

The impact of EU ETS on Nordic energy markets

- Electricity market
- Natural gas
- District heating
- CO₂ emissions

Thomas Unger, PROFU
Hans Ravn, RAM-løse edb
Tiina Koljonen, VTT



The NEP model toolbox – 8 professional energy models

GTAP : global macro economy

Markal-Nordic : stationary energy systems in the Nordic countries

Balmorel : electricity and district heating in the Baltic Sea area

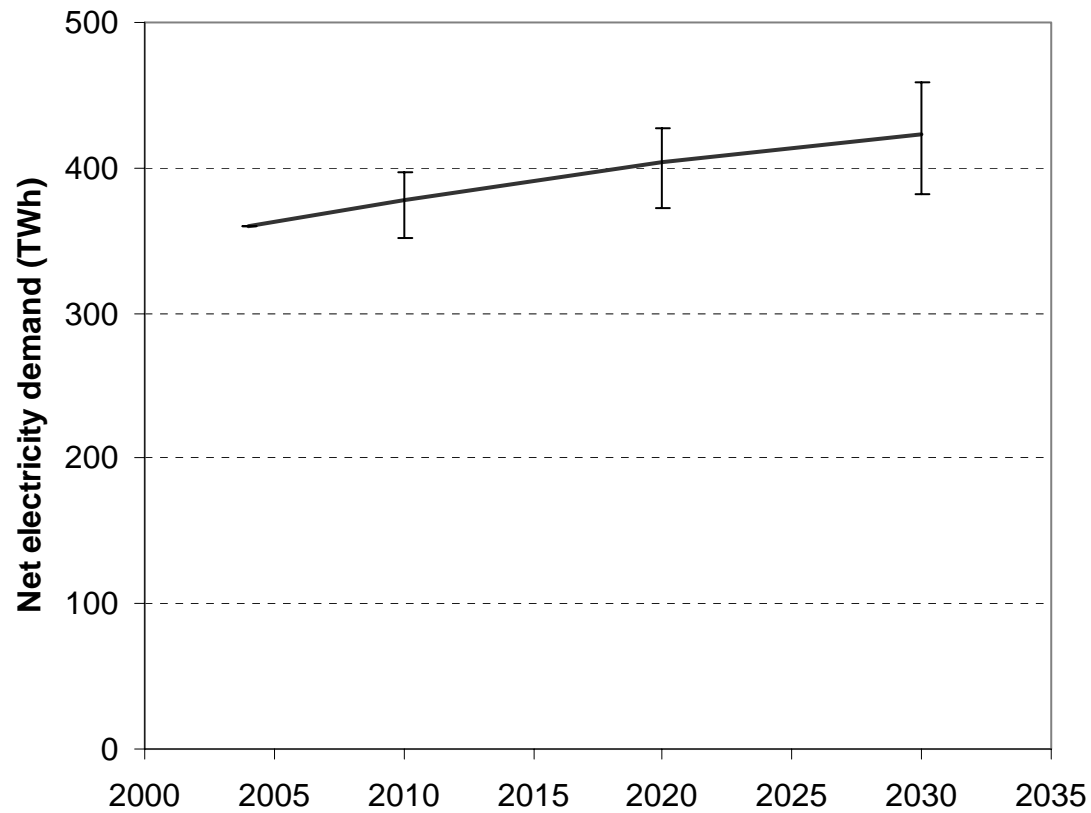
ECON-Classic : electricity markets in Northern Europe

VTT-EMM and **PoMo** : electricity market in the Nordic countries

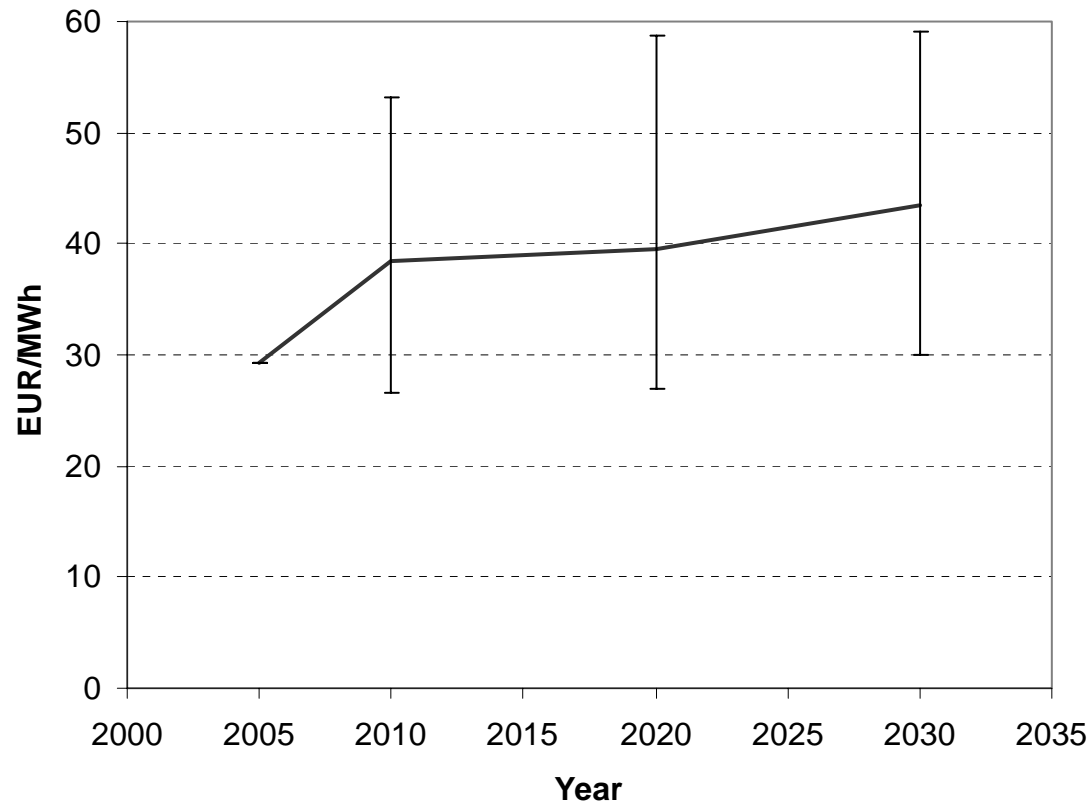
DoS : electricity demand in the Nordic countries

Martes : district heating supply in selected local district heating systems

Increasing electricity demand in the Nordic countries

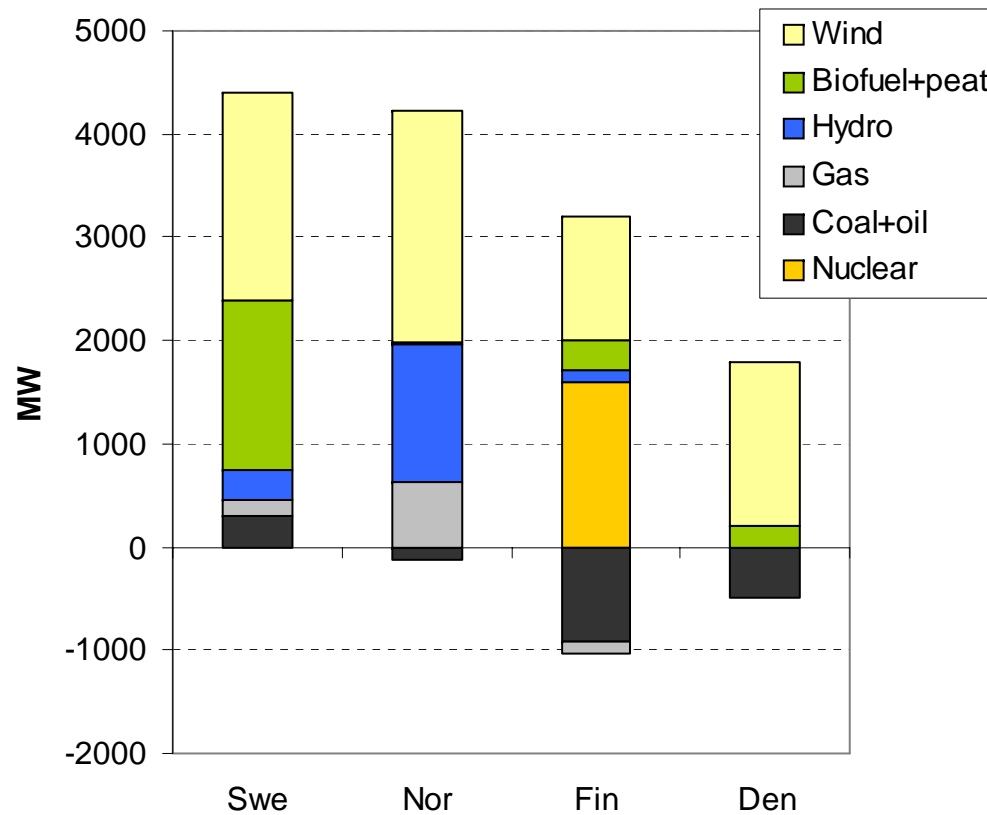


Increasing (normal year) electricity prices are likely

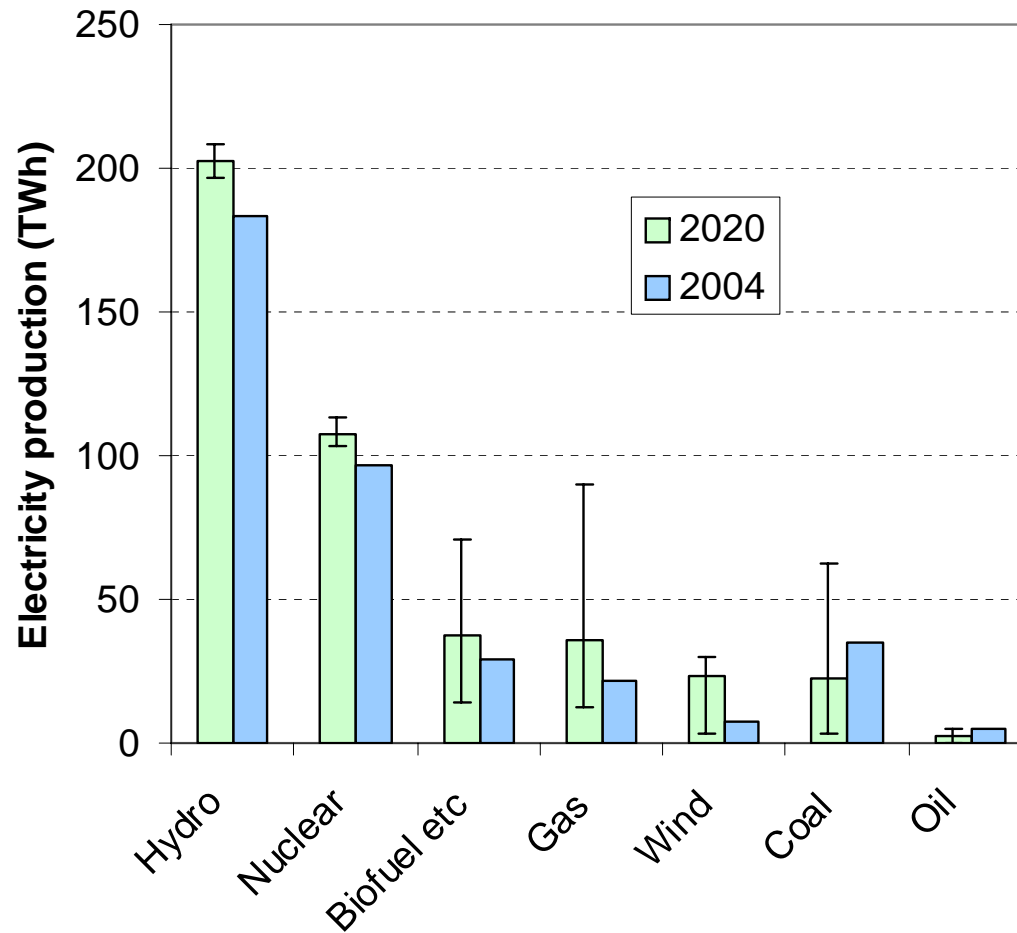


Large new investments mainly in renewables and nuclear ...

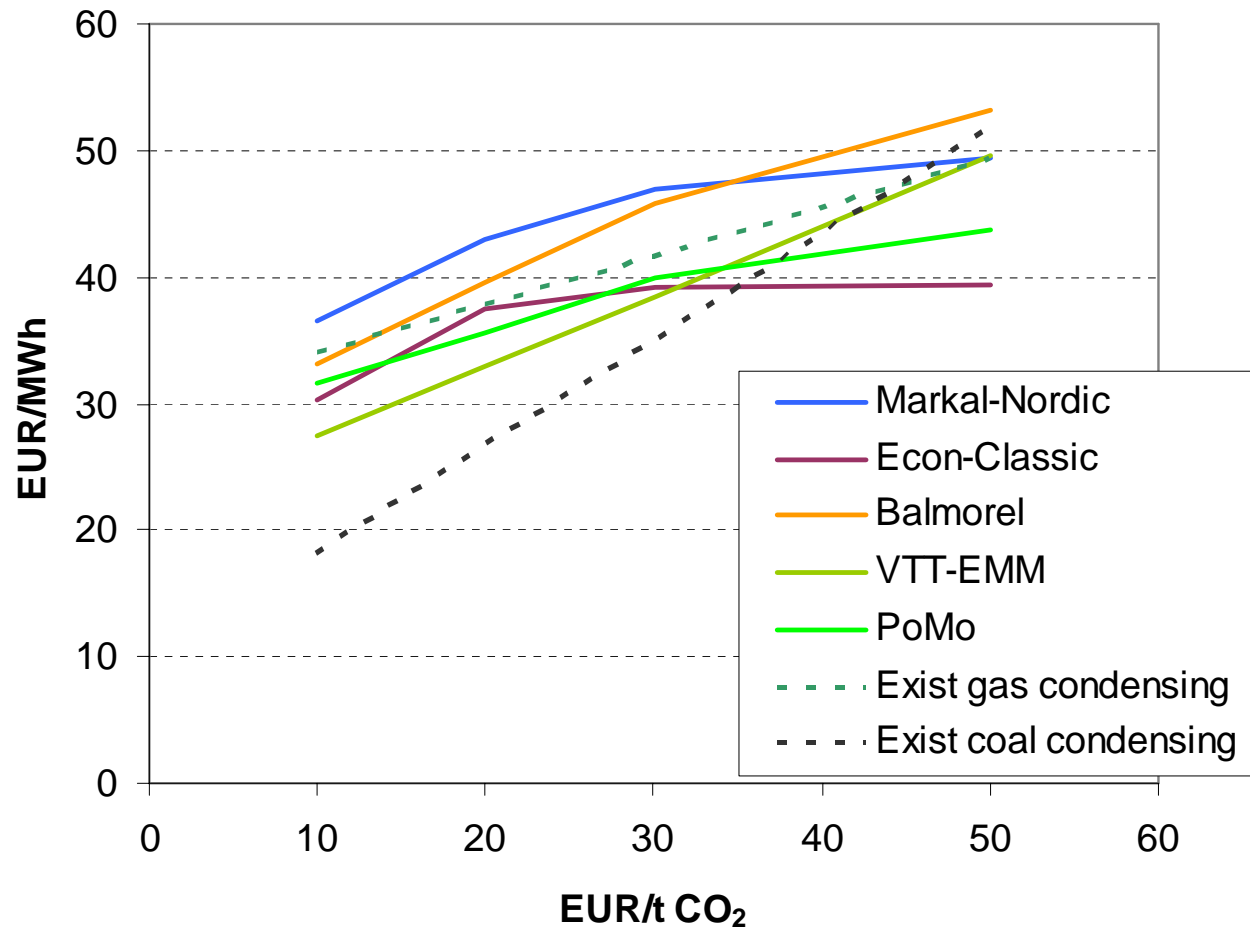
Capacity changes between 2005 and 2020



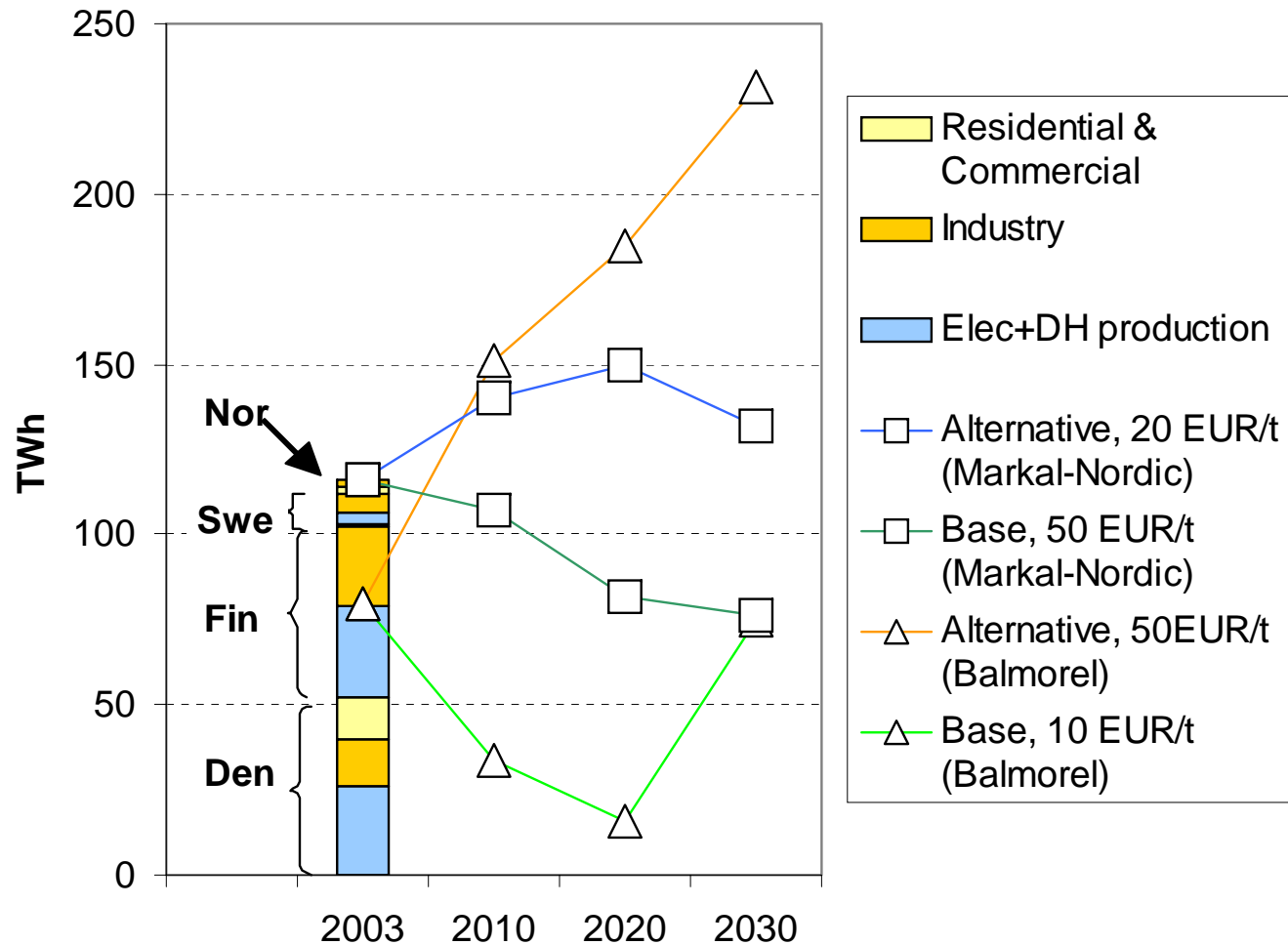
...however, large uncertainties for certain technologies



Wholesale electricity price vs. EUA price

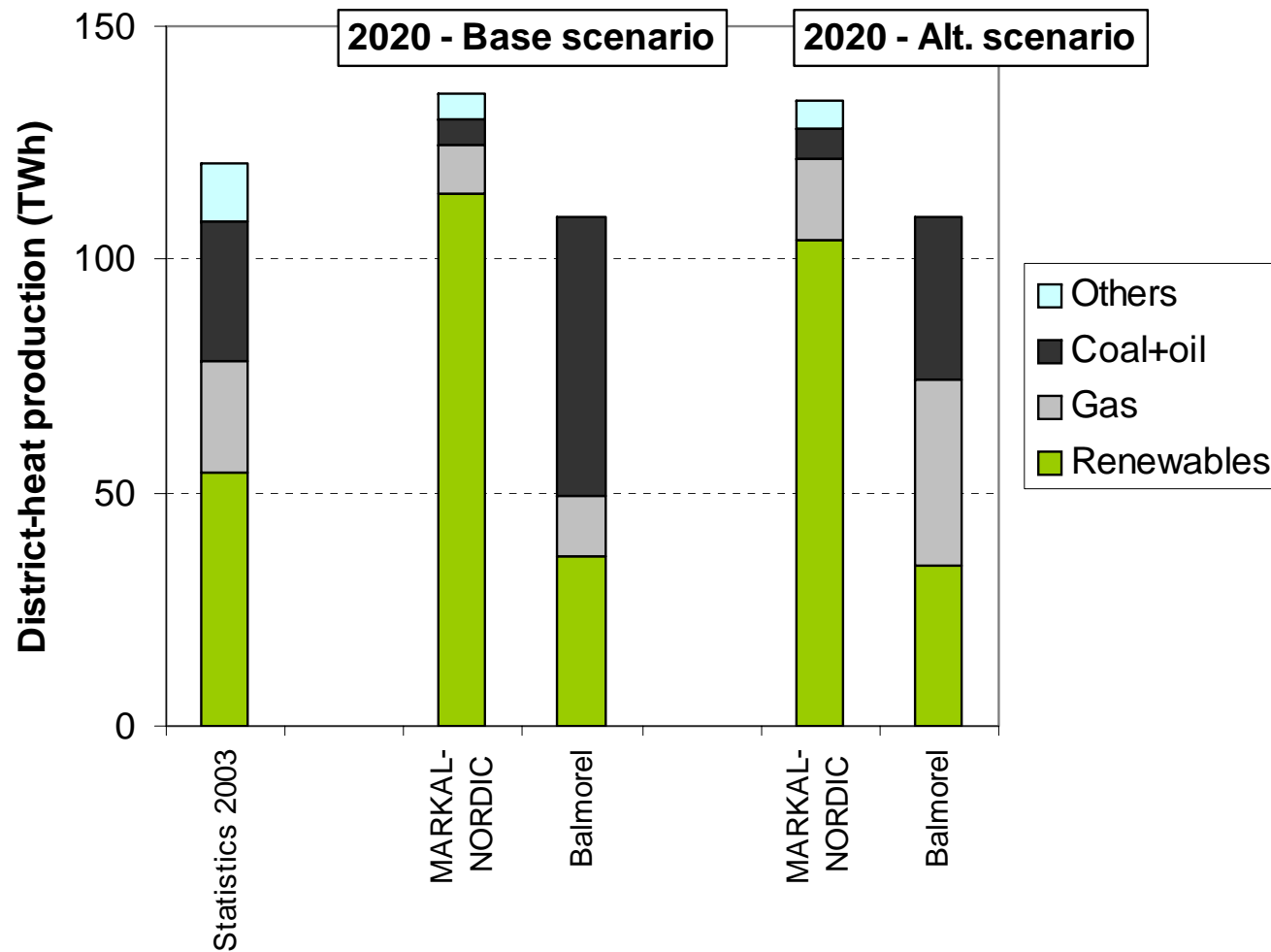


Natural gas – Very high sensitivity to input assumptions



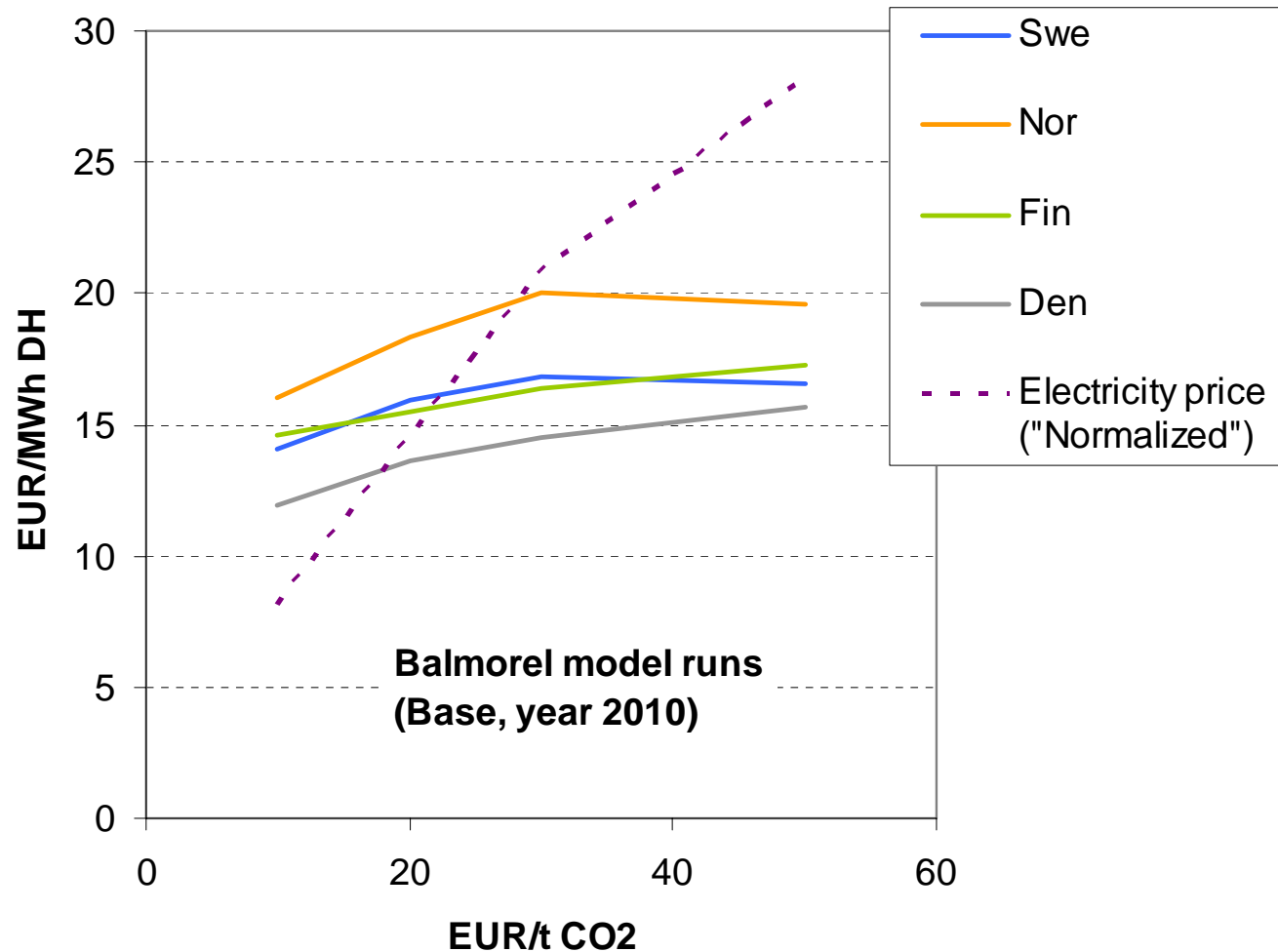
District heating supply in the Nordic countries

- Existing policy measures important for the development

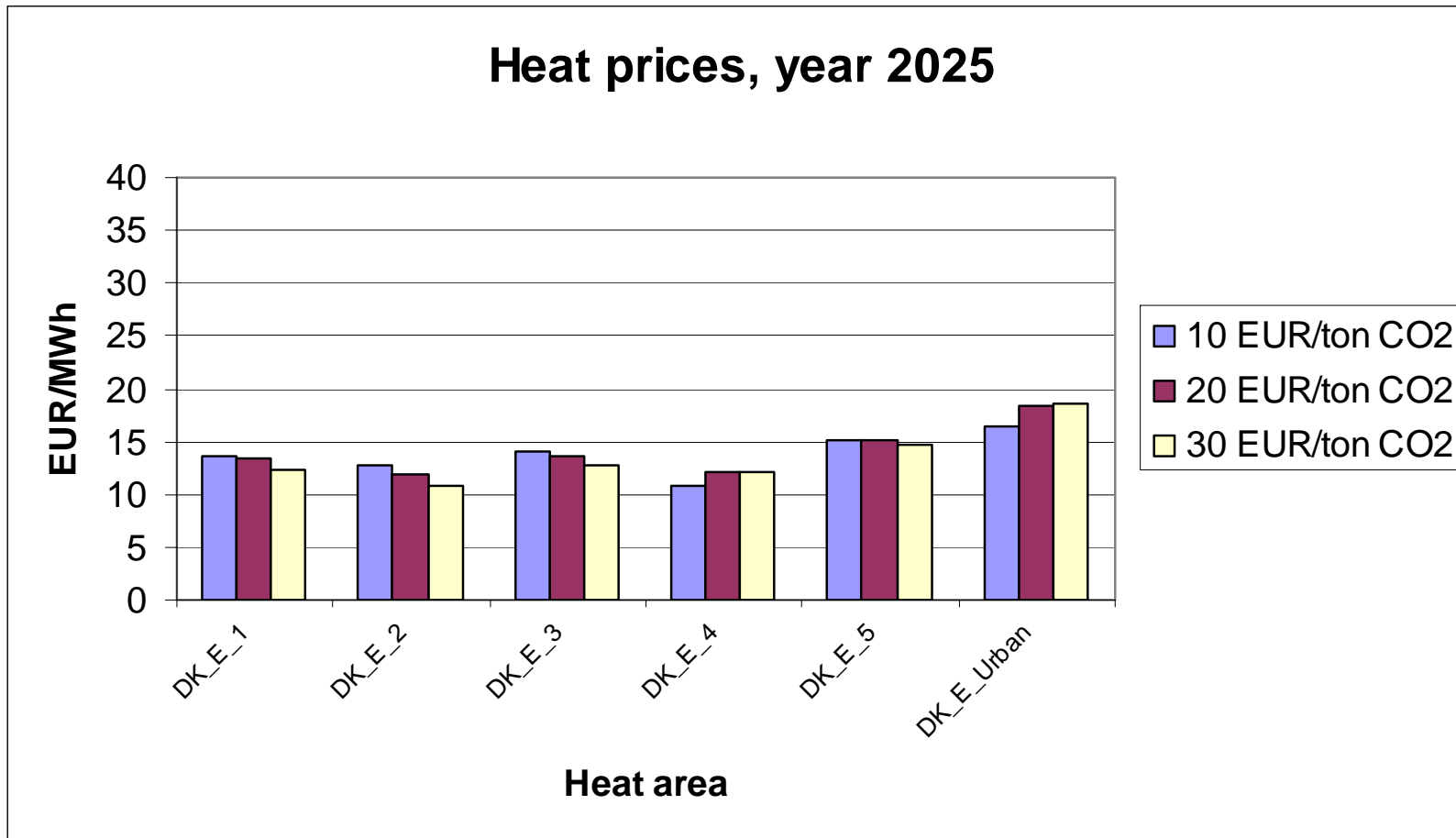


Marginal costs for producing DH vs EUA

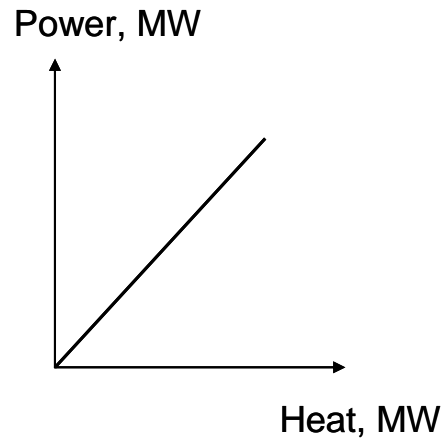
- Less dramatic than electricity prices ...



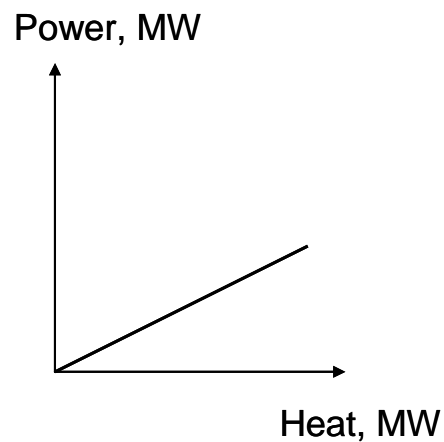
... but local modeling reveals interesting details
- The Danish case ...



Increased CO2 price, back pressure type units

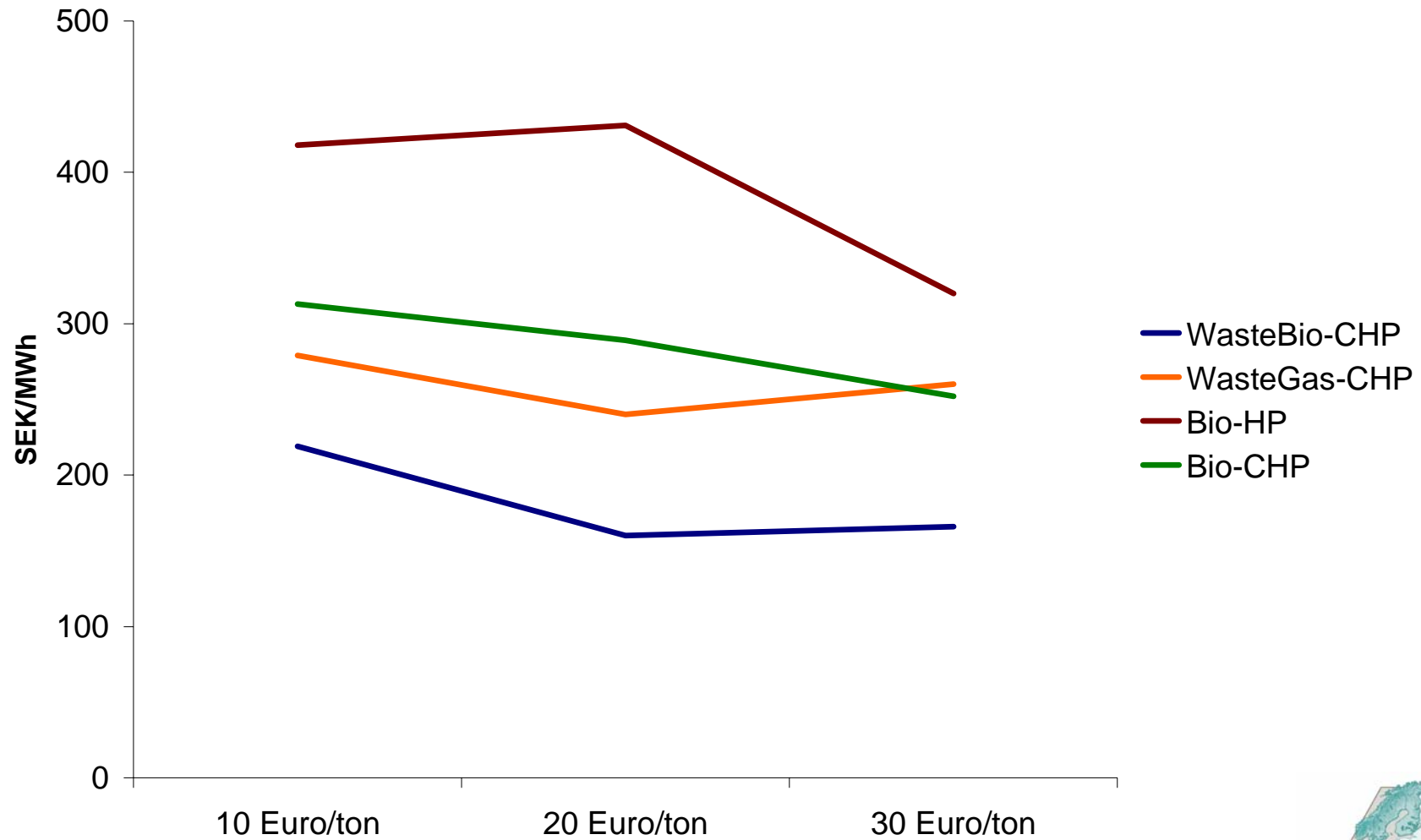


- Fuel with low CO2 emission
- High overall fuel efficiency
- High power to heat ratio
- The heat price may go down! (the CHP unit is over compensated by the increase in electricity price)



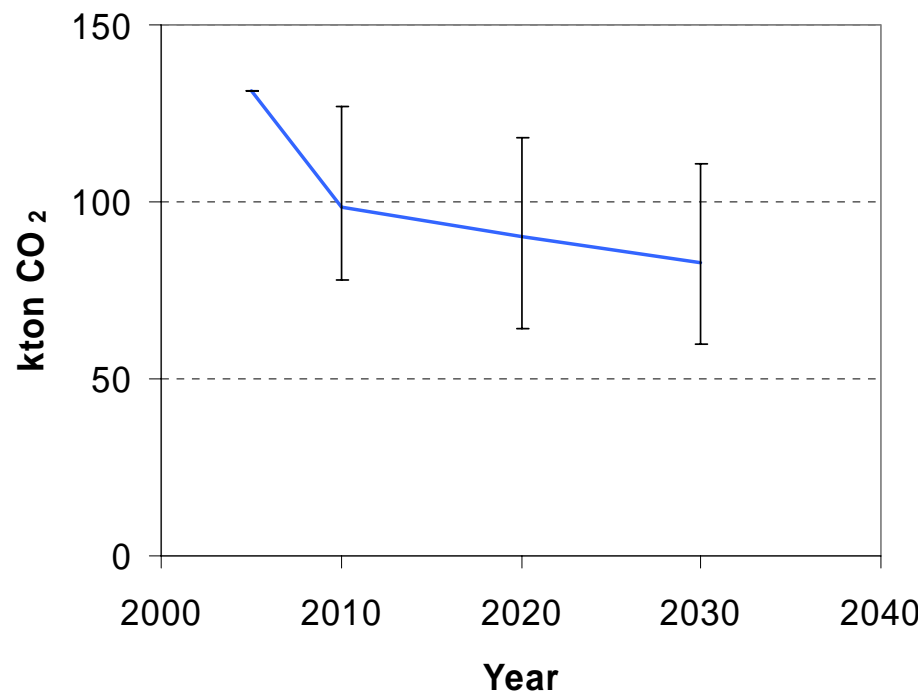
- Fuel with high CO2 emission
- Low overall fuel efficiency
- Low power to heat ratio
- The heat price may go up! (the CHP unit is not compensated by the increase in electricity price)

...and the Swedish case

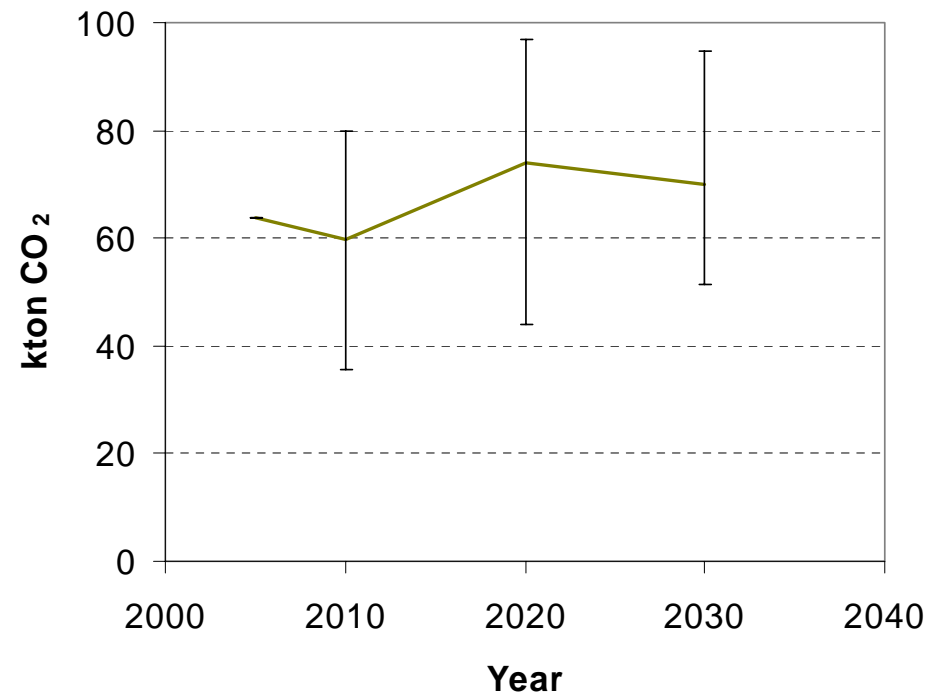


Future CO₂ emissions – A question of EUA price, fuel prices, other policy measures, demand, technological development etc.

The stationary energy system of the Nordic countries (*MARKAL-NORDIC*)



The electricity and district-heating systems of the Nordic countries (*Balmore*)



Conclusions

- As shown, the EU ETS impacts the Nordic energy markets relative to
 - Electricity prices
 - District heat prices
 - Fuel use
 - CO₂-emissions
- ... with further consequences for, i.a.,
 - New investments, capacity balances and security of supply
 - Infrastructure
 - Competitiveness of national industries
 - ...