

# Heat pump demonstrator at AGRANA wheat starch dryer in Pischelsdorf, Austria

High temperature heat pumps in energy intensive  
industries: demonstration plants  
21<sup>st</sup> April 2021

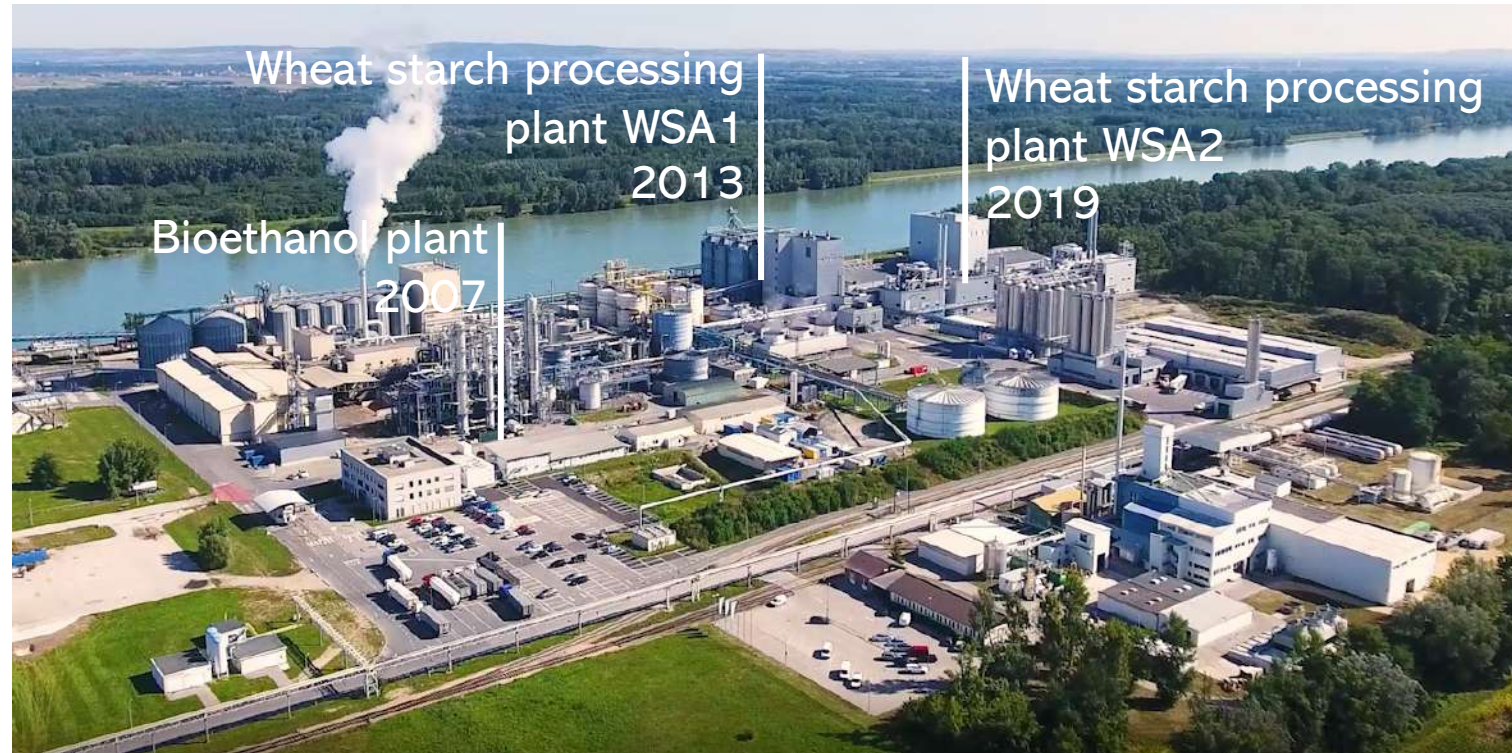
AGRANA Stärke GmbH  
Thomas Laminger










Grant Agreement No 723576 – Energy Efficiency-  
Innovation Action H2020-EE-2016-2017



# AGRANA Biorefinery, Pischelsdorf



-  250.000 m<sup>3</sup> bioethanol
-  80.000 t biogenic CO<sub>2</sub>
-  260.000 t wheat starch
-  50.000 t wheat protein
-  170.000 t ActiProt®
-  100.000 t ActiGrano®
-  10.000 t bran

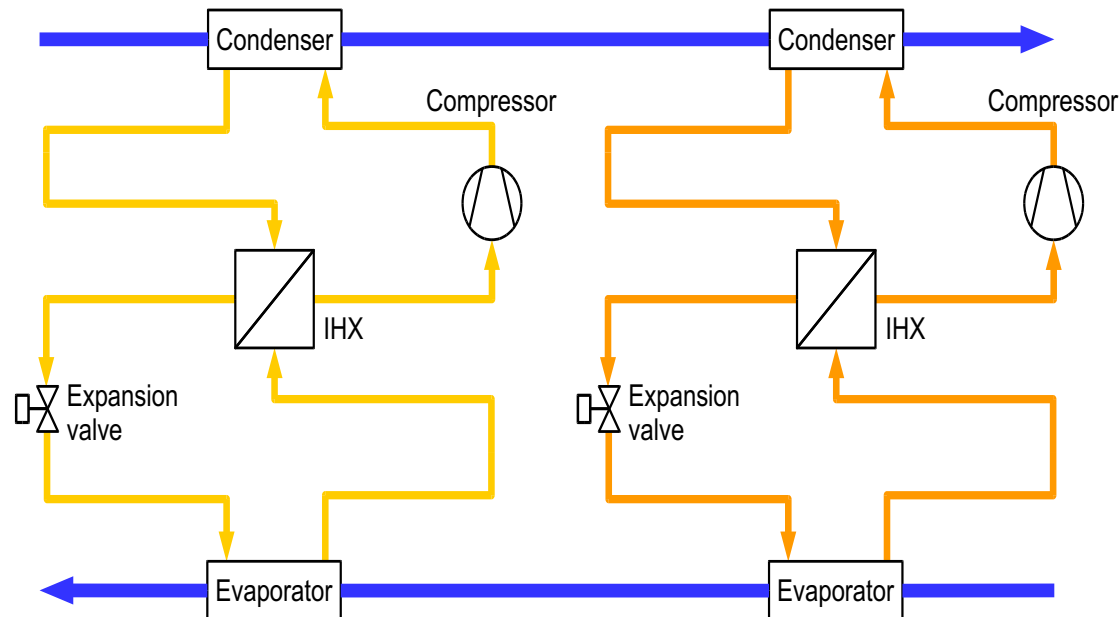
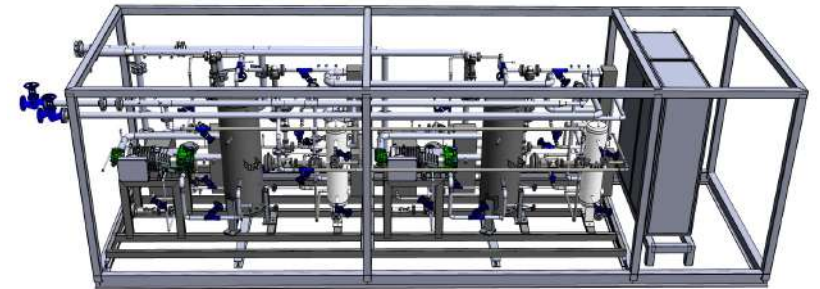
# Heat pump demonstrator – Starch dryer WSA1

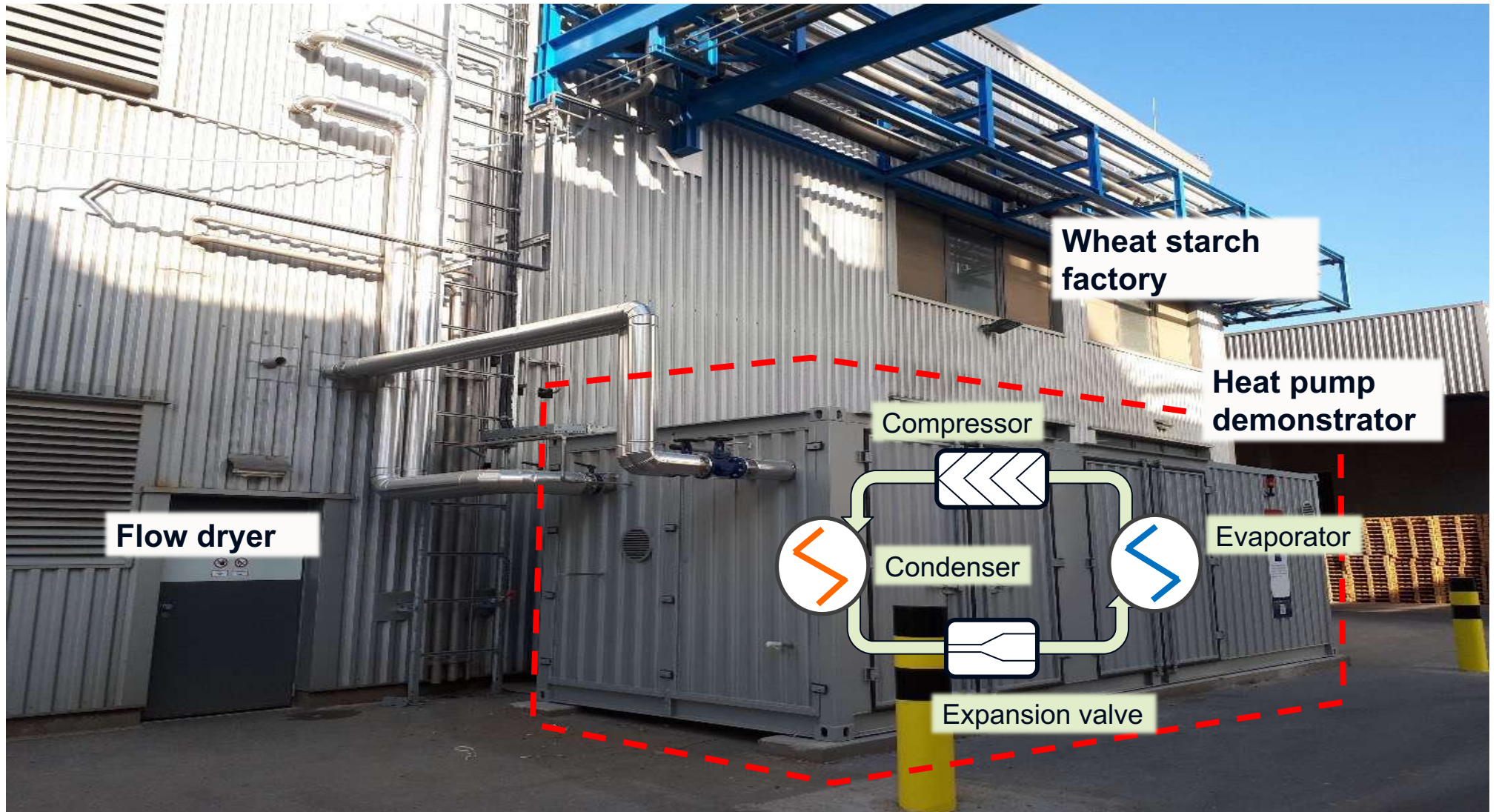
- Container outside the starch dryer WSA1
  - Start of installation September 2019
  - Start of commissioning May 2020
  - Trial test until August 2020
  - Ongoing performance optimization
  
- Design parameters
  - Heating capacity of appr. 400 kW  
(appr. 10% of the starch dryer's heat demand)
  - The heat supply temperatures are in the range of 110 - 160 °C.
  - COP up to 4
  
- Integration
  - Heat source: heat recovery circle (water)
  - Heat sink: drying air

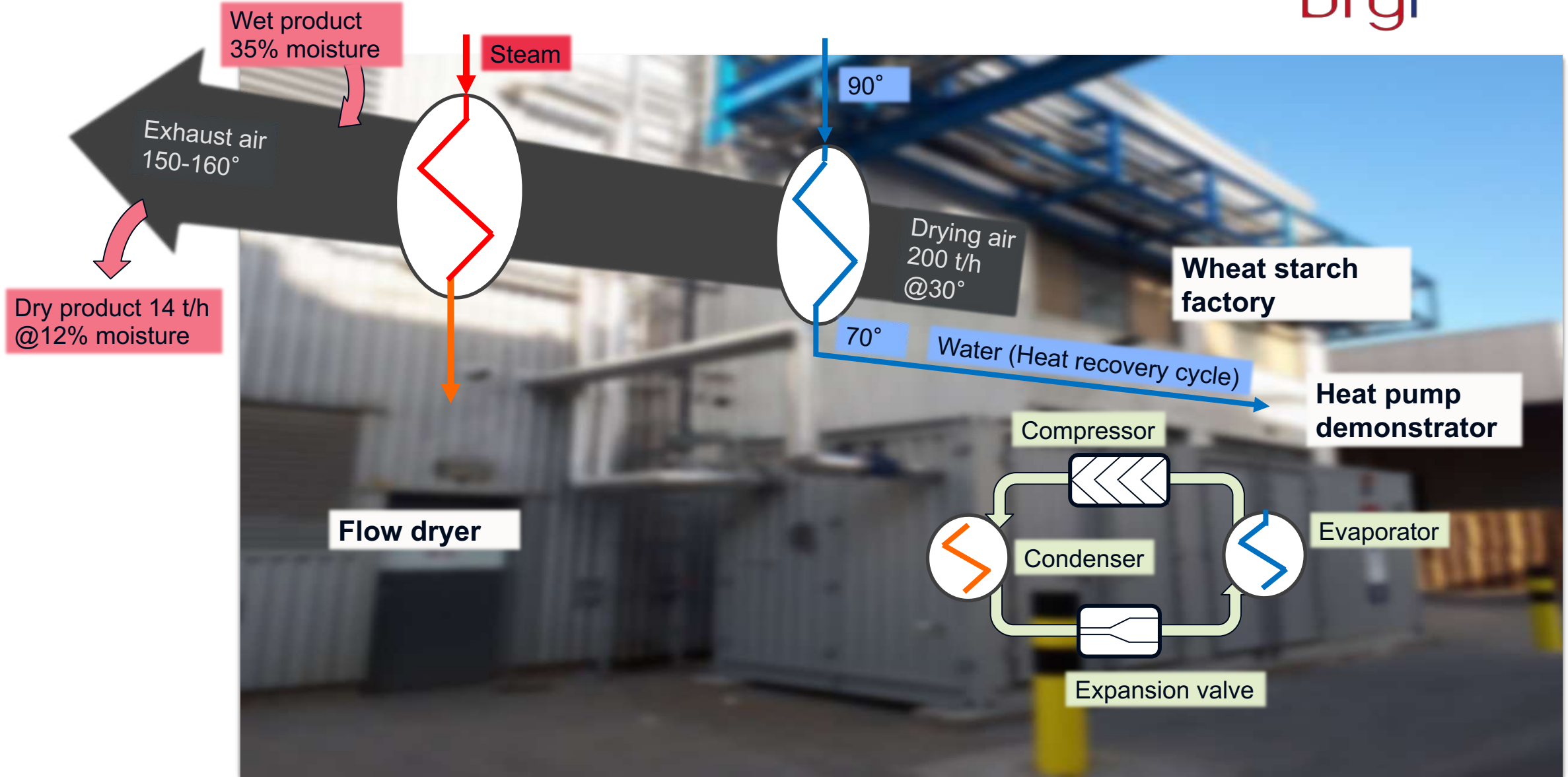


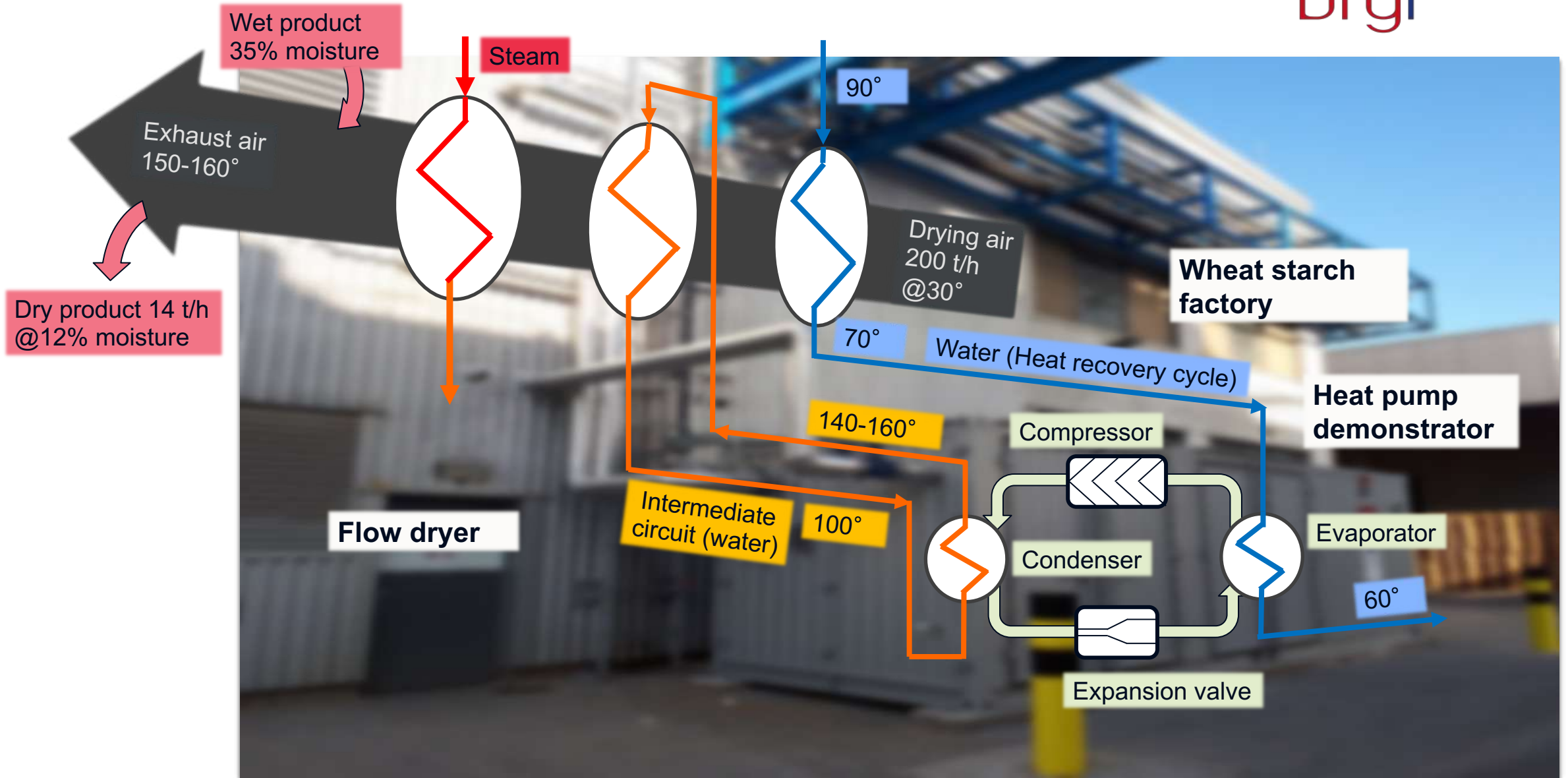
# Closed loop heat pump cycle

- Variable configuration (twin-cycle source parallel or serial)
- Refrigerant OpteonMZ™ by Chemours
- 2 screw compressors (Bitzer)



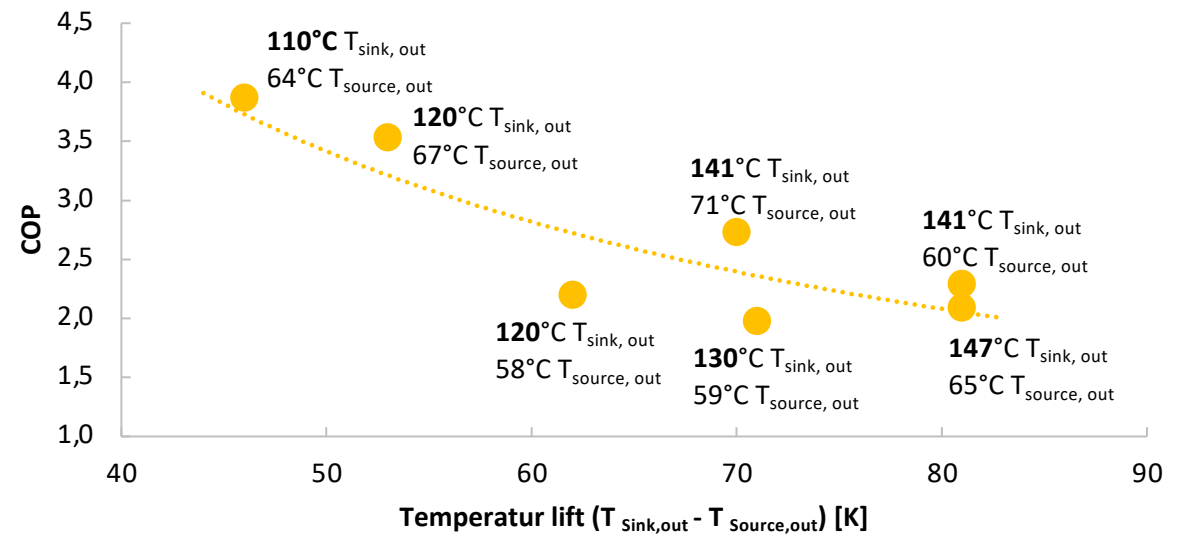
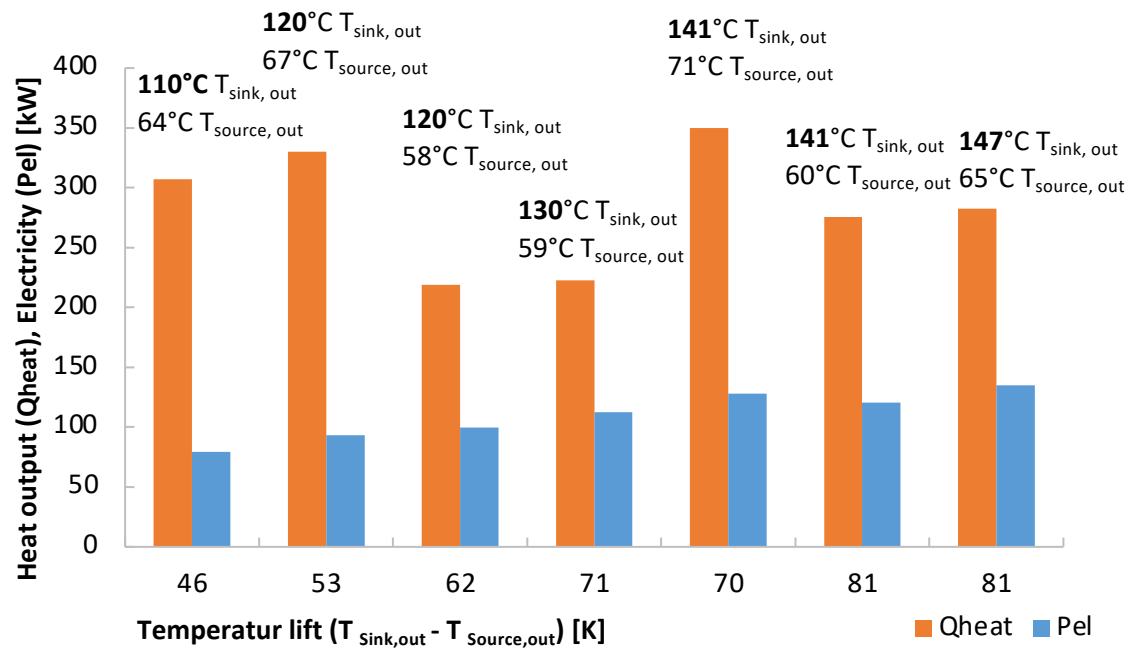
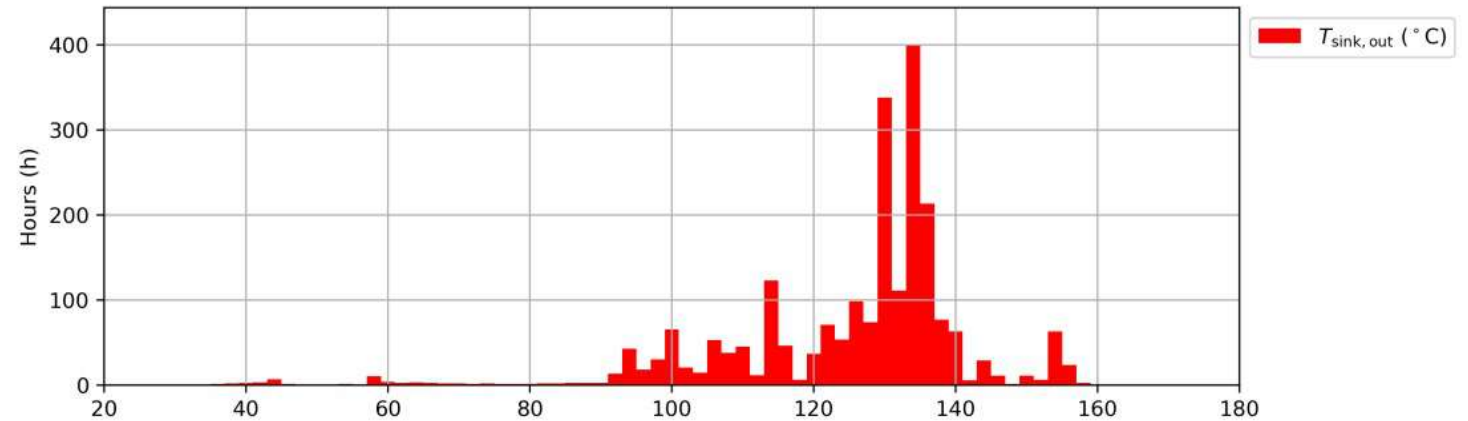






# Performance

- ~2300h Operation hours
- max. heat output ~350kW
- COP between 2-4
- Varying source temperature

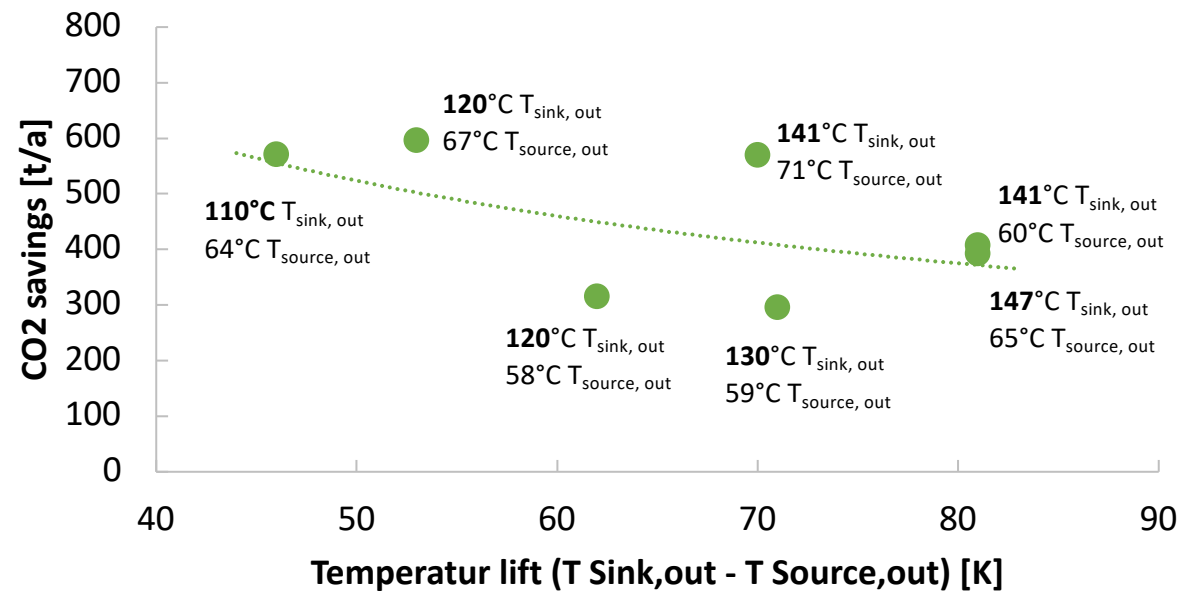




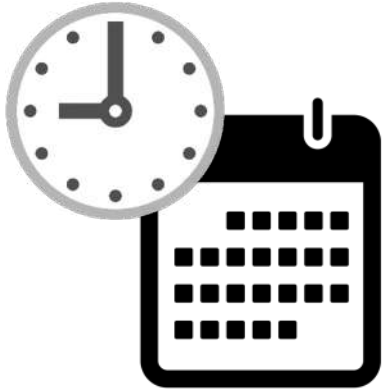
# Performance

- Annual CO<sub>2</sub> savings up to 600 t

Operation hours: 8280 h/a  
 CO<sub>2</sub>-Factors: 271kg/MWh Natural gas;  
 258 kg/MWh Electricity (Austrian Mix)  
 [Umweltbundesamt 2019]



## Time schedule



Ongoing optimization in cooperation with AIT, AMT and ENERTEC.

The demo phase until August 2021 will be split in thirds:

- providing the heat supply temperature of the design point with different operation conditions and
- providing the heat supply temperature close to the design point with different operation conditions.
- more challenging conditions at the operational limits of the heat pump