TASK XV – Subtask 4
Industrielle Abwärmenutzung

IEA Vernetzungstreffen "Klimafitte Industrie: Forschung und Entwicklung für die Industrie der Zukunft"

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Takeaways from former Subtasks

- Industrial systems are complex, requiring clear and replicable **strategies for identifying and quantifying excess heat**
- **Future changes in industrial energy systems**, such as deep decarbonization, **will impact excess heat levels** and may impact excess heat projects with long lifetime
- **Strong policy frameworks** are essential for providing certainty to stakeholders, **enabling better risk management** in excess heat projects
- Innovation and **cooperation between industries**, along with new technologies, are key to **unlocking the full potential of excess heat utilization**

Task XV Subtask 4

Time frame: 01.2024 – 12.2025

Task Manager: René Hofmann (TU Wien)

Participating counties: Austria, Canada, Denmark, France, Germany, Norway, Portugal, Sweden, Switzerland

Institutions: University, Research Institutes, Consultants, Industry

The role of excess heat in industry and industrial symbiosis

Activity 1

Strategic process integration/intensification for future changes in industrial energy systems

Activity 2

Ongoing projects at different TRL levels and systematical knowledge transfer

Activity 3

Activity 1: The role of excess heat in industry and industrial symbiosis

Motivation

- **Cooperation across sectors**: Collaboration between industries and other sectors improves efficiency (e.g., Domestic heating, Power-to-X)
- **Increased complexity**: Symbiosis and Power-to-Heat require new frameworks—holistic system analysis is key

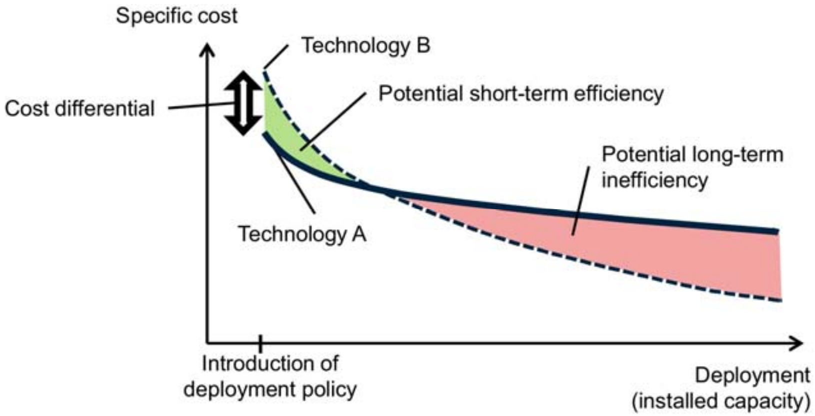
Objective

- **Guidelines and recommendations for industrial symbiosis project:** Includes methods for optimizing excess heat use, energy efficiency, GHG reduction, planning, risk assessment, and new business models.

Approach

- **Sharing of experiences with industrial symbiosis projects:** discuss holistic identification and implementation methods, recommendations for future regulatory frameworks, assess risk/barriers

Activity 2: Strategic process integration/intensification for future changes in industrial energy systems



SCHMIDT, T. ET AL. DO DEPLOYMENT POLICIES PICK TECHNOLOGIES BY (NOT) PICKING APPLICATIONS?-A SIMULATION OF INVESTMENT DECISIONS IN TECHNOLOGIES WITH MULTIPLE APPLICATIONS, RESEARCH POLICY, VOLUME 45, ISSUE 10, 2016, PAGES 1965-1983, HTTPS://DOI.ORG/10.1016/J.RESPOL.2016.07.001.

Motivation

- **Process Integration Methods**: Techniques like pinch analysis and optimization are highly effective
- **Avoid Lock-In**: Long-term heat measures must account for future technological and economic changes to prevent dead-ends and lock-in effects

Objective

- **Optimization & guidelines:** Approaches for introducing new technologies
- **Managing uncertainty & risks:** Address policy, social, economic, and technical risks

Approach

- **Experience exchange**: Share insights on demo plant operations and strategic planning for deep decarbonization.
- **New methods**: Introduce uncertainty management techniques from academia to industry

Activity 3: Ongoing projects at different TRL levels and systematical knowledge transfer

Motivation

- **Knowledge & data transfer**: Systematic sharing of knowledge and data to support future evaluations
- **Project insights**: Large-scale projects and high-TRL examples serve as blueprints for new initiatives

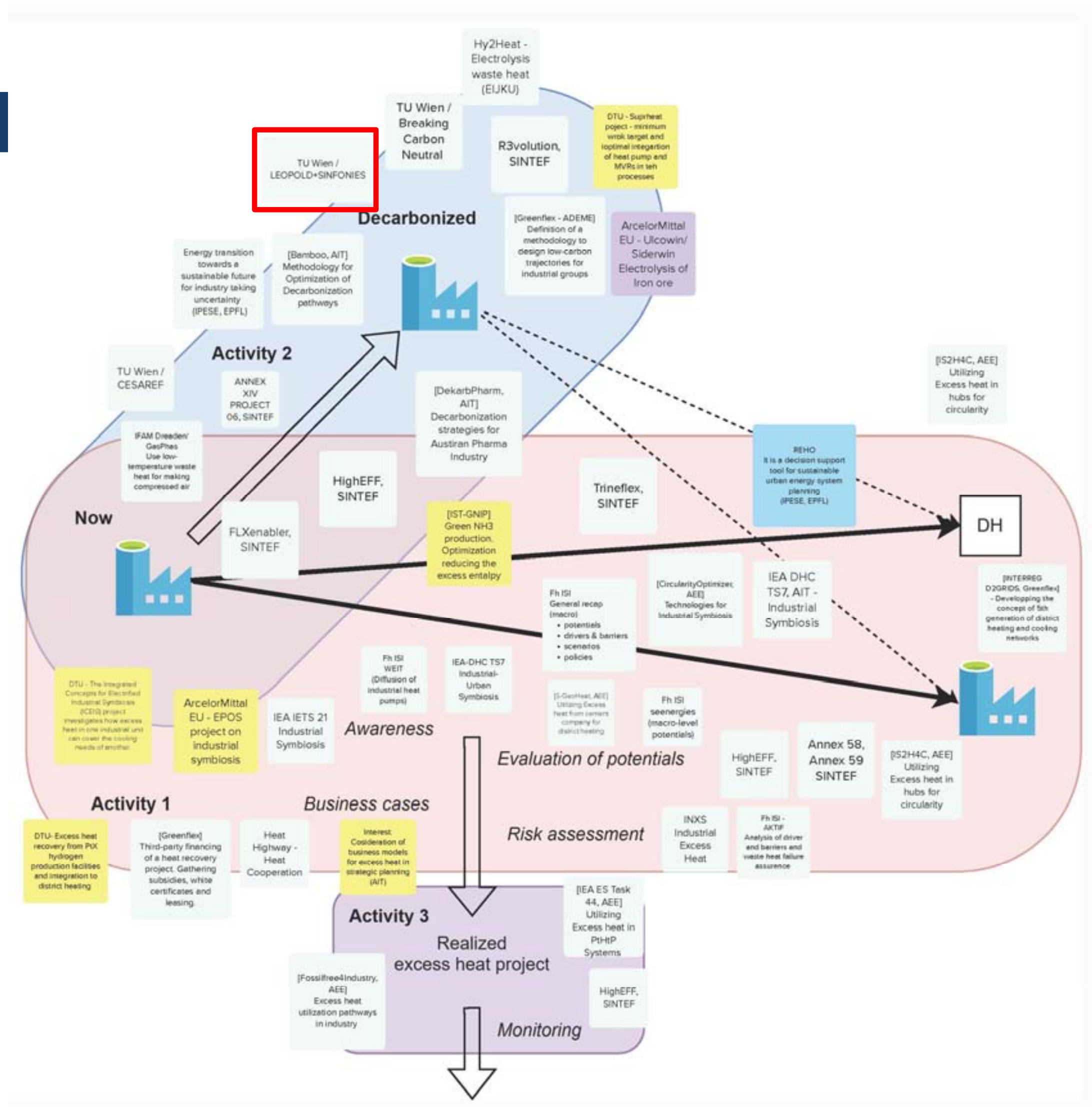
Objective

- **Knowledge exchange platform**: Open, accessible database for machine-readable data on excess heat projects
- **Project metrics & analysis**: Assess key metrics and use the database for advanced analysis
- **Ongoing project collection**: Gather innovative projects across various TRL levels

Approach

- **Database insights**: Share experiences from other domains and evaluate data exchange formats
- **Data needs**: Use questionnaires to identify required information for effective process integration analysis

Mural Board Discussion



LEOPOLD

- Investigation of **alternative energy supply technologies for a steel rolling mill**
  - **Decarbonization** of energy-intensive processes
  - Better **utilization of waste heat**

- Reheating steel
  - At 1250 °C in an industrial furnace **using natural gas**
  - **Waste heat** flow from the furnace **cannot yet be used internally**

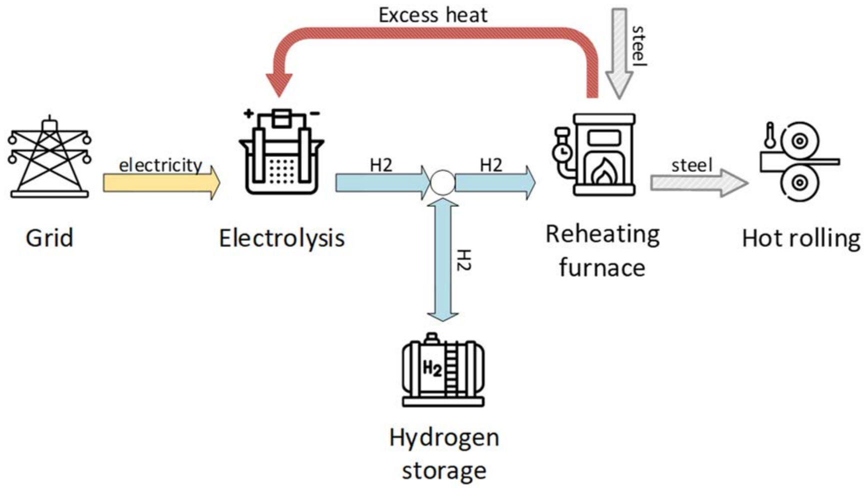
- Alternative energy supply
  - **Hydrogen**
  - **SNG**
  - Electrification

LEOPOLD

- Requirements for the alternative energy system
  - **Flexible energy system** (adaptation to price fluctuations)
  - **Use of excess heat** on site

- Excess heat flow
  - Utilization by **SOEC** for the **evaporation of water**

- **Design** of the energy system using mathematical optimization (**MILP**)

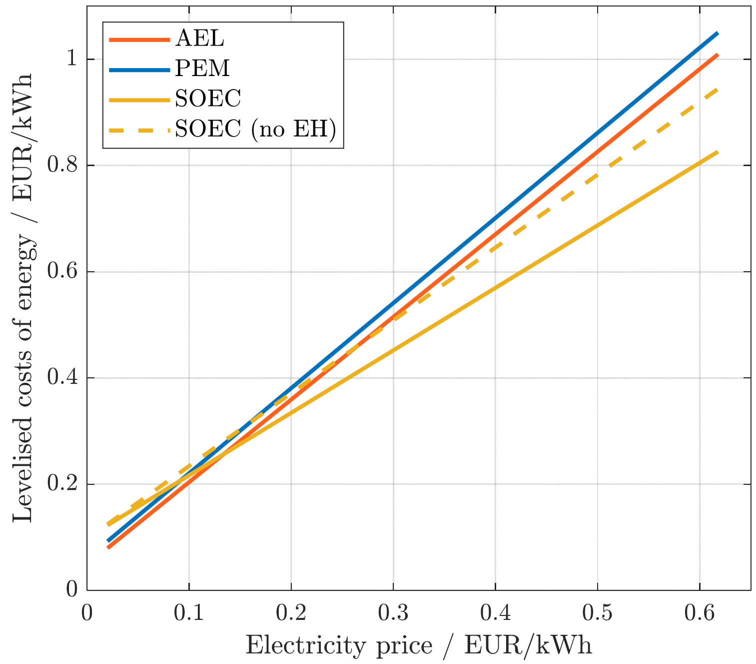


Electrolysis: AEL, PEM, SOEC

Storage: compressed gas

LEOPOLD

- **H_2 production costs can be significantly reduced** through excess heat utilization
- Reheating furnace in combination with SOEC good use case for excess heat utilization
- **Excess heat integration** must be considered in the design, as it **affects dimensioning** and operation



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