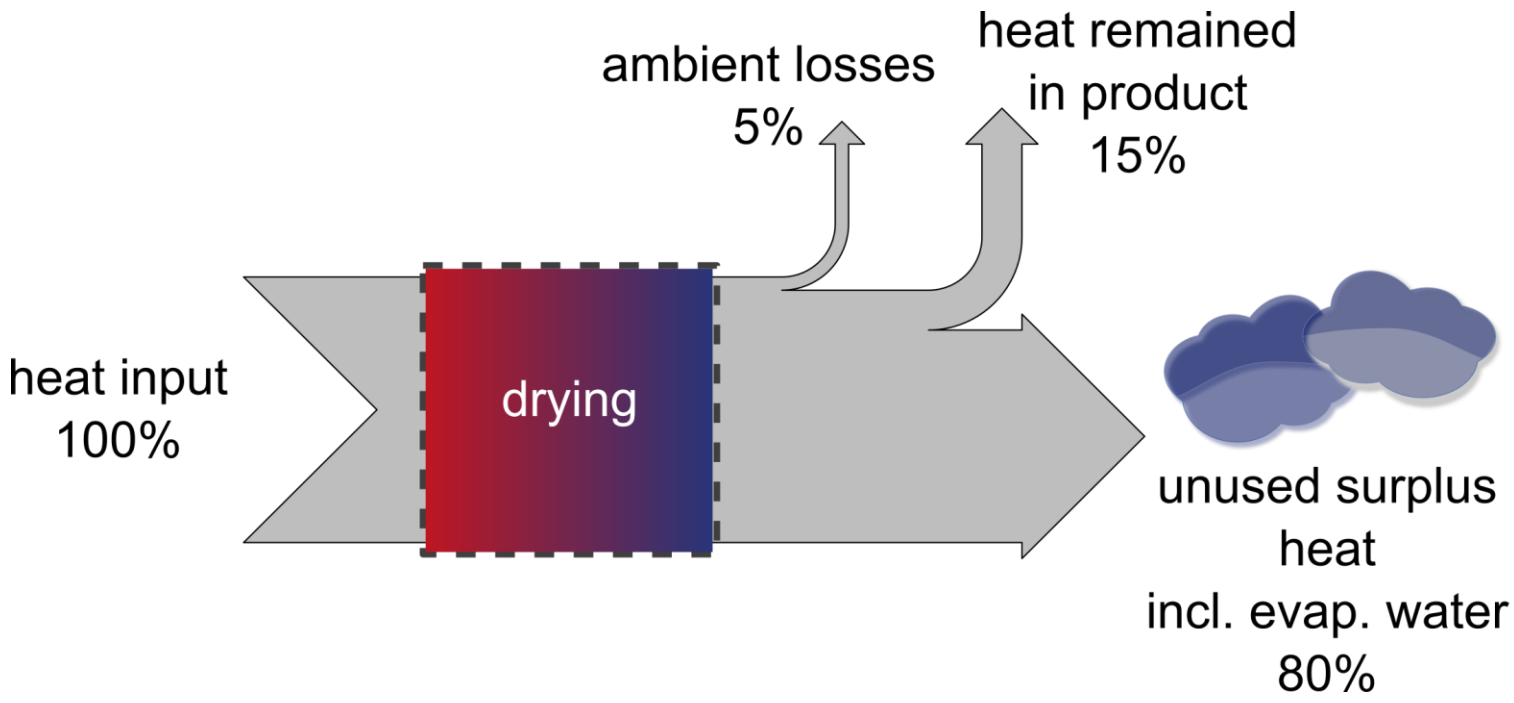
Industrial Drying:

DryFiciency as a research-to-market innovation using high temperature heat pumps

V. Wilk
AIT Austrian Institute of Technology GmbH

Challenge



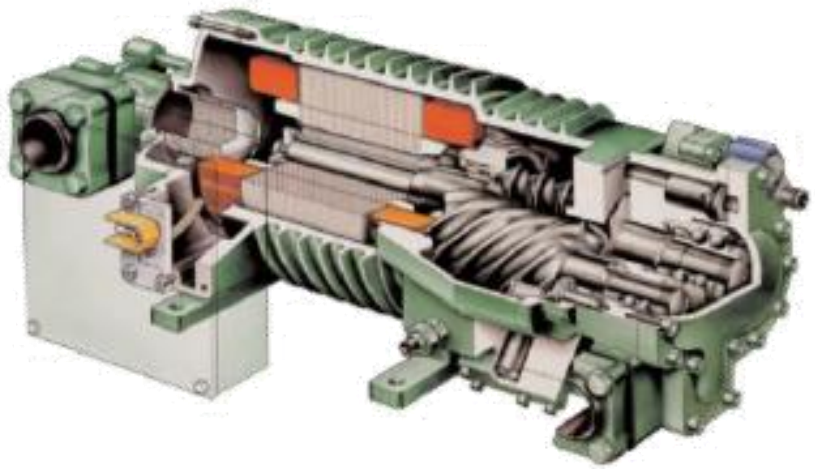
Drying & dehydration processes

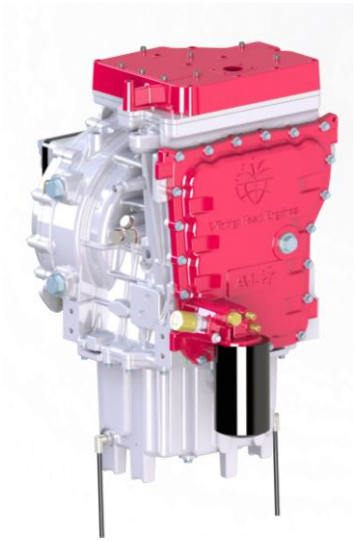
- wide-spread in a number of industries
- primarily fossil-fired
- large volumes of low grade waste heat
- large potential to increase energy efficiency

Grant Agreement No 723576 – Energy Efficiency

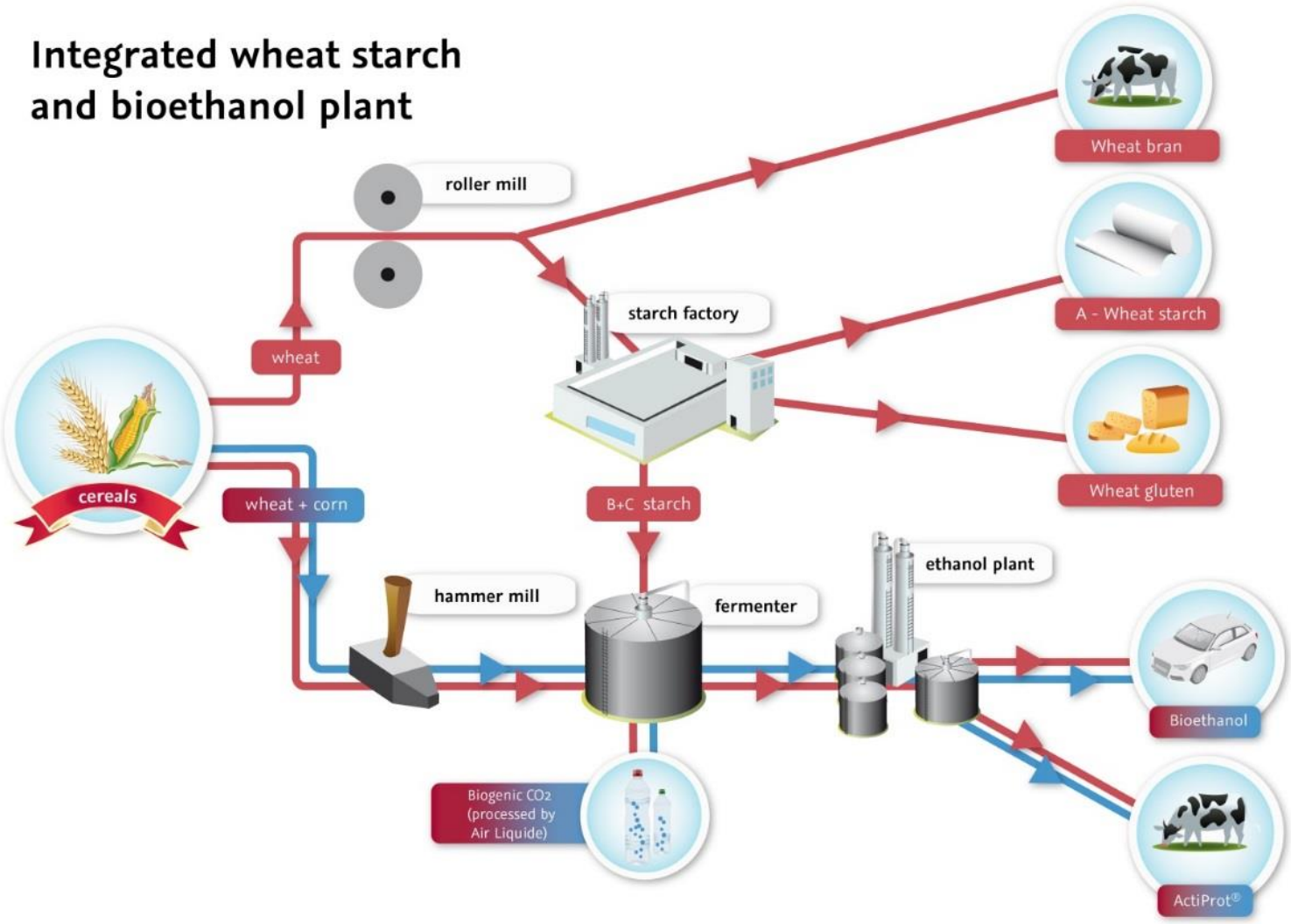
Objectives

- develop and demonstrate heat pumps in three industrial drying processes with heat supply temperatures up to 160 °C
- two **closed loop heat pumps** for air drying processes
- one **open loop heat pump** for steam driven drying processes





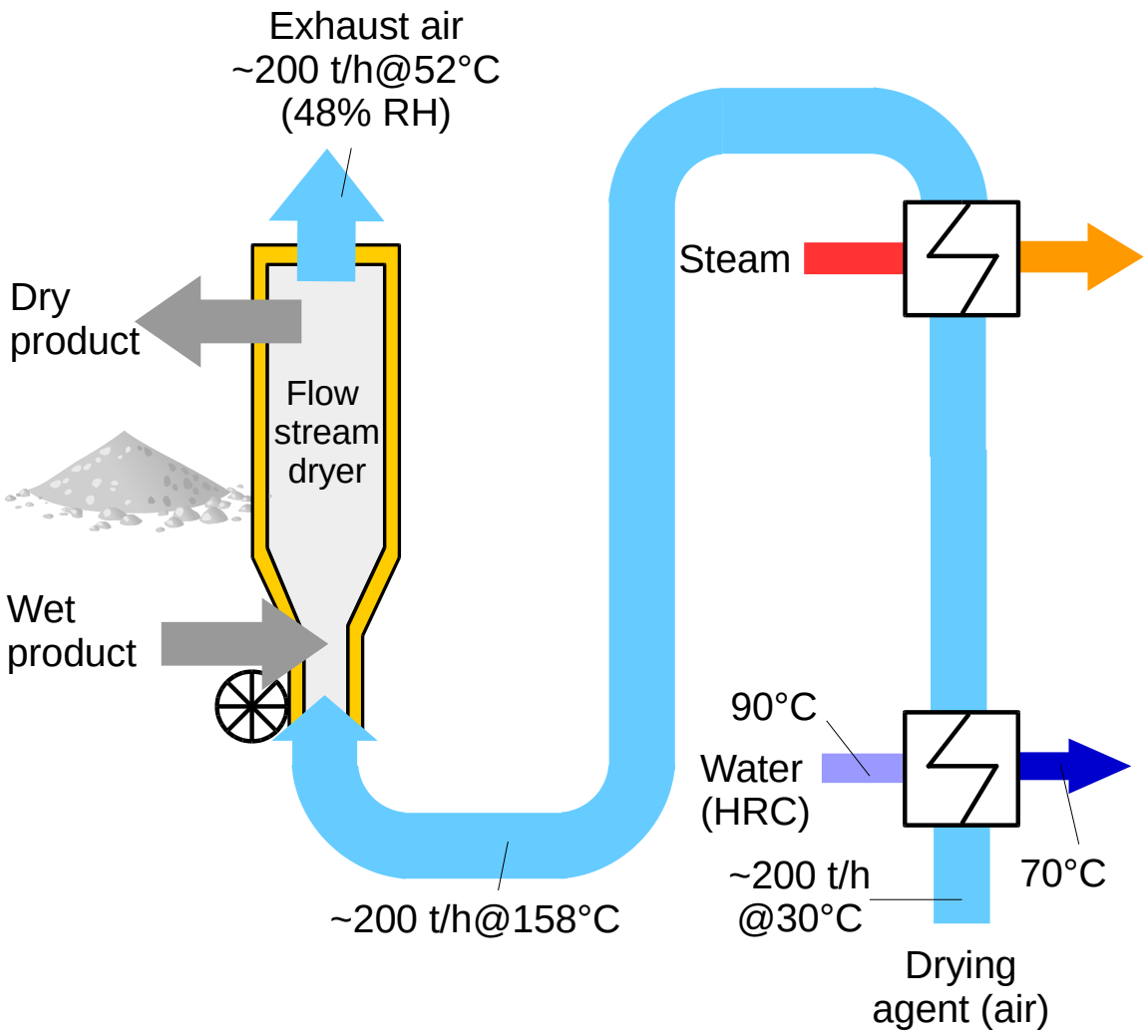
AGRANA: Starch drying



http://www.agrana.com/fileadmin/inhalte/agrana_group/photos/Weizenstaerke-_und_Bioethanolproduktion_ENGLISCH_END.jpg

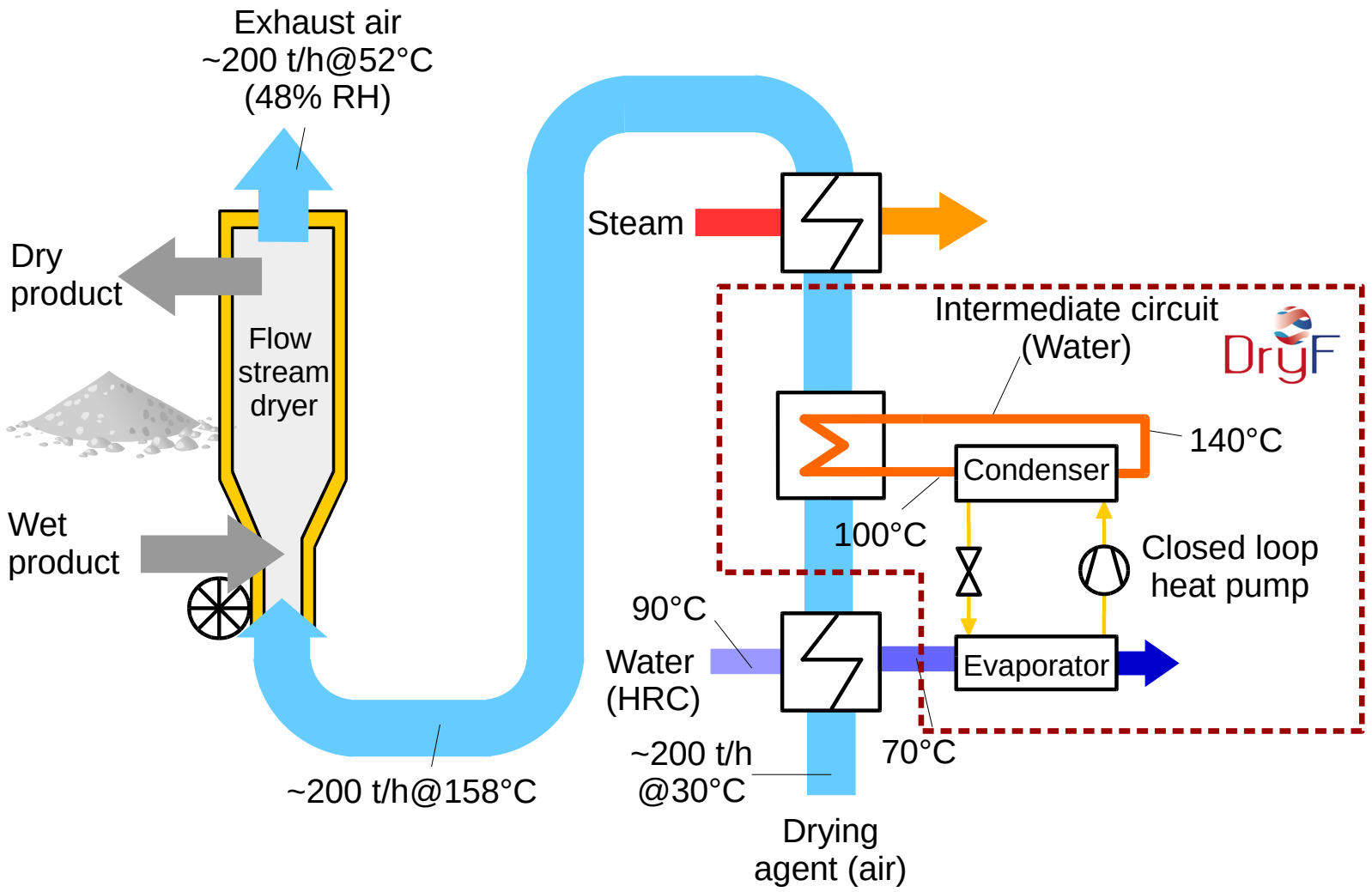
Grant Agreement No 723576 – Energy Efficiency

AGRANA: Conventional dryer



Grant Agreement No 723576 – Energy Efficiency

AGRANA: Dryer with heat pump



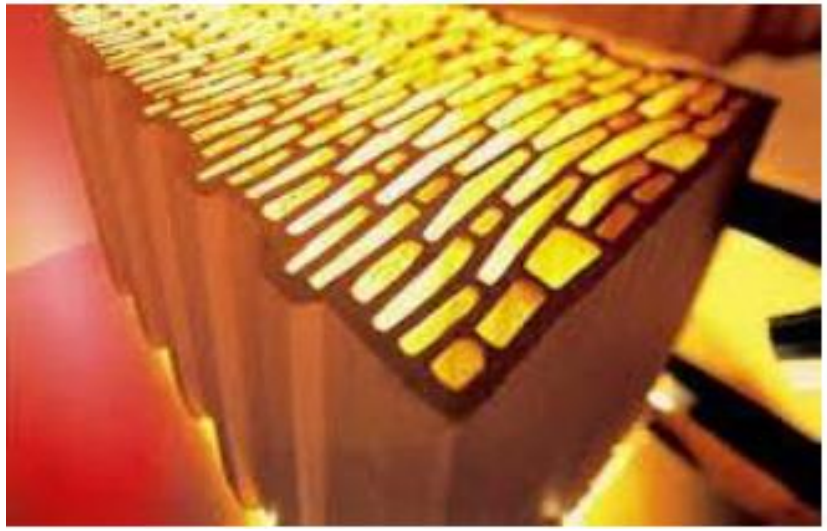
Grant Agreement No 723576 – Energy Efficiency

Demo sites for the closed loop heat pumps

STARCH

AGRANA Stärke GmbH
Pischelsdorf (AUT)

BRICKS

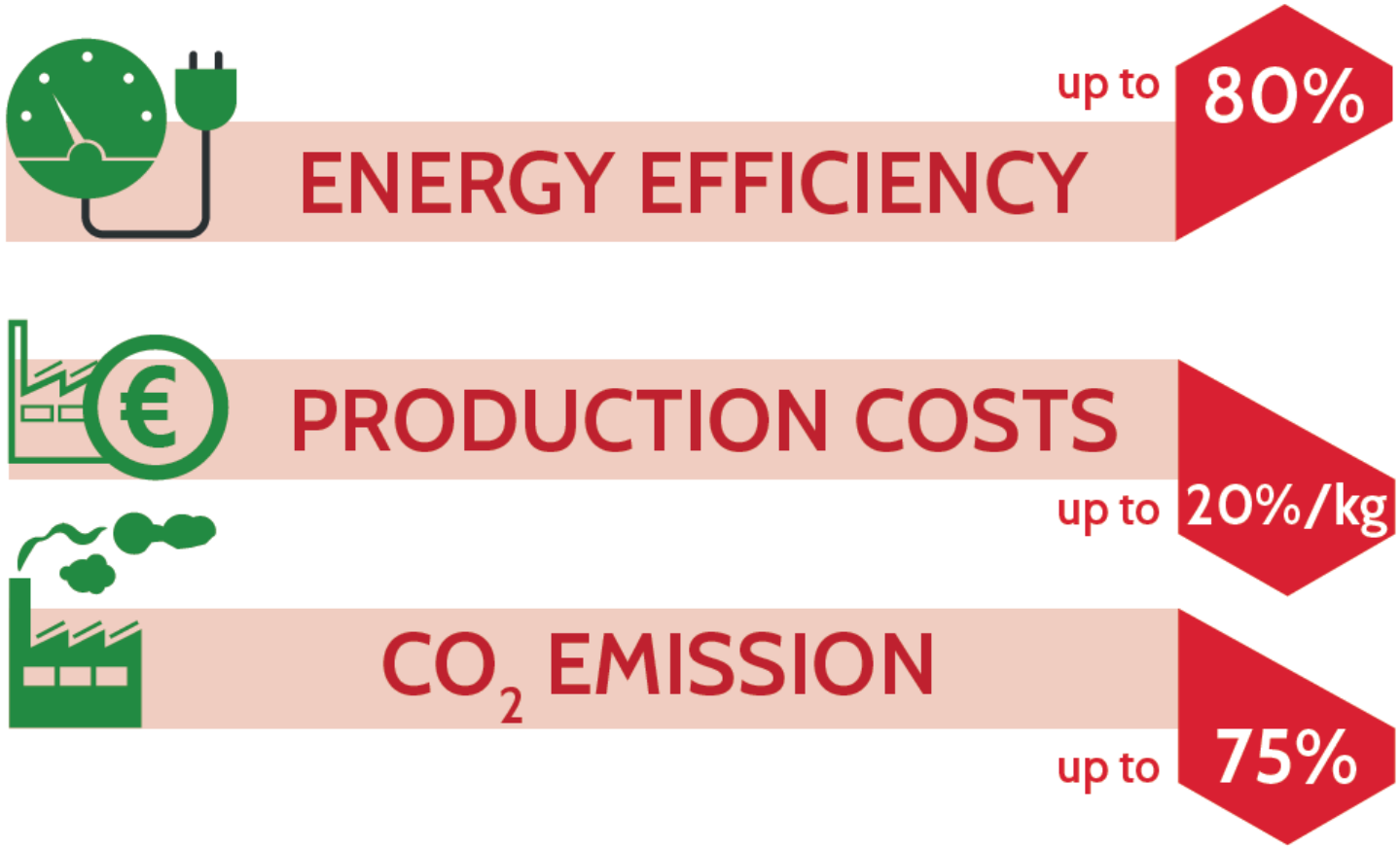


Wienerberger AG
Uttendorf (AUT)

Integration and commissioning starts in May 2019

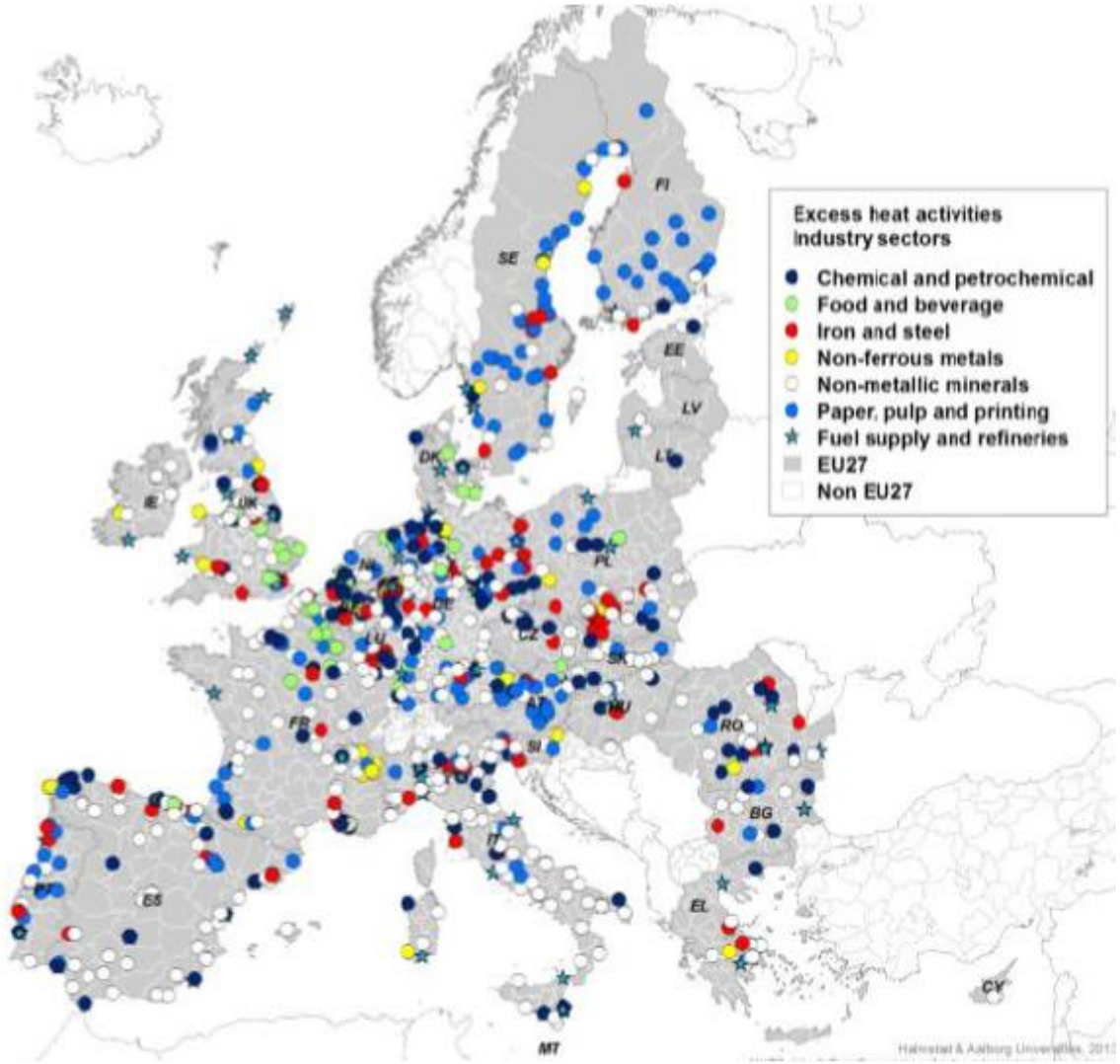
Grant Agreement No 723576 – Energy Efficiency

Key goals



Grant Agreement No 723576 – Energy Efficiency

DryFiciency – vast market potential



Connolly et al. (2013). Heat Roadmap Europe 2: Second Pre-Study for the EU27. Department of Development and Planning, Aalborg University

Grant Agreement No 723576 – Energy Efficiency

Where to use heat pumps in industry?

Heat sources:

- waste heat from chillers:
  ca. 30°C
- waste heat from process cooling (cooling water): ca. 50°C
- waste water:
  20 – 40°C, also contaminated
- off gas:
  60 – 80°C, humidity, contaminated

Heat demand:

- process water: 50 – 80°C
- steam: 105 – 210°C
- hot air
- air preheating
- feed water preheating
- district heat: 60 – 120°C

Capacity:

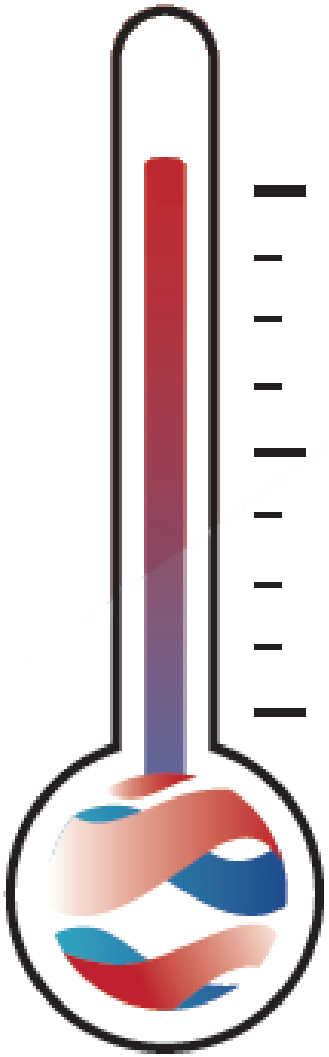
- up to the MW range

Grant Agreement No 723576 – Energy Efficiency

Conclusions

- industrial heat pumps turn waste heat into valuable process heat
- increase on-site efficiency and contribute to decarbonization
- solution of technological challenges for high temperature applications essential, such as
  - suitable refrigerants
  - temperature resistant materials and components
- expectations of the industry
  - high availability and reliability
  - short payback periods
- industrial heat pumps allow for economic and environmental benefits
- industrial heat pumps are in an early phase of market diffusion and there is a large application potential

Grant Agreement No 723576 – Energy Efficiency



Email us:
dryficiency@ait.ac.at

Visit www.dryficiency.eu
and sign up to our **Newsletter**
to stay updated.

Follow us on **LinkedIn** and
Twitter:

Dr. Veronika Wilk
Center for Energy
Sustainable Thermal Energy Systems
AIT Austrian Institute of Technology GmbH
Giefinggasse 2, 1210 Vienna, Austria
veronika.wilk@ait.ac.at

Grant Agreement No 723576 – Energy Efficiency