

# VISION & HIGHLIGHTS DER NEFI INITIATIVE (NEW ENERGY FOR INDUSTRY)

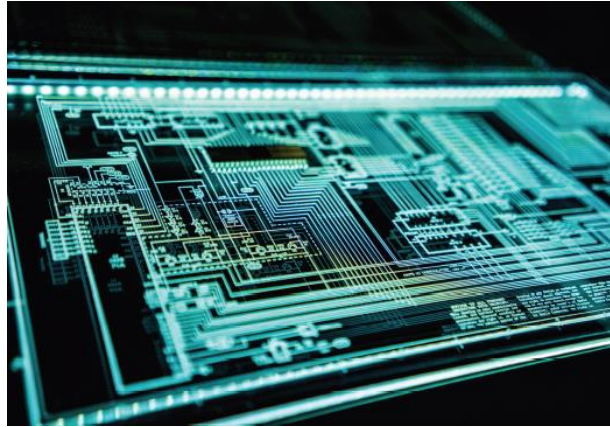
Dekarbonisierung des industriellen Energiesystems,  
Schlüsseltechnologien und Pilotprojekte

DI Dr. Wolfgang Hribernik

*Head of Center for Energy, AIT Austrian Institute of Technology*

*Verbundkoordinator New Energy for Industry (NEFI)*

# CHALLENGES & DRIVERS

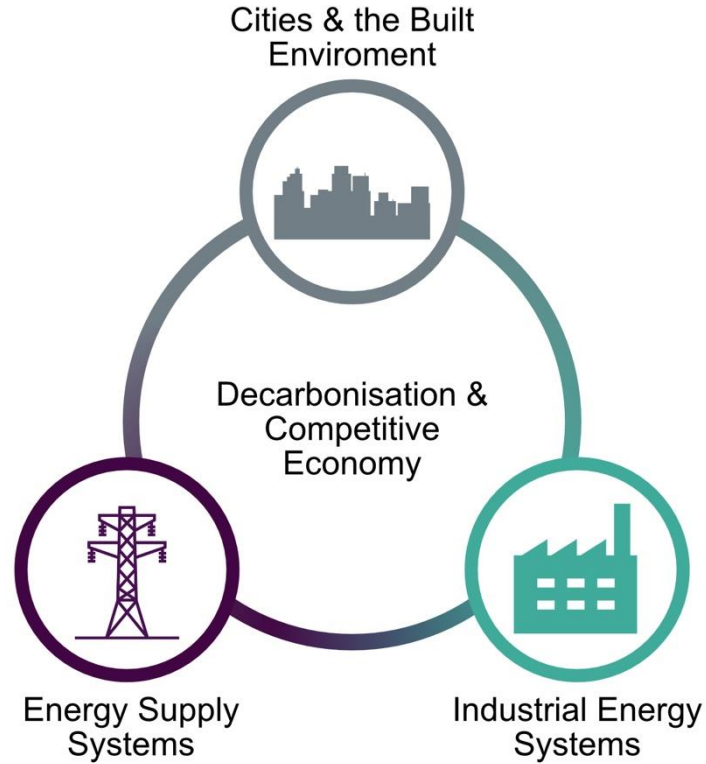


- Climate change
- Deep decarbonisation
- Energy & mobility transition

- Industrial competitiveness
- Business innovation
- Digitalisation

- Urban resilience
- Infrastructure needs
- Societal changes

# STRATEGIC POSITIONING



# AIT CENTER FOR ENERGY FACTS & FIGURES

---

## FUNDING FRAME (CO-FINANCED)

**56%**

National

**44%**

International

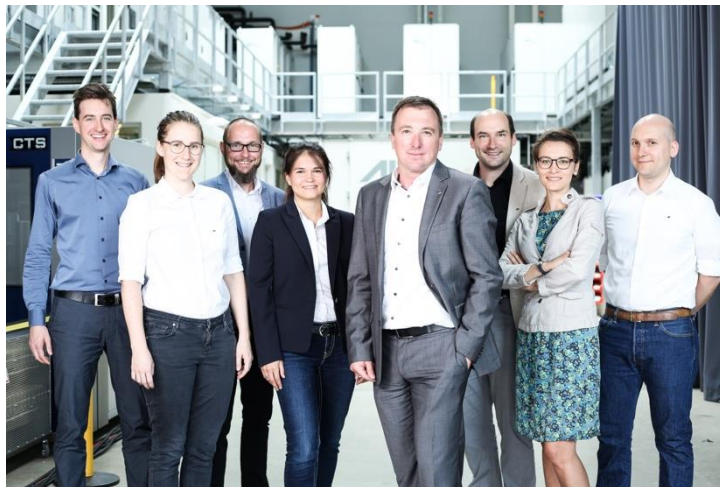
---

## INCOME 2021

**8.4 Mio €** AF

**8.7 Mio €** KF

**13.2 Mio €** BM



---

## RESEARCH FIELDS

**12**

---

## SCIENTIFIC PUBLICATIONS

**270+** per year

---

## RESEARCHERS AND SCIENTISTS

**250+** engineering, physics, architecture,  
IT, economics, social science

---

## SPIN-OFF VENTURES:

**Digital Findet Stadt GmbH (20%)**

**Viridad GmbH (19%)**

---

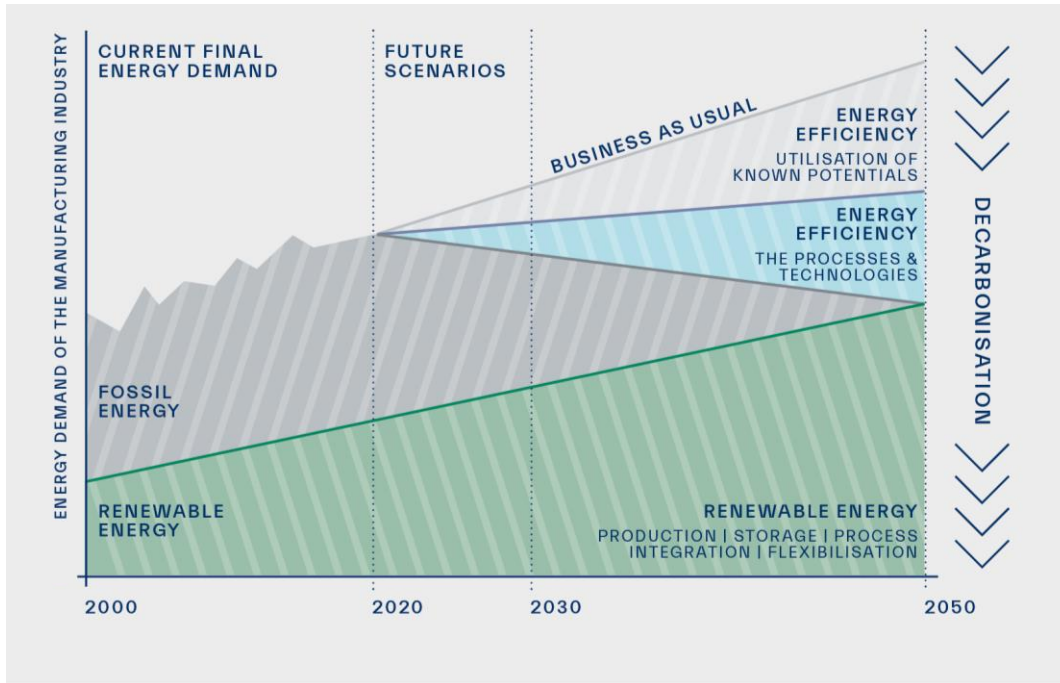
## NATIONALITIES

**25+**

# Industrial Decarbonization

# NEFI VISION & GOALS

NEFI key technologies “Made in Austria” enable the **decarbonisation** of industrial energy systems and help to **secure Austria’s position** as an industrial location.



**Decarbonisation**  
of industrial energy systems

100 % renewable energy supply at selected locations

**Added value “Made in Austria”**

through export and technology development

**Securing the industry location**

contribution to the economic location Austria by user involvement

# NEFI NEW ENERGY FOR INDUSTRY



**WOLFGANG HRIBERNIK**  
NEFI Network Coordinator  
AIT Center for Energy



**THOMAS KIENBERGER**  
Head of NEFI\_Lab  
Head of Chair for Energy  
Network Technology at  
University of Leoben



**CHRISTIANE EGGER**  
Member Cluster Steering  
Committee  
Deputy Manager OÖ  
Energiesparverband  
Manager Cleantech-Cluster  
Energy



**DORIAN WESSELY**  
Member Cluster Steering  
Committee  
Business Upper Austria  
Manager Cleantech-Cluster  
Environment



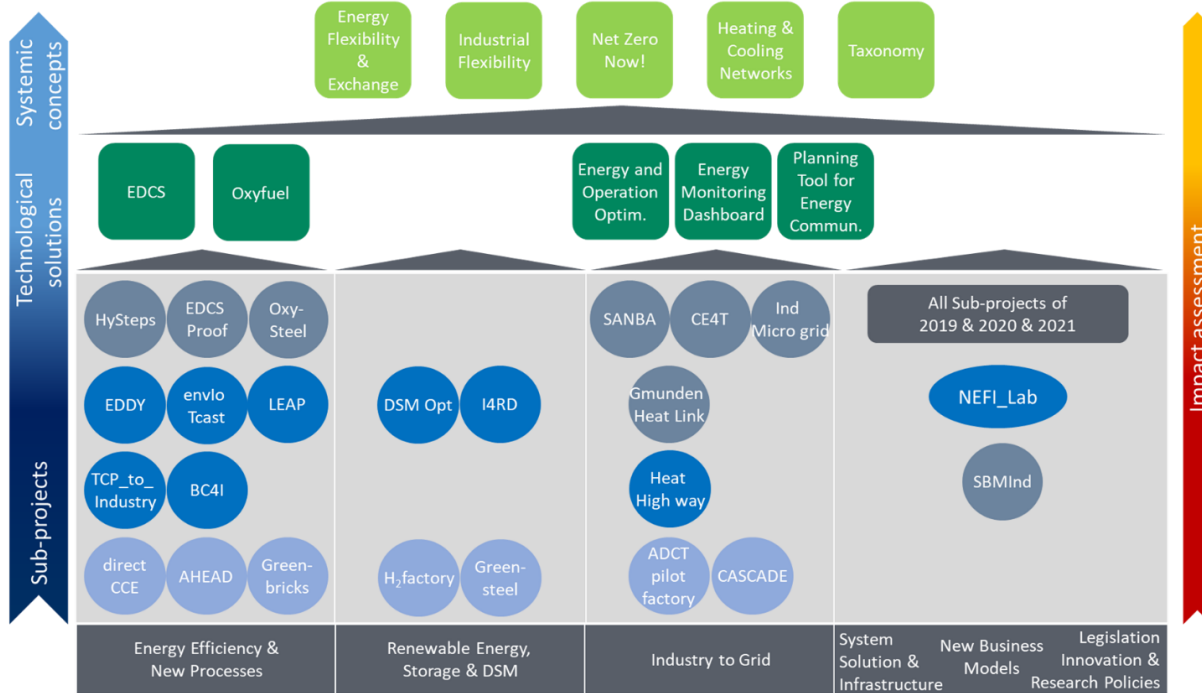
**BERNHARD GAHLEITNER**  
NEFI Operative Coordination  
AIT Business Manager Energy Markets  
& Infrastructure Policy





# NEFI INNOVATION ECOSYSTEM

## INNOVATION FIELDS – PROJECT LANDSCAPE – NEFI SOLUTIONS



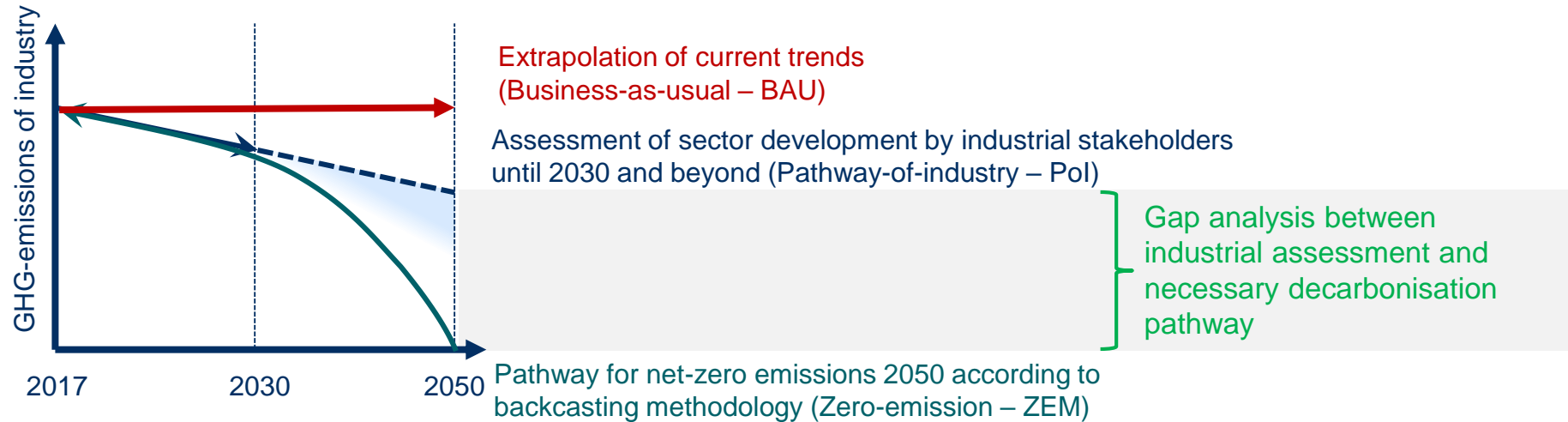
- 8 completed projects
- 9 running projects
- 7 starting projects
- Up to 100 Mio € total project volume (depending on KPC funding decision)
- 30 Mio € funding volume (KLIEN)
- KPC funding (decision pending)
- 125 partners from industry, RTOs and public institutions

● ... Running sub-projects   
 ● ... Sub-projects accepted for funding   
 ■ ... NEFI solutions   
 ■ ... NEFI Technology Talks  
● ... Completed sub-projects



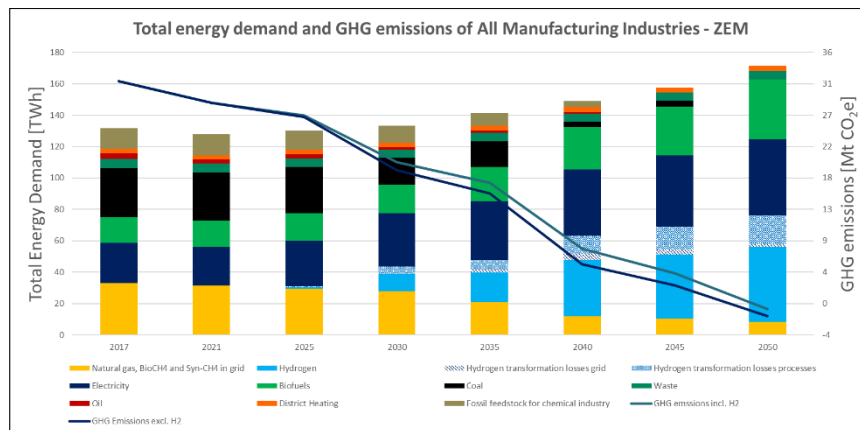
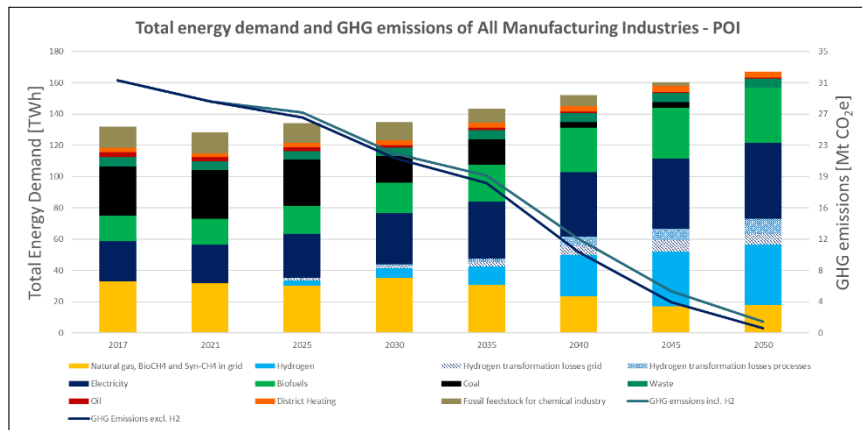
# DECARBONISATION SCENARIOS

STAKEHOLDER ASSESSMENT IS CHALLENGED WITH NET-ZERO PATHWAY FROM SCIENTIFIC BACKCASTING



# DECARBONISATION SCENARIOS

## FEW DIFFERENCES BETWEEN POI AND ZEM INDICATE ROBUST RESULTS



**Pathway of Industry** decarbonisation is driven by a combination of technology levers

- CO<sub>2</sub>-neutral gases for high temperature applications and feedstock
- CCUS especially for mitigation of geogenous emissions
- Electrification through heat pumps for low temperature applications
- Circular economy can reduce energy demand additionally

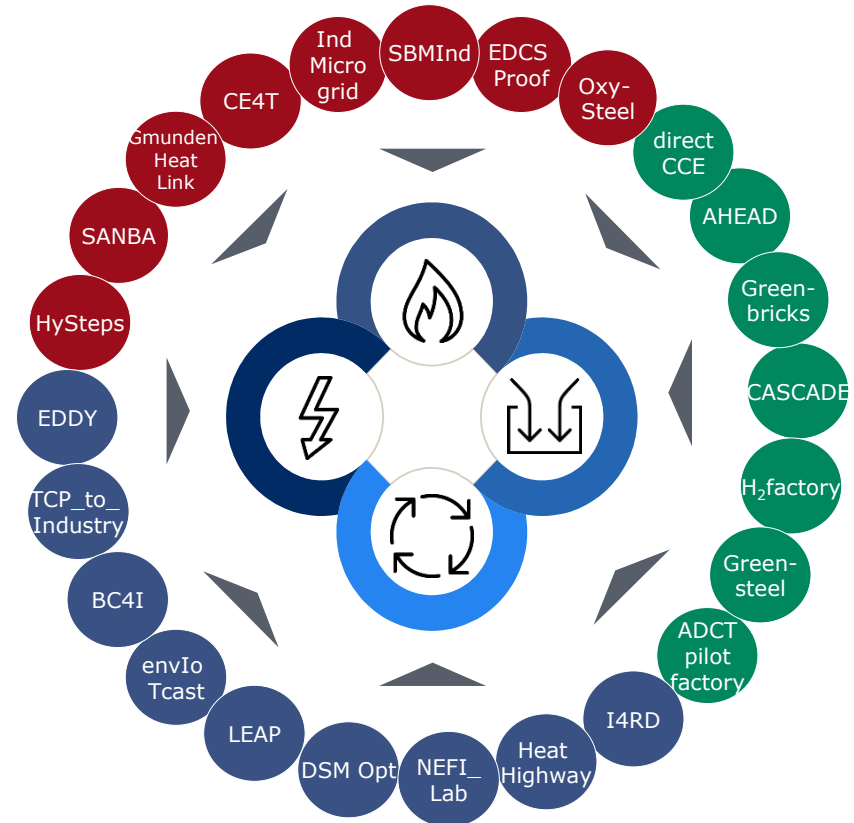
**Zero Emission** transformation needs

- Further pilot plants needed
- Scale-up of existing prototypes to industrial solutions
- Accompanying development of necessary infrastructure
- Further research (especially regarding integration of future industrial systems into the overall energy system)

# DECARBONISATION SCENARIOS

## LEVERS OF ACTION

- 1.** CO<sub>2</sub>-neutral gases and biomass
  - Hydrogen
  - Bio-CH<sub>4</sub>
  - Synthetic CH<sub>4</sub>
  - Solid biomass
- 2.** Electrification and energy efficiency
  - Process efficiency improvements
  - Heat pumps
  - Stationary engines
- 3.** Carbon capture
  - Sequestration of geogenous emissions
- 4.** Circular economy
  - Increased use of end-of-life materials
  - CO<sub>2</sub>-Usage for material production



## Goal Climate-Neutrality 2040

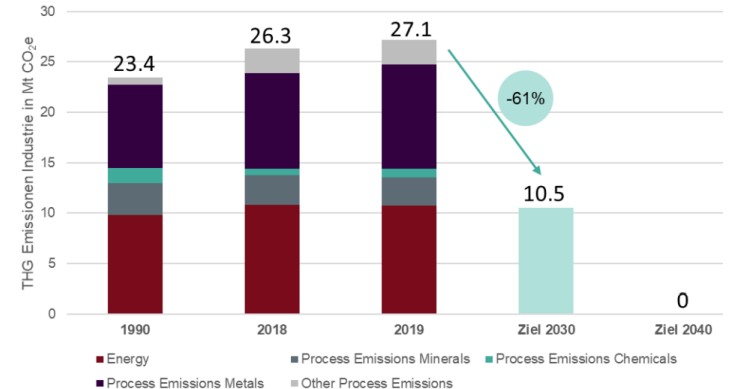
- Decarbonisation + Energy Efficiency + Security of Supply + Competitiveness

## Expected Results

- Scenario-based **transformation pathways** of Austrian industry at sector level to reach climate neutrality 2040
- Identification of **fields of action in research, technology and innovation policy**.
- Development of **sector-specific action plans** that summarise the key results and fields of action per sector.

## Boundary Conditions

- Long investment cycles
- Industry should invest in clean key technologies already in the **next investment cycle**
- Creation of framework conditions is essential.
- Focus on **Made in Austria** and export.



Quelle: Klimaneutralität Österreichs bis 2040 – Beitrag der Österreichischen Industrie, BMK.gv.at, AIT, EVT, EI-JKU, AEA

# TRANSFORM.INDUSTRY - TECHNOLOGIES & METHOD

**Five technologies are available: which are ideal for which application?**

## **Elektrifikation**

- Heat pumps
- Stationary engines

## **Utilisation of CO<sub>2</sub>-neutral gases**

- Hydrogen
- Bio-CH<sub>4</sub>
- Synthetic CH<sub>4</sub>

## **Carbon Capture**

- Separation of (geogenic) emissions

## **Circular Economy**

- Redesign
- Second life models
- Material-recycling

## **Energy efficiency**

- Heat recovery
- Efficiency increase through exergetic optimisation of energy sources (Electricity / H<sub>2</sub>)

Scenario-modelling

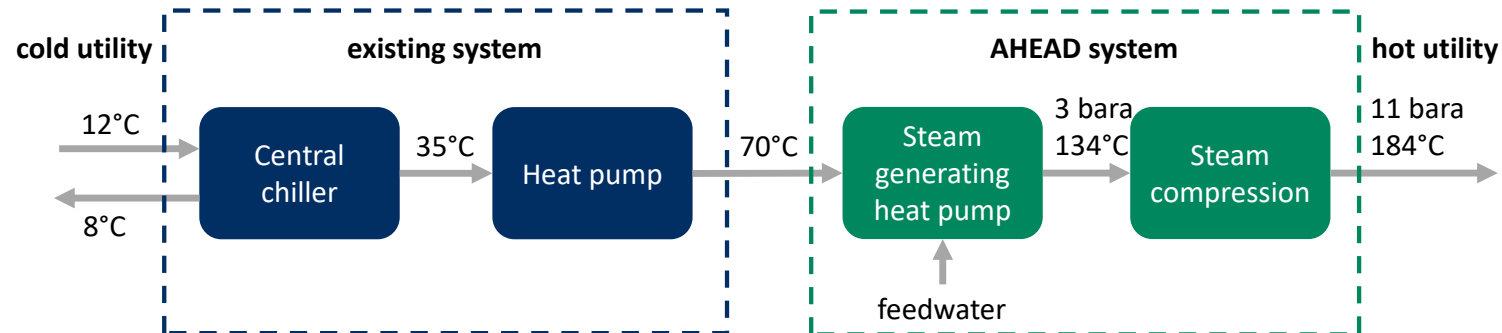
- „*Renewable Gas*“
- „*Circular Economy*“
- „*Innovation*“
- „*Sector-coupling*“

Quantitativ &  
Qualitativ

# ADVANCED HEAT PUMP DEMONSTRATOR - AHEAD

## GOALS

- Decarbonised steam production through integration of high temperature heat pump (11bar, 184° C) at TAKEDA
- Operation of the AHEAD Systems for at least 4000 h, heating capacity of 1.7 MW
- Energy savings of 52% compared to fossil steam production
- CO<sub>2</sub> reduction of 46% at the production site, equals 1900 t/a
- Development of an AHEAD concept for roll-out at other Takeda sites in Austria and worldwide



# NEFI-GREENSTEEL - CO<sub>2</sub> NEUTRAL STEEL PROCESSING

## AIMS

- Identification of CO<sub>2</sub>-neutral energy sources to replace natural gas in steel processing
- Development of efficient industrial furnaces heated in a 100% CO<sub>2</sub>-neutral way.
- Ensuring high product quality when switching to CO<sub>2</sub>-neutral energy sources.
- Demonstration of developed concepts & technologies at real production sites of various voestalpine product lines.
- Preparation for scaling up of solutions as well as transfer of results to other production sites and sectors.

## KEY FACTS

Duration: 11/22 – 04/25

Project volume: € 4,9 Mio.





# GREENBRICKS - CO<sub>2</sub> NEUTRAL BRICK FACTORY

## AIMS

- Holistic optimization of the brick manufacturing process.
- Development of new CO<sub>2</sub>-neutral clay mixtures considering site-specific product/clay properties and industrial production environments.
- Optimization of overall energy efficiency dryer - burner - HP heat network and adaptation of the brick drying technology to the new electric kiln and clay recipe.
- Integration and optimization of operation of the highly-efficiency, high temperature tunnel kiln for brick firing.
- Scaling up the concept and evaluate transferability of results to other sites as well as to related sectors.

## KEY FACTS

Duration: 10/22 – 09/25

Project volume: € 30 Mio.



© Robert Oberbichler / Wienerberger AG

# THANK YOU!

AIT Austrian Institute of Technology – Center for Energy

Wolfgang Hribernik

[wolfgang.hribernik@ait.ac.at](mailto:wolfgang.hribernik@ait.ac.at)

[www.ait.ac.at/energy](http://www.ait.ac.at/energy)