

District Heating, District Cooling & CHP in Finland

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11.5.2010



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Content

- Finnish Energy Industries
- Statistics
- Regulation of DH
- Challenges of today
- Vision 2050

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- Industrial policy
 - Production, procurement, transmission, distribution and sales of electricity
 - District heating and district cooling
 - Design, implementation, operation, maintenance and construction of networks and power plants
- Labour market policy
- Provision of services for the branch
 - Service company Adato Energia Oy
 - Training, publishing, statistics etc.

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- Operations started 1.1.2005
- Predecessors: Finergy, Sky, Sener and Enerta
- Now 245 members and 63 co-operative members
 - DH division: 116 members and 46 co-operative members
- Budget 6,5 million €, staff 37 persons
 - DH & CHP division: 1,0 million €, staff 6 persons
 - Based mainly on membership fees
 - Offices in Helsinki and Brussels
- Adato Energia Oy: 4,2 million €, staff 15 persons
 - 100 % owned service company of the FEI
 - Services with extra fees
 - Dividend for the FEI



Statistics



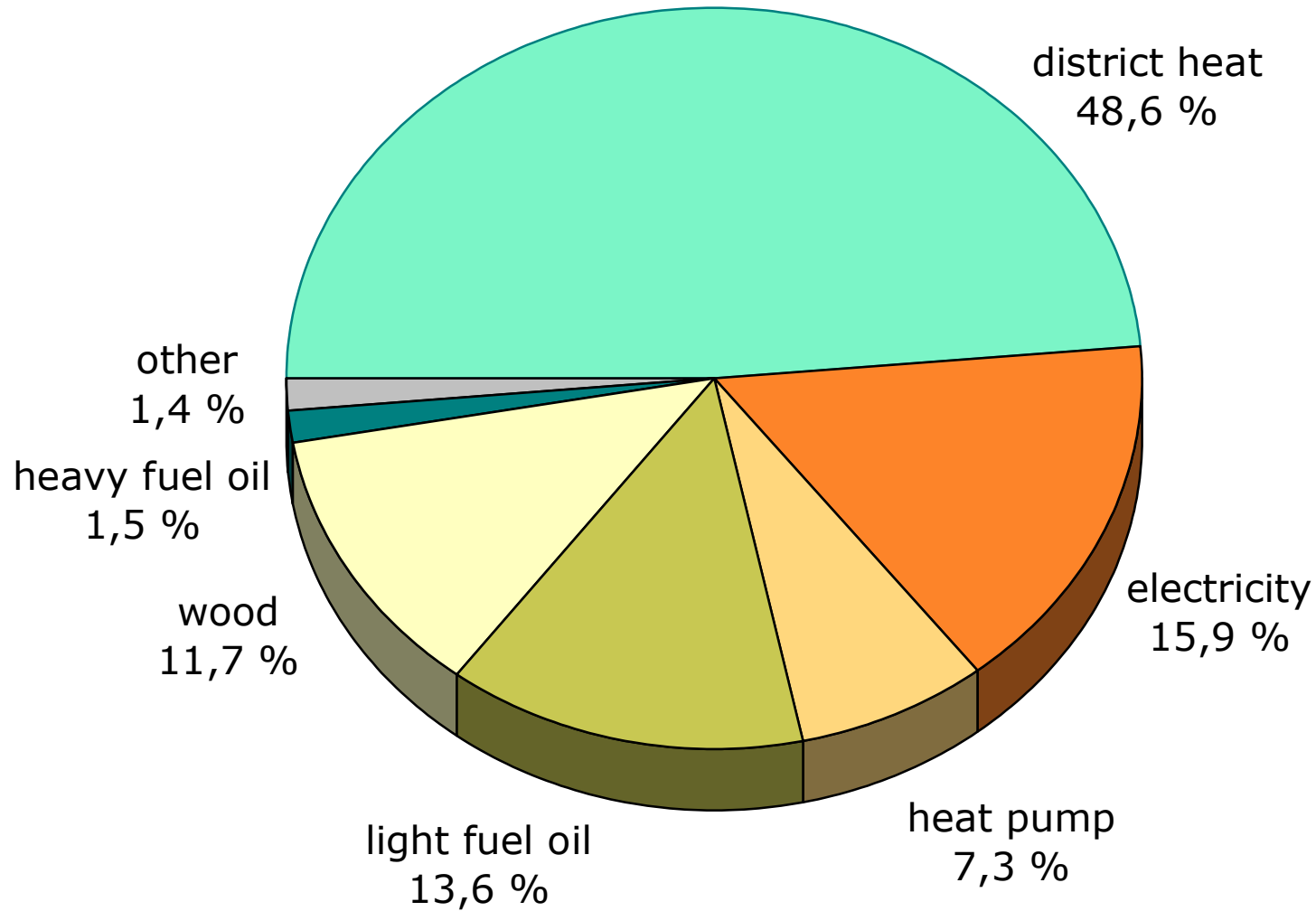
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District heating and cooling in Finland 2009

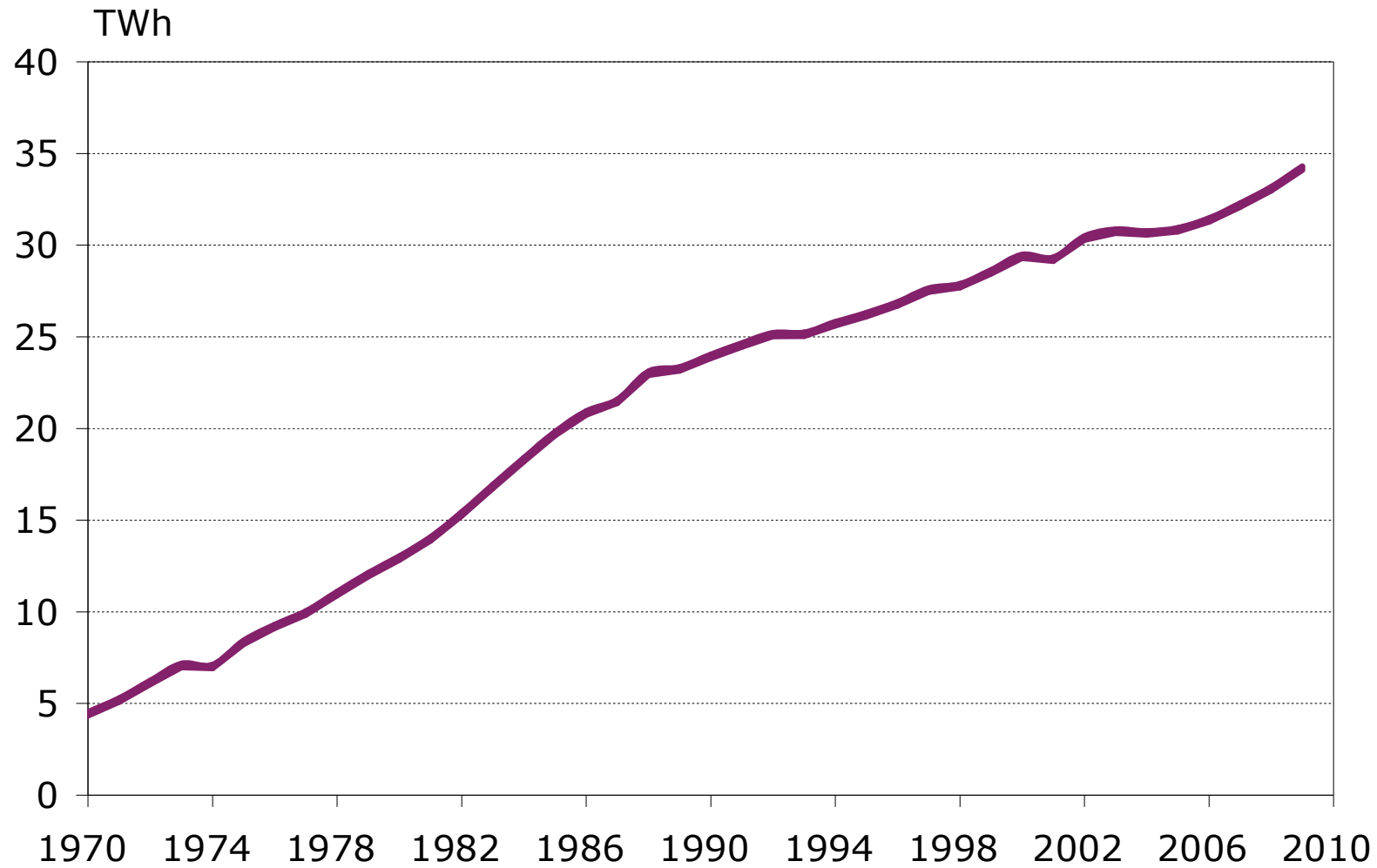
- Heat sales (incl. taxes) 1,8 milliard €
- Sold heat energy (all-time-high) 31,3 TWh (5th in EU)
- Average price of DH (incl. taxes) 5,62 c/kWh
- Inhabitants in DH apartments 2,6 million
- Market share of district heat 49 % (2nd in EU)
- Sold district cooling energy 75,8 GWh (6th in EU)

Market share of space heating v. 2007

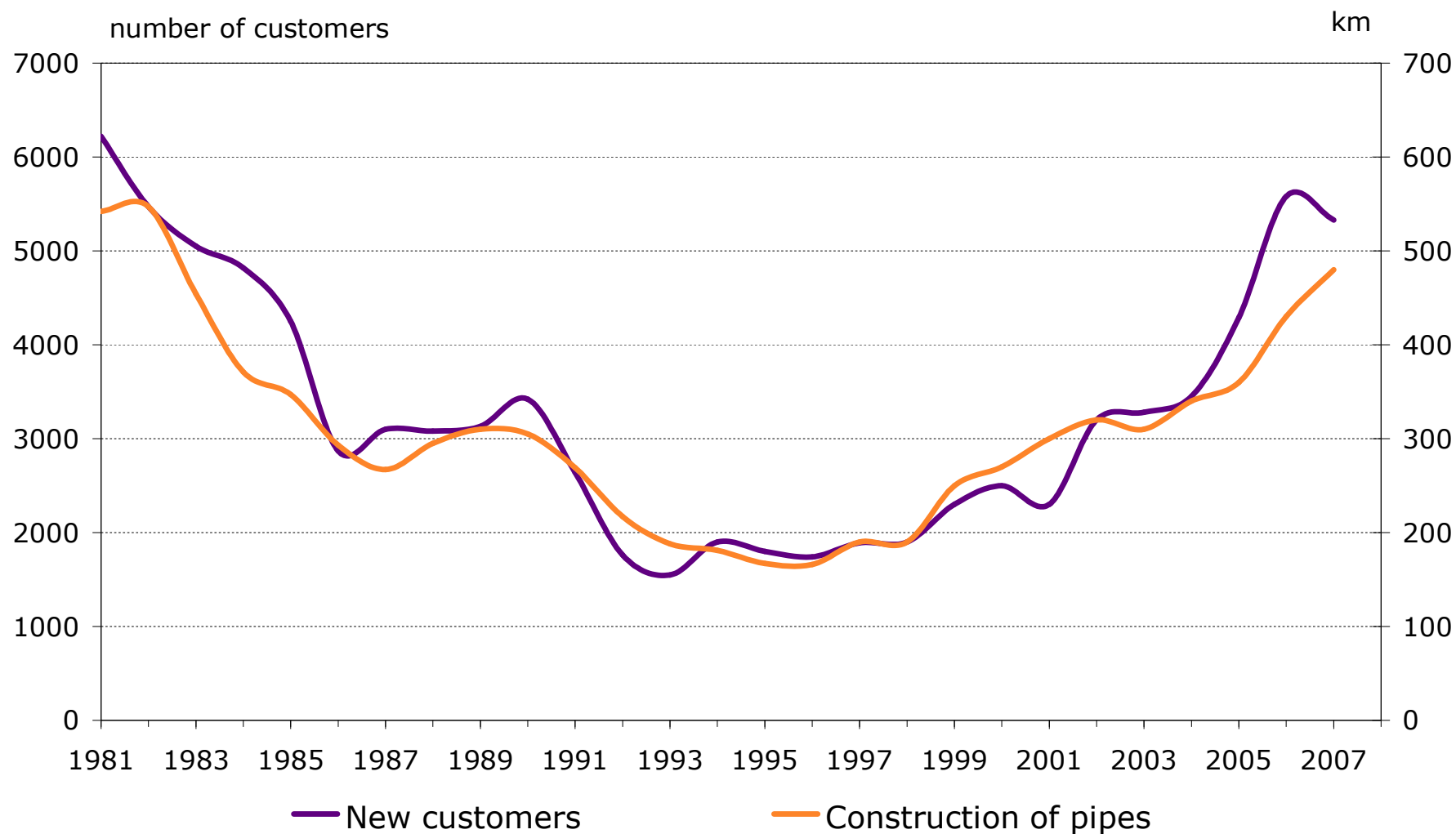
Source: Statistics Finland



Temperature corrected district heat consumption, TWh



New customers connected to district heating and construction of new pipelines



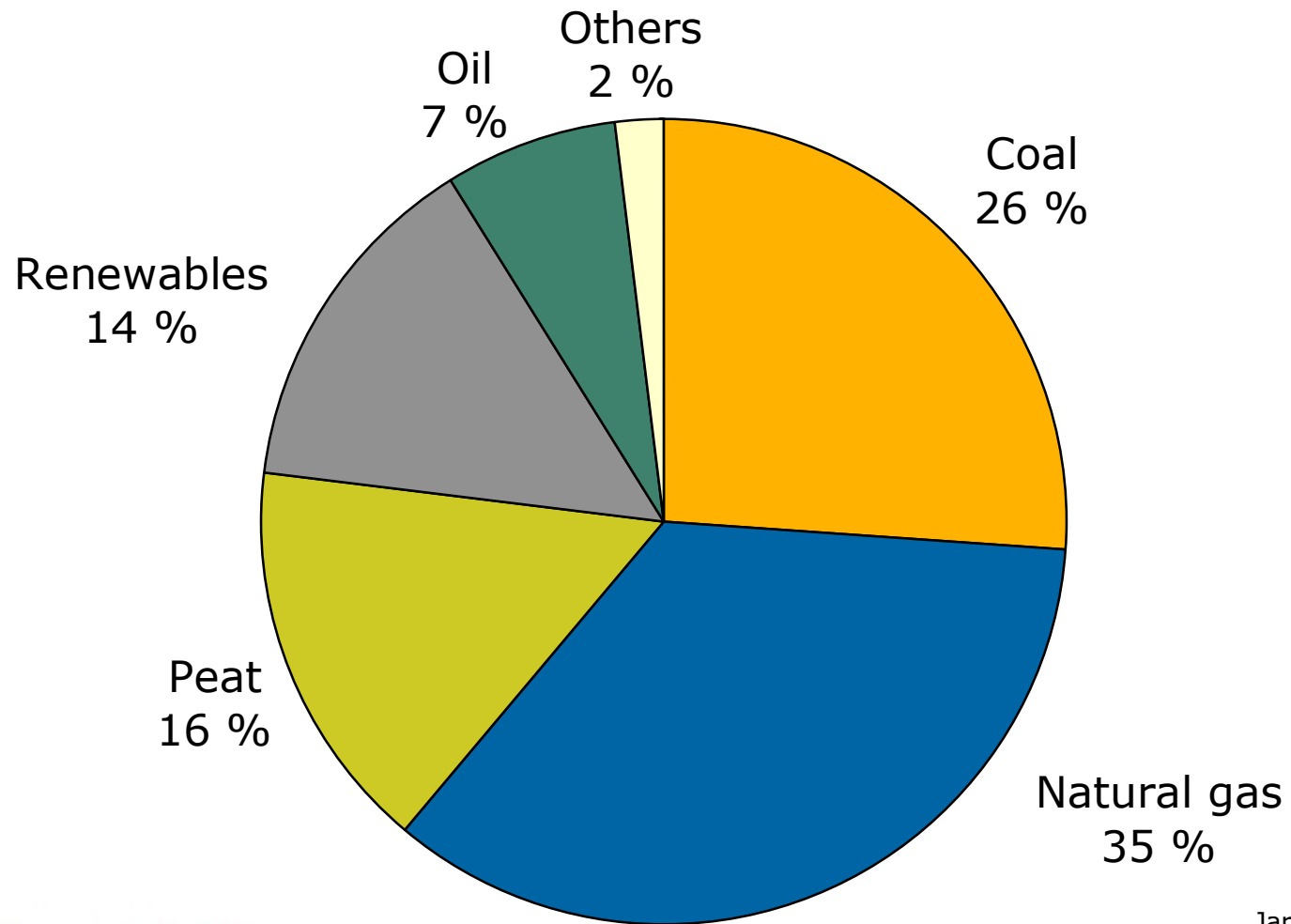
District heating customers 2008

- Around 119 000 district heating customers
- About 93 500 customers are dwellings with 2,61 million inhabitants
- Year 2008 (2007)
 - o 5 700 (5 300) new customers
 - o 74 % (60 %) of the connected building volume are new buildings and the rest are buildings, which have changed their heating form
- District heating in new buildings 2008 (2007)

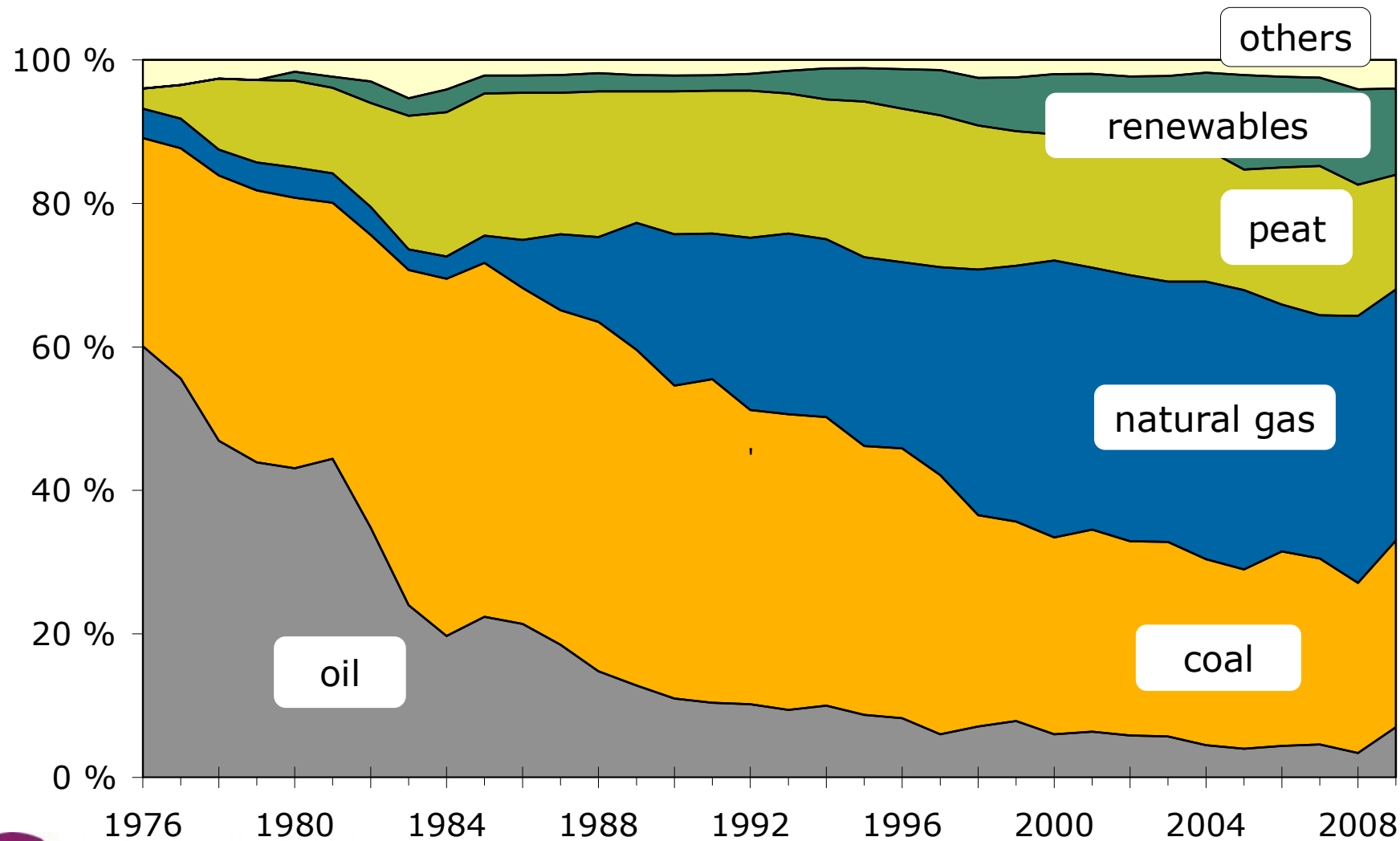
| | | |
|------------------------|------|--------|
| o Single family houses | 15 % | (16 %) |
| o Apartment houses | 98 % | (98 %) |
| o Office buildings | 95 % | (97 %) |
| o Commercial buildings | 86 % | (85 %) |
| o Industrial buildings | 57 % | (58 %) |

Fuel consumption in production of district heat and CHP 2009

- fuel consumption 57,8 TWh

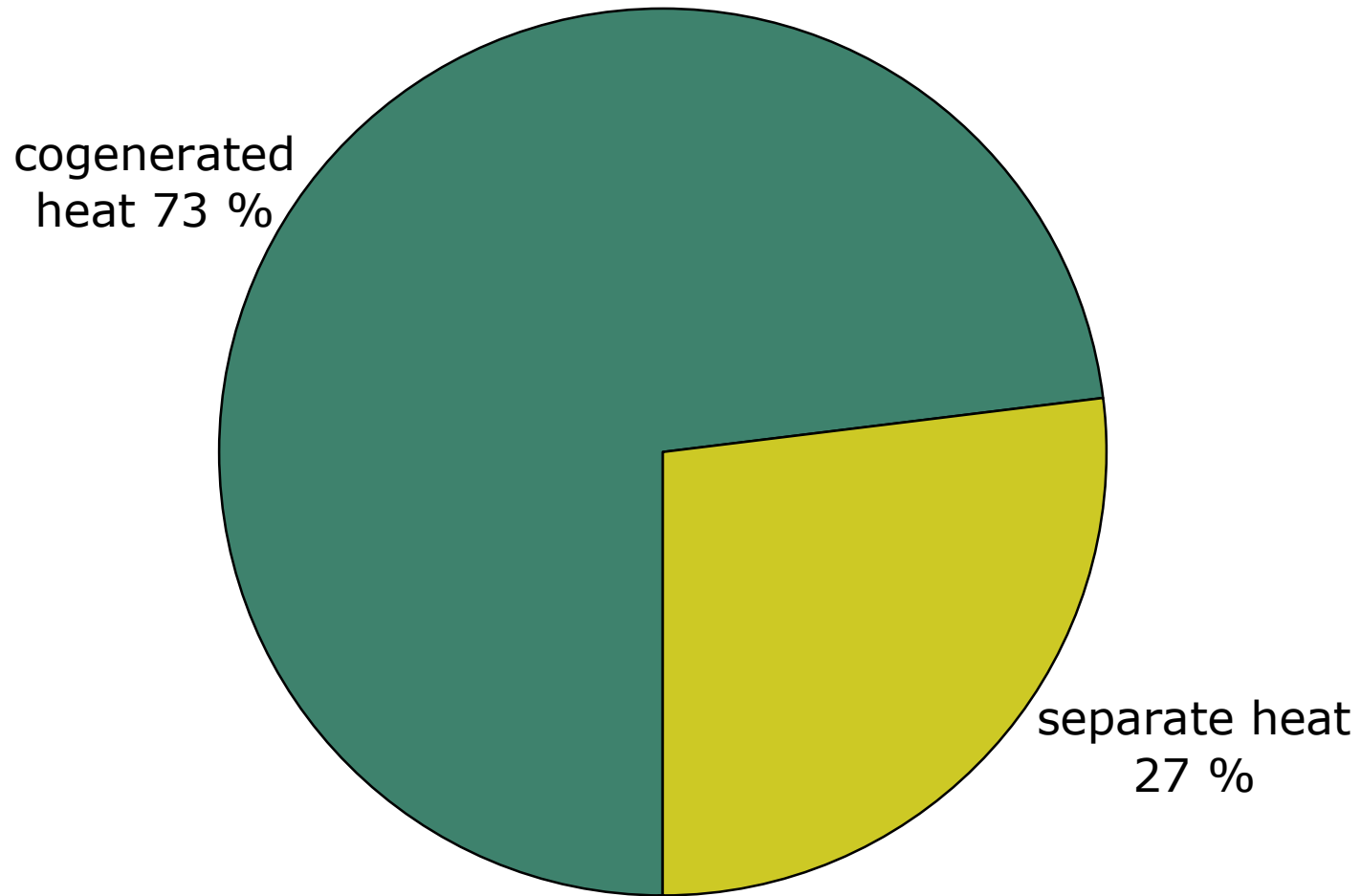


Fuel consumption in production of district heat and CHP

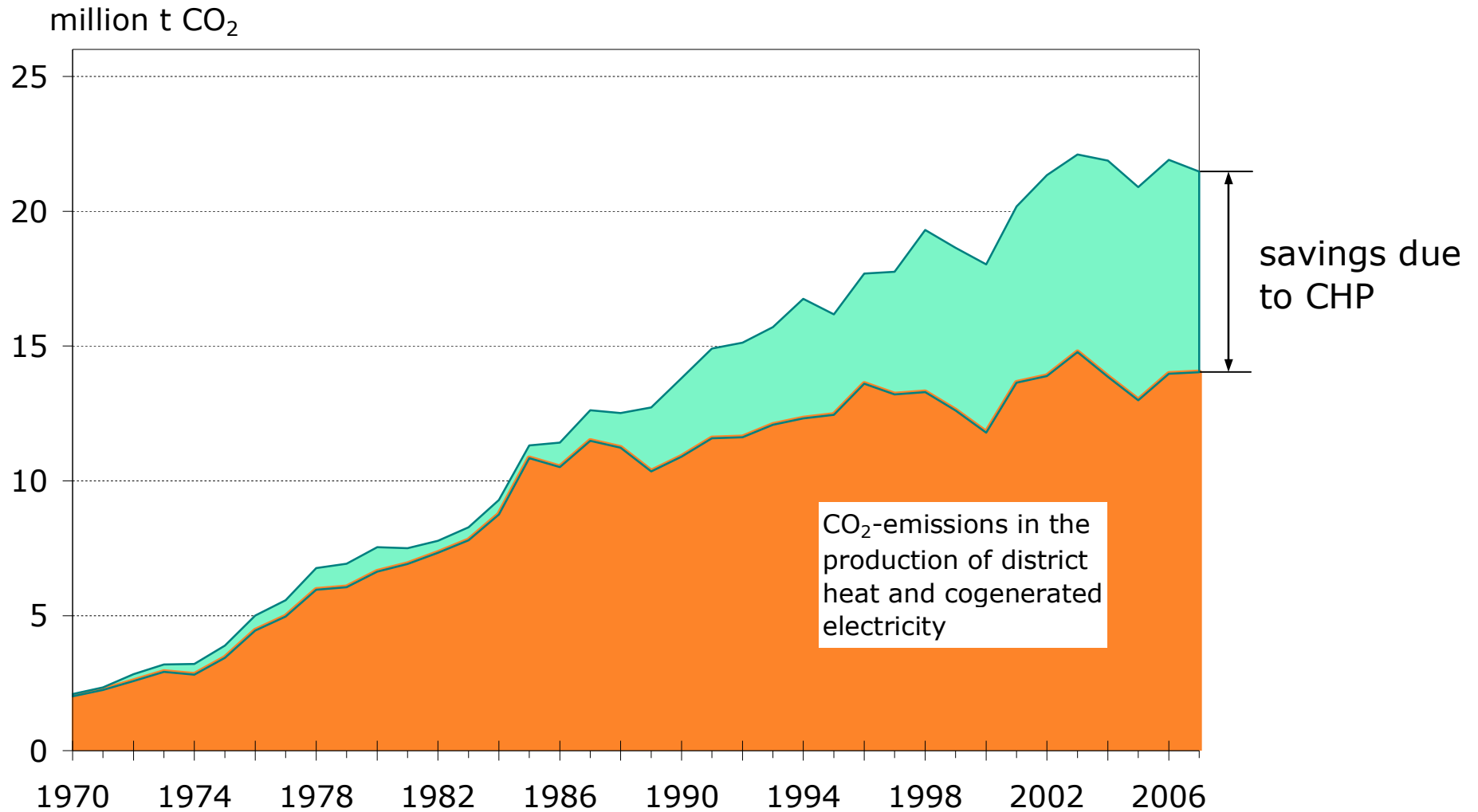


District heat production 2009

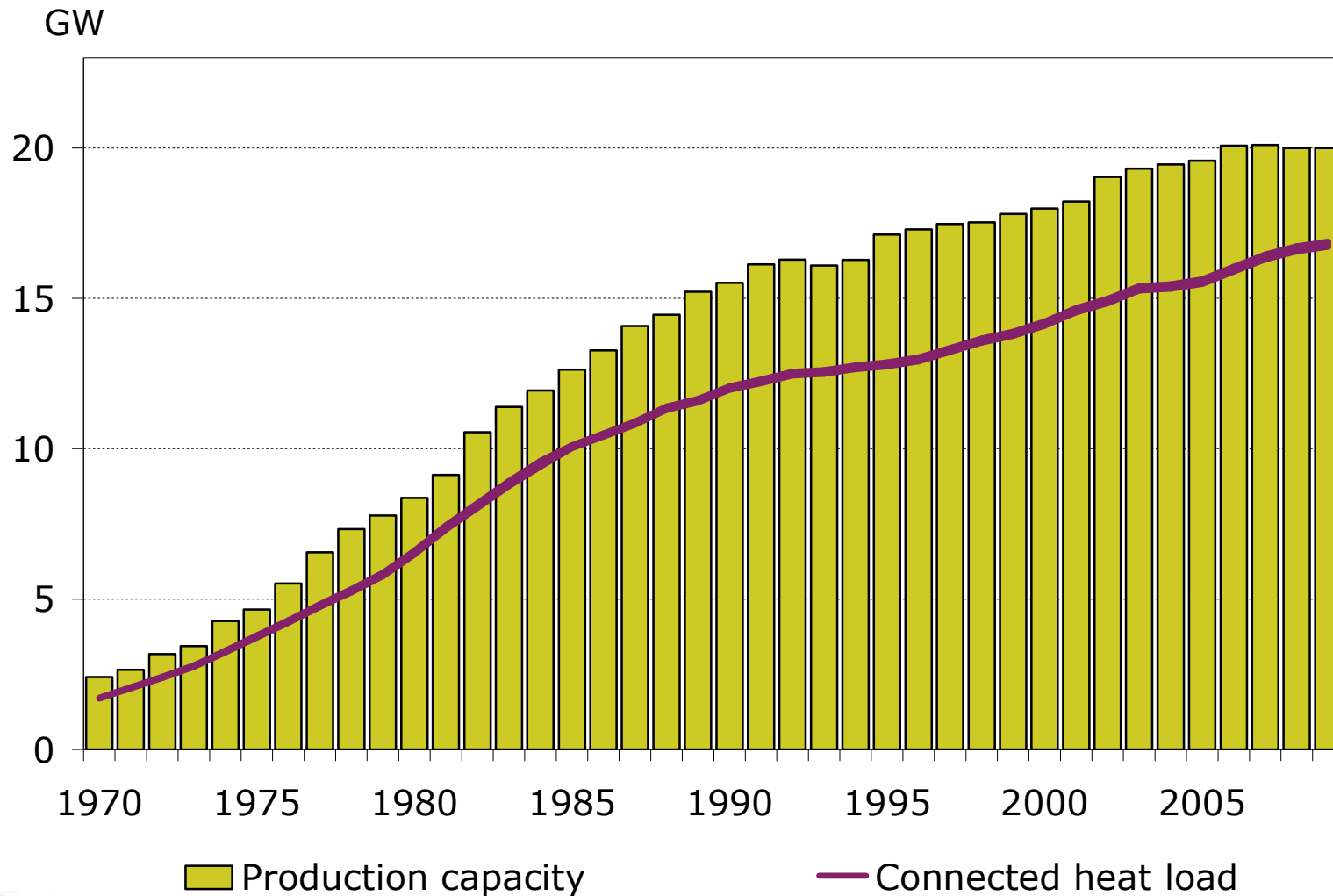
- All-time high 34,2 TWh



Savings in carbon dioxide emissions due to CHP

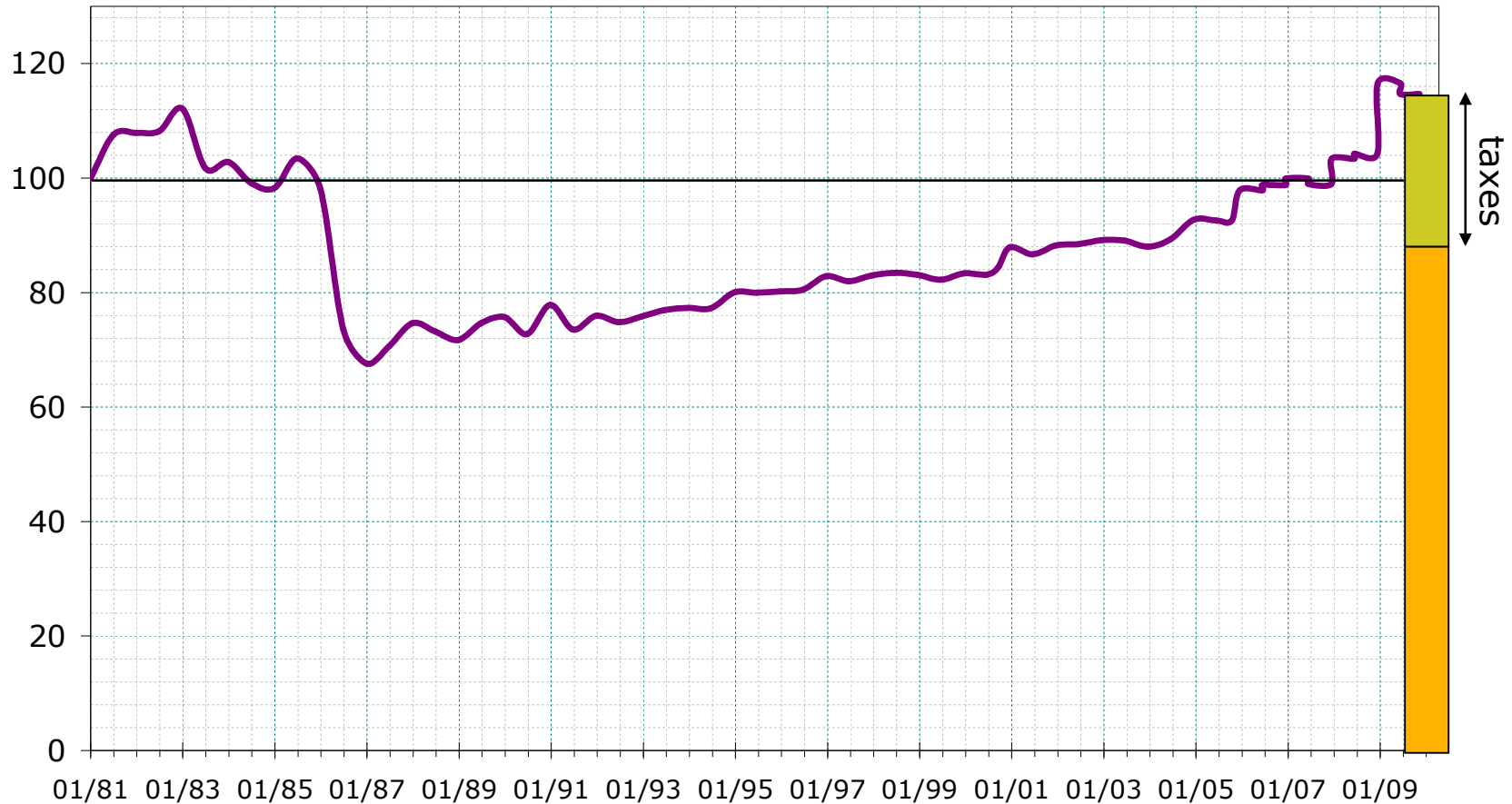


Production capacity of district heat and connected heat load of the customers



Real price of district heat

corrected with cost-of living index, 1.1.1981 = 100



— real price of district heat

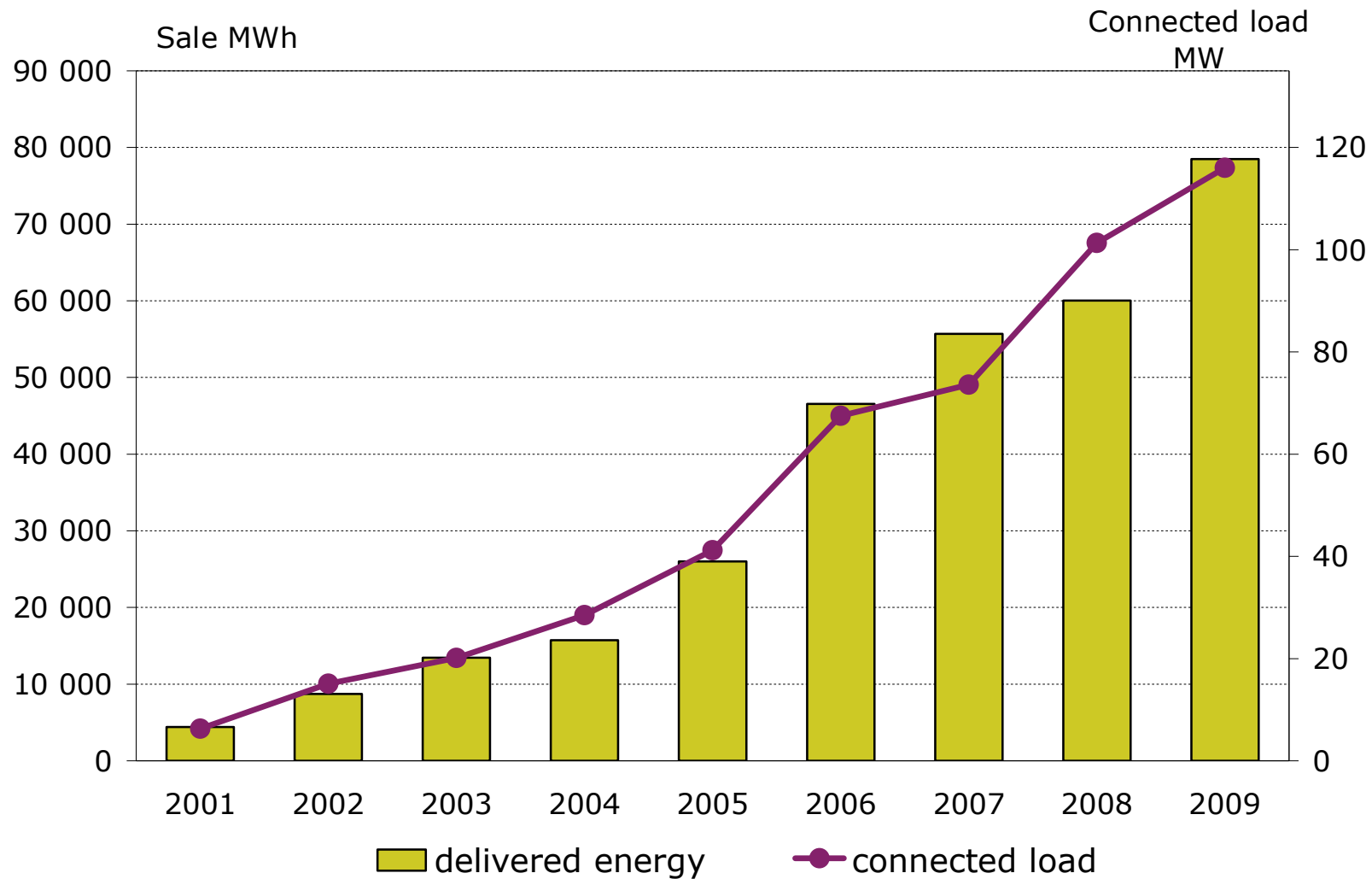
Share of the excise and value added taxes was 24% in the average price of district heat 2009



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Jari Kostama
7.5.2010
17

District cooling – delivered energy and connected heat load





Regulation of District Heating in Finland



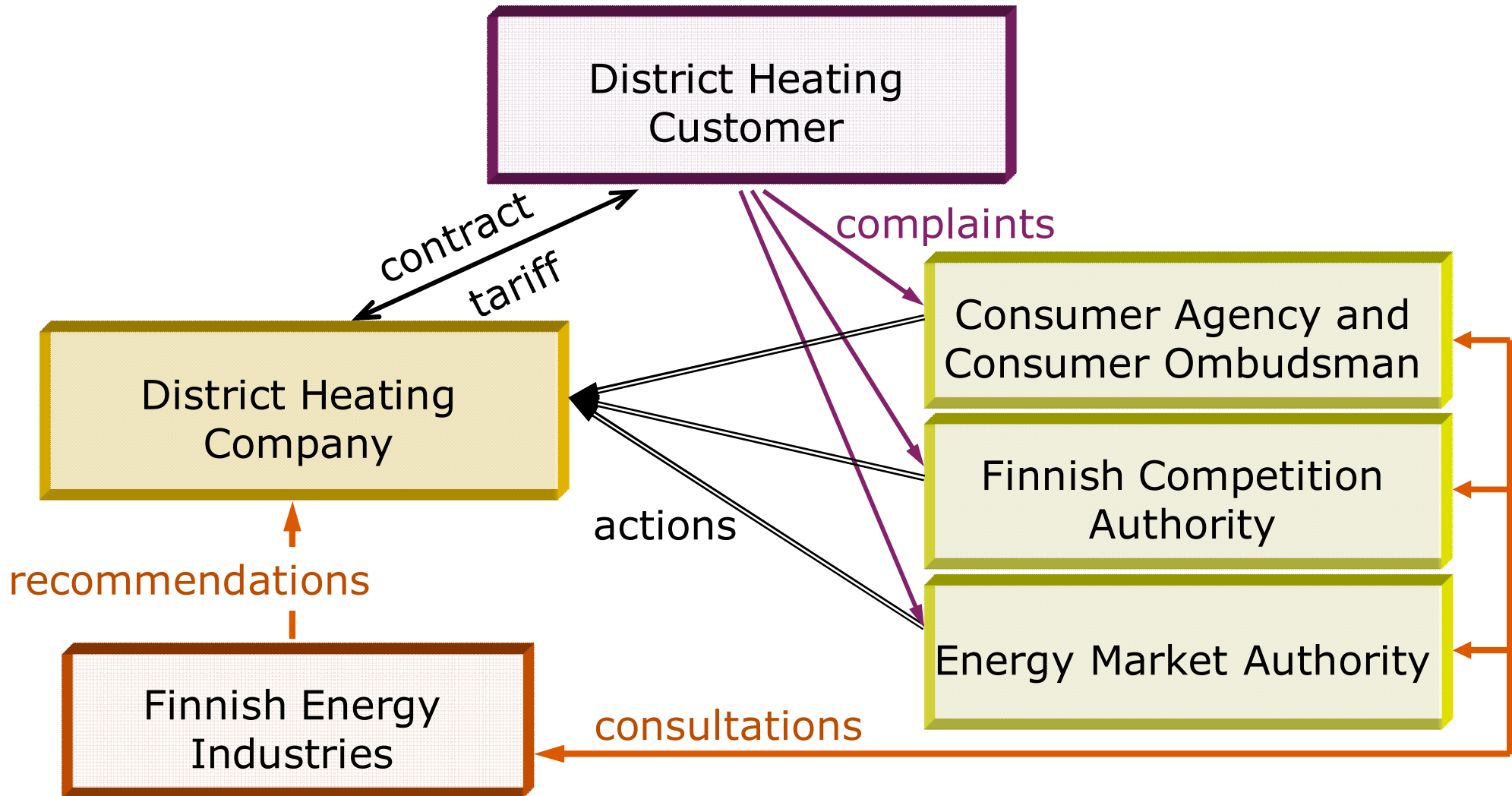
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Regulation of district heating

- No specific legislation for district heating
- Traditionally market-oriented approach, competition between different heating forms
- District heating companies are mainly supervised by general legislation like competition and consumer protection legislation, and related authorities
 - Exception: Act on Energy Services of Energy Companies (electricity, DH, fuels), supervised by Energy Market Authority
- The Finnish Competition Authority considers that DH companies are in so-called dominant market position towards their customers
 - o Competition legislation prohibits the misuse of the dominant market position

District heating in Finland

Relations Between Different Actors



Some requirements for a DH company, which is in dominant market position

- Price level of DH may not be excessive
- Price setting has to be sufficiently cost related and transparent
- It's not allowed to catch customers with a too favourable (dumping) product
- Same kind of customers must be treated in a same way
- If different products (heat, steam, electricity etc.) are delivered to the same customer, the product prices may not be artificially bound to each other
- Extra services, which are under competition, must be priced according their costs

How the DH companies have acted in the dominant market position?

- Price setting is transparent, same kind of customers have the same prices
- DH connection and sales terms of DH companies are mainly in accordance with the recommendation publication of the Finnish Energy Industries
- Average interruption time of DH delivery is only 1 hour per year per customer
- According the customer surveys DH customers are quite satisfied
- Finnish Competition Authority and consumer authorities get only 2-3 complaints annually



Challenges of today



Finnish Energy Industries

Key forces for change and their impact on the DH sector - Global level

| Key forces for change | Impact on the DH sector |
|---|---|
| <ul style="list-style-type: none">• Global actions to slow down climate change<ul style="list-style-type: none">- Post-Copenhagen • International market failures<ul style="list-style-type: none">- Commercial fuels- Raw materials- Finance market | <ul style="list-style-type: none">• Reducing carbon dioxide emissions<ul style="list-style-type: none">- Emission trading- Fuel switching • Increasing the security of supply<ul style="list-style-type: none">- Domestic fuels- Versatile fuel and supplier mix |

Key forces for change and their impact on the DH sector - European level

| Key forces for change | Impact on the DH sector |
|---|--|
| <ul style="list-style-type: none">• Increasing steering by the EU<ul style="list-style-type: none">- 20-20-20-10 in 2020 targets- Emission trading- Other emission reduction targets (IED, NEC) | <ul style="list-style-type: none">• Growing significance of international supervision of interests• Increasing the awareness of DHC and CHP• Reducing CO₂ emissions• Increasing the use of renewables• Achieving the energy efficiency targets• Forecasting and managing the impacts of emission trading• Reducing other emissions (e.g. NO_x, SO₂ and particulates) |

Key forces for change and their impact on the DH sector - National level

| Key forces for change | Impact on the DH sector |
|---|---|
| <ul style="list-style-type: none">• National targets in the climate and energy policy• Change in the social structure• Population changes | <ul style="list-style-type: none">• Increasing the awareness of DHC and CHP• Equal allocation of CO2 emission reductions to various sectors• Support for the production and use of renewables• Participating in energy efficiency agreements• Support for RTD and investments• Ensuring the availability of raw materials and goods• Influencing in urban planning• Development of expertise |



Strategic themes for DH sector

- Making DHC and CHP more visible
- More efficient use of primary energy sources
- Reinforcing the position of DH in densely built areas
- Active promotion of the use of renewable energy sources
- Development of the skills of the personnel of DH companies

Making DHC and CHP more visible

- Key interest groups:
 - DH is regarded as a good, reliable and safe form of heating.
 - On the other hand, DH is taken as a matter of course and is, in fact, not sufficiently well known.
- The drive for brightening the brand is to improve knowledge of the sector on both national and international level.
- The challenge is to raise the profile of DH in all interest groups, among politicians and the authorities, DH customers and end-users.
- Strengthening the co-operation with Euroheat & Power, Nordvärme and the IEA
- Continuation and Development of the Fair District Heating Quality Label system

More efficient use of primary energy sources

- Raising the profile of DHC and CHP as energy-efficient solutions
- Promotion of the introduction of primary energy assessments
- Growth of the use of surplus heat of the industry
- Active participation in the energy efficiency agreement system and its development
- Stopping the use of electric heating in houses connected to DH network
- Promotion of the technology development in metering data and remote reading systems

Reinforcing the position of DH in densely built areas

- Ensuring DH in densely built areas as the primary heating alternative
- Development of DH technology and creation of clear and transparent DH pricing models, which enable the success of DH also in more energy-efficient buildings and a warmer climate
- Growth of the use of DH in new and old areas of detached houses in a profitable way
- Influencing the planning for the preference of sufficiently dense construction
- To build regional networks in district heating in order to expand district heating operations
- Development of ancillary services related to district heating

Active promotion of the use of renewable energy sources

- Recognition of the potential and potential uses of various sources of renewable energy and giving preference to them whenever it is sensible for the DH company
- Promotion of the development and introduction of new technology and the development of the entire bioenergy procurement chain
- Safeguarding the position of peat as a fuel for DH
- However, for the security of supply reasons, it's still important to maintain the possibility of using coal and oil in DH production

Development of the skills of the personnel of DH companies

- Improvement of the image of the DH sector and increasing the awareness of the field
- Development of models and methods to support co-operation between DH companies and colleges
- Establishment of the manpower and competence needs in the DH sector
- Influencing the vocational qualifications and decision-making in education policy

Vision 2050

Energy use in buildings / Role of DHC

- Building codes decrease specific heat demand of buildings substantially
- Need for heating energy will diminish by 30 per cent by 2050
- DH will substitute oil heating in densely populated areas, heat pumps will do the same in sparsely populated areas
- Demand for DH is 25-33 TWh 2050 (2007: 31 TWh).
- DH's market share of space heating will be close to 60 %
- DC will become general in cities

Energy production in Finland 2050 ¹⁽²⁾

- Use of fossil fuels decreased
 - Carbon capture utilised – some CHP plants are even carbon sinks
 - Natural gas in towns and industry
- Peat still important
- CO₂ free energy production increased
 - More wood based fuels
 - More hydropower for balancing
 - Very much more wind energy
 - Nuclear district heat is an option

Energy production in Finland 2050 2(2)

- More distributed generation
 - Energy production integrated to the buildings, small-scale combined heat and power
- Power generation in CHP 25–30 TWh, nowadays 27 TWh
 - Follows demand for district heating and industrial steam
 - The share of combined heat and power increased in district heat production 75 % -> 85
 - Plants are flexible regarding fuels and energy production
 - Share of bioenergy will increase considerably
 - Power-to-heat ratios higher than today

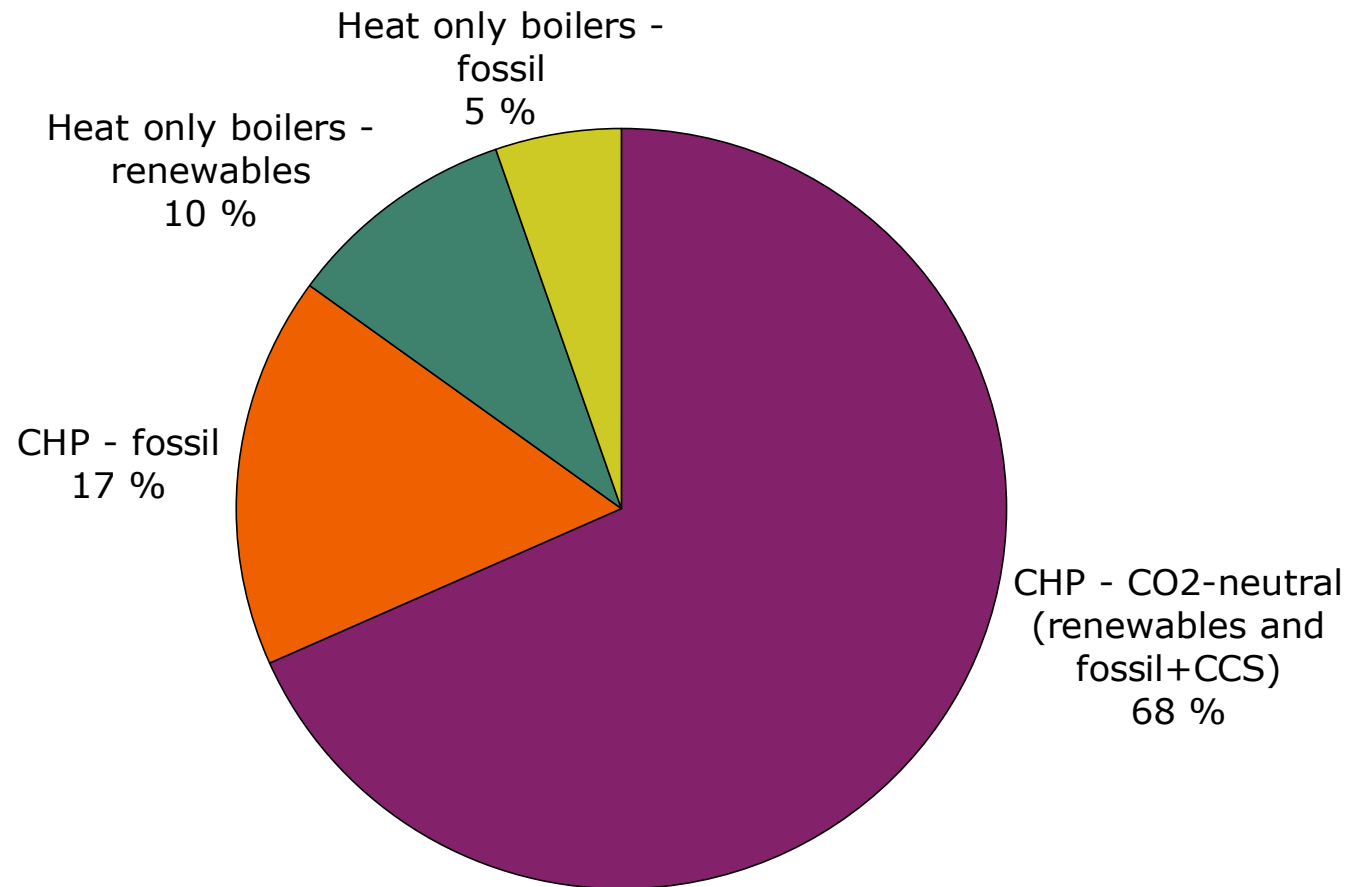
Carbon neutral energy production

- Emissions for power generation and production of district heat 5–7 Mt CO₂, now 30 Mt CO₂
- Production of electricity and district heat grows 40 %
 - Emissions from power generation
280 g/kWh => 30–40 g/kWh
 - Emissions from district heat 220 g/kWh => 25 g/kWh

Fossil fuels replaced by district heat and electricity

- Electricity and district heat will replace fossil fuels and reduce emissions
 - Traffic: -8 million tons
 - Heating: -3 million tons
 - Industry: -1 million tons
- Import of electricity replaced by minor export
 - - 6 million tons
- Altogether -18 million tons CO₂

District heat production in Finland 2050





Thank You!