Heat Upgrade technologies (HUTs)

What are they?

Heat Upgrade Technologies (HUTs)

HUTs capture and transform low-grade waste heat from industrial processes into valuable thermal energy. These technologies enhance energy efficiency and reduce CO2 emissions, by upgrading process heat at a higher temperature than the waste heat they recover.

Energetic & Environmental Benefits

Fossil Fuel Reduction

Over 95% of industrial heat demand is currently met by burning fossil fuels. HUTs reduce dependency on these fuels, contributing to energy independence.

Market Potential

An estimated 6,361 industrial HP units per year could be utilized, assuming a 30% share of waste heat use, carbon taxes at €80/tonne CO2, and rising energy prices.

CO2 Emission Reduction

The industrial sector accounts for a quarter of global energy system CO2 emissions. Implementing HUTs helps lower emissions and supports climate neutrality targets.

Heat Pump Potential

For applications between 0–200 °C, heat pump (HP) technologies can supply up to 730 TWh annually, covering 37% of industrial process heat demand in Europe.

Energy Efficiency

Recovering and upgrading waste heat increases energy efficiency, providing a significant step towards industrial decarbonization.

Scan to learn more!

Which types exist?

Closed Systems

Electrically Driven Heat Pumps: Use electrically driven compressors to convert waste heat into usable energy, boosting efficiency and cutting costs. They offer versatility and precision, suitable for diverse industrial applications.

Thermally Driven Heat Pumps (Heat Transformers): A heat transformer makes possible the heat upgrade of a process stream by means of chemical or sorption processes. Around 50% of the waste heat input is converted into upgraded heat, the rest needs to be rejected at lower temperature.

Open Systems

Mechanical Vapour Recompression (MVR): Utilises a compressor to increase the pressure of low-pressure vapour, raising its temperature. This high-pressure vapour then transfers heat to processes needing higher temperatures.

Thermal Vapour Recompression (TVR): Employs a high-temperature motive fluid, such as steam, to drive a jet ejector. This compresses low-pressure vapour from waste heat, elevating its temperature. TVR is simpler than MVR but requires a high-temperature motive fluid source.

Push2Heat

PUSH2HEAT is an EU-Funded project that aims at addressing the technical, economic, and regulatory barriers that prevent heat upgrade technologies to be widely deployed. It is doing so by scaling up four different heat upgrading technologies to optimise their efficiency and economic performance. In addition, it is focusing on integrating them into the relevant industrial sectors such as the paper and chemical industries.

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