SCCER EIP
EFFICIENCY OF INDUSTRIAL PROCESSES

WP2 – ENERGY EFFICIENCY (DIRECT)

State of the Art and Need

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NTB Interstaatliche Hochschule für Technik Buchs
FHO Fachhochschule Ostschweiz
HSR HOCHSCHULE FÜR TECHNIK RAPPERSWIL
FHO Fachhochschule Ostschweiz

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& HOW TO CHOOSE A HEATING DEVICE

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SCCER EFFICIENCY OF INDUSTRIAL PROCESSES

- Packaging Sector
- Sensor production
- Injection molding

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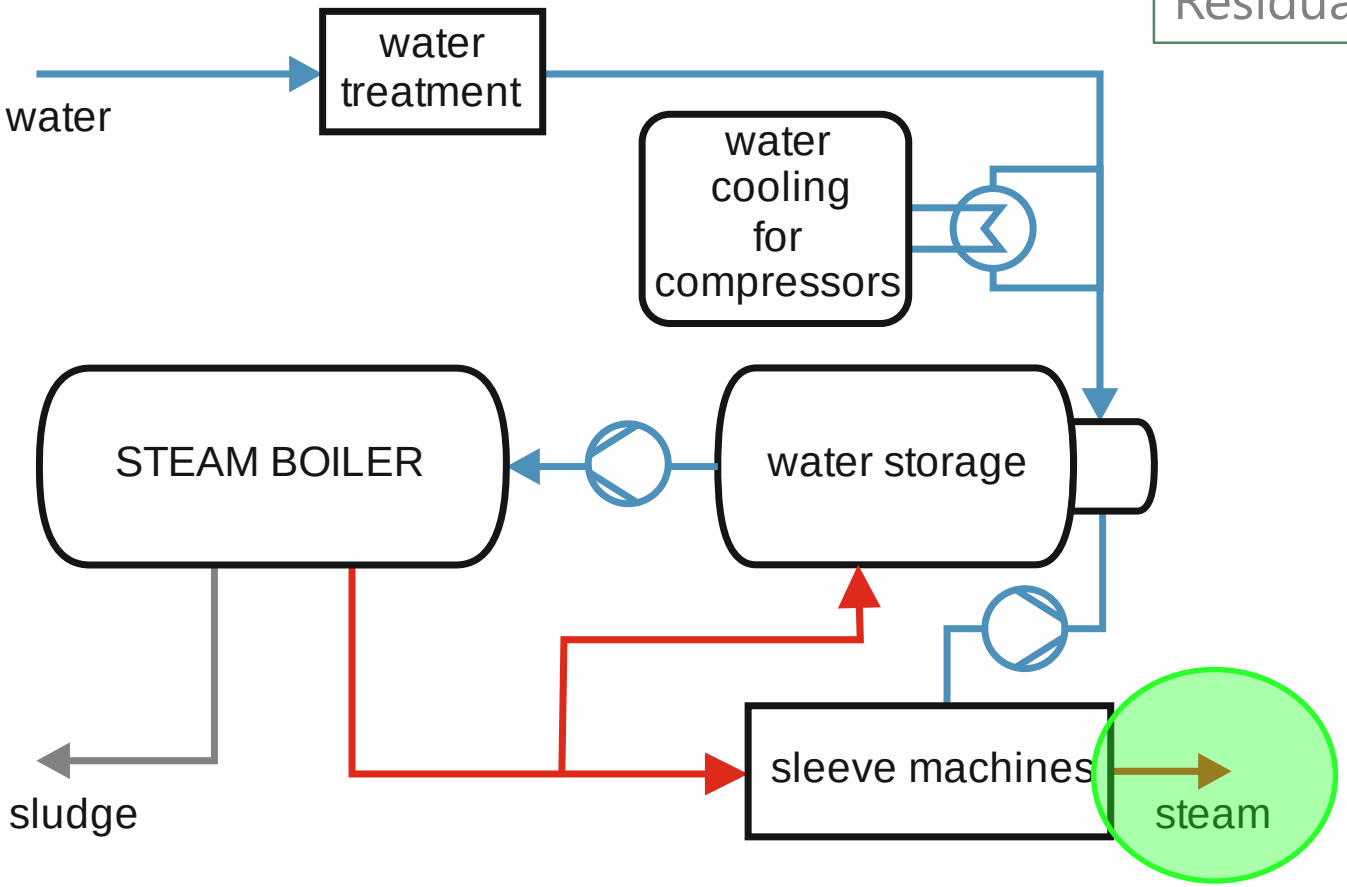
- Case studies: Packaging Sector

Water
Steam
Residual water



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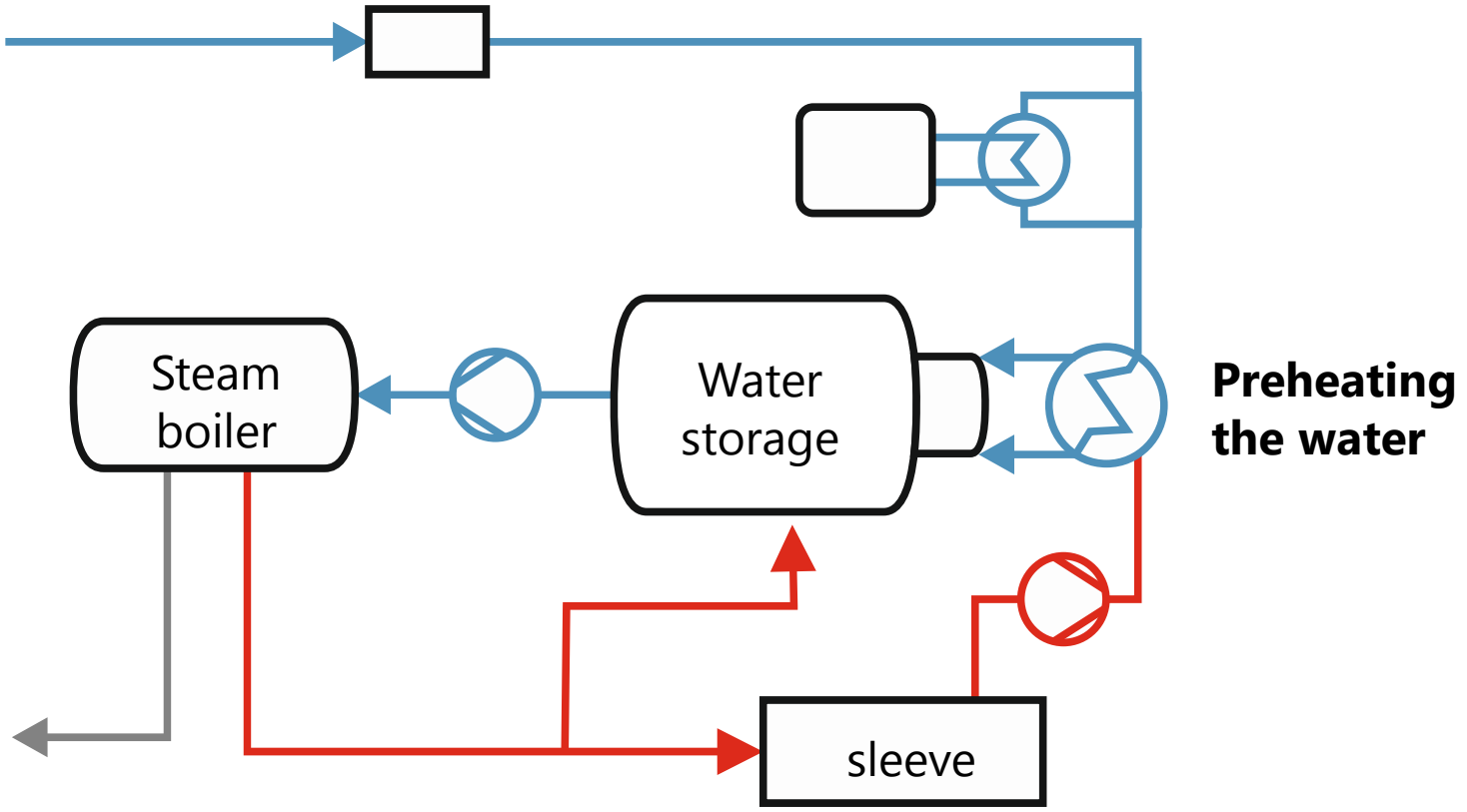
- Case studies: Packaging Sector



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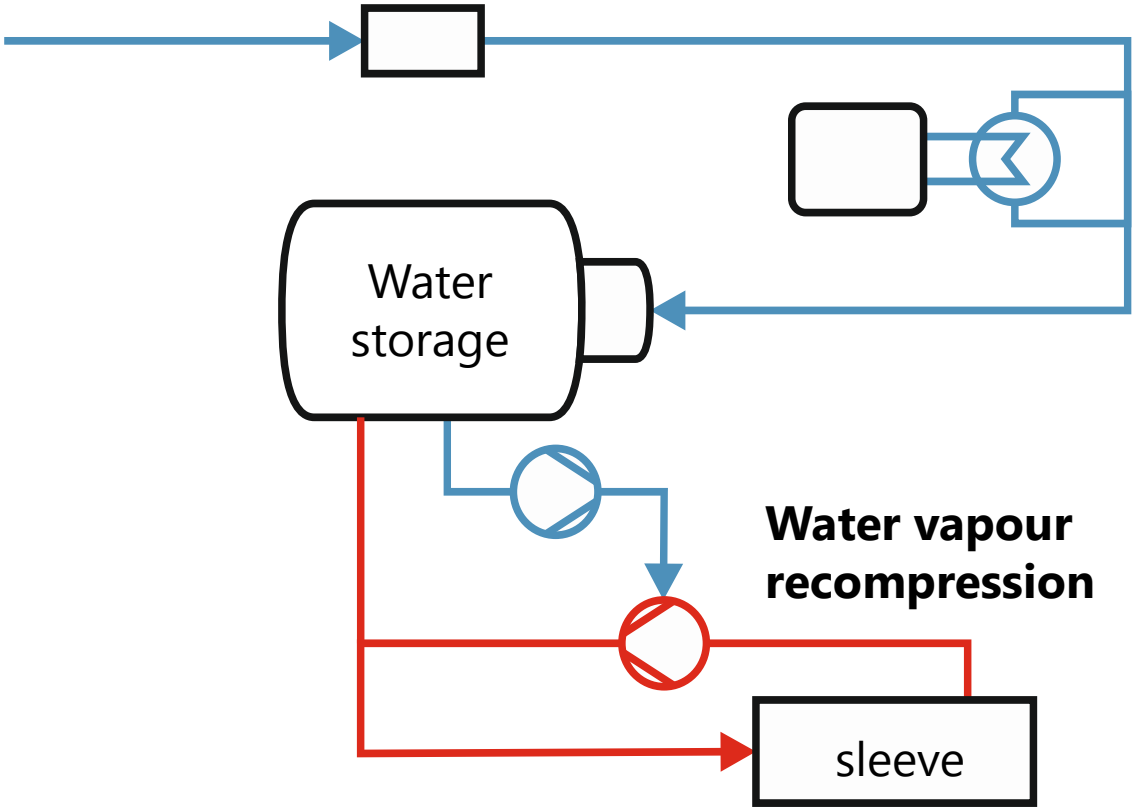

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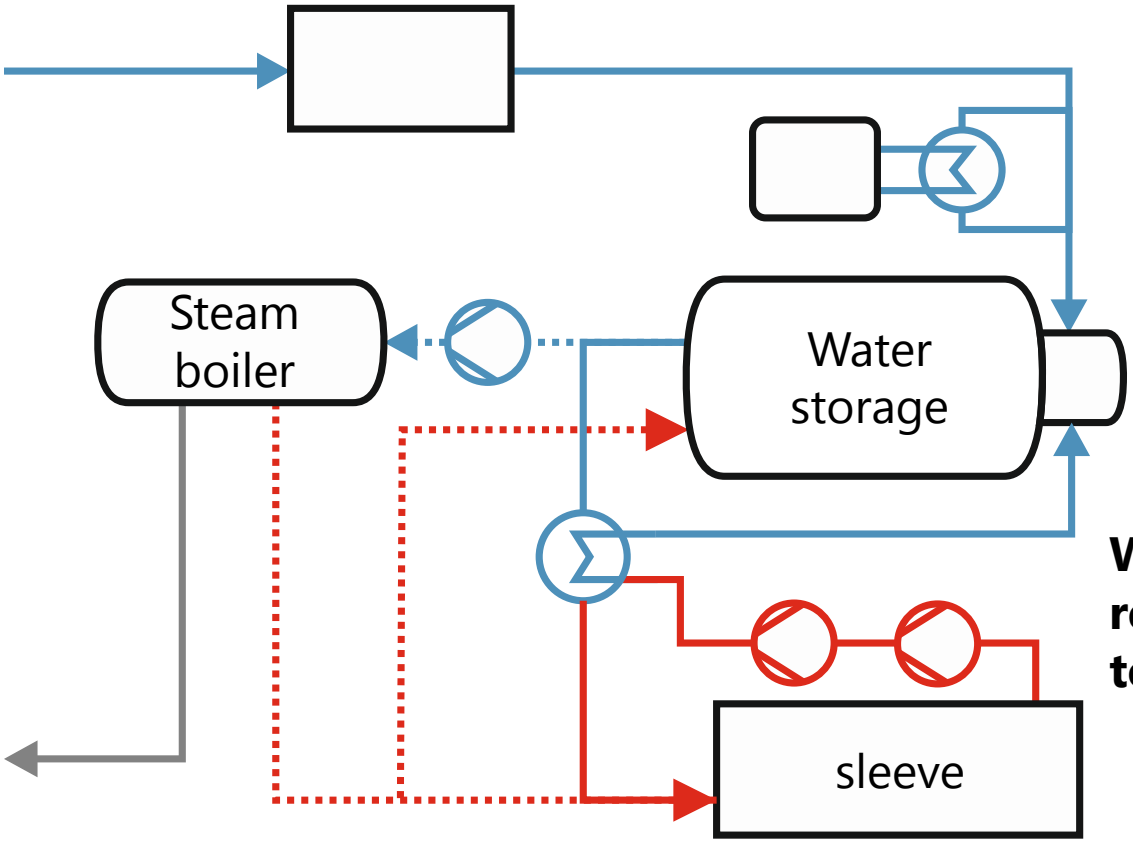
- Case studies: Packaging Sector



Water vapour recompression to boil the water

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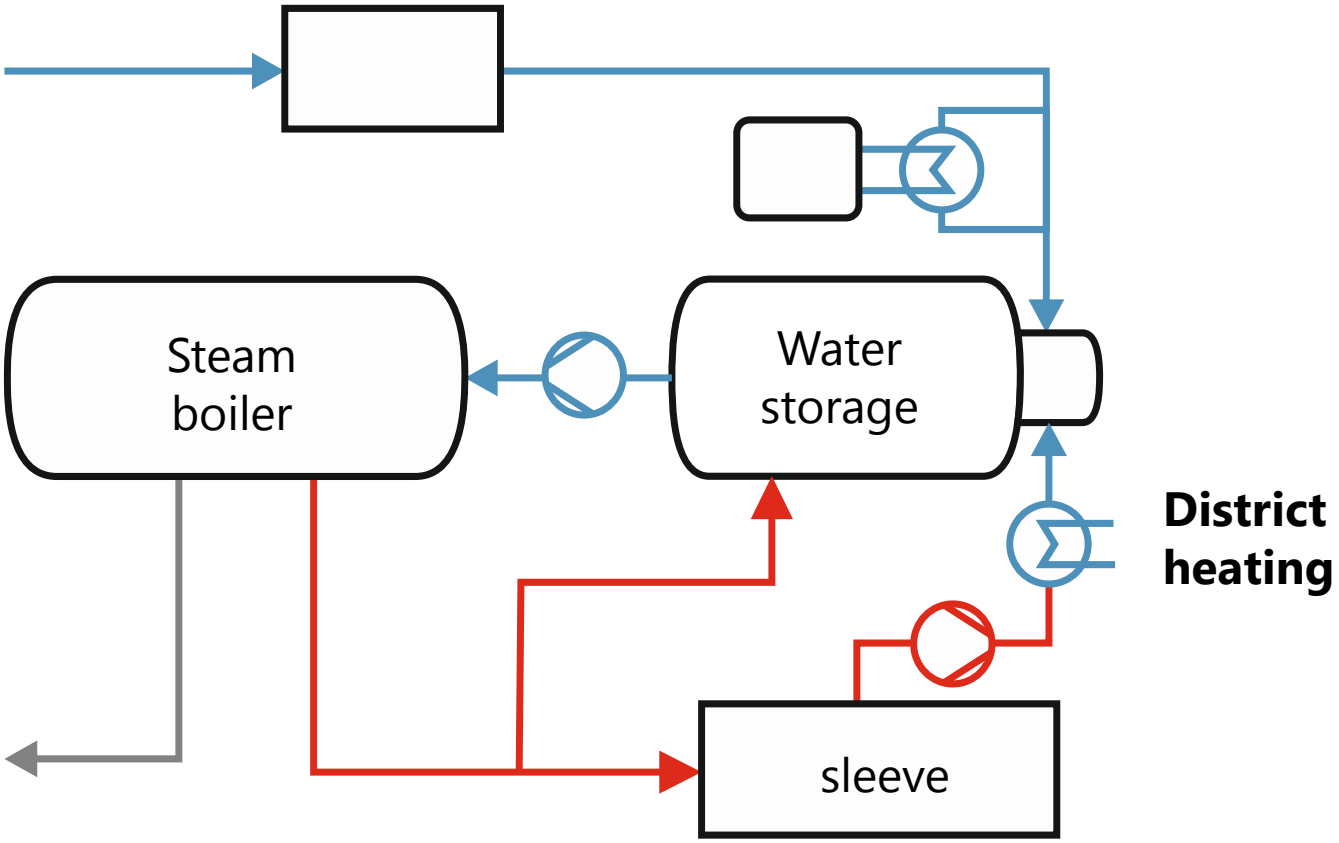
- Case studies: Packaging Sector



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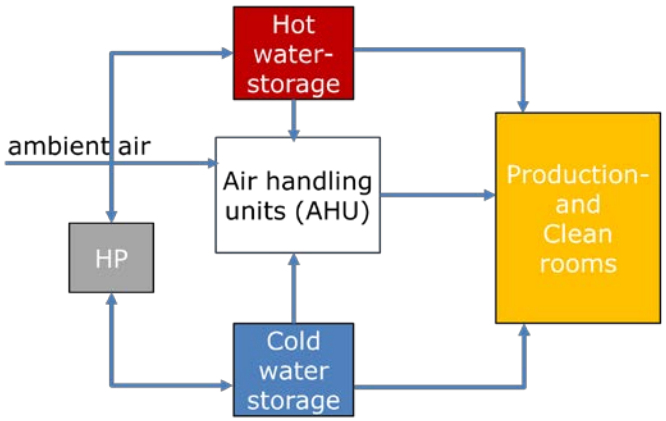
- Case studies: Sensor production



Scheme of the air conditioning system with hot and cold water storages as energy source and sink.

Description: The production steps of the sensors produces a lot of waste heat so that the production rooms need much energy to keep the humidity and temperature under control.

Worksteps:

- Analysis of the electrical and thermal energy consumption of the air handling units (AHU) for production and clean rooms.
- Measurement of the room temperature and humidity as well as the in- and outlet temperatures of the hot and cold water storages.
- Analysis of the thermal power and operation time of heat pumps (HP), analysis of heat and cold storage stratification.

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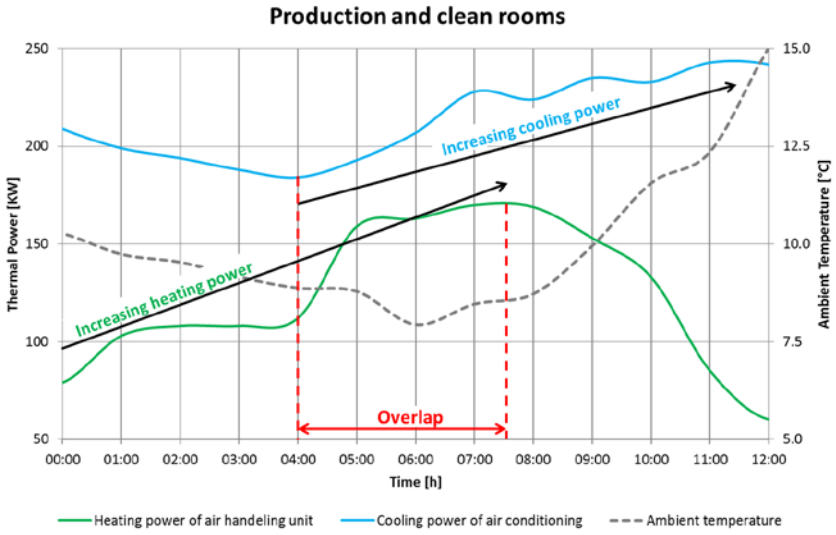
- Case studies: Sensor production



Results: Investigation of the thermal energy consumption for the clean rooms showed that the **air handling unit is heating** the incoming air, while at the same time the **air conditioning is cooling** the room air to keep the room temperature at the desired 23°C.

Other Improvements:

- Reduce inlet temperature on one Kelvin saves 10 kW cooling power in each production room
- Follow up analysis of storage temperature stratification for better control conditions (ON/OFF) of the heat pumps

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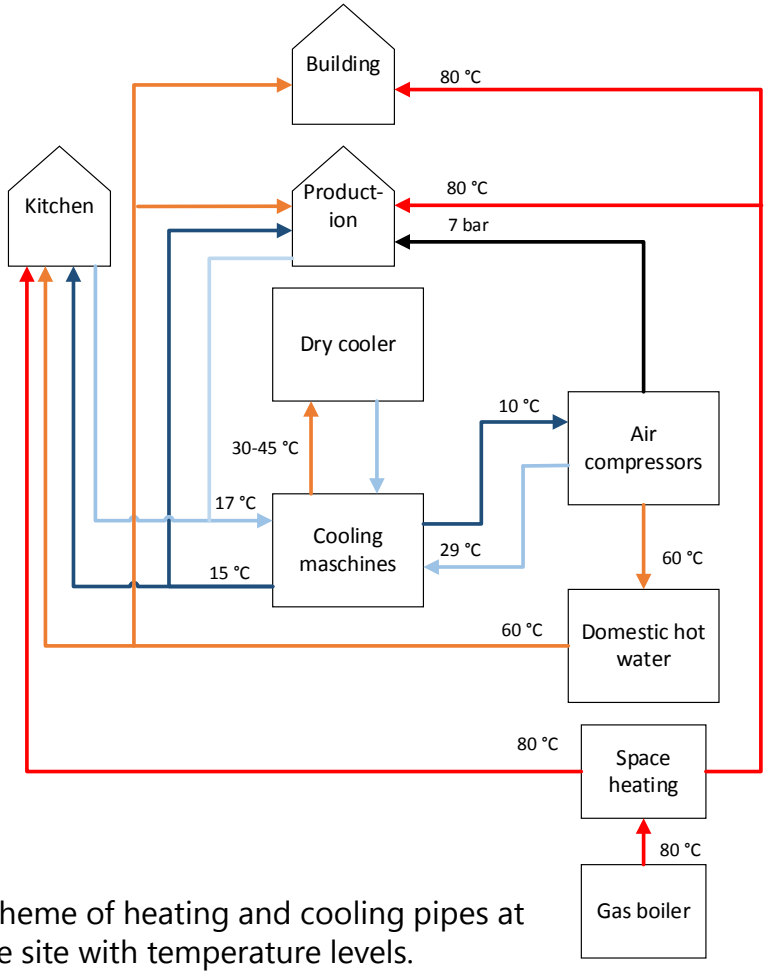
- Case studies: Injection molding



Scheme of heating and cooling pipes at the site with temperature levels.

Description: Energy analysis of two companies were examined. Most of the used energy at the sites goes in process heating and cooling steps.

Work steps:

- Getting to know the main production steps
- Analyzing of the given data
- Drawing a simplify P&I scheme as a basis for discussion
- Creating of heat and cold profiles with energy costs and temperature levels

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Results:

- Air compressor: Only 3% heat recovery achieved, instead of 70% according to manufacturer indication
- Frequency converter for cooling water pumps: Could save 30% electric power

Improvements:

- Insulate hot water pipes in unused spaces
- Using colder outside air instead of warm room air for the air compressors
- Equip cooling water pumps with frequency converters
- Equip air compressors with heat recovery system to use it for heating buildings

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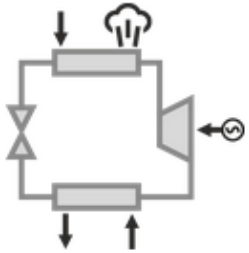
- Market overview:
  - Webtool to compare heating devices

Database of Industrial Heating System

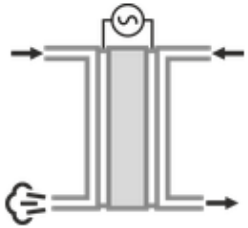
The database has an inventory of industrial heating generating devices. This database is constantly updated and serves as indication of available heat devices on the market. The user is invited to contact the company of any device listed in this database to be ensured of the information provided

Information in the form of a fact sheet is available by clicking on the corresponding image

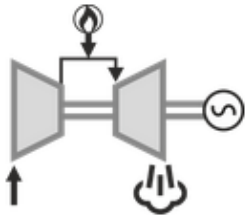
Heat pump:



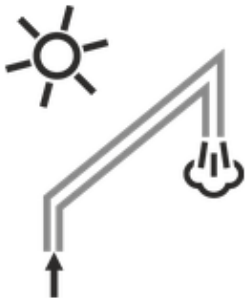
Fuel cell:



Gas Turbine:

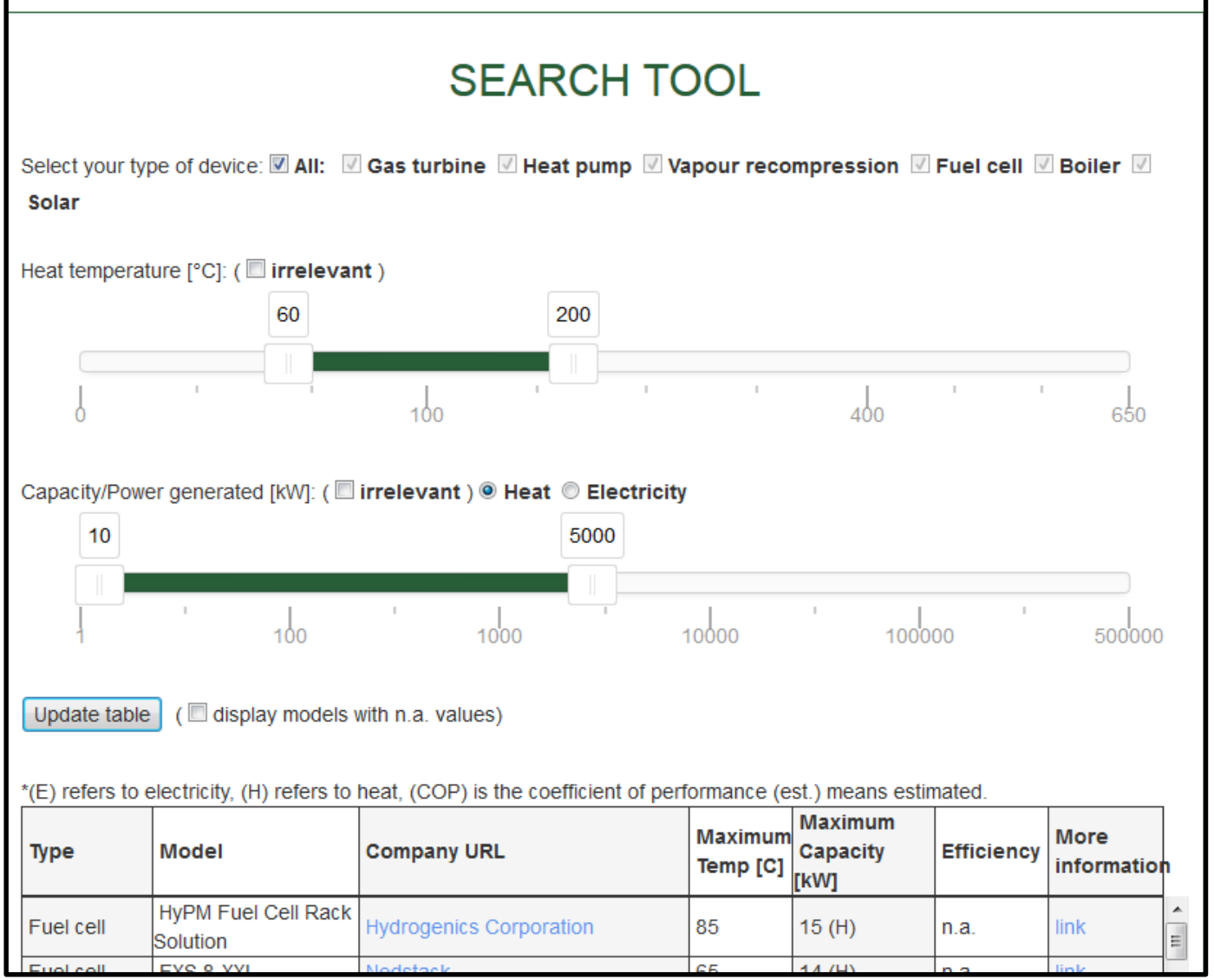


Solar heat and photovoltaic:



WP2

SEARCH TOOL



Type	Model	Company URL	Maximum Temp [C]	Maximum Capacity [kW]	Efficiency	More information
Fuel cell	HyPM Fuel Cell Rack Solution	Hydrogenics Corporation	85	15 (H)	n.a.	link
Fuel cell	EXS & XXL	Nedstack	65	14 (H)	n.a.	link

(printscreen from Webtool)

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Discussion (10 min)