

INDUSTRIAL HEAT PUMPS IN AUSTRIA

Status, case studies, potentials

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EFFICIENT PROCESSES WITH WASTE HEAT RECOVERY

106 EJ
industrial energy
consumption
worldwide (2012)

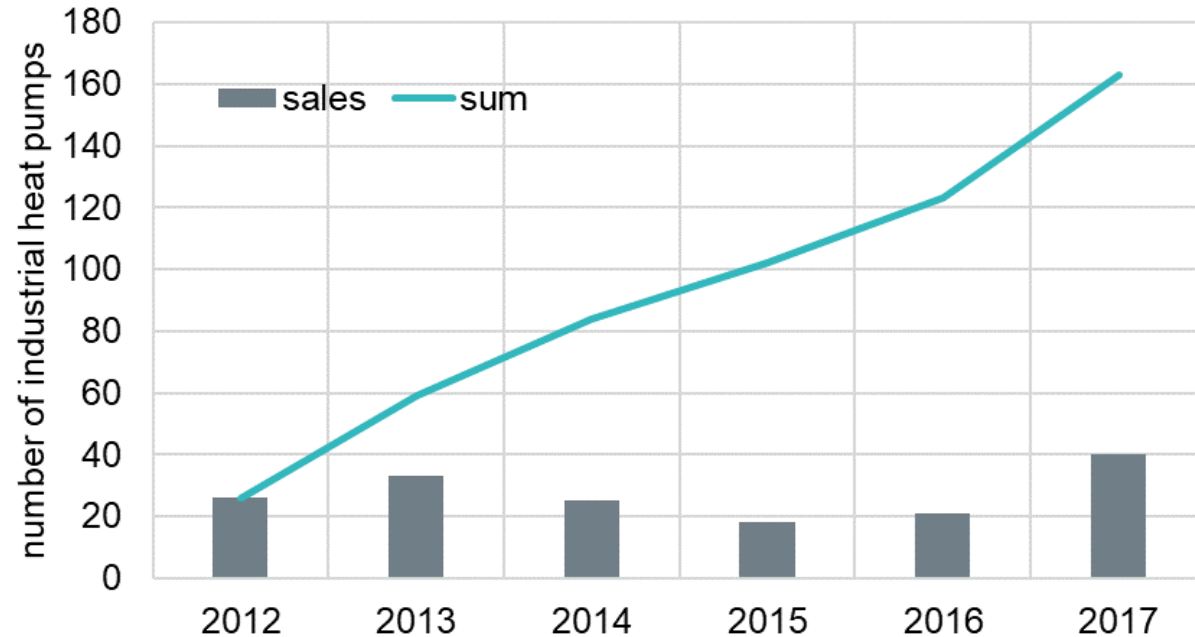


52 EJ = 49% utilization

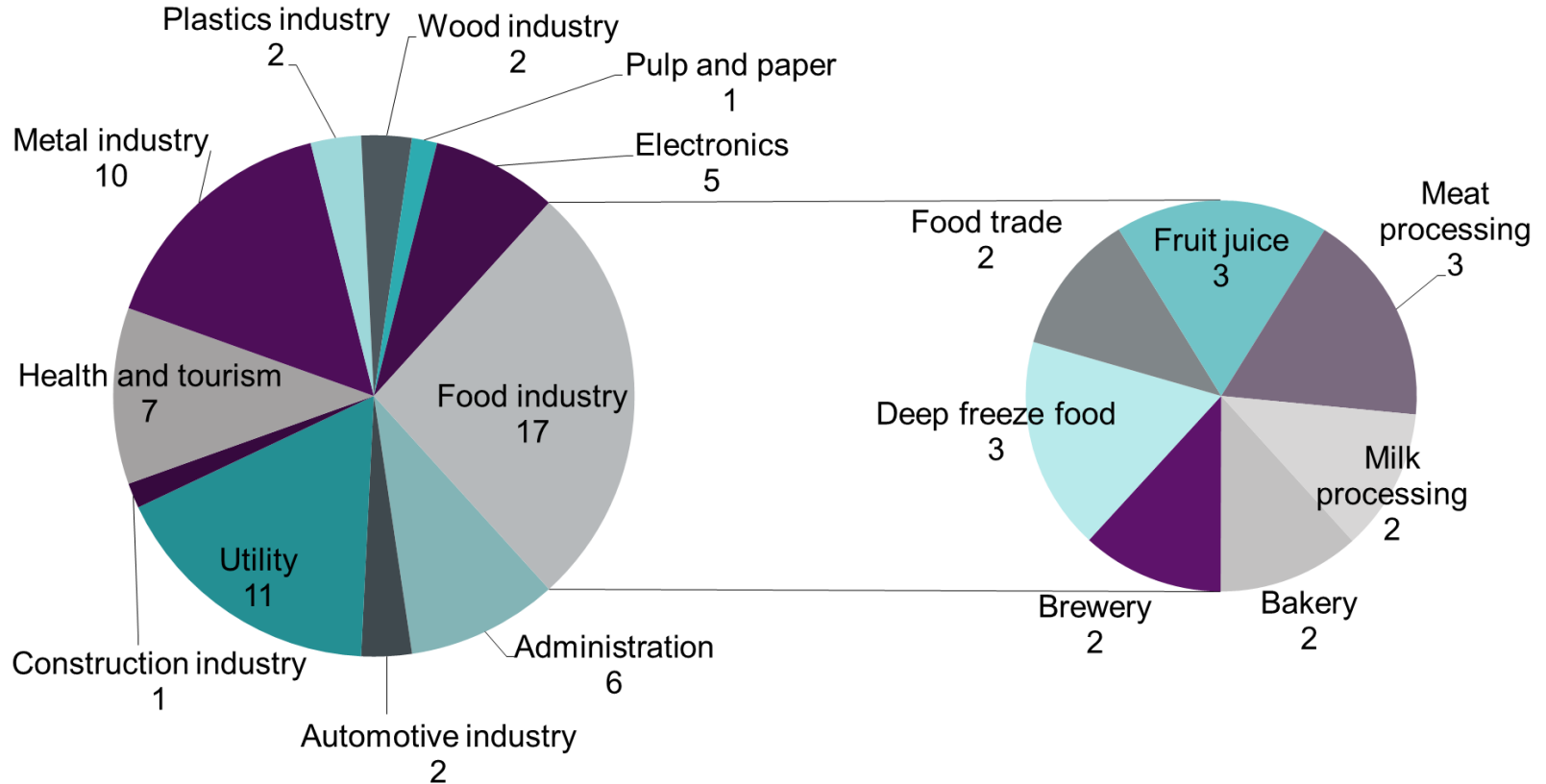
54 EJ = 51% losses

waste heat in waste water and off-gases
radiation, friction, resistance, etc.

INDUSTRIAL HEAT PUMPS IN AUSTRIA

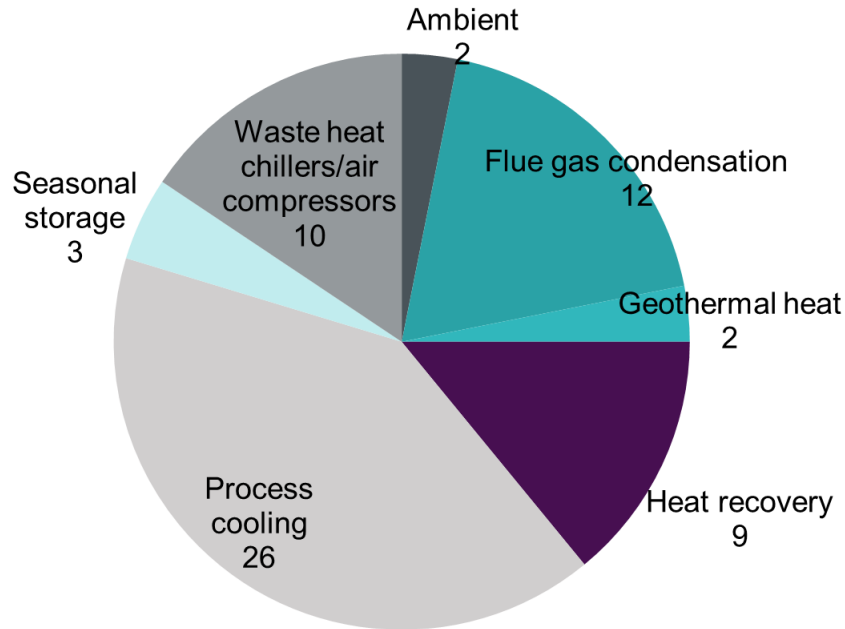


64 CASE STUDIES

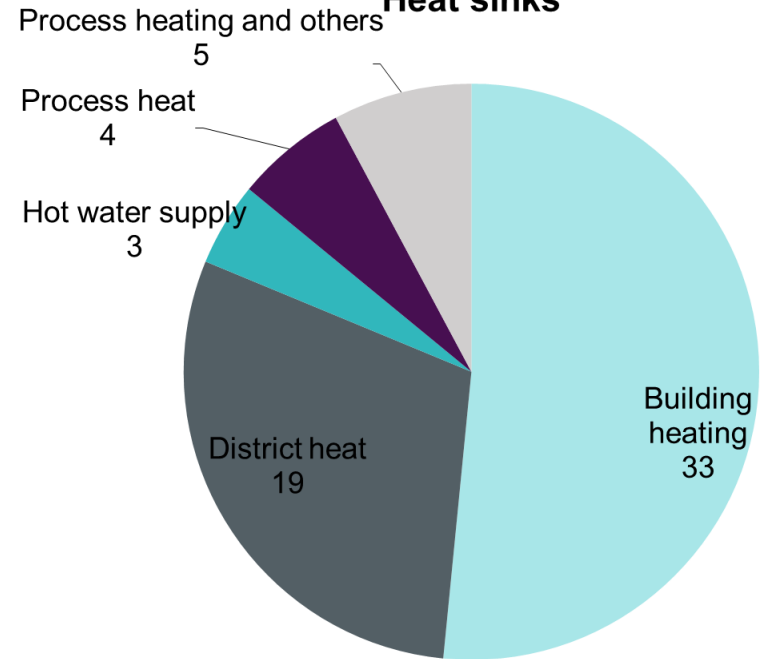


HEAT SOURCES AND SINKS

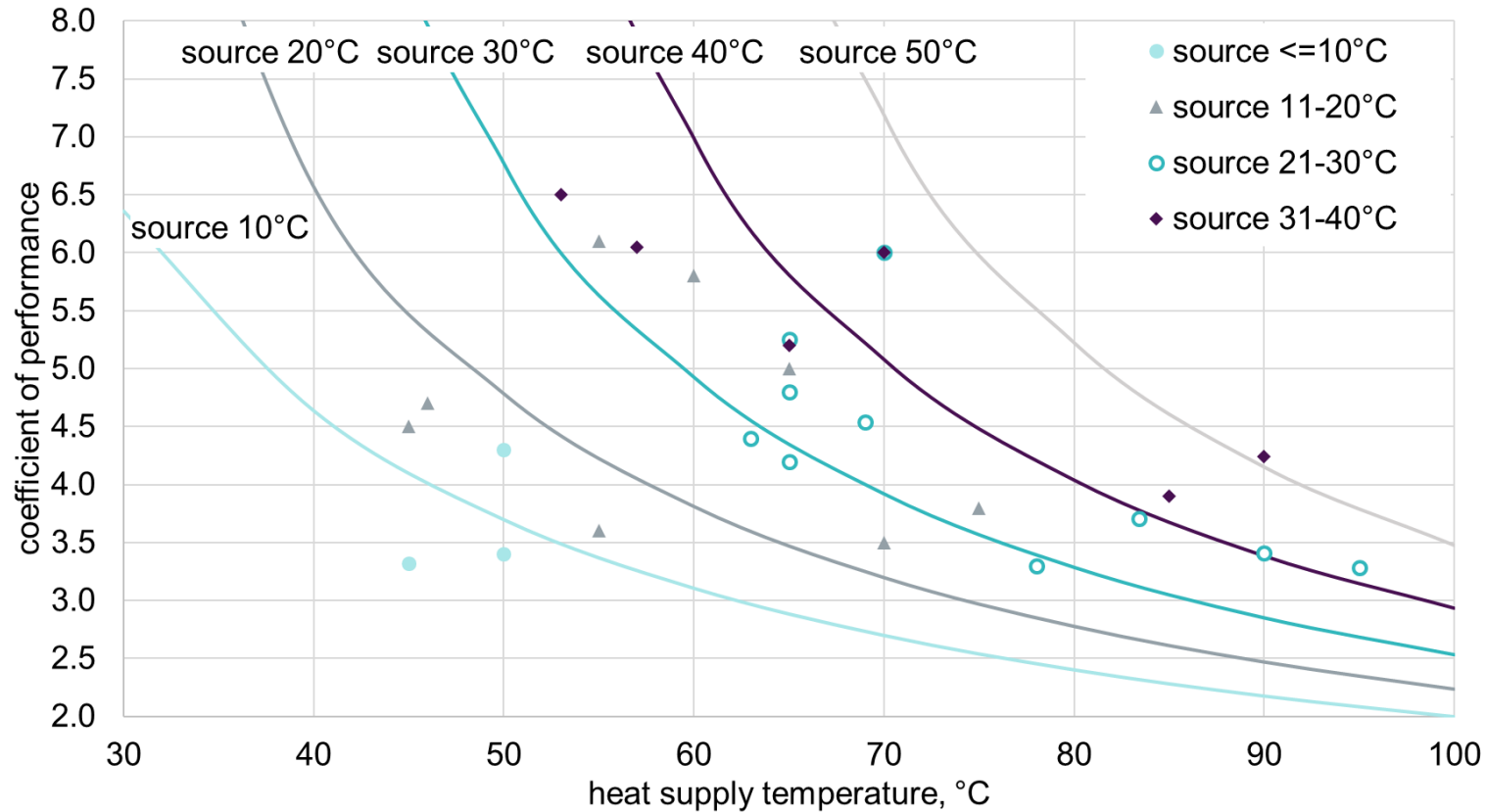
Heat sources



Heat sinks



COMPRESSION HEAT PUMPS

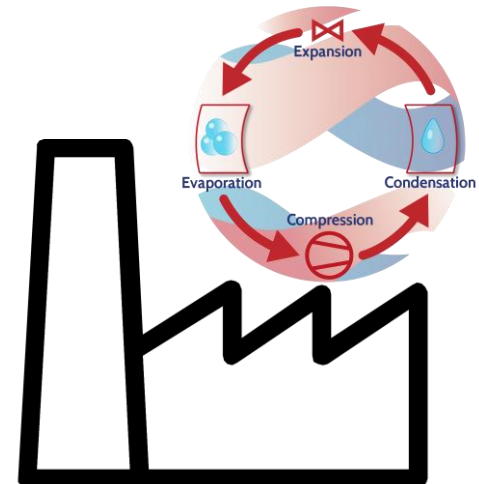


POTENTIAL

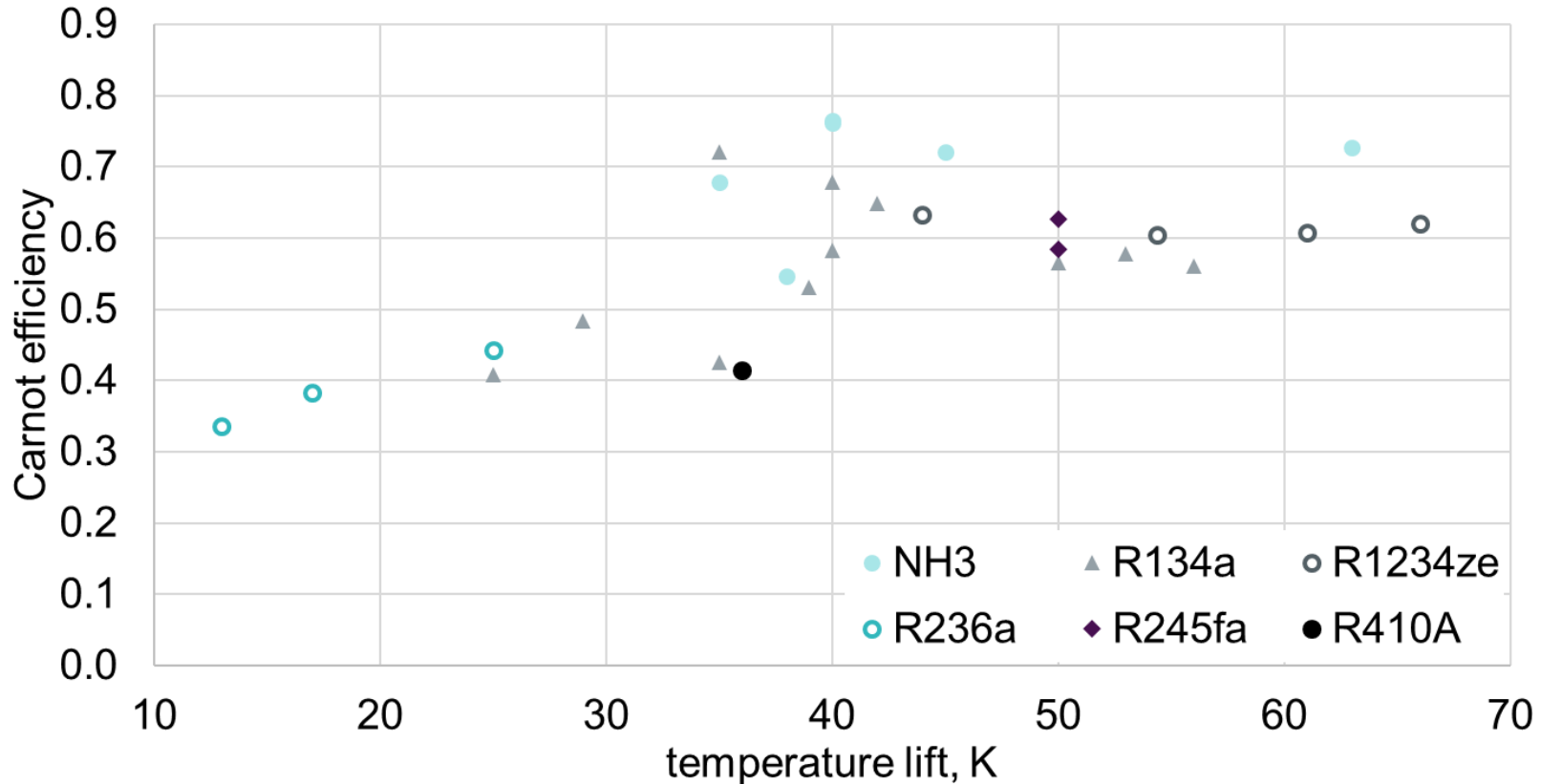
Heat pumps with a COP of 3,5 – 5,5...

- reduce CO₂ emissions by 70-81 %
- reduce energy costs by 33-58 %
(gas 3,4 ct/kWh, electricity 8,8 ct/kWh)
- reduce energy costs by 59-74 %
(gas 3,4 ct/kWh, electricity 5,4 ct/kWh)

compared to a natural gas boiler.



CARNOT EFFICIENCY



APPLICATION EXAMPLES



METAL INDUSTRY + DISTRICT HEAT

Rolling Mill

- Steel and rolling mill Marienhütte GmbH
- Energie Graz GmbH & Co KG

2 heat pumps (Friotherm) with a total heating capacity of 11 MW

- Heat source: process waste heat (cooling baths)
- Heat sink: district heating at 70 and 95°C, residential area (Graz City center and Reininghaus)



BIOMASS PLANT + DISTRICT HEAT

Biomass cogeneration plant Klagenfurt East

- Bioenergie Kärnten
- SOLID
- Riegler & Zechmeister

Absorption heat pump with a total heating capacity of 20 MW (Ebara, installed in 2017)

- Heat source: Flue gas condensation, 45/35°C
- Heat sink: district heating, 60/70°C
- Driving temperatures: 130/120°C

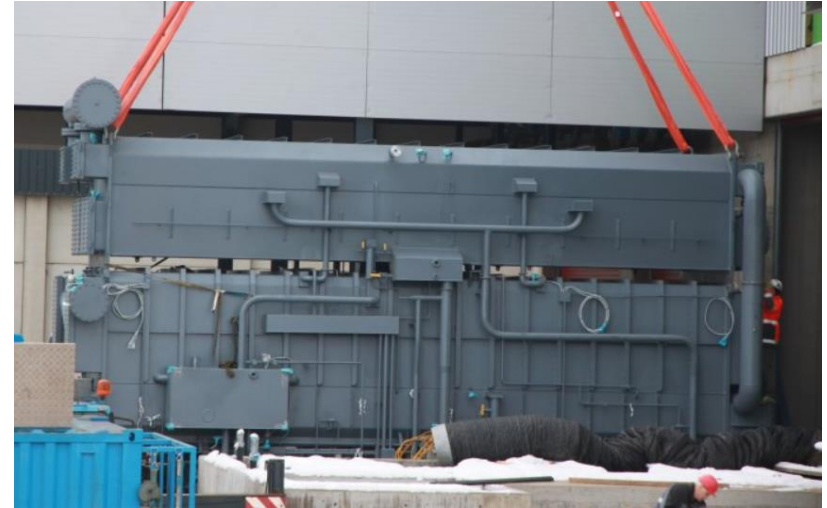


Photo: <https://www.solid.at/de/referenzen/absorptionswaermepumpe>

Link: www.bioenergie-kaernten.at

Further information: M. Jeilter, Riegler & Zechmeister GmbH,
M. Schuber, S.O.L.I.D, Gesellschaft für Solarinstallation und Design GmbH

FOOD INDUSTRY + PROCESS HEAT

Production of meat and sausages

- F. Krainer
- AMT Kältetechnik GmbH

CO₂ heat pump since 2018, cooling capacity 600 kW, heating capacity 800 kW

- Heat source: brine to cool products and raw materials, -6°C
- Heat sink: hot water for cleaning purposes, 60°C

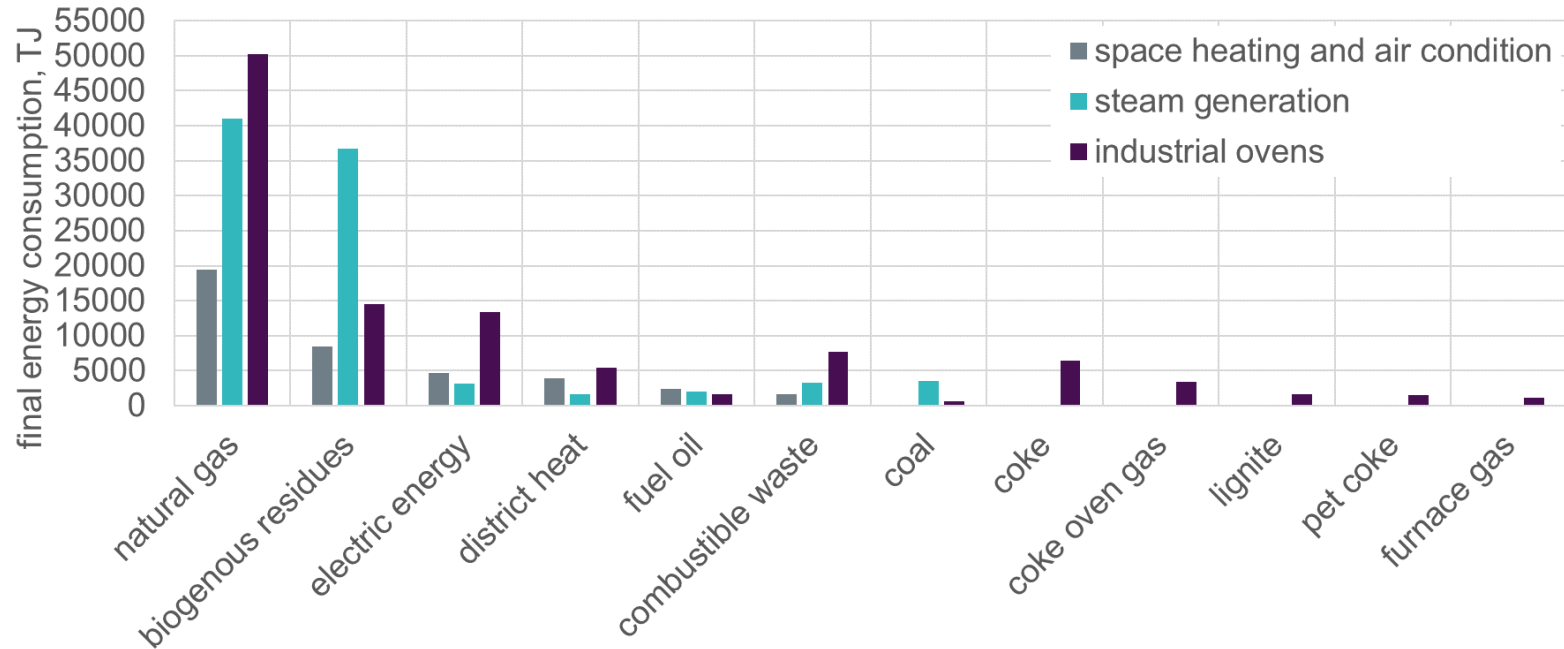


POTENTIALS

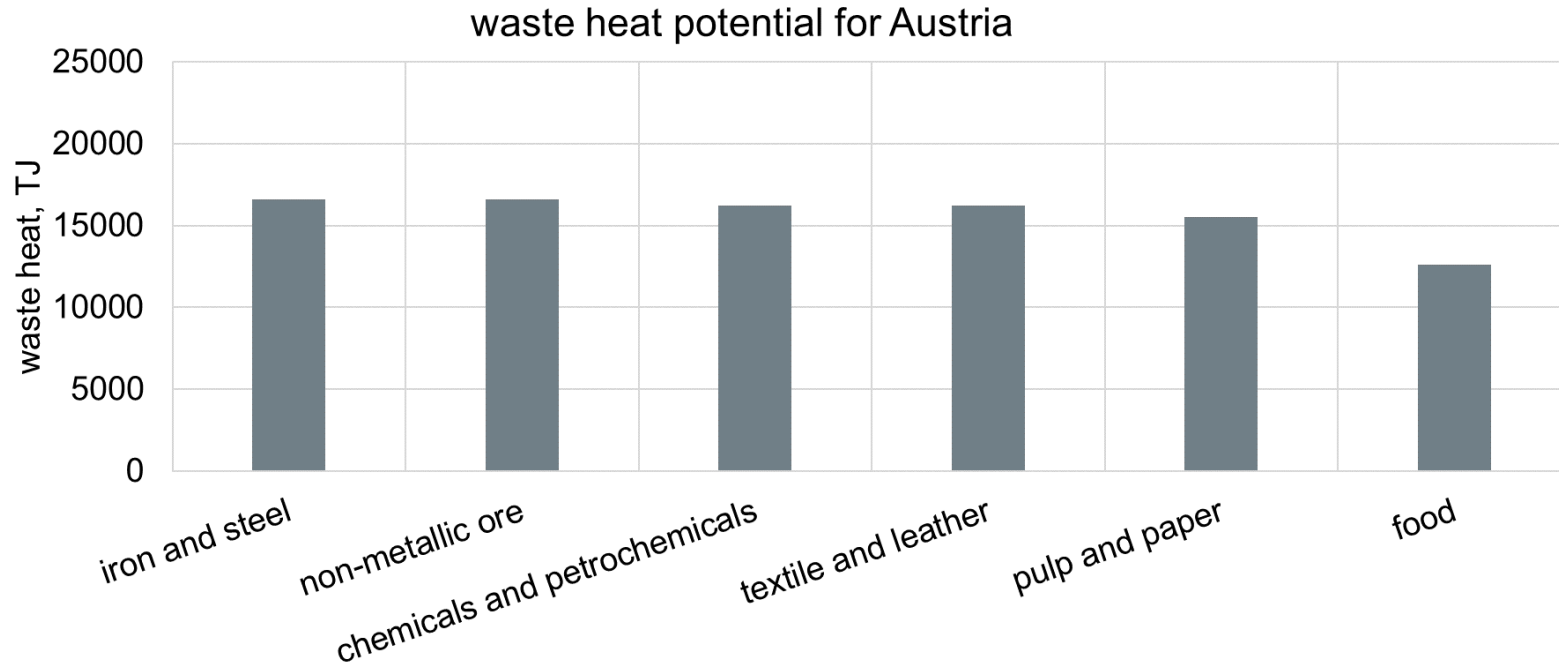


INDUSTRIAL HEAT DEMAND

Energy carriers for industrial applications, 2016



WASTE HEAT IN INDUSTRIAL PROCESSES



PROMOTING AND INHIBITING FACTORS

	endogenous	exogenous
promoting	<ul style="list-style-type: none"> • subsidies for commercial sector • pilot and demonstration plants for innovative concepts • high efficiency of industrial processes with waste heat recovery 	<ul style="list-style-type: none"> • currently low electricity prices • currently low rate of interests
inhibiting	<ul style="list-style-type: none"> • insufficient networking among manufacturers, planners and users • low level of awareness of the technical possibilities and economic feasible application potential 	<ul style="list-style-type: none"> • cautious investment environment due to restrictive lending conditions since 2008 • continuously low oil and gas prices since 2014

CONCLUSIONS

- about 70 examples for industrial heat pumps in Austria
- food industry
 - simultaneously heating and cooling
 - heating capacity in the range of several 10 – 100 kW, mostly internal heat consumption (space heating)
- power plants that supply district heat
 - flue gas condensation
 - absorption and compression heat pumps
- industrial companies supplying district heat
 - usually in the MW range, supply temperatures of 60 - 95°C
- more efficient processes and considerable reductions in CO₂ emissions

THANK YOU!

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