



RAP[®]

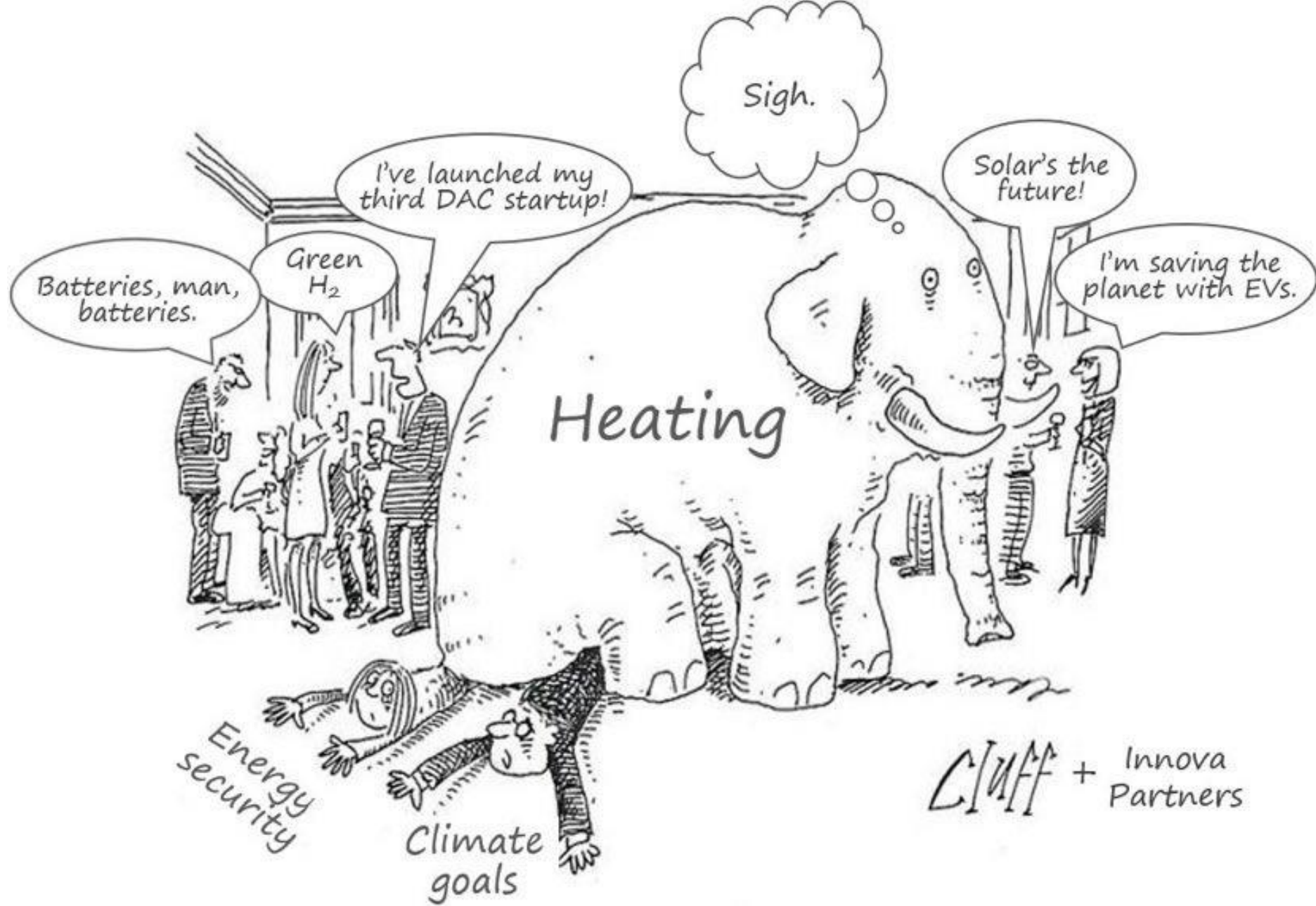
REGULATORY
ASSISTANCE PROJECT

05 November 2024

It's gettin hot in here: how heat electrification will fundamentally change what electricity is used for

REKK

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RAP



"HAVE YOU NOTICED IT, TOO?"



"HAVE YOU NOTICED IT, TOO?"

An aerial photograph of a building's roof, showing a grid of solar panels and a section of red-tiled roof. A large, semi-transparent blue rectangle is overlaid on the left side of the image, containing the number '1' and the text 'How heat fits in'.

1

How heat fits in

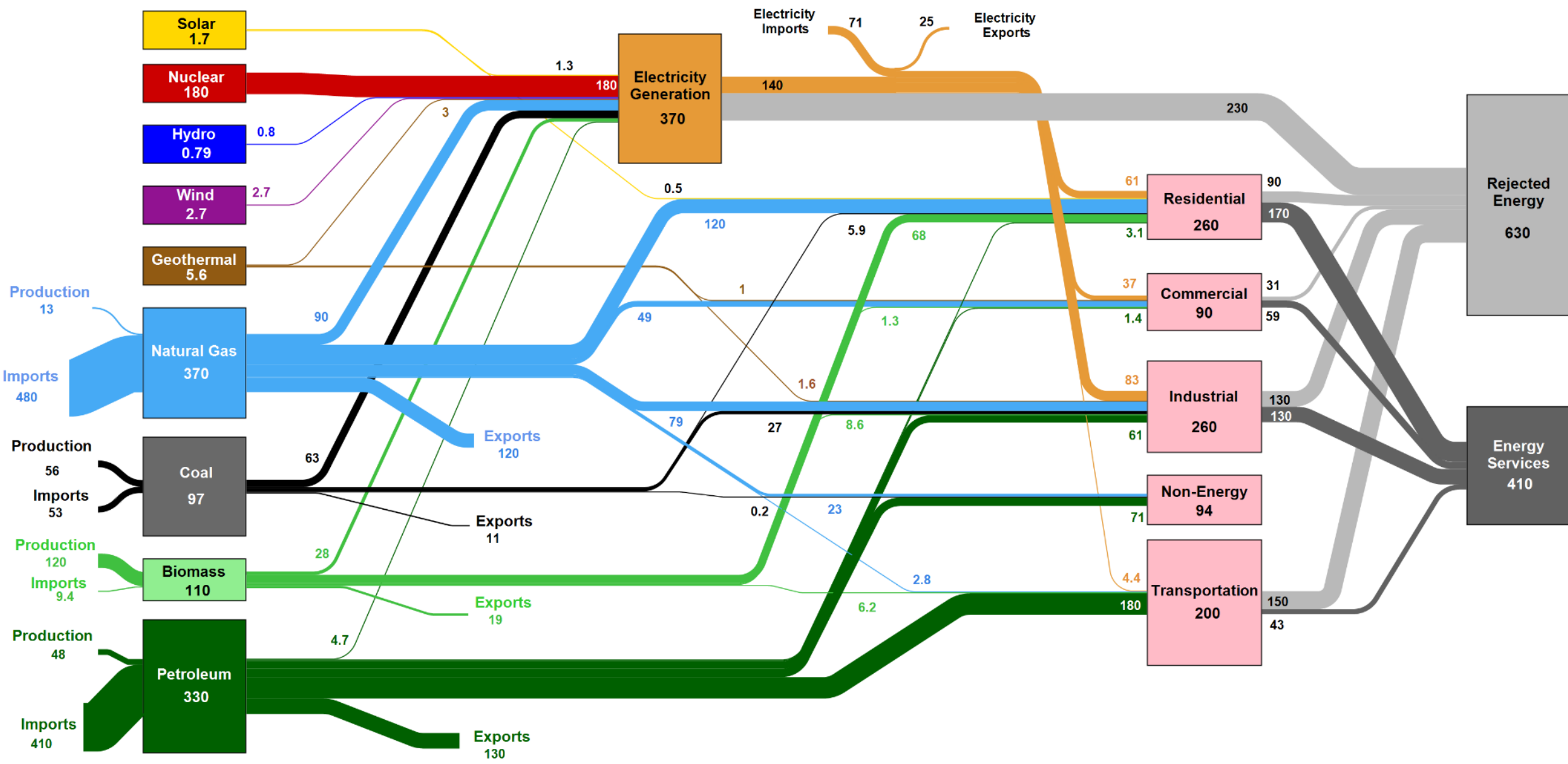
An iceberg floating in the ocean. The tip of the iceberg is above the water surface, while the much larger, jagged base is submerged. The sky is blue with scattered white clouds. The water is a deep blue, and the submerged part of the iceberg is illuminated from above, showing its complex, crystalline structure.

Electricity 23%

Heat 49%

Transport 28%

Hungary Energy Flow in 2017: 1,200 PJ



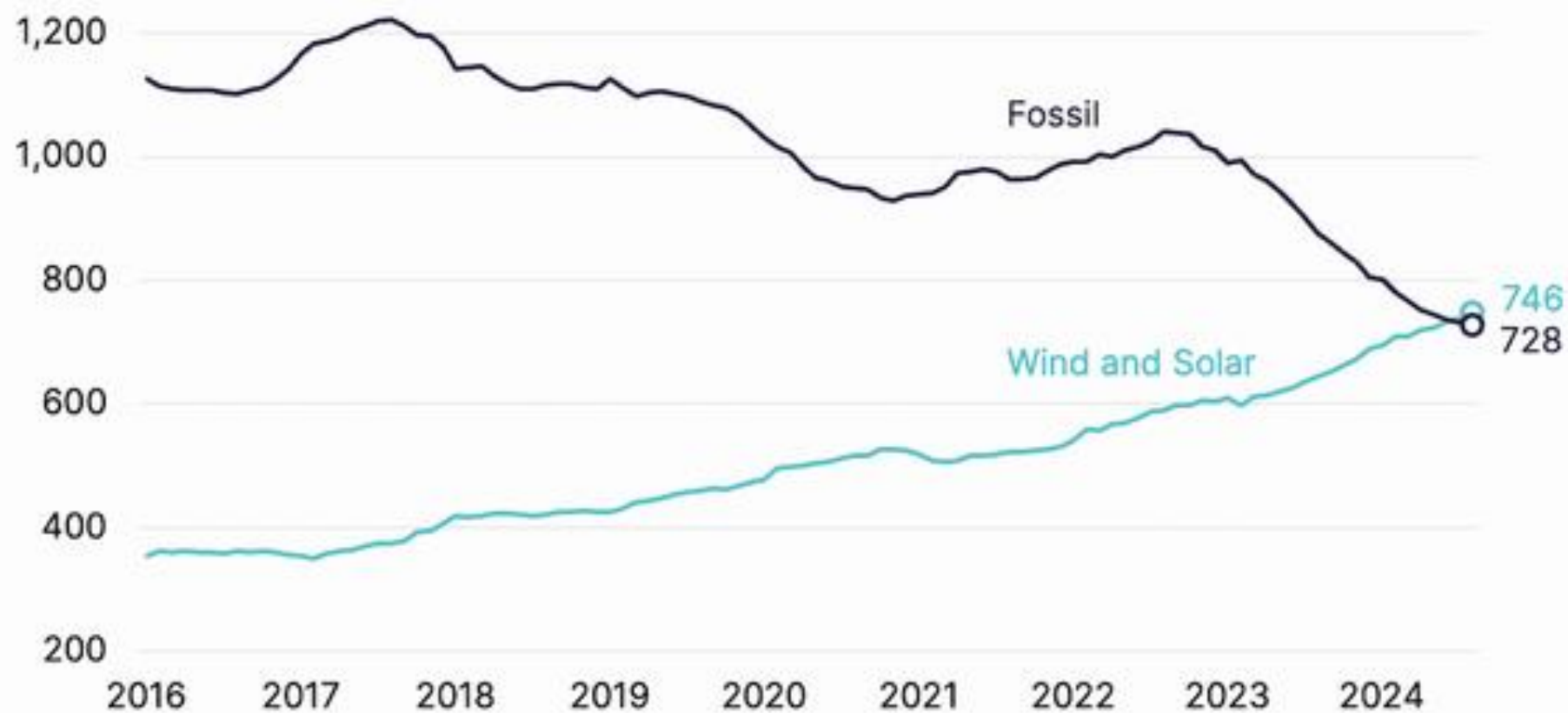
Source: LLNL 2021. Data is based on IEAs Detailed World Energy Balances (2019 Edition). If this information, or a reproduction of it is used, credit must be given to the Lawrence Livermore National Laboratory and the U.S. Department of Energy, under whose auspices this work was performed. All quantities are rounded to 2 significant digits and annual flows of less than 0.10 PJ are not included. Total energy supply (top of chart) and energy resource statistics (left-side boxes) represent national energy use which is the sum of production and imports minus exports. Totals may not equal sum of flows due to independent rounding, stock changes, statistical difference and reporting inconsistencies. Further information can be accessed at <https://flowcharts.llnl.gov>. LLNL-MI-410527



Greening Europe

The EU now generates more power from wind and solar than from fossil fuels

1,300 terawatt-hours trailing 12 months power generation in the EU



Source:
Ember

Note:
Data through
July 2024



NAT BULLARD



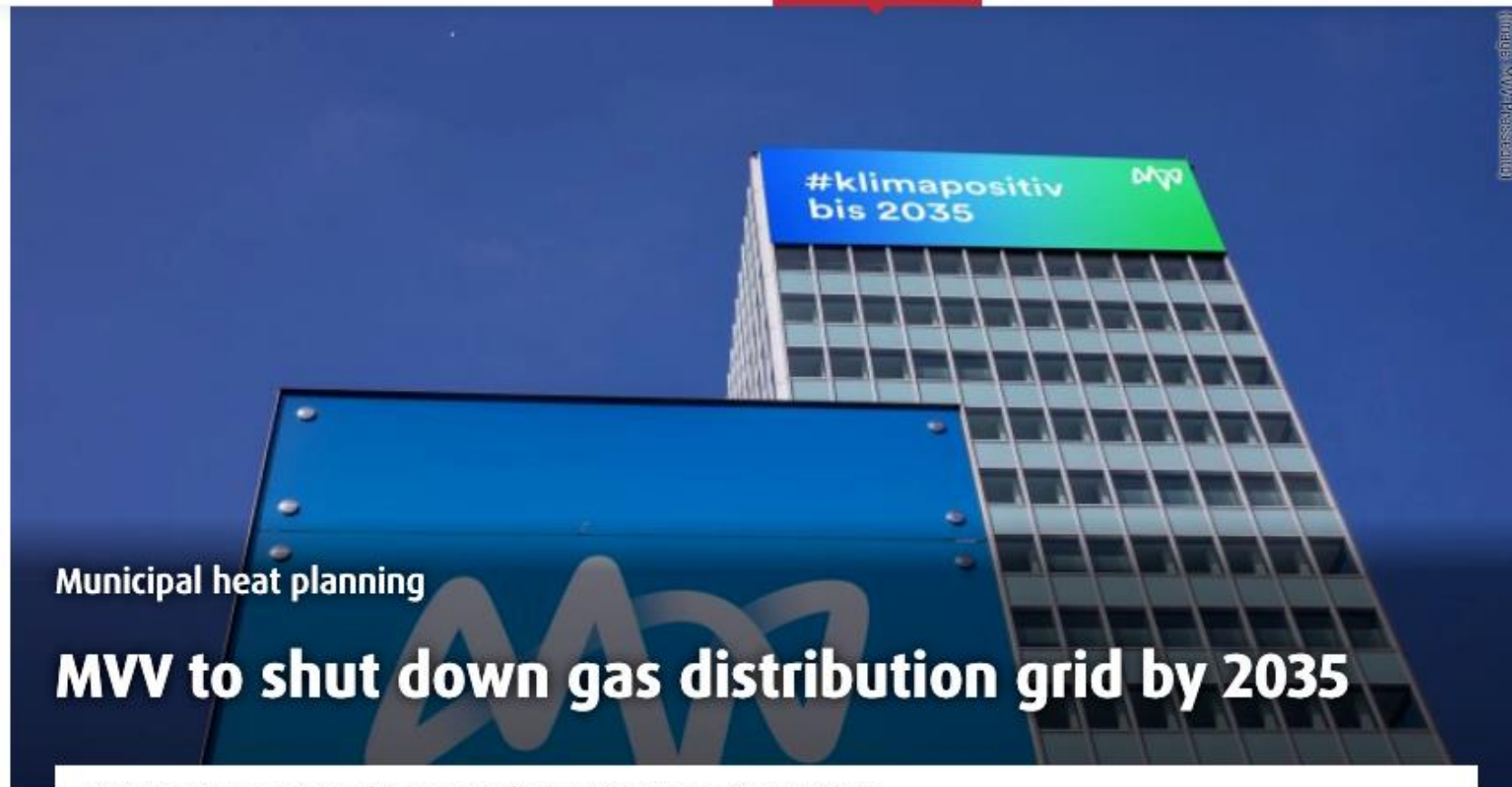
Home

Politics

Market & Industry

Power

Gas & Heat



© MVV Energie AG

Municipal heat planning

MVV to shut down gas distribution grid by 2035

MVV Energie has set itself the target of being "climate-positive" by 2035.

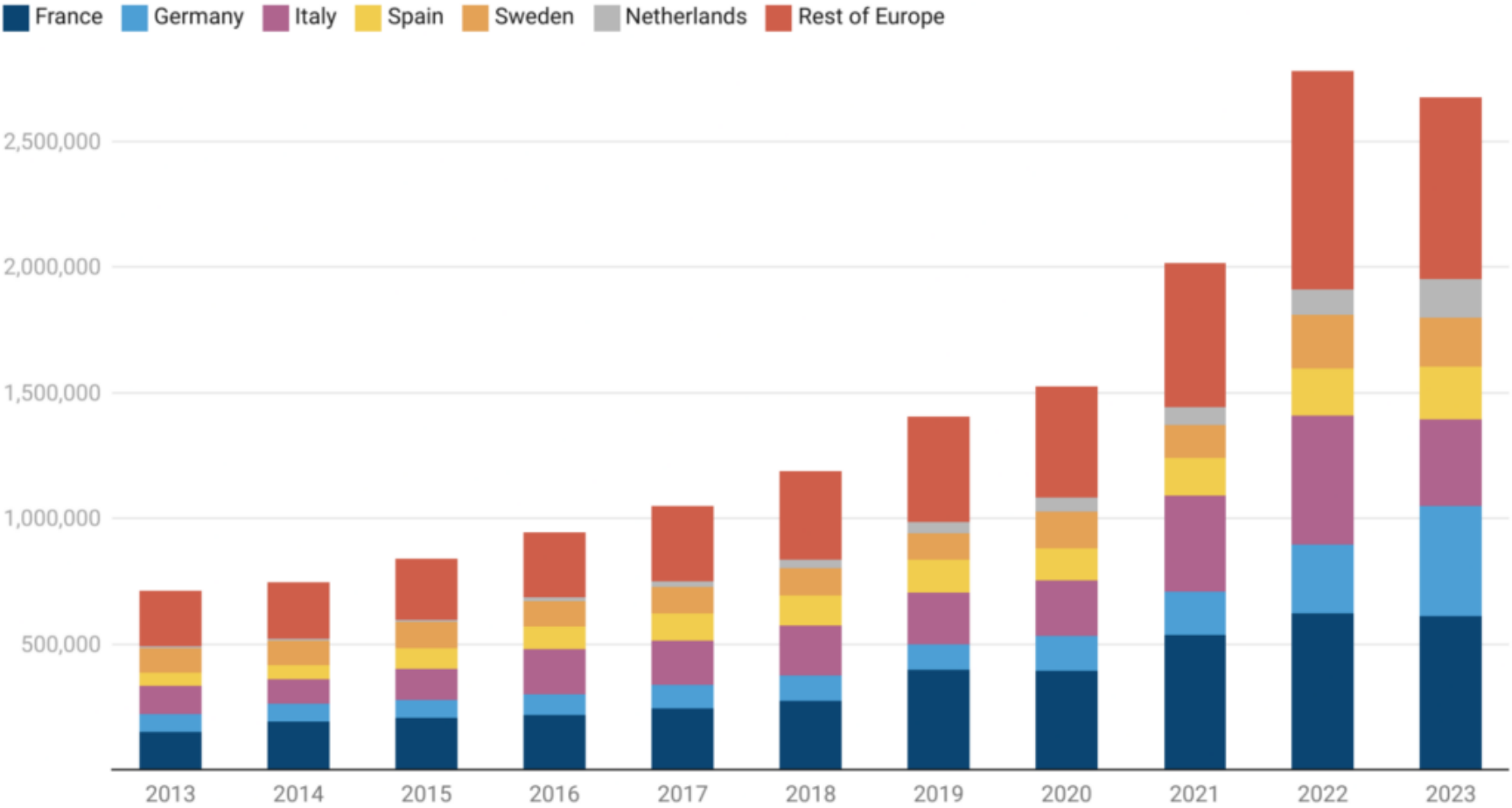
An aerial photograph of a building's roof, showing a mix of red-tiled sections and large rectangular solar panel arrays. A dark blue semi-transparent overlay covers the middle portion of the image, containing the title. A vertical bar on the left side of the overlay is colored yellow at the top and orange at the bottom.

2

Technologies



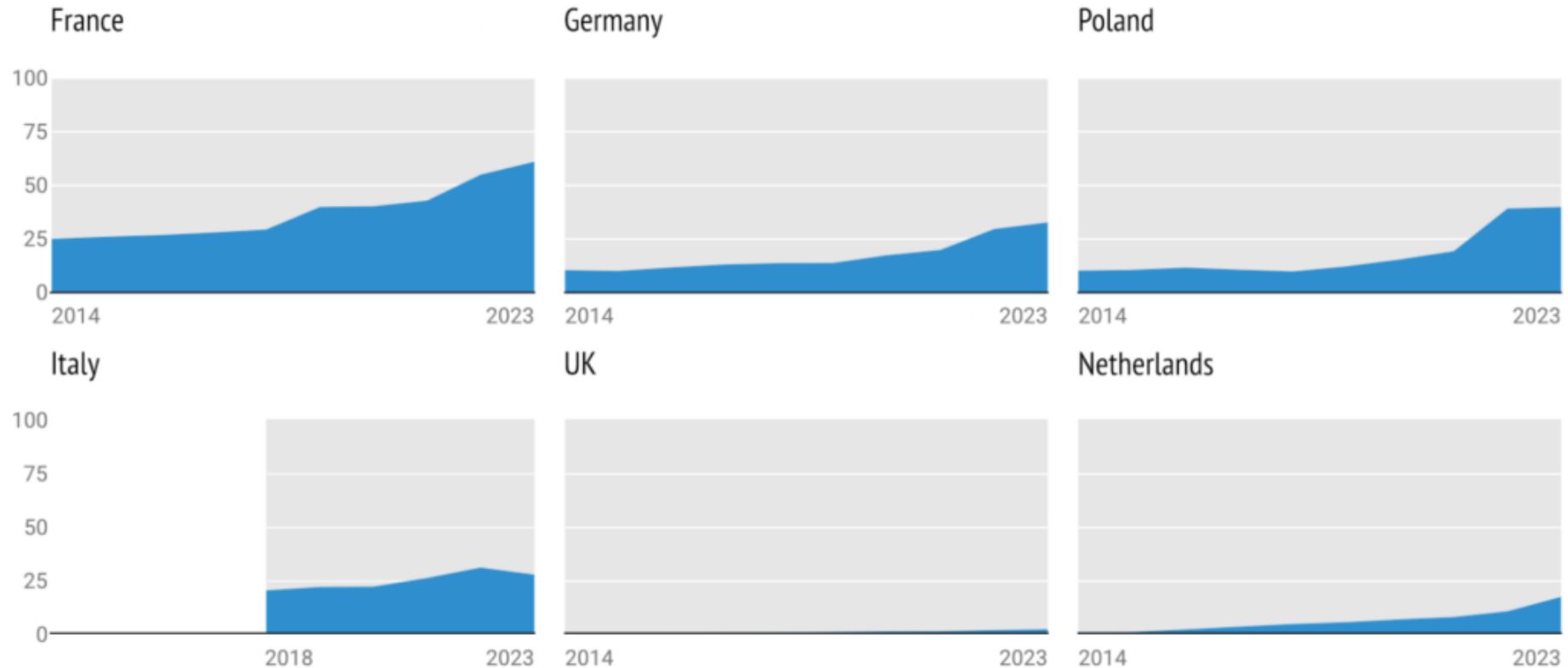
Almost a fifth of European homes now have heat pumps



Source: EHPA market statistics

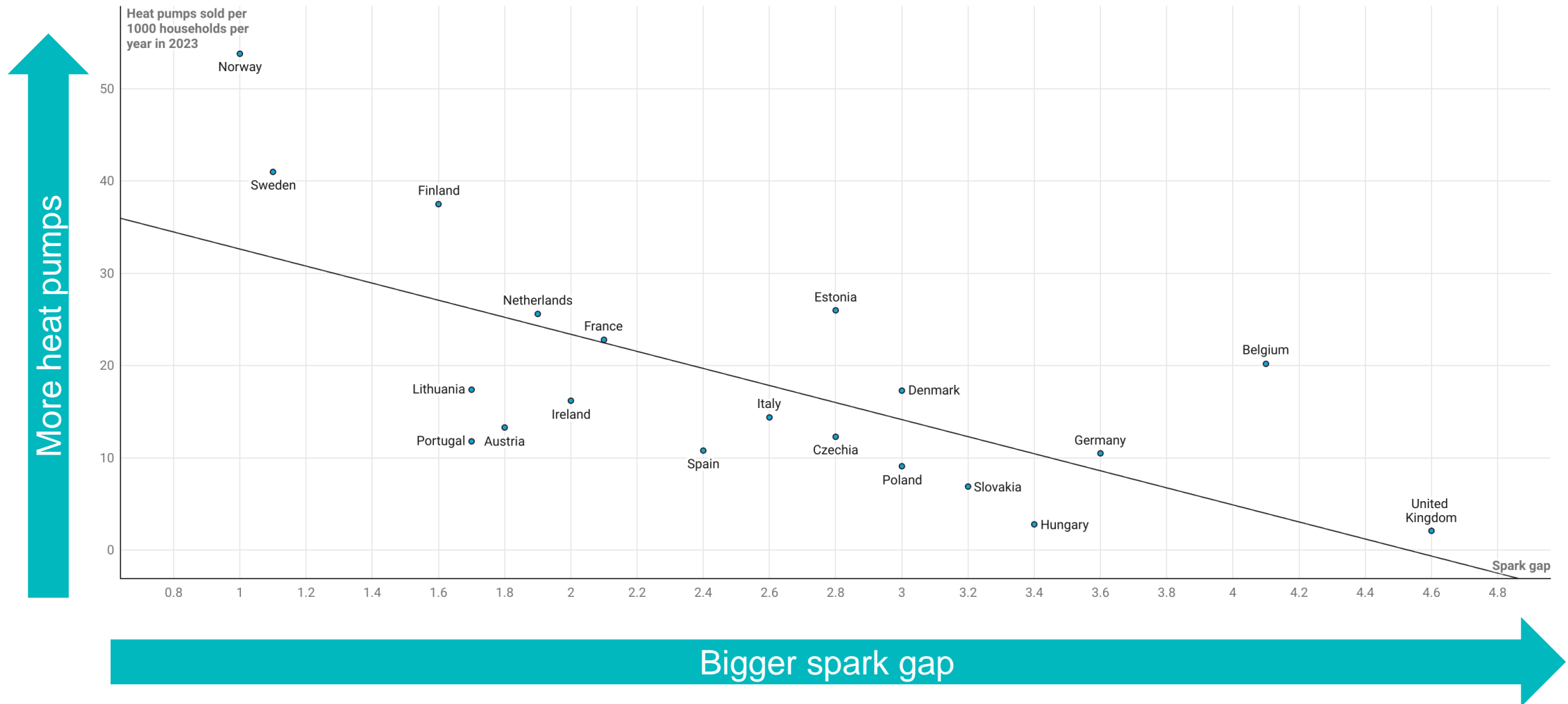
Different heat pump market shares

Share of heat pumps compared with fossil fuel boilers across six European markets, %



Source: EHPA Market Statistics, Uniclimate, BDH, Umweltbundesamt, SPIUG, Assotermica, BRG

Bigger spark gap means fewer heat pumps







Electric arc furnaces: the technology poised to make British steelmaking more sustainable

Published: December 1, 2023 5.52pm GMT



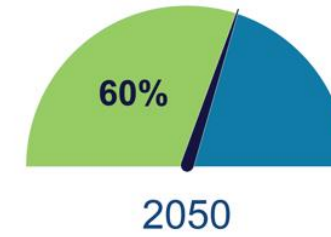
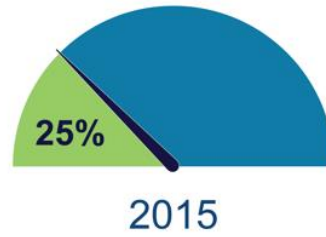


3

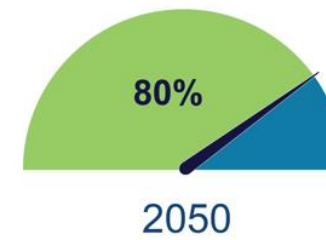
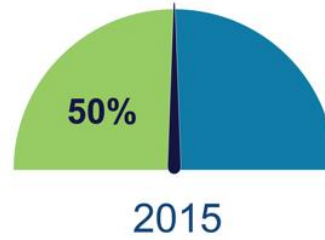
Potential

Share of electricity in EC scenarios

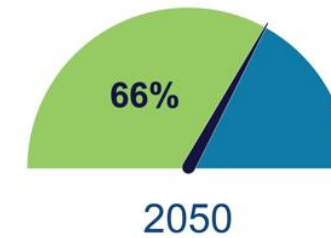

Residential



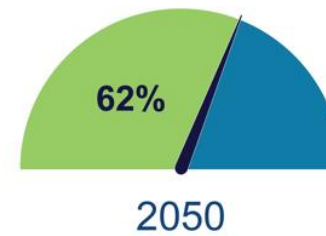
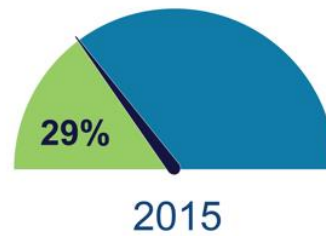

Services



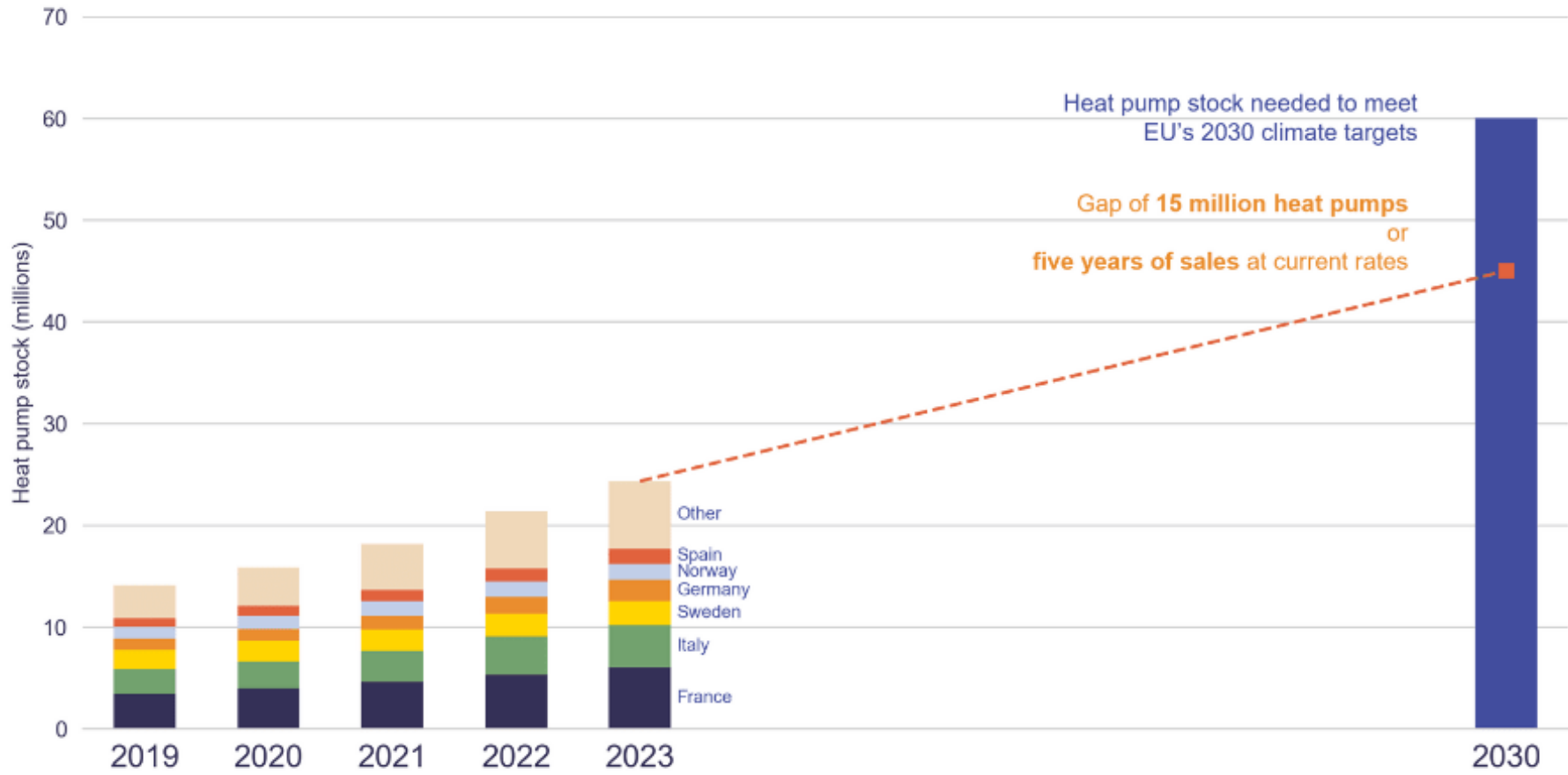

Passenger
transport




Industry



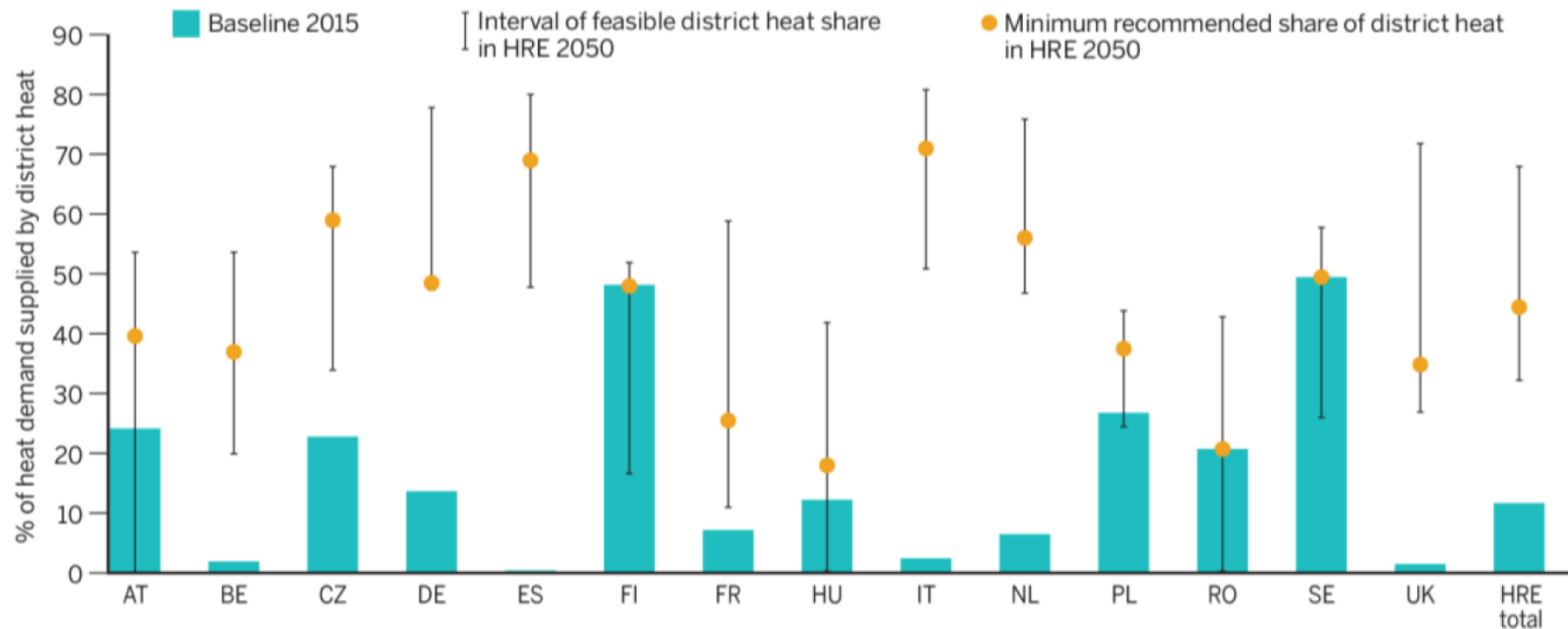
Heat pumps



Source: EHPA 2024

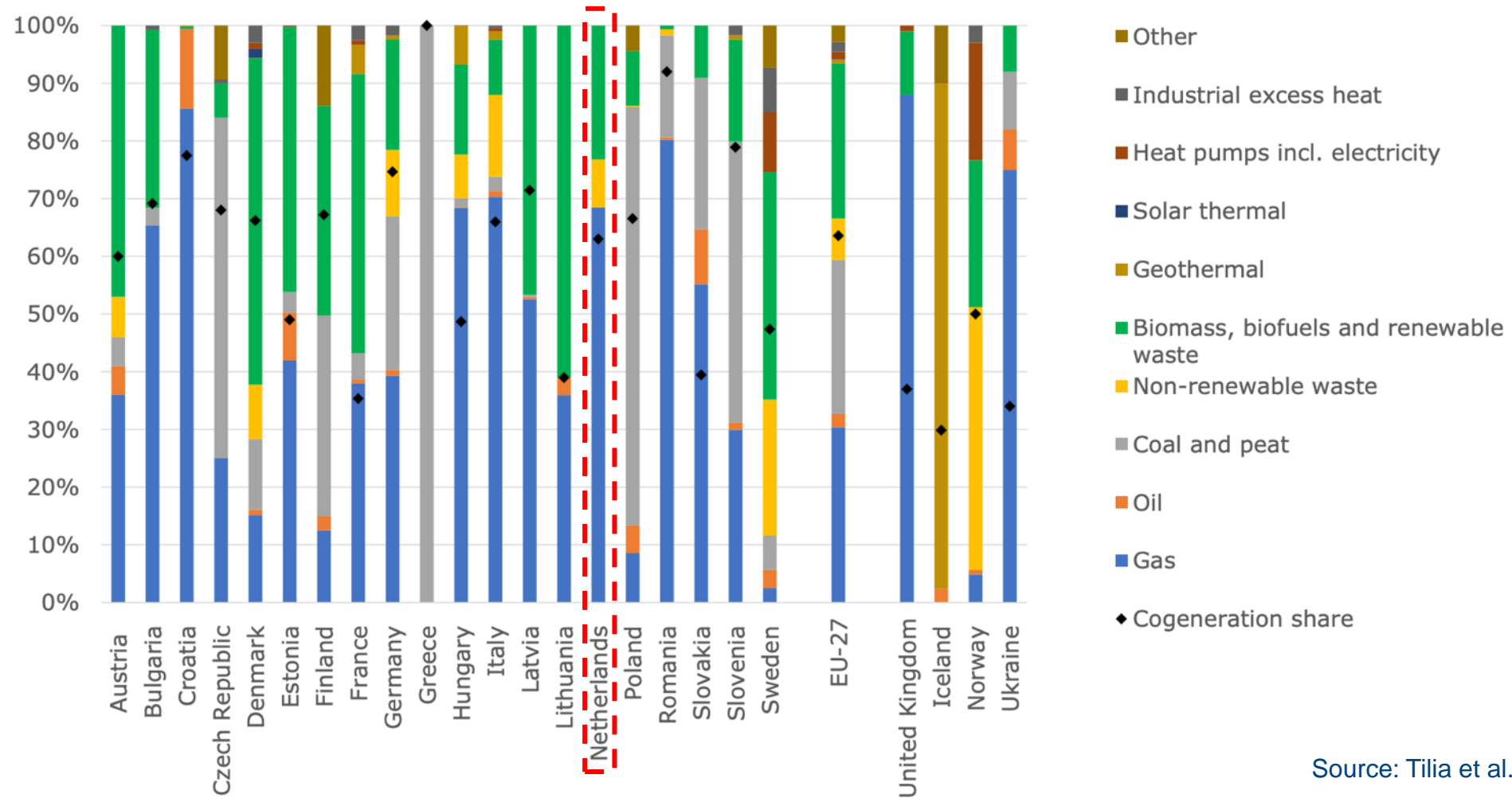
Huge untapped district heating potential

Figure 4. Modelled cost-effective district heating levels in 2050: Heat Roadmap Europe scenarios



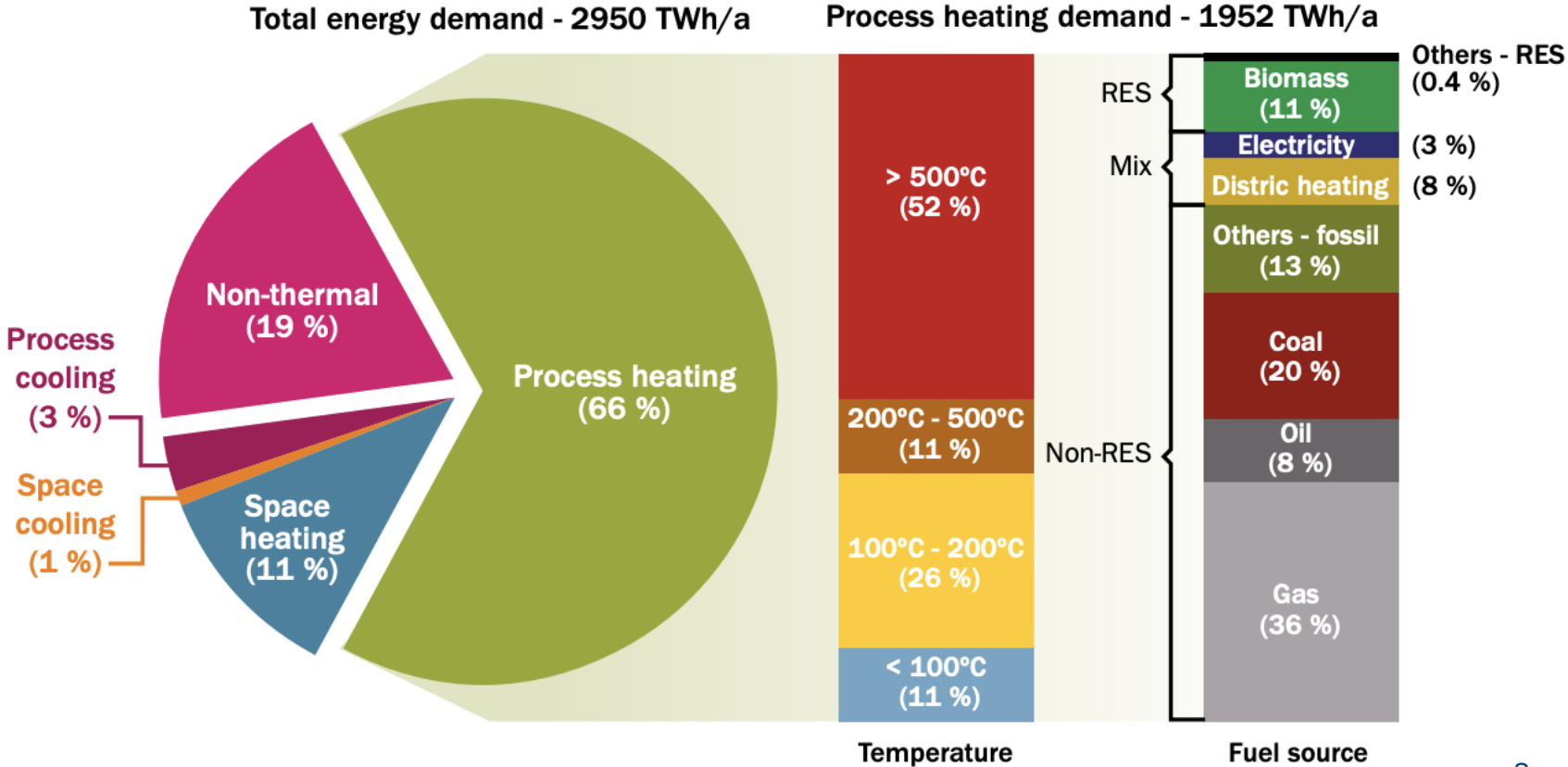
Source: Paardekooper. (2018). *Heat Roadmap Europe 4*.

District heating energy mix in Europe



Source: Tilia et al. 2021

78% of Europe's industrial process heat is fossil with only 3% from electricity

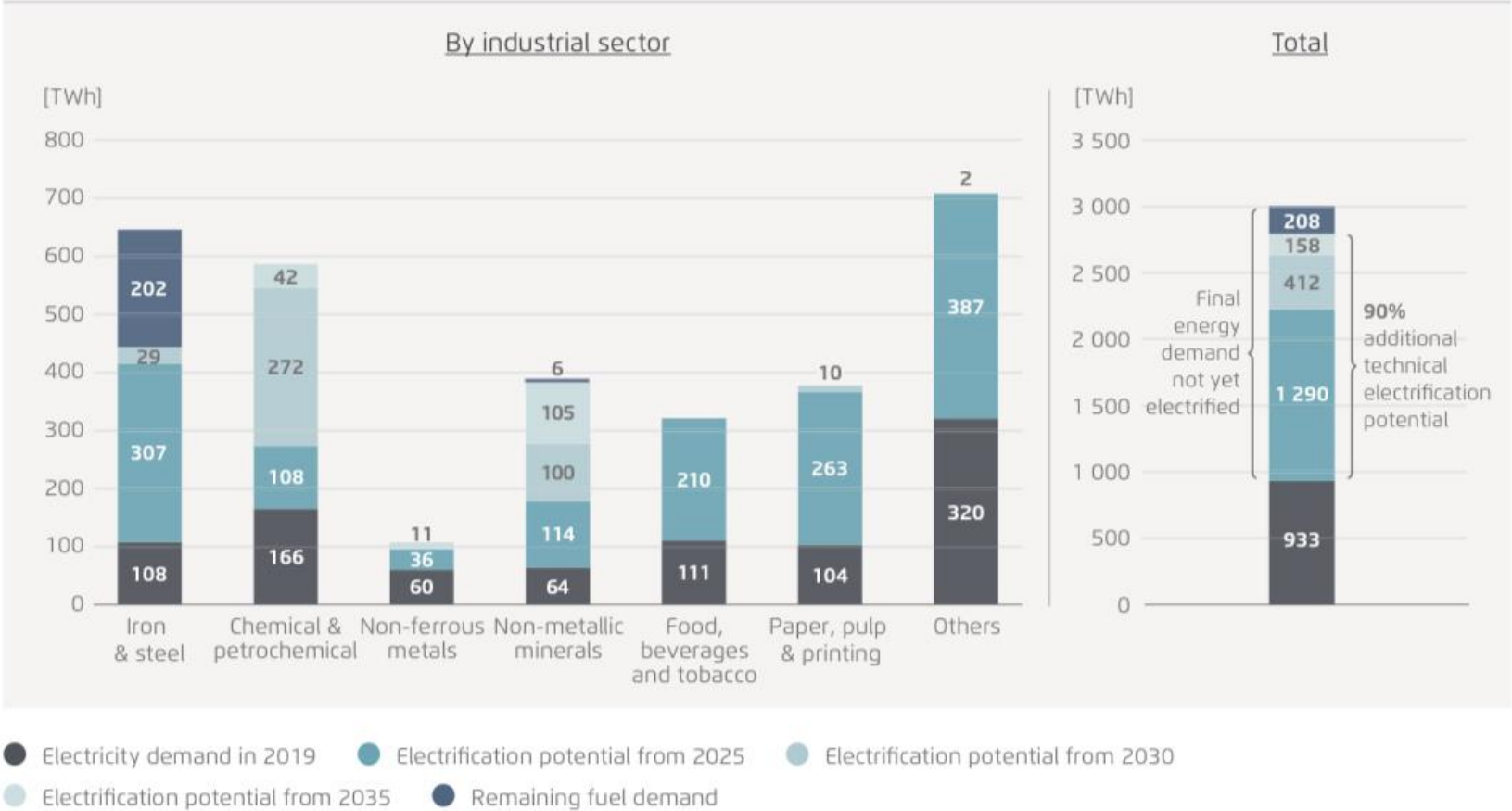


Source: de Boer et al. 2020

Industry: 90% electrifiable by 2035

Technical potentials for direct electrification in the EU-27 based on 2019 energy demands

→ Fig. 1



Source: Agora Industry 2024

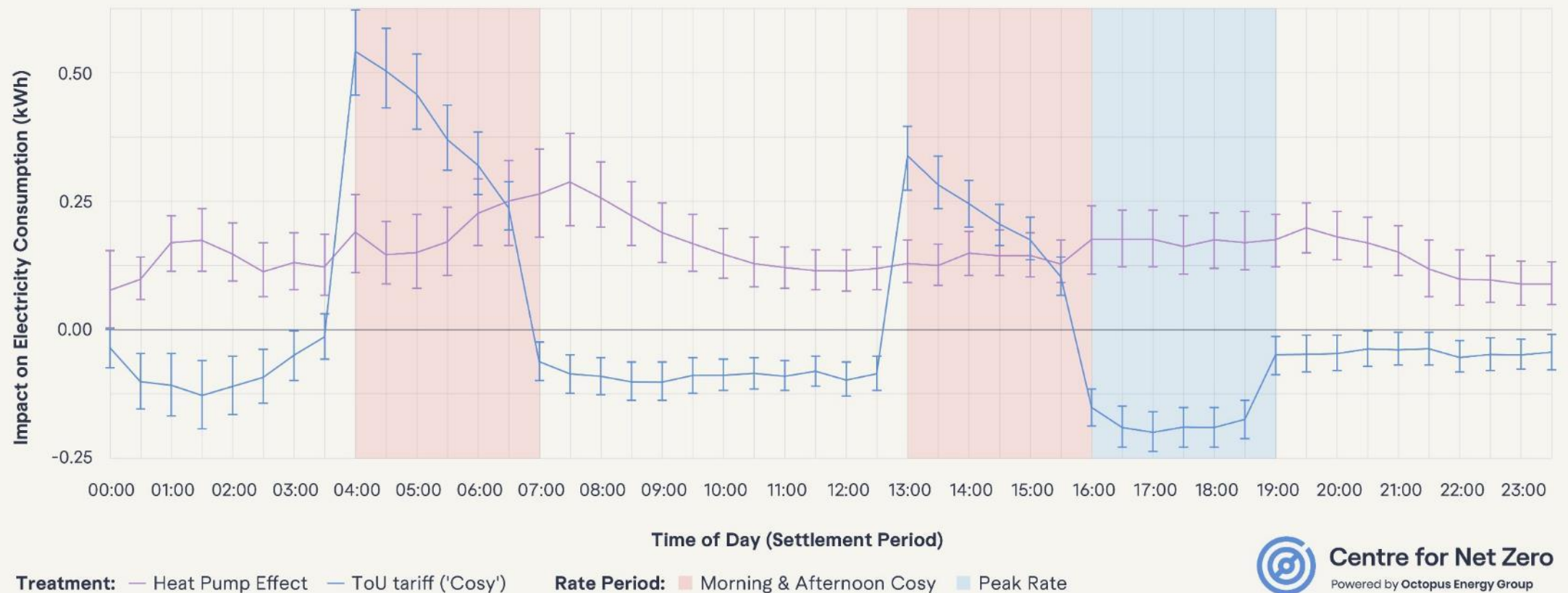
An aerial photograph of a building's roof, showing a grid of solar panels and a central section with red tiles. A large, semi-transparent blue rectangle is overlaid on the left side of the image, containing the number '4' and the text 'System integration'.

4

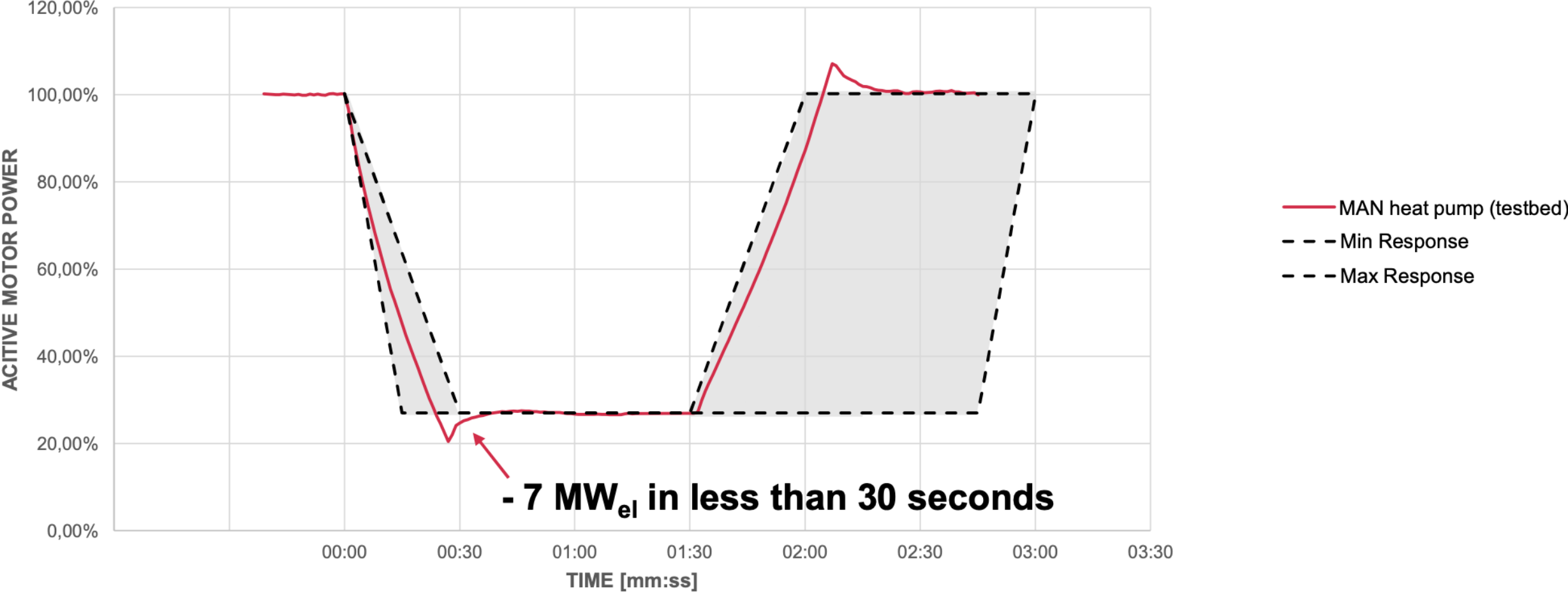
System integration

Residential heat pumps can be flexible

Impact of heat pump adoption and heat pump time-of-use tariff on consumption throughout the day



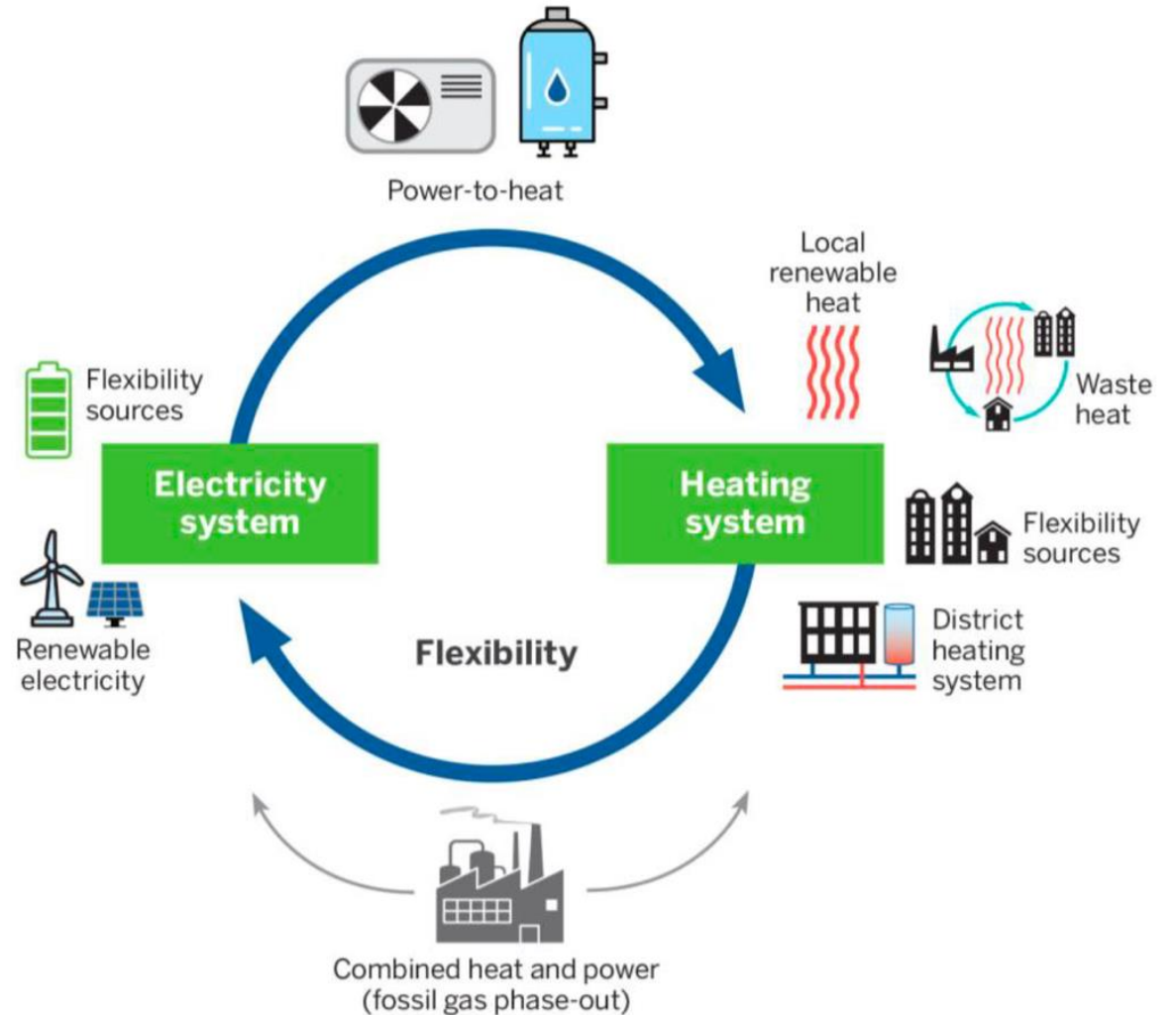
Industrial heat pumps can also provide flexibility



Source: Wolscht 2023

District heating provides large system benefits

- Unlock ambient, waste, and geothermal sources
- Benefits of scale
 - Lower total capacity
 - Aggregation of heat loads
- Flexibility in supply and demand
- Storage



Thermal storage



An aerial photograph of a building's roof, showing a mix of red tiles and blue solar panels. A large, semi-transparent blue rectangle is overlaid on the left side of the image, containing the number '5' and the text 'Wrap up'. A vertical bar with a yellow-to-orange gradient is positioned to the left of the number '5'.

5

Wrap up



“Honey, come look! I’ve found some information all the world’s top scientists and doctors missed.”



About RAP

Regulatory Assistance Project (RAP)[®] is an independent, global NGO advancing policy innovation and thought leadership within the energy community.

Learn more about our work at raponline.org

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