

Energy Year 2023 District Heating

25.01.2024

Finnish Energy

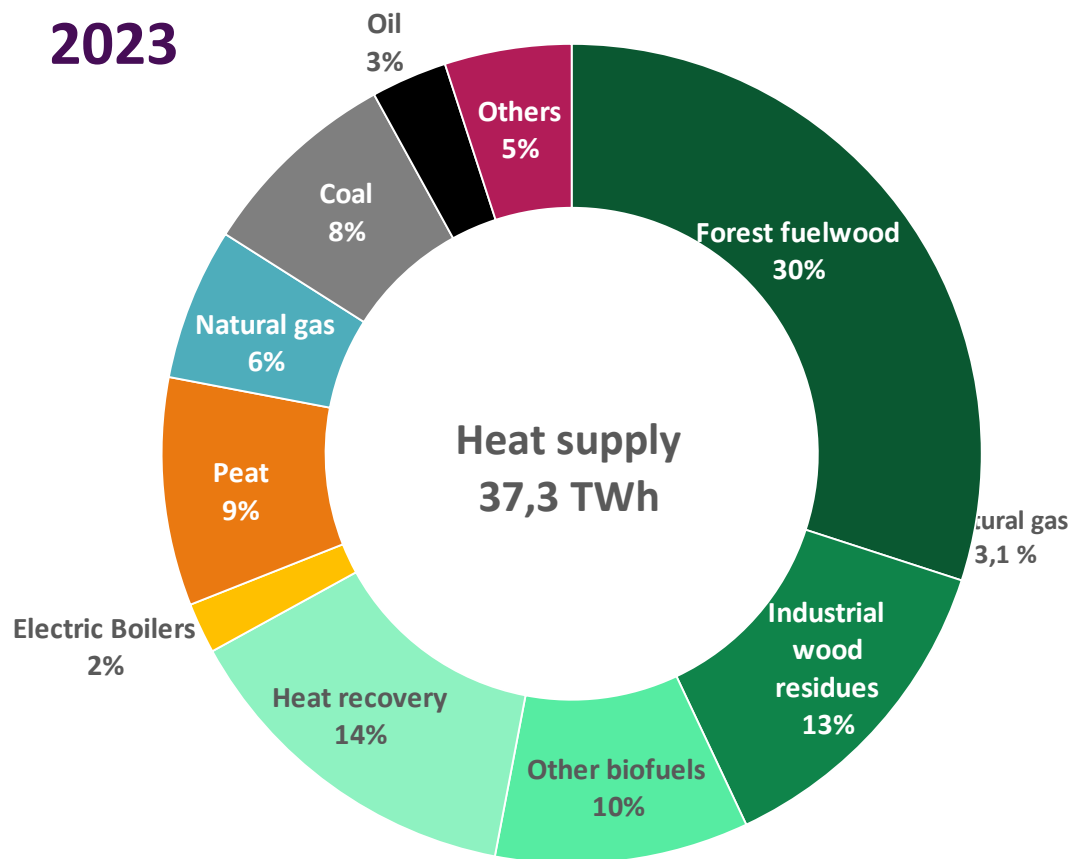


Finnish Energy

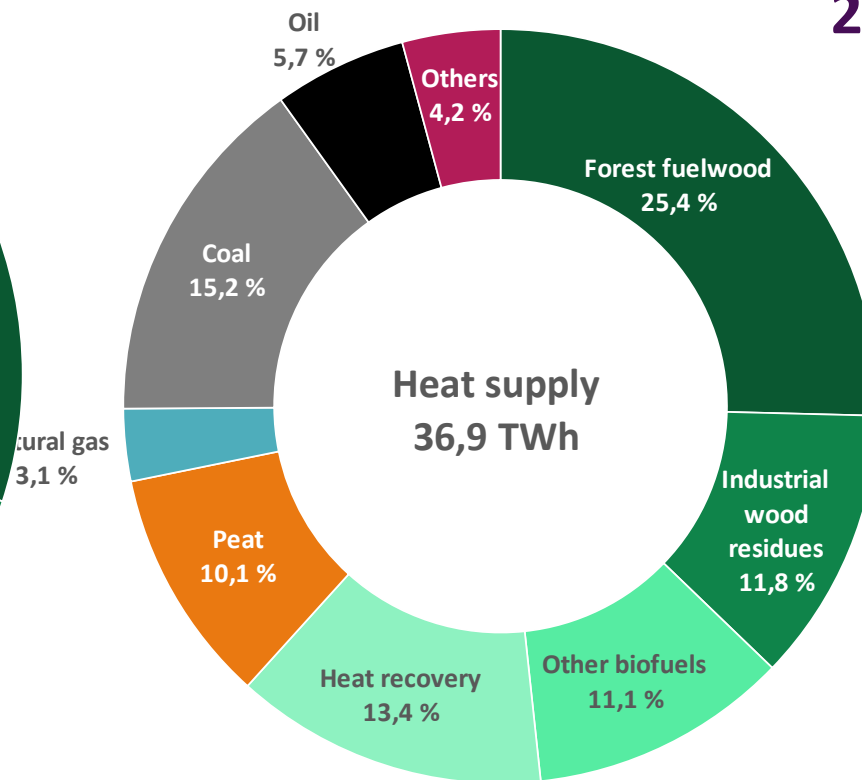
Share of climate neutral energy continued to grow

Share of renewables, heat recovery and electric boilers increased from 61 percent to 69 percent

2023



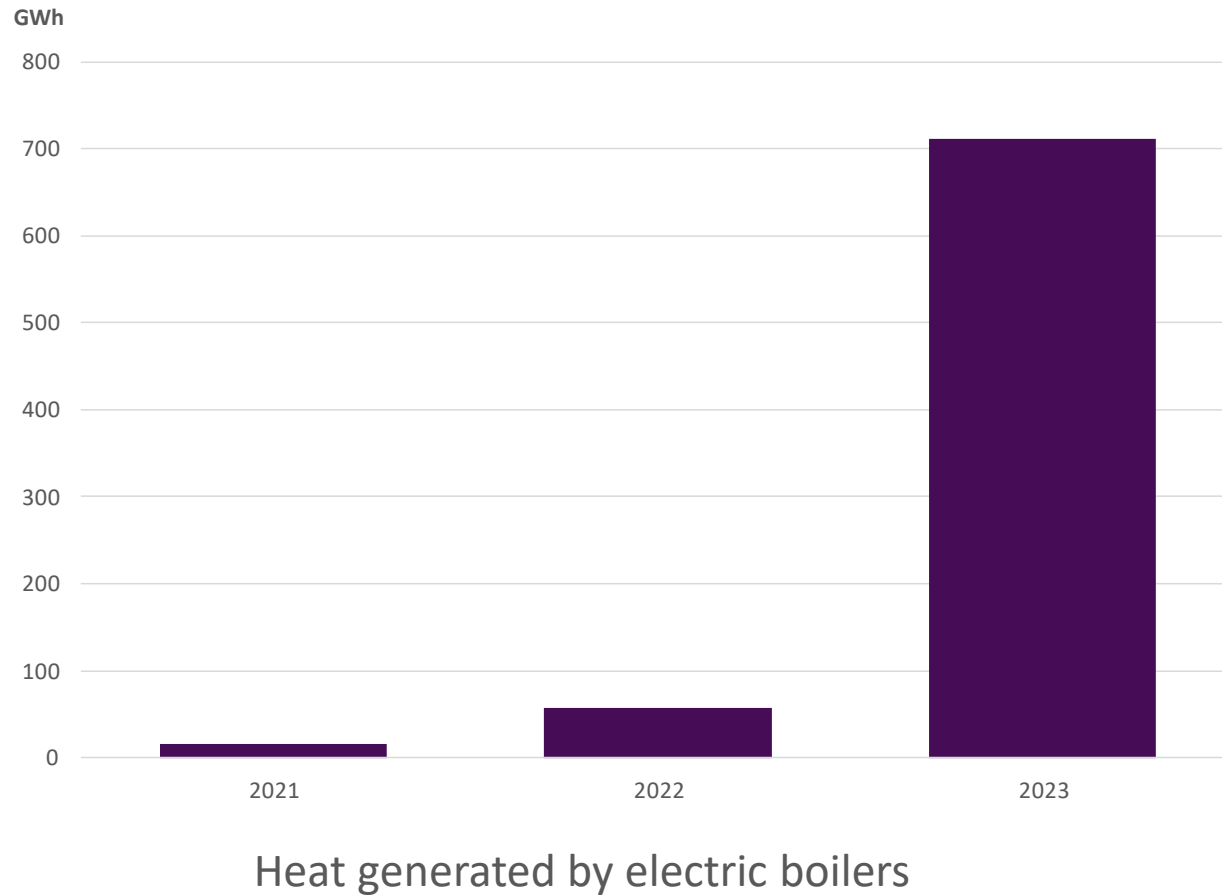
2022



- Recovered (recycled) heat: energy that would otherwise go to waste
- Other biofuels: includes also the bio share of municipal waste
- Other: non-bio share of municipal waste, plastic or hazardous waste, electricity.

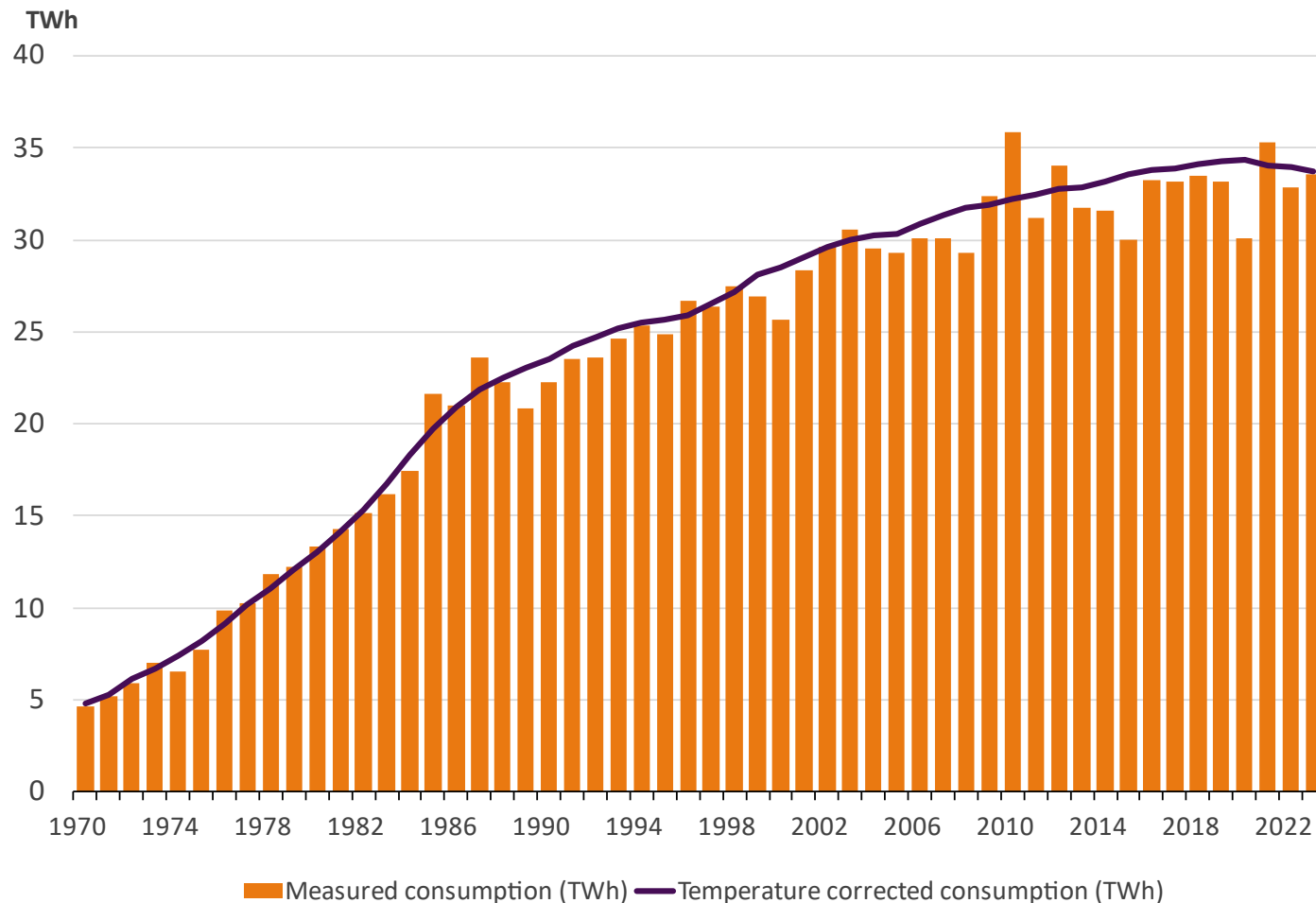
District heating goes electric

Significant increase in the number of electric boilers



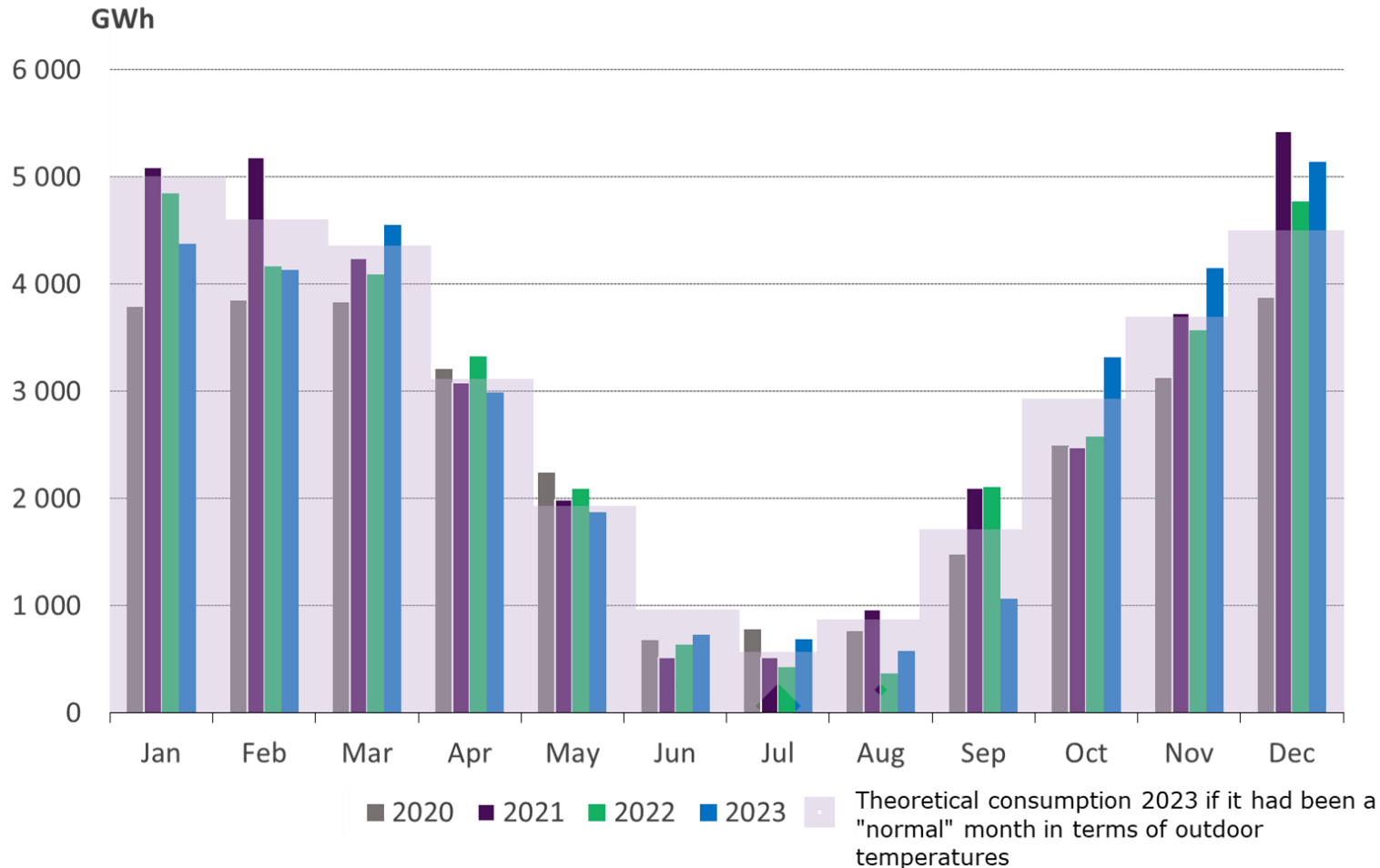
- Electric boilers produced 710 GWh heat in 2023
- Electric boilers reduce the use of fuels when electricity price is low
- Electric boilers are already in operation in following companies:
 - Fortum
 - Lappeenrannan Energia
 - Seinäjoen Energia
 - Tampereen Energia
 - Vaasan Sähkö
 - Turun Seudun Energiantuotanto

Temperature corrected heat consumption decreased from the previous year



- District heat consumption 33,6 TWh
 - The heating season was 0,2 °C warmer than normal year and 0,1 °C colder than previous year.
- Temperature corrected district heat consumption 33,7 TWh
 - Temperature correction takes into account annual temperature differences.

Monthly district heat demand



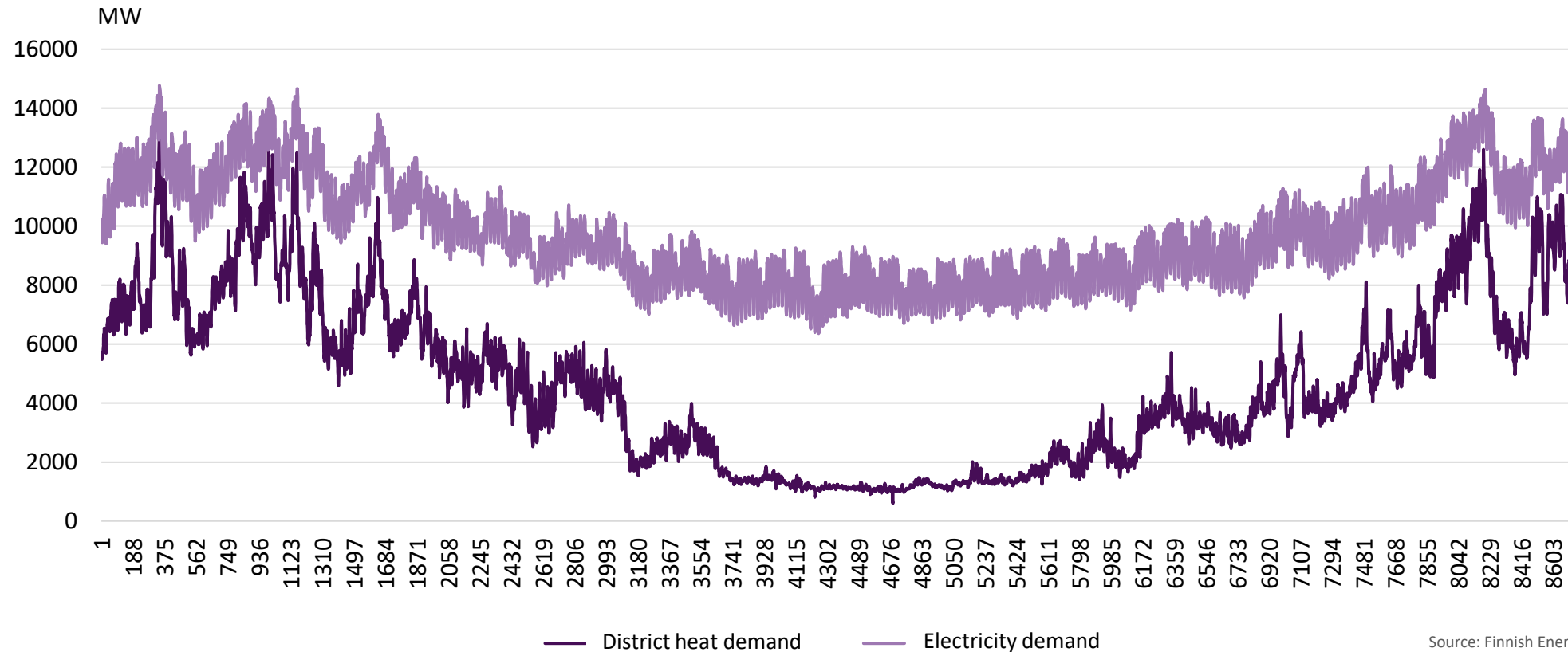
Year 2023 was 0,3 °C warmer than the normal period of 1991-2020

The cold winter months exemplify the need for a wide palette of fuels to ensure the security of supply of heating.

District heating supports the Finnish electricity system



Peak consumptions of district heat and electricity are close to each other

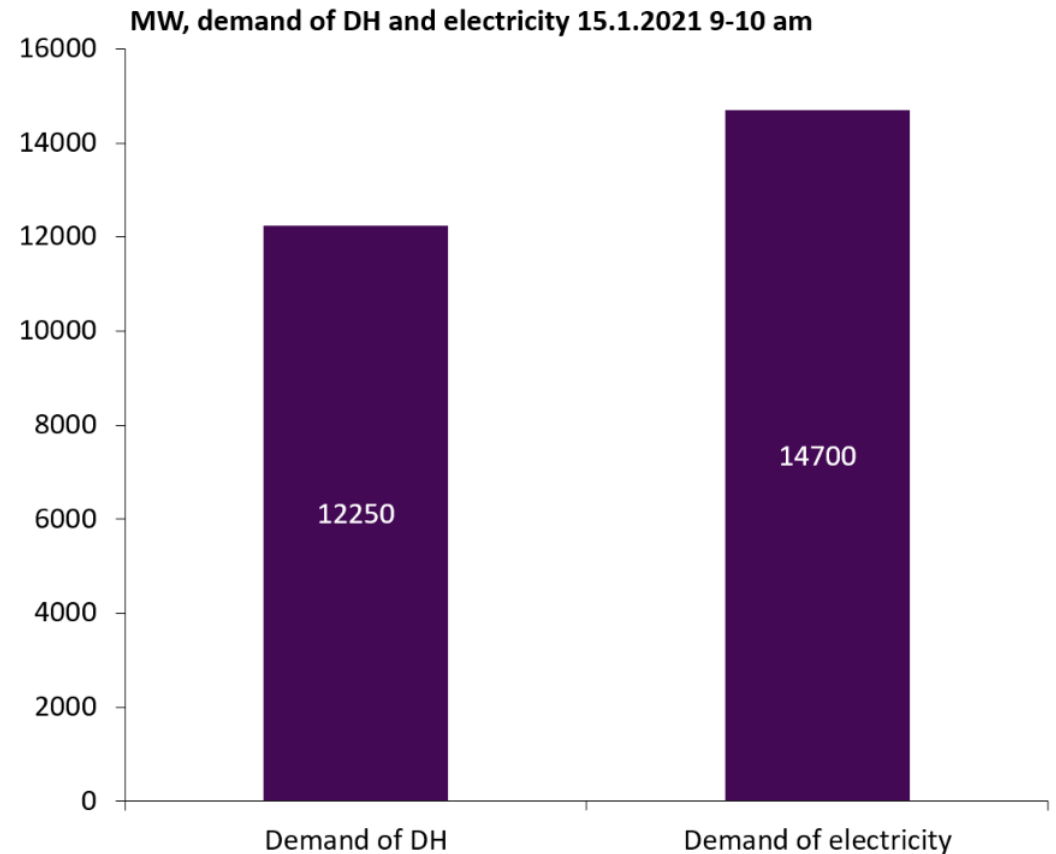


Source: Finnish Energy, estimation is based on Helen open data 2021

- Hourly consumption of district heat and electricity in 2021
- Despite a significant difference in overall demand for electricity and heat, peak consumptions are relatively close to each other

Electricity vs heat demand in winter

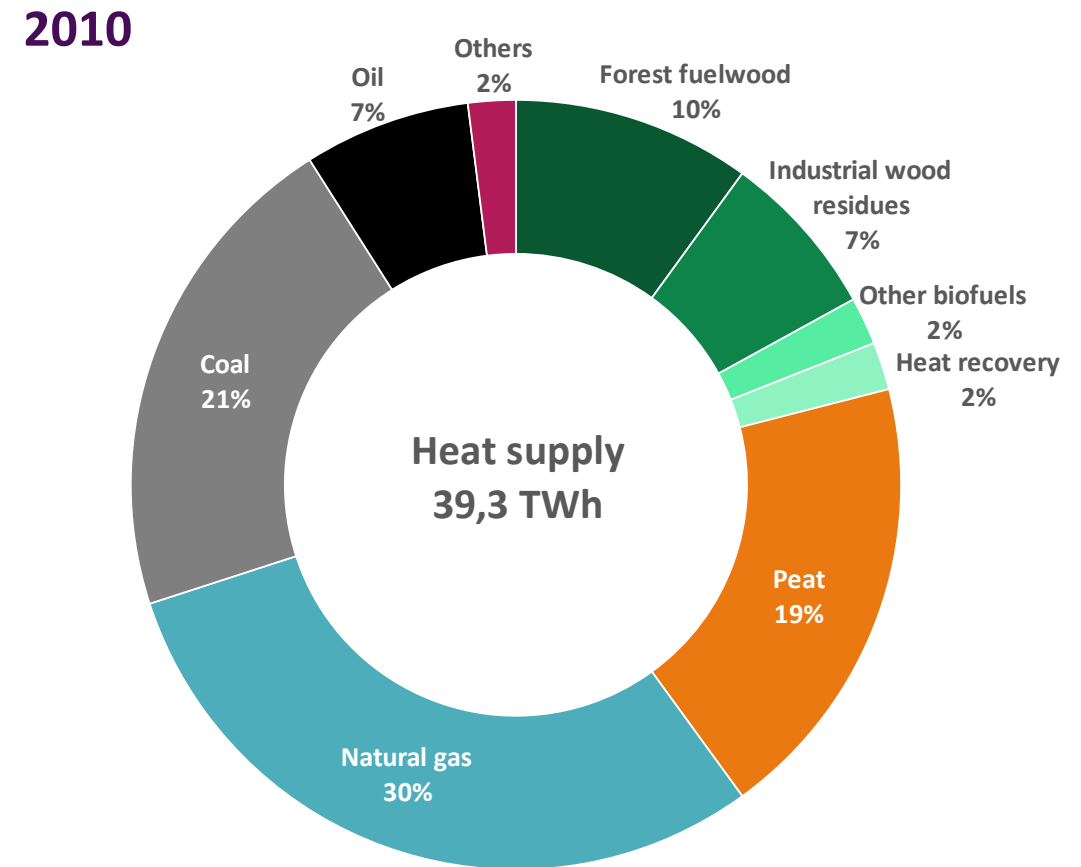
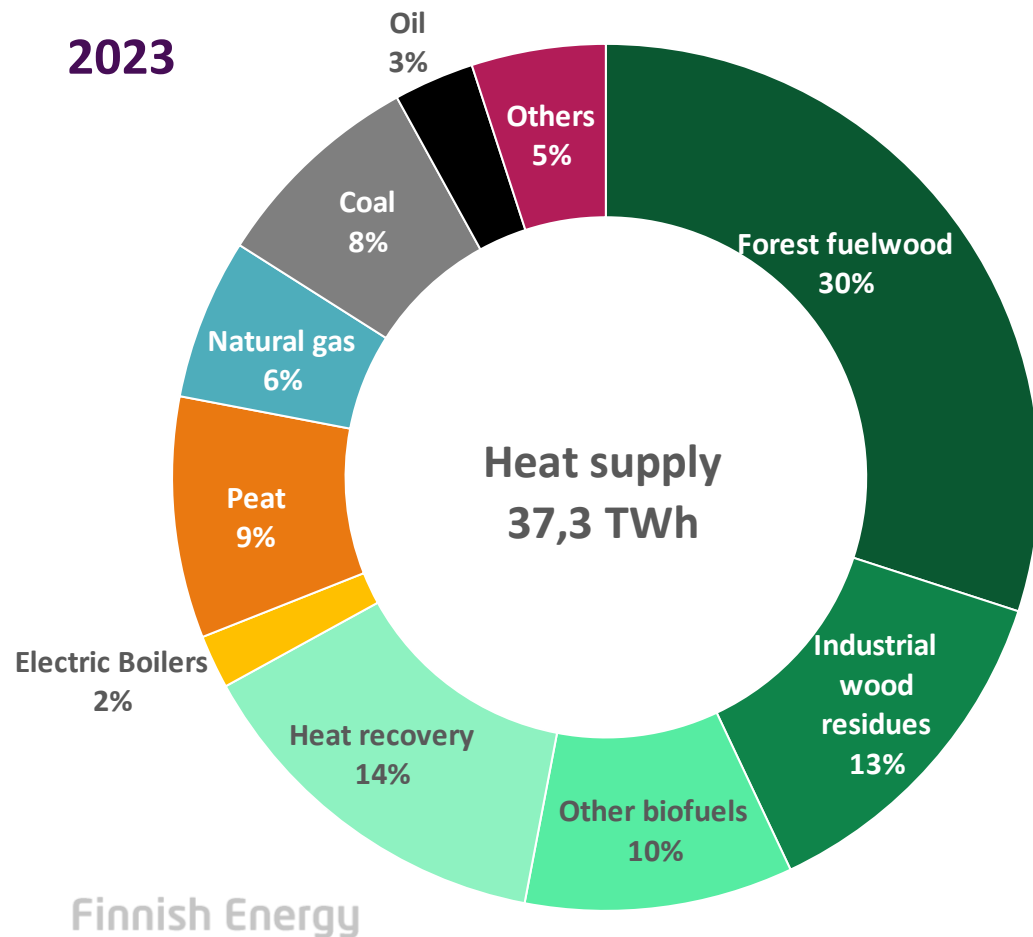
- Demand of district heating (DH) at the time of the peak consumption is about the same magnitude as the demand for electricity. On annual basis the demand of electricity is higher than DH (ca. 85 TWh vs. 35 TWh)
- Combined Heat and Power (CHP) plants produce a significant amount of electricity (2 500 MW) while producing heat.
- District heating reduces electricity demand peaks, in addition to electricity production



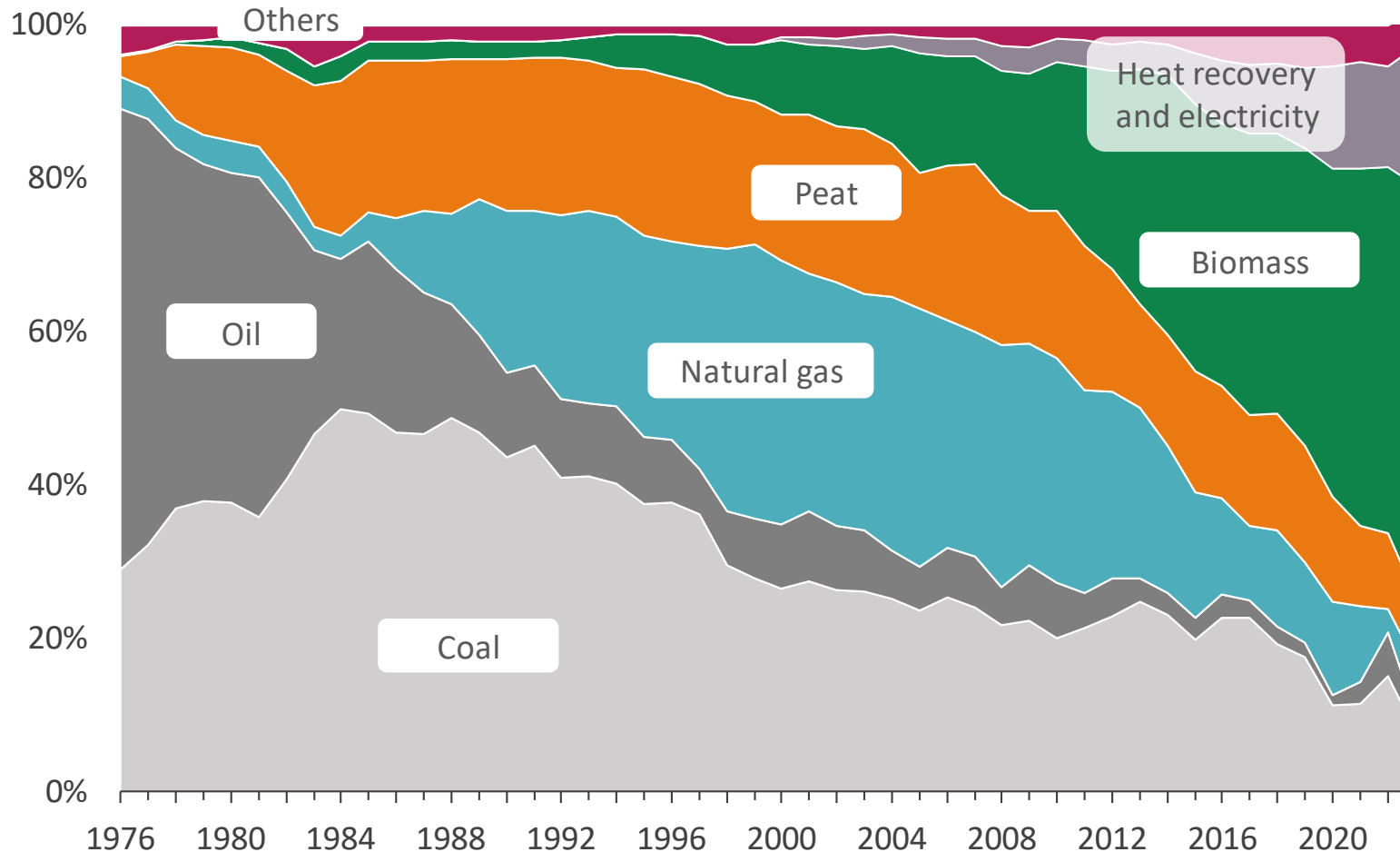
CO₂-neutral district heating at high level

Share of renewables has more than doubled and share of heat recovery has multiplied compared to year 2010

Share of renewables has increased from 19 to 53 percent and heat recovery from 2 to 14 percent

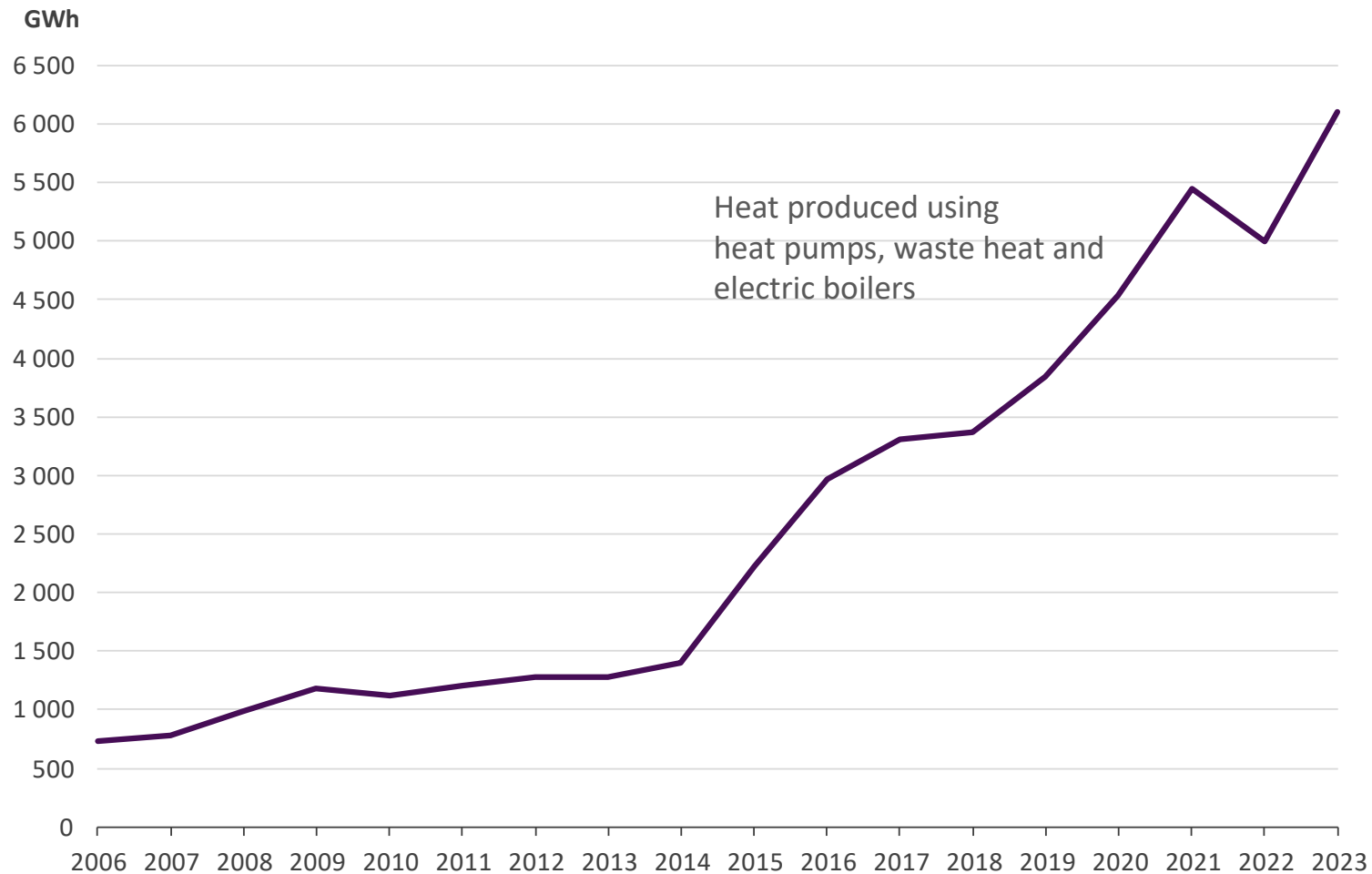


Share of renewables and recovered heat well more than a half in district heat supply



- Fossil fuels have increasingly been replaced by biomass and recovered heat.
- Use of biomass has more than doubled during last decade.
- Amount of recovered heat has quadrupled compared to year 2010. Recovered heat consists mainly of waste heat. Fuel consumption is avoided by making use of surplus heat.

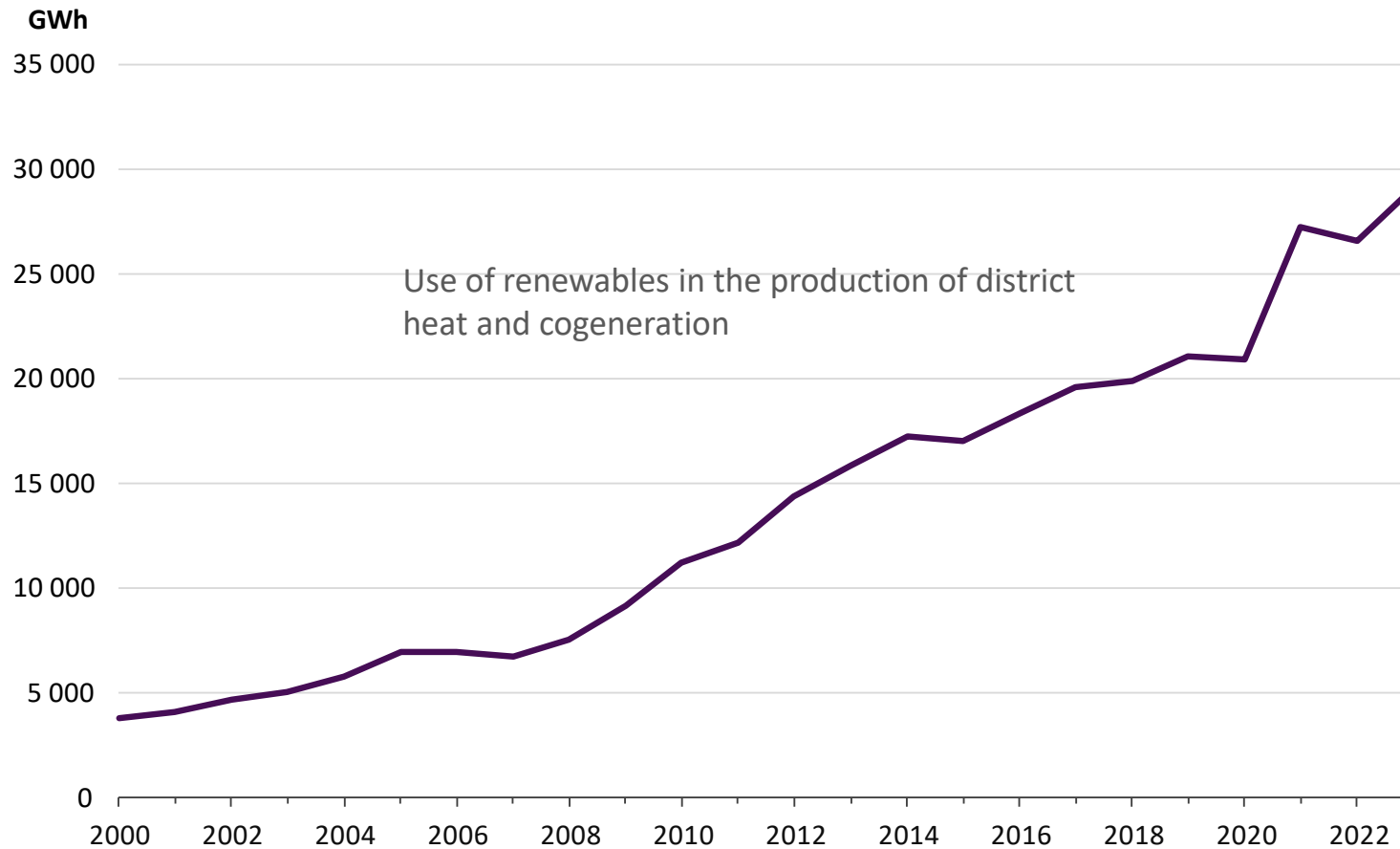
The use of waste heat and electricity continued to grow



- Fuel consumption can be avoided by making use of surplus heat. Heat can be recovered from data centers, industrial processes, flue gases, sewage water etc.
- Electric boilers played a significant role in 2023 and they produced 710 GWh heat

The use of renewables increased

They replaced especially peat and coal

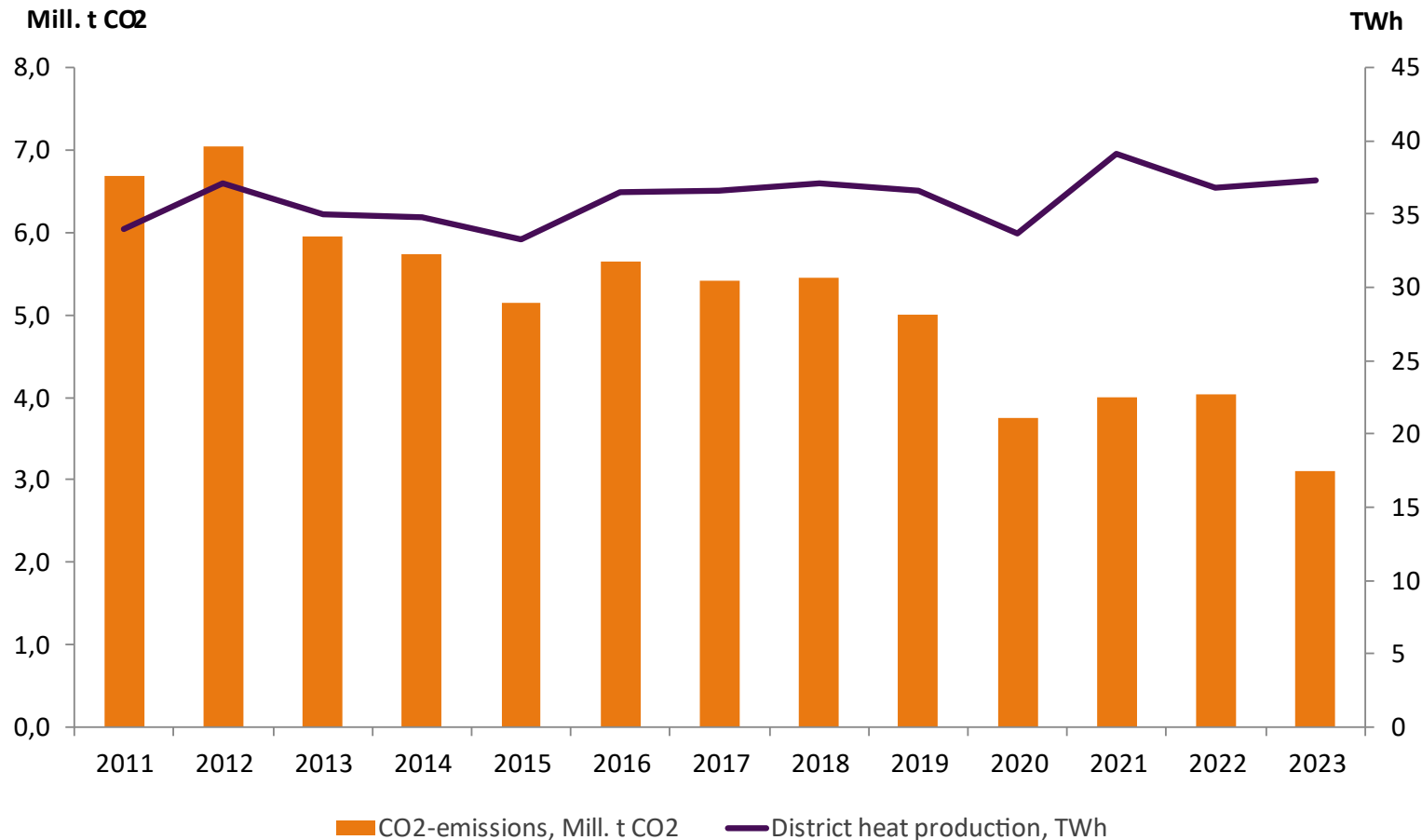


- In municipalities where district heating is provided
 - 75 per cent of networks heat comes from renewable fuels or recovered heat
- Renewable fuels used in producing district heat are e.g. forest fuelwood, industrial wood residue, bio share of municipal waste, biogas, biofuel oil.

**The trend of district heat
emissions is strongly declining**

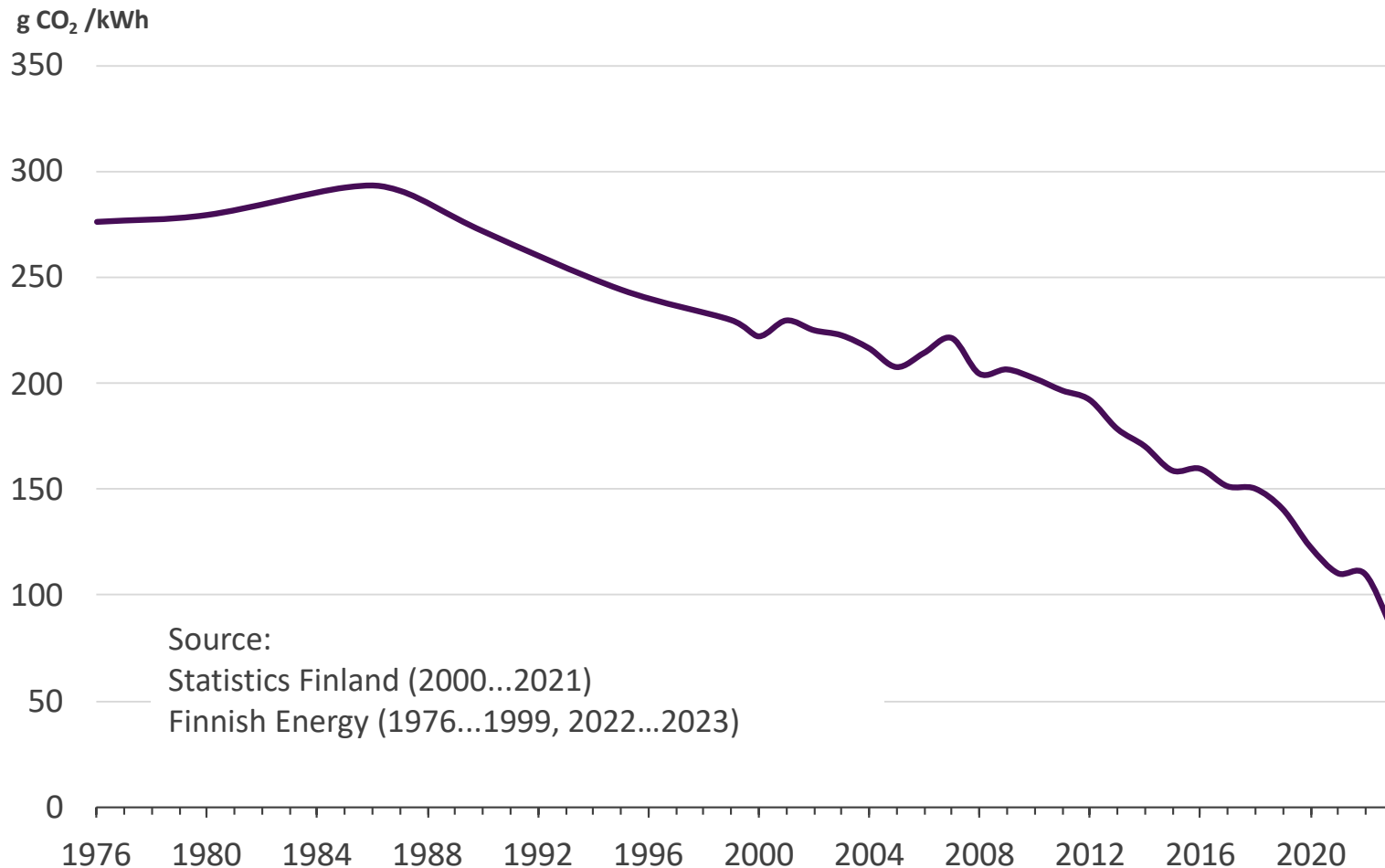


CO₂-emissions from district heat production decreased by 24 %



- CO₂-emissions from district heat production in 2023 were 3,1 Million tons and decreased by 24 % from the previous year

Specific CO₂-emissions from district heat production have decreased by 59 % since 2010

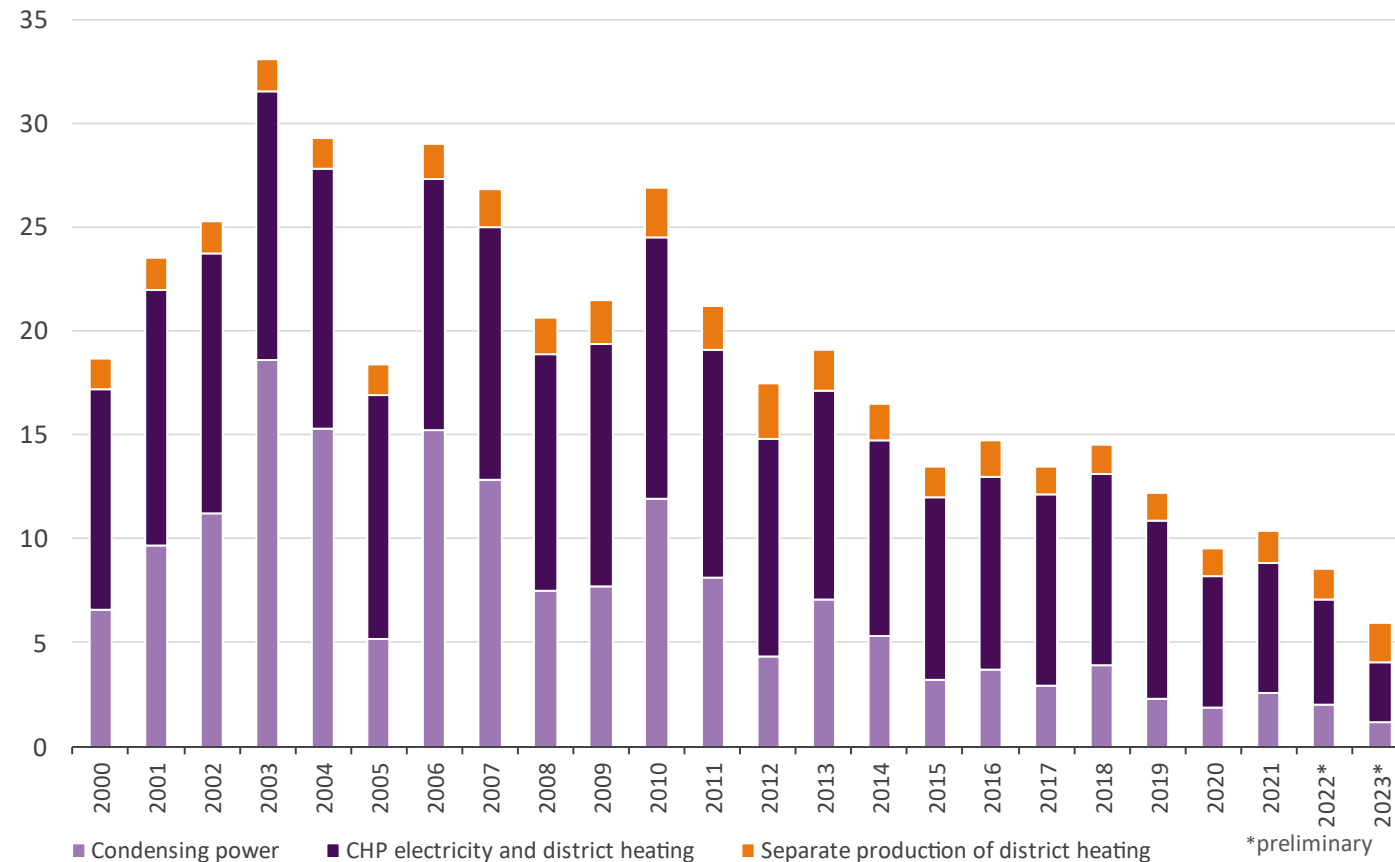


- Specific emissions from district heat production in 2023 were 83 gCO₂/kWh^(*), which
 - Decreased by 24 % from the previous year
 - Decreased by 59 % since 2010

^{*)} Fuels used in combined heat and power production were allocated according to the benefit allocation method

The CO₂-emissions from Finland's energy production are decreasing

million t CO₂



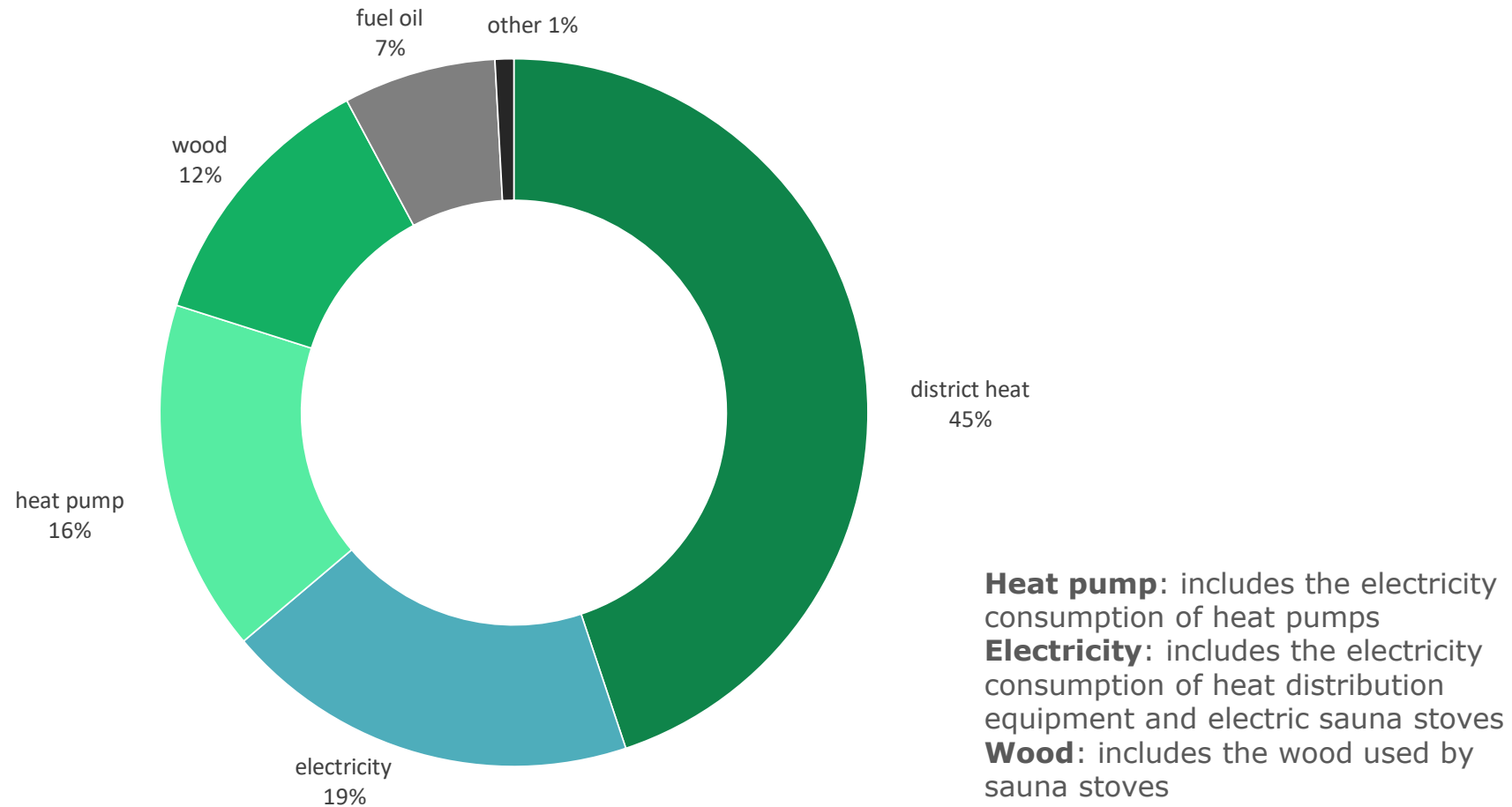
- CO₂-emissions of electricity and district heating production 6 million tons in year 2023
- Emissions have declined 82 % compared to 2000s highest emission year 2003

**District heat is the most common
source of space heating in Finland**



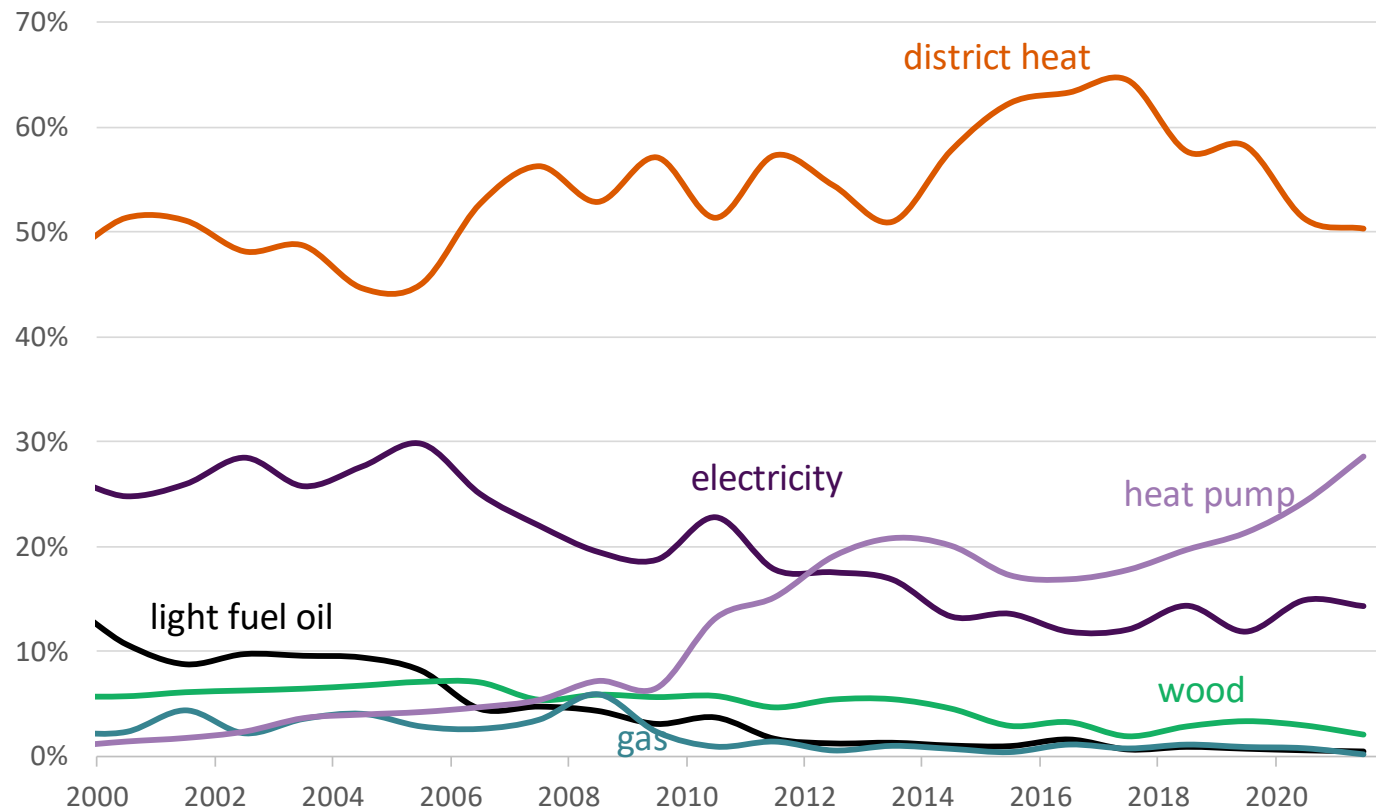
Market share of space heating 2020

Residential, commercial and public buildings



Source: Statistics Finland

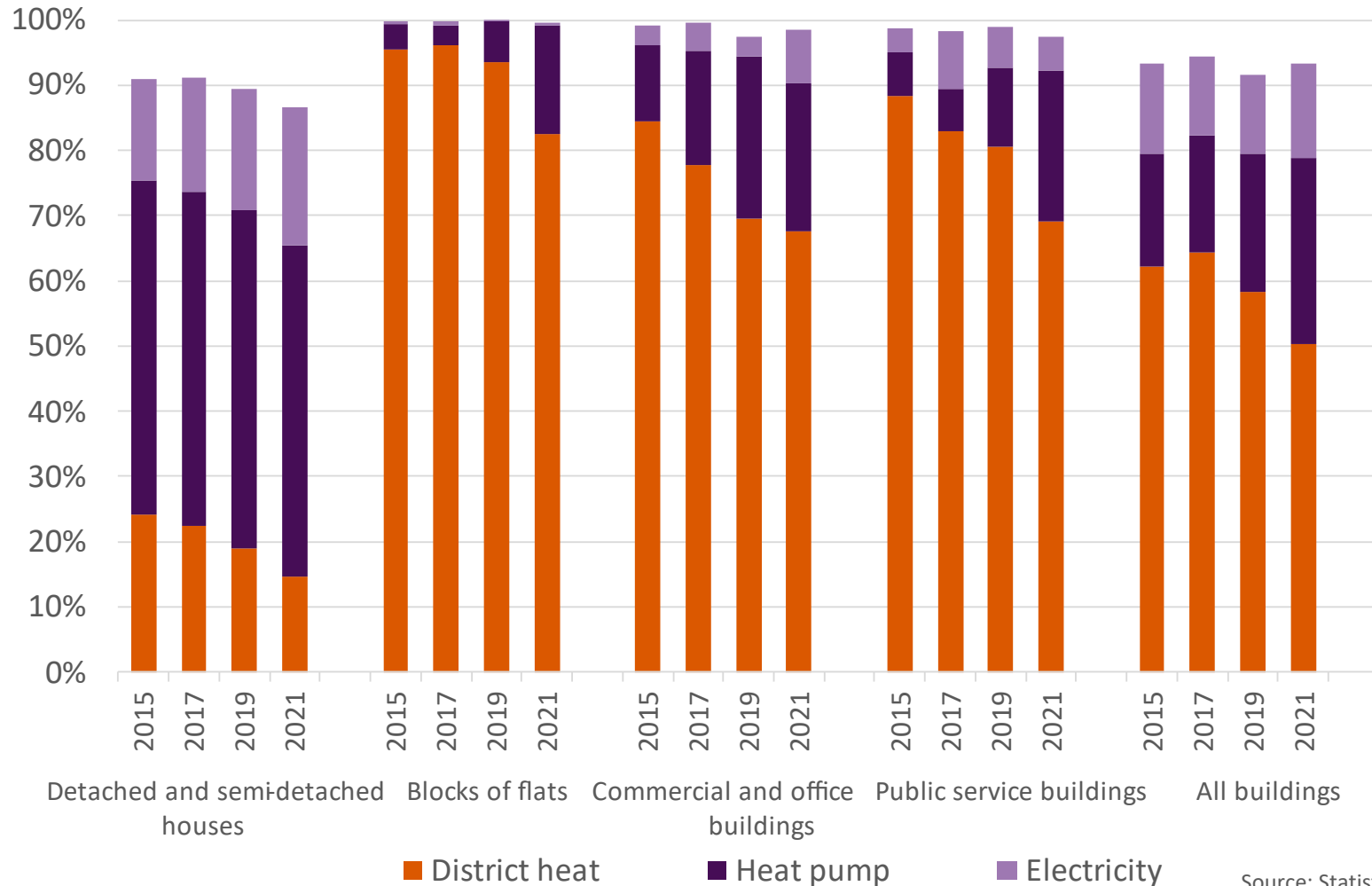
District heating is the most popular method of heating in new buildings



Source: Statistics Finland, Granted building permits (heated cubic volume)

- Market share of district heating in 2021
 - All buildings 50 %
 - Residential buildings 54 %
 - Blocks of flats 83 %
 - Detached and semi-detached houses 15 %
- Office buildings 84 %
- Public service buildings 69 %
- Commercial buildings 58 %
- Industrial and mining and quarrying buildings 48 %
- Warehouses 38 %

Main heating method in new buildings

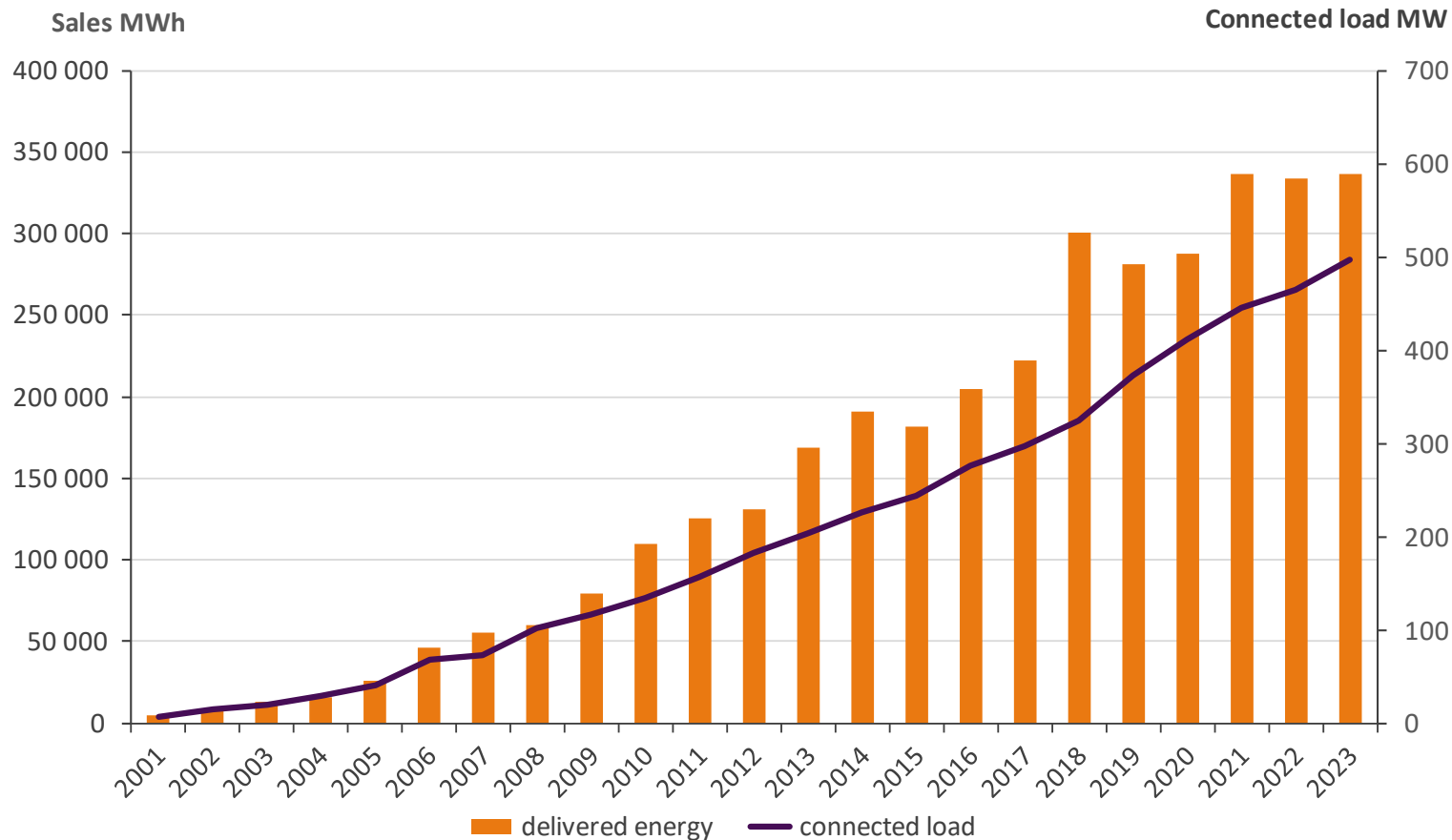


Source: Statistics Finland, Granted building permits (heated cubic volume)

**District cooling is cost-effective
and environmentally friendly**



District cooling business continues to expand

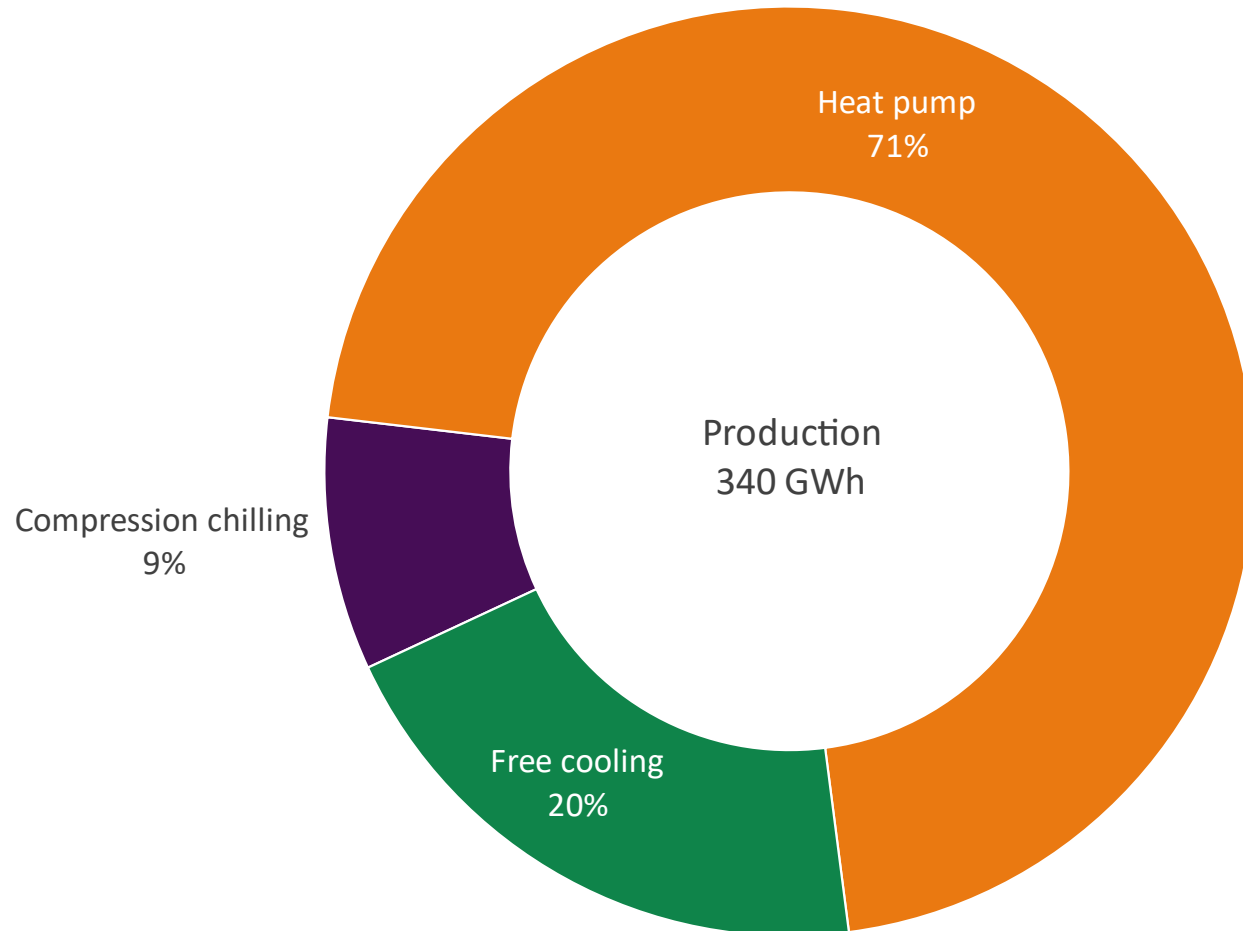


- District cooling sales increased by 1 % from the previous year
- Connected load increased by 7 %

Energy companies which sold district cooling 2023:

- Etelä-Savon Energia Oy
- Fortum Power and Heat Oy
- Helen Oy
- Jyväskylän Energia Oy
- Kuopion Energia Oy
- Lahti Energia Oy
- Lempäälän Lämpö Oy
- Oulun Energia Oy
- Pori Energia Oy
- Tampereen Sähkölaitos Oy
- Turku Energia Oy
- Vierumäen Infra Oy

Energy efficiency with district cooling



- Same heat pumps often produce both heat and cooling energy
 - the cooling water is cooled and the district heating water is warmed up in the same process.
- District cooling also utilizes the ambient energy from sea, lakes and rivers as well as outdoor air whenever the temperature is low enough.