Maximize Value, Reduce Waste

Masterclass IFFI 21th of November 2025

GEA Refrigeration Netherlands N.V.

One of the largest refrigeration contractors in BNX

- **Originated from the Grasso compressor factory (est. 1858)**
- **Grenco was established in 1965**
- **175 People on the road and in the office**
- **Since 3 years 50% of turnover exists out of heat pumps**
- **Biggest markets in Food, Dairy, Beverages and Cold Stores**

OUR CLIENTS


thialf


Cargill


DANONE


DÖHLER


Nestlé


Mondelēz
International


AB InBev


NUTRICIA


FrieslandCampina


Vreugdenhil


JUMBO


Heineken


KERRY


A
ware
Food Group


LIDL

Our applications put consumers in touch with GEA every day

Food
Approx. every third chicken nugget is produced using GEA technology

Food
Approx. every third process line for instant coffee was installed by GEA

Dairy farming & processing
Roughly one quarter of processed milk comes from GEA production systems

Beverage
Approx. every second liter of beer is brewed with the aid of systems and process solutions from GEA

Pharma & healthcare
Roughly every fourth liter of human blood for making plasma-derived products is processed using GEA equipment

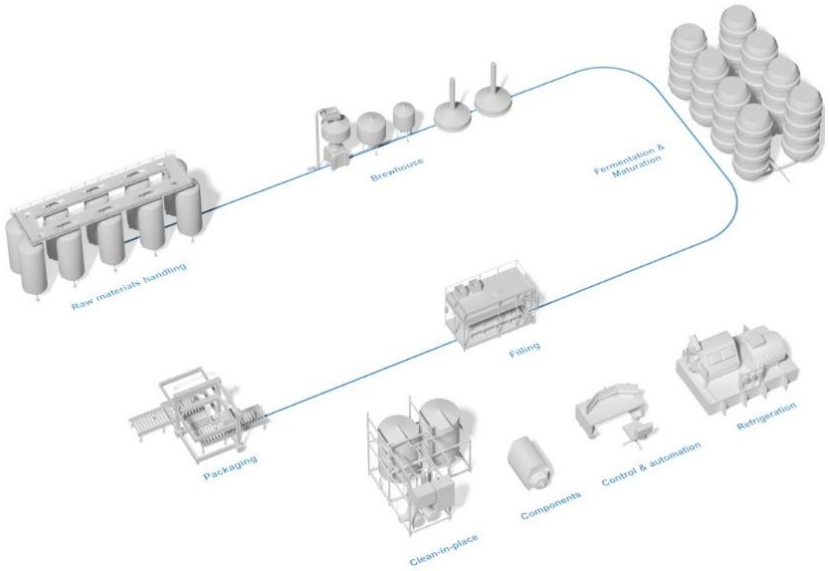
Chemical
More than one third of all polymer producers are using GEA drying technology

Environment
Approx. two million tons of pollutants are averted annually thanks to GEA emission control plants

Heating & refrigeration
Each industry we serve utilizes industrial heating and refrigeration technology from GEA

Marine
Roughly every second container ship in the world sails with GEA marine equipment on board

Holistic sustainable solutions



Fossil Fuels

100%

PROCESS
requires energy

Down to zero

0 %

Harvest Renewable energy

Upgrade energy

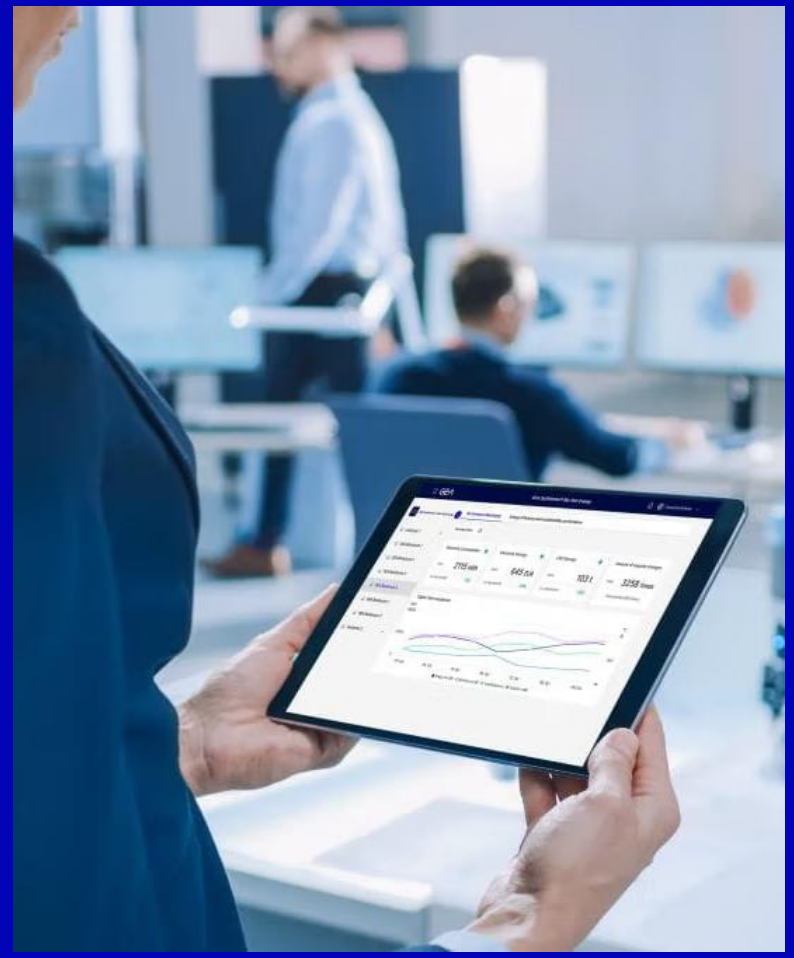
Reuse energy (cascading)

Minimum Necessary energy

Minimize energy consumption

Design

Use

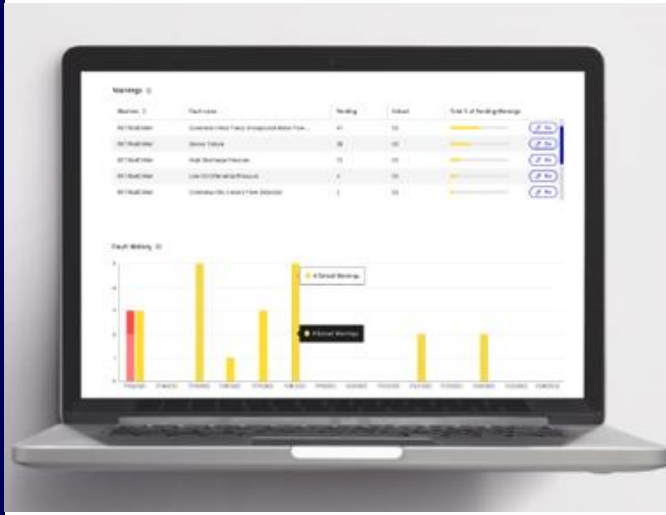


Optimize

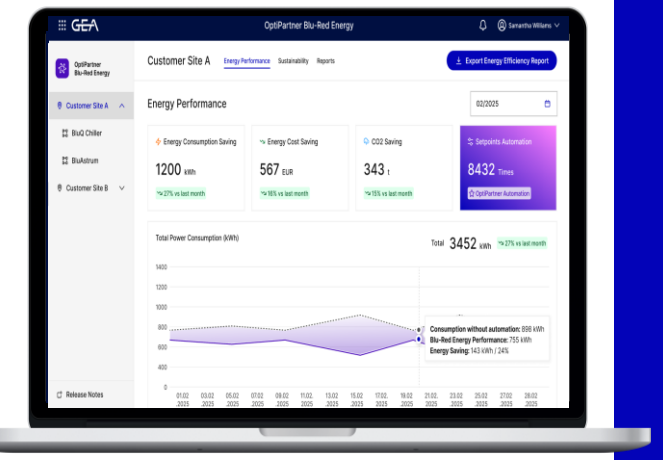
GEA InsightParner® Blu-Red Care

- **Proactieve & Predictieve Remote Monitoring**
  65 parameters om beschikbaarheid en performance te optimaliseren met verhoogde veiligheid.

- **Proactieve Service**
  Op AI gebaseerde fout analyses. Remote oplossingen en GEA support van experts.



GEA OptiPartner® Blu-Red Energy



- **Op AI gebaseerde diagnostiek**
  om de werking te optimaliseren van u warmte of koude installatie.

- **Leveren van energy efficiëntie**
  Verlagen van de energiekosten en van de CO2 emissie.

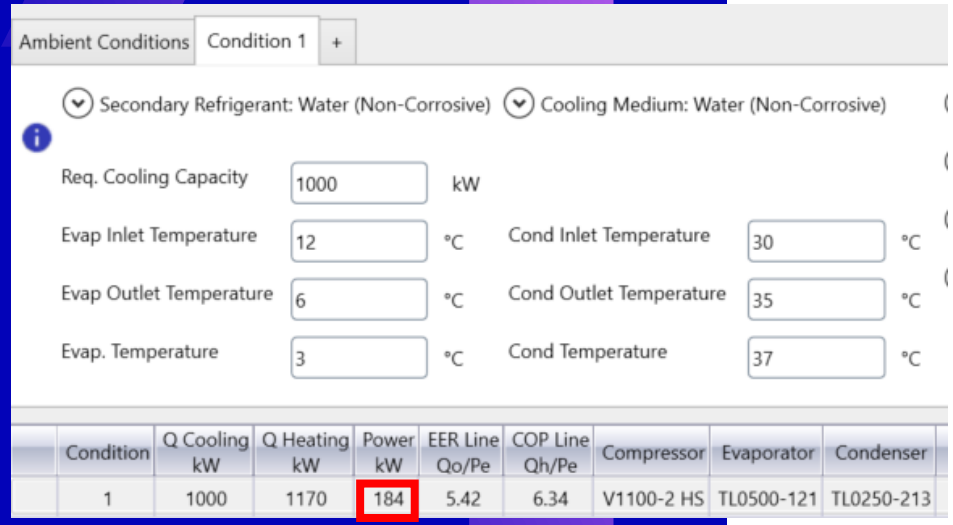
Where do you expect to decrease energy costs ?

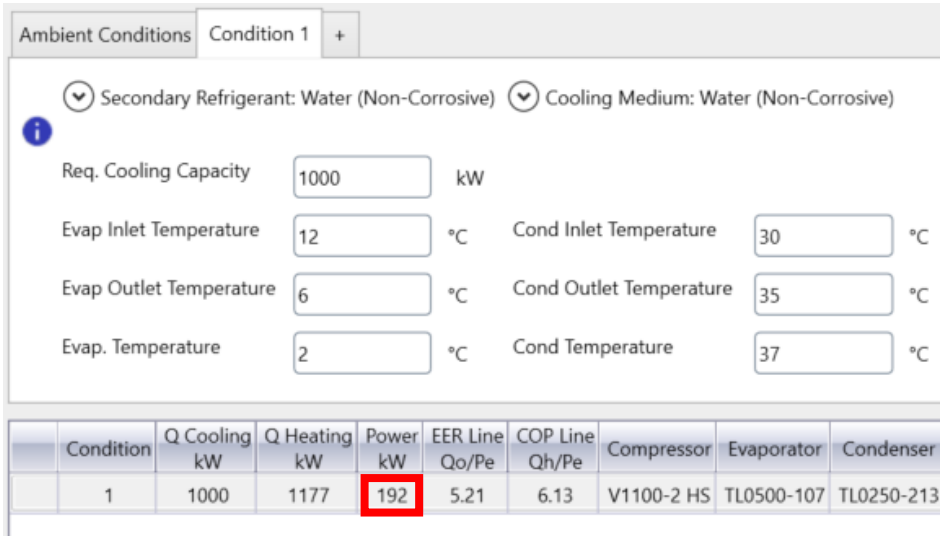
related to refrigeration yes/no

Impact

- Doorlosses 30%
  - In a coldstore of 100 kW this will be around Eur 8.000 / year
  - In a freeze store of the same size around Eur 12.000 / year
  - With double doors/doorflaps thiw can by reduced up to 95%

- Wrong design
  - Each degree lower evaporation costs 3% of energy (*)
  - Each degree higher condensation costs 2% of energy



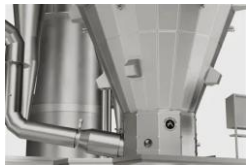


BREAK

WHAT ABOUT WASTE HEAT?

Waste heat sources

Cooling tower



Process

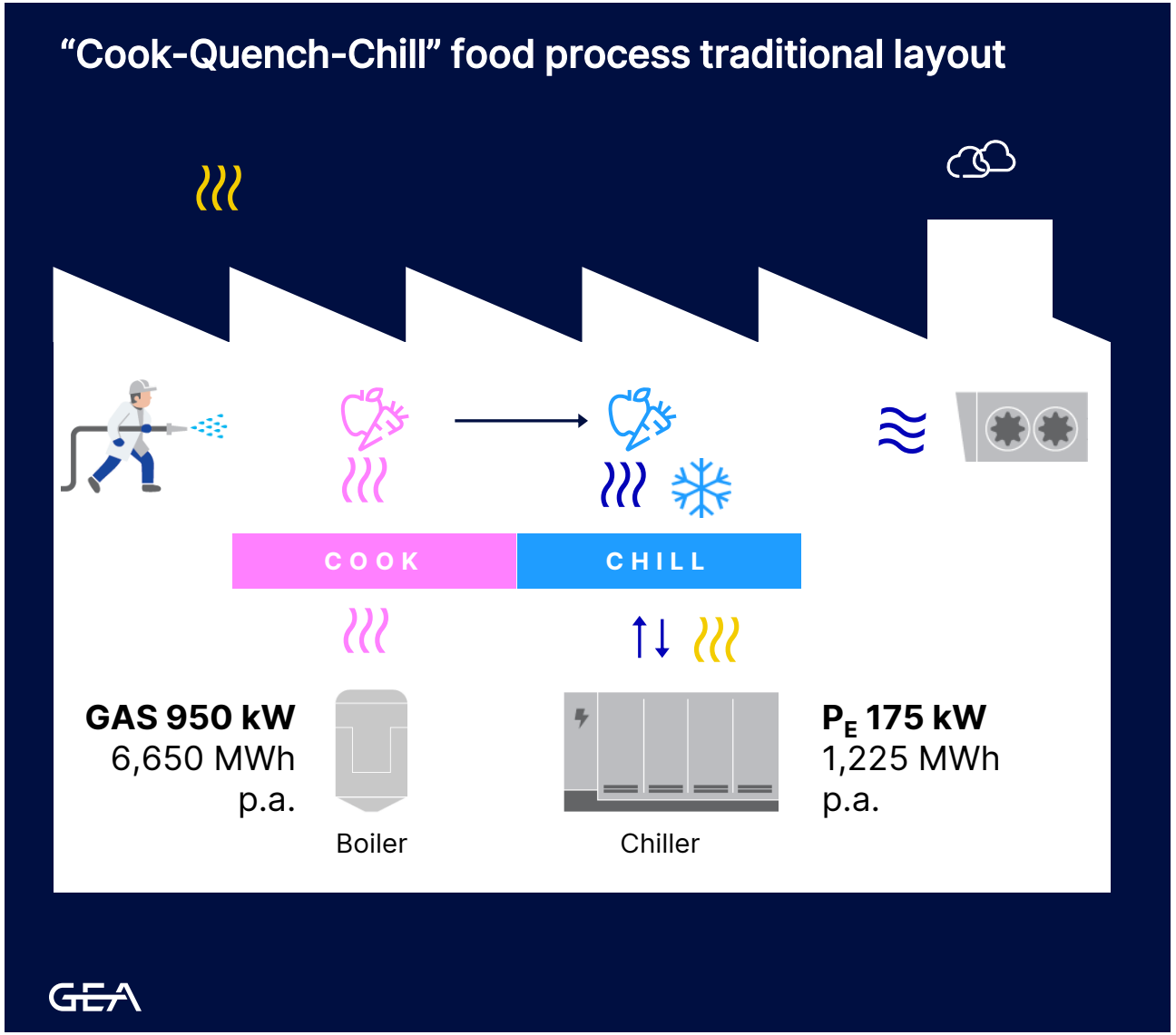
Chiller

Refrigeration

Chimney

Waste water

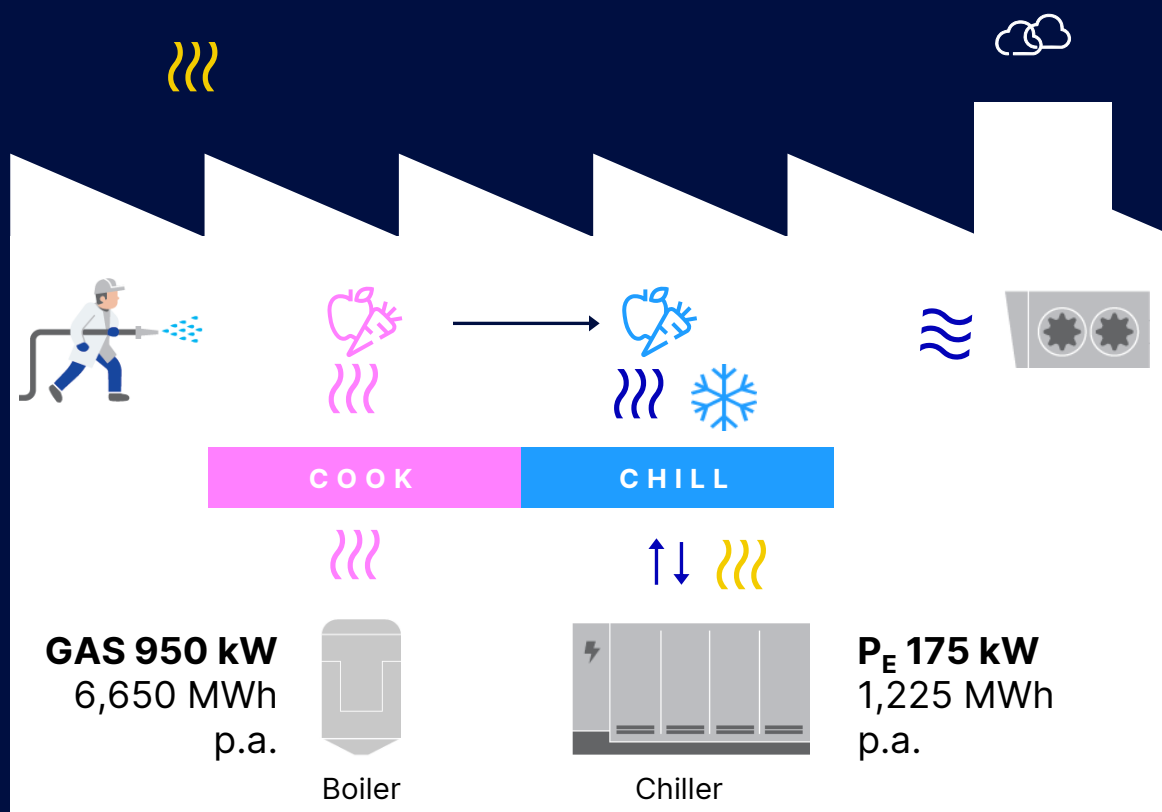
Example traditional food production



Example sustainable food production

Factories on track to “Net-Zero“.

“Cook-Quench-Chill” food process traditional layout



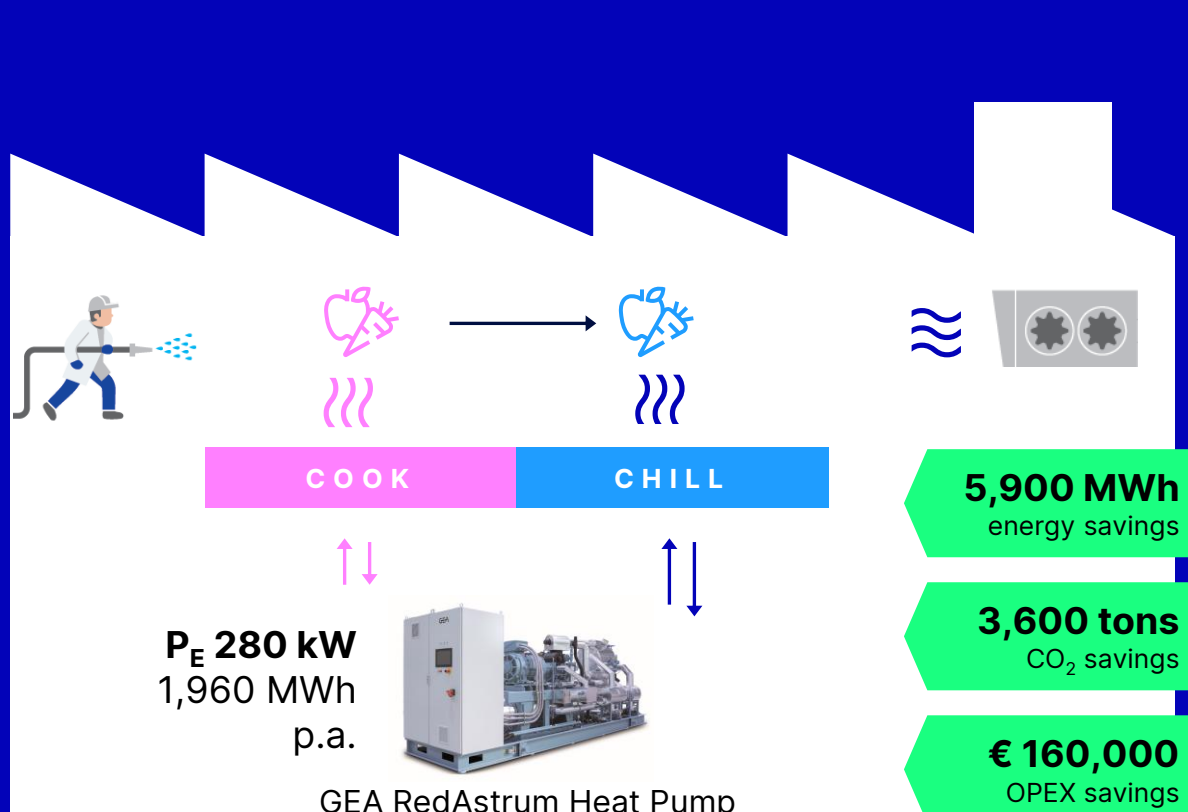
GAS 950 kW
6,650 MWh
p.a.

Boiler

Chiller

P_E 175 kW
1,225 MWh
p.a.

“Cook-Quench-Chill” food process new layout



P_E 280 kW
1,960 MWh
p.a.

GEA RedAstrum Heat Pump

5,900 MWh
energy savings

3,600 tons
CO_2 savings

€ 160,000
OPEX savings

Heating accounts for 50% of global energy consumption1

… And it contributes to 40% of global greenhouse gas emissions.

Global end-use of energy

50%
Industrial processes

46 %
Buildings

4%
Agriculture

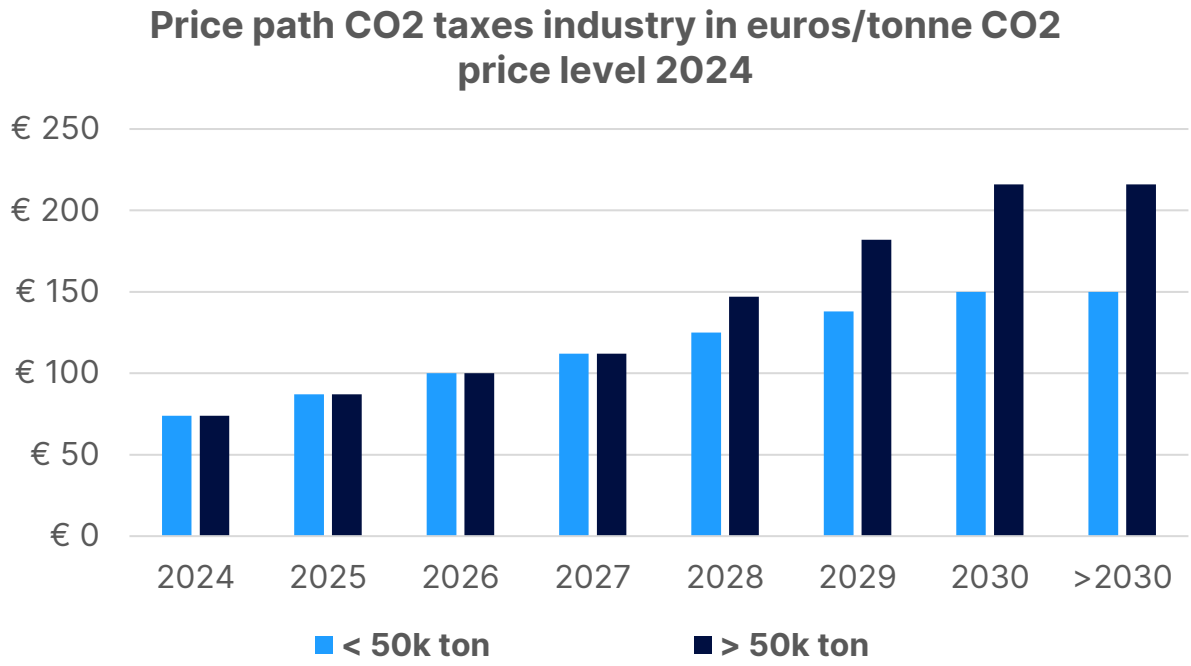
50%
Energy for heating processes

Alone **25%**

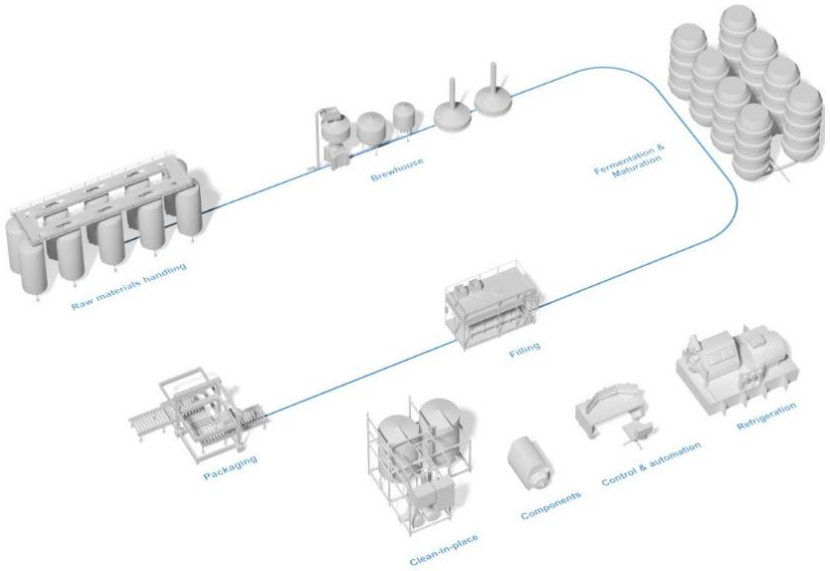
of heat production is based on renewable sources2

1. Source: www.irena.org in 2023 | 2. Source: IEA World energy outlook 2022

CO2-tax industry



Holistic sustainable solutions



Fossil Fuels

100%

PROCESS
requires energy

Down to zero

0 %

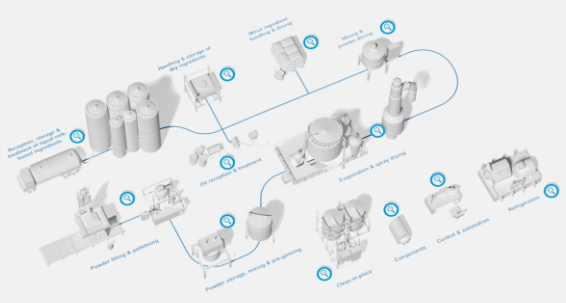
Harvest Renewable energy

Upgrade energy

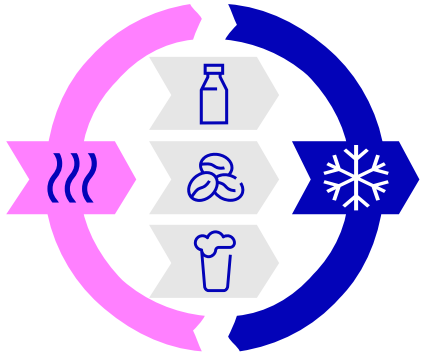
Reuse energy (cascading)

Minimum Necessary energy

Nexus combines heating, refrigeration and process expertise to holistic sustainable solutions



Brown- or green-field sites focusing on **OPEX, energy and carbon footprint optimization**



Holistic assessment, process analysis & proposal for a **sustainable and integrated process solution**

- Sustainability
- Energy consumption
- Operational costs
- CO_2 emissions

Implementation of the solution for an **optimized site and sustainable plant**

Interconnection of process solutions with heating & cooling solutions, resulting in **lowered energy consumption, minimized operating costs, and reduced carbon footprint.**

GEA supports you with a team of Process, Sustainability and Cooling & Heating experts reflecting the triangle of sustainability, quality and efficiency.

From cooling installation to heat pump – Upcycle Energy

Driven by renewable energy

.. heat to cool product!

+2°C

.. the same heat, the wrong temperature!

+35°C

.. the same heat, right temperature... and gasless

+55 to 90°C

Efficiency heat pump

250% to 750%

Refrigeration installation

Renewable energy

Heat pump

Heat pumps

Insight into our thermal needs!

	Product Intake		Feathering		cool		Endproduct	
POULTRY		+38 °C		+52 °C		+2 °C		+2 °C
DAIRY DRINKS		+2 °C		+74 °C		+2 °C		+2 °C
VEGETABLES		+20 °C		+80 °C		-18 °C		-22 °C

Heat pumps

Understanding our thermal needs!

POULTRY

DAIRY DRINK

VEGETABLES

Product Intake

+38 °C

+2 °C

+20 °C

Feathering

+52 °C

Pasteurisation

+74 °C

Blanch

+80 °C

HEAT/ENERGY IN

Cool

+2 °C

Cool

+2 °C

Freeze

-18 °C

HEAT/ENERGY OUT

Finished product

+2 °C

+2 °C

-22 °C

.. THE SAME HEAT,
The wrong temperature!

Temperature needs in food

Freezing -30/-15°C
- Storage
- Processes

Cooling -15/0°C
- Storage
- Processes

Cooling +6/+12°C
- HVAC
- Processes

Refrigeration - 60 years GEA expertise

Heat pumps GEA focus 15 years experience

Heating 45/65°C Warm/hot water
- HVAC
- CIP
- Proces heating

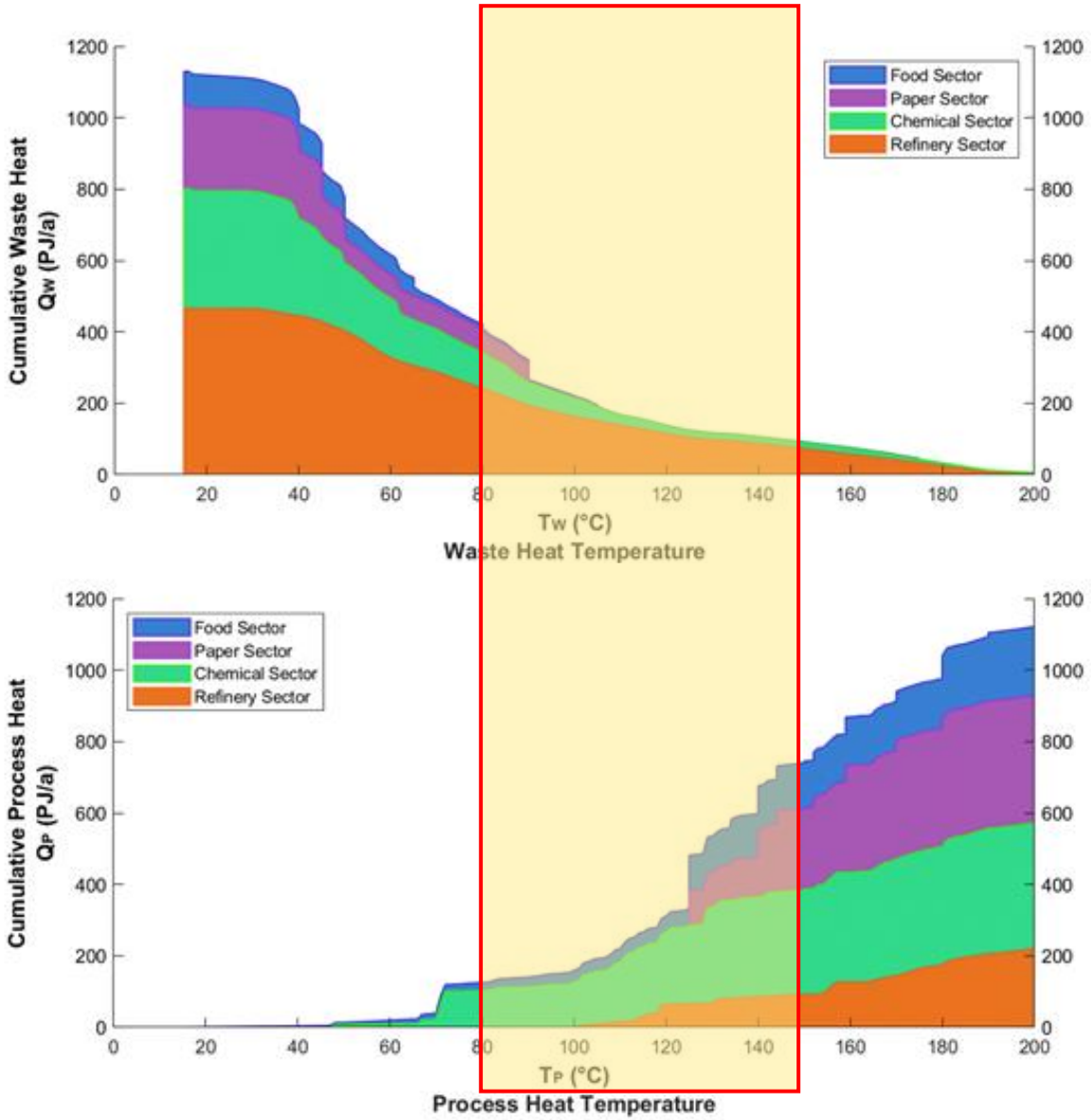
Heating 65 /95°C Hot water
- Pasteuriser
- Blancher
- CIP

Heating 95/150°C Hot water / Steam
- UHT pasteuriser
- Cooking
- Drying

Heating 150/200°C Steam/gas/electrical
- Drying
- Baking

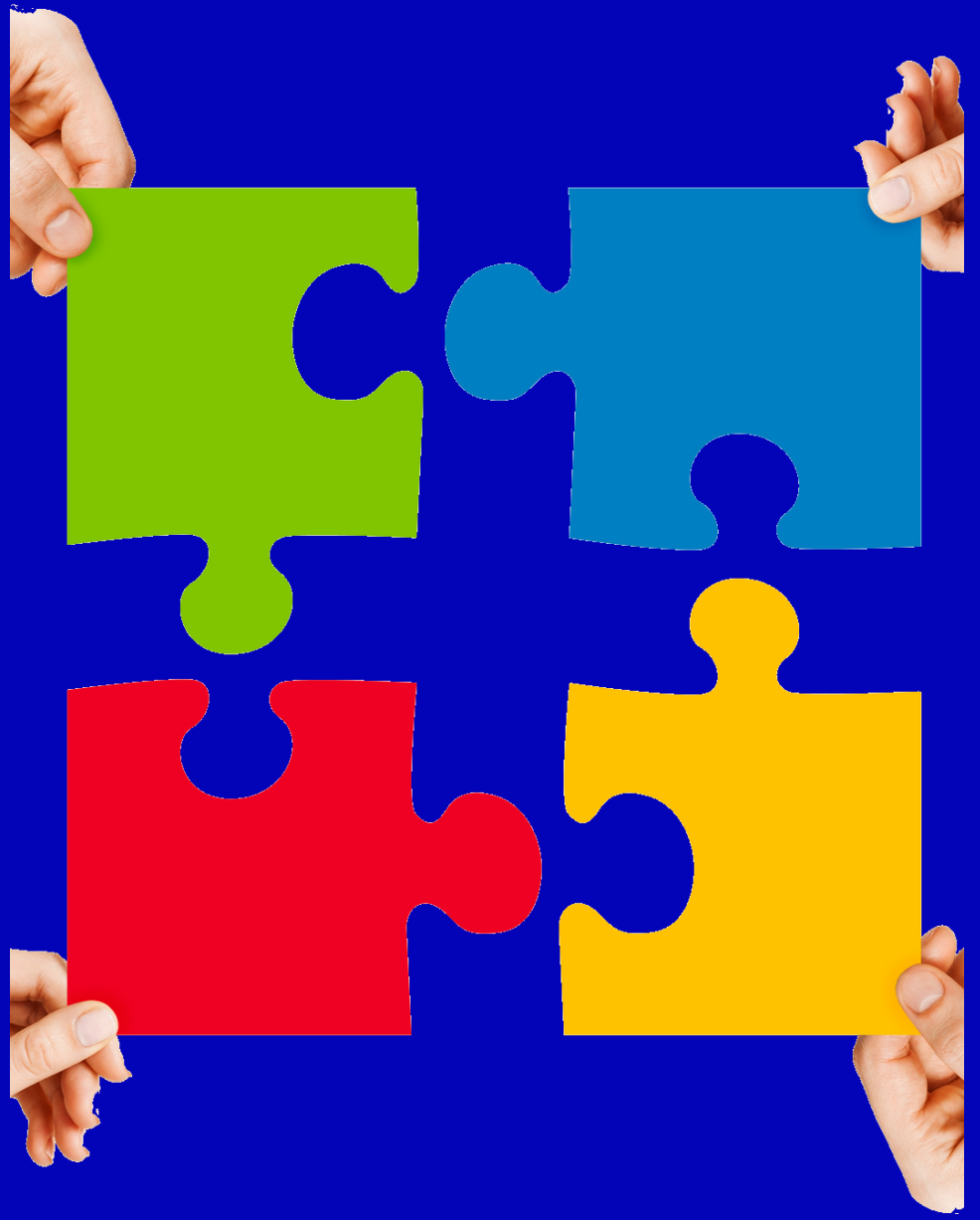
GEA focus for the future – development and cooperation

Residual heat and process heat in the food sector



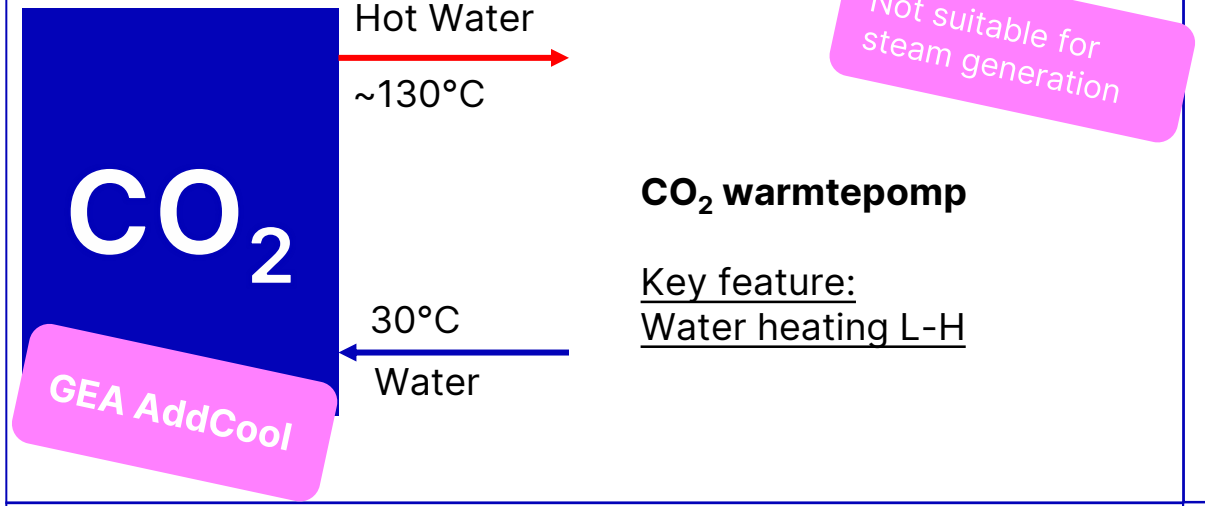
Bron: TNO

HEAT PUMPS ABOVE 100°C



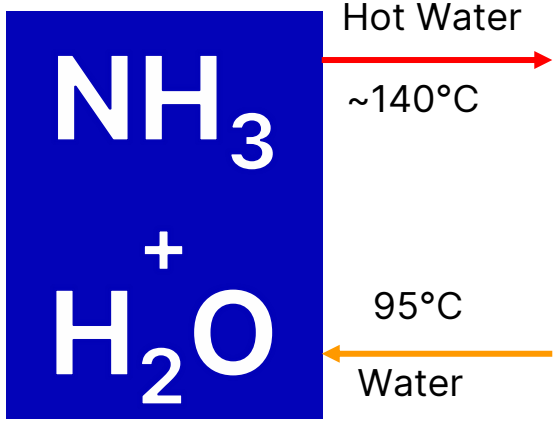
Energy issue is a combination of different techniques/solutions

Heat pumps for temperatures above 100°C



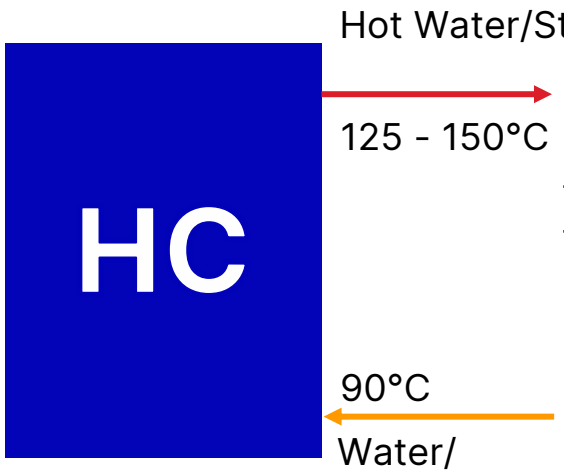
CO_2 warmtepomp

Key feature:
Water heating L-H

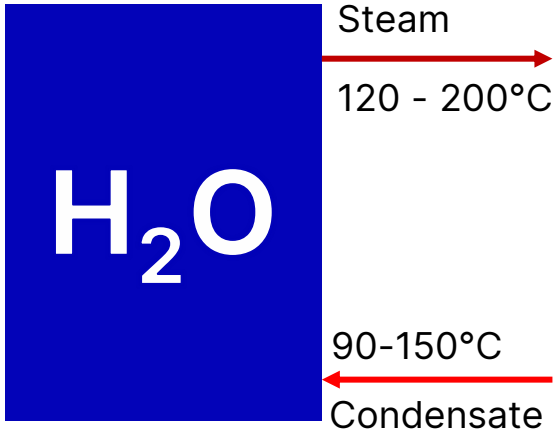


Ammonia-Water compression/ absorption heat pump

Main feature :
Water warming



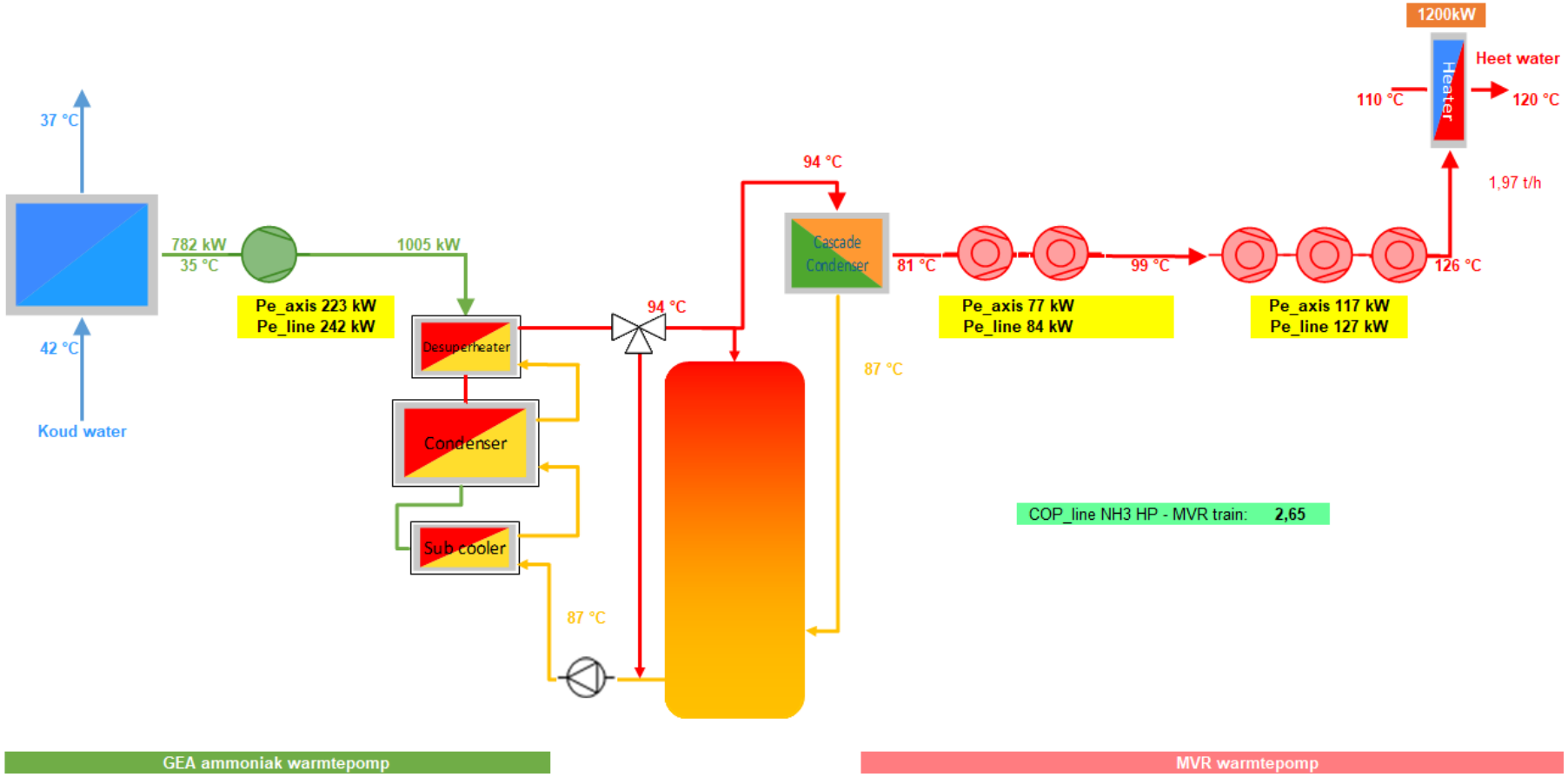
Heat pump with hydrocarbon
Key feature:
Hot water or steam generation
- Butane up to ~125°C
- Iso-Pentane up to ~ 150°C



Steam heat pump / MVR
Key feature:
Steam generation
Multi-level branching

Possible developments above 200°C

Ammonia HP multi stage MVR 120°C

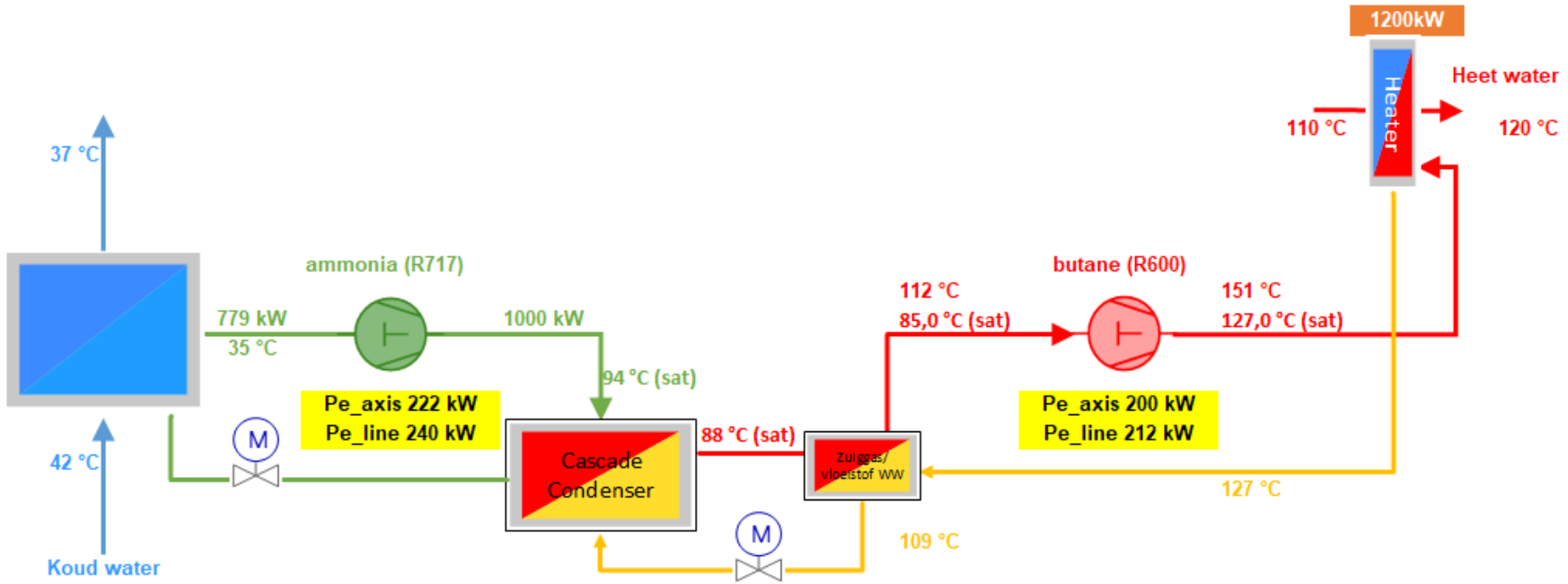


Bron: Standard Fasel

COP	E-boiler	Heatpump	%
COP_grid	0.95	2.65	**+280%**

Voorlopige data

Ammonia HP – single stage butane HP 120°C <–> e-boiler

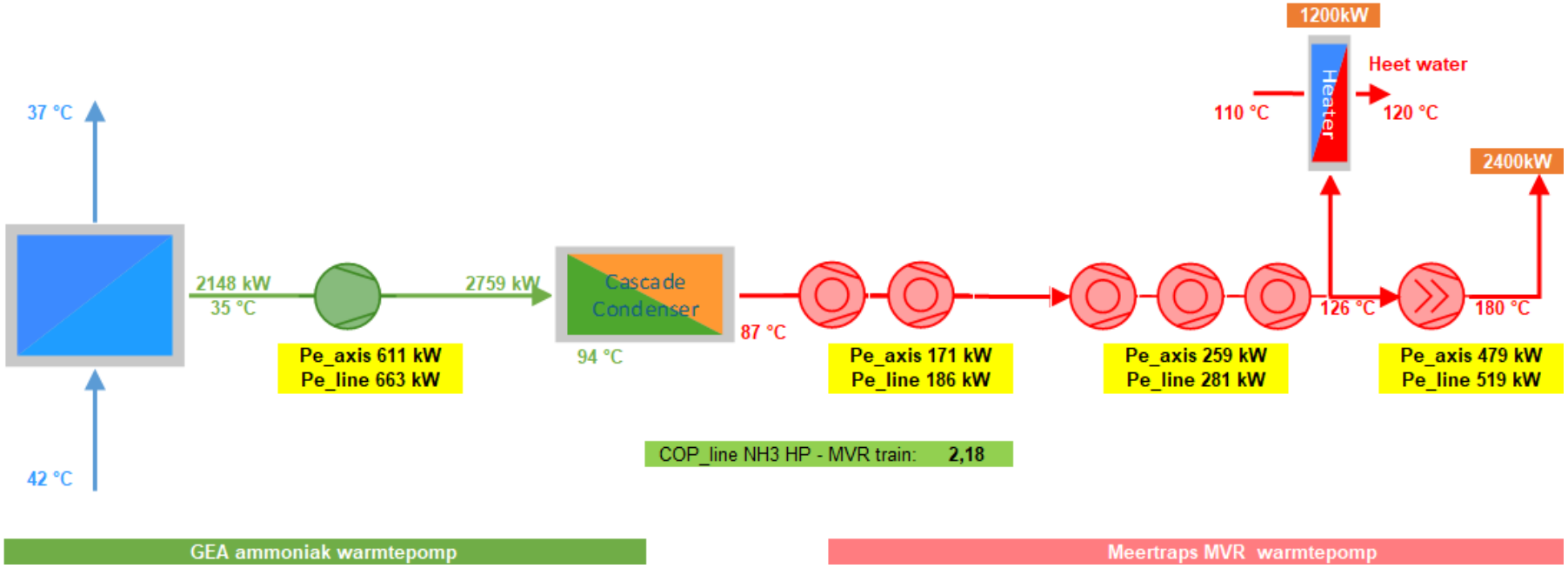


Bron: Standard Fasel

COP	E-boiler	Heat pump	%
COP_grid	0.95	2.65	**+280%**

Voorlopige data

Ammonia HP - multi stage MVR 180°C <–> e-boiler



Bron: Standard Fasel

COP	E-boiler	Heatpump	%
COP_grid	0.95	2.18	**+229%**

Voorlopige data

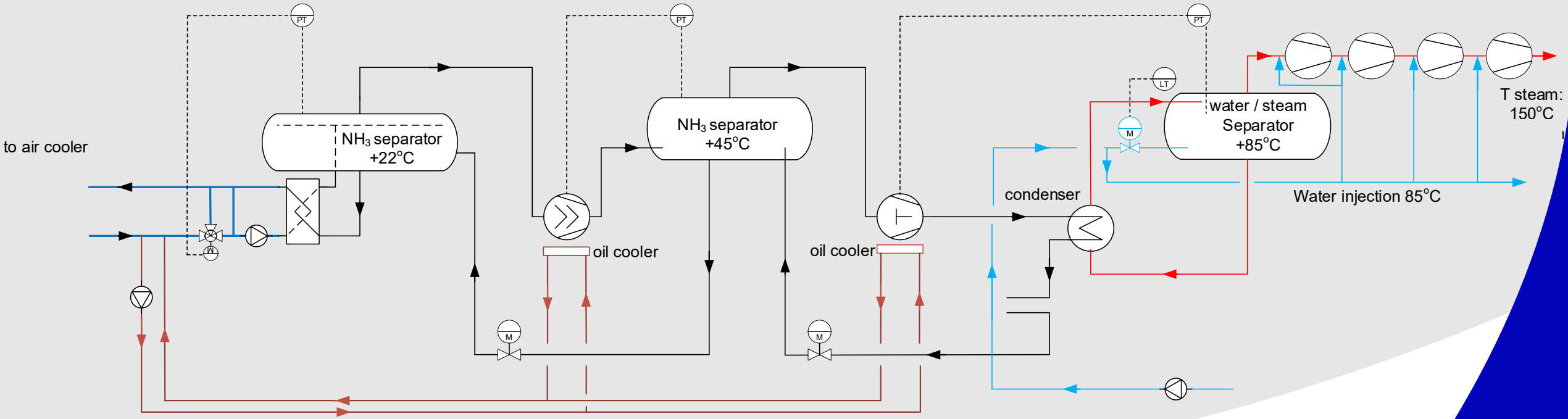
EXPERIENCES SO FAR

Ammonia / steam heat pump

Heat source: 25°C, Steam supply: 151 °C

Flow rate: 2000 kg steam per hour

Heating COP of 2.5



Heat pump performance

- ✓ Produces 2 tons of steam per hour
- ✓ Recycles air-sourced waste heat
- ✓ Capacity of 1.4 – 1.8 MW_{th}
- ✓ Efficiency gain of 67%

The first steam-producing heat pump has been installed at Felleskjøpet Agri in Trondheim

Location: Tiense Suiker, 3300 Tienen, Belgium

Type of industry: Food & Beverage

Technology involved: High Temperature heatpump, Pentane, from GEA

Type of production: Beet Sugar

The partners involved in the first demonstration case are:

DTI, as knowledge provider

GEA, as technology provider

TIS, as end-user

SPIRIT project

4 MW heating at 139°C

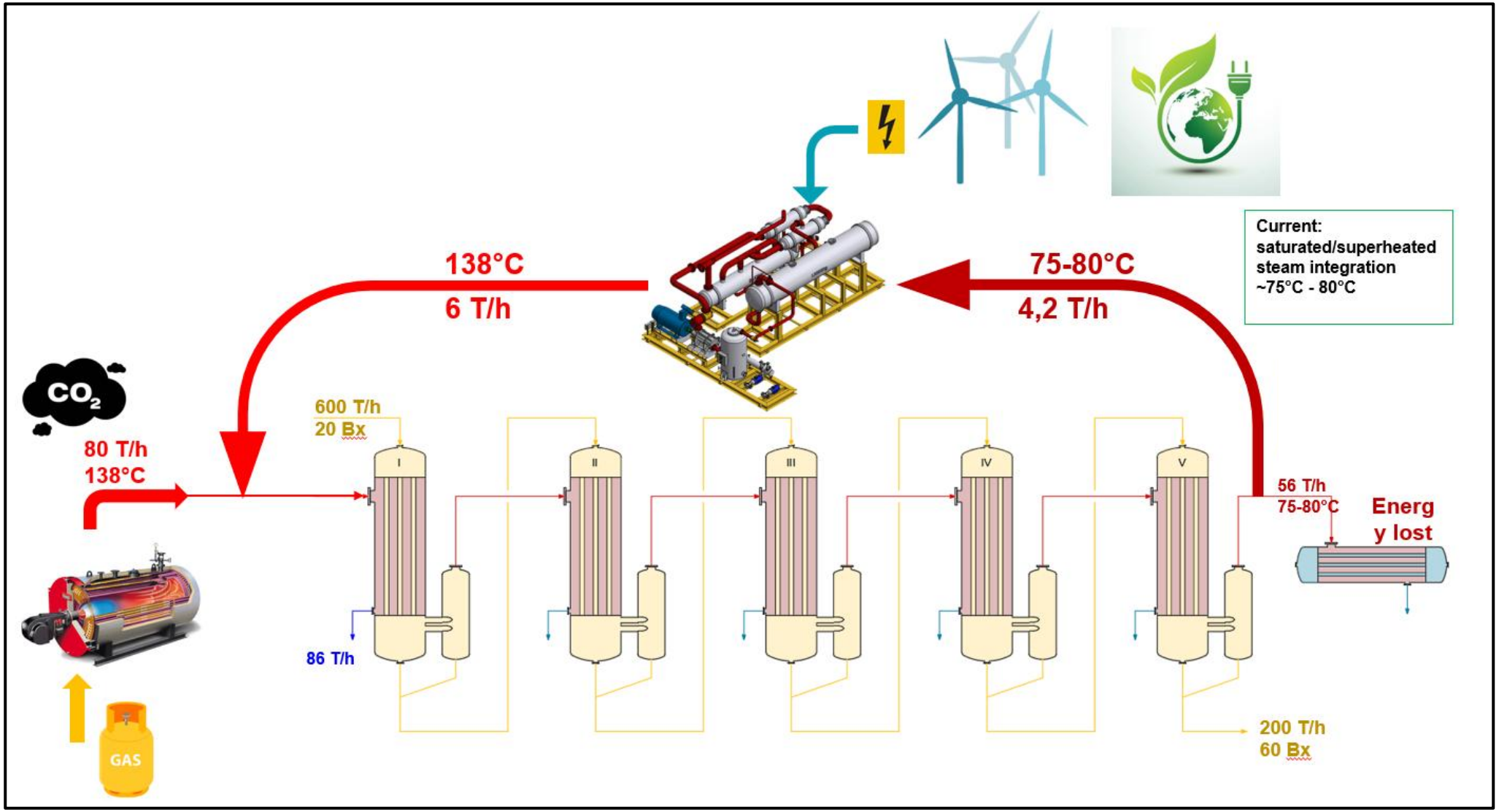
Hot pressurised water or steam

Refrigerant pentane

Maximum temperature 140°C
To be increased to 160°C

Start 2024
In full production 2025

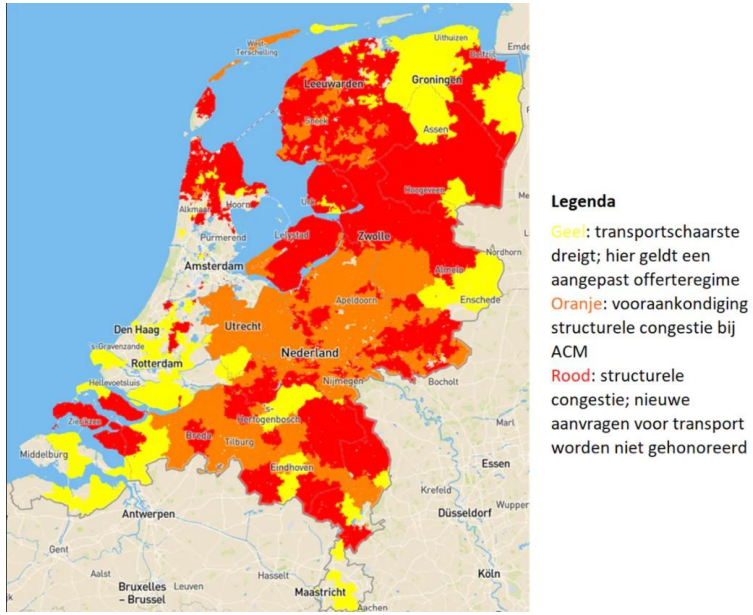
GEA HEAT PUMP – Pilot project

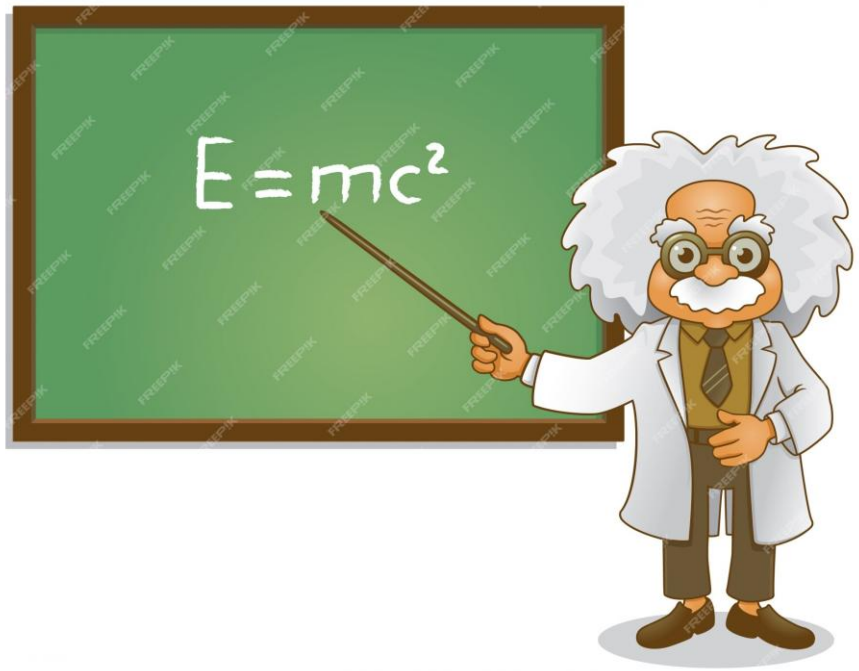


Skid Compressor

Why a steam heat pump – beyond sustainability

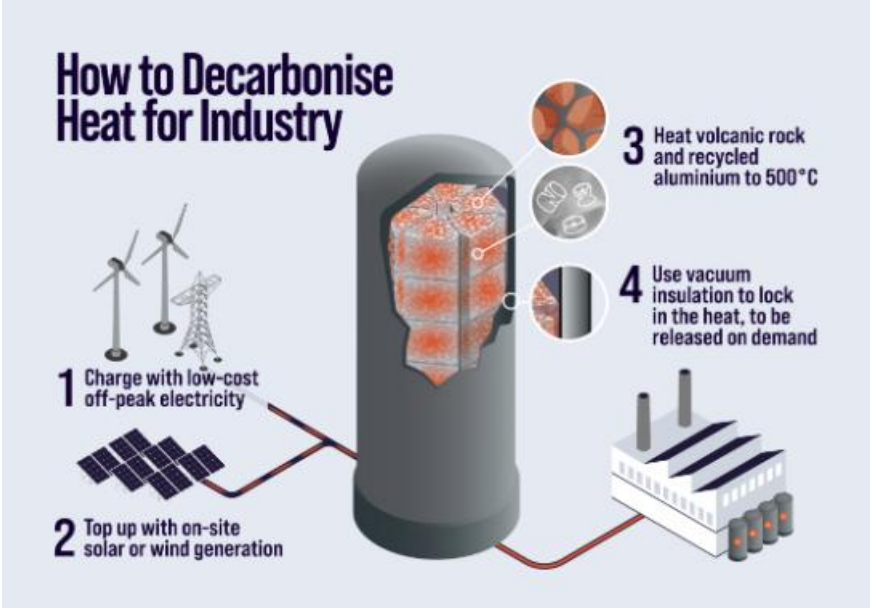
- Conversion of existing system to water of max. 95 deg C not always achievable – ROI
- Process adjustments not always feasible
- Electrical supply - grid congestion

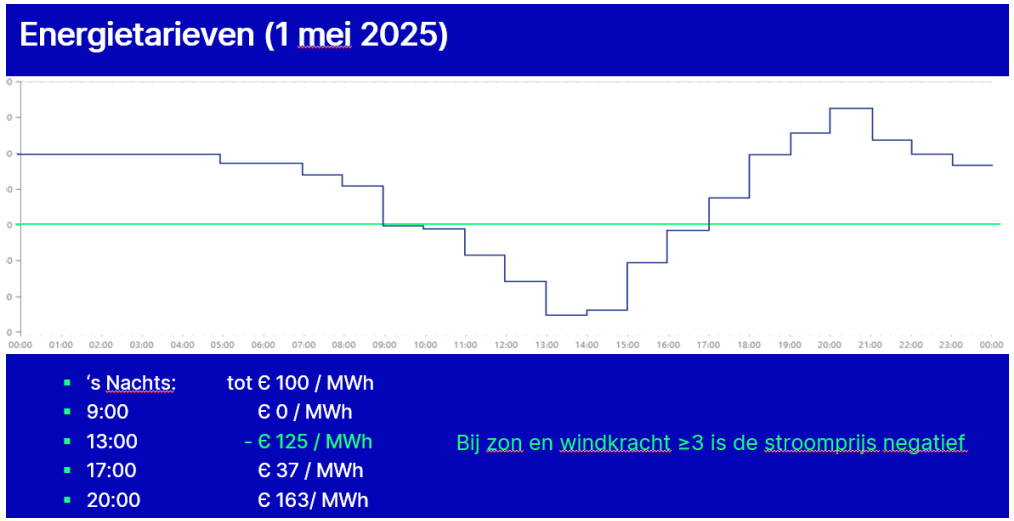




What will an installation look like in the future?

- Combination hot water / steam heat pump / E-boiler ?
- Control on energy tariffs
- Production manager vs. utilities





Q&R

Thank you!

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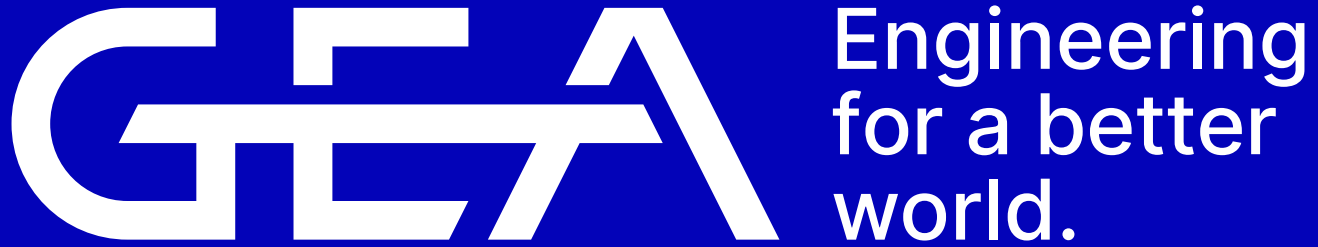
Engineering
for a better
world.