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WEBINAR ON HIGH TEMPERATURE HEAT PUMPS

7 NOVEMBER 2024

Lessons Learned & Key Messages

Cordin Arpagaus, OST

Lessons Learned & Key Messages

Guidelines for the implementation of HTHPs in industrial processes

Lessons Learned:

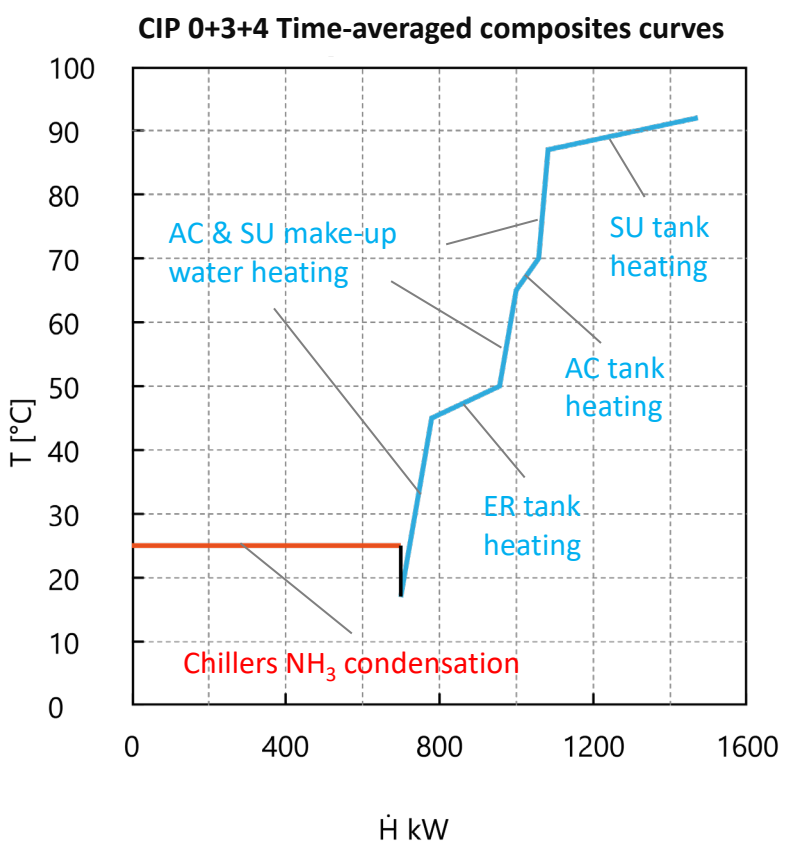
- HTHPs provide in **energy savings and decarbonization**
- **Guidelines offer insight from basic principles to defining efficient integration concepts**
- Consider CAPEX, OPEX, funding, and subsidies in **economic calculations**

Key Messages:

- **Apply Pinch Analysis**, which is relevant for integration
- **Favorable electricity prices are crucial** for HTHP adoption

Lessons Learned & Key Messages

ELSA Dairy case study: Integration concept & status



Lessons Learned:

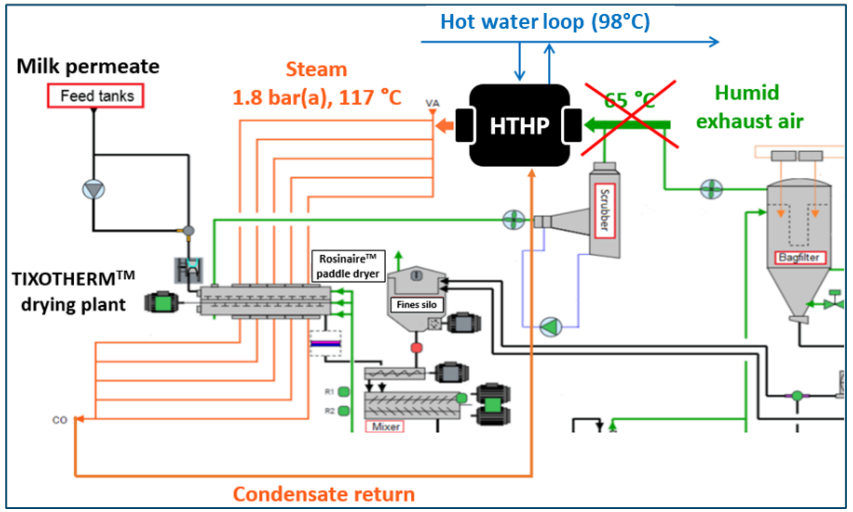
- **In retrofit projects, constraints can become killing factors** → check potential killing factors first before moving on
- The search for "optimal" HP integration solutions under **practical constraints may highly combinatoric and multicriteria** → Use the guidelines to filter out candidates

Key Messages:

- **Gain process knowledge** before making decision → a HTHP is not always necessary, HP may do the job even more efficiently
- With focus on decarbonisation, **HP is hard to "sell"** and may be contra when steam is produced from biomass

Lessons Learned & Key Messages

Cremo case study: Integration concept & status



Lessons learned:

- Integration at process level on 5th floor is **technically feasible** with a 500 kW steam HTHP
- **Small capacity HTHP** → efficiency decrease & specific costs rise
- **98% CO_2 emissions reduction** with HTHP integration

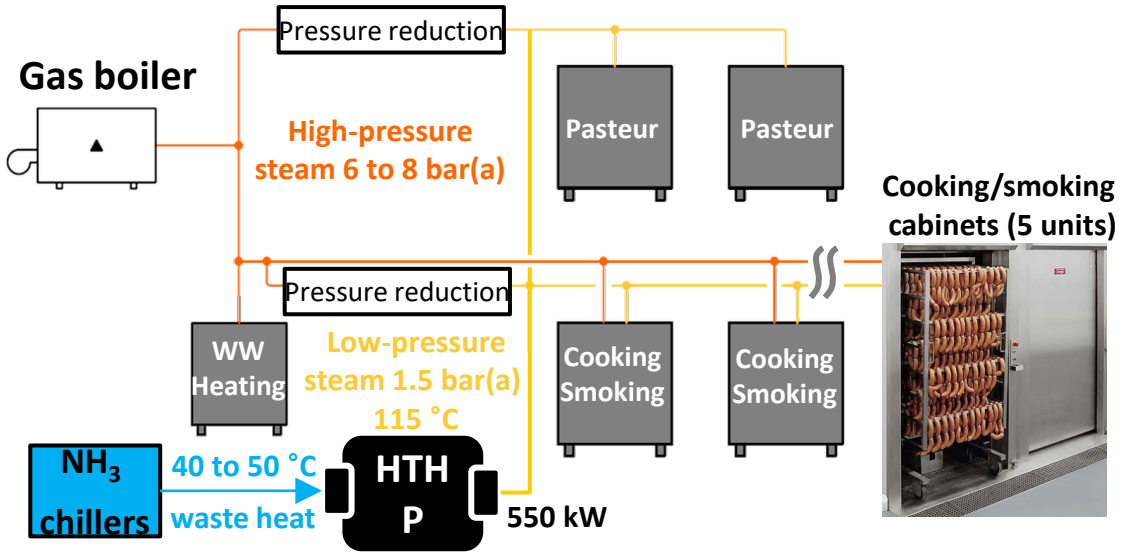
Key messages:

- HTHP is a solution for **industrial heat & steam decarbonization**
- **Good knowledge of process streams is necessary:**
  - To find best match between sink and source for HP integration
  - To supply their fundamental heat needs (not necessarily as currently done) → reduce temperature levels of heat supply and enhance HP efficiency
- New and renewable technologies have a **higher cost**. OPEX overcost acceptable for CO_2 emissions avoided?

Lessons Learned & Key Messages

Gustav Spiess case study: Integration concept & status

Spiess
Wurst für Feinschmecker.



Lessons Learned:

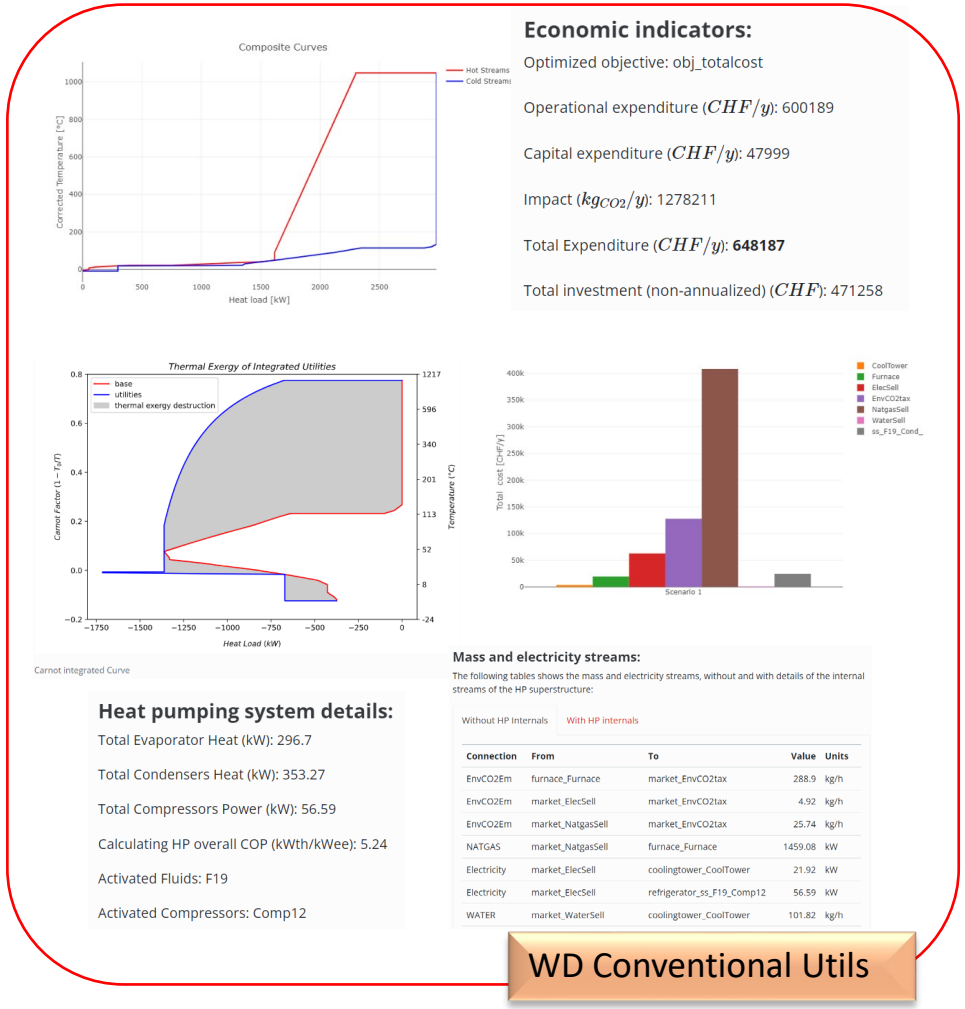
- HTHP technologies and waste heat from chillers are available
- Energy costs & CO_2 emissions can be reduced

Key Messages:

- **Economic sensitivity analysis is crucial**
- **Measured steam profile is essential** for decision-making and HTHP sizing
- **Pinch Analysis supports decision-making**

Lessons Learned & Key Messages

Web-based integration tool



Lessons Learned:

- **Tools are required** to systematically and objectively compare the performance of alternative technologies
- **Automated computational & reporting tools can speed up** modeling, reporting and comparison of scenarios
- **Data-handling platforms**, like Excel and open-source programming languages and libraries are useful

Key Messages:

- Develop support tools that **fit different users' profiles**
- **Qualified engineers** with powerful tools are required to leverage models databases and routines for industrial diagnosis and optimization
- **Consider open-source tools** addressing web scalability, maintainability, server hosting, and confidentiality issues

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Annex 58 HTHP-CH: Integration of High-Temperature Heat Pumps in Swiss Industrial Processes

Project Number: SI/502336

Industrial partner feedback round

(1) What are your lessons learned from the project?

(2) What topics were missing (not addressed) in the project?

(3) What are the future next steps with the heat pump integration in your company?

Industrial partner feedback round

Questions from the Q&A chat

(1) What primary energy are you using for heating today? (gas, oil, biomass, electricity, district heating)

(2) Do you already have a heat pump in operation? (yes, no)

(3) Do you already have experience with HTHPs? (yes, no)

(4) Is there potential for HTHP in your company? (yes, no)

(5) What would be the required heating capacity for the HTHP? (50 to 100 kW, 100 to 500 kW, 500 kW to 1 MW, 1 MW to 5 MW, 5 to 10 MW, <10 MW)

(6) What would be the required steam pressure (hot water temperature)? (1 bara, 2 bara, 3 bara, 4 bara, 5 bara, 80 °C, 100 °C, 120 °C, …)

(7) What refrigerant would you prefer in a HTHP? (water, ammonia, CO2, hydrocarbon, noble gas, synthetic HFO, mixture)

Answers from the Poll

1. Have you already implemented or realized an industrial heat pump?

Yes	Ihre Antwort	47%
No		53%

2. Do you have a specific application for an industrial heat pump?

Yes	Ihre Antwort	72%
No		28%

3. If yes, which application (2 to 3 keywords)?

4. Which heating capacity is required?

<100 kW		2%
100 to 200 kW		10%
200 to 500 kW	Ihre Antwort	15%
500 kW to 1 MW	Ihre Antwort	21%
1 to 5 MW	Ihre Antwort	35%
>5 MW		17%

5. Which refrigerant would you use for an industrial heat pump?

Ammonia (R717)	Ihre Antwort	20%
CO2 (R744)	Ihre Antwort	10%
Hydrocarbon (e.g. butane R600)	Ihre Antwort	15%
Water (R718)	Ihre Antwort	25%
Synthetic HFO low-GWP (e.g. R1233zd, R1336mzz)	Ihre Ant...	8%
No preference		22%

6. In which industrial sector do you see the greatest potential for HTHP?

Food and beverage	Ihre Antwort	27%
Chemicals		22%
Pharma	Ihre Antwort	21%
Pulp and paper		16%
Textiles		4%
Metal		3%

7. How did you like this Webinar?

4.2

0	2 %	13 %	37 %	41 %

Sie haben Level 5 gewählt

43 Antworten

7/7

Fertig