

Low Carbon District Heating in Sweden

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District Heating (DH) in Sweden, 2008

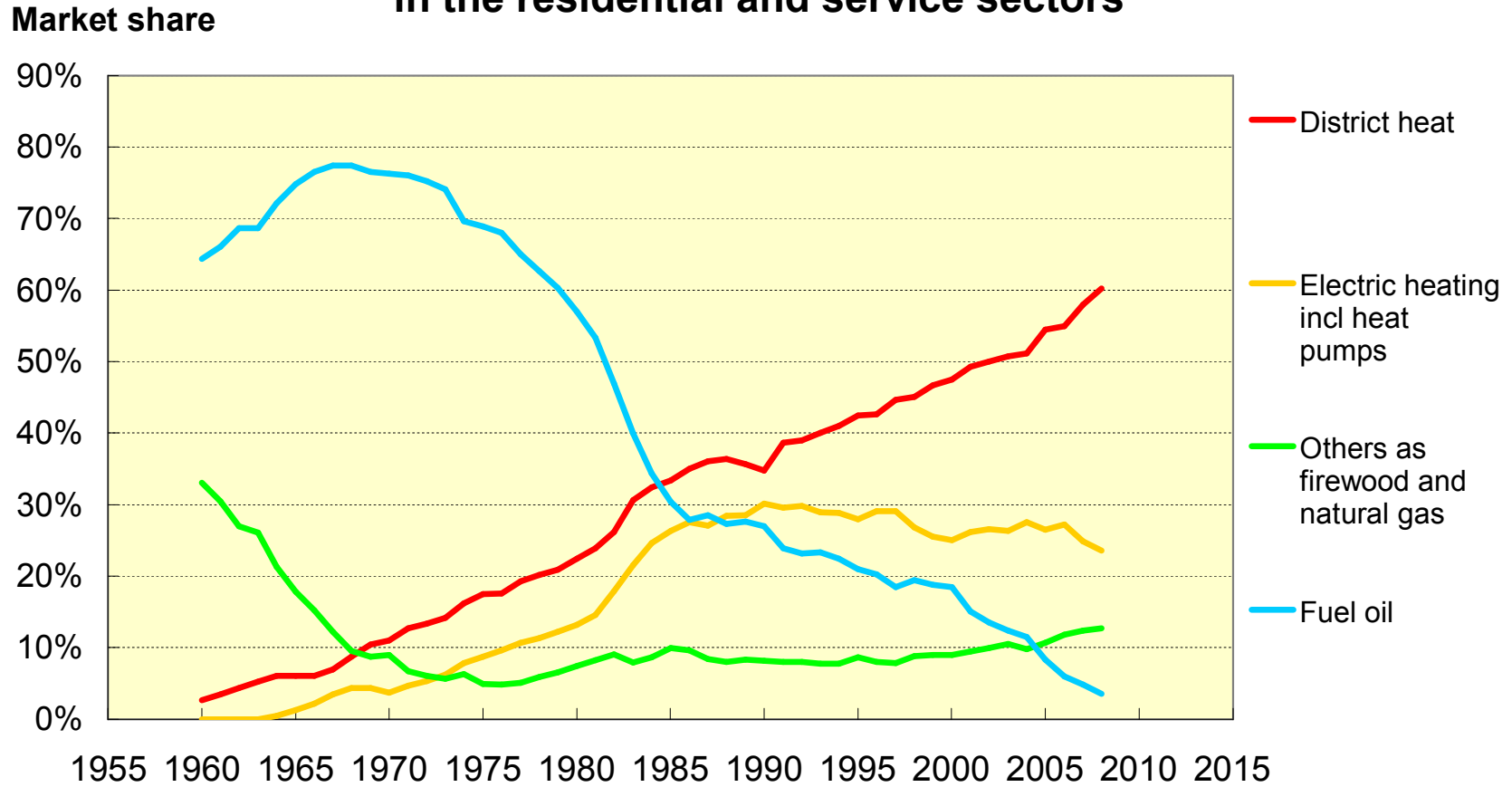
- 60 % market share for residential and service sector buildings
- 140 DH companies deliver heat from 540 urban-wide networks in 220 municipalities
- Only 39 % of derived DH from combined heat and power, CHP
- No specific national CHP or DH policy
- 1st District Heating Law since July 1, 2008
- Almost no municipal energy planning or zoning
- About the same level of specific heat demands as in Poland, Germany, Hungary, Austria, Belgium, United Kingdom, and France.

Topics to discuss

1. Heat demands
2. Decarbonisation 1980-2008
3. Current issues
4. Conclusions

1. Heat demands: Development of heat market shares

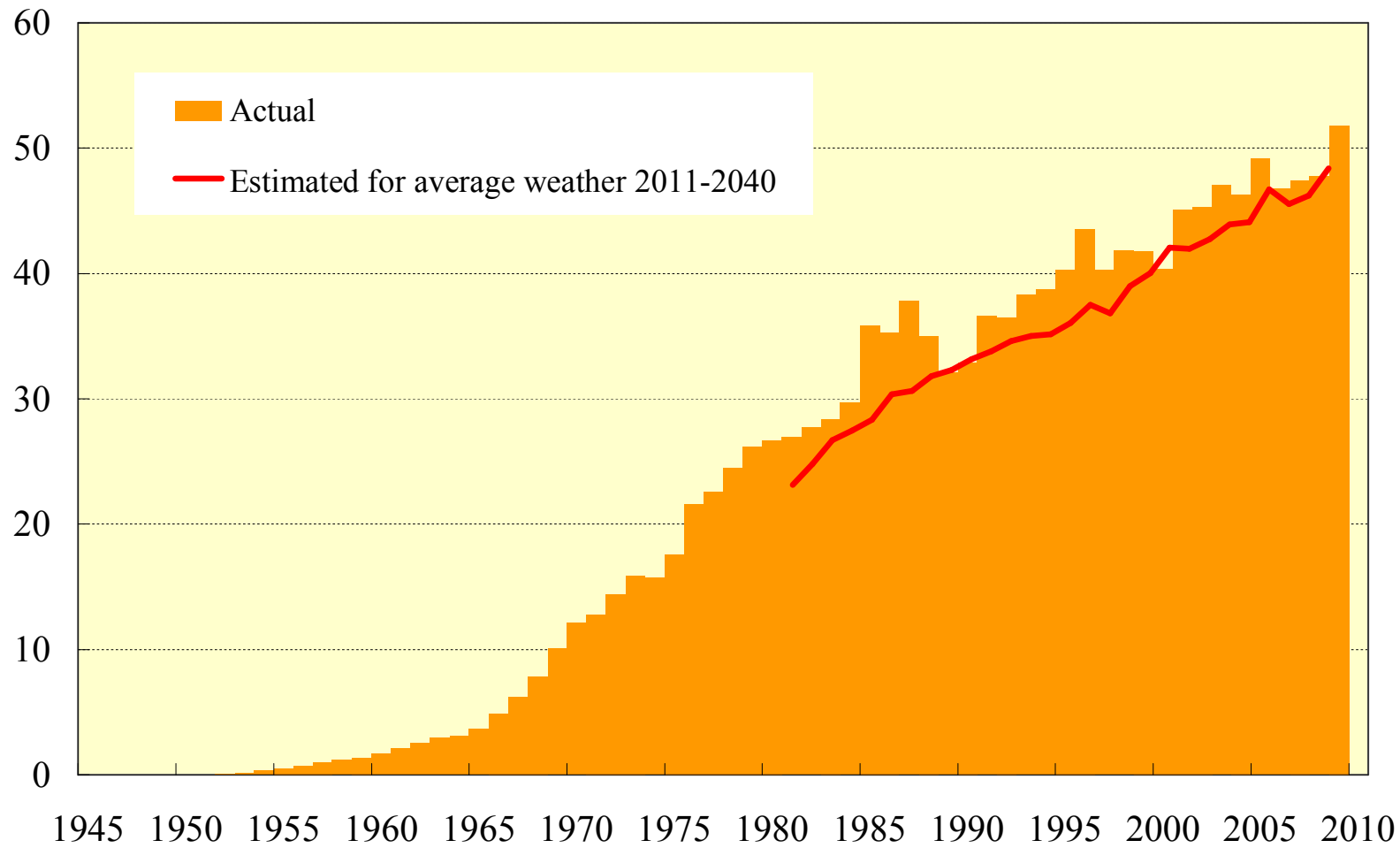
The Swedish heat market for buildings in the residential and service sectors



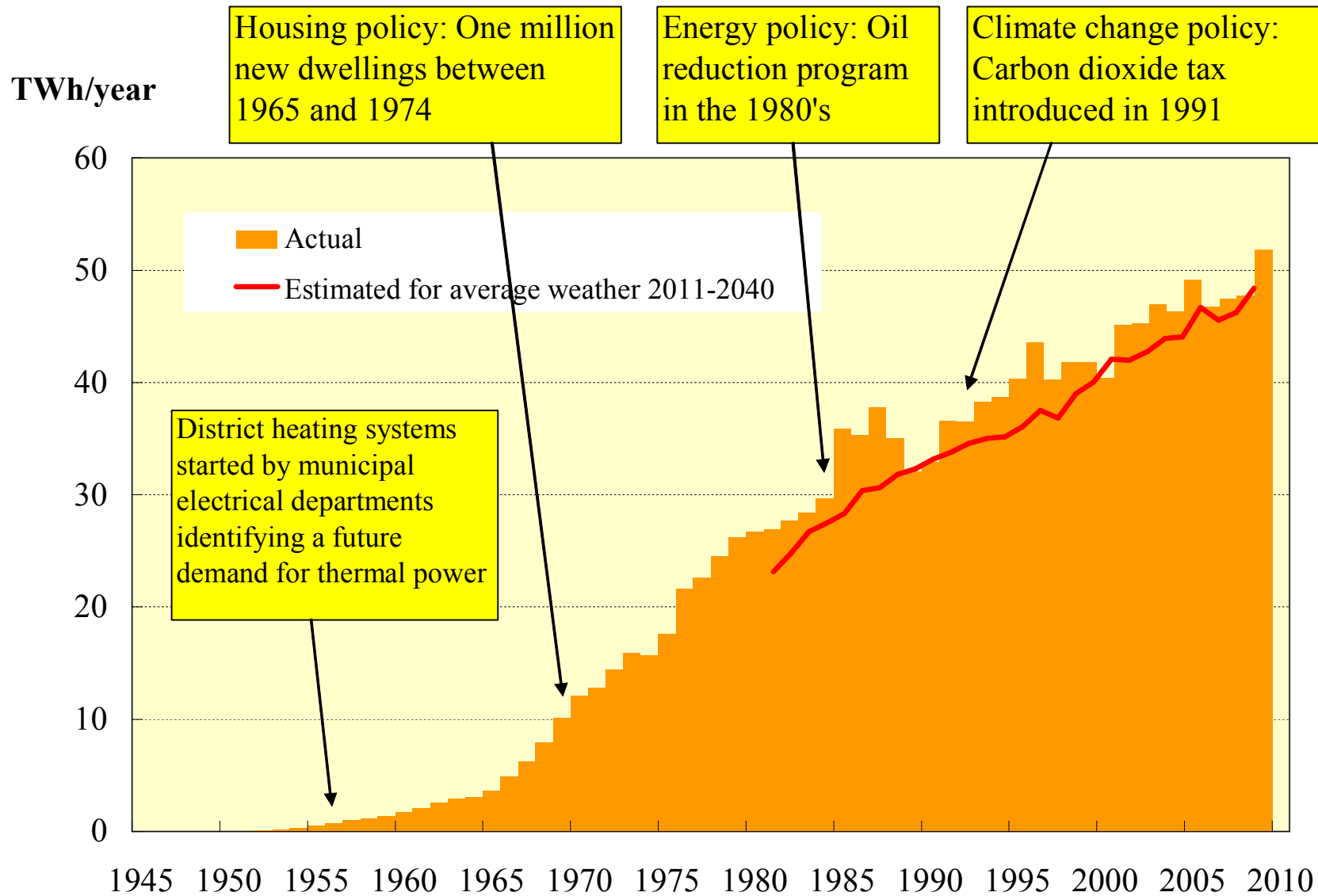
1. Heat Demands: Development of district heat deliveries

Sweden: District heat deliveries

TWh/year

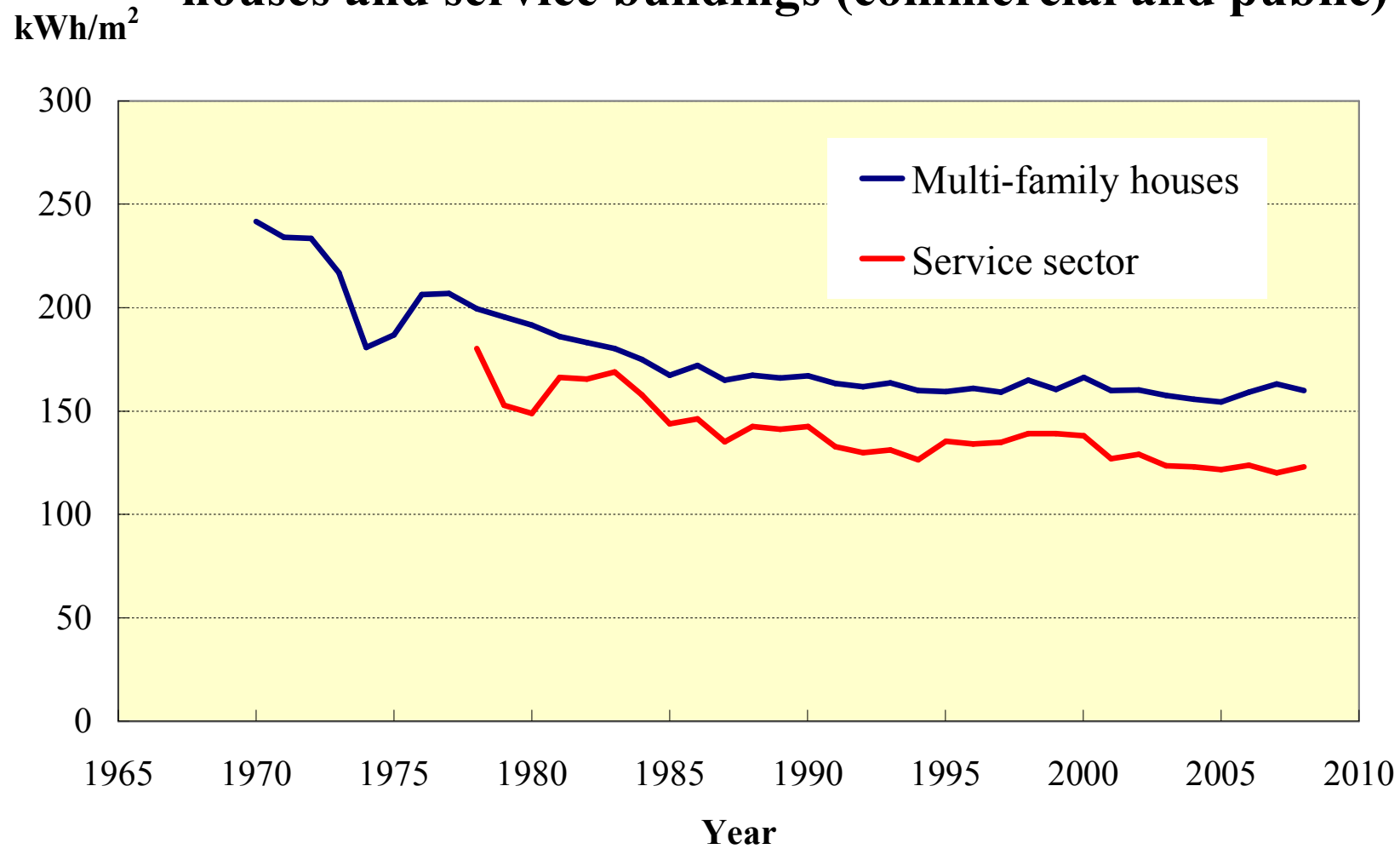


1. Heat demands: Development of district heat deliveries: Four driving forces

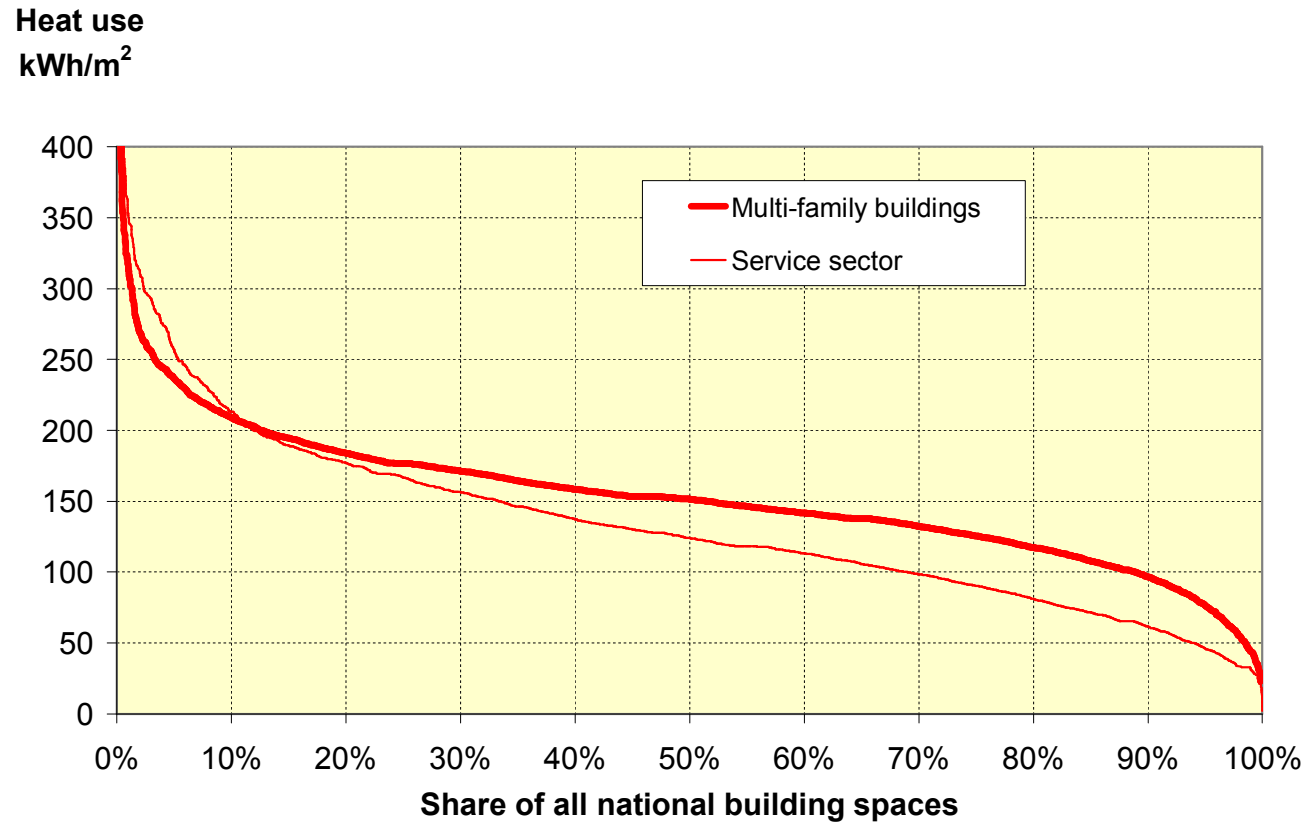


1. Heat demands: Specific heat demands

Sweden: Specific district heat demands in multi-family houses and service buildings (commercial and public)



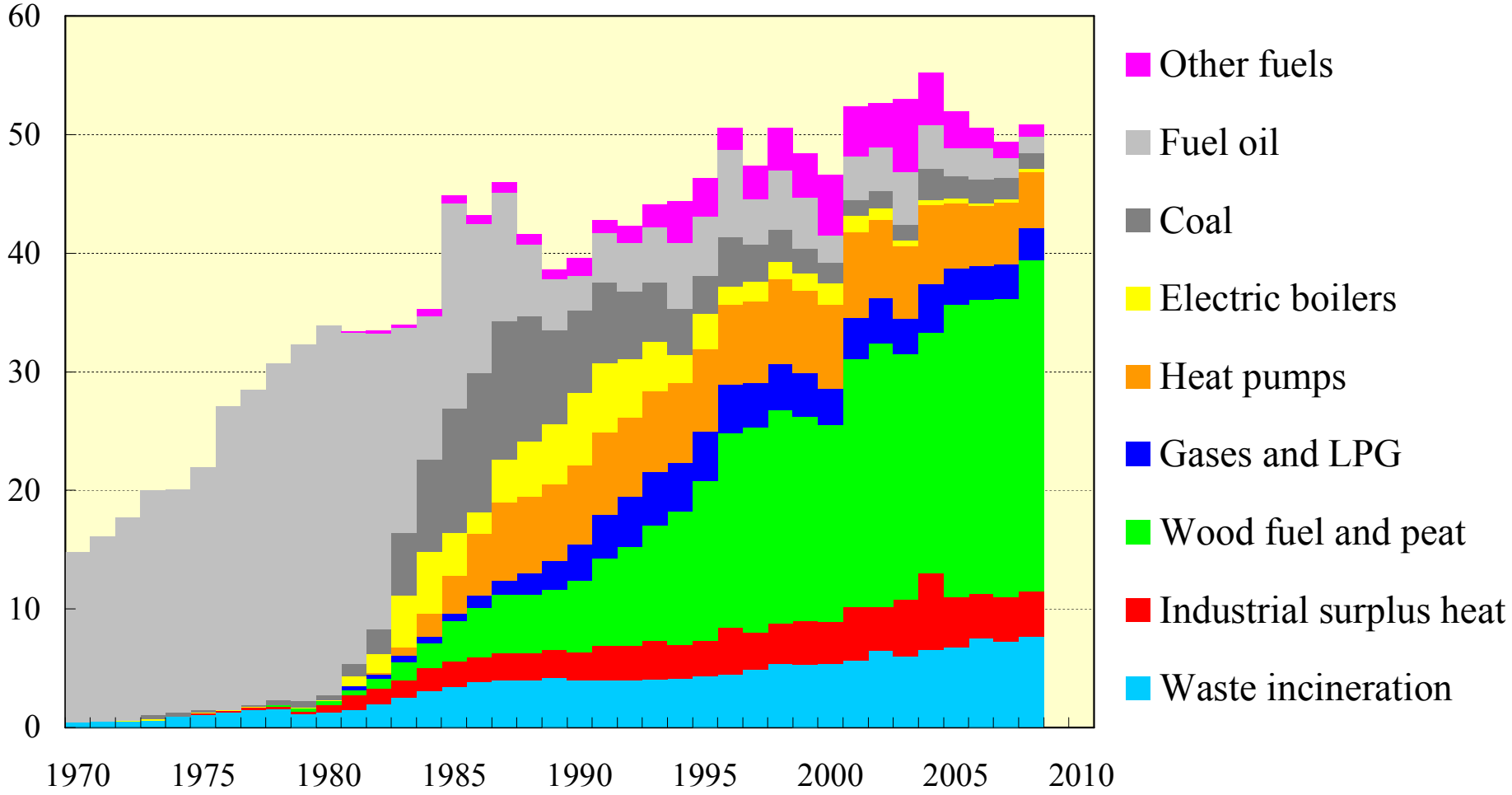
1. Heat demands: Distribution during 2006



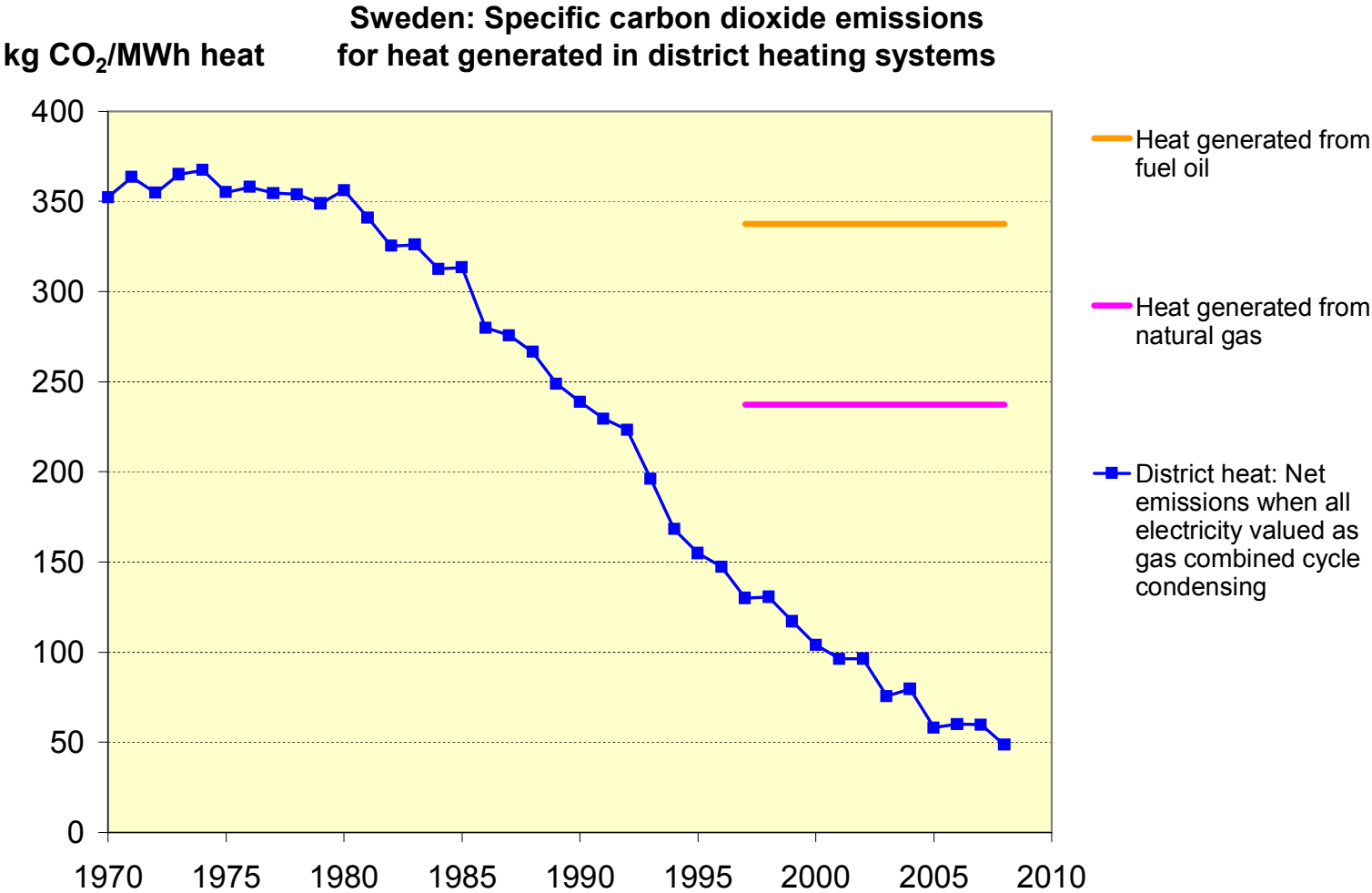
Distribution of heat use during 2006 as a function of the share of all national building spaces. The diagram is an estimation for all multi-family houses and all service sector buildings in Sweden.

2. Decarbonisation: Energy supply

TWh/year **Supply for heat generation in district heating systems**



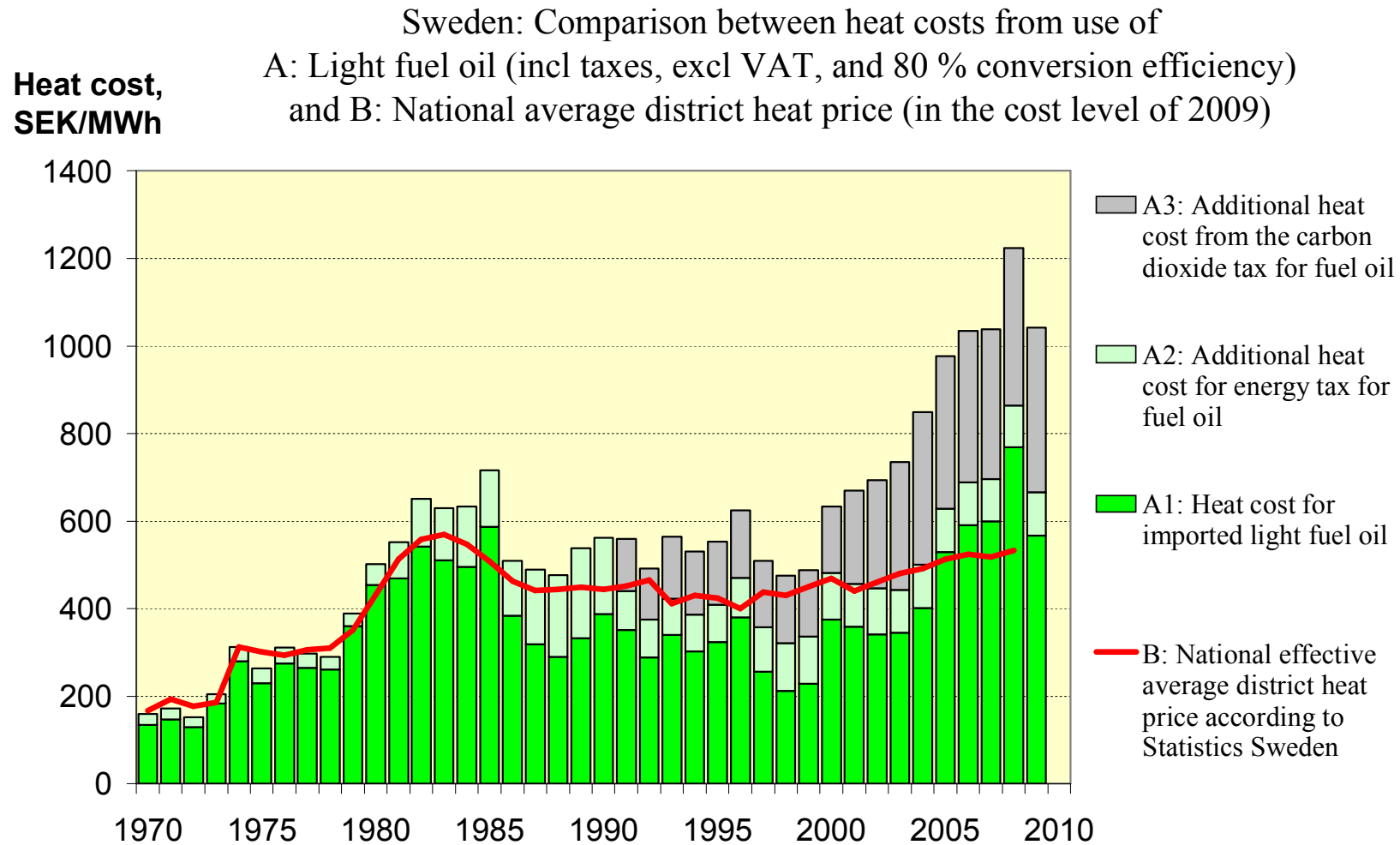
2. Decarbonisation: Carbon dioxide emissions



2. Decarbonisation: The current added values for DH in Sweden

- Soon zero net emissions of carbon dioxide emissions for half of the national heat demand in the residential and service sectors (the DH share)
- High security of supply for DH, since domestic resources are mostly used
- When other countries is searching for future mitigation strategies, the Swedish district heating sector can provide an outcome assessment after a 28 year market experiment of a large-scale carbon mitigation experiment.

2. Decarbonisation: Outcome assessment by cost comparison between fuel oil and district heating



2. Decarbonisation: Outcome assessment 1980-2008 for the Swedish district heating sector

Assessment analysis for 1980-2008

Billions SEK, 2009

Untaxed district heat	501
Untaxed fuel oil	-456
Additional cost for DH	44

10% more expensive with DH

Additional specific cost

40 SEK/MWh

1,1 EUR/GJ

Decarbonisation cost

22 EUR/ton CO₂

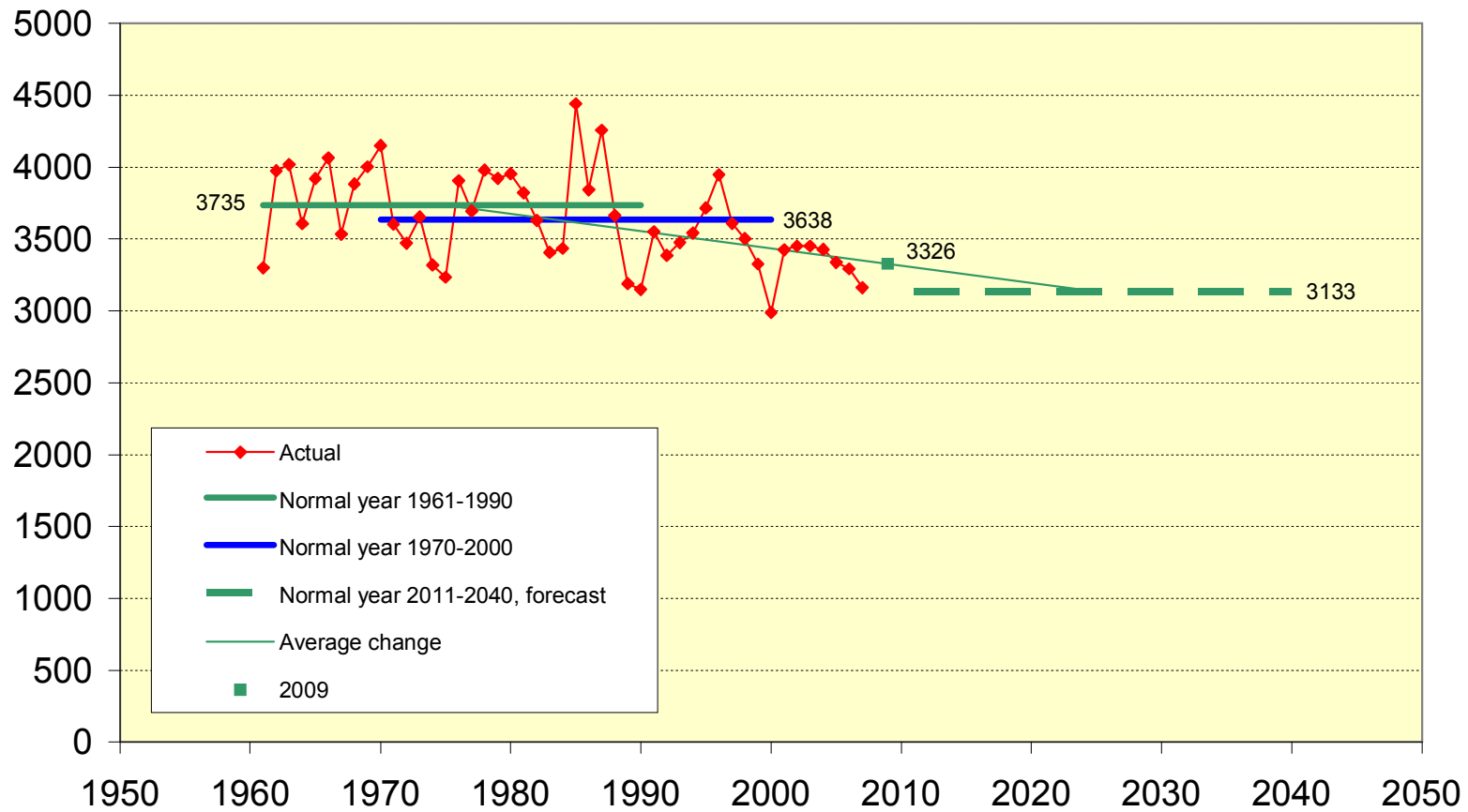
3. Current issues in Sweden

- Future specific heat demands, both from climatic change and energy efficiency measures
- Future market rules (Price regulation, Price compliance, and/or Third Party Access)
- More and more biomass CHP plants in operation
- Labeling of external heat use (in contrast to primary energy demands)

3. Current issues: Lower heat demands from climate change

Number of degree days

Stockholm



EPHA anniversary, May 12, 2010

3. Current issues: New biomass CHP

Igelsta biomass CHP plant in
Södertälje, South of Stockholm

Inaugurated March 17, 2010

250 million EUR

85 MW electricity

140 MW heat

60 MW heat recovery from flue gas
condensation

265 MW fuel input

Total conversion efficiency of
108%, compared to the lower
calorific value.



4. Conclusions

1. During 60 years, district heating systems have grown from local municipal energy strategies and national housing, energy, and climate change policies.
2. Extensive fossil fuel taxation, fuel oil since 1981 and fossil carbon dioxide since 1991, has created strong market forces (as carbon trading) for low carbon district heat supply.
3. Sweden has performed a full-scale long-term experiment of strong fossil fuel taxation for non-industrial use. District heat became the market response.
4. The additional customer social cost for district heat since 1980, compared to use of completely untaxed fuel oil, has only been 10 %.

The End

Any questions?