Heat pump technology – Sweden

Country Report

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Swedish Energy Agency

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www.heatpumpingtechnologies.org

IEA HPT

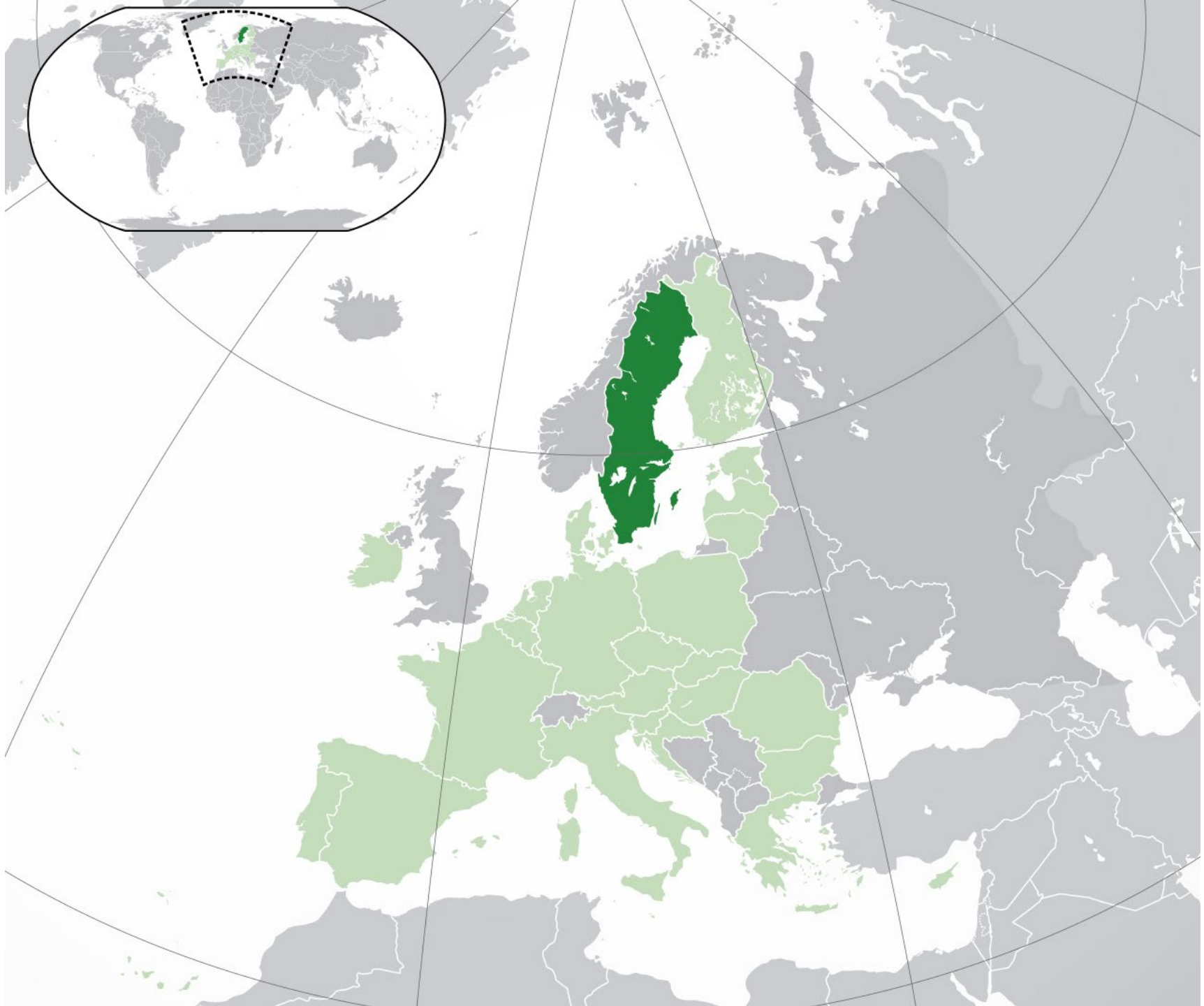
Sweden

Swedish Energy Agency- We are leading society´s transition to a sustainable energy system

Swedish Refrigeration and Heat Pump Association

SVENSKA KYL&VÄRMEPUMP FÖRENINGEN

Swedish Energy Agency



Sweden

450 000 km^2 - 1/5 biggest country in Europe

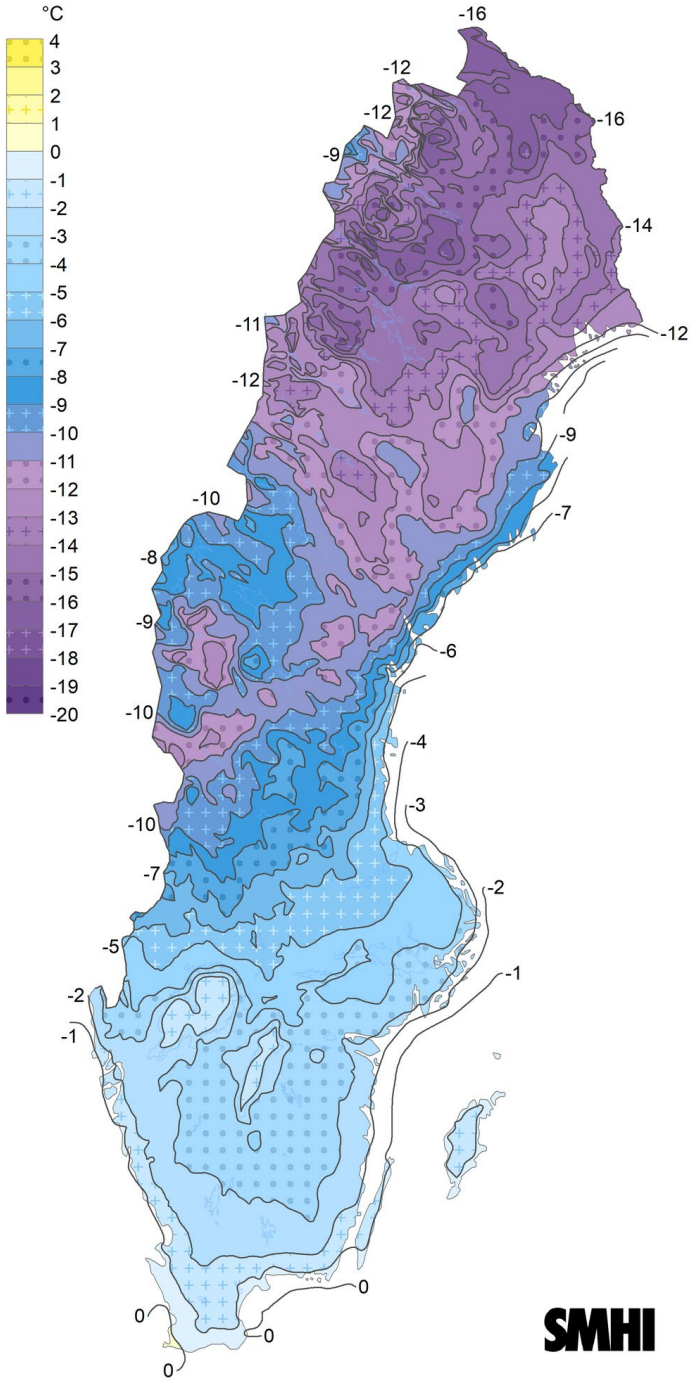
Mountains,
forests 67%,
lakes and rivers 10%
8% arable land

10,5 M inhabitants,
41% urban systems (>50 000)
2,4 M in the greater Stockholm area

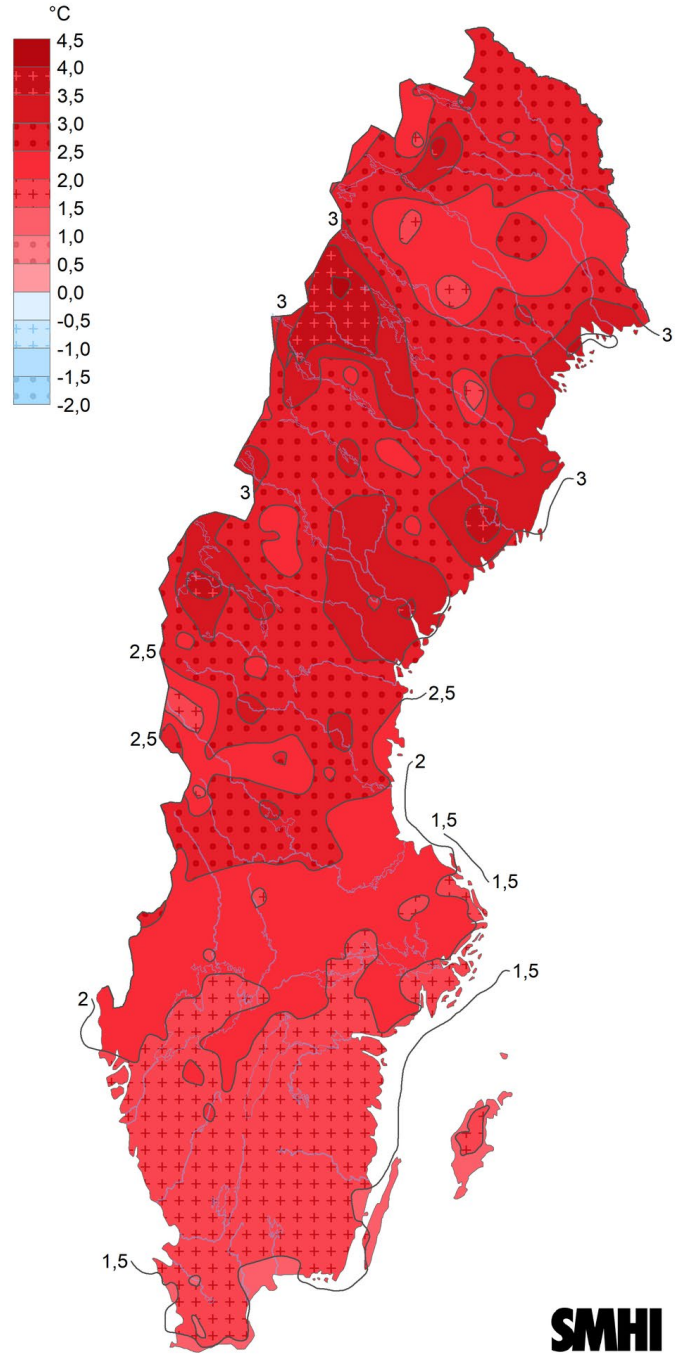
Part of EU and Nordpool

Average January

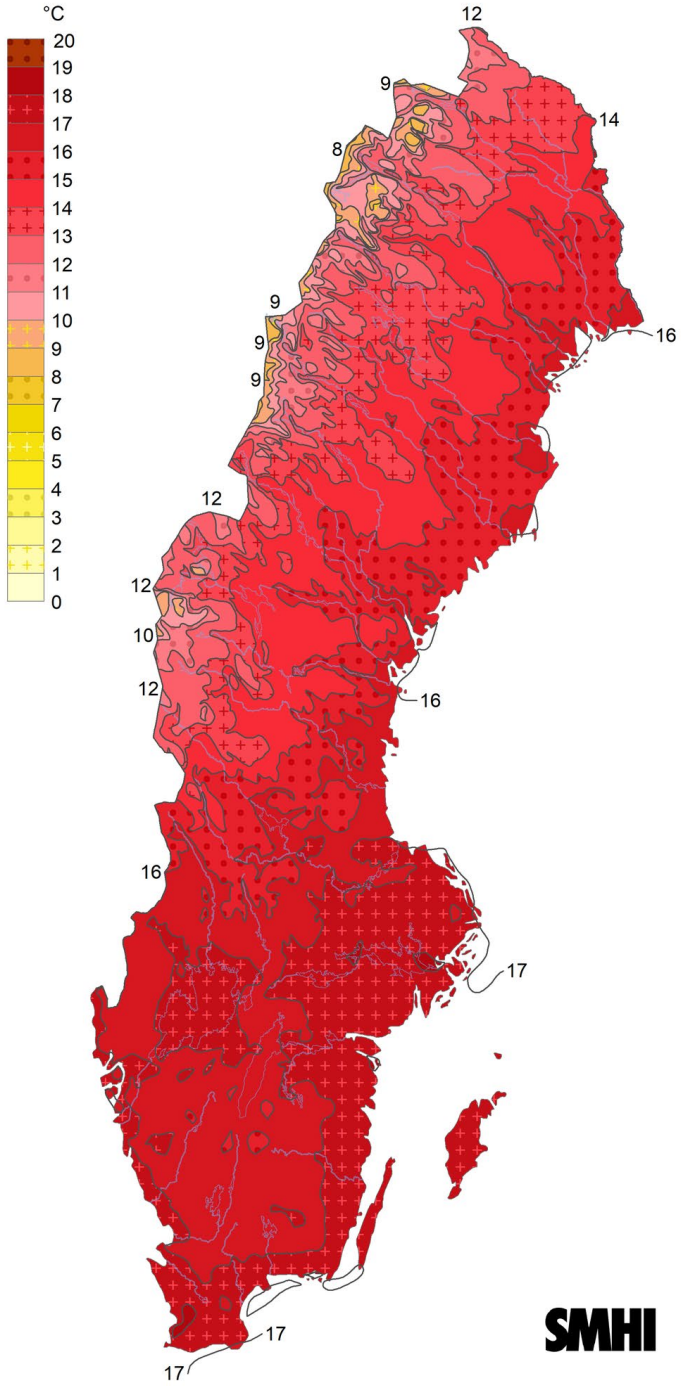
1961- 1990



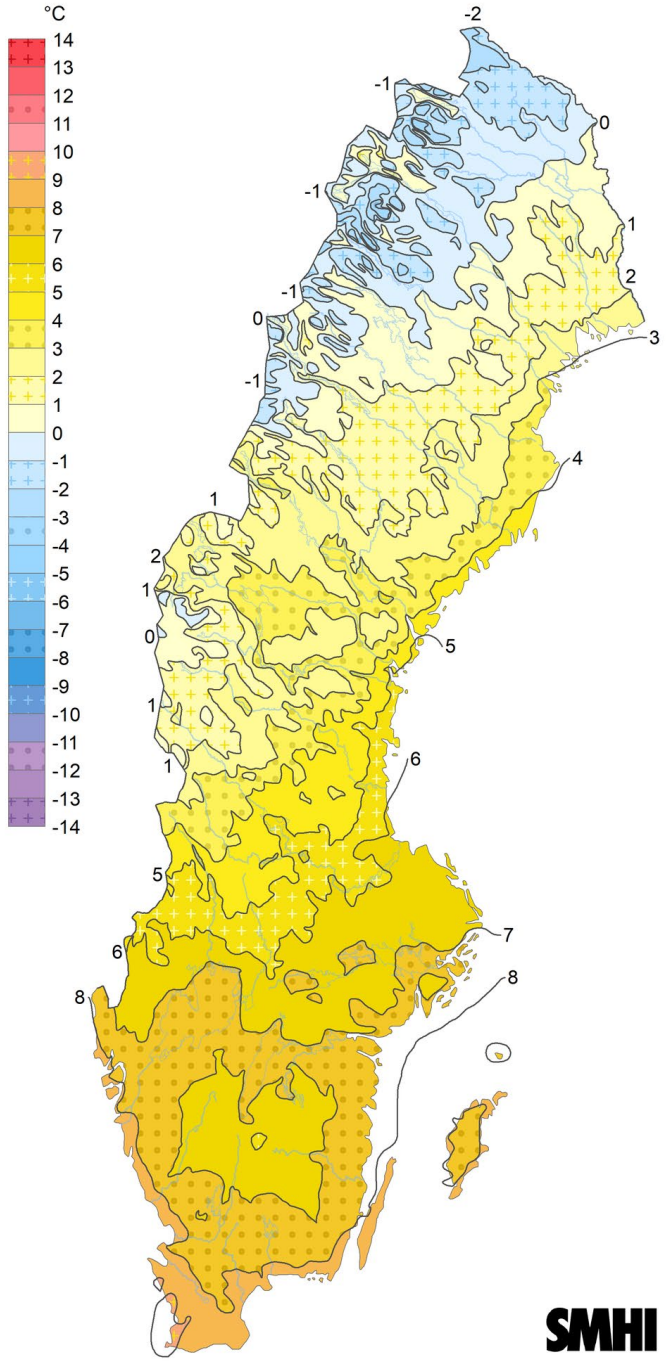
Difference
1991-2020



Average July
1991-2020



Yearly average
1991-2020



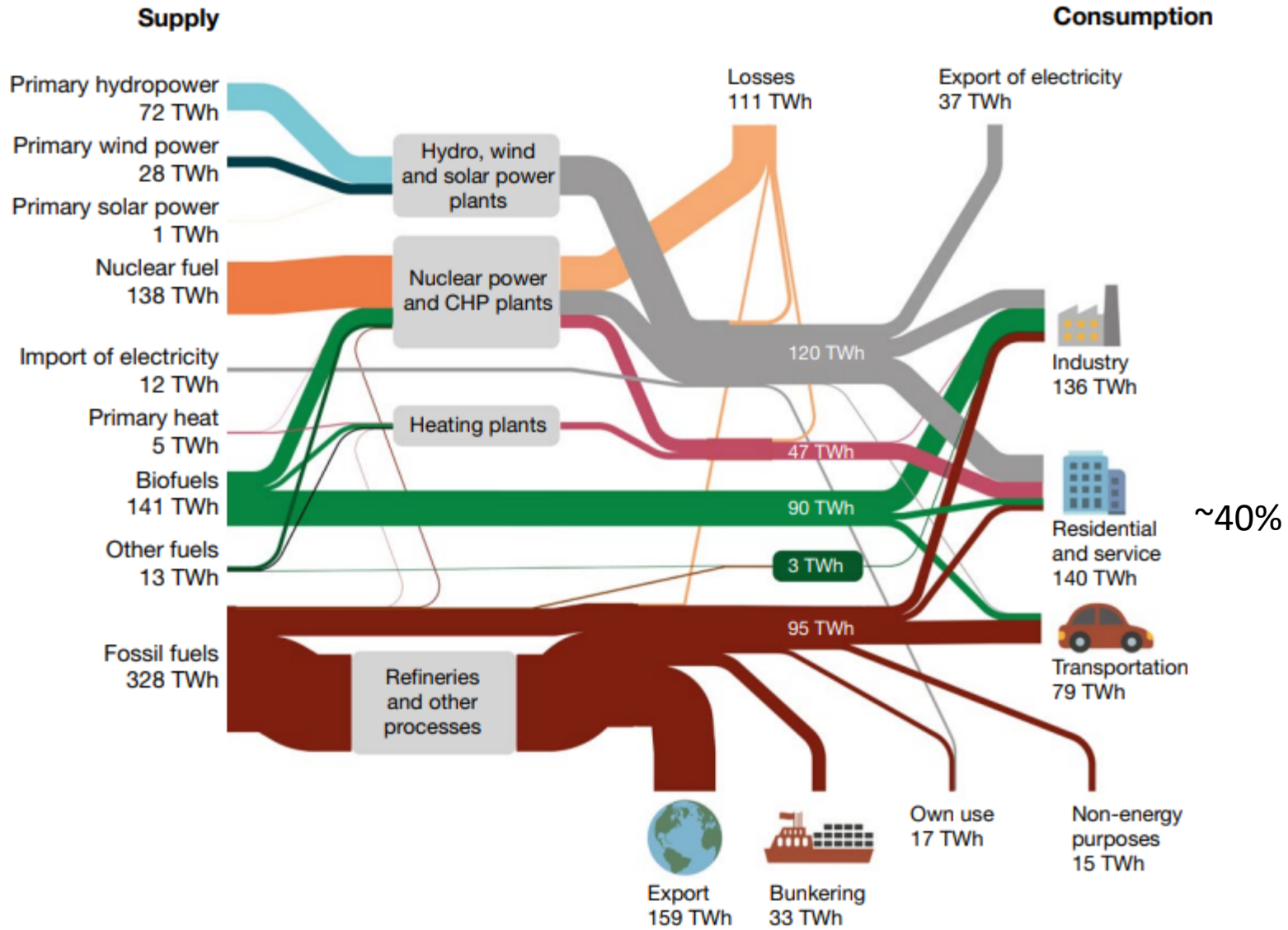


Figure 1. Energy supply and use in Sweden 2020, TWh.

Source: Swedish Energy Agency

Around 100 TWh for heating

Share from heat pumps?

We estimate 28 – 40 TWh

~40%

Swedish Energy Agency

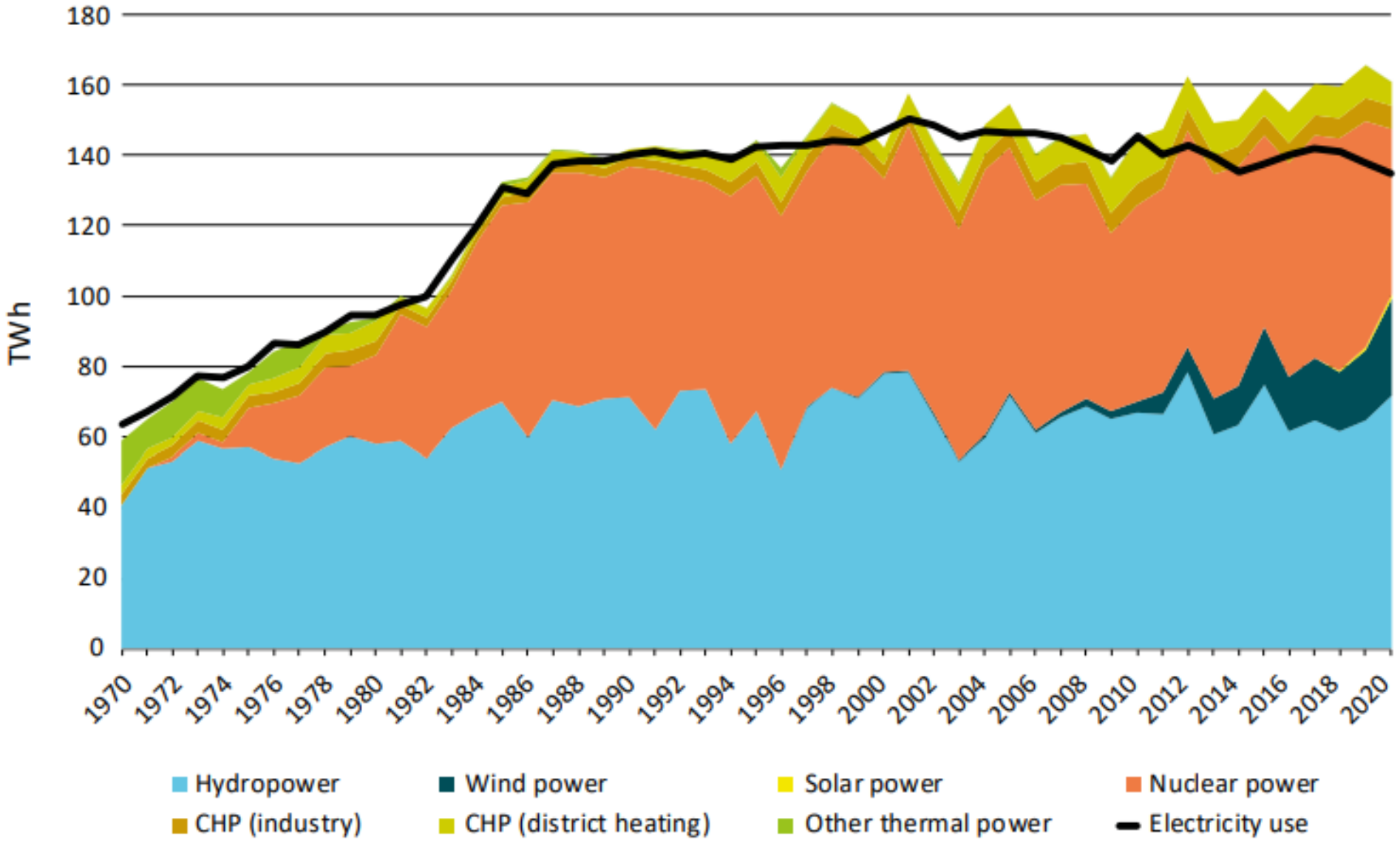
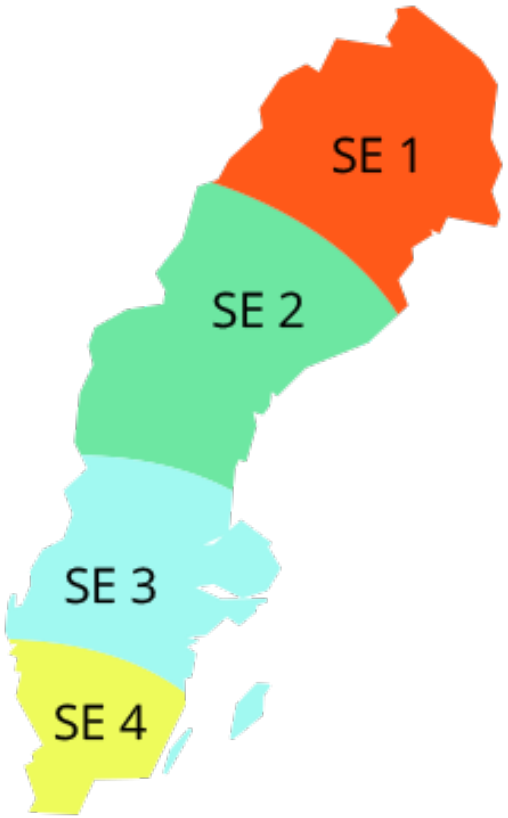


Figure 7. Net electricity production and electricity use 1970-2020, TWh.

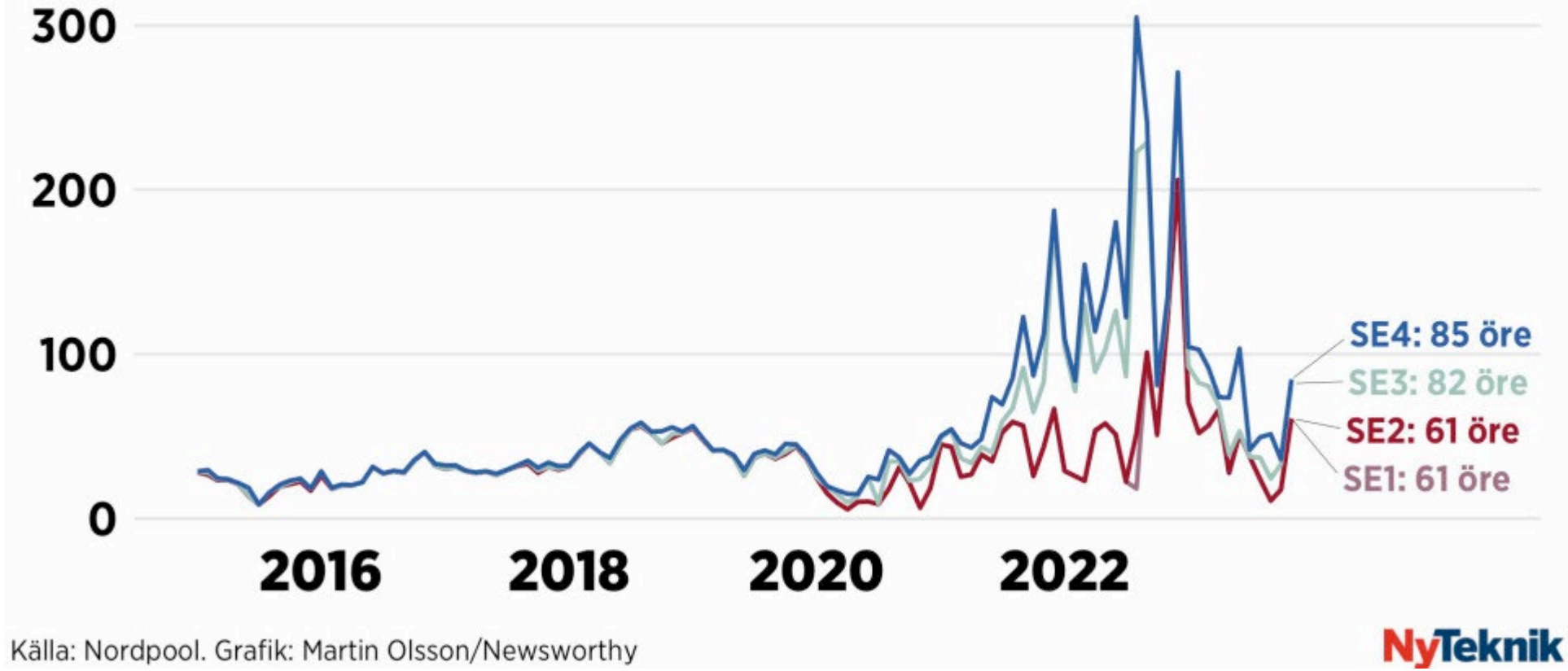
Source: Swedish Energy Agency and Statistics Sweden.

Notes: Wind power was included in hydropower up to and including 1996.

Swedish Energy Agency



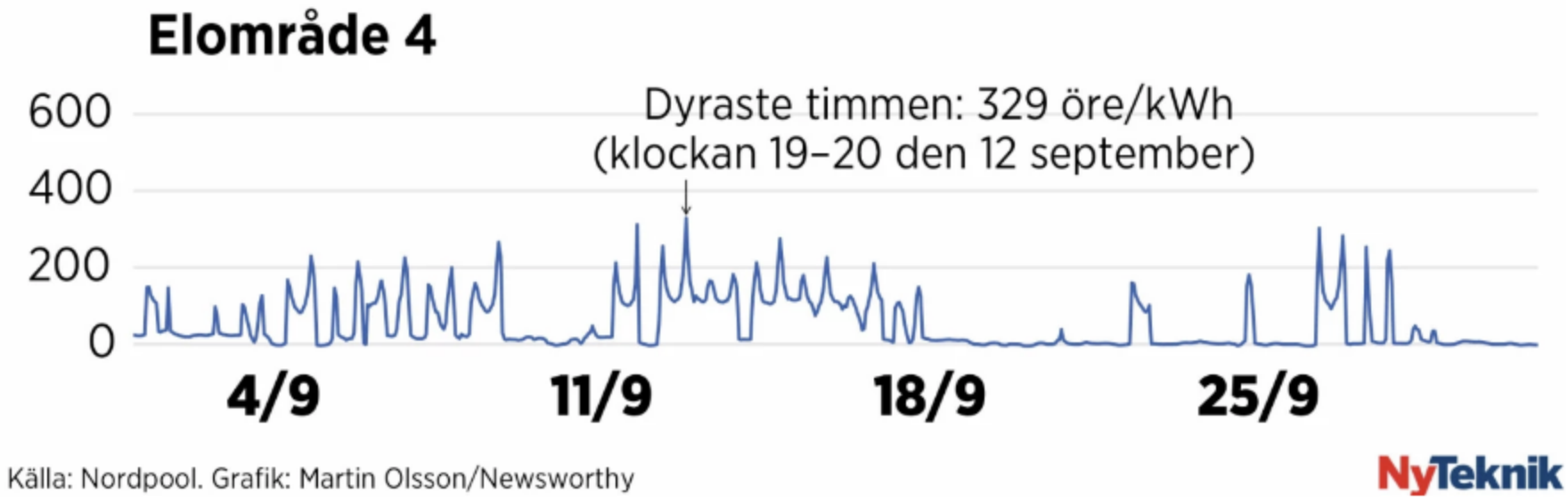
Electricity price monthly average November öre/kWh
excluding VAT and transmission costs (100 öre~0.1 Euro)



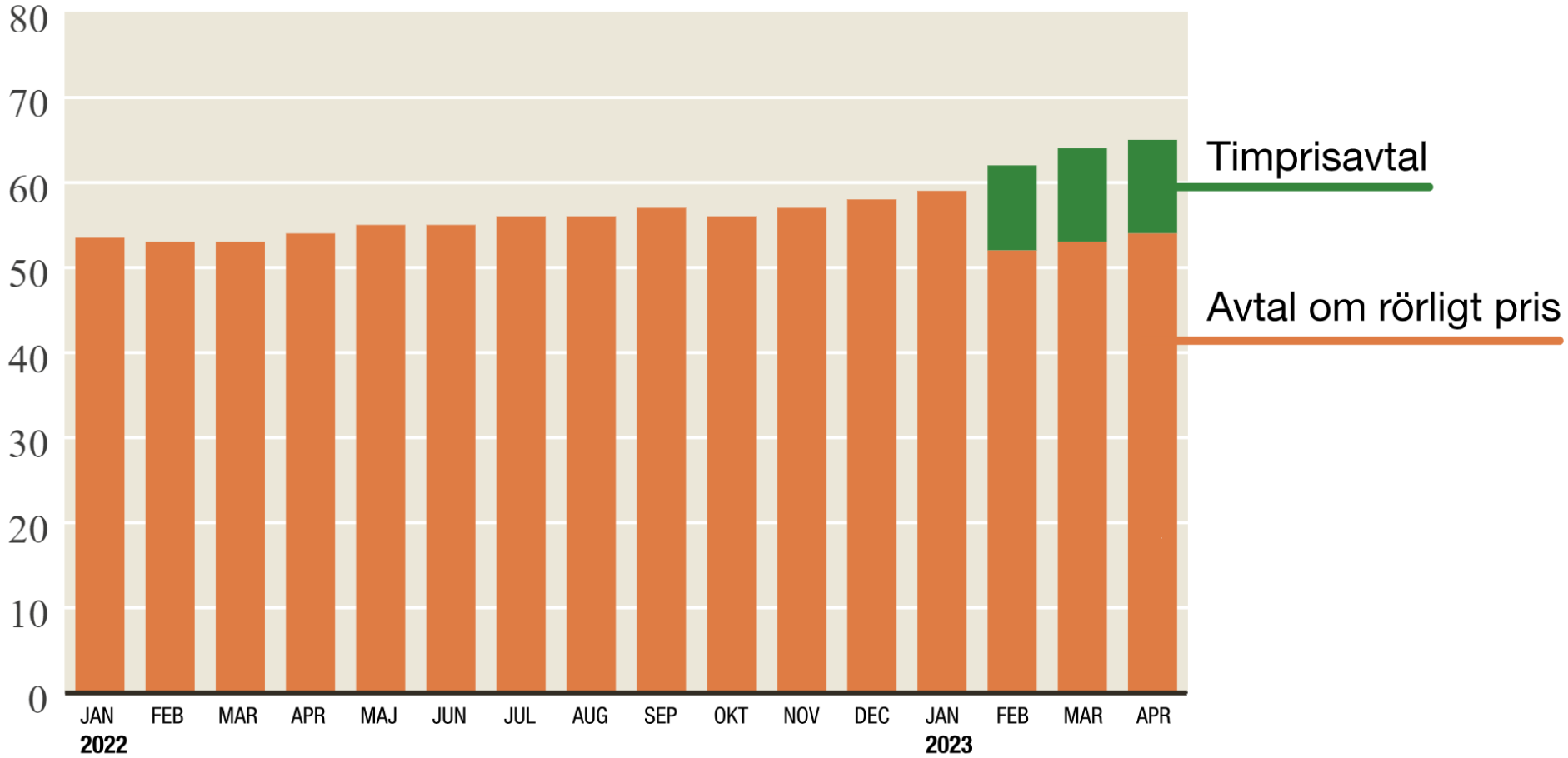
Källa: Nordpool. Grafik: Martin Olsson/Newsworthy

NyTeknik

Fluctuating prices



11 % have floating price



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Heating and hot water

- Electricity and district heating account for more than 80 per cent of the energy used in the residential and service sector.
- Electricity is the most common energy carrier for heating in houses, followed by biofuels and district heating. In multi-dwelling buildings and nonresidential facilities district heating is by far the most common energy carrier.
- Petroleum products can be used for heating but are mainly used for machinery in agriculture, foresting, fishing and construction.

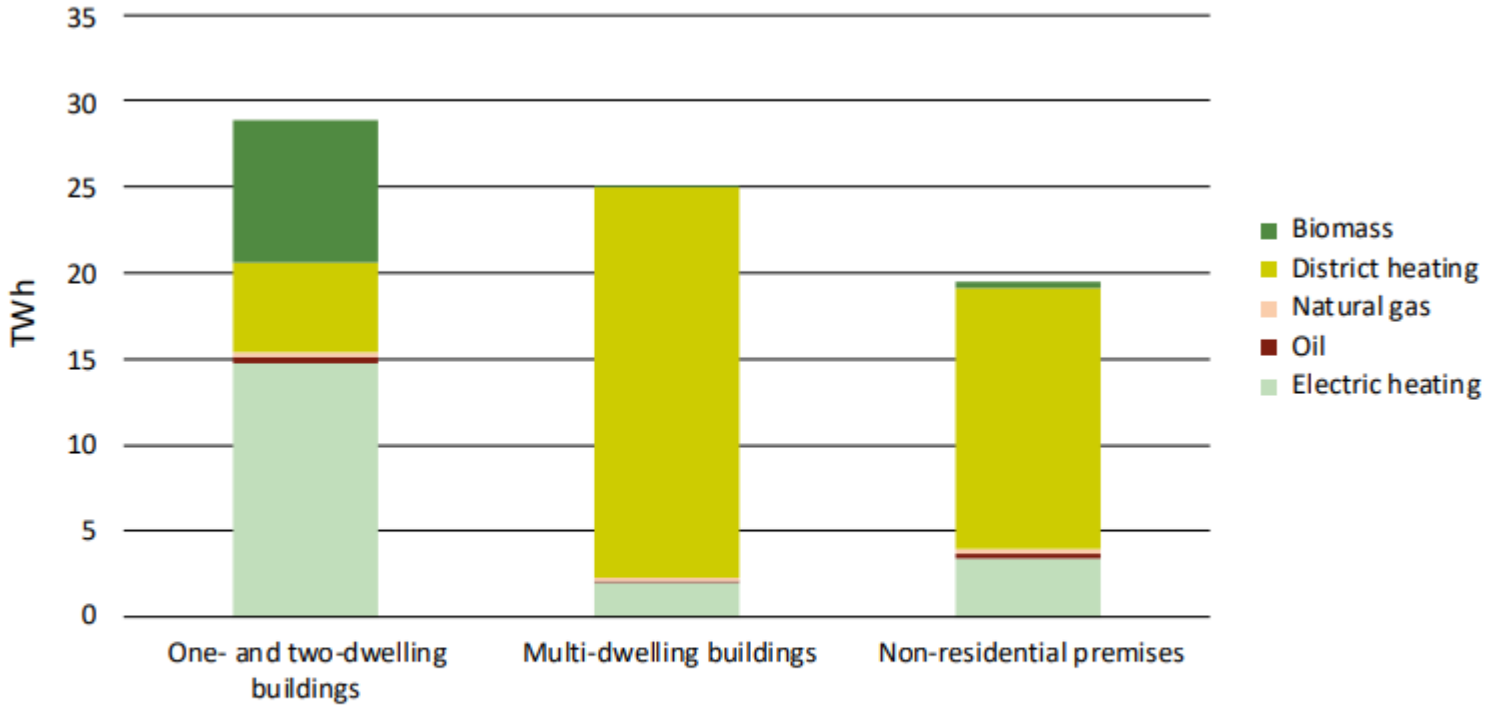

Figure 36. Energy use for heating and hot water in one- and two-dwelling buildings, multi-dwelling buildings and non-residential premises 2020, TWh.

Source: Swedish Energy Agency.

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District heating

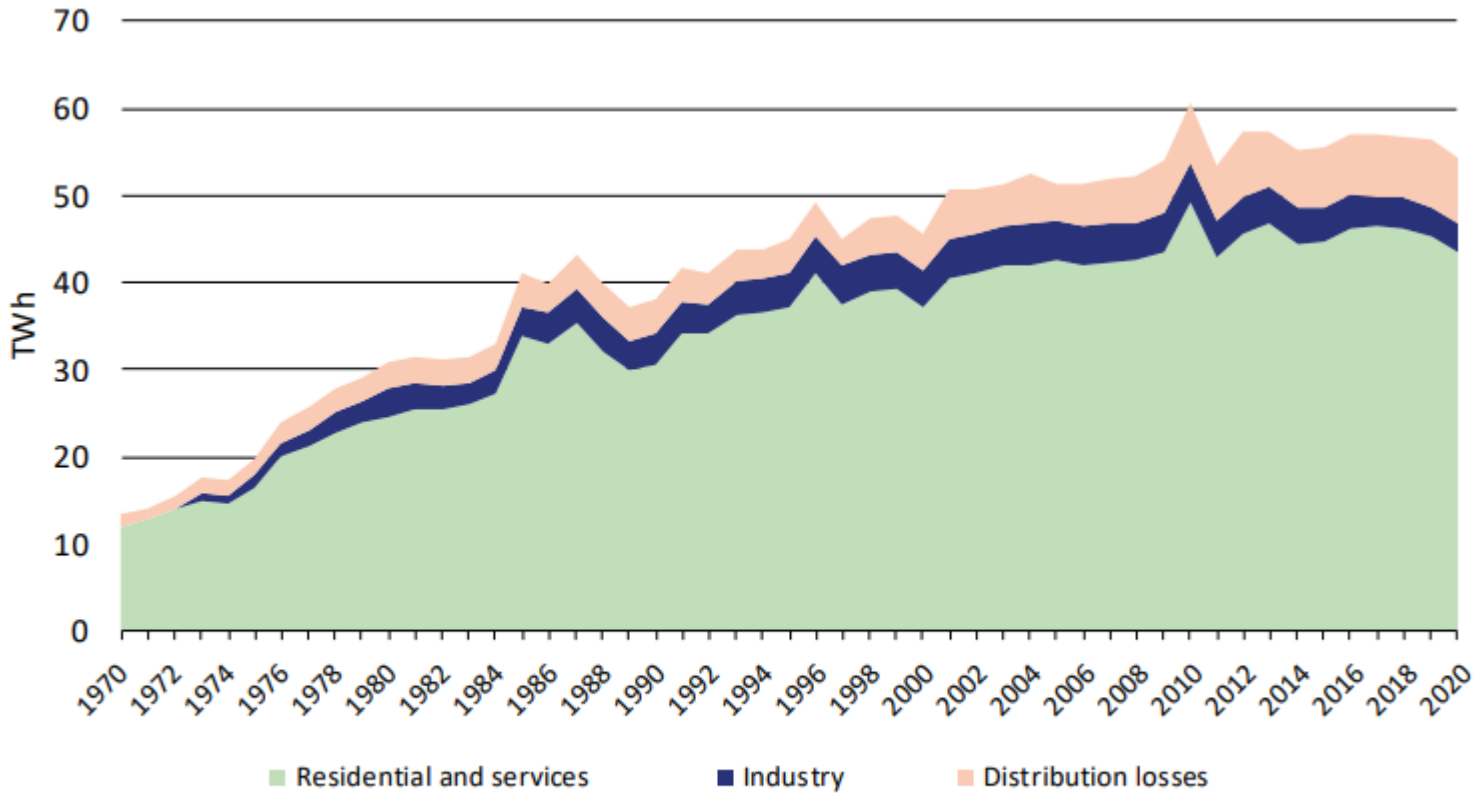
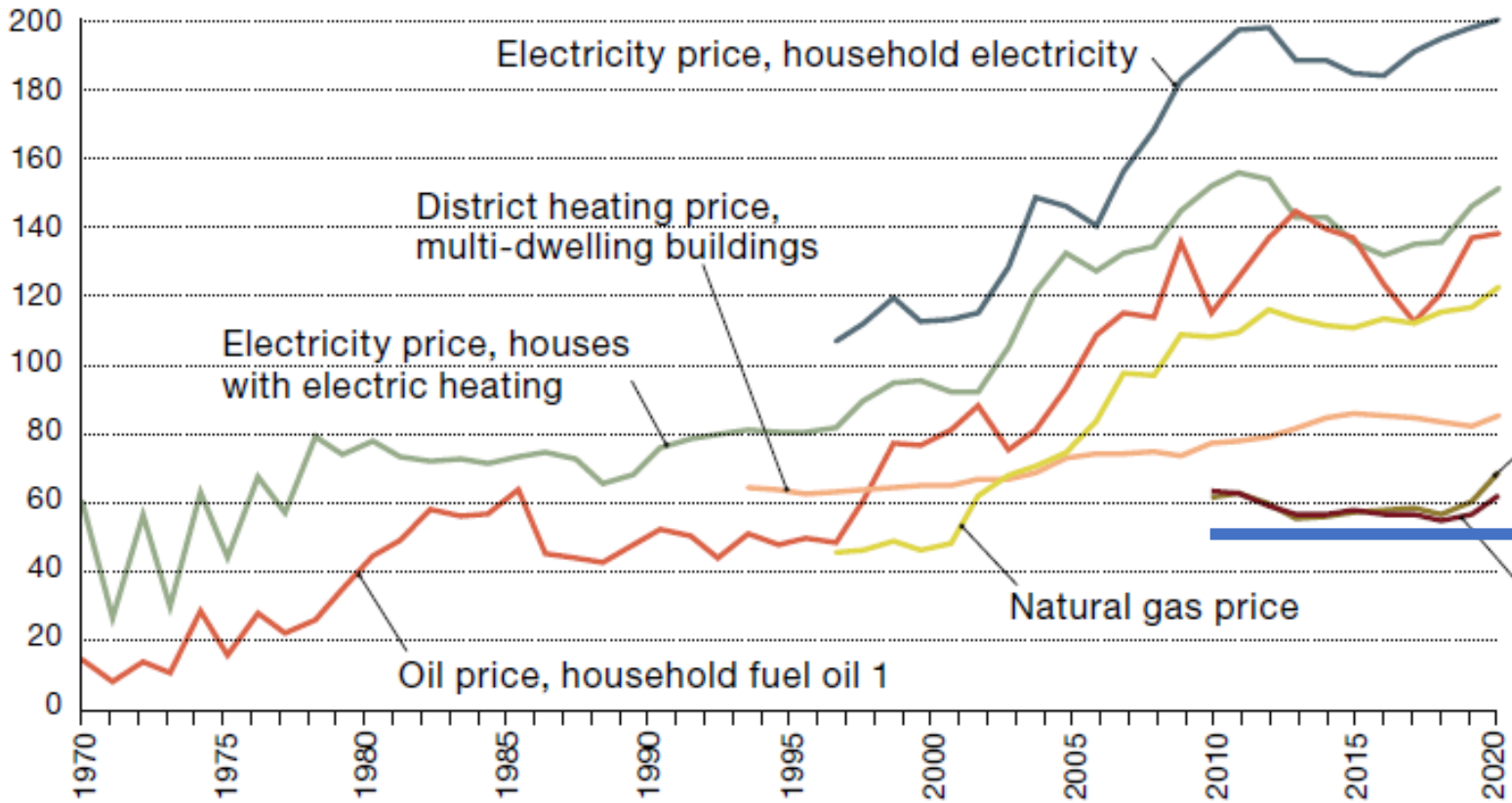


Figure 14. District heating consumption 1971–2020, TWh.

Source: Swedish Energy Agency and Statistics Sweden.

Swedish Energy Agency

Energy prices for households from 1970, including taxes and VAT, in 2019 price levels, öre/kWh



Sources: The Swedish Energy Agency, Statistics Sweden (SCB), Swedish Petroleum and Biofuels Institute (SPBI). Remark: Prices are presented in 2019 price levels; consumer price index is used for recalculating of prices.

Öre = cent

100 öre ≈ 0,1 Euro / USD

OPEX HP 0,05 Euro/ kWh

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Climate targets

Sweden should have net zero emissions 2045,

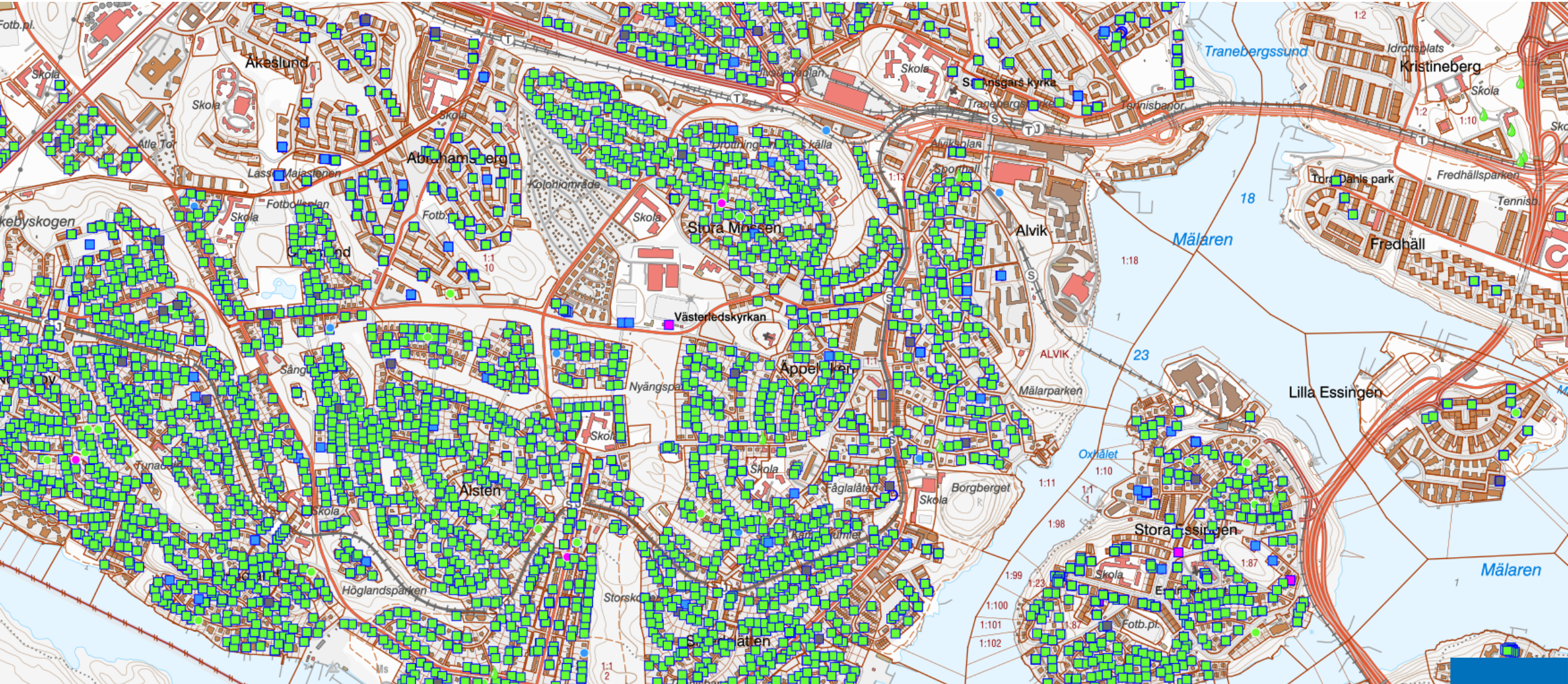
and thereafter negative emissions.

Emissions (negative or positive) from land use, change use of land and forestry (LULUCF) not included in national climate targets. But is part of the fit for 55 package.

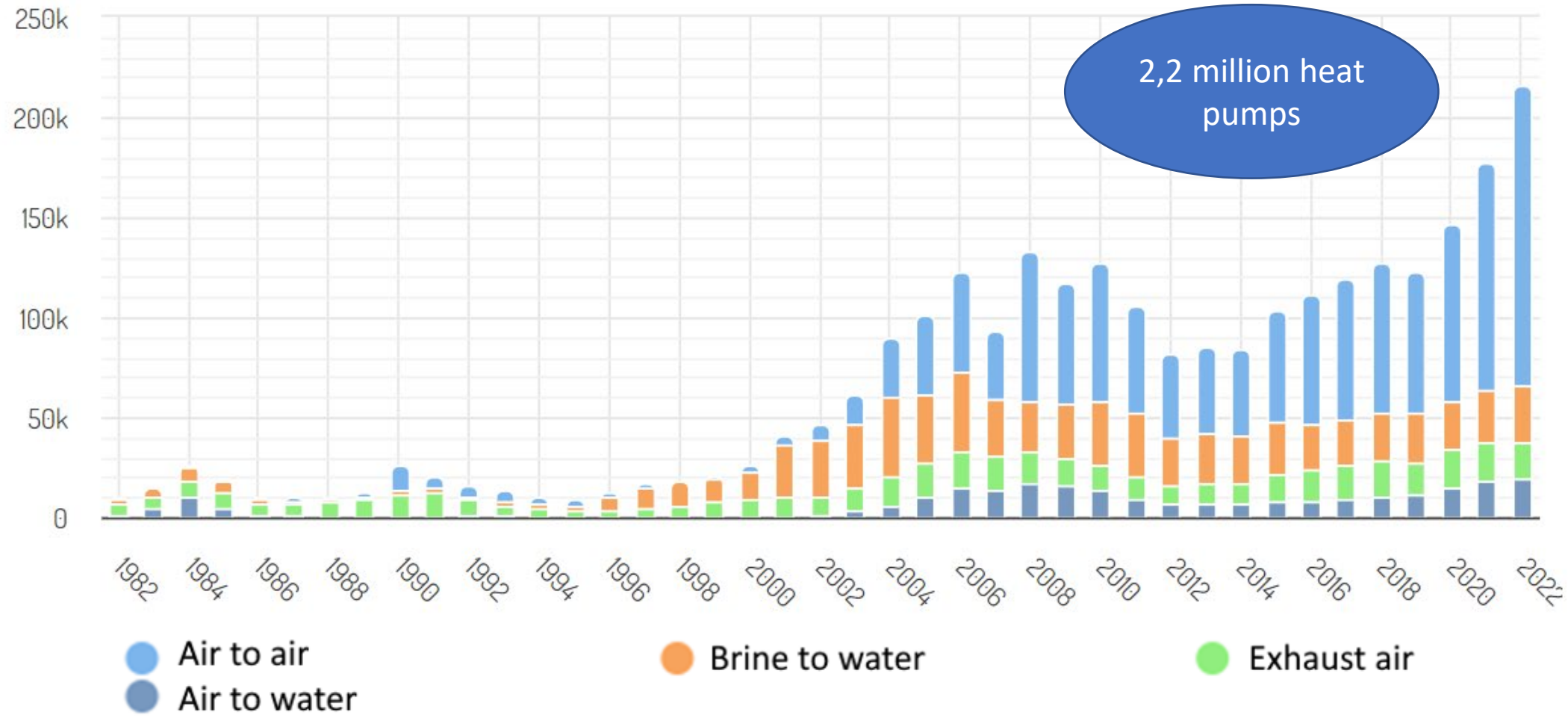
Market

Some statistics

HP market in Sweden



Heat pump sale 1980 - 2022



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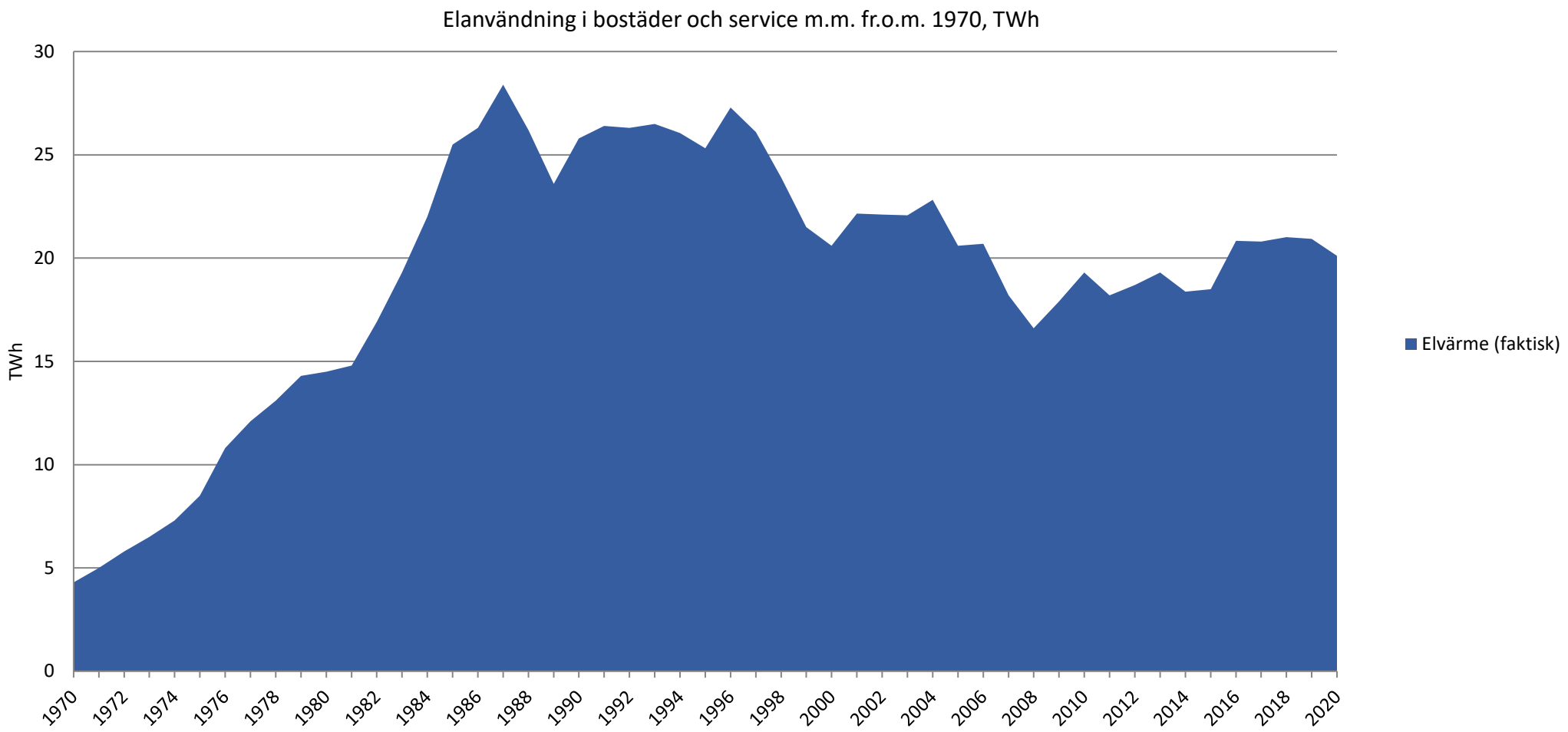
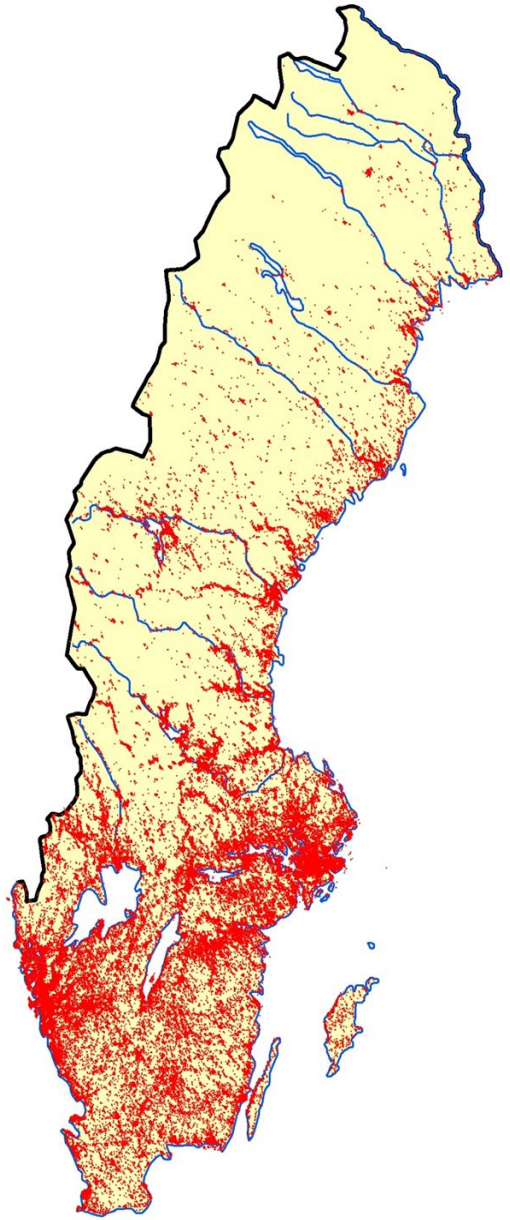
Electricity for heating and hot water

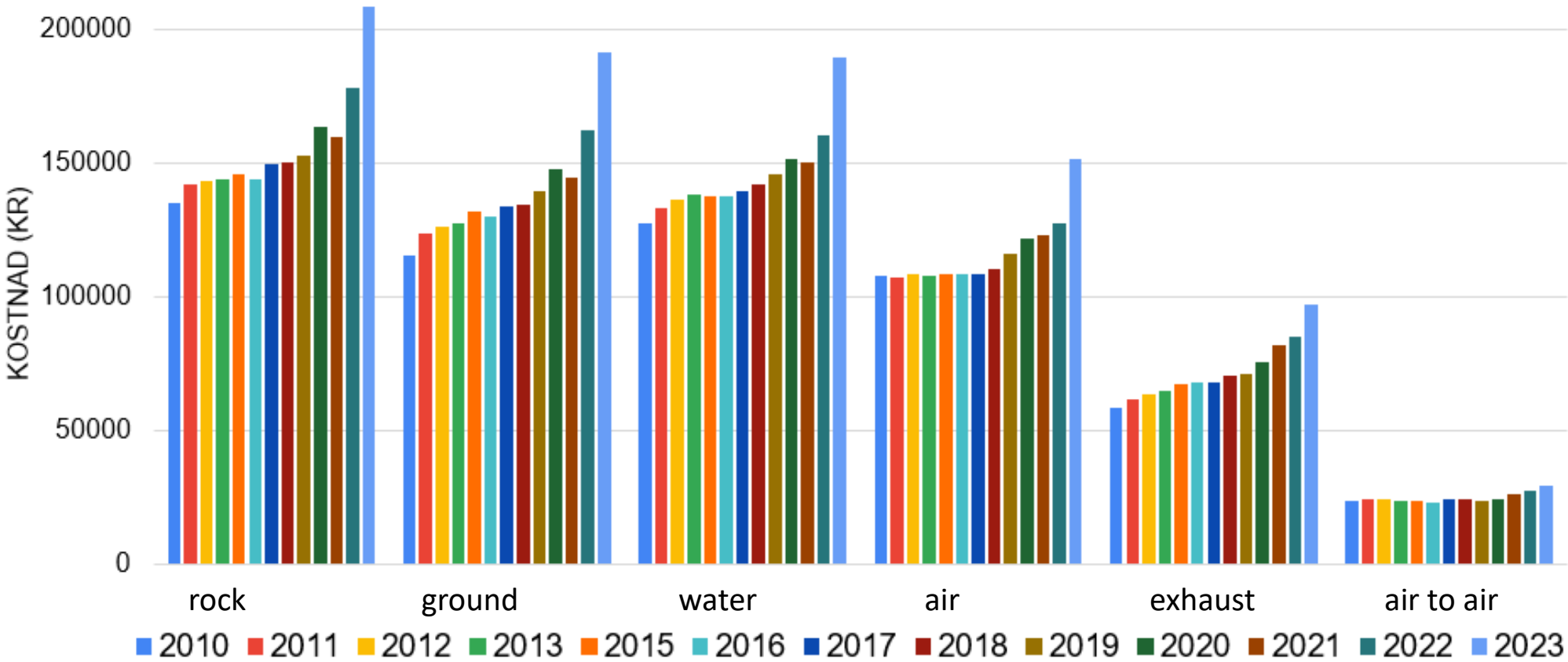


Ground source HP

- 2 M single family houses
- ~400 000 GSHP
- The typical domestic GSHP is a 5-10 kW



Total cost of installation 20 000 kWh/anually



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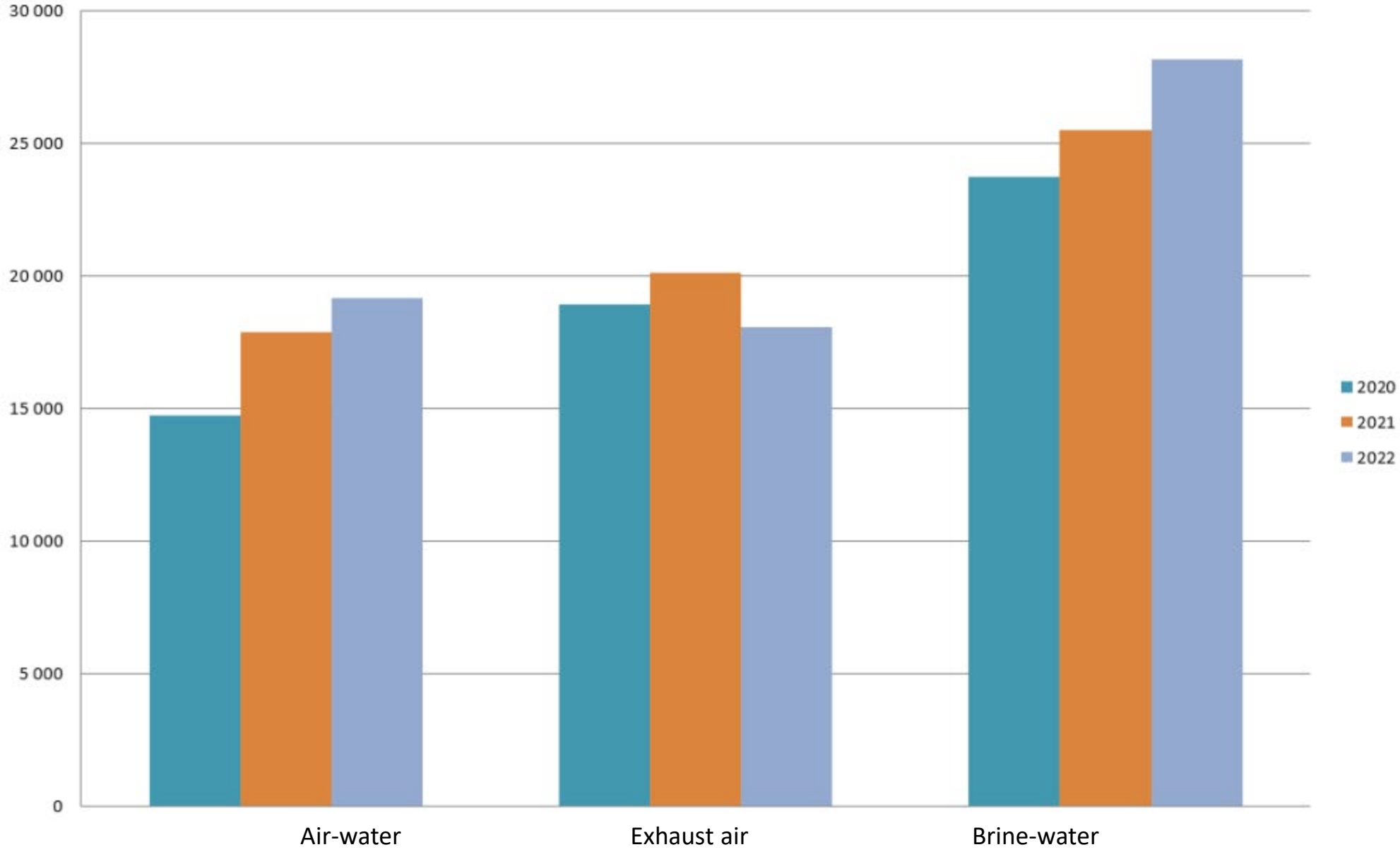
Heat pump sales in Sweden 2020 - 2022



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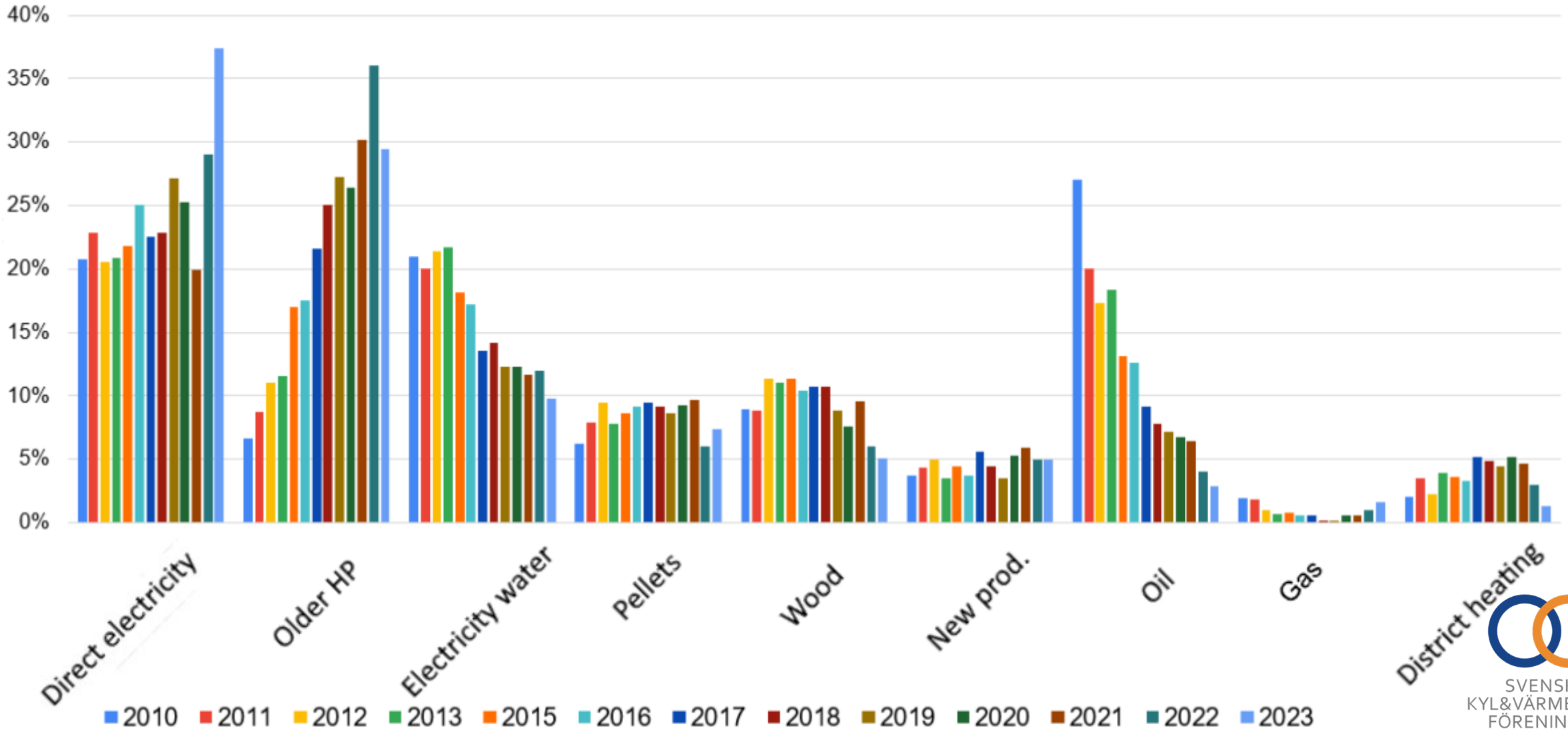
Previous system



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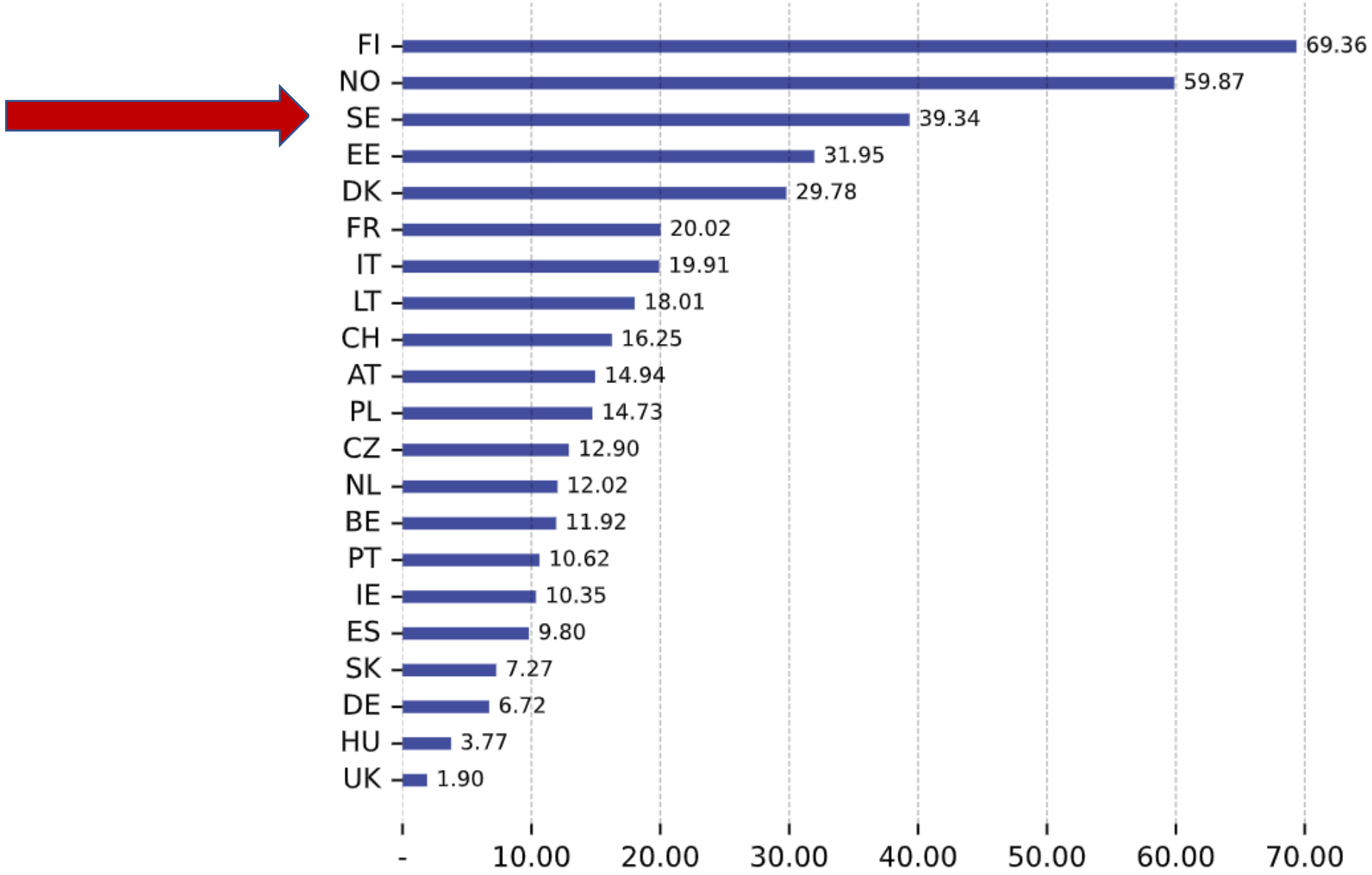
Heat pump sales 2022 per 1 000 households



stats.ehpa

Research & Innovation

With a focus on Refrigeration and Heat pumps

Nutek – alternative refrigerants 1994-96

Driven by the phase out of ozone depleting substances

- Work with flammable refrigerants (Hydro carbons)
- Low charge
- Brazed plate heat exchangers

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Swedish Energy Agency - Effsys programs 1997 - 2018

- A broadening of focus from components to systems
- Supported academia, the industry and the energy system to be where it is today
- High level of expertise of
  - thermal systems
  - Natural refrigerants
- Funding private and public partnership

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Energy agency – Termo

Research and innovation of thermal systems

- Refrigeration, Heat Pumps, Storage, Solar and District heating
- System view of total energy system
- Environmental changes
- termoinnovation.se/

- Innovation cluster “Varmt & Kallt” focal point for RoI
  - refrigeration & heat pumps
  - geothermal system
  - varmtochkallt.se

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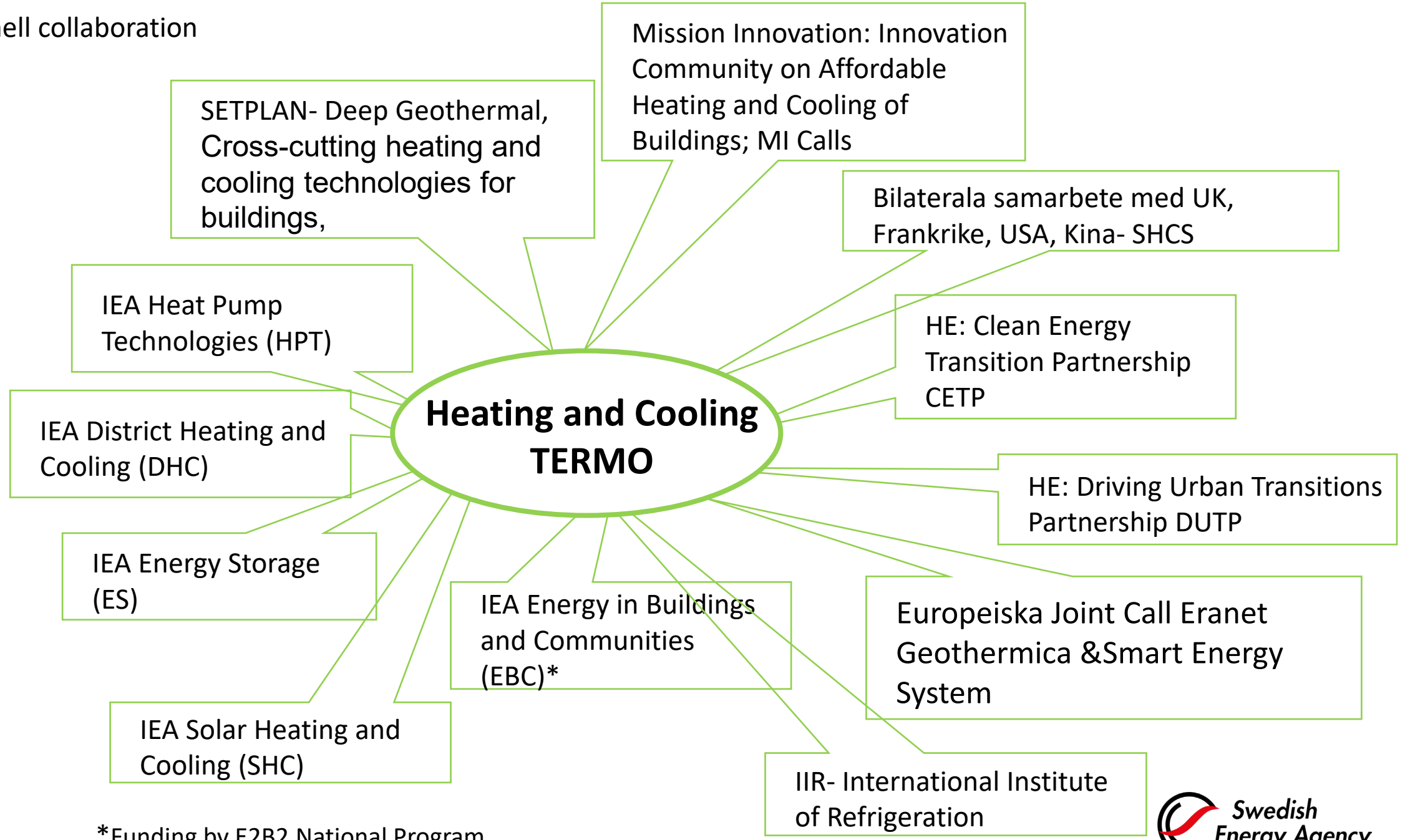
Internationell collaboration



*Funding by E2B2 National Program

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Annexes in HPT TCP

ANNEX 59
START DATE: 1 January 2022
END DATE: 31 December 2025

Heat Pumps for Drying

The proposed Annex aims to structure and describe the numerous possibilities and advantages of heat pump integration in dryers. Both state of the art and innovative solut...

Read more | Visit annex

ANNEX 58
START DATE: 1 January 2021
END DATE: 31 December 2023

High-Temperature Heat Pumps

This Annex gives an overview of available technologies and close-to-market technologies regarding high-temperature heat pumps. The need for further RD&D developments ...

Read more | Visit annex

ANNEX 65
START DATE: 1 January 2024
END DATE: 31 December 2026

Heat Pumps in a Circular Economy

For a long time, energy efficiency has been a key selling point for heat pumps. However, with the transition to a more circular economy, an increasing focus on the lifeti...

Read more | Visit annex

ANNEX 64
START DATE: 1 April 2023
END DATE: 31 December 2025

Safety measures for flammable refrigerants

The ultimate goal of the Annex is to contribute to a broader safe use of flammable refrigerants. The objective is that the findings generated in the Annex will be used as...

Read more | Visit annex

ANNEX 57
START DATE: 1 January 2021
END DATE: 31 December 2023

Flexibility by implementation of heat pumps in multi-vector energy systems and thermal networks

The Annex description: This Annex focus on the implementation of heat pumps in district heating and cooling systems, describe possible solutions and barriers for heat pum...

Read more | Visit annex

ANNEX 54
START DATE: 17 January 2019
END DATE: 31 December 2023

Heat pump systems with low Global Warming Potential (GWP) refrigerants

This annex aims at promoting low GWP refrigerant application to accelerate phase down of high-GWP HFCs by developing design guidelines of optimized heat pump components a...

Read more | Visit annex

ANNEX 63
START DATE: 1 January 2023
END DATE: 31 December 2025

Placement Impact on Heat Pump Acoustics

The Annex aims to focus on the "Placement Impact on Heat Pump Acoustics" but leaves room for special topics of heat pump acoustics covering selected applications and ...

Read more | Visit annex

ANNEX 62
START DATE: 1 January 2023
END DATE: 31 December 2025

Heat pumps for multi-familyresidential buildings in cities

This Annex will focus on heat pump solutions for multi-family houses in high-density cities. With respect to the demand of the participating countries, new buildings and ...

Read more | Visit annex

New project proposal
Enhanced miniaturized components

- Cheaper
- More environmentally friendly
- Safe with naturals

Thank you !

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