

Press release

Vienna, July 6th, 2021

Industrial heat pumps for a climate-neutral European industry

- AIT presents the results of the EU research project DryFiciency
- Piloted and tested in industrial applications at AGRANA, Wienerberger and Scanship
- Use of industrial waste heat creates enormous potential for energy efficiency and the reduction of CO₂ emissions

On 6 July 2021, Timur Gül, Head of the Energy Technology Policy Division of the International Energy Agency (IEA), opened the final online conference of the five-year EU research project DryFiciency and underlined the potential of industry to massively reduce emissions through the use of new technologies.

Under the scientific lead of the AIT Austrian Institute of Technology, the first industrial high-temperature heat pumps were put into operation and tested in an industrial environment in three different application areas at AGRANA, Wienerberger, and Scanship in Norway. The three demonstrators showcased the use of heat pumps as an alternative to conventional fossil natural gas for many industrial drying processes. The technology developed shows in the first tests running across Europe that heat pumps can deliver process heat of up to 160 °C. Compared to natural gas, heat pumps have the potential to increase energy efficiency by up to 80 per cent, reduce CO₂ emissions by up to 80 per cent and also cause up to 20 per cent less production costs.

Wolfgang Hribernik, Head of Center for Energy at the AIT Austrian Institute of Technology: “In the future, heat pumps will be an essential element of the energy infrastructure, also in an industrial context. The EU research project shows the enormous potential for waste heat recovery from industrial drying processes. Demonstration projects such as DryFiciency show how industrial processes can be made more efficient by using waste heat and strengthen trust in this new technology through scientific monitoring.”

Norbert Harringer, CTO and Member of the Management Board of AGRANA Group: “Climate protection is undoubtedly one of the most important challenges of our time. AGRANA is committed to CO₂-neutral production. It is clear that this requires an action plan with ambitious but realistic milestones. Specifically, this means that AGRANA will invest around EUR 10 million annually through 2025 to save 25% of the greenhouse gas emissions caused by our production and to reduce them to net zero by 2040. The DryFiciency project is also a building block in our climate strategy for achieving our emissions targets.”

Johannes Rath, CTO at Wienerberger Building Solutions: “Sustainability has always been at the core of the Wienerberger world. As a leading provider of smart solutions for the entire building envelope and infrastructure, we want to implement innovative solutions in a targeted manner. As part of the DryFiciency research project, together with AIT, we were able to set another milestone in the direction of decarbonisation of the brick industry and create a prime example of how innovations from research can be brought to market quickly. In the future, we will be able to save up to 80% of the energy in the drying processes, while at the same time reducing CO₂ emissions by up to 80% and thus also significantly reducing production costs.”

Pål Jahre Nilsen, Vice President Innovation, Scanship: “Normally we would use some 900,000 kWh worth of heat to evaporate 1 ton of water, in this site, with the challenging

materials we are using, we can go down to 300,000 kWh. This is key to making a sustainable and economically viable process.”

New heat pump technology for drying processes

The use of heat pumps is already widespread in residential buildings, but not in industry. Here, the technology is in the early phase of market diffusion. "With heat pumps, previously unused waste heat can be reintegrated into the process. However, most industrial processes require process heat at a high temperature, so in DryFiciency we developed heat pumps that deliver up to 160°C," explains Veronika Wilk, project manager and senior research engineer at the Center for Energy, AIT Austrian Institute of Technology. As part of DryFiciency, three demonstration projects were carried out in the field of industrial drying, as drying processes are very energy-intensive and offer enormous potential for increasing energy efficiency with high-temperature heat pumps.

"With over 6,500 hours of equipment operation in industrial environments, DryFiciency has demonstrated the benefits of high-temperature heat pumps in industrial processes. The technology we have developed can be used in many industrial sectors, such as paper, food and the chemical industry, and can be integrated into existing plants. The recovery of unused waste heat significantly reduces the need for fossil fuels, leading to the decarbonization of processes," summarizes Wilk.

Wienerberger brickworks in Uttendorf, Austria

Wienerberger AG, the largest brick producer in the world, operates around 200 brick dryers. A high temperature heat pump was integrated in the brickworks in Uttendorf (Upper Austria), which supplies heat for the drying process. In brick production, the bricks are first formed, dried and then fired. The drying process takes place in a continuous tunnel dryer. A thermally driven heat pump uses the hot air from the kiln and the moist exhaust air from the dryer to supply hot water at 90°C for the dryers. The DryFiciency heat pump sits on top of the thermal heat pump and provides hot air at up to 160°C for the last zone of the dryer, where even higher temperatures are needed. The DryFiciency demonstrator thus acts as an amplifier for the thermally driven heat pump and has already completed more than 3,500 operating hours.

AGRANA Stärke GmbH in Pischelsdorf, Austria

The second DryFiciency high temperature heat pump is located at AGRANA in the wheat starch factory in Pischelsdorf (Lower Austria). AGRANA is a global player in the three segments of fruit, starch and sugar, specializing in the processing and refinement of high-quality agricultural raw materials. The innovative DryFiciency heat pump technology enables temperatures of up to 160°C, which are required to remove water in a wheat starch drying process. The DryFiciency heat pump demonstrator has completed more than 3,300 operating hours with a maximum heat output of around 350 kW. The demonstrator provides up to 10% of the heat demand of the dryer, internal calculations show annual energy savings of 3200 MWh and CO₂ savings of up to 600 tons per year.

Scanship in Norway

The third demonstrator, coordinated by the Norwegian research organization SINTEF, is an open circuit heat pump system, also known as the Mechanical Vapor Recompression (MVR) system, which uses water as a refrigerant in steam drying processes. During this demonstration, Scanship is drying biomass at the Lindum waste disposal facility near Oslo. The Norwegian demonstrator shows improvements in the efficiency and capacity of the dryer of almost 100 percent. More than 100 tons of biomass have so far been dried with the system, now additional operating hours are used to optimize and validate the system.

About DryFiciency

DryFiciency is a five-year Innovation Action project funded by Horizon 2020 Research & Innovation Framework Program. The consortium consists of 13 partners, including two research institutions, five SMEs, five large industrial companies and an industry association,

and deals with the particular challenge that resource and energy-intensive industry currently generates considerable amounts of waste heat. Energy and fuels represent between 20% and 40% of the production costs in several of these industries and produce large amounts of CO₂ emissions. DryFiciency aims to improve energy efficiency by designing, building, testing & demonstrating high temperature heat pump systems applicable to these industries.
<http://dryficiency.eu>

DryFiciency project partners

AIT Austrian Institute of Technology GmbH, AGRANA Stärke GmbH, Bitzer Kühlmaschinen GmbH, Chemours Deutschland GmbH, European Heat Pump Association (EHPA), EPCON Evaporation Technology AS, Fuchs Europe Schmierstoffe GmbH, Heaten A/S, Rotrex A/S, RTDS Group, Scanship A/S, SINTEF, Wienerberger AG

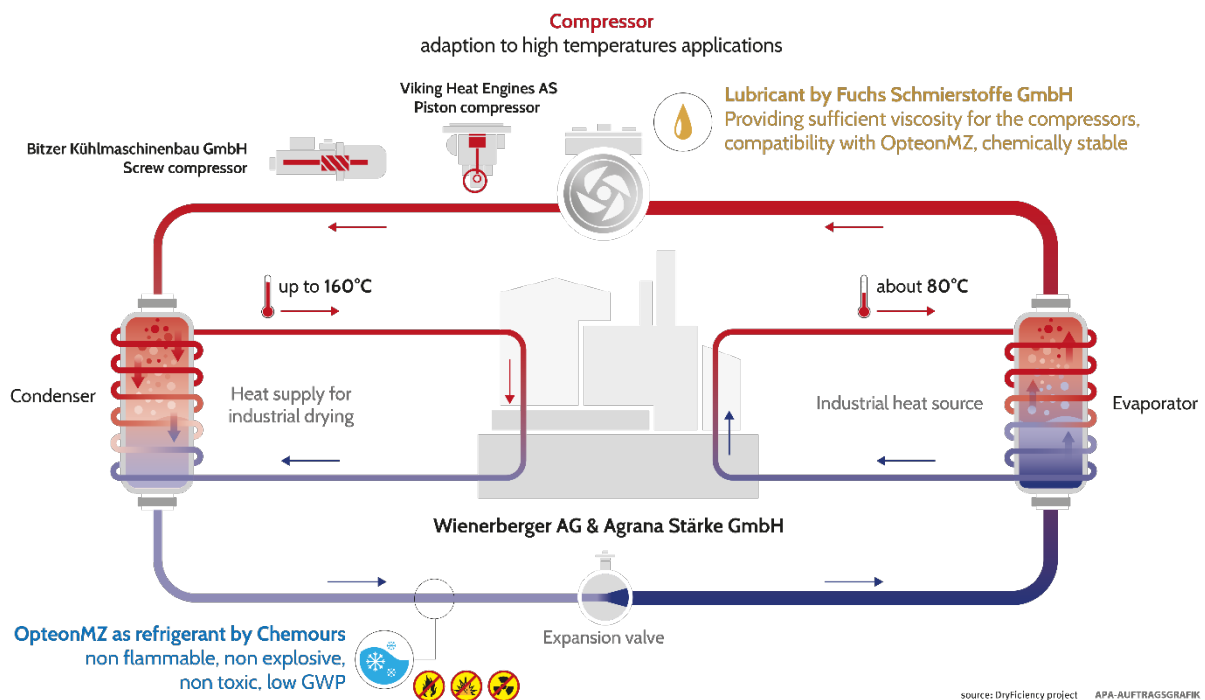
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Press photos:

The diagram shows the two DryFiciency heat pumps in a closed circuit: The heat pump is integrated into air drying processes that are currently heated with natural gas. Waste heat from other drying processes is available at both industrial sites. Thus, heat recovery water circuits serve as a heat source for the two heat pumps. © AIT/APA Auftragsgrafik





BU: DryFiciency high-temperature heat pumps were commissioned in three applications and tested in an industrial environment. System at Wienerberger AG in Uttendorf © AIT / Schneeberger



BU: DryFiciency high-temperature heat pumps were commissioned in three applications and tested in an industrial environment. Plant at AGRANA Stärke in Pischelsdorf. © AGRANA



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