Making thermodynamics great again: industry electrification in Europe

CI Industry Electrification Workshop

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1

Recap energy crisis
Huge boost for heat pumps in buildings

A record 3 million heat pumps were sold across Europe in 2022

Source: Rosenow and Gibb 2023
Industry electrification status quo
Share of electricity in EU industry increased from 31% in 2000 to 34% in 2021

Source: Odyssee-Mure 2023
83% of Europe’s industrial process heat is from burning fossil fuels with only 3% from electricity.

Source: de Boer et al. 2020
Notes: 61% of EU27 district heating fuel mix is from fossil fuels.
EU industry carbon emissions are barely down

Source: Eurostat 2023
Industry: 78% electrifiable with existing technologies

Source: Madeddu et al. 2020
Moving up the s-curve

Support for innovation
Information and incentives
Regulation

Early adoption
Mass adoption
Late adoption

Research

We are here:

Source: Rosenow et al. 2015
Challenging economics identified as key barrier to deployment

- Low fuel prices
- High CAPEX
- Requirements for short payback periods
- Product acceptance
- Lack of knowledge about available HPs
- No suitable temperature levels
- Disruption of processes
- High OPEX
- Lack of suitable products
- Trade-off with direct use of waste heat
- Insufficient efficiency
- Lack of LCA
- Taxation of electricity
- Lack of knowledge of planners

Source: Wolf et al. 2017
Key barrier to industry electrification remains

Ratio electricity to gas price for medium-sized industrial consumers in 2022 with and without taxes and levies

Source: Eurostat 2023
Higher gas prices in 2021 and 2022 helped

**Figure 1.18** Average levelised cost of production of industrial heat in Germany and Finland

Source: IEA 2023
3

EU policy
REPowerEU Strategy

- Sees “great potential for electrification of industry”.

- But detailed implementation plan mentions electrification 9x vs hydrogen 229x.

- Mentions Innovation Fund and guidance on PPAs as main vehicles to support industry electrification.
EU Heat Pump Action Plan

Heat pump accelerator
(Partnerships)

Communications and skills
/share information and skills partnership/

Legislative work
(existing legislation not new)

Financing
(mapping existing funding sources)

2024
first half of the year
Adoption of the Action Plan

2023
9 October
Stakeholder forum IV

5 July
Stakeholder forum III

16 June
Stakeholder forum II

07 June - 30 August
Launch of a public consultation

25 May
Stakeholder forum I

28 April
Launch of a call for evidence
EU Heat Pump Accelerator

A joint plan for boosting heat pump deployment and meeting the REPowerEU targets
Innovation Fund selected no projects on industry electrification

The 41 projects were selected following the third call for large-scale projects, covering four topics: “general” decarbonisation; “industry electrification and hydrogen”; “clean tech manufacturing”; and “mid-sized pilots”.

Projects in brief

- In “general” decarbonisation topic: 8 projects worth €1.4 billion

They include 3 projects from refineries and 5 projects in the cement and lime sector, and are located in Belgium, Croatia, Germany, Greece, the Netherlands, Portugal, and Sweden.

- In “industry electrification and hydrogen” topic: 13 projects worth almost €1.2 billion

They include 6 projects on renewable hydrogen production as well as 7 projects on hydrogen use in different sectors: chemical industry, refineries and steel. The projects are located in Austria, Belgium, France, Germany, the Netherlands, Portugal, Spain, Sweden and Norway.