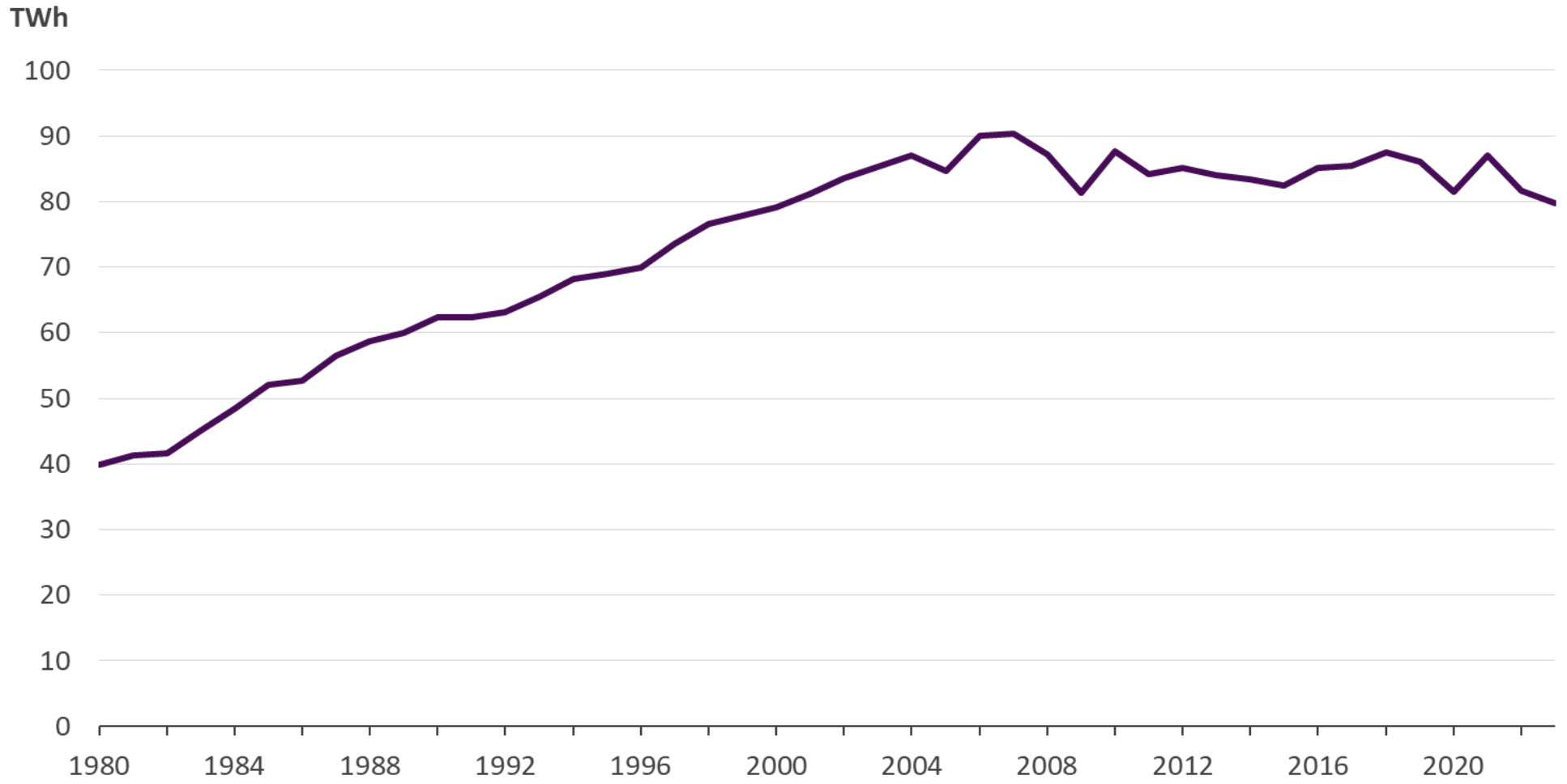
Energy Year 2023
Electricity

Finnish Energy

11.1.2024

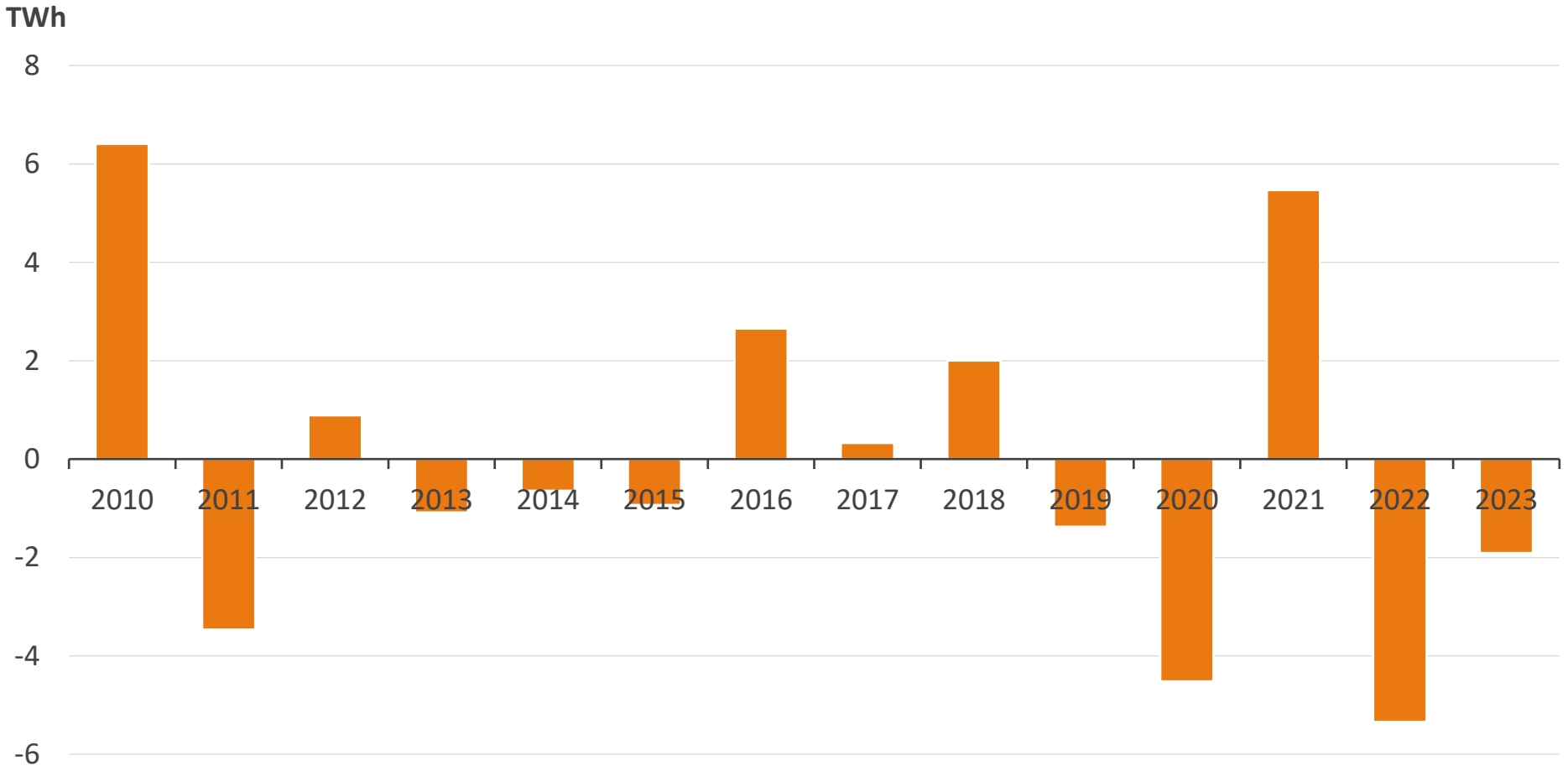
Finnish Energy

Electricity total consumption 80 TWh, 2 % decrease compared to 2022

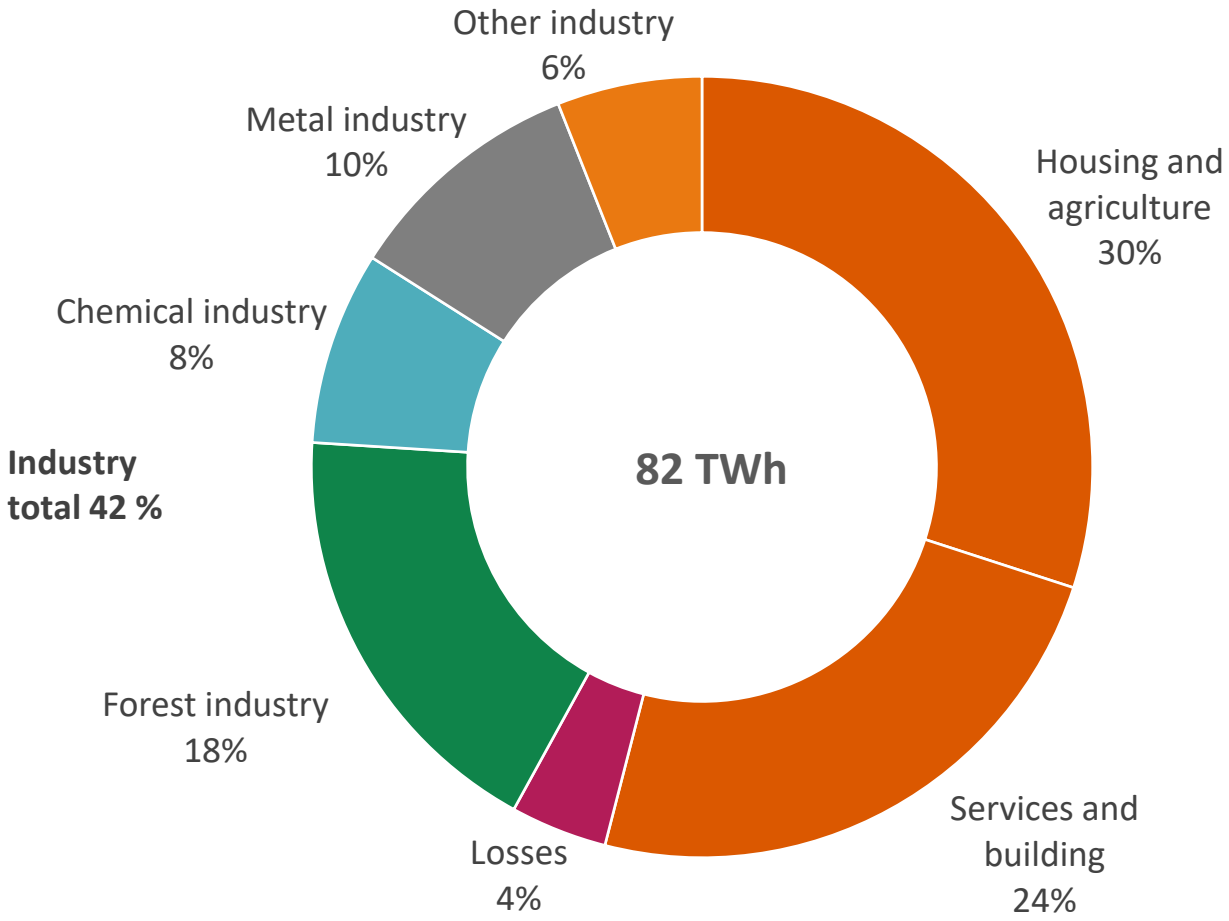


Electricity consumption decreased from the previous year

1,9 TWh change 2022-2023

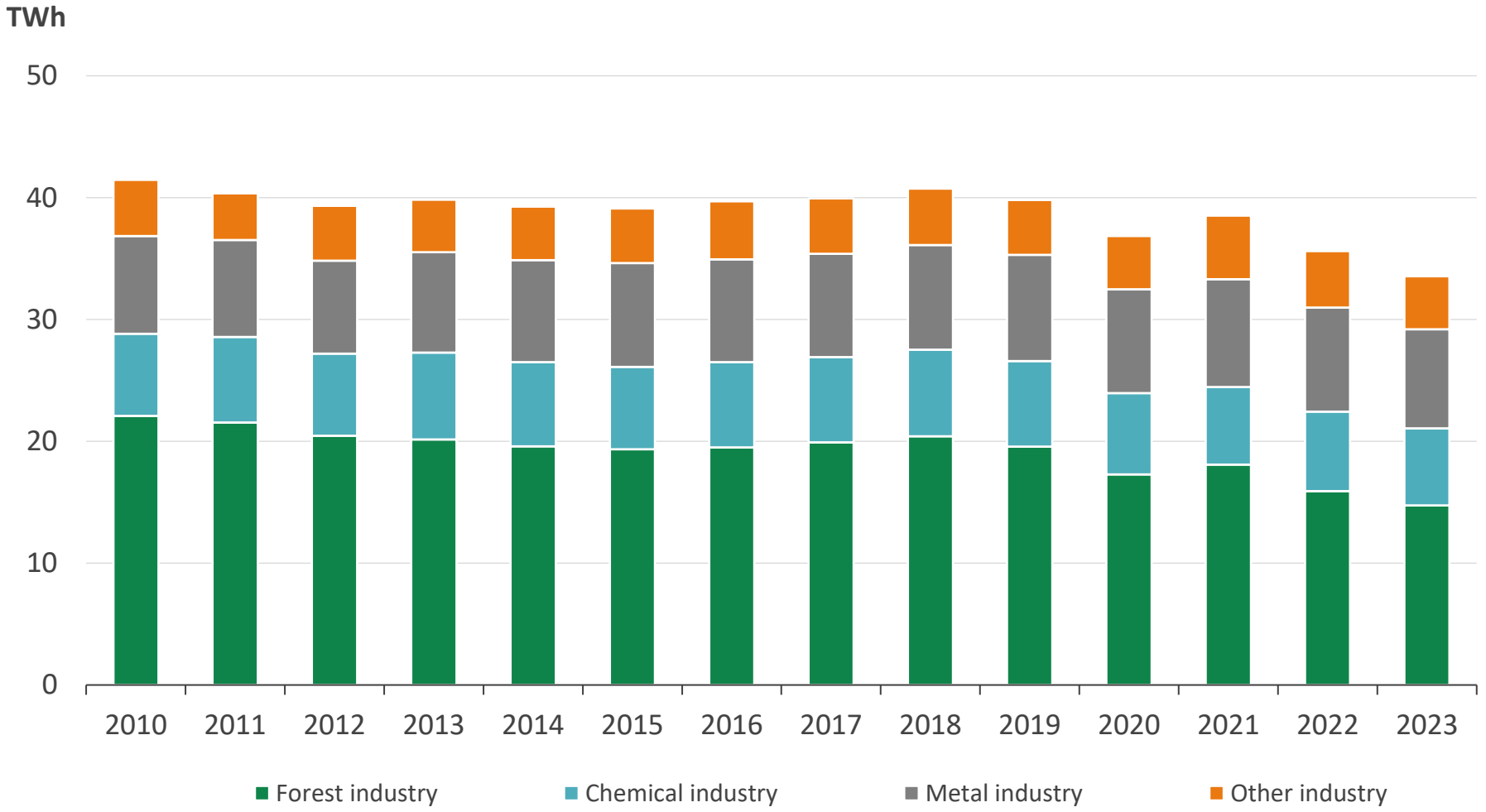


Electricity consumption 2023

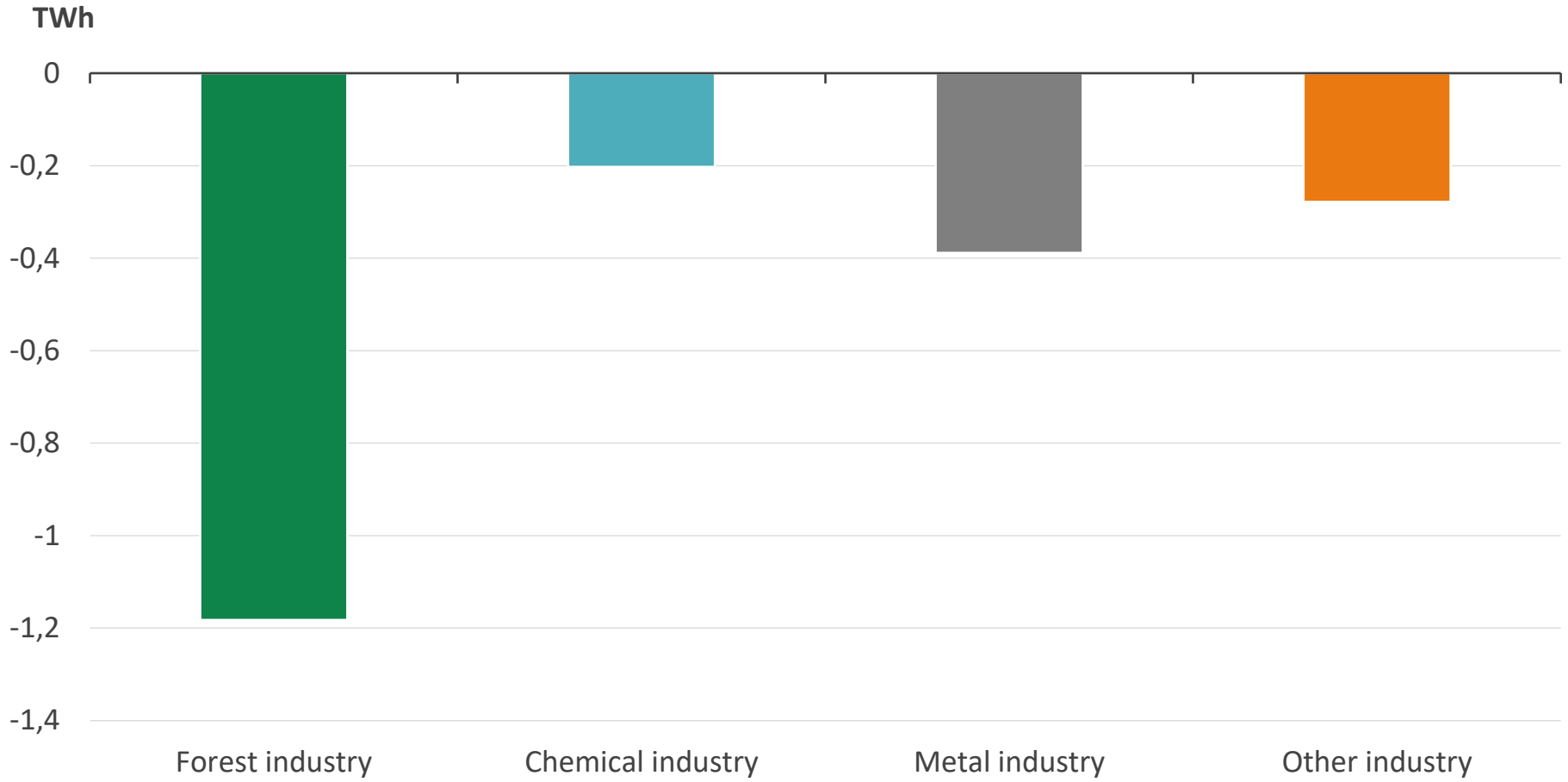


Electricity consumption of industry decreased 6 percent

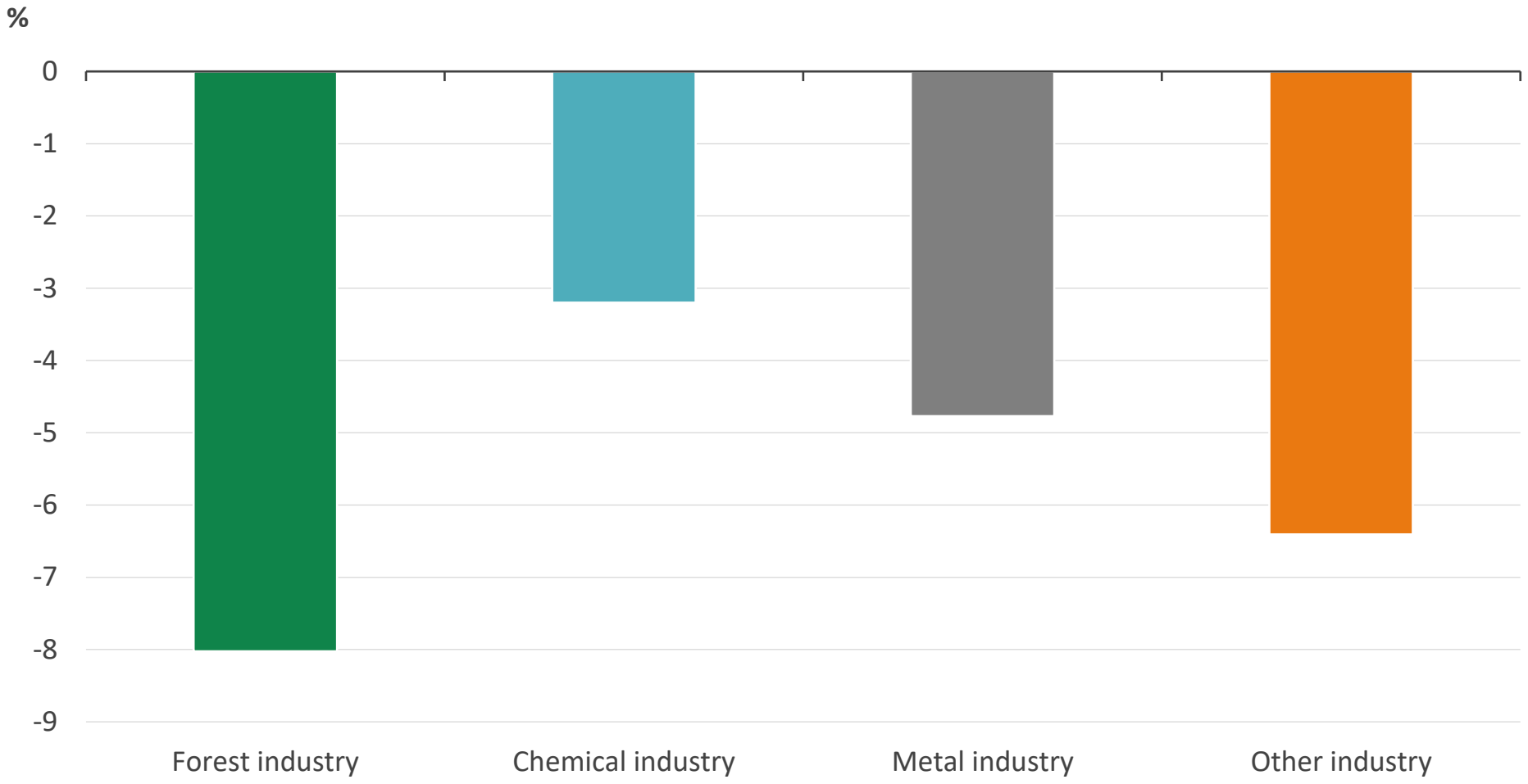
Consumption total 33 TWh



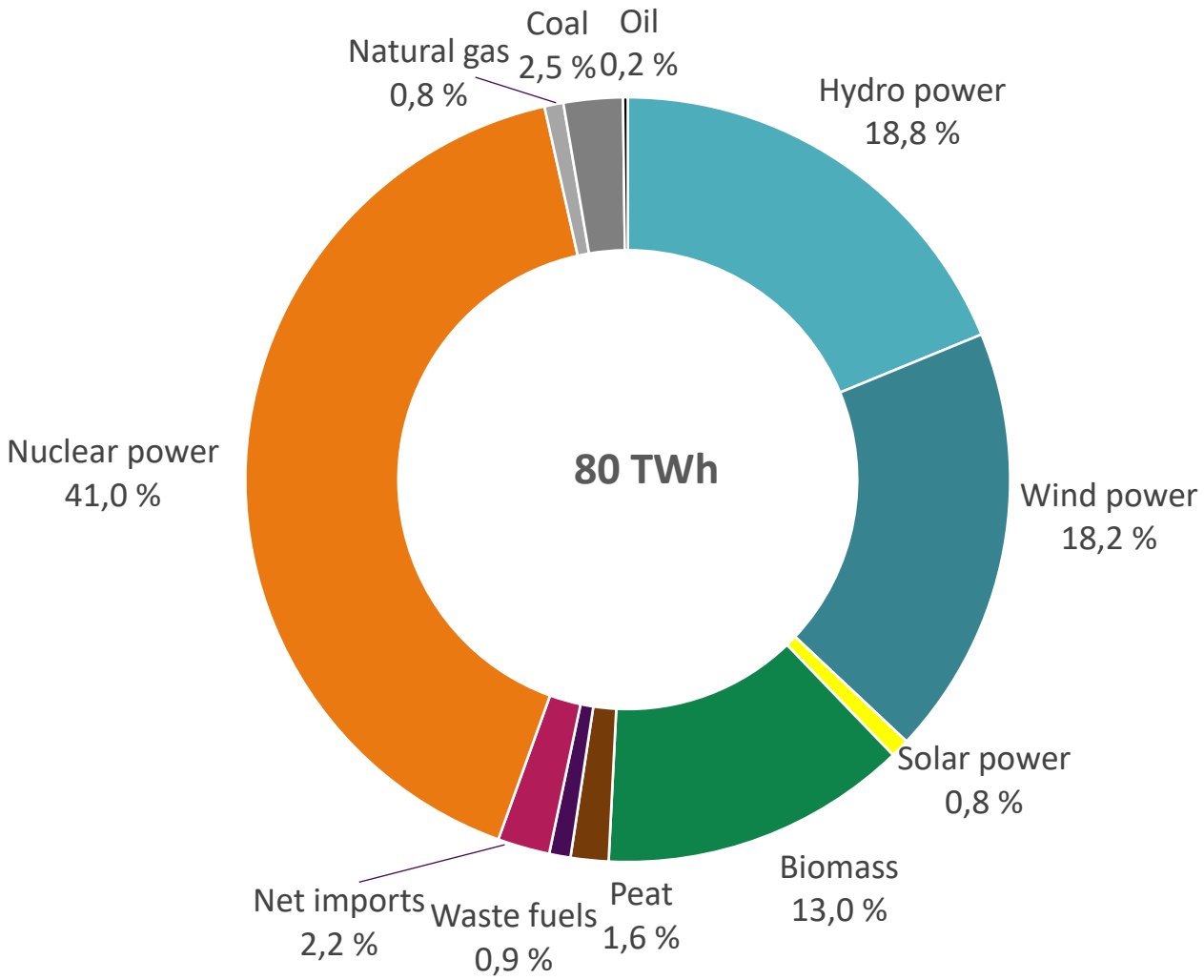
Industrial electricity consumption 2022-2023:
most of decrease in forest industry



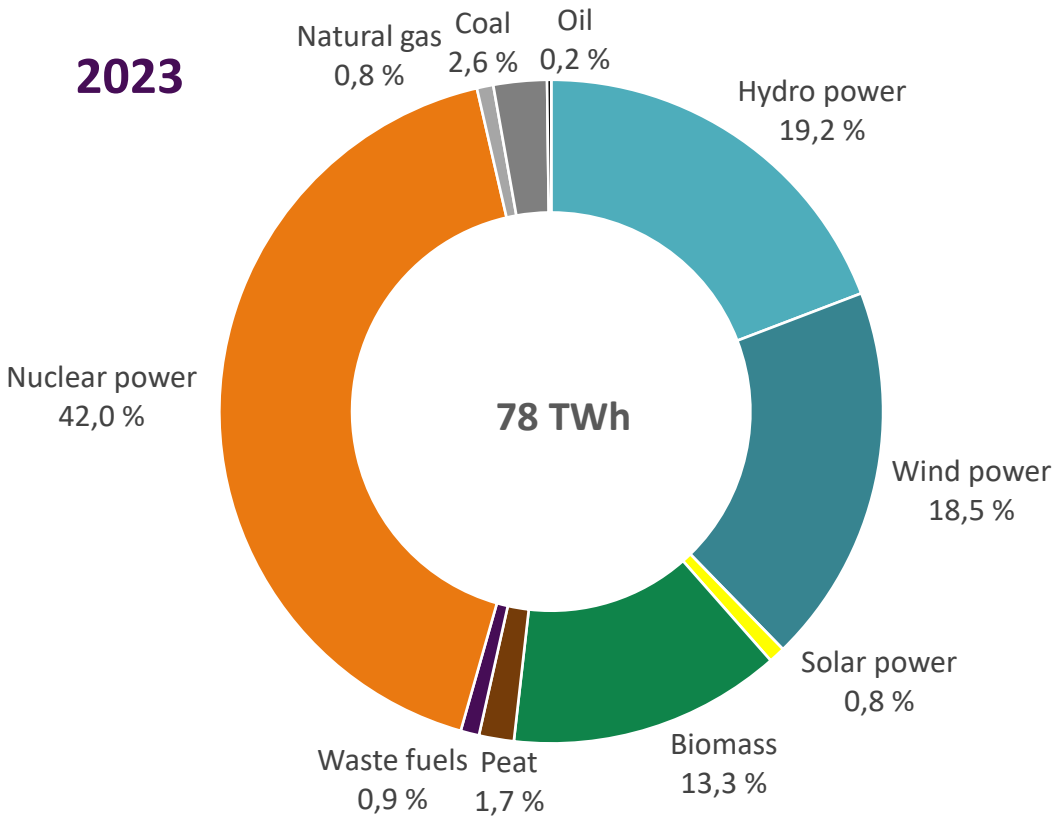
Change of Industrial Electricity Consumption 2022-2023

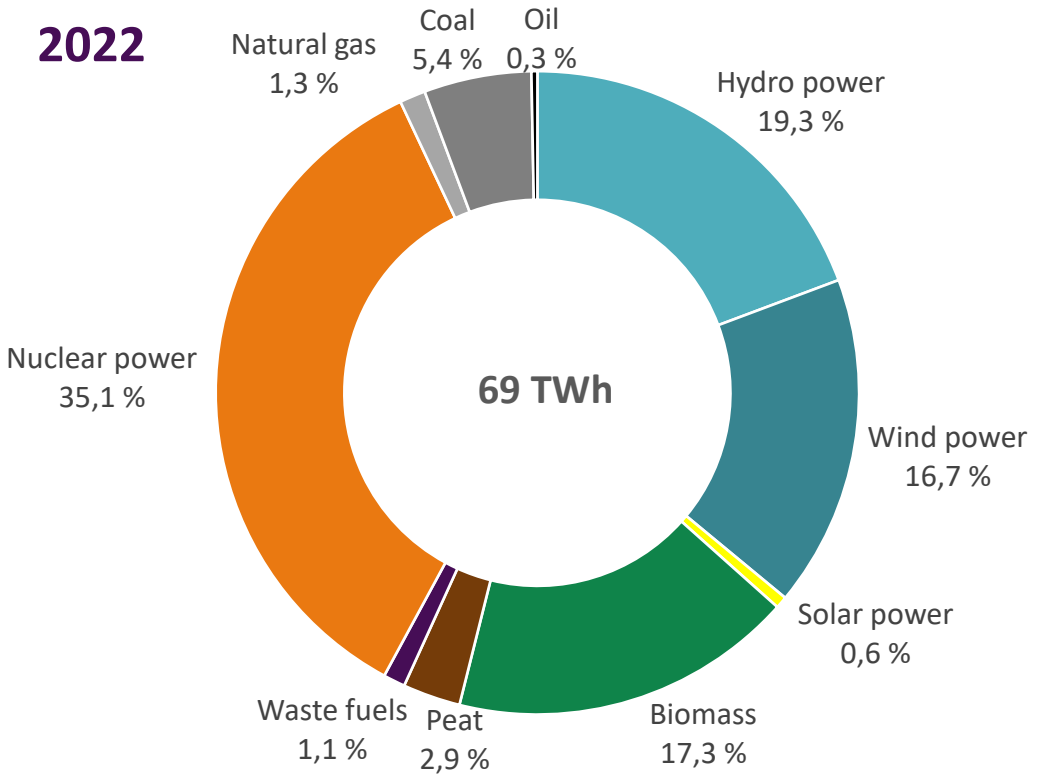


Electricity by energy source and net imports 2023



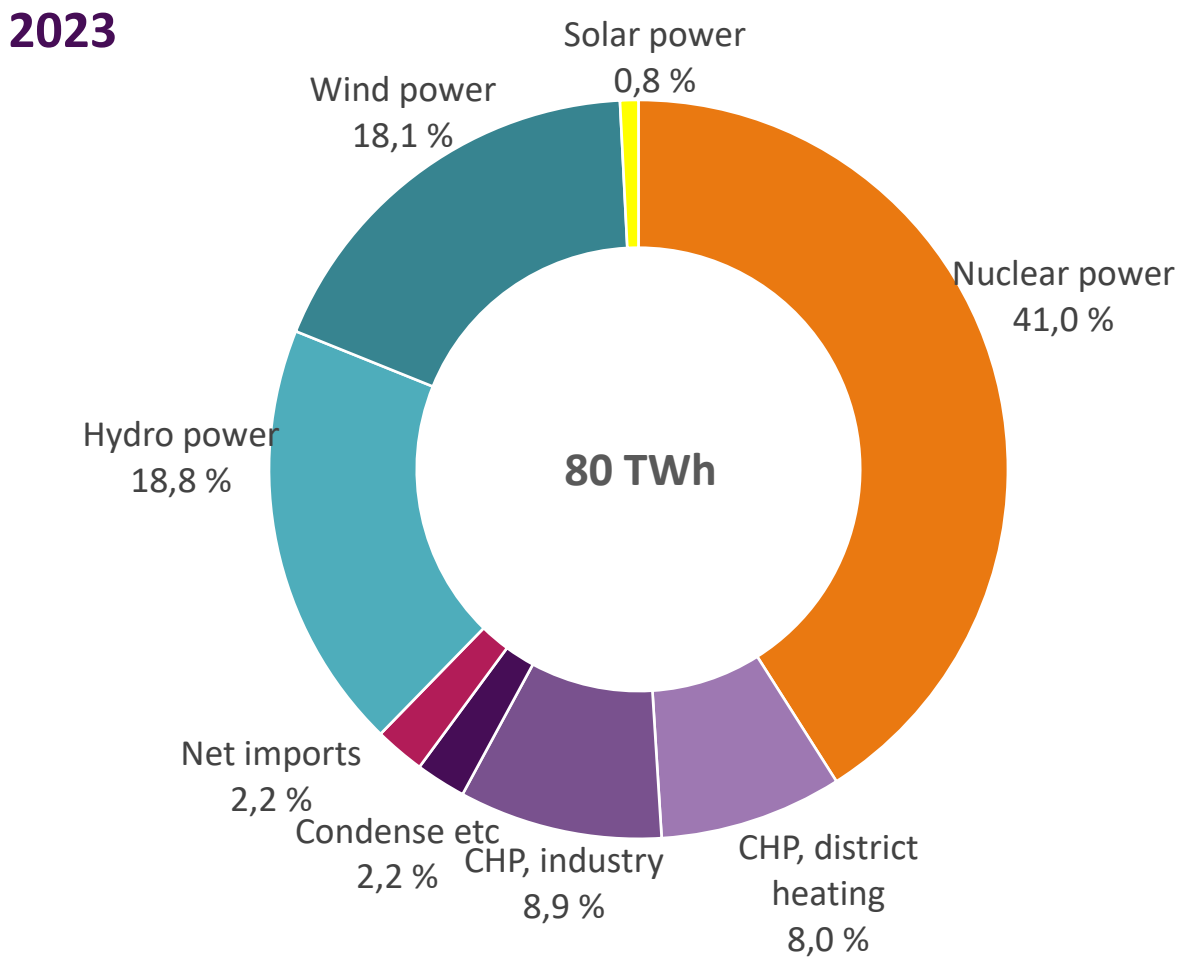
The share of CO_2-neutral electricity 94 percent

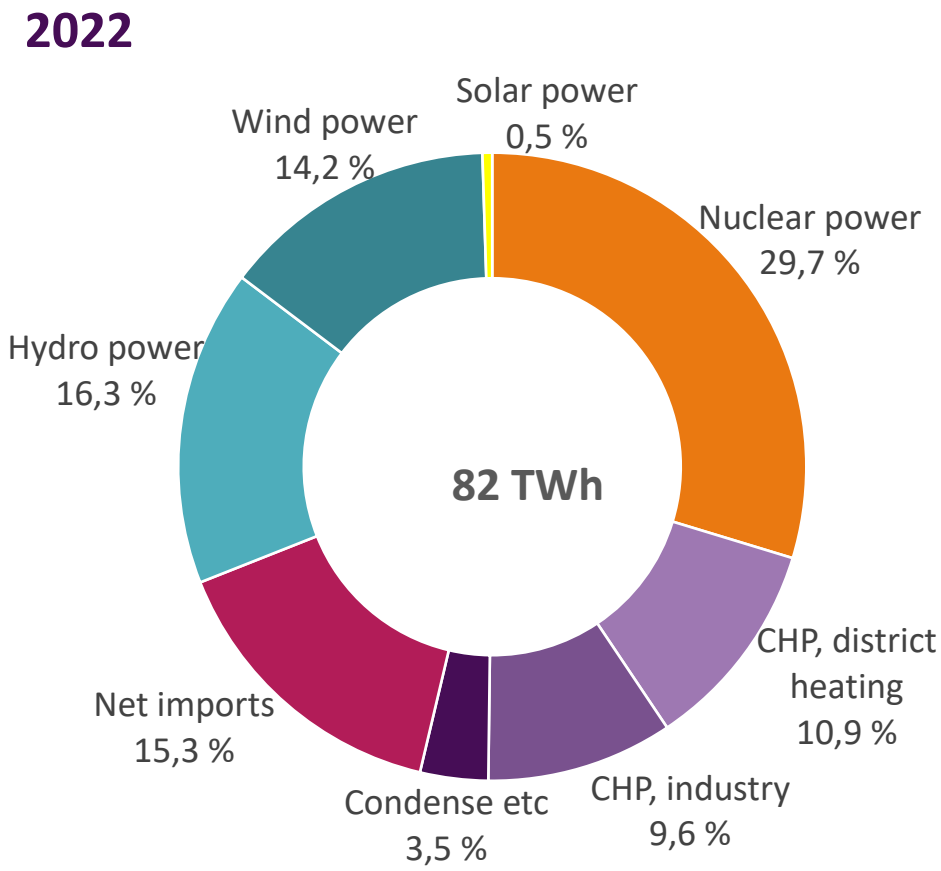




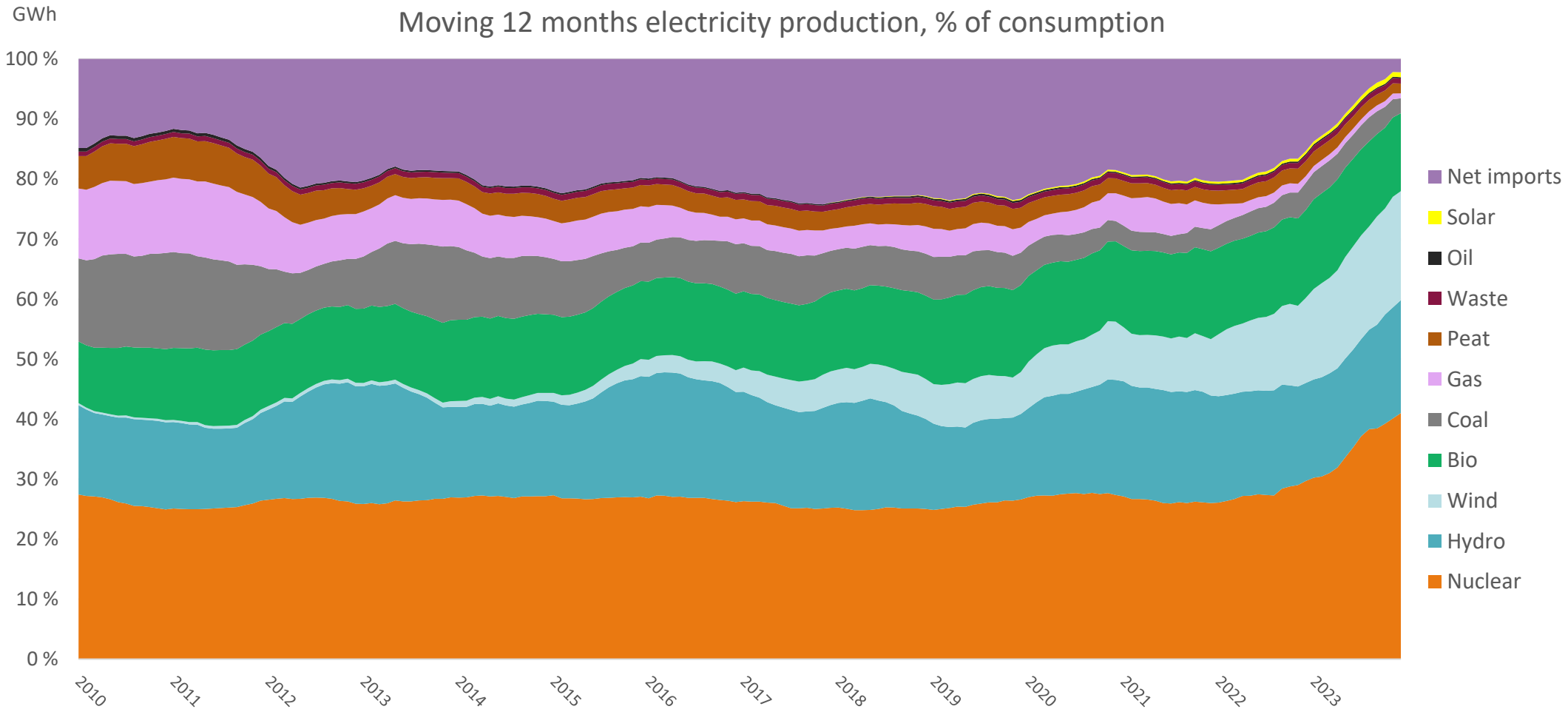
- ✓ Renewable: 52 % (54 % in year 2022)
- ✓ CO_2-neutral: 94 % (89 % in year 2022)
- ✓ Domestic: 54 % (57 % in year 2022)

Electricity production in Finland and net imports

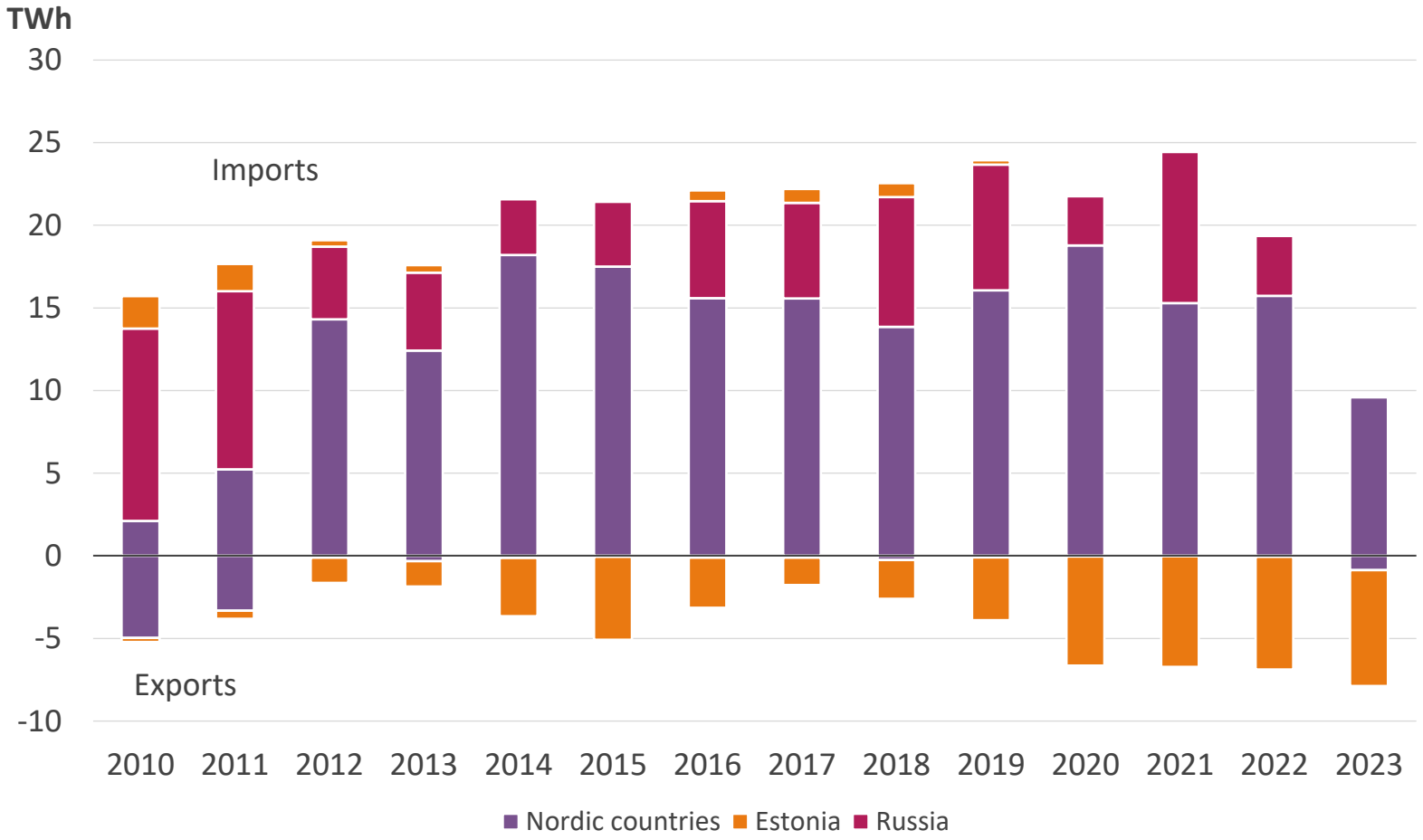




Fossil fuels have been replaced by renewables

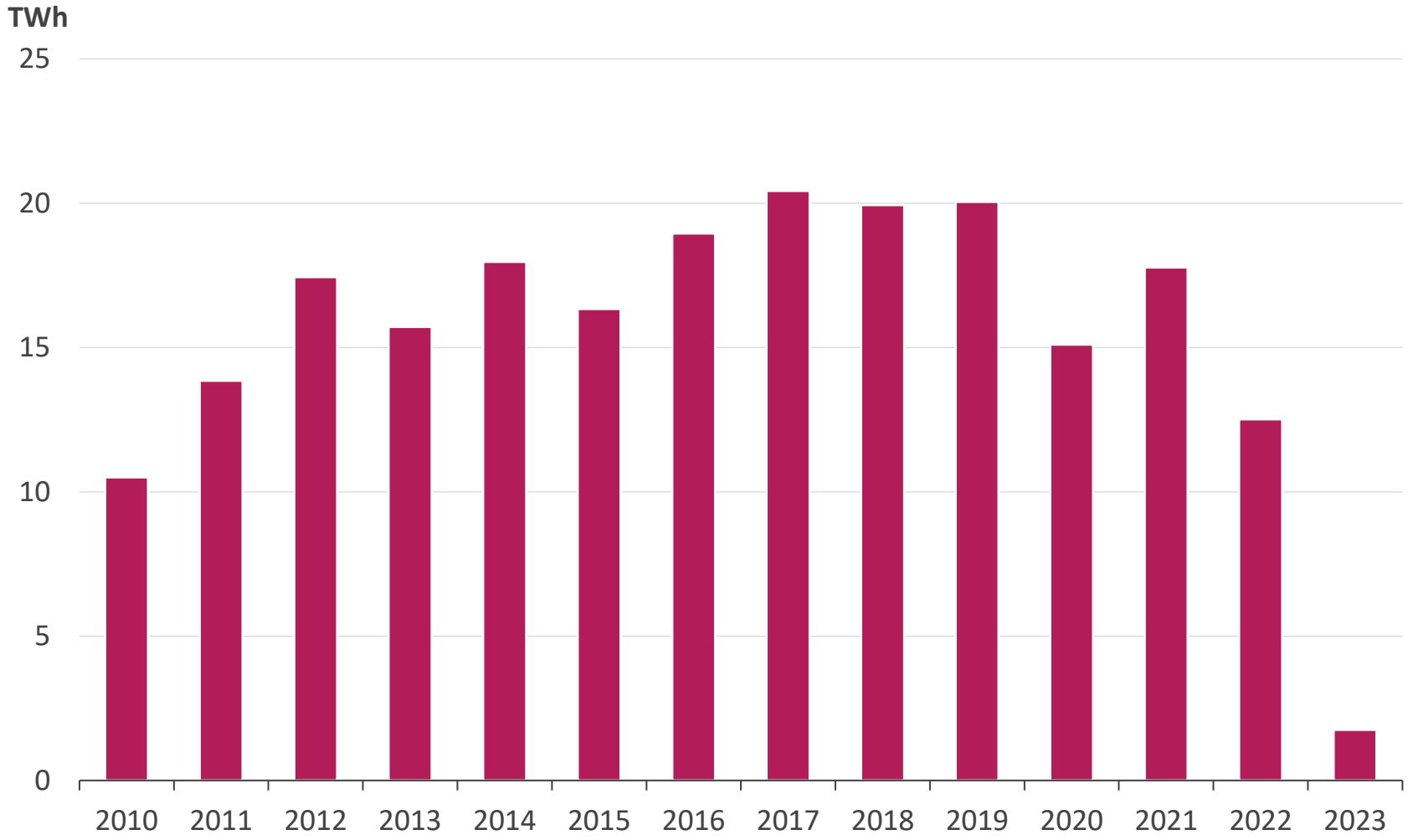


Net imports of electricity decreased 86 percent (10.7 TWh)

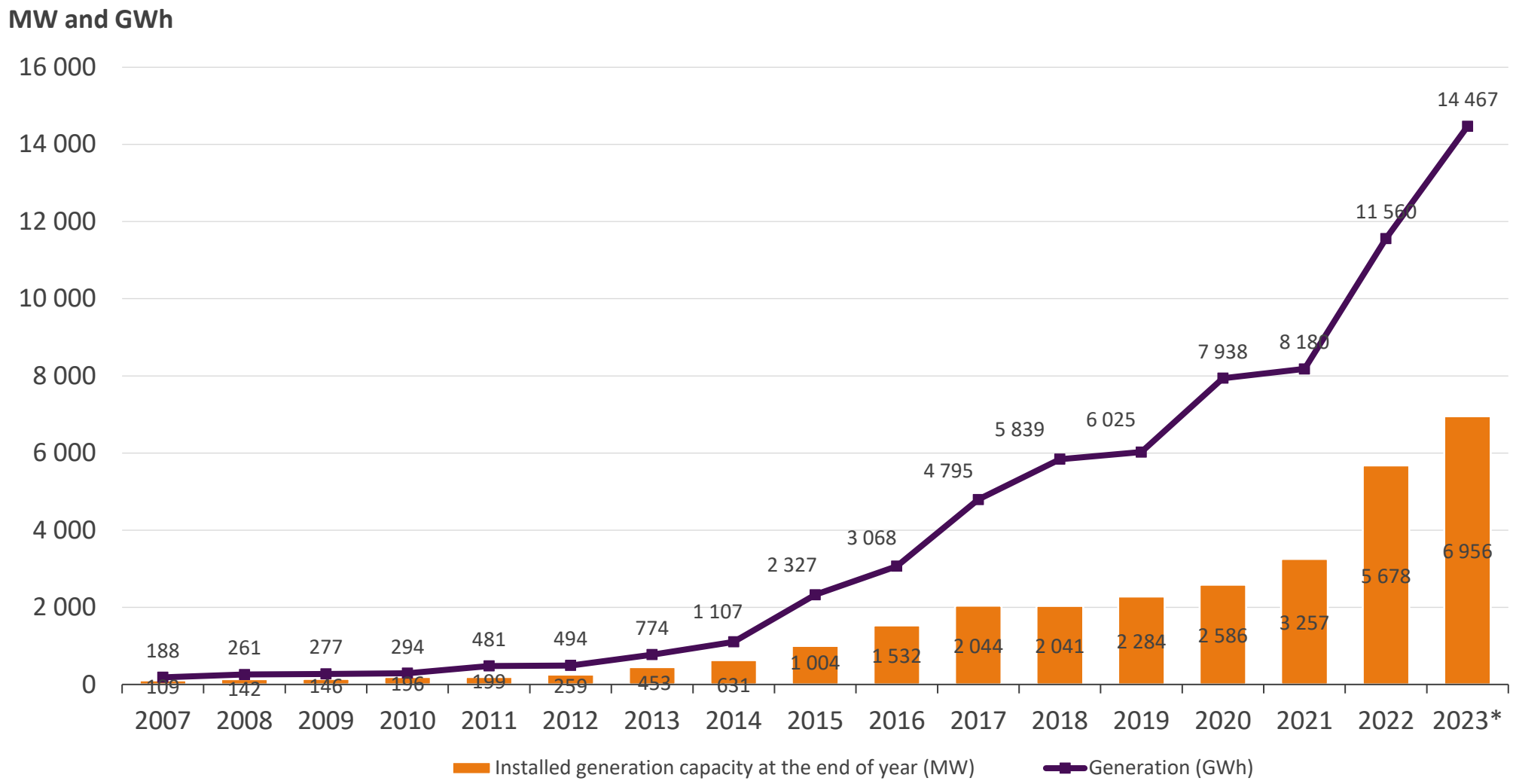


- Exports increased 15 %
- Imports from Nordics decreased 40 %

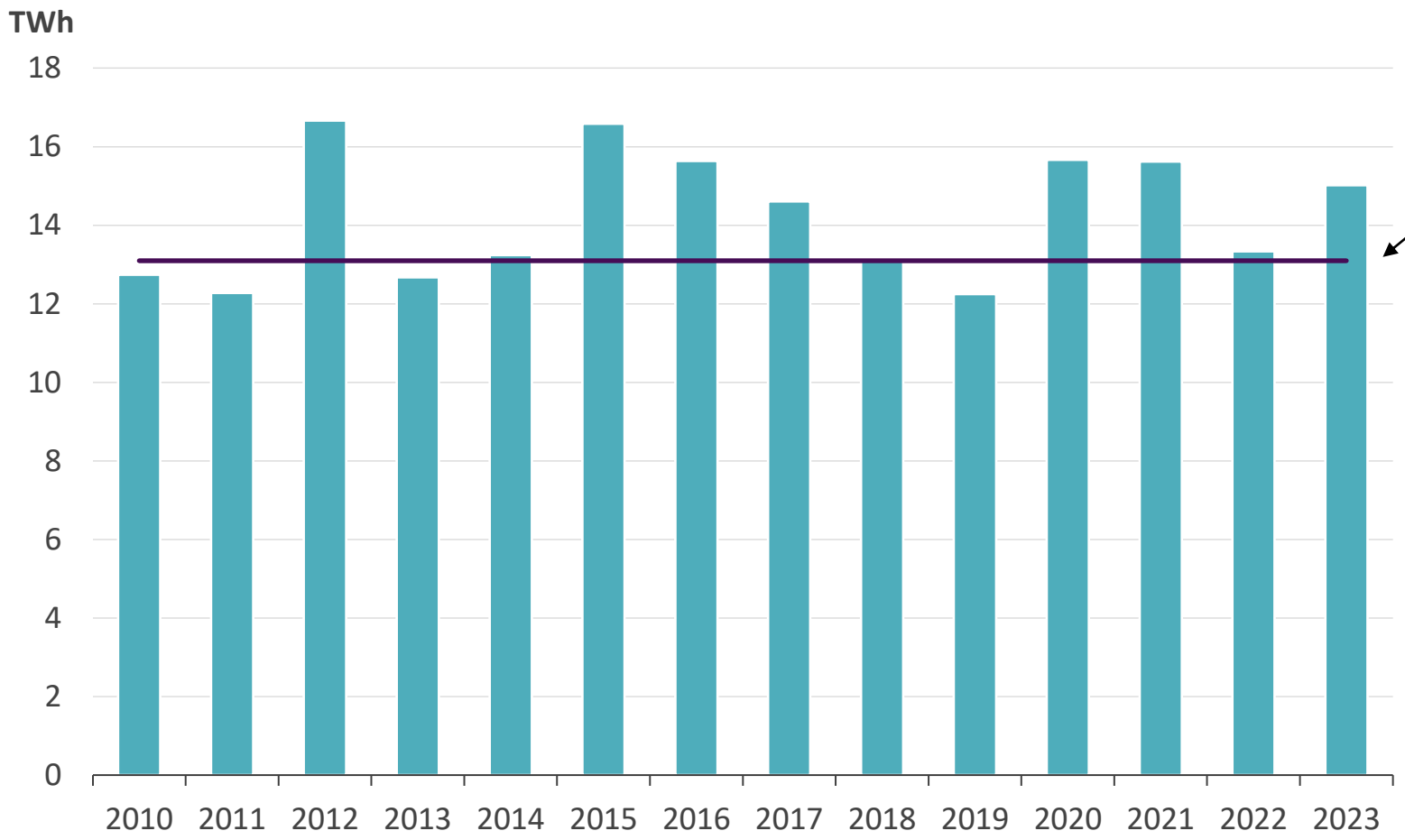
Net imports of electricity
1.8 TWh in year 2023



Wind power generation growed 25 %



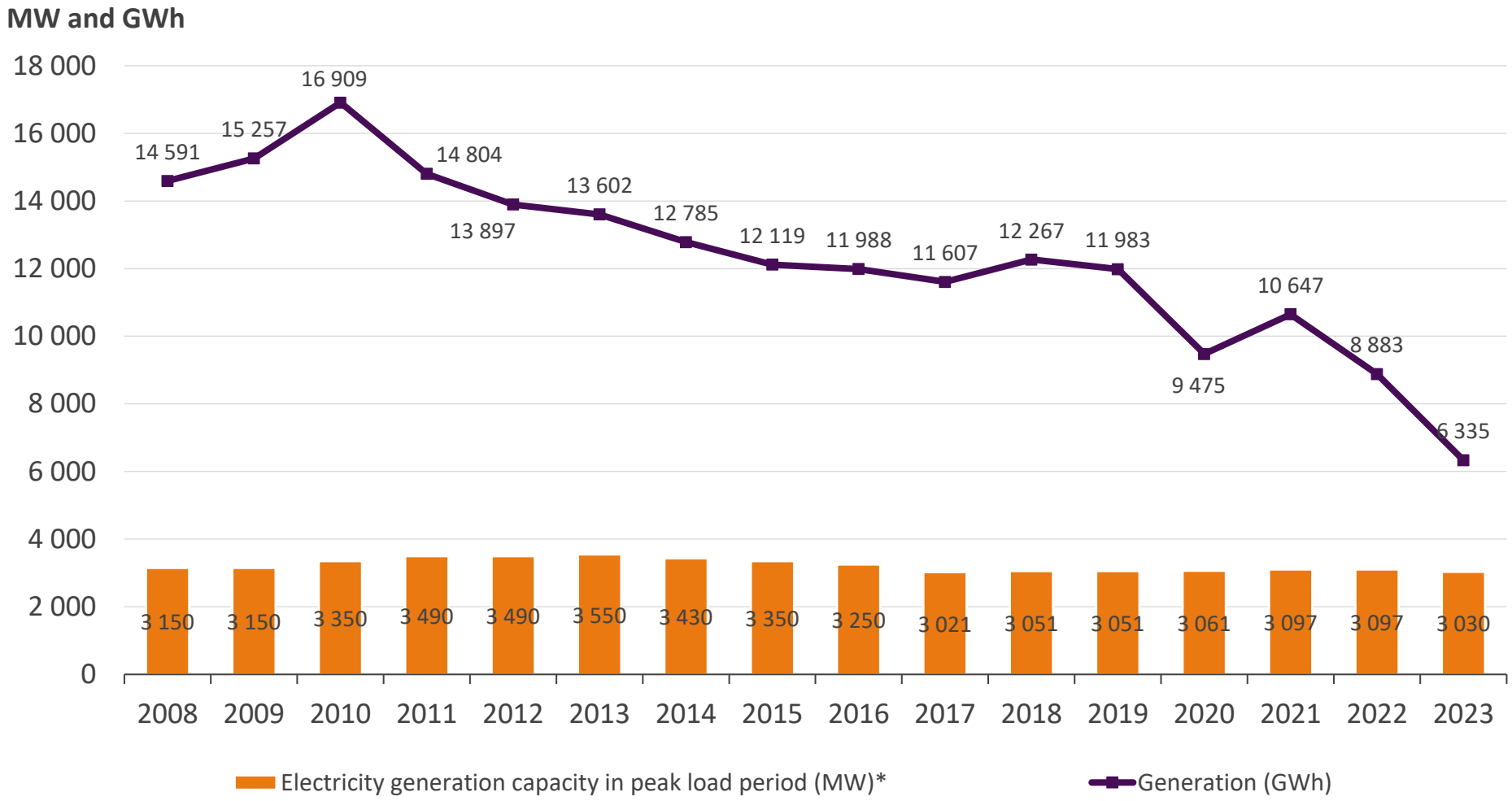
Hydropower generation



Average year

= hydropower production calculated when flows of built rivers are in average level

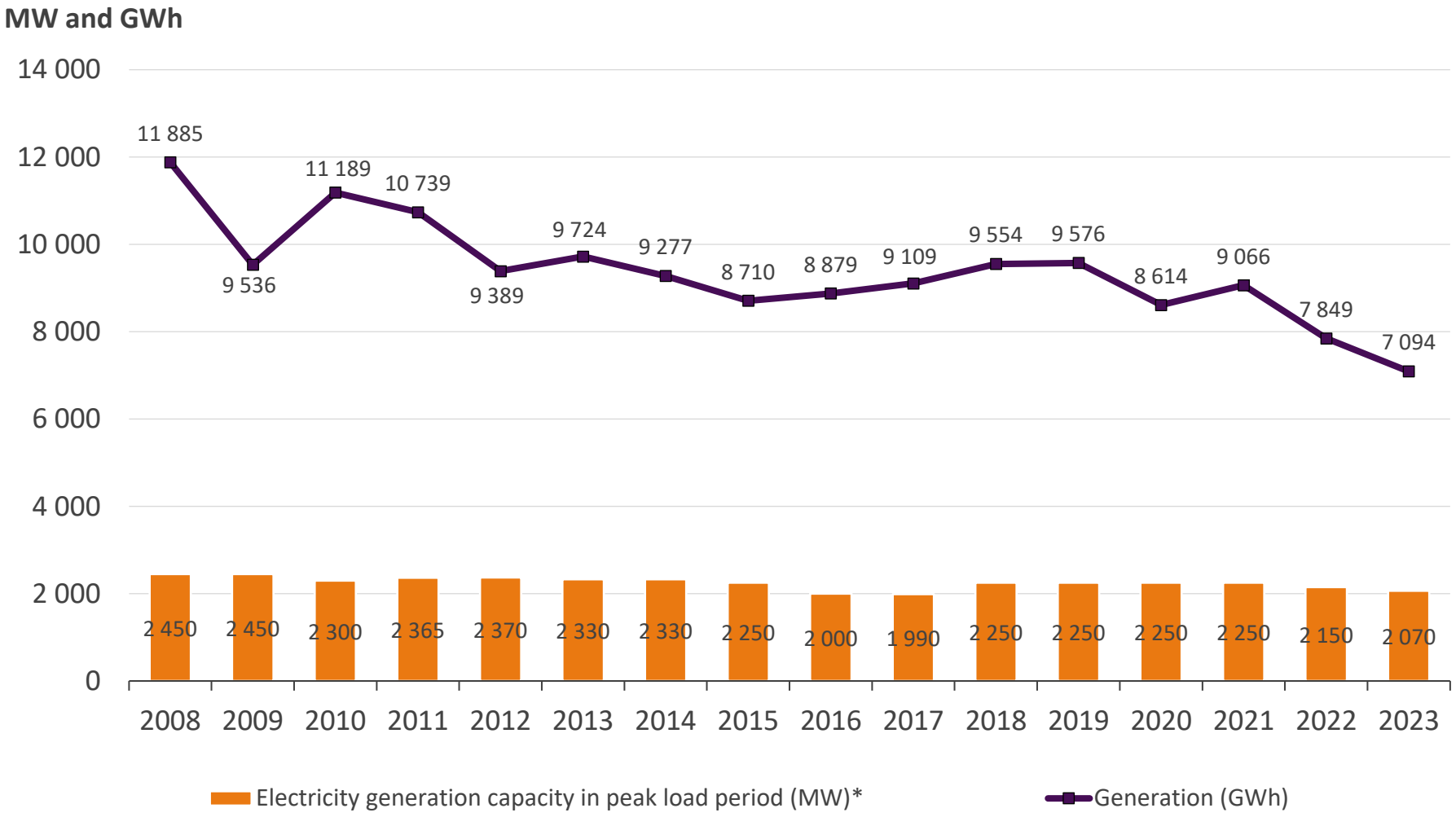
Generation and capacity of CHP in district heating



*Peak load capacity is not included from year 2017

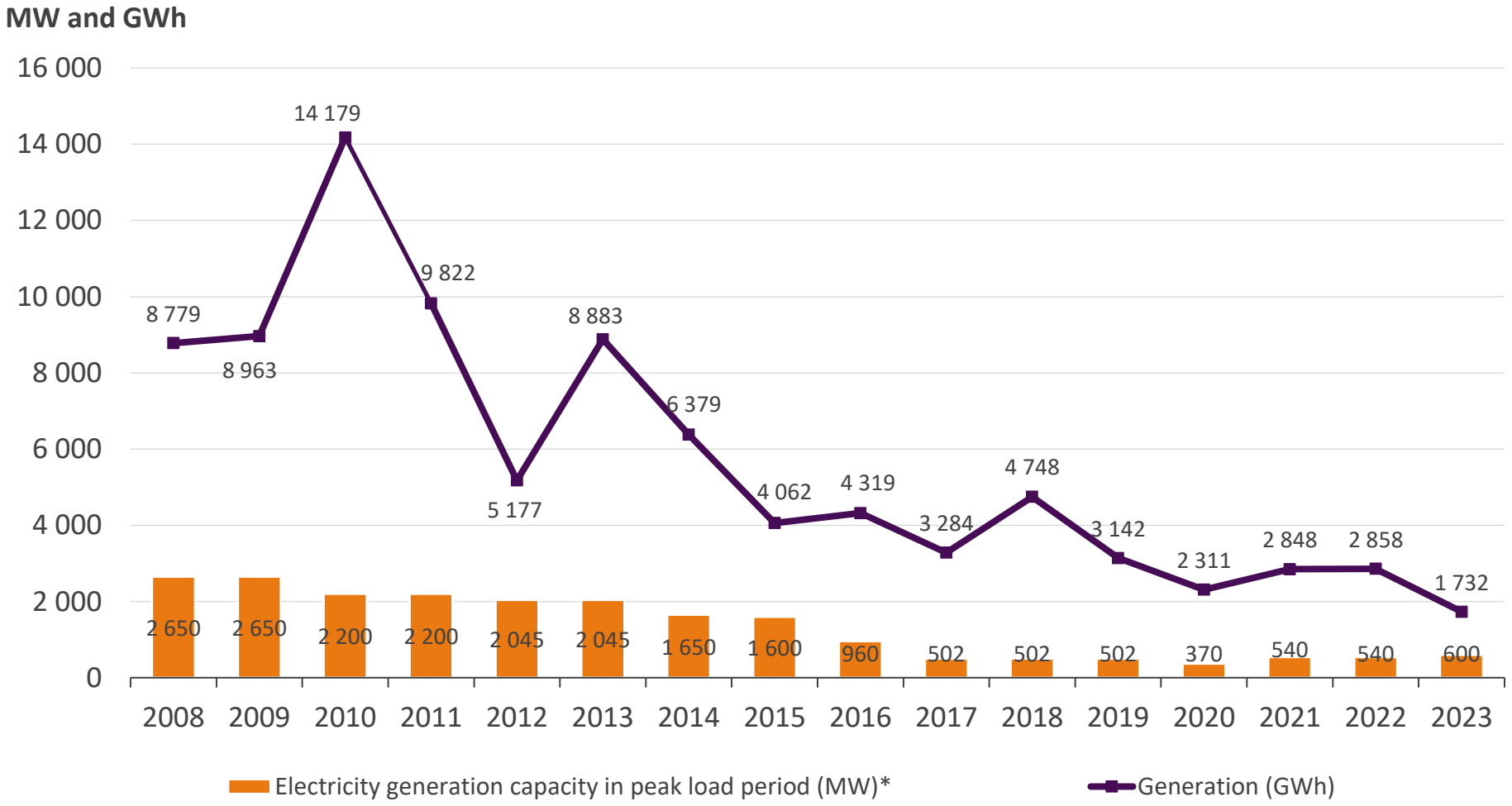
*Source: Statistics Finland, Energy 2023 table service, table 3.5

Generation and capacity of CHP in industry



*Source: Statistics Finland, Energy 2023 table service, table 3.5

Generation and capacity of condensing power

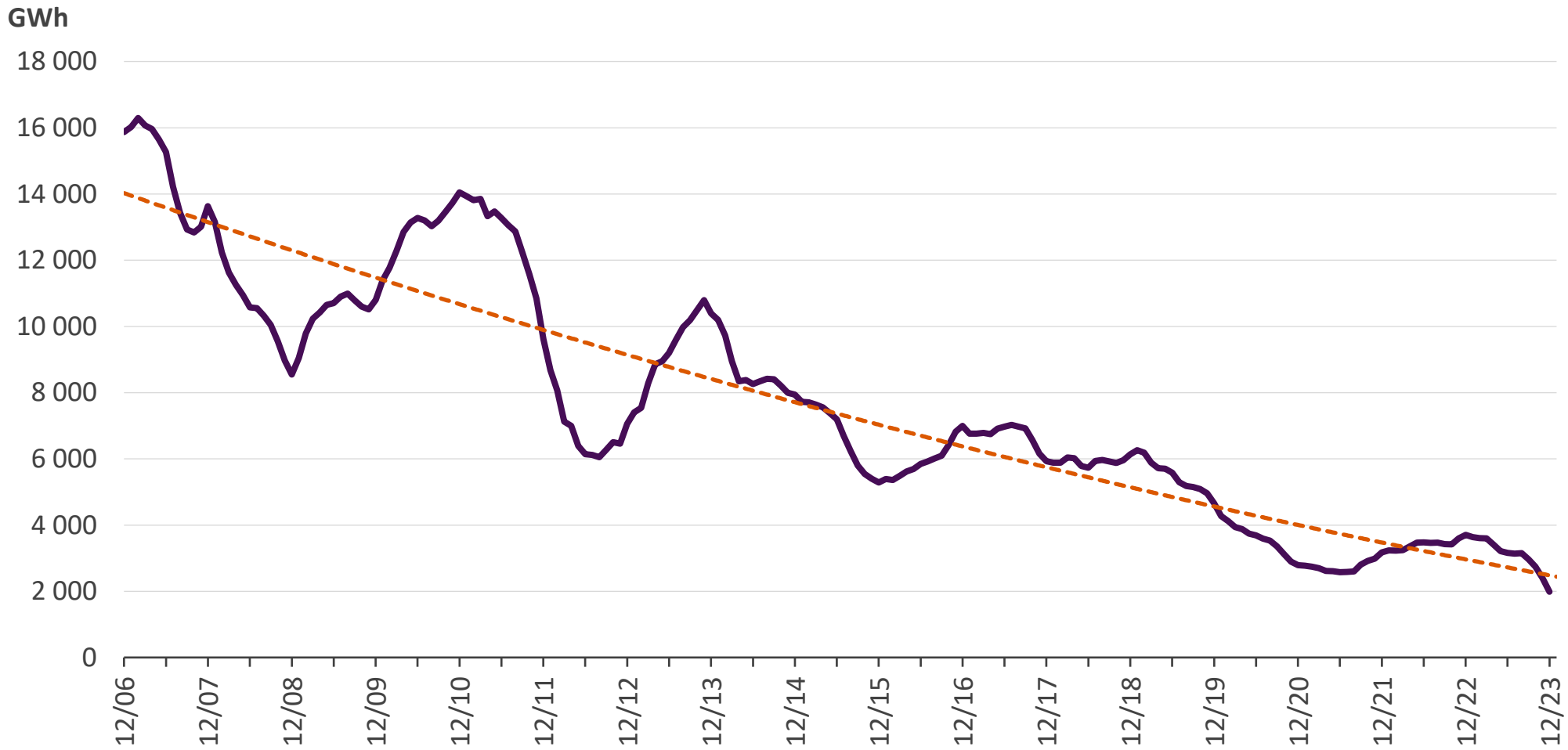


*Peak load capacity is not included from year 2017

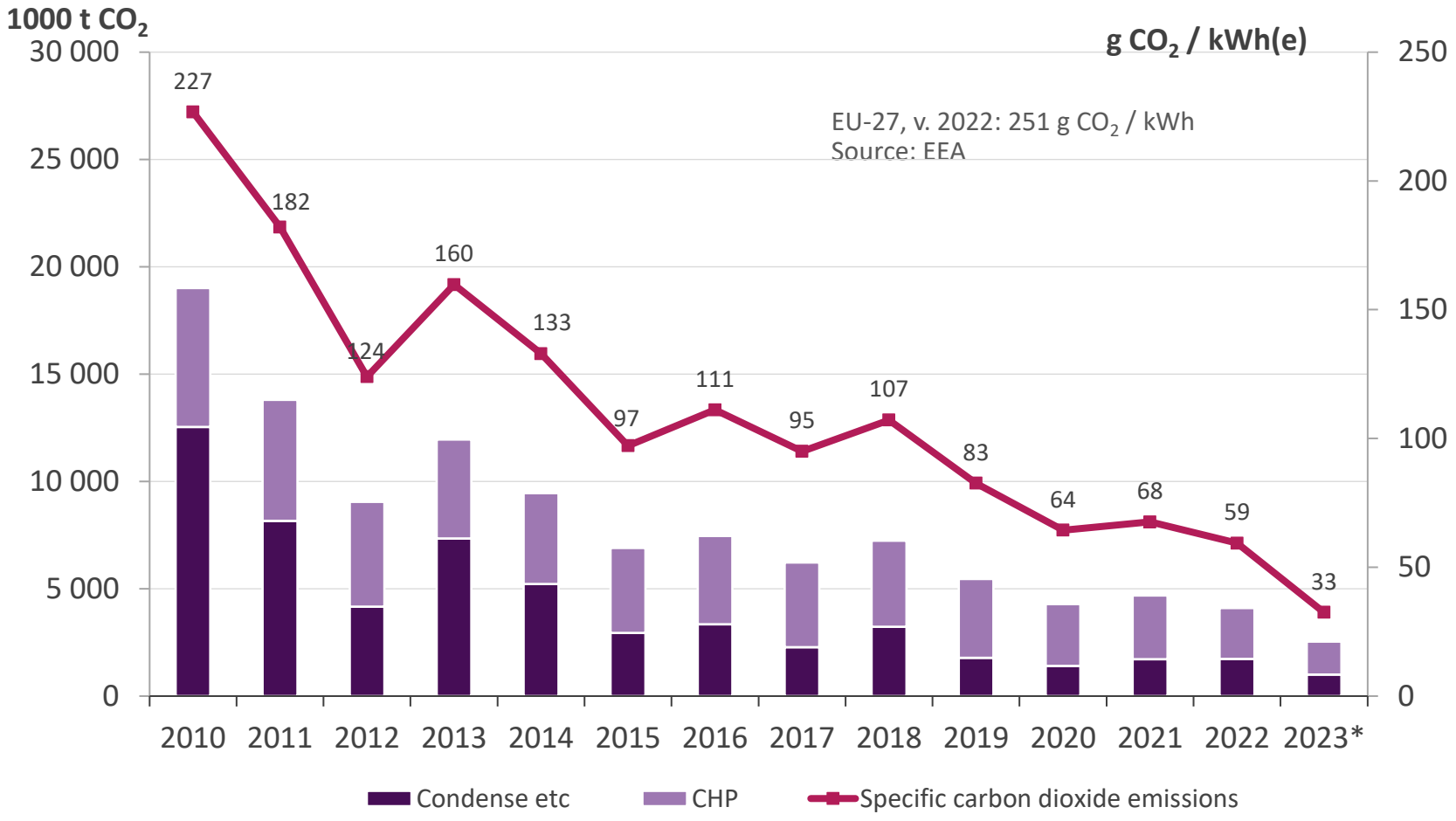
*Source: Statistics Finland, Energy 2023 table service, table 3.5

Electricity Generation with Coal

total of moving 12 months



CO_2-emissions of power generation-downward trend continues



CO_2-emissions of power generation:

- 2.5 Mt in year 2023
- 4.1 Mt in year 2022
- 4.7 Mt in year 2021
- 7.5 Mt in year 2016
- 19 Mt in year 2010

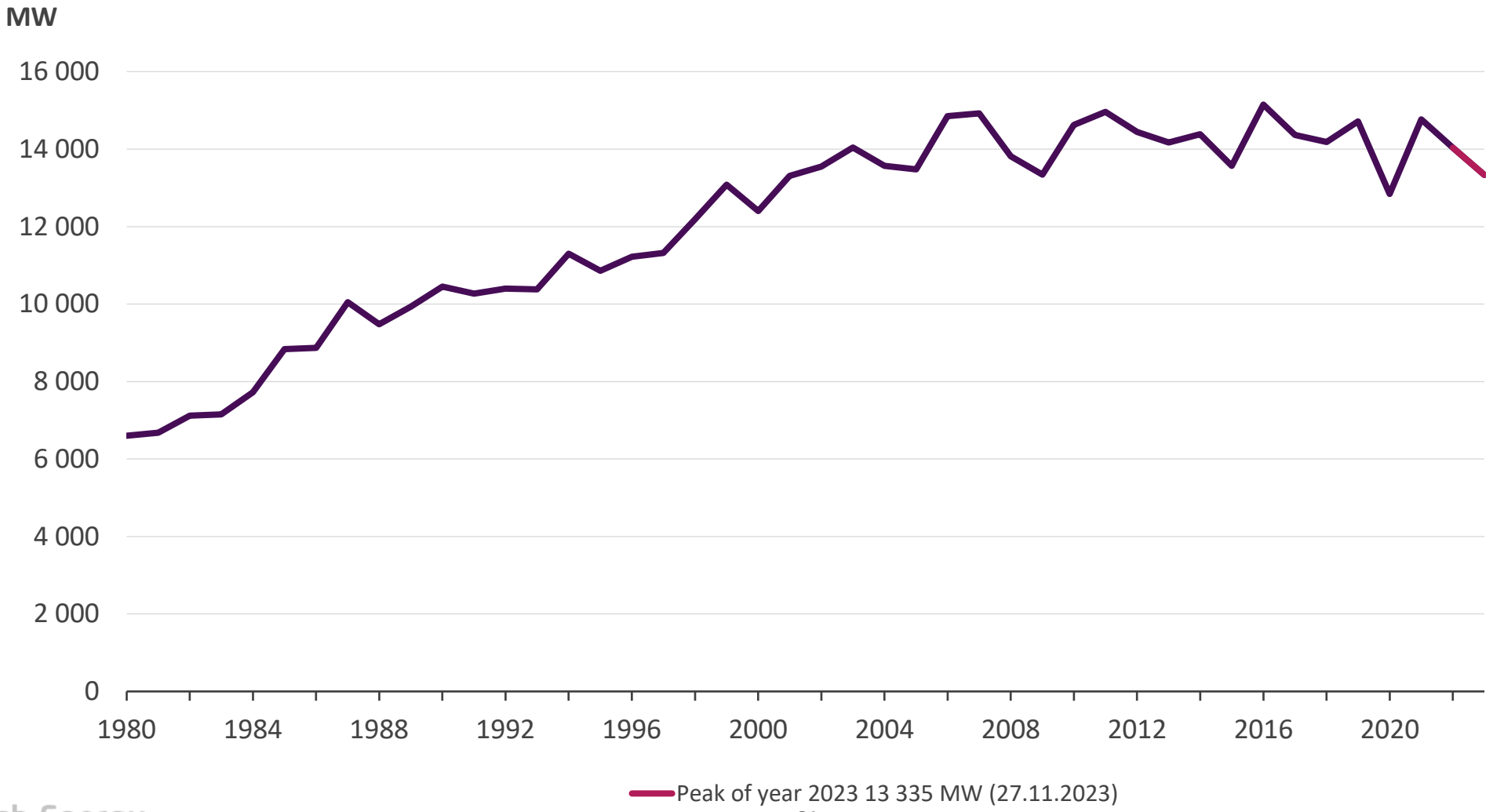
→ 2023 vs. 2022 **-38 %**

→ Emissions **-65 %** in last 5 years

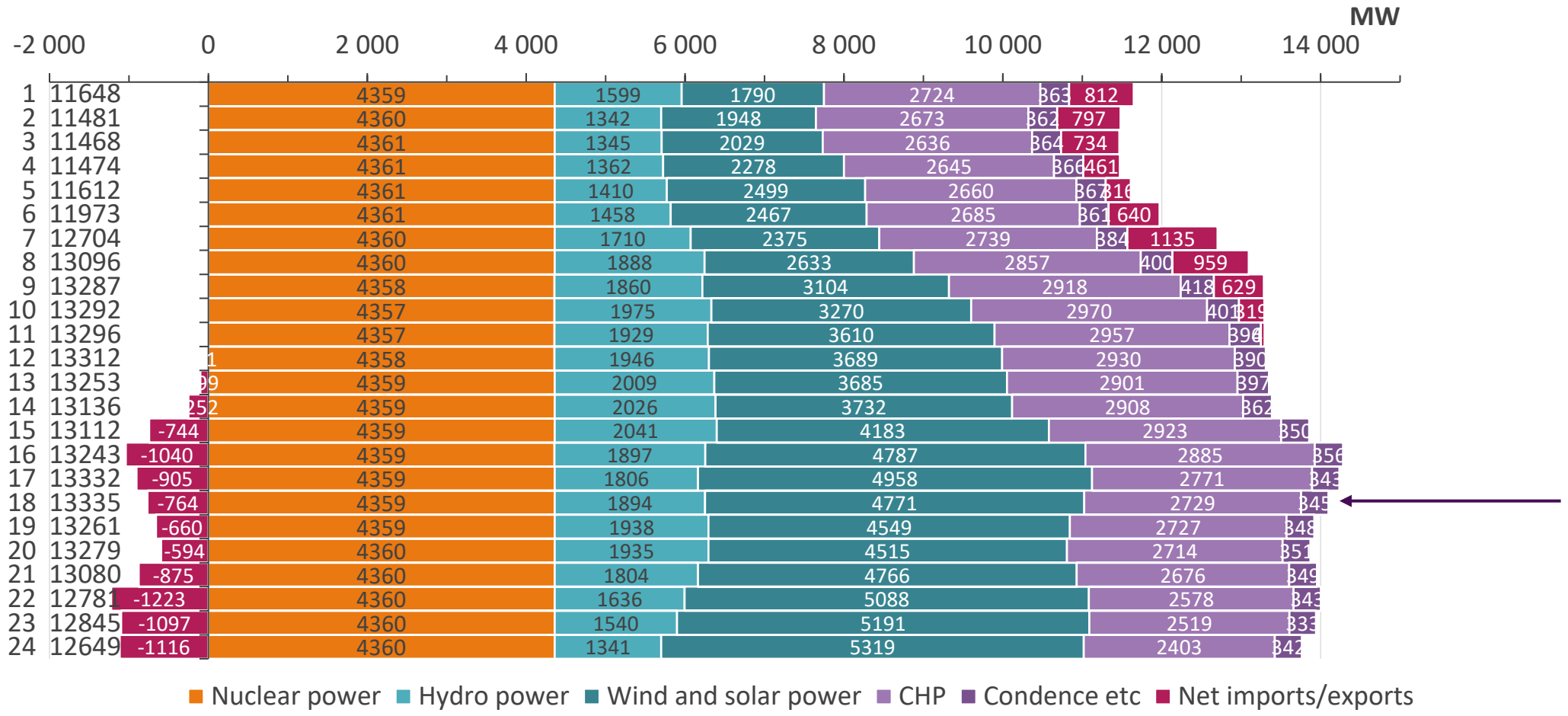
→ Emissions **-87 %** vs 2010

Peak loads of electricity

maximum electricity power MW

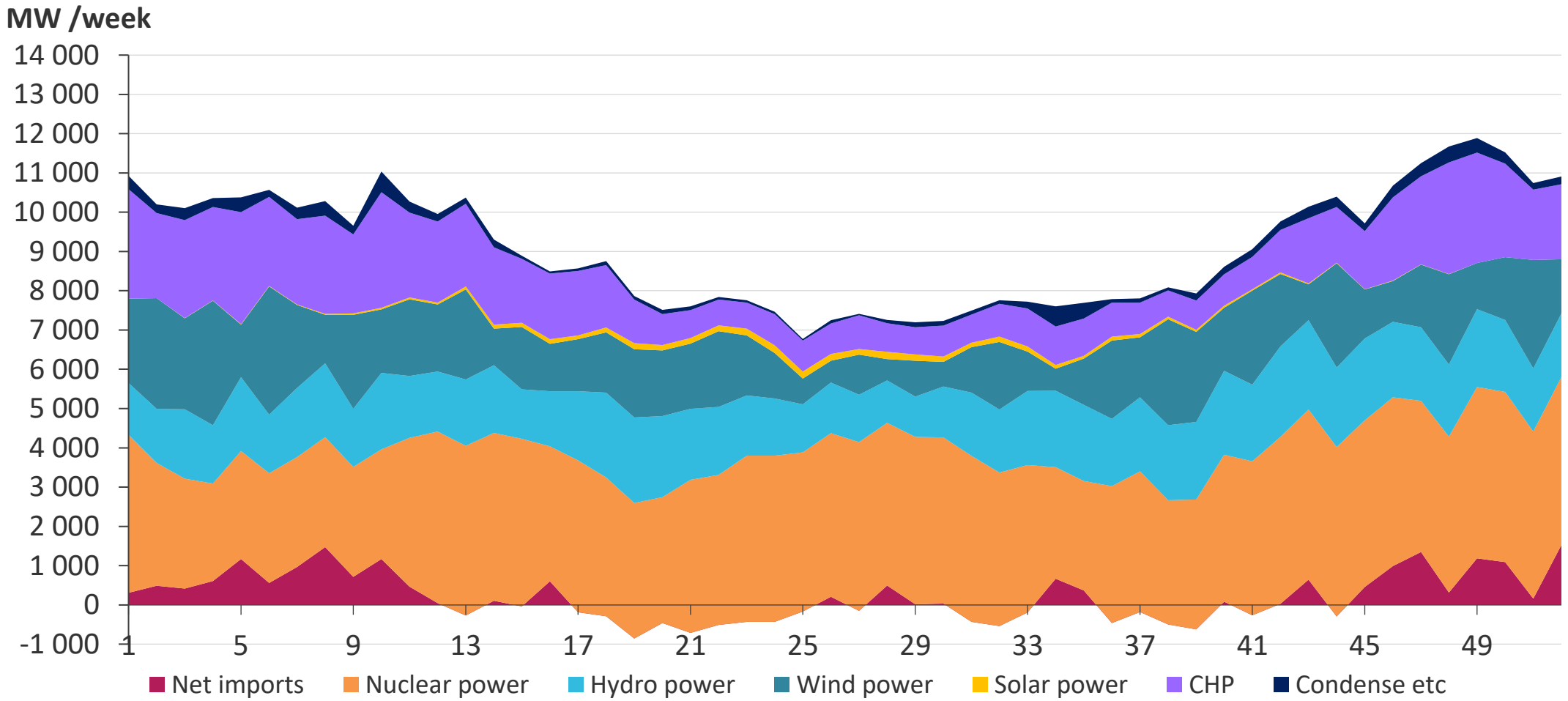


Electricity supply hourly in year 2023 peak load day 27.11.



Variation of Electricity Production and Imports in 2023

average week power

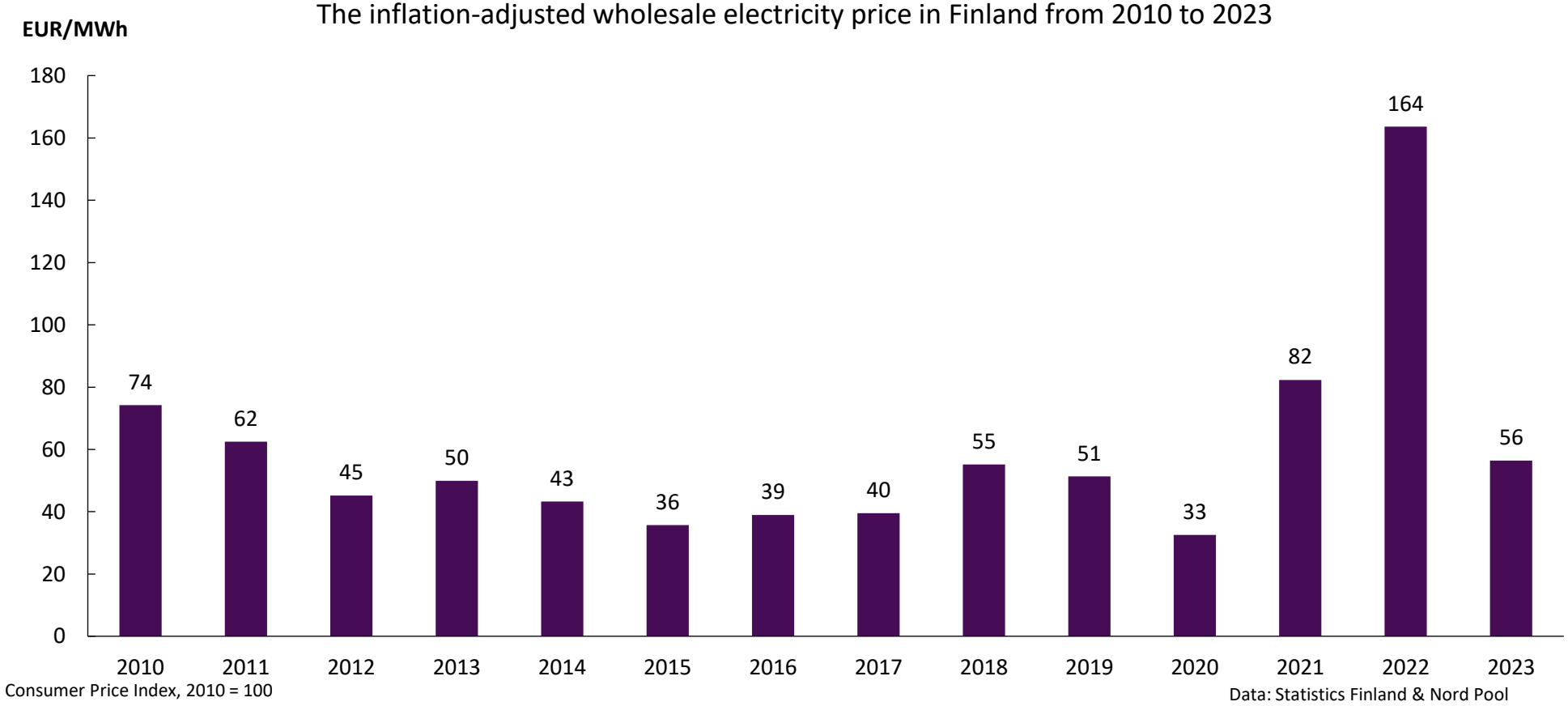


Electricity price statistics 2023

Finnish Energy

The development of annual prices in Finland relative to the Consumer price Index

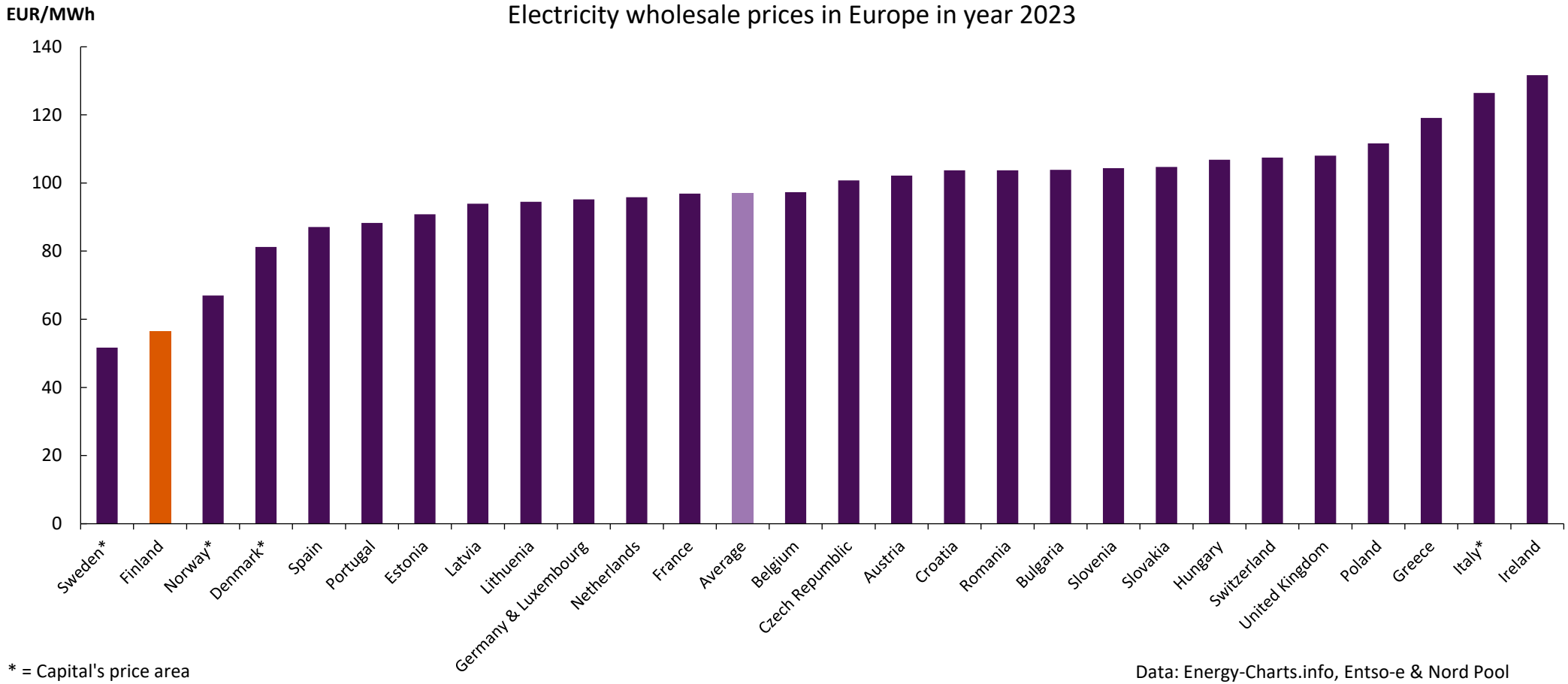
The inflation-adjusted wholesale electricity price in Finland from 2010 to 2023



Consumer Price Index, 2010 = 100

Data: Statistics Finland & Nord Pool

Finland has the second lowest electricity prices in Europe

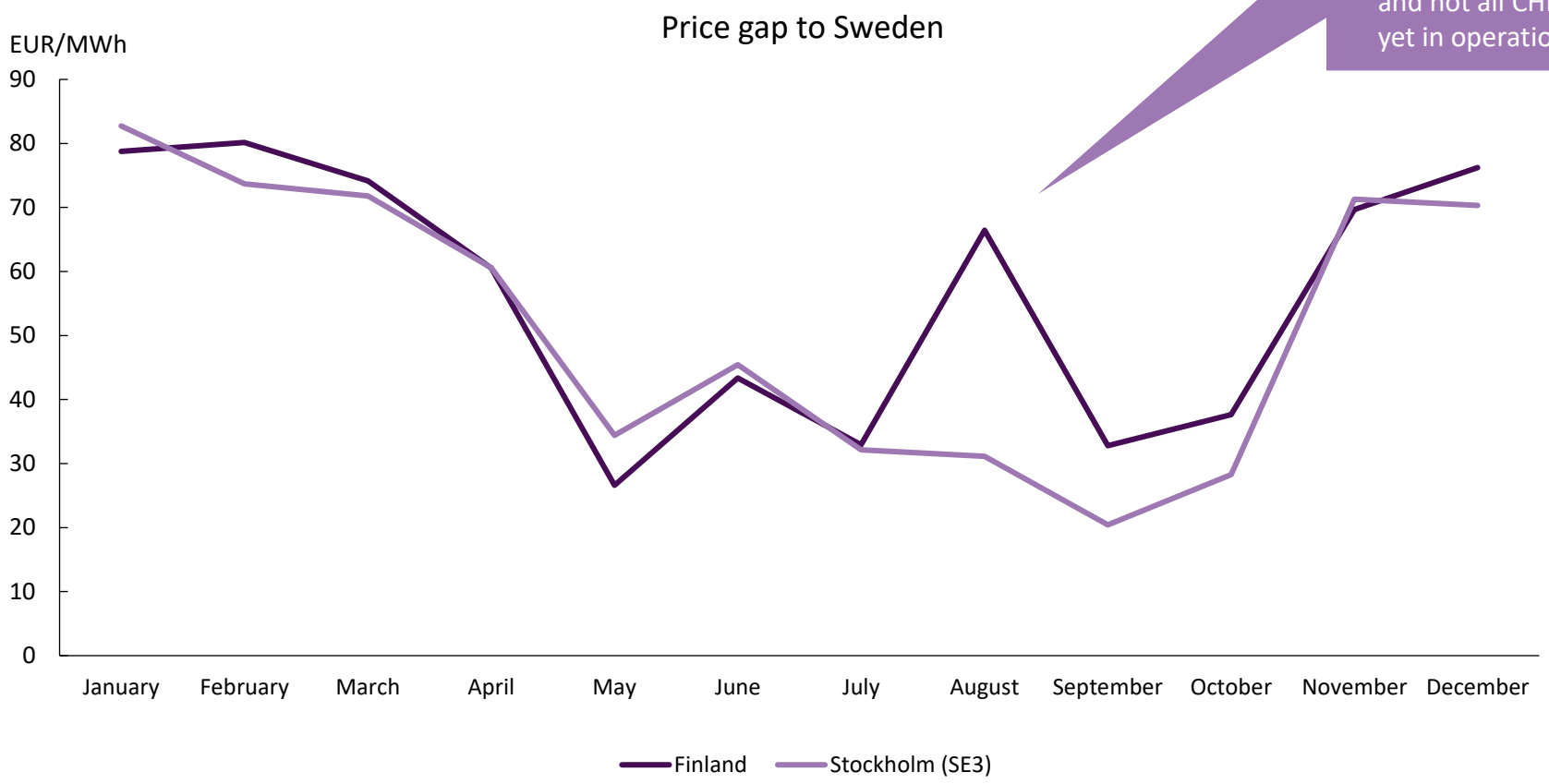


* = Capital's price area

Data: Energy-Charts.info, Entso-e & Nord Pool

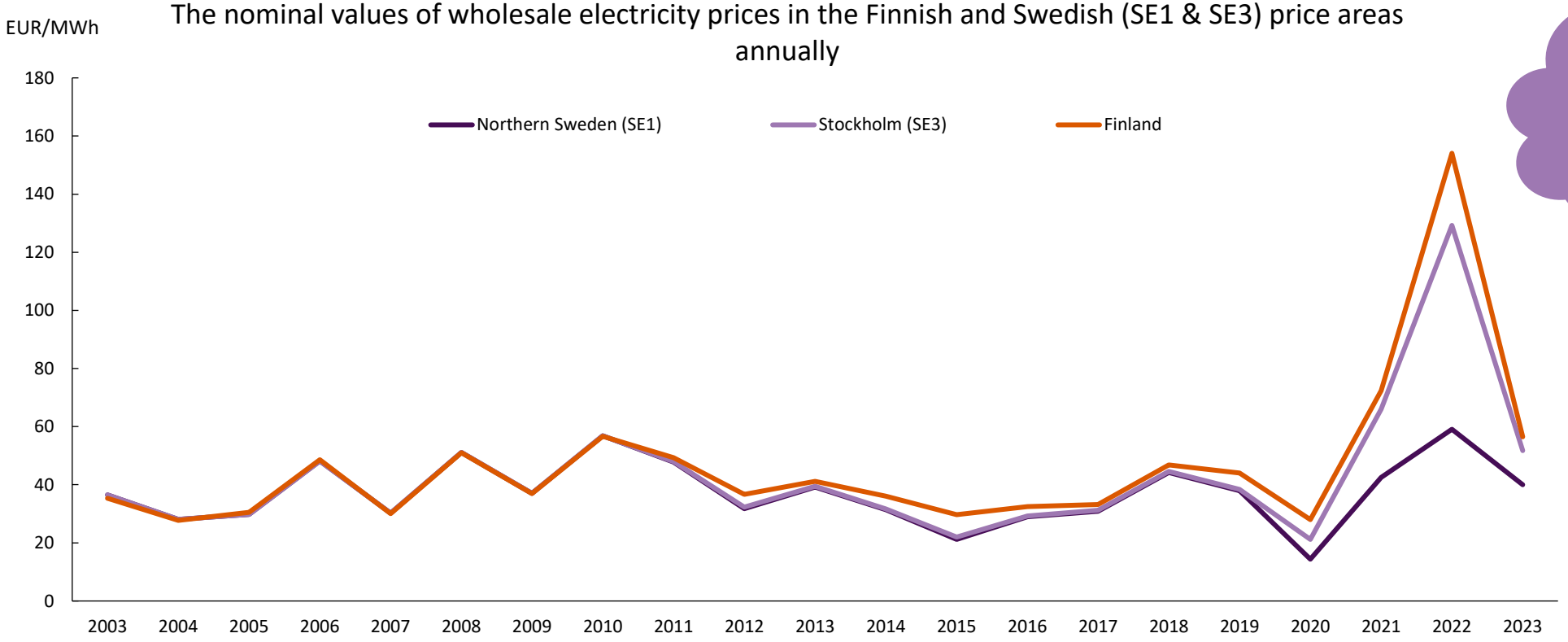
Price gap to Sweden in year 2023

- At the end of August, Olkiluoto 2 and Loviisa 2 were out of operation, and there were disruptions in transmission connections.
- Simultaneously, there was a prolonged period with little wind, and not all CHP power plants were yet in operation.



Price differentials between regions have increased, with Finald following Stockholm

The nominal values of wholesale electricity prices in the Finnish and Swedish (SE1 & SE3) price areas annually



The Aurora 1 transmission connection, scheduled to be completed in 2025, is expected to reduce the price difference between Finland and Northern Sweden.

SE1 & SE3 between years from 2003 to 2011 = The price of Sweden before splitting the country into four bidding zones

Data: Nord Pool

Factors influencing the electricity price

Supply

- Variable costs of generation units (e.g. fuel costs and CO2 prices)
- Status of water reservoirs
- Wind/solar conditions

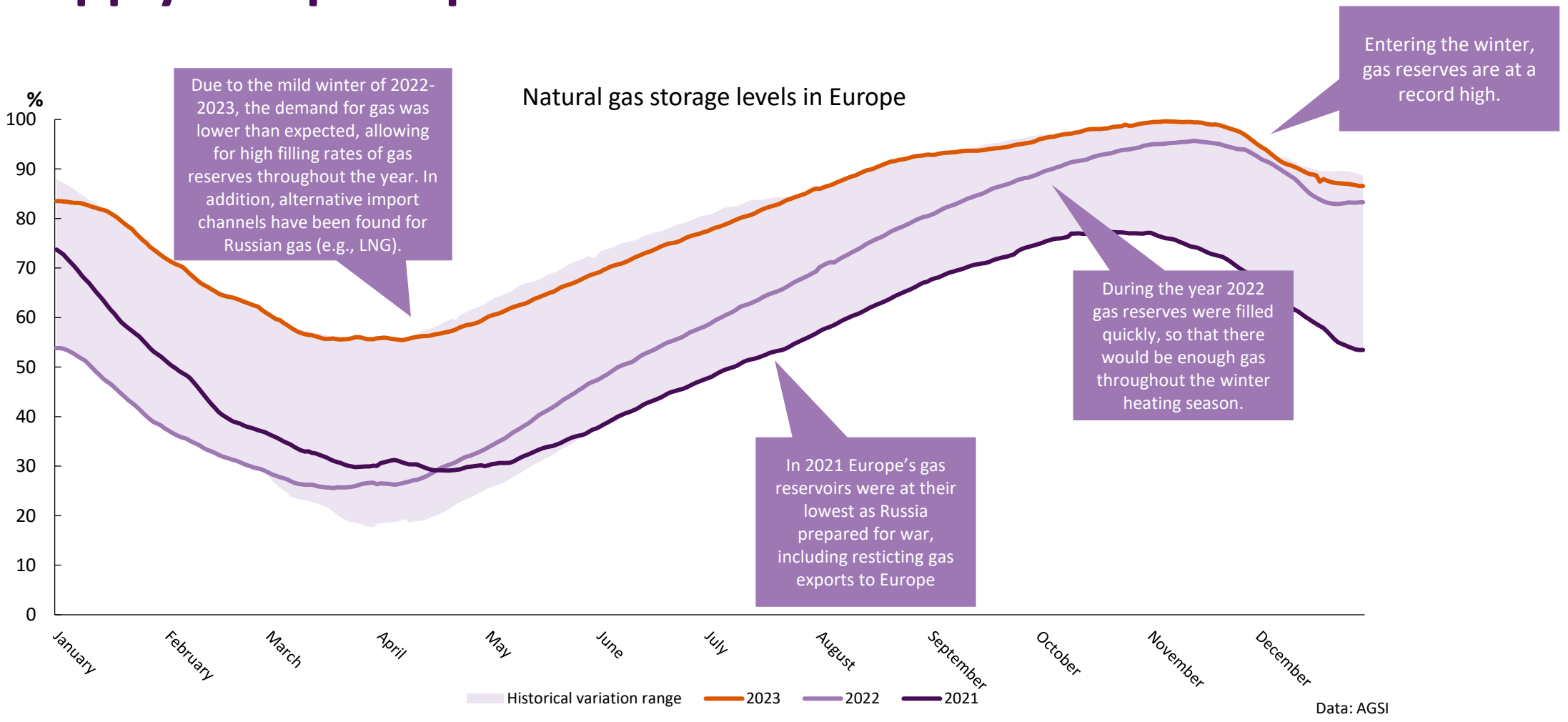
Demand

- Weather conditions (Temperature, seasonality…)
- Time of day or week (day vs. night & weekday vs. weekend)
- Industrial activity

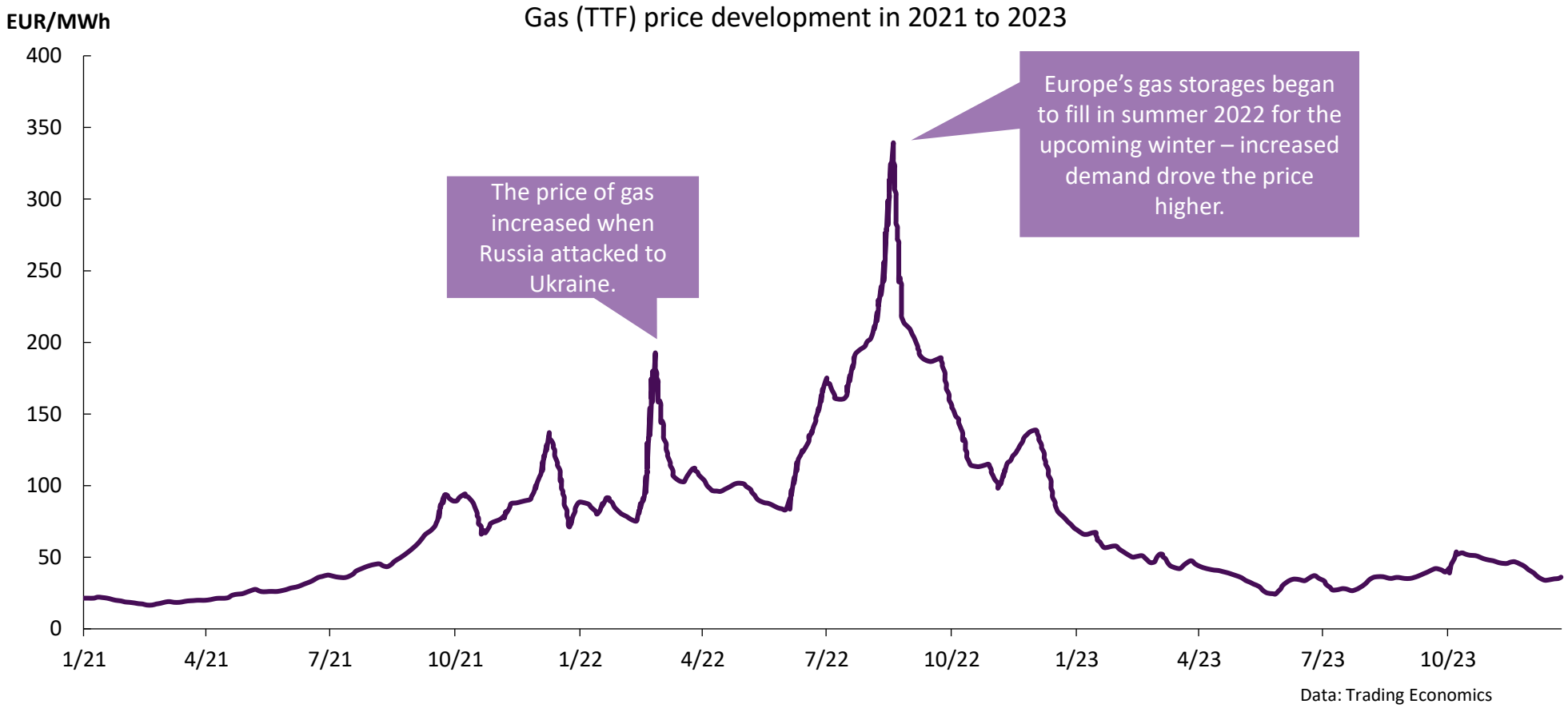
Cross-border impacts

- Available transmission connections
- Maintenance and incidents in transmission connections
- Demand/supply in neighboring countries

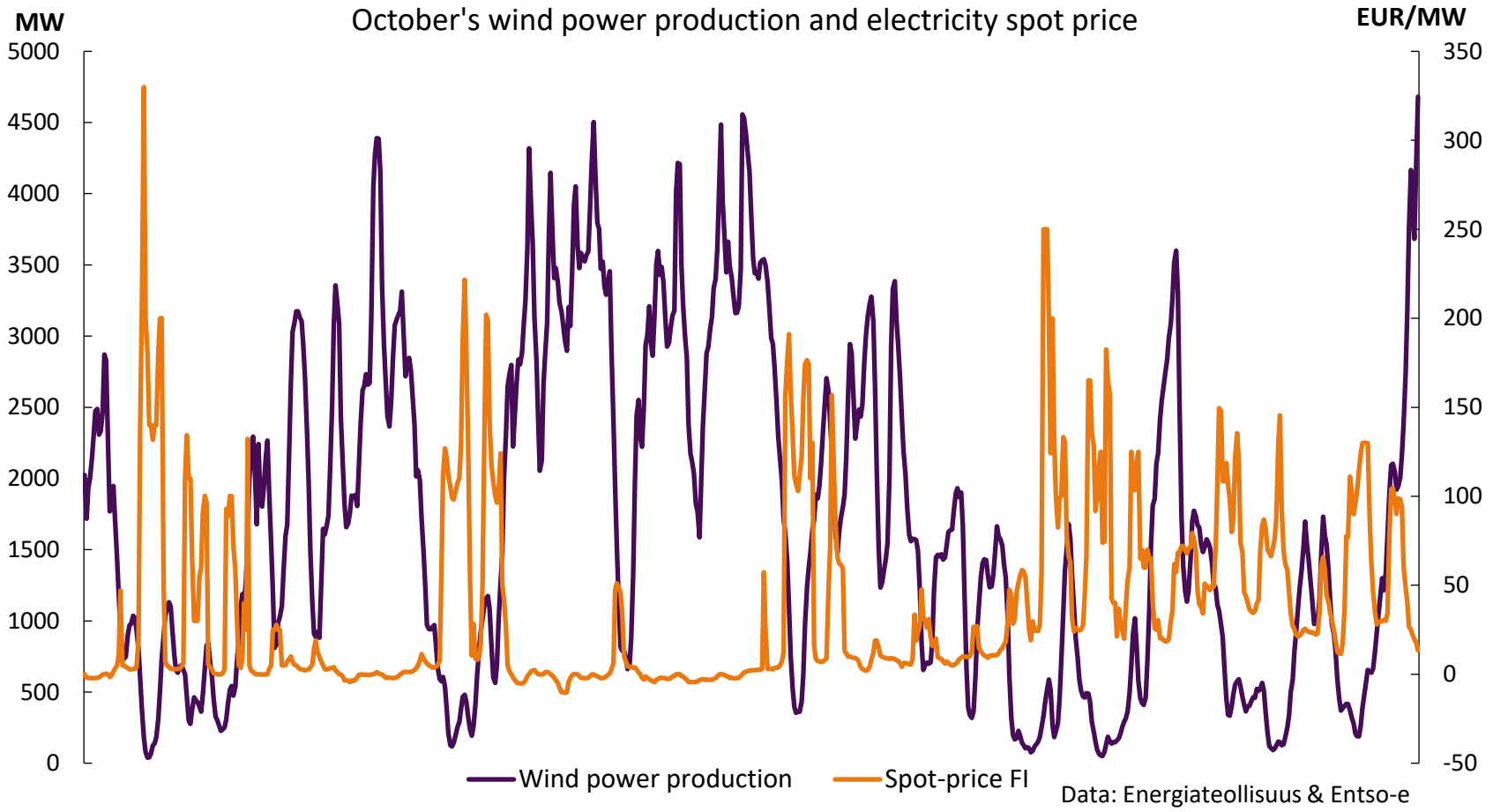
Alternative import channels have been found for Russian gas – supply and price pressures have eased



Price development of gas

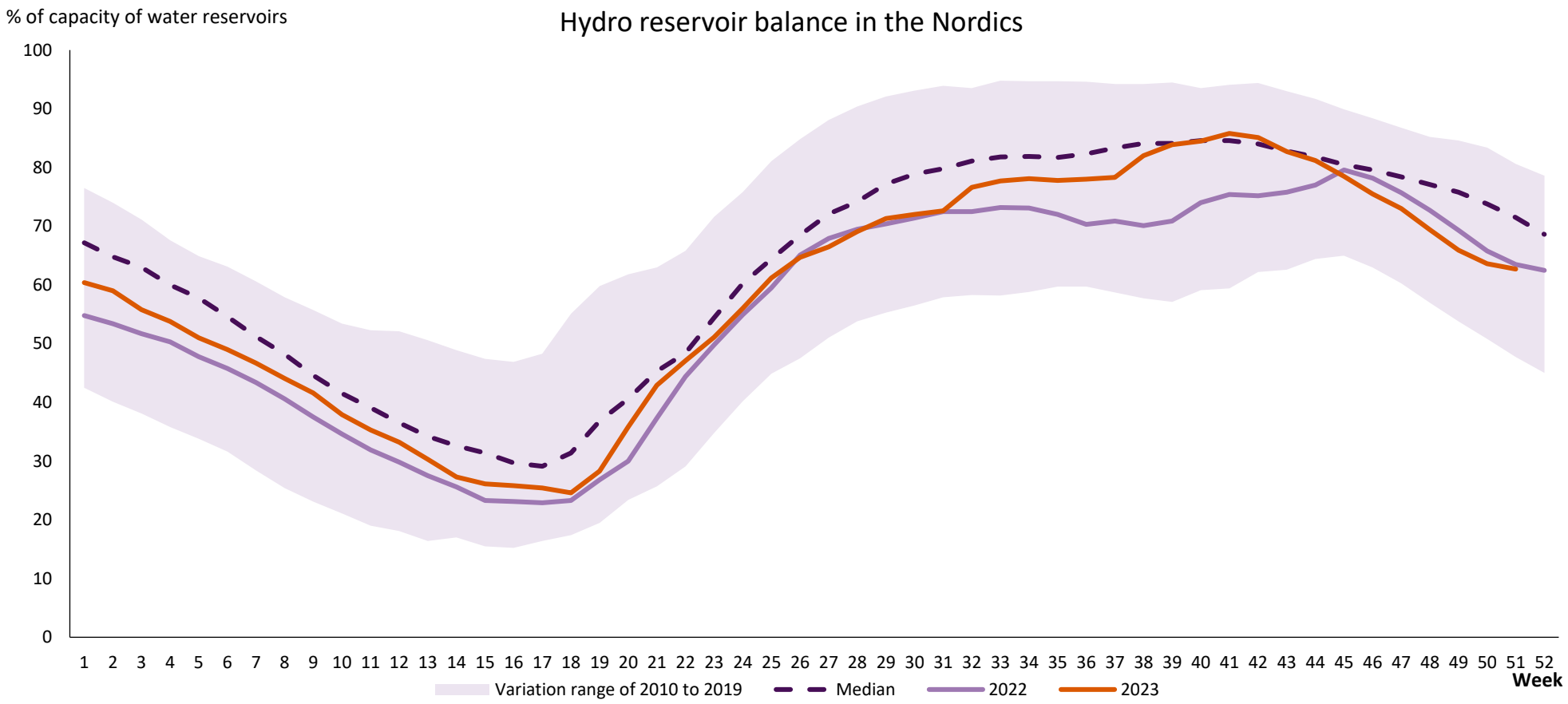


The connection of wind power to the price

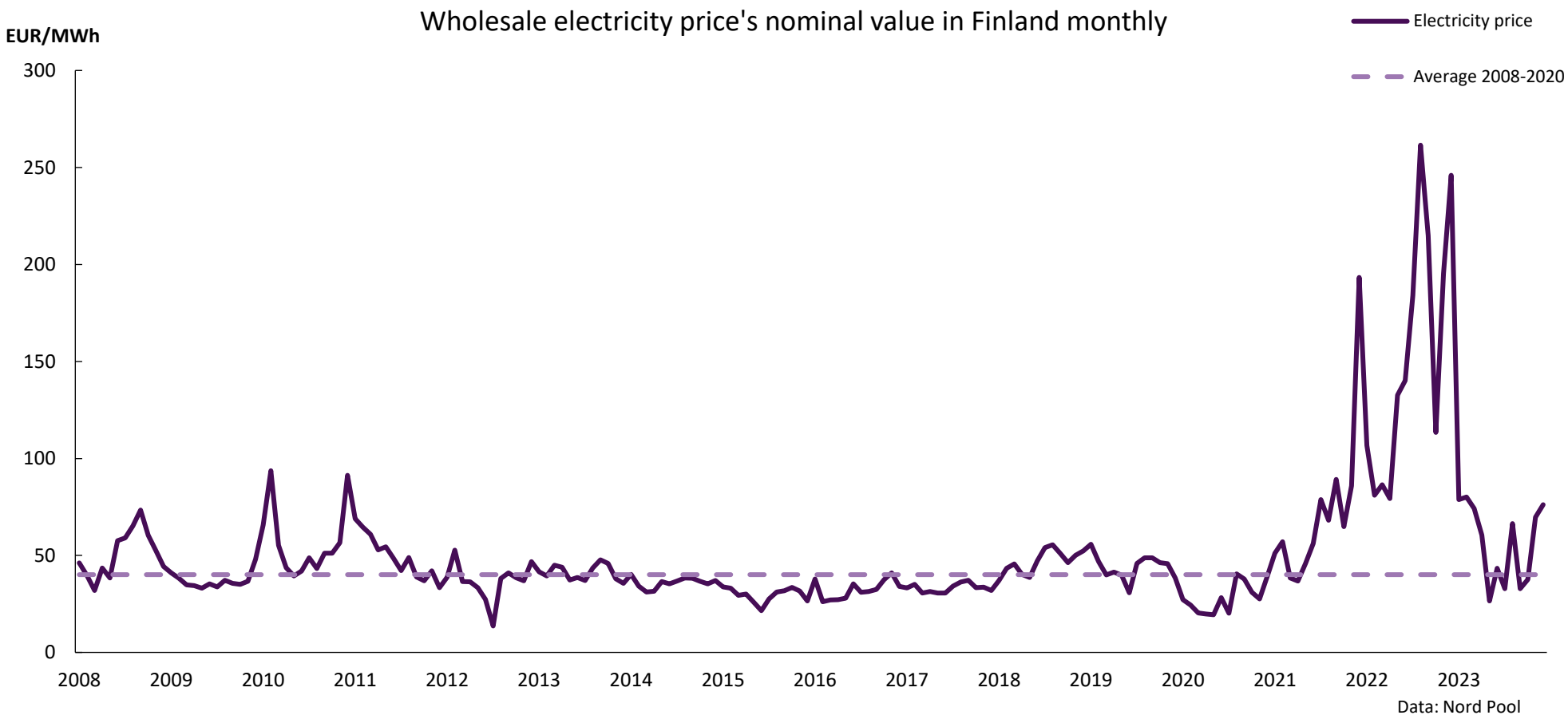


- The amount of wind power production is a significant individual factor influencing the price in Finland
- Other factors continue to have a significant impact on the price as well, such as electricity demand, temperature, status of water reservoirs, transmission connections and maintenance and incidents in nuclear and thermal power plants.

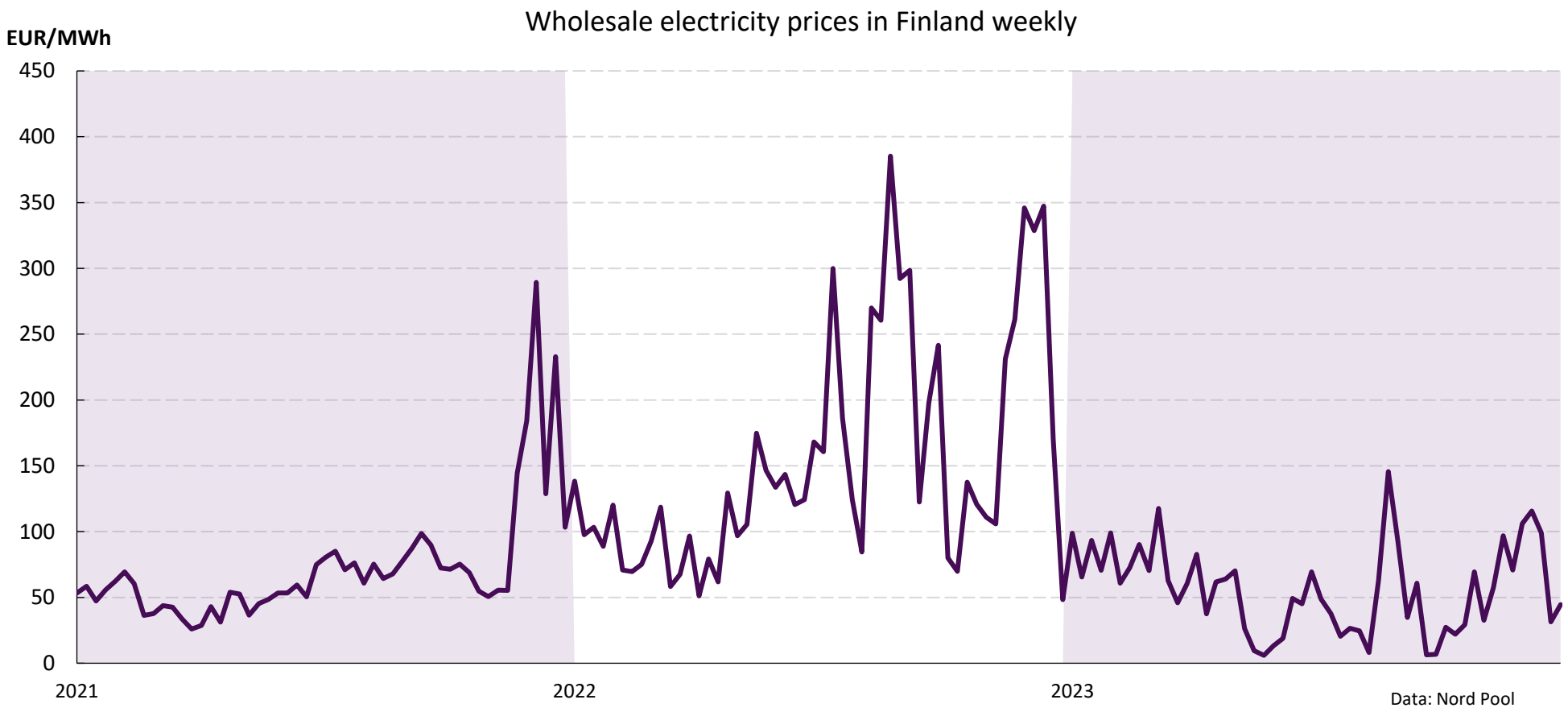
Hydro reservoir balance in the Nordics



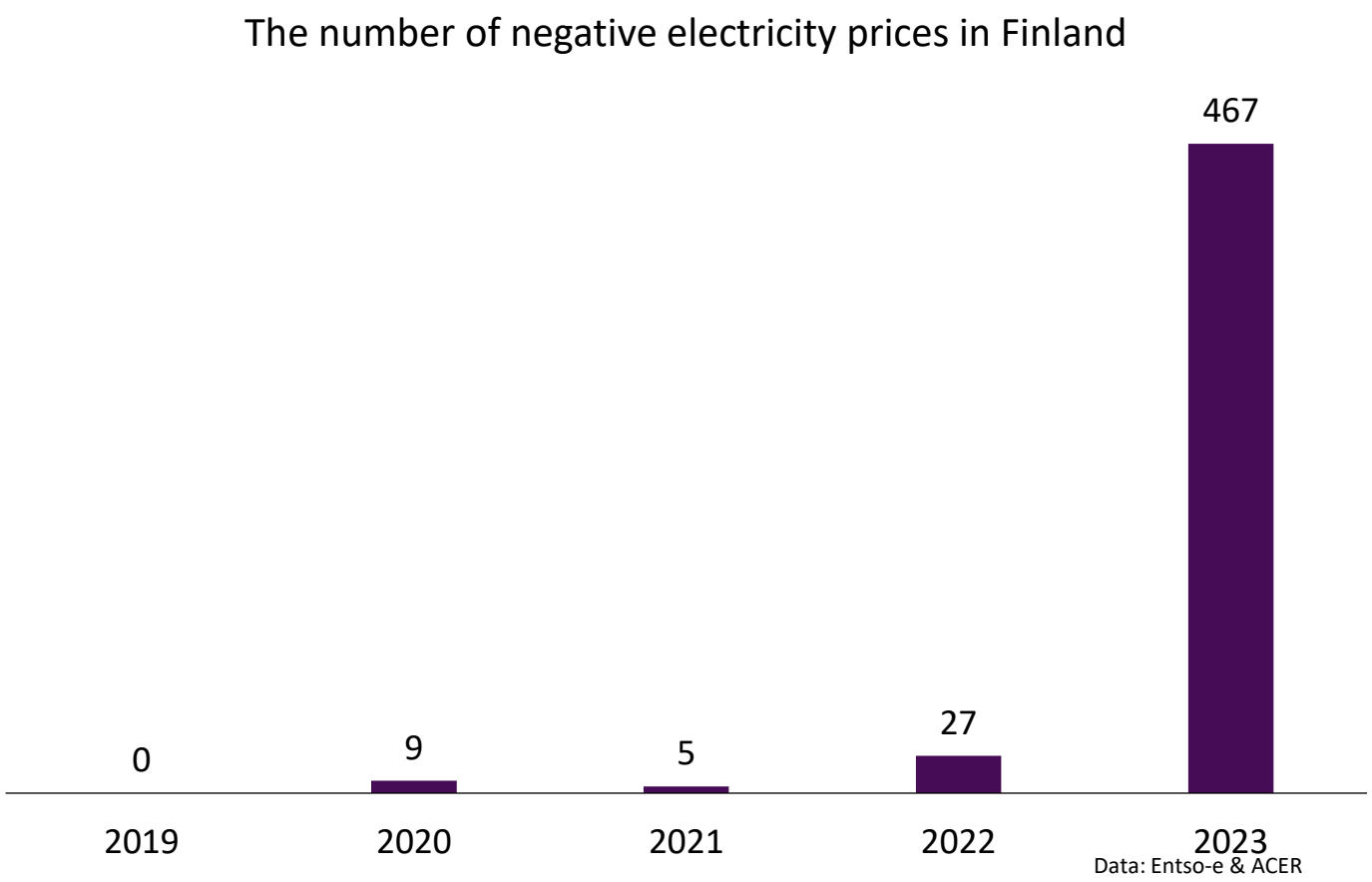
The development of the nominal wholesale electricity price



Weekly prices of electricity in 2021 to 2023

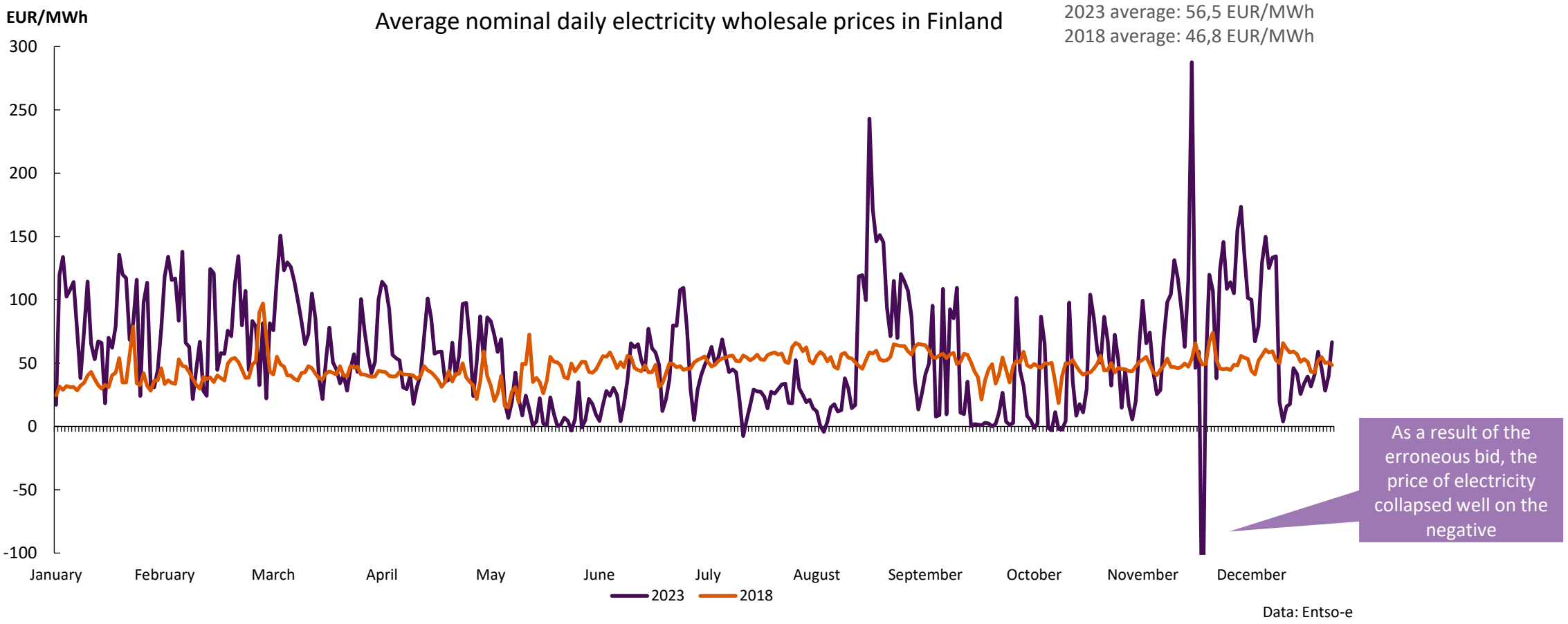


The amount of hours with negative price has growed sharply

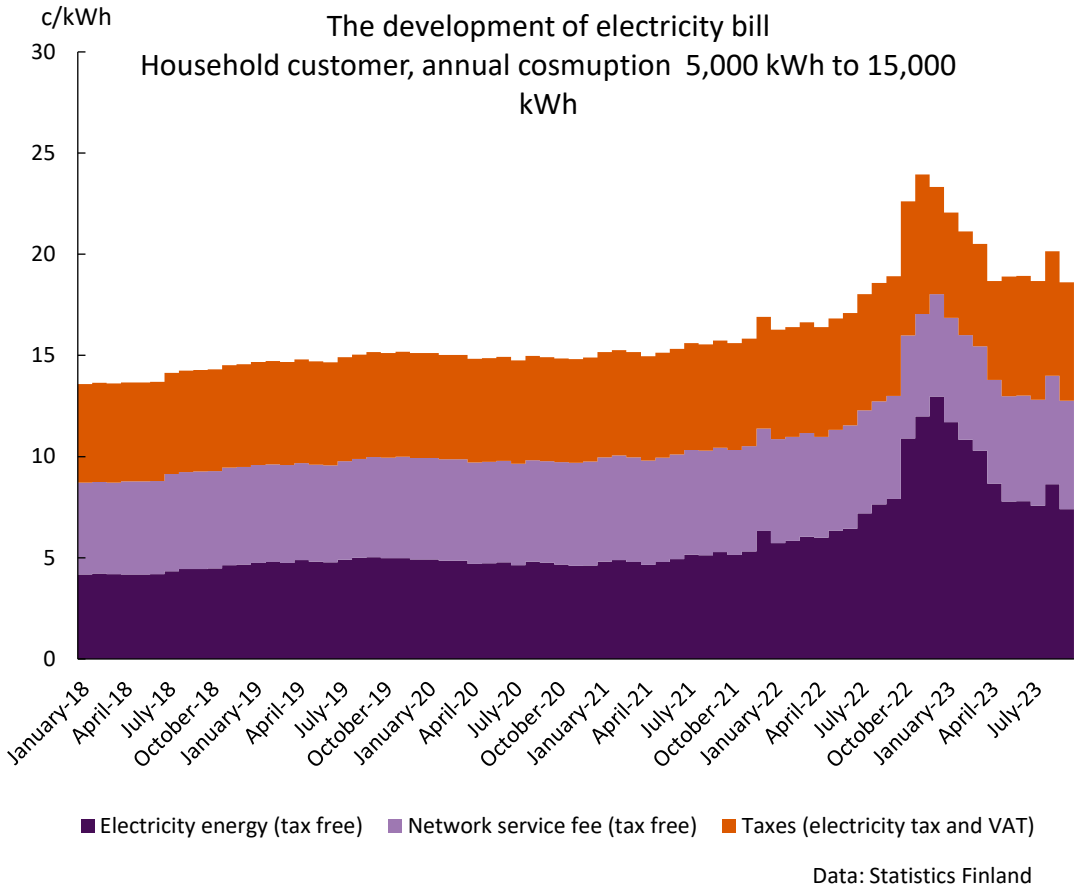


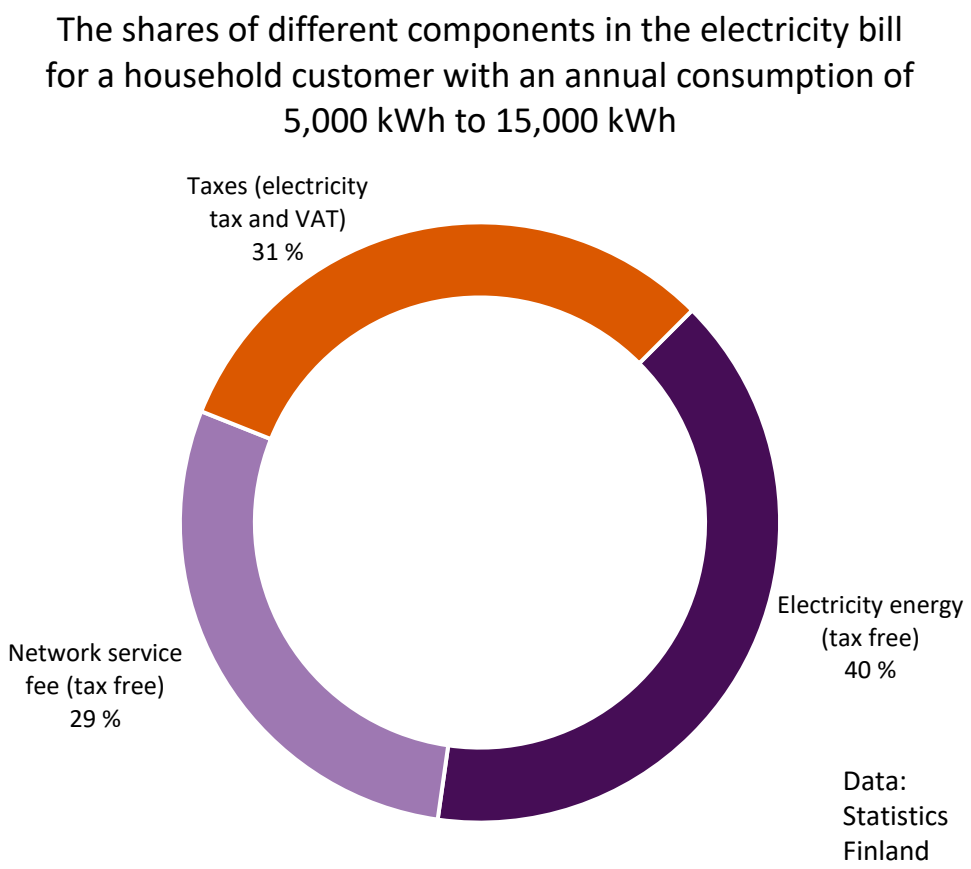
- The number of negative electricity prices has significantly increased due to the rapid growth of wind power.
- Low and negative electricity prices imcentivize investments in flexible demand, such as electric boilers connected to district heating networks, with electricity capacity soon exceeding 1 GW.

Electricity price fluctuations have increased

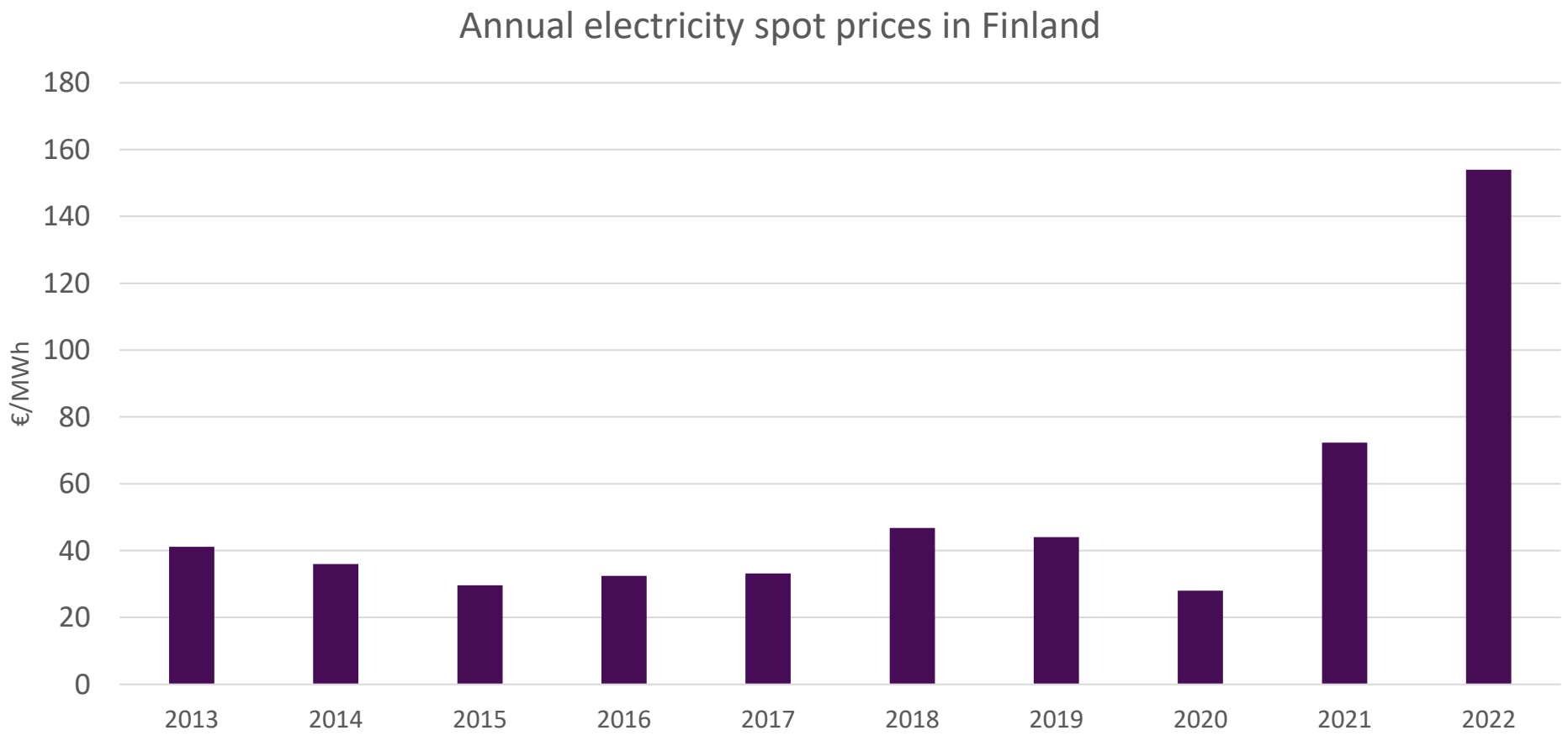


Consumers' electricity bills have significantly decreased over the past year



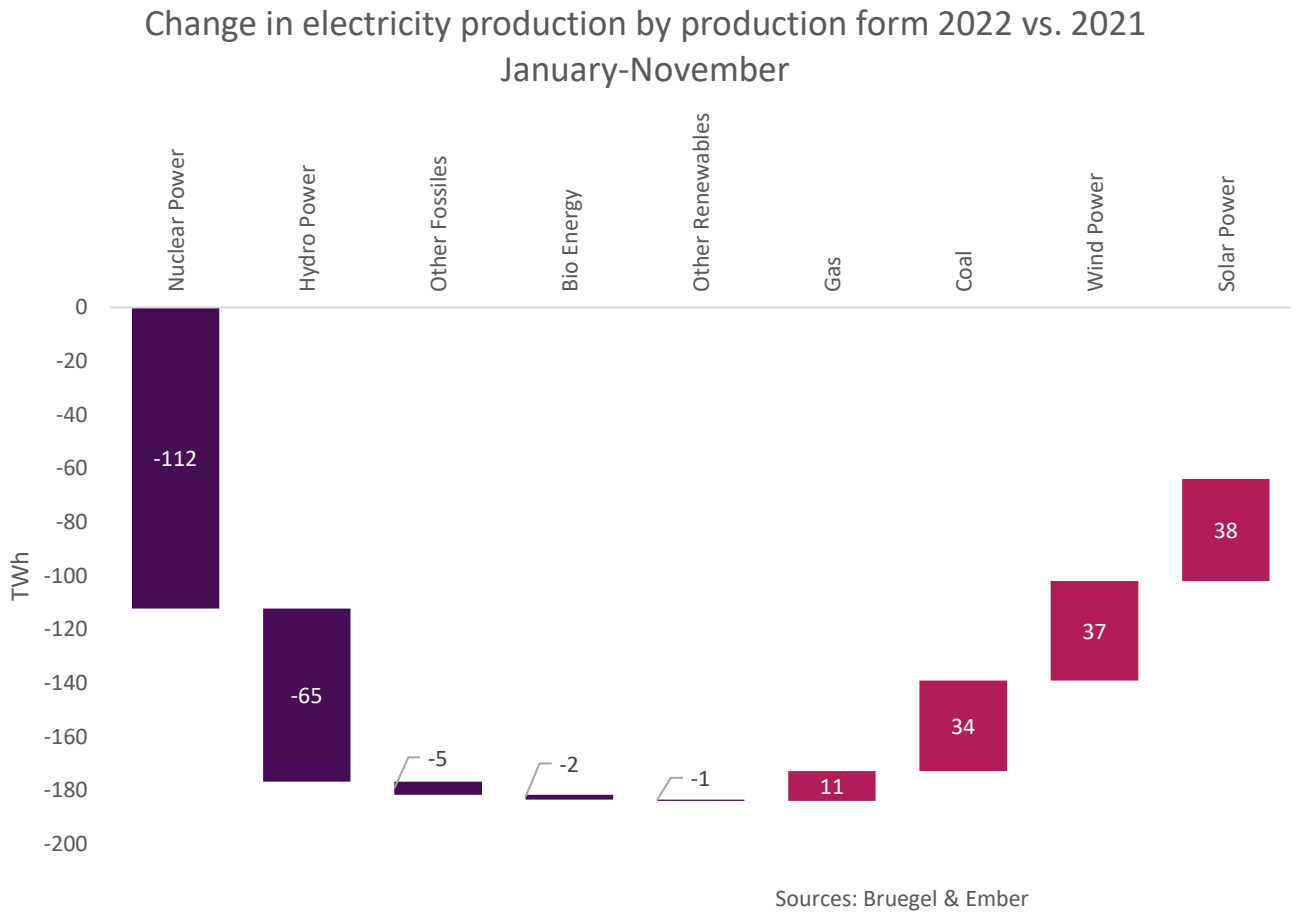


In 2023, wholesale electricity price in Finland was considerably higher than in the previous years



Source: Nord Pool

In addition to gas, the hot and dry summer and challenges in nuclear power plants also contributed to the crisis



Sources: Bruegel & Ember

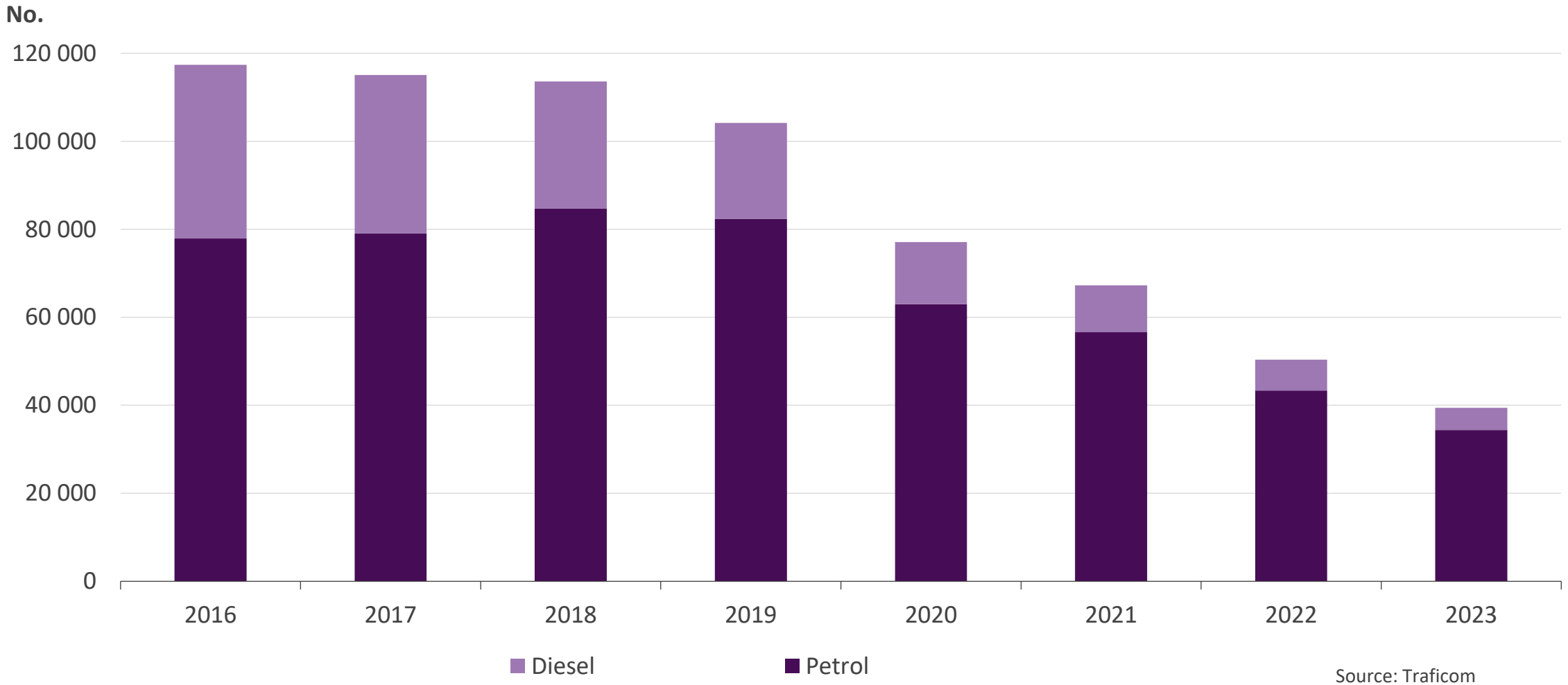
- The rise in electricity prices is also partly explained by the reduced supply of nuclear and hydro power.
- There are a number of faults and maintenance issues especially in French nuclear power plants, due to which production has plummeted.
- The dry year has reduced the supply of hydro power.
- Reduced use of electricity and increased production of wind and solar power have not been enough to meet the shortfall in nuclear and hydro power.
- It has been necessary to utilise more coal power in electricity production, and even the hugely expensive natural gas has been slightly more in demand than in the previous year.

The low carbonization of traffic is progressing

Finnish Energy

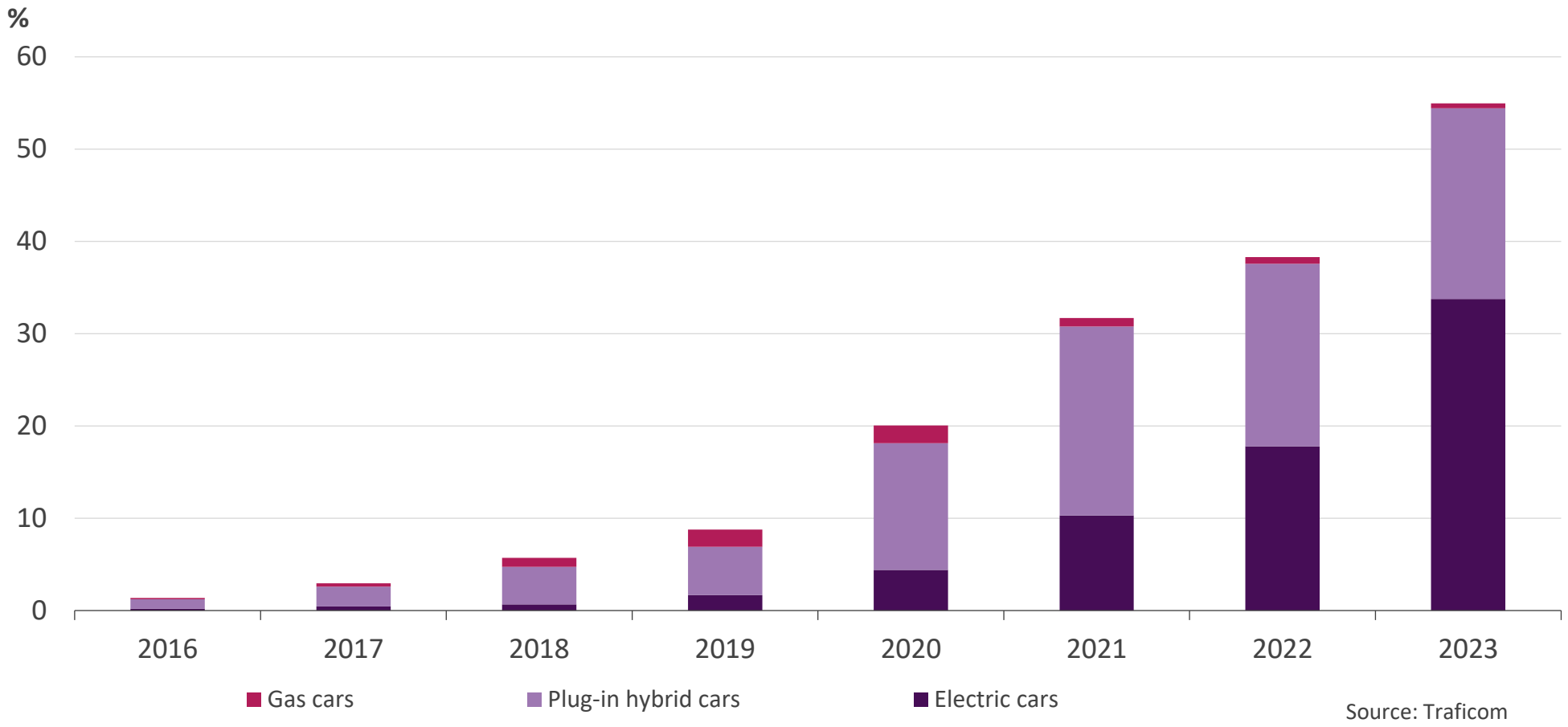
Petrol and diesel car sales in Finland

(new passenger cars, plug-in hybrid cars not included)



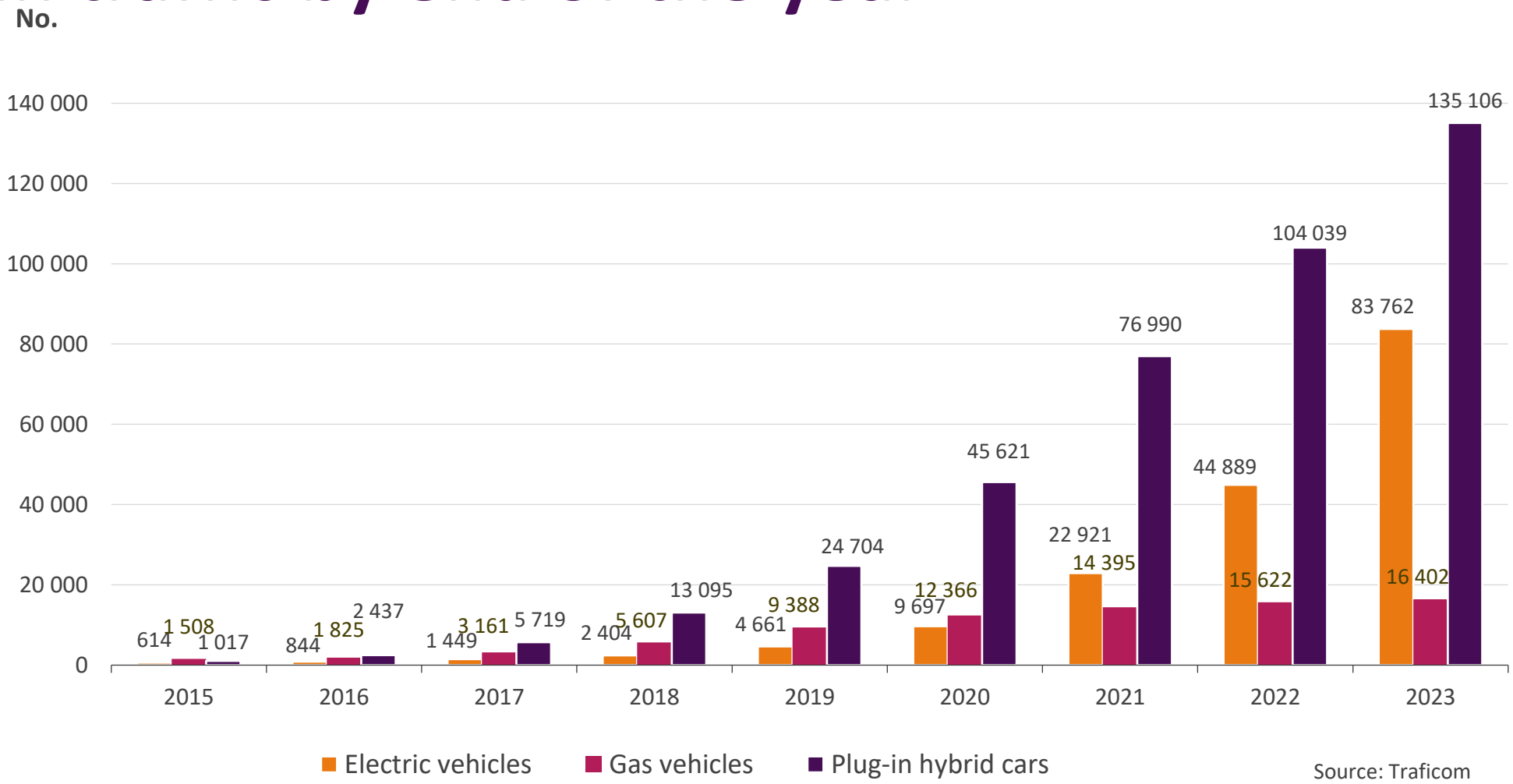
Source: Traficom

Alternative power sources for the first registration of passenger cars



Source: Traficom

Alternative power sources in passenger cars in traffic by end of the year



Source: Traficom