and CO_2 refrigerant to provide 200 GWh of heat per year – cutting 26,000 tons of CO_2 and supporting 30,000 homes.

Read more →

Pioneering clean steam in Boston

Vicinity Energy is installing a 40 MW Everllence heat pump in Cambridge, MA – the largest of its kind in the U.S. Powered by renewables and river water, it will supply fossil-free steam to Boston's district network.

Read more →



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MAN Energy Solutions SE has been renamed to Everllence SE and its products are being rebranded from “MAN” and/or “MAN Energy Solutions” to “Everllence”. As this is an ongoing process, any reference to “MAN” and/or “MAN Energy Solutions” is actually a reference to “Everllence”.

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