HEAT PUMPS FOR PRODUCTION PROCESSES

Reliable and Sustainable CO_2 Reduction

Online Presentation Berlin by Thomas Lergenmueller (GEA Refrigeration Germany), July 2nd 2020

euramm n
refrigerants delivered by mother nature

Contents

GEA – “engineering for a better world”

GEA is one of the largest suppliers of process technology to the food industry and to a wide range of other sectors.

4.751
million
order intake (EUR) *

17.863
employees
(full time equivalents) *

* 2018

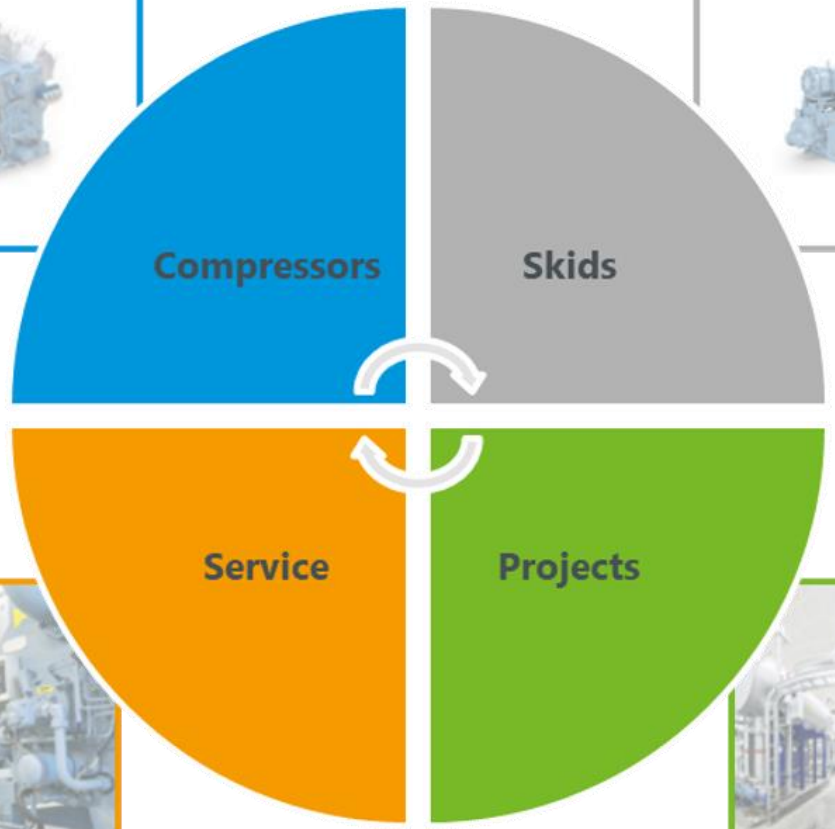
The “Refrigeration“ division provides components and solutions for the industrial refrigeration and heating for nearly all applications which have respective demands.

GEA is one of the few “OEM‘s“ worldwide that offer complete ammonia heat pumps from our own production.

GEA Refrigeration Portfolio at a Glance

COMPONENTS

- High-quality screw and reciprocating compressors
- Controls
- Valves
- Service equipment



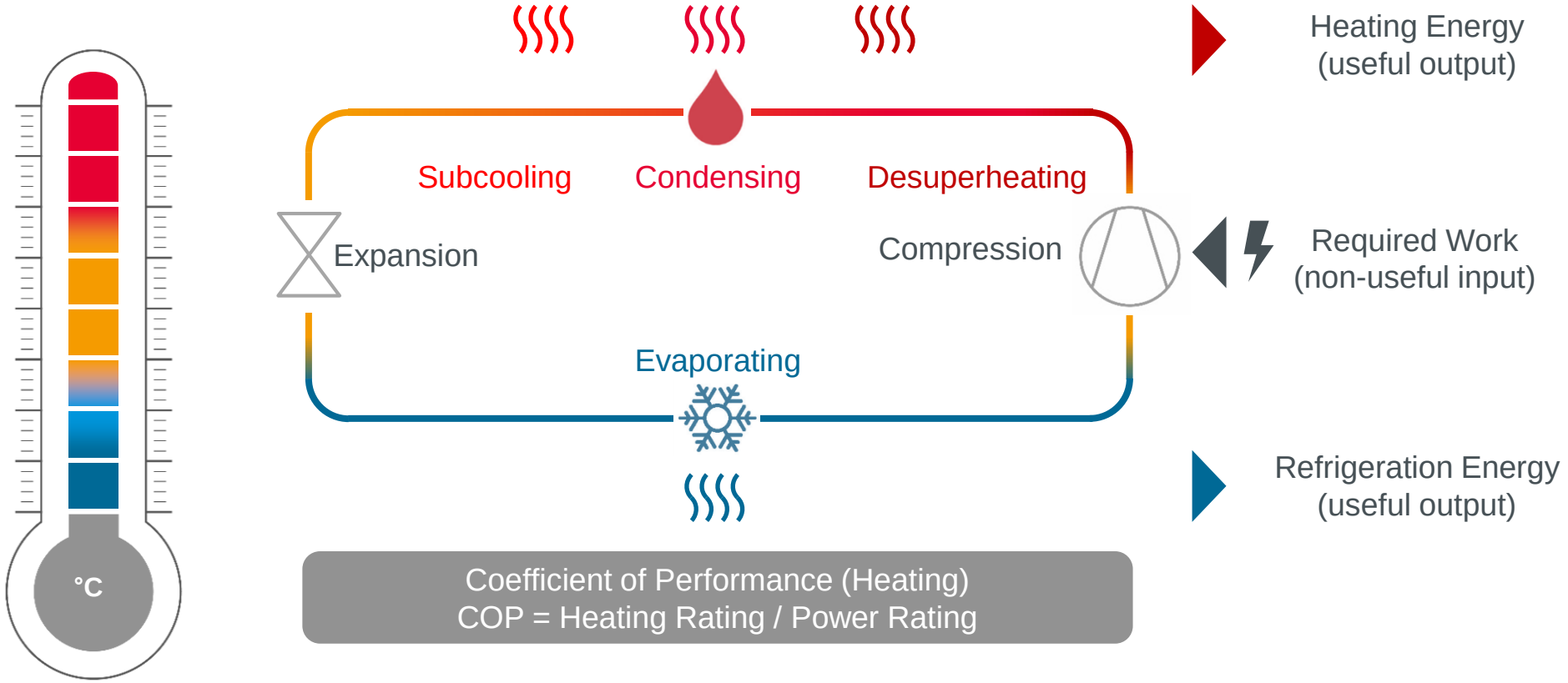
SKIDS

- Compressor packages
- Chillers
- Heat Pumps

Building, **MAINTAINING**, optimizing and adapting for your continued success

Turnkey **SOLUTIONS** for complete refrigeration and heating systems

Single-Stage Heat Pump Circuit

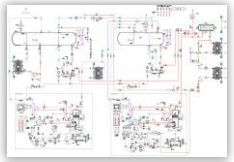


GEA‘s History of Heat Pump Technology

engineering for a better world

2020

Market launch standardized screw compressor heat pump packages.
Market launch standardized chiller-heat pump combinations.
Development of new high temperature compressors.



2018

Market launch of the standard heat pump lines
GEA RedAstrum (screw based) and GEA RedGenium (piston based).

2017 – 2011

Continuous advancement of heat pump technologies and products.
Multiple installations accors Europe.

2010

First large heat pump installation for a district heating network:
Using waste heat from a paper production process to generate hot water above +80 °C to supply the heating network in the Swedish town Sarpsborg.

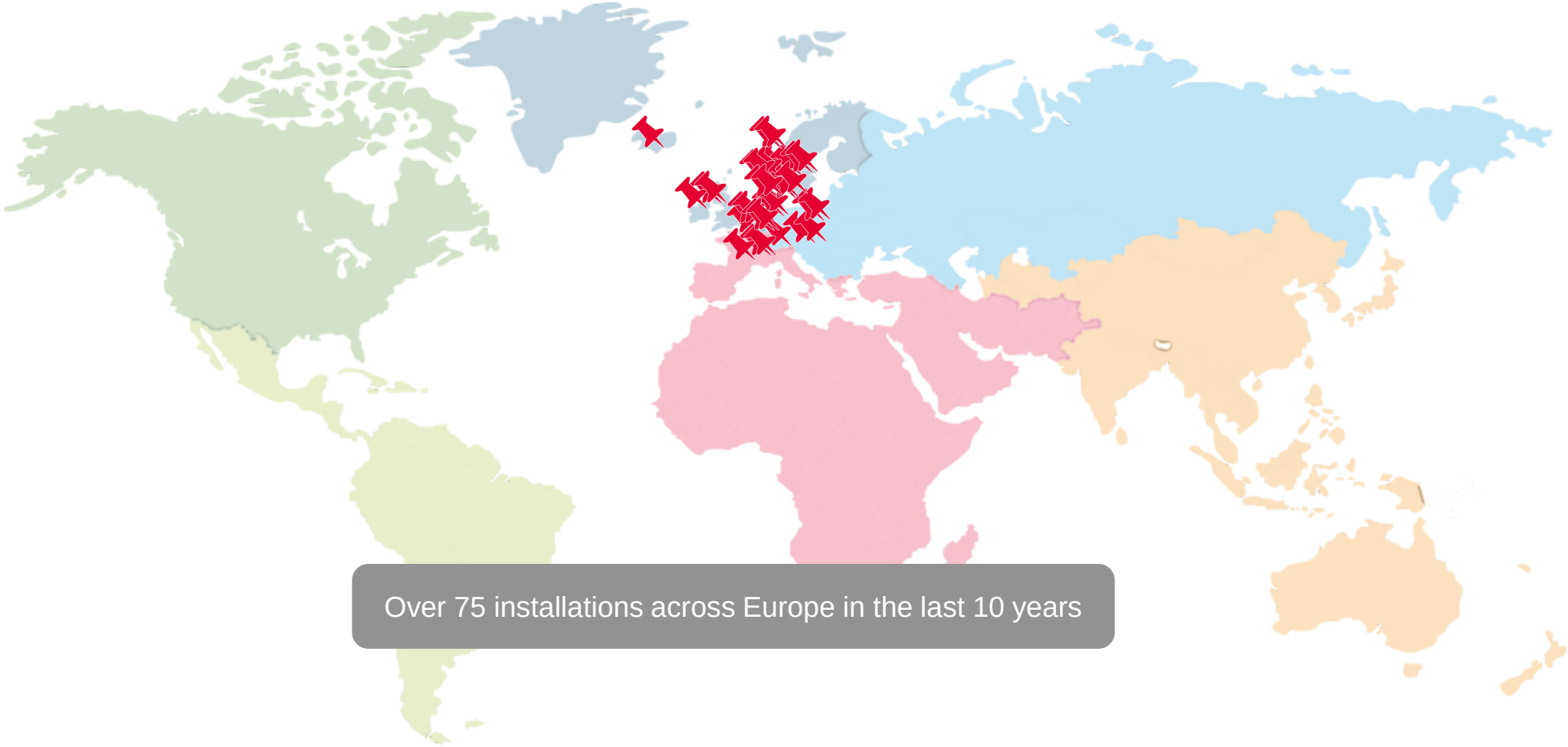
2008

Market launch of high pressure screw and reciprocating compressors.

2005

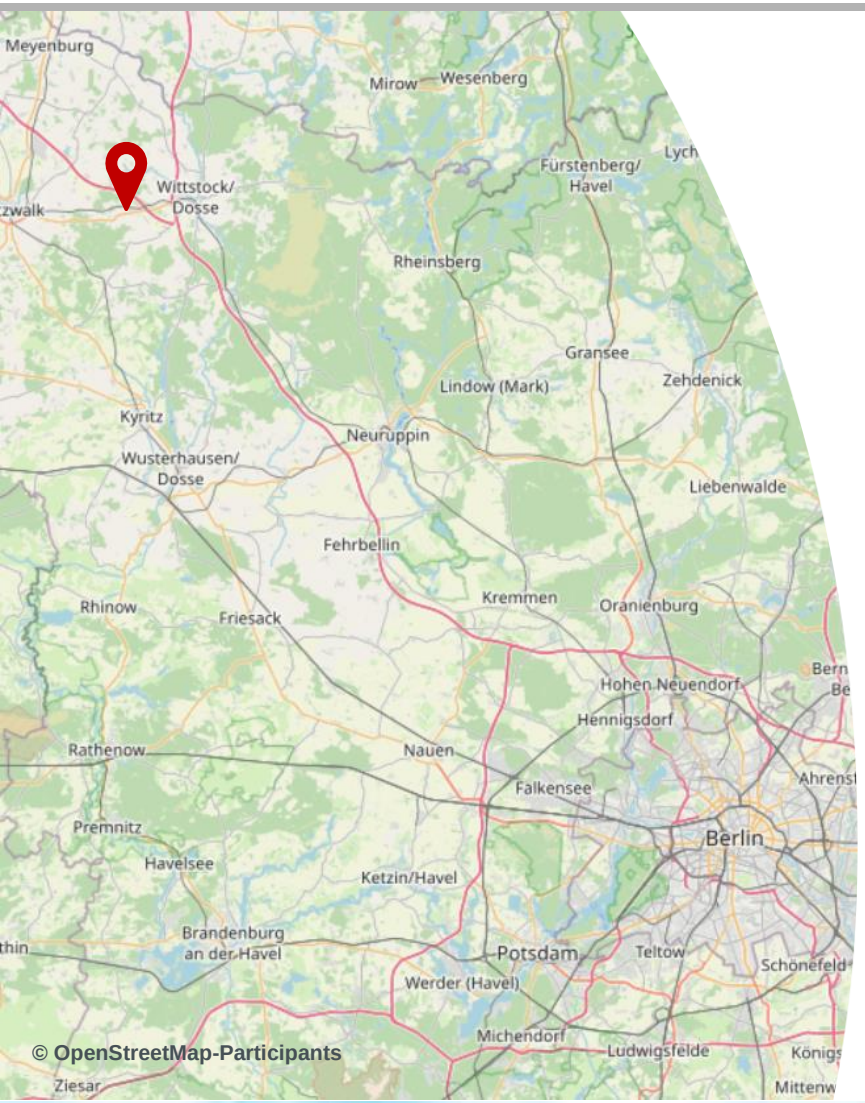
First screw compressor based heat pump installed for a food producer:
Hot water up to +70 °C for a gelatin production process.

GEA Heat Pump References



Over 75 installations across Europe in the last 10 years

GEA Heat Pump Reference “Kronoply“



INITIAL SITUATION

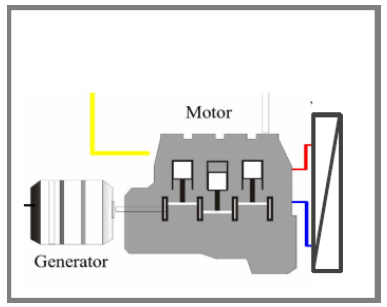
- Switzerland based company SWISS KRONO is a producer of wooden products.

  At the German location *Heiligengrabe* the group manufactures OSB plates (oriented structural board) using long tall wood chips called “strands“.
- During an energy-intensive production process the strands are dehumidified in a directly fired rotary dryer.
- SWISS KRONO also operates two biomass heating plants on the premises.

PLAN

- Modernization by installing an efficient heat pump that supports the drying process and ultimately saves cost and emissions by reducing fossile fuels.

“Kronoply“ Layout

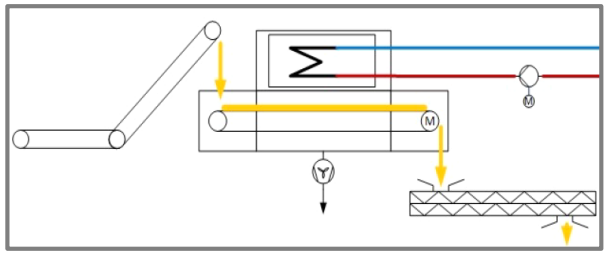


Natural Gas CHP Plant

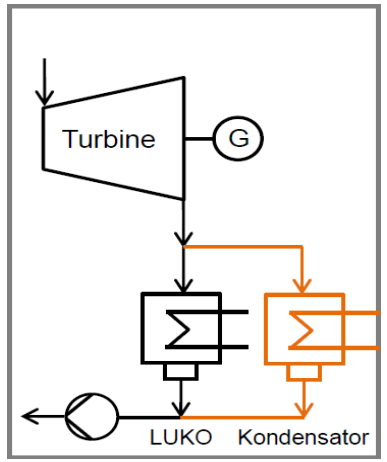
useful heat 2 MW supply +95 °C

useful heat 9 MW return +60 °C

electrical power 2 MW



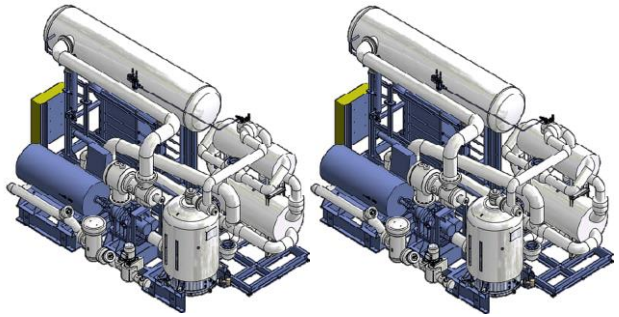
OSB-Dryer (11 MW)



Biomass Heating Plant

waste heat 7 MW

+35 ... +40 °C



GEA Heat Pumps

useful heat 9 MW return +60 °C

useful heat 9 MW supply +83 °C

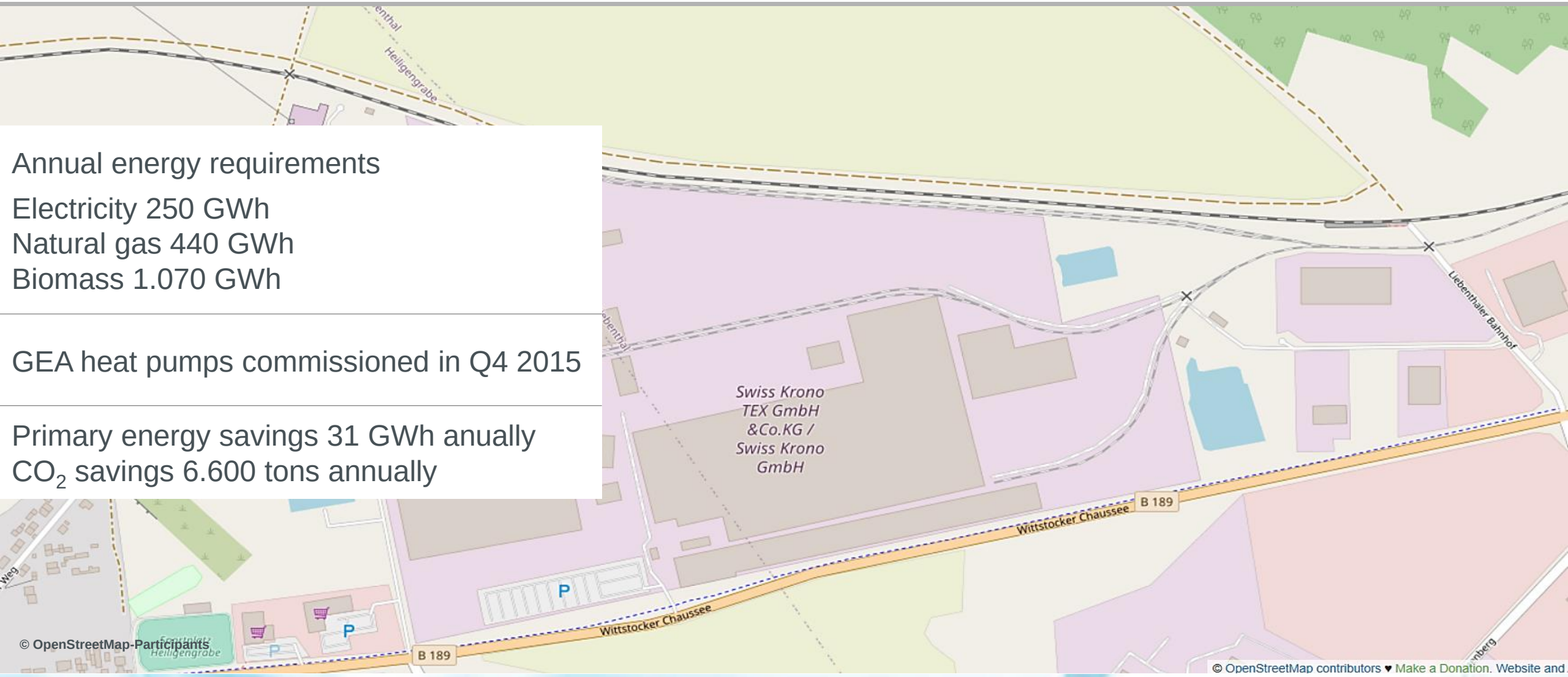
“Kronoply“ Plant Data

Annual energy requirements

Electricity 250 GWh
Natural gas 440 GWh
Biomass 1.070 GWh

GEA heat pumps commissioned in Q4 2015

Primary energy savings 31 GWh anually
CO_2 savings 6.600 tons annually



“Kronoply“ GEA Heat Pump Data

2 x heat pump units
9 MW total heating capacity

2 MW electrical power input
Coefficient of performance COP = 4.5

Heat source water +39 / +33 °C
Heat sink ethylen glycol +60 / +73 … +83 °C

Dimensions per unit
Lenght x Width x Height = 7.7 x 3.9 x 3.9 m

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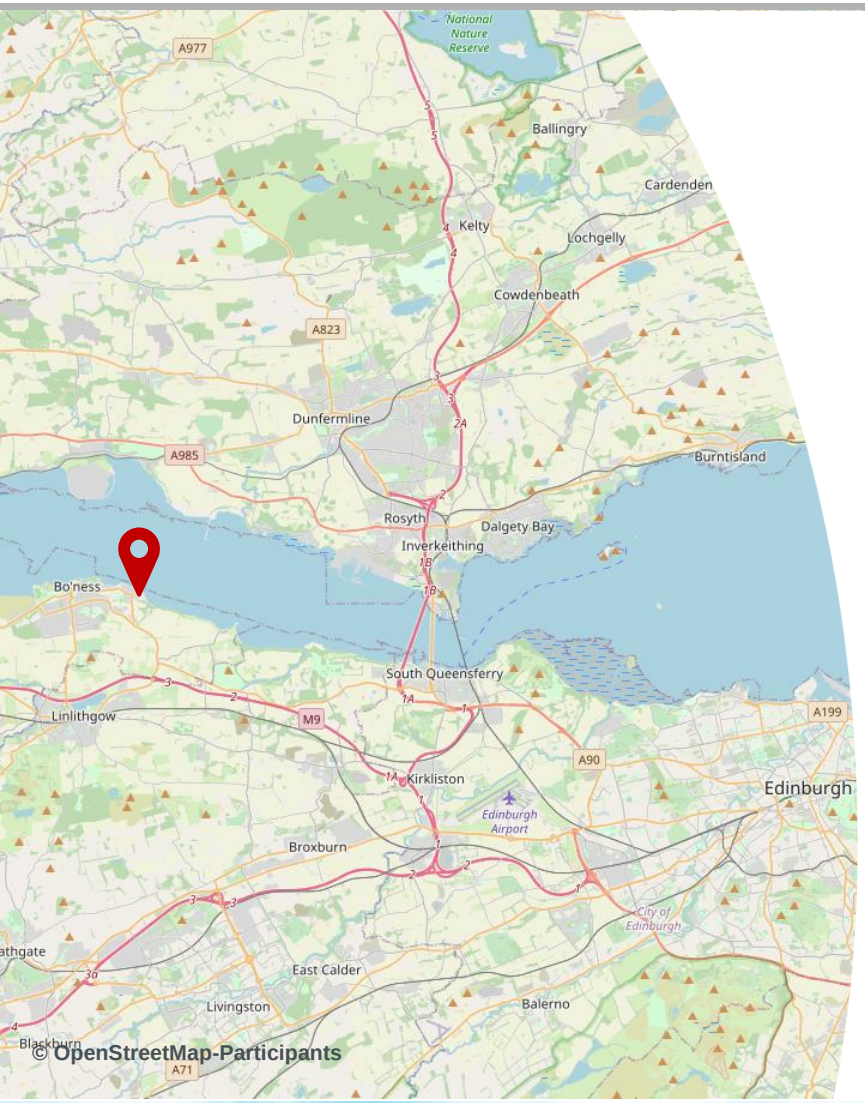
GEA Heat Pump Reference “Cook-Quench-Chill“



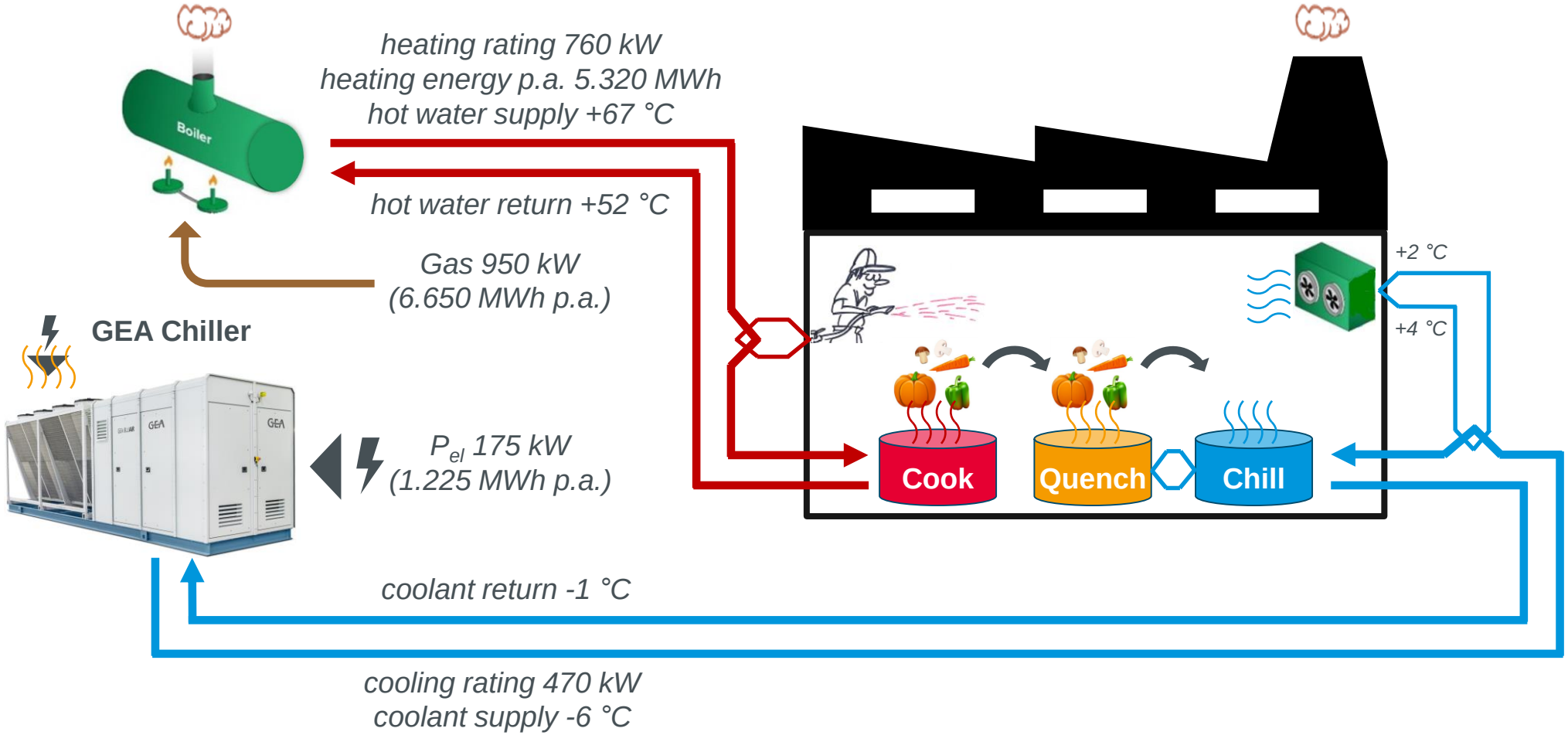
INITIAL SITUATION

- A British based, global food producer operates a plant in Bo‘ness (Scotland) which provides fresh prepared foods, chilled ready meals, soups, salads, etc.
- The production process follows the so-called cook-quench-chill technique:
  Foods are cooked evenly, then transferred to and cooled down in a quench tank at ambient temperature level, and finally released to the chiller.
- The traditional plant uses a chiller and a boiler.

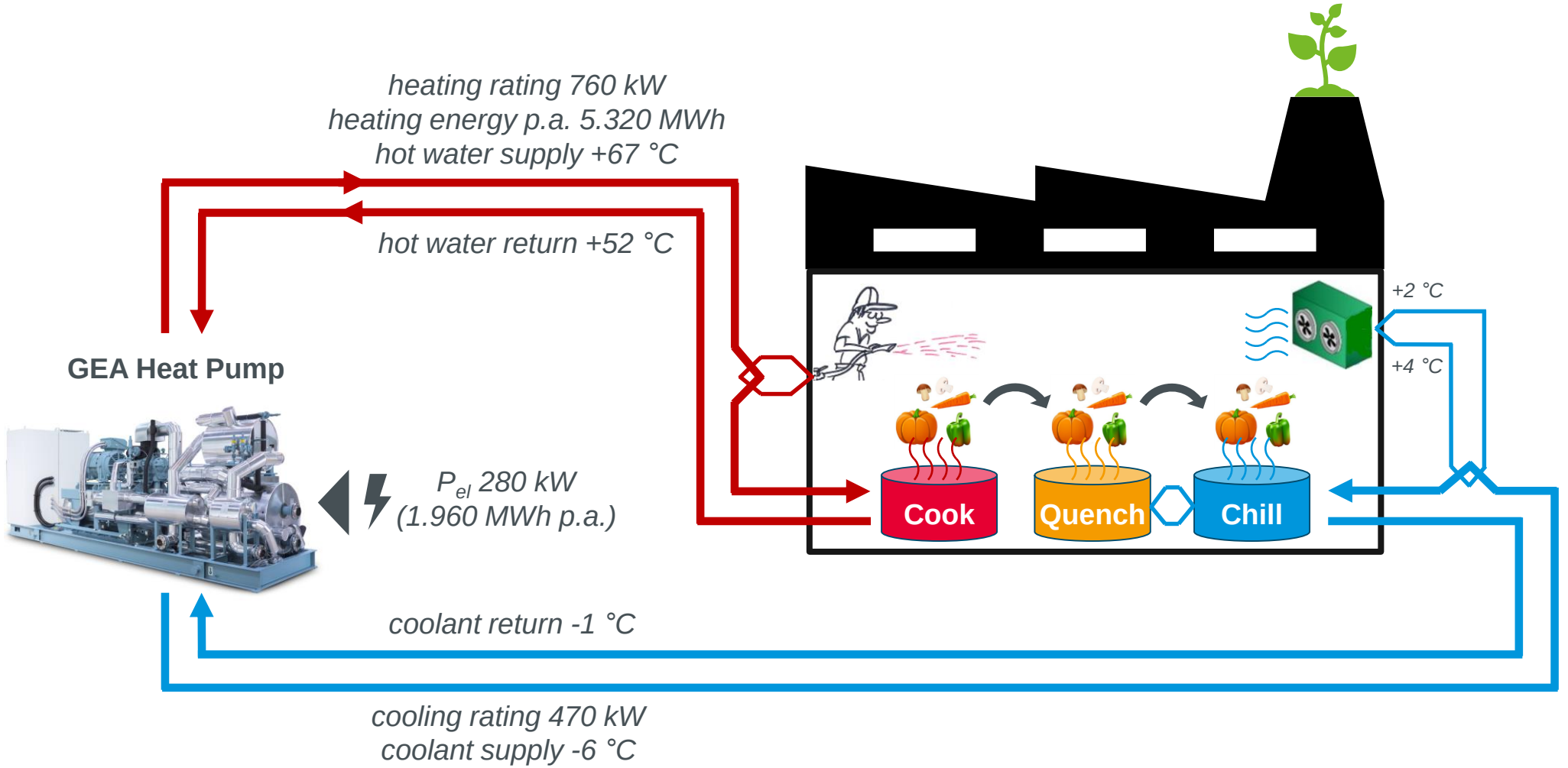
PLAN

- Modernization by installing an efficient, combined chiller – heat pump unit that provides both, cooling capacity for the chilling process and heating capacity for the cooker.

“Cook-Quench-Chill“ Layout Old



“Cook-Quench-Chill“ Layout New



“Cook-Quench-Chill“ Plant Data

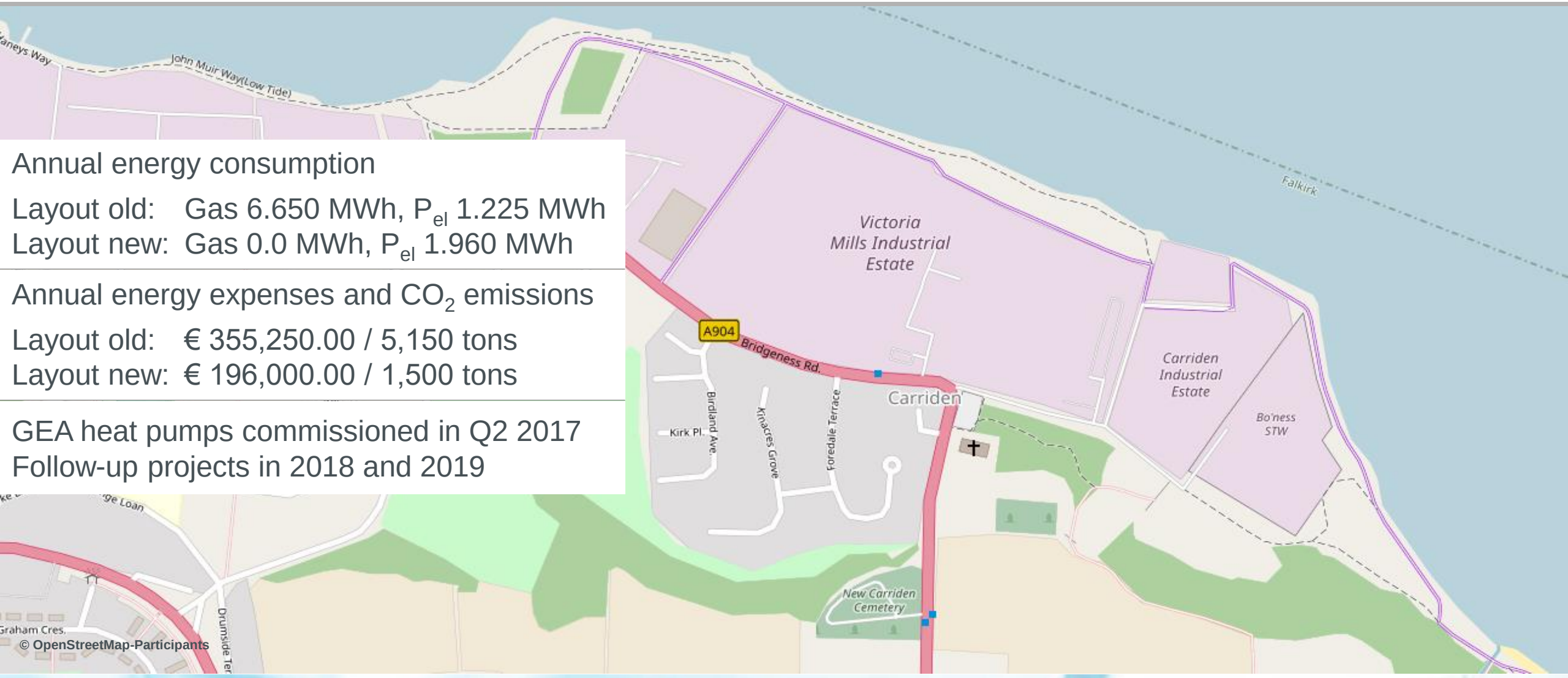
Annual energy consumption

Layout old: Gas 6.650 MWh, P_{el} 1.225 MWh
Layout new: Gas 0.0 MWh, P_{el} 1.960 MWh

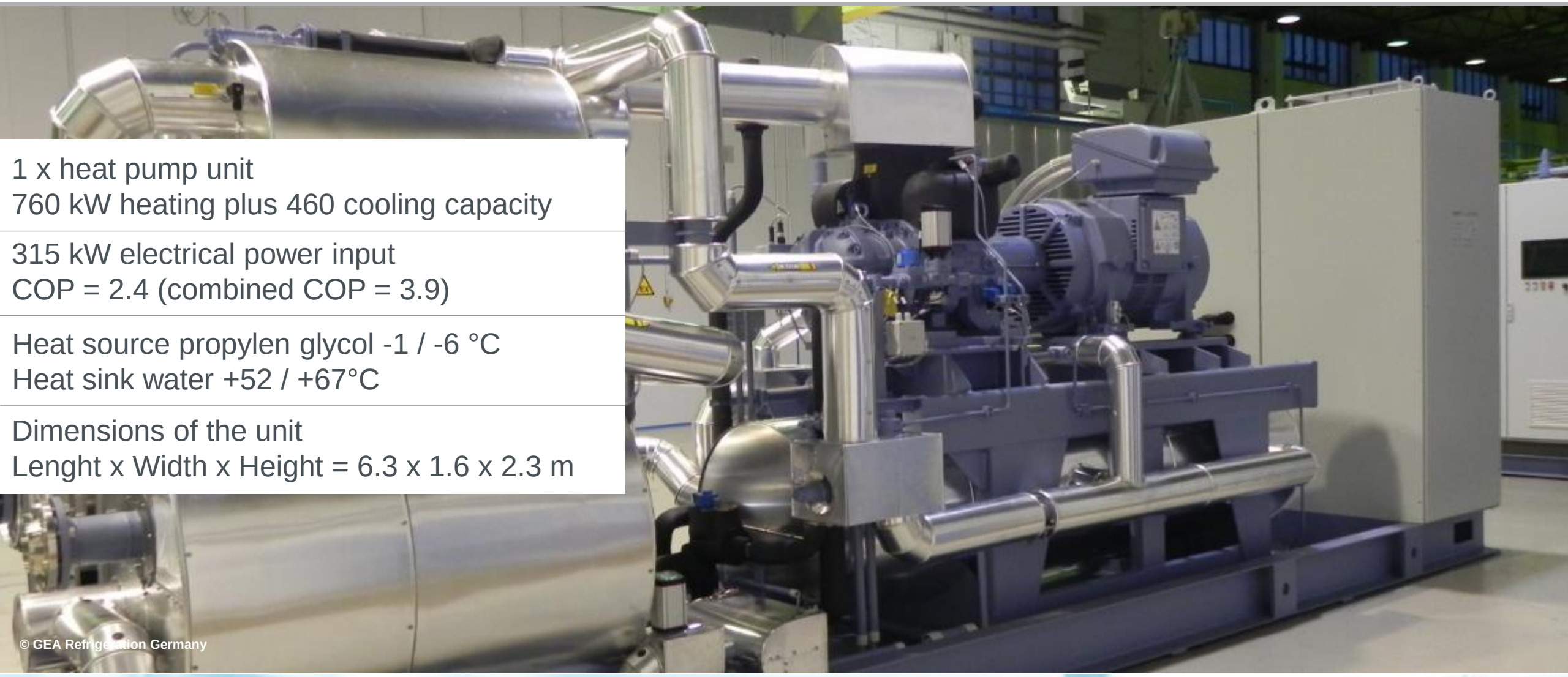
Annual energy expenses and CO_2 emissions

Layout old: € 355,250.00 / 5,150 tons
Layout new: € 196,000.00 / 1,500 tons

GEA heat pumps commissioned in Q2 2017
Follow-up projects in 2018 and 2019



“Cook-Quench-Chill“GEA Heat Pump Data



1 x heat pump unit
760 kW heating plus 460 cooling capacity

315 kW electrical power input
COP = 2.4 (combined COP = 3.9)

Heat source propylen glycol -1 / -6 °C
Heat sink water +52 / +67°C

Dimensions of the unit
Lenght x Width x Height = 6.3 x 1.6 x 2.3 m

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Contact:
Thomas Lergenmueller
GEA Refrigeration Germany GmbH

13509 Berlin
Thomas.Lergenmueller@gea.com

euraammon

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