

# District Heating, District Cooling & CHP in Finland

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11.5.2010



Finnish Energy Industries

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- Statistics
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# Finnish Energy Industries



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# Finnish Energy Industries

- 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.

# Finnish Energy Industries

- 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



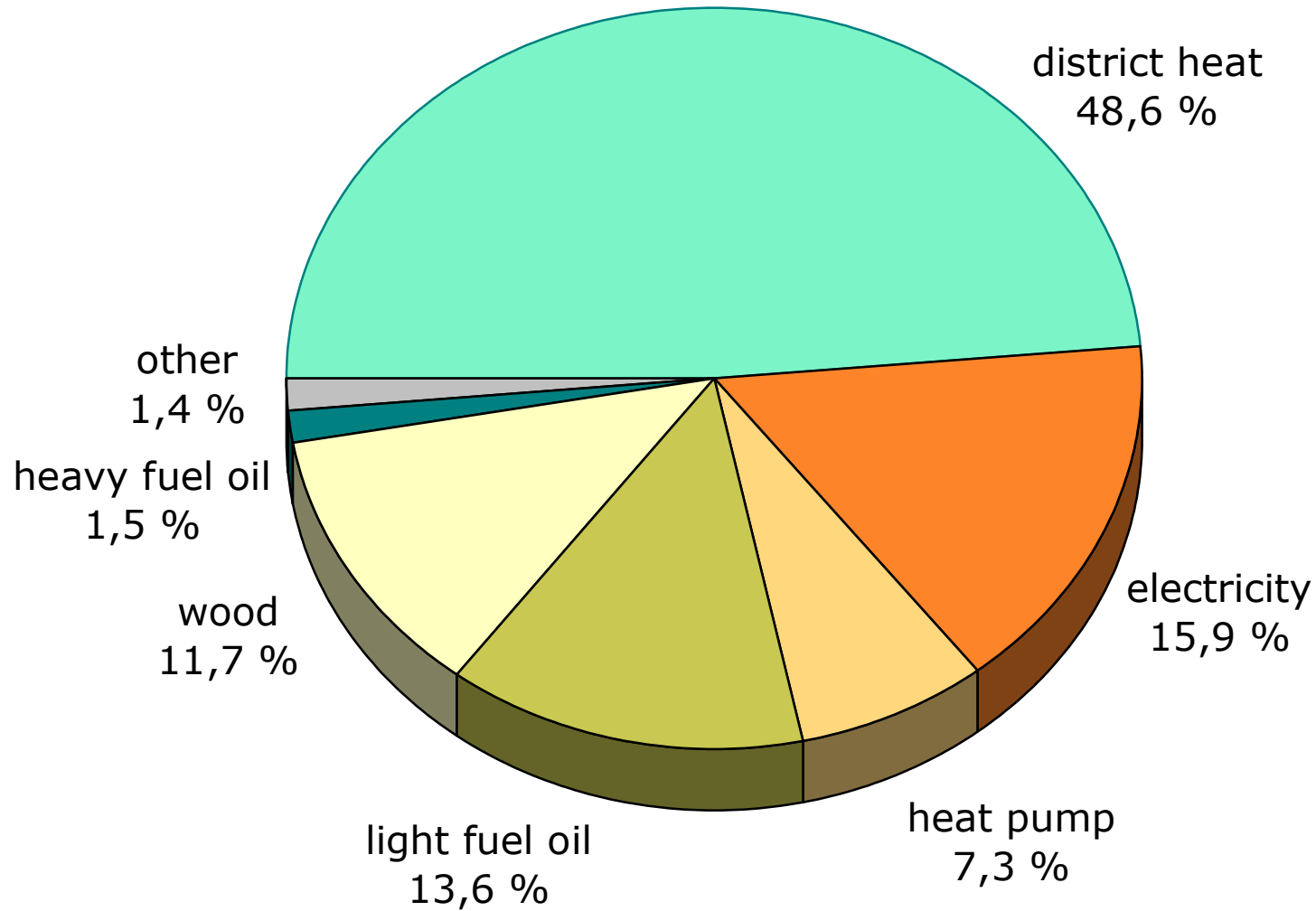
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# District heating and cooling in Finland 2009

- 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)

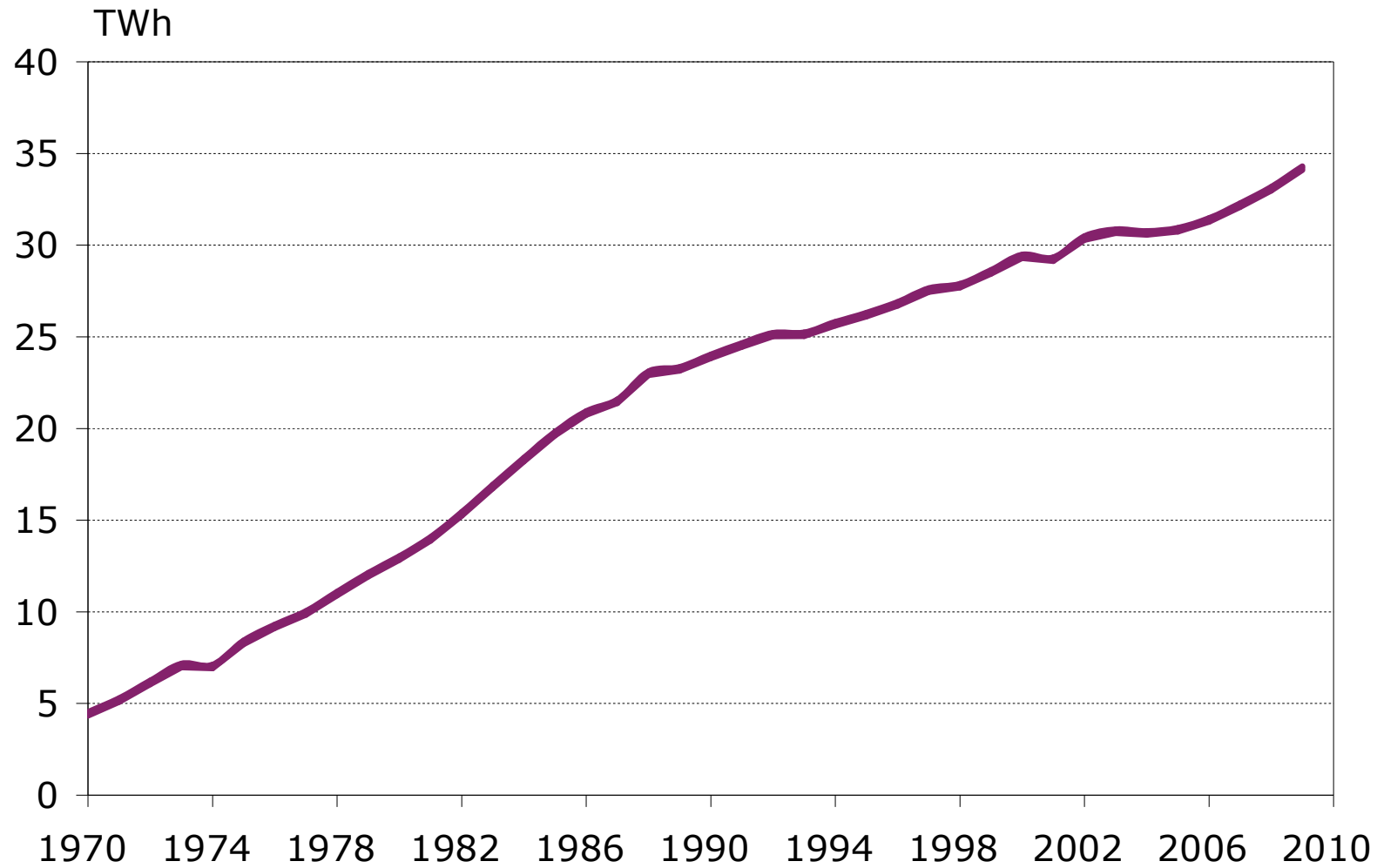
# Market share of space heating v. 2007

Source: Statistics Finland

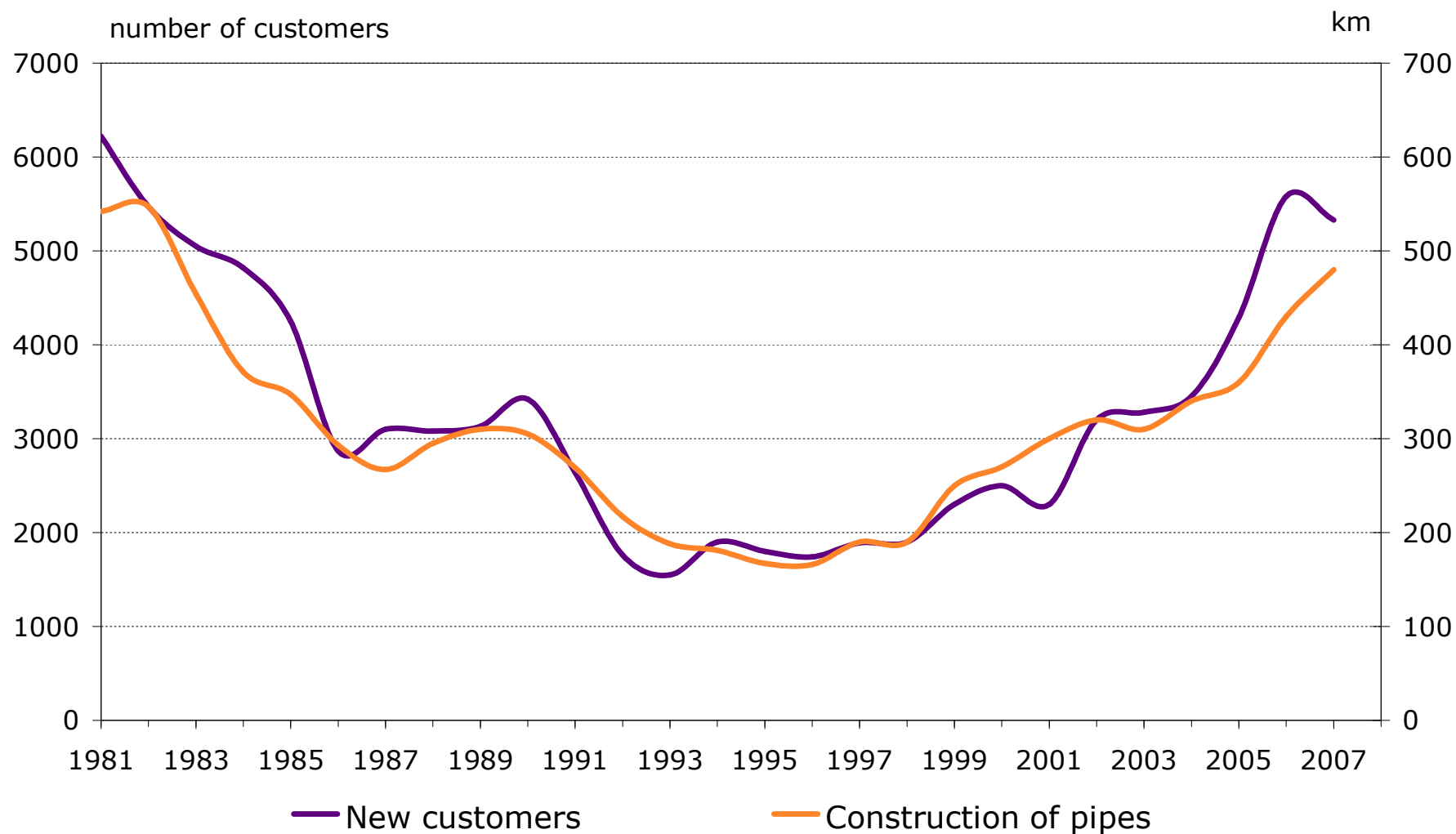




# Temperature corrected district heat consumption, TWh



## New customers connected to district heating and construction of new pipelines



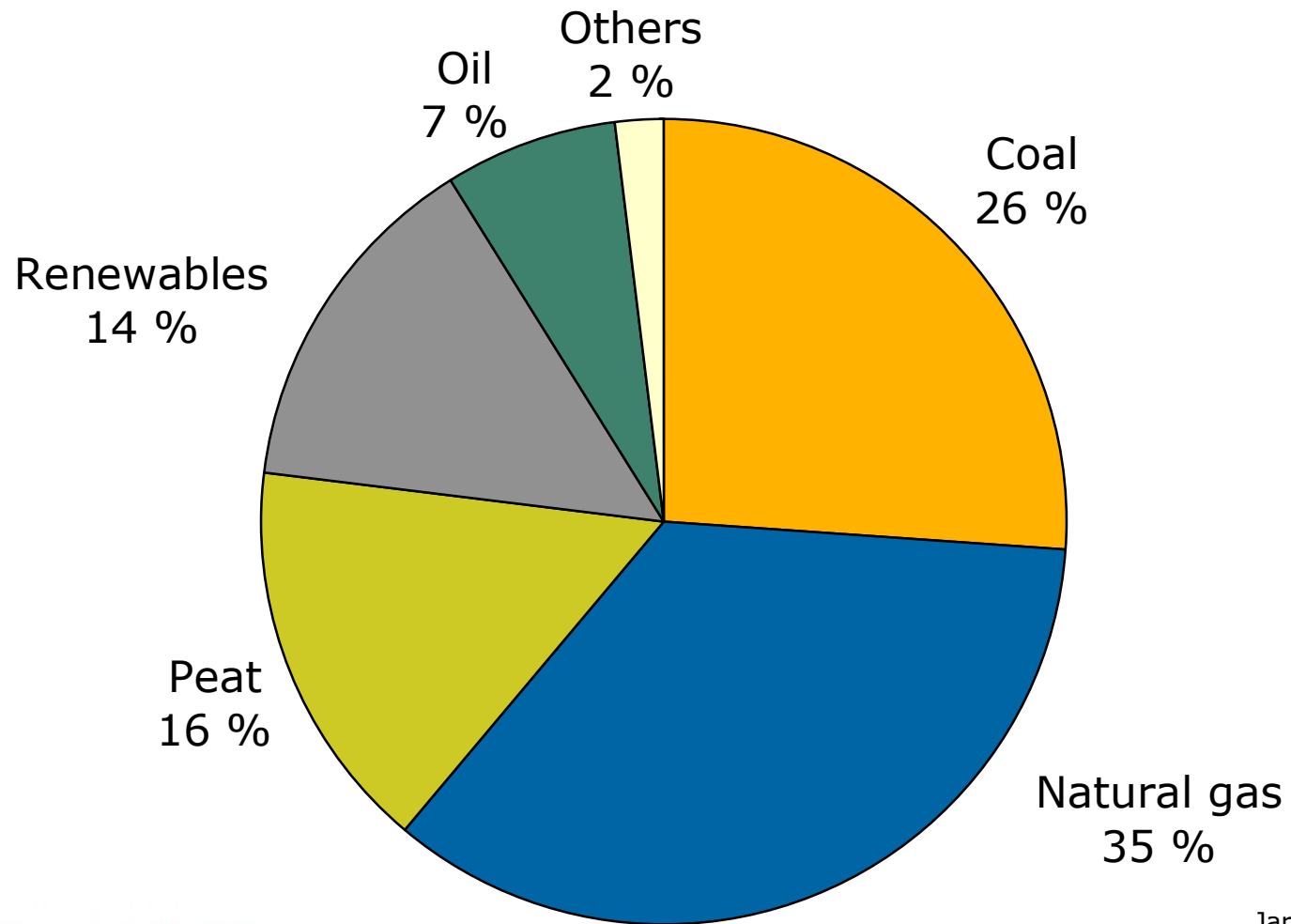
# District heating customers 2008

- 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)

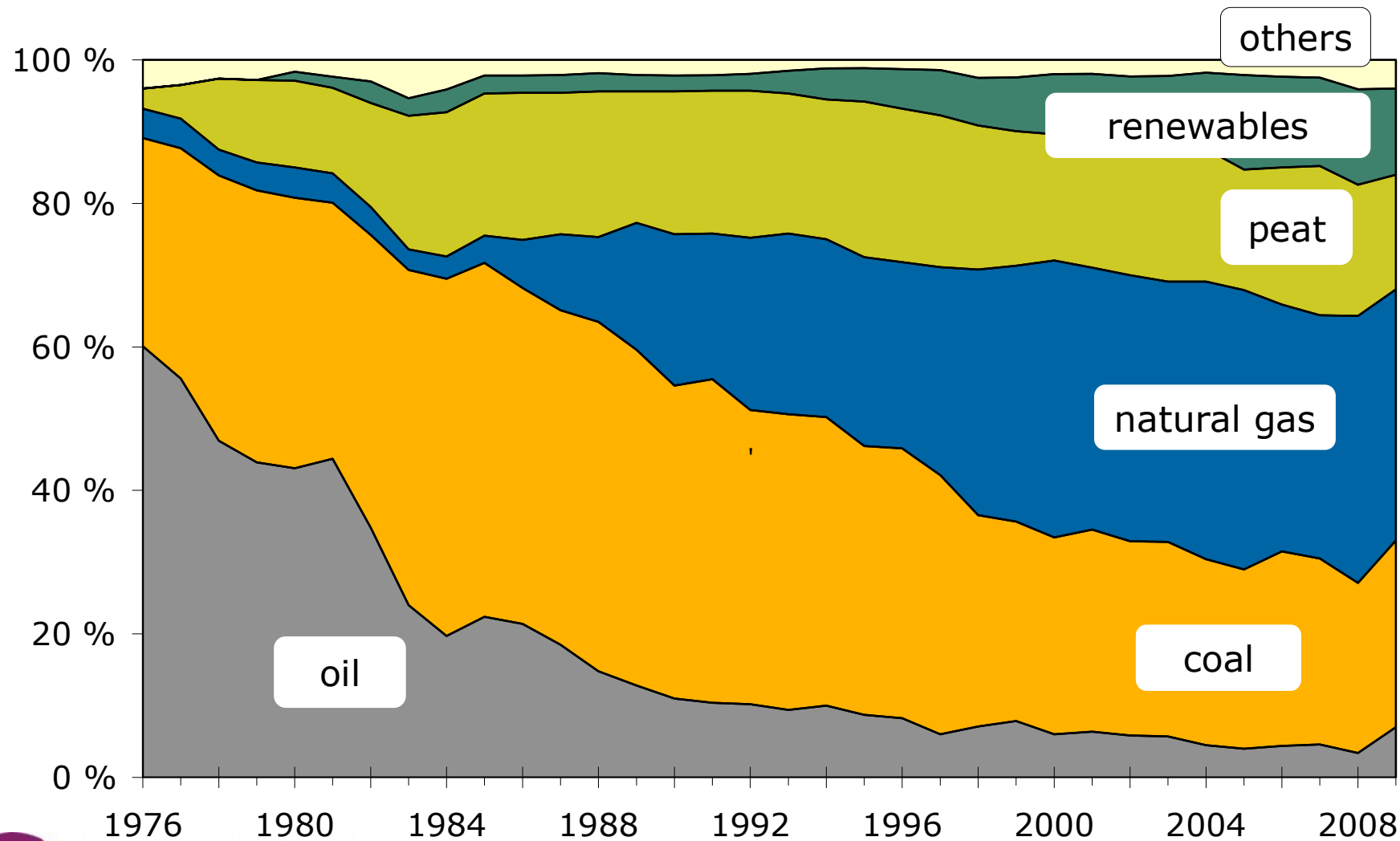
o Single family houses	15 %	(16 %)
o Apartment houses	98 %	(98 %)
o Office buildings	95 %	(97 %)
o Commercial buildings	86 %	(85 %)
o Industrial buildings	57 %	(58 %)

# Fuel consumption in production of district heat and CHP 2009

- fuel consumption 57,8 TWh

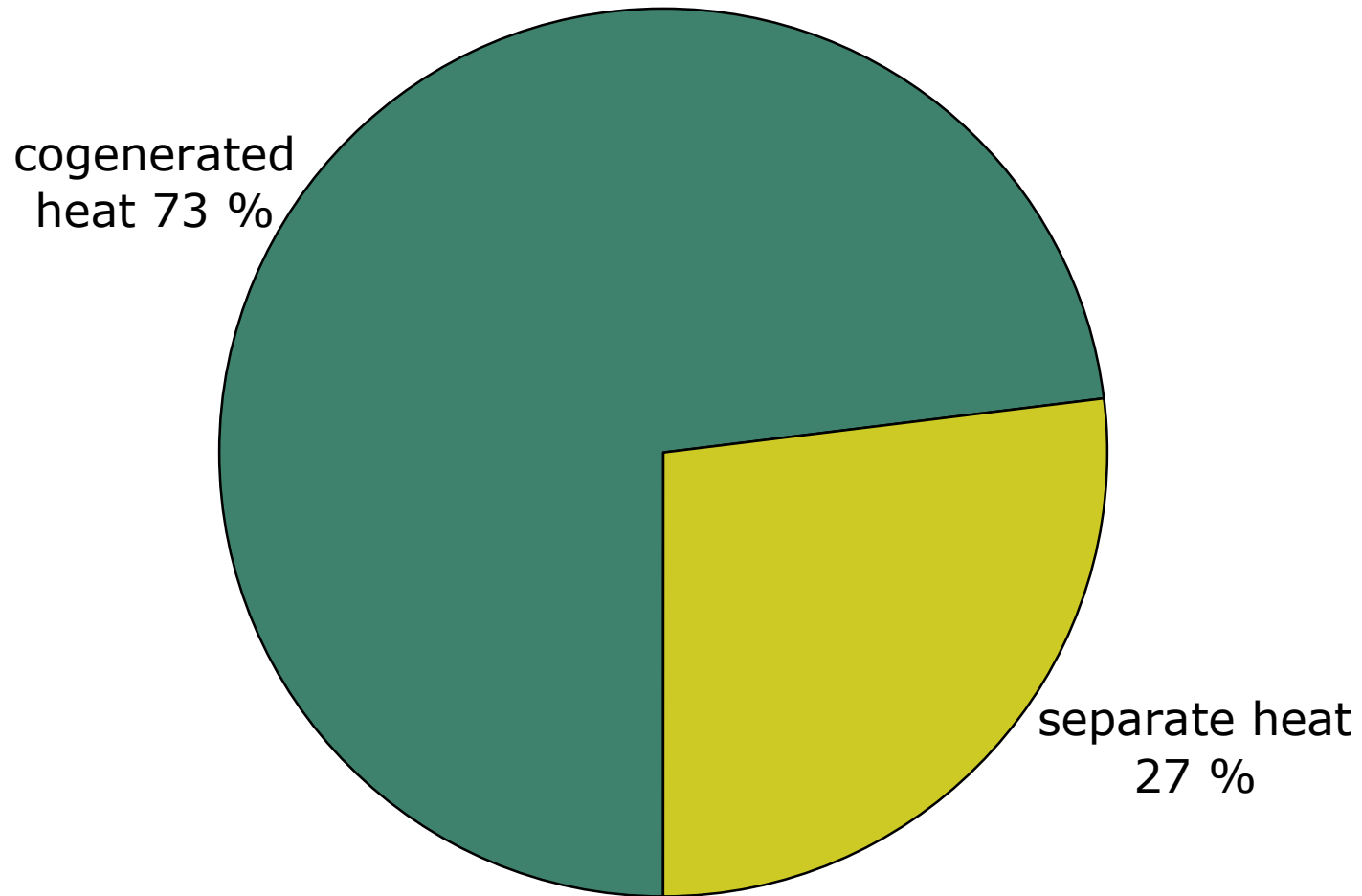


# Fuel consumption in production of district heat and CHP

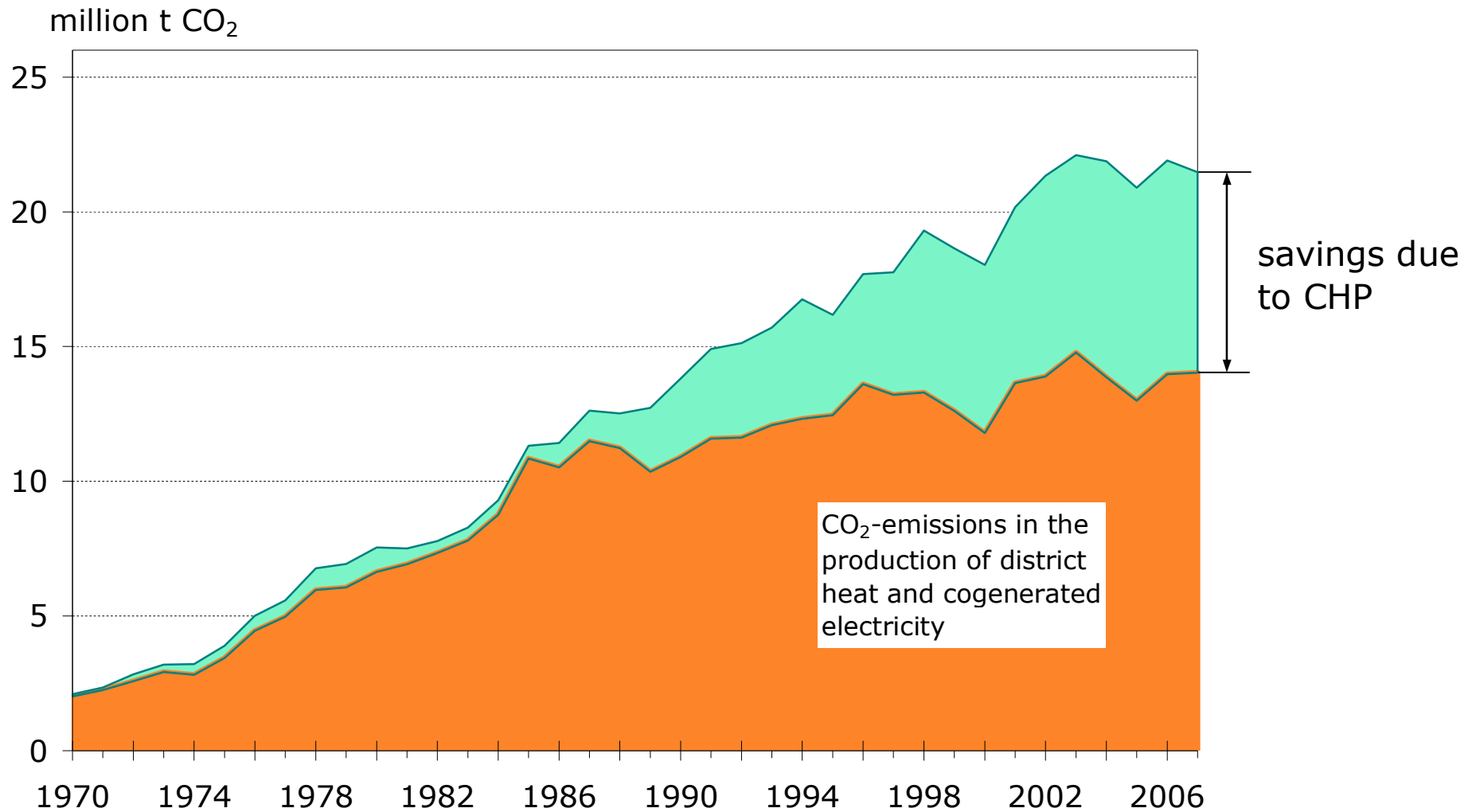


# District heat production 2009

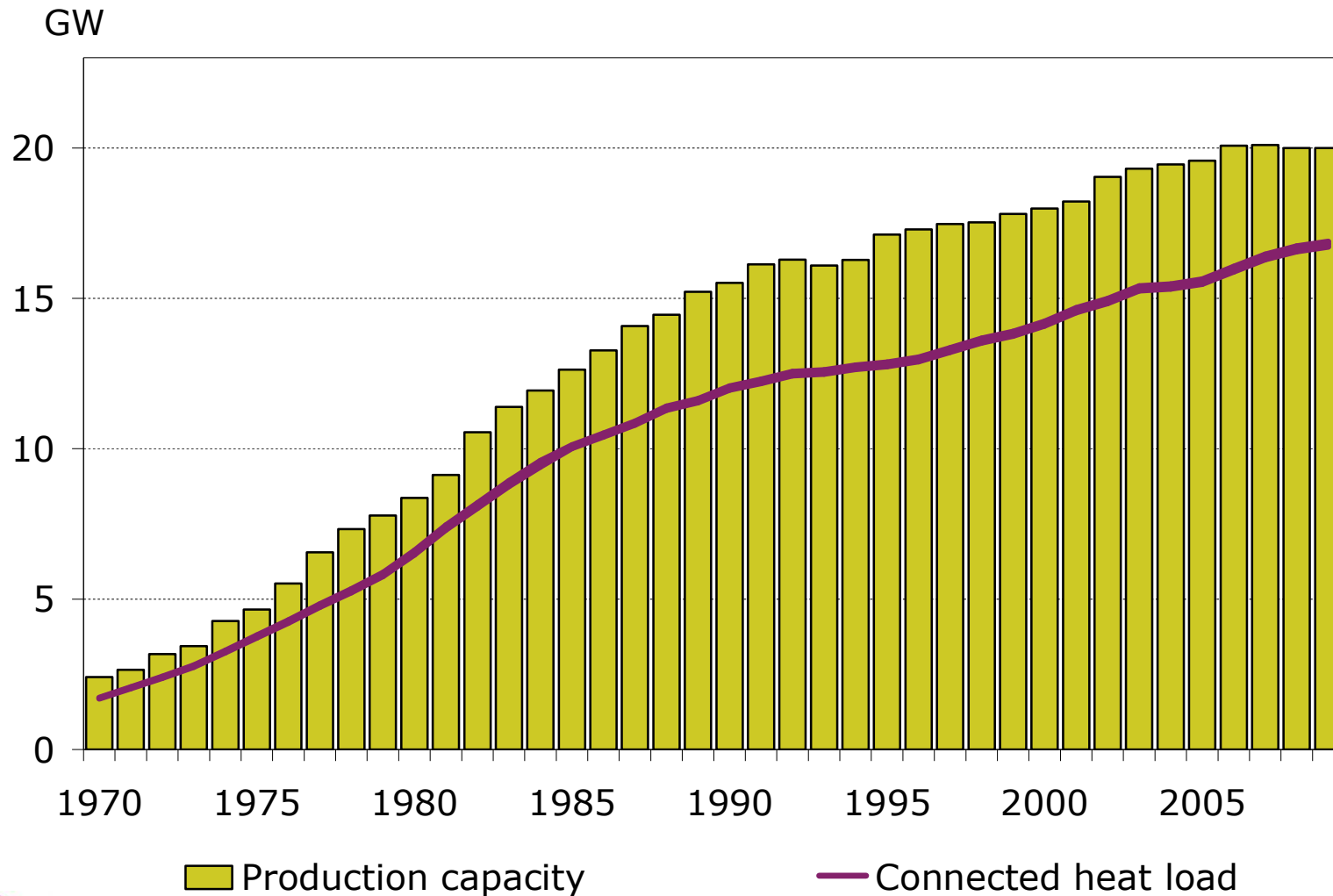
- All-time high 34,2 TWh



# Savings in carbon dioxide emissions due to CHP



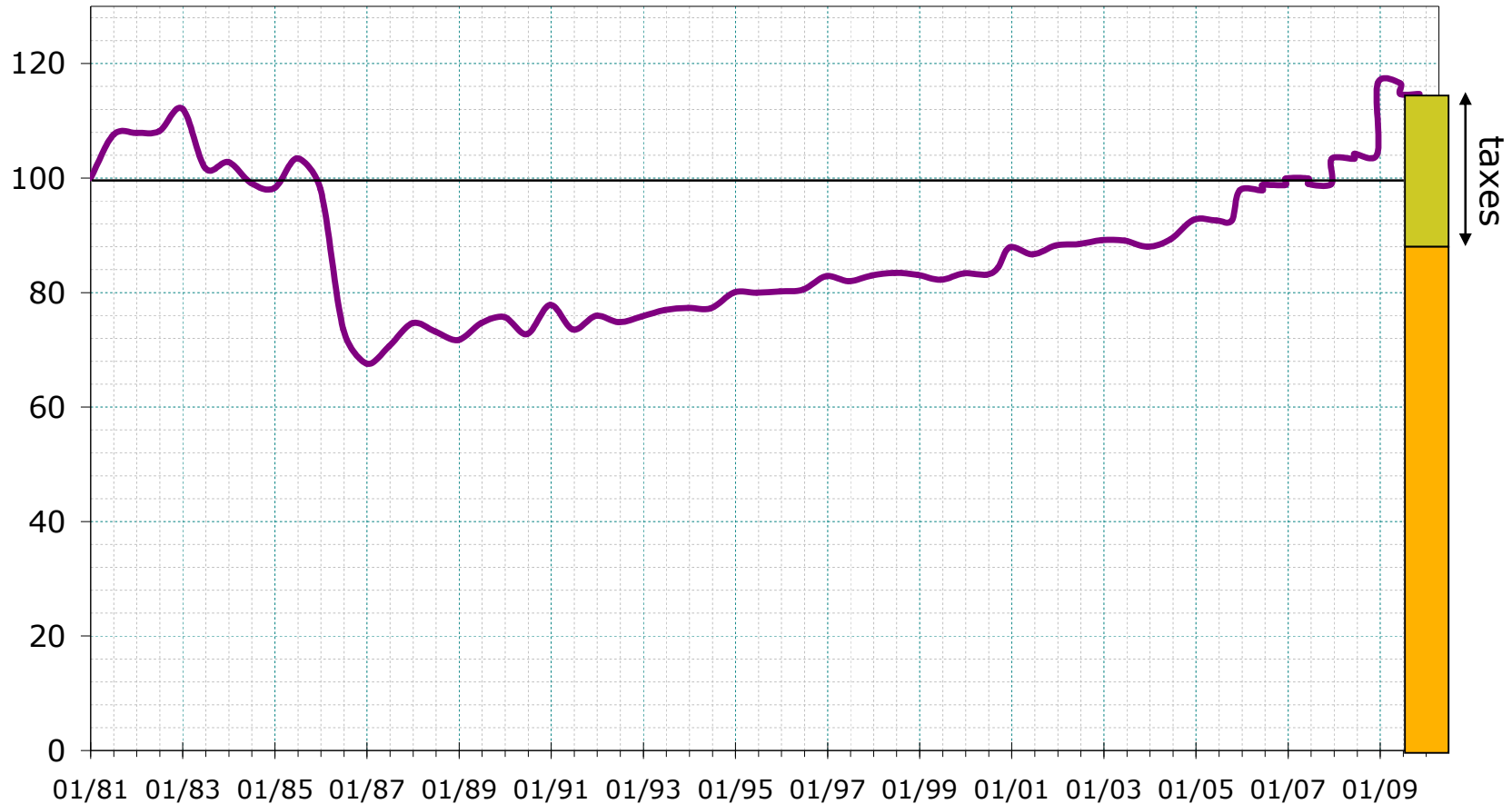
# Production capacity of district heat and connected heat load of the customers





# Real price of district heat

corrected with cost-of living index, 1.1.1981 = 100



— real price of district heat

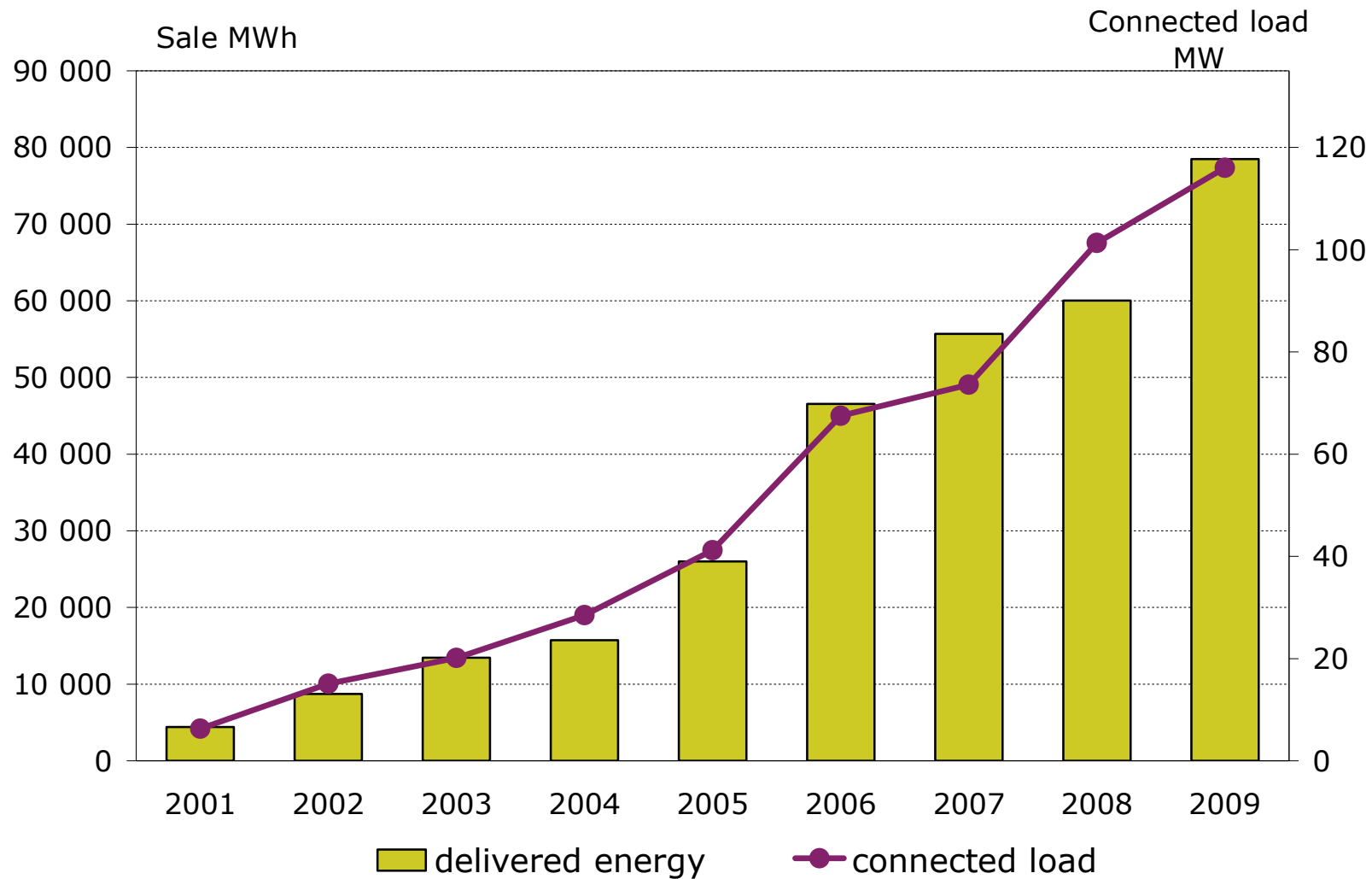
Share of the excise and value added taxes was 24% in the average price of district heat 2009



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7.5.2010  
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# District cooling – delivered energy and connected heat load





# Regulation of District Heating in Finland



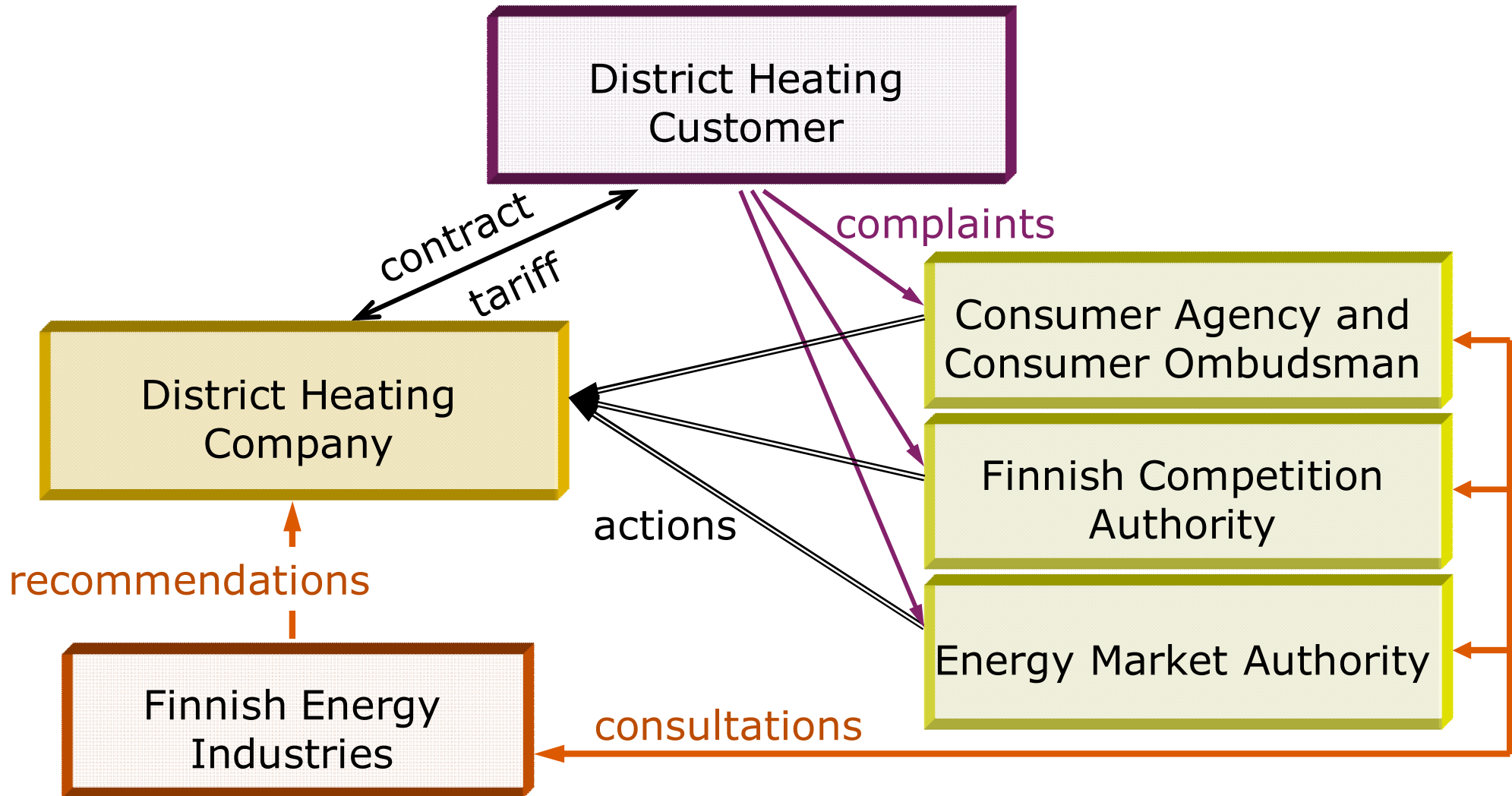
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# Regulation of district heating

- 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



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

# 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"><li>• Increasing steering by the EU<ul style="list-style-type: none"><li>- 20-20-20-10 in 2020 targets</li><li>- Emission trading</li><li>- Other emission reduction targets (IED, NEC)</li></ul></li></ul>	<ul style="list-style-type: none"><li>• Growing significance of international supervision of interests</li><li>• Increasing the awareness of DHC and CHP</li><li>• Reducing CO<sub>2</sub> emissions</li><li>• Increasing the use of renewables</li><li>• Achieving the energy efficiency targets</li><li>• Forecasting and managing the impacts of emission trading</li><li>• Reducing other emissions (e.g. NO<sub>x</sub>, SO<sub>2</sub> and particulates)</li></ul>

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



# 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 <sup>1(2)</sup>

- Use of fossil fuels decreased
  - Carbon capture utilised – some CHP plants are even carbon sinks
  - Natural gas in towns and industry
- Peat still important
- CO<sub>2</sub> 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

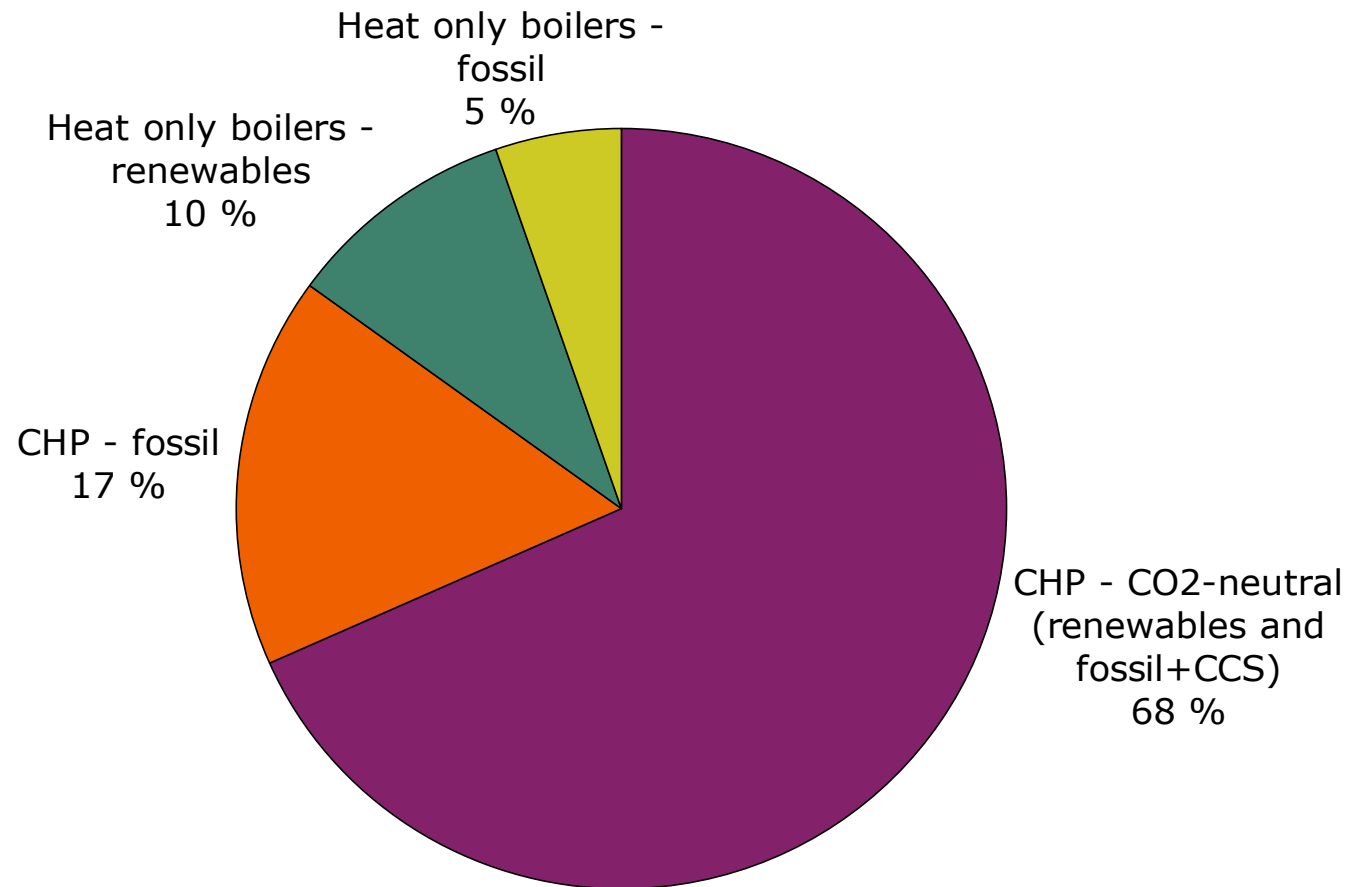
# Carbon neutral energy production

- Emissions for power generation and production of district heat 5–7 Mt CO<sub>2</sub>, now 30 Mt CO<sub>2</sub>
- 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 CO<sub>2</sub>

# District heat production in Finland 2050







Thank You!



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