The Swedish Energy System in an Environmental Perspective

IVA-CAE Workshop in Västerås
2007-06-20

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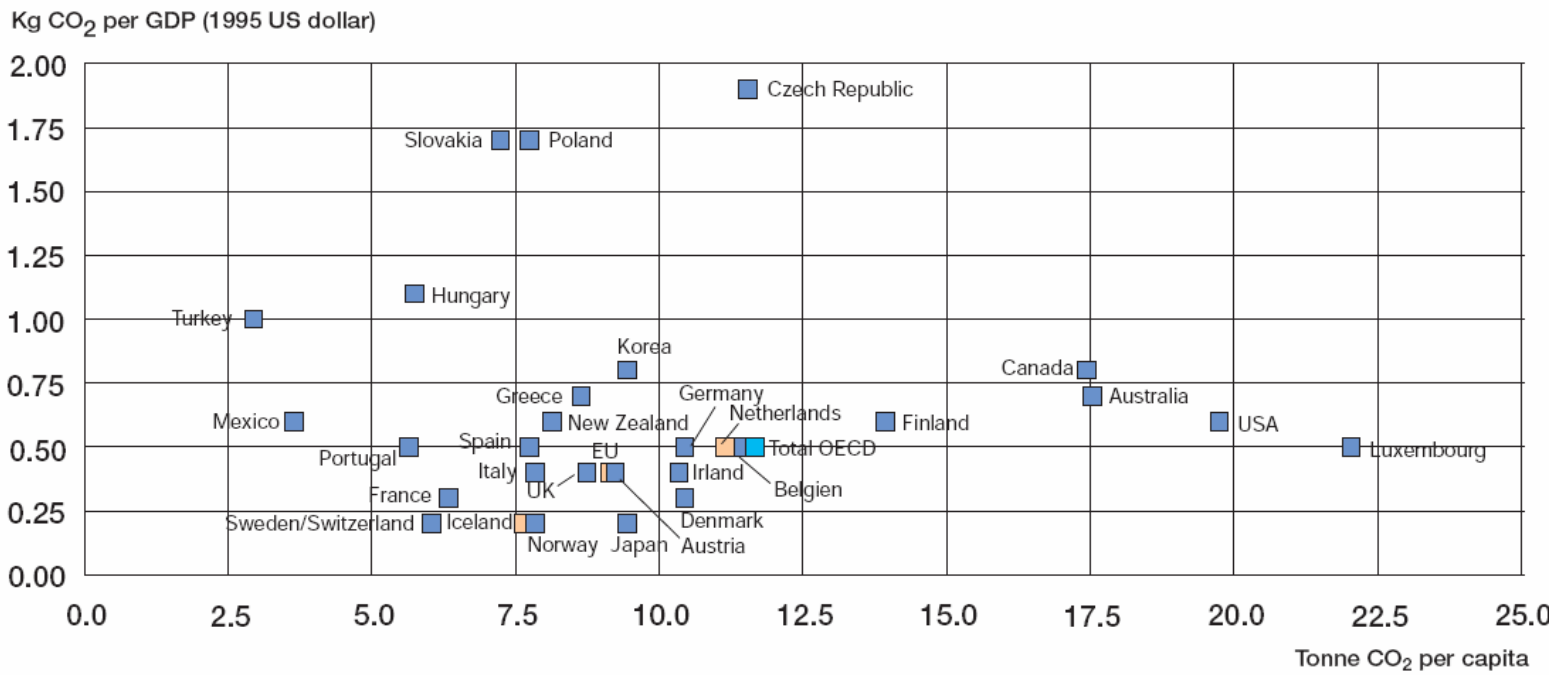
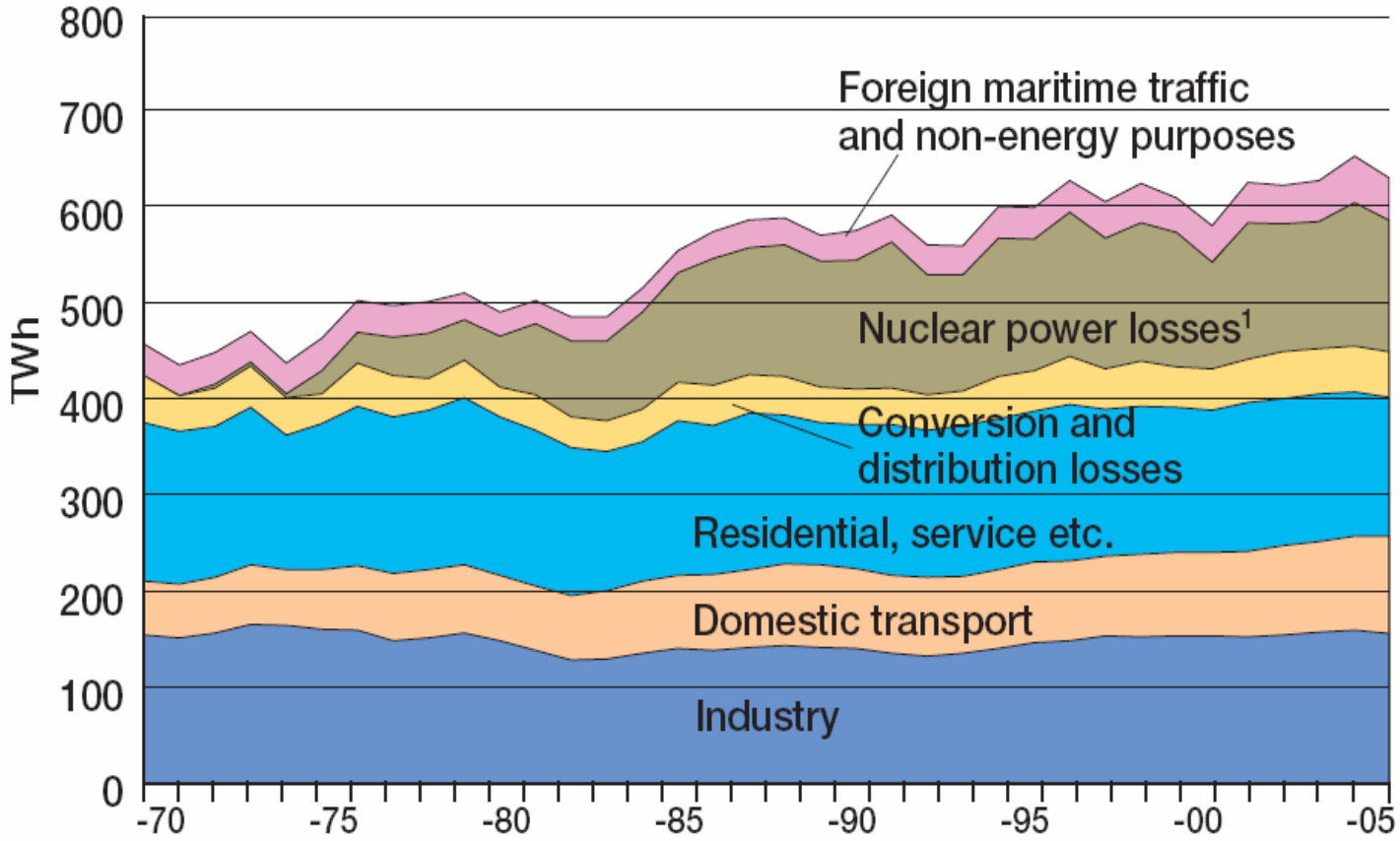
Sweden is one of the least CO_2-intensive economies in the world..



...thanks to a combination of favourable conditions, policy actions and industrial development.

- An electricity system based on **hydro, nuclear** and, recently, **bio-mass based CHP**
- Rapidly increased **bio-mass based district heating**
- **Efficent end-use** of energy thanks to a high portion of **electricity**

In spite of a growing economy, Swedish energy consuption has virtually not increased for 35 years



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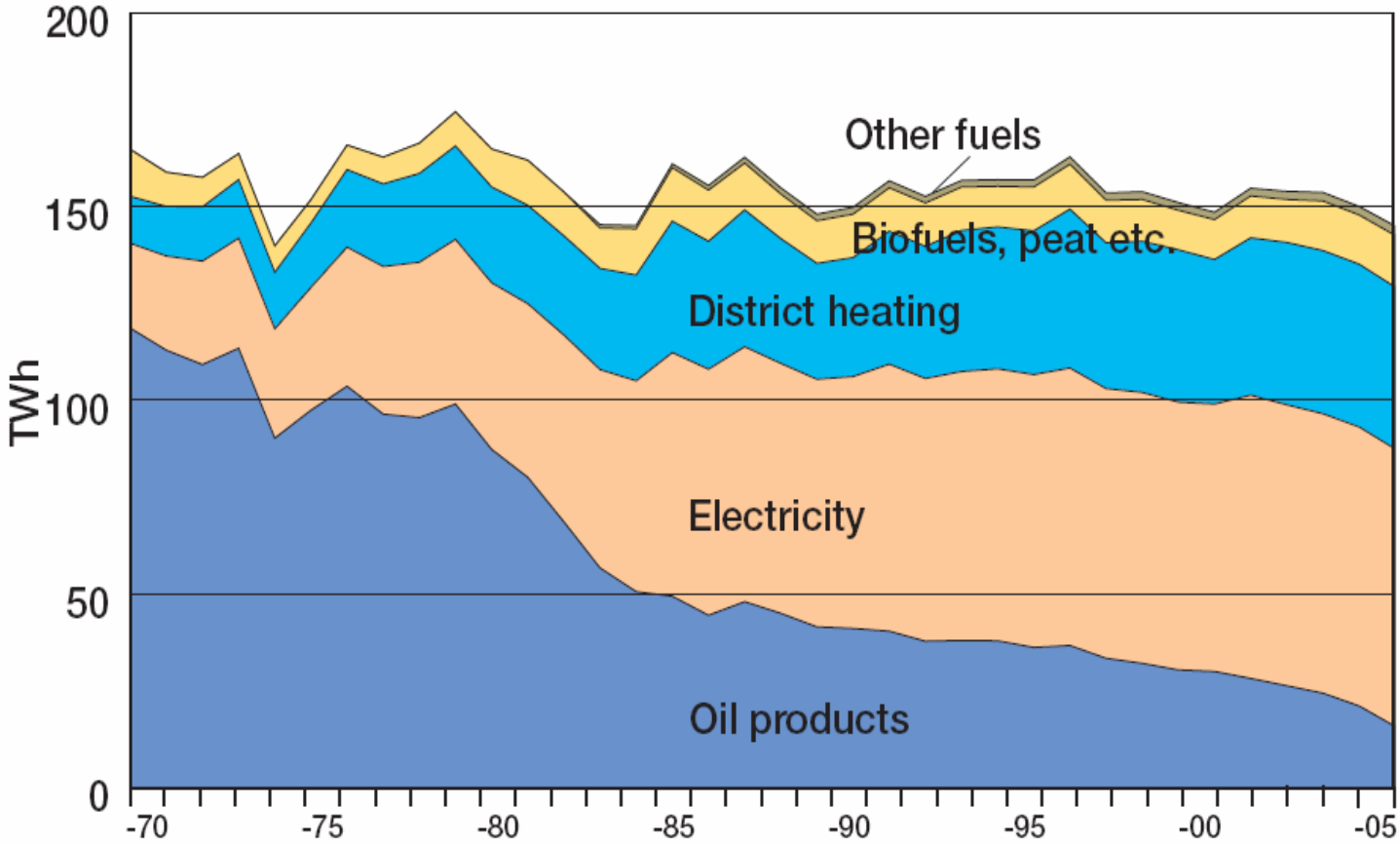
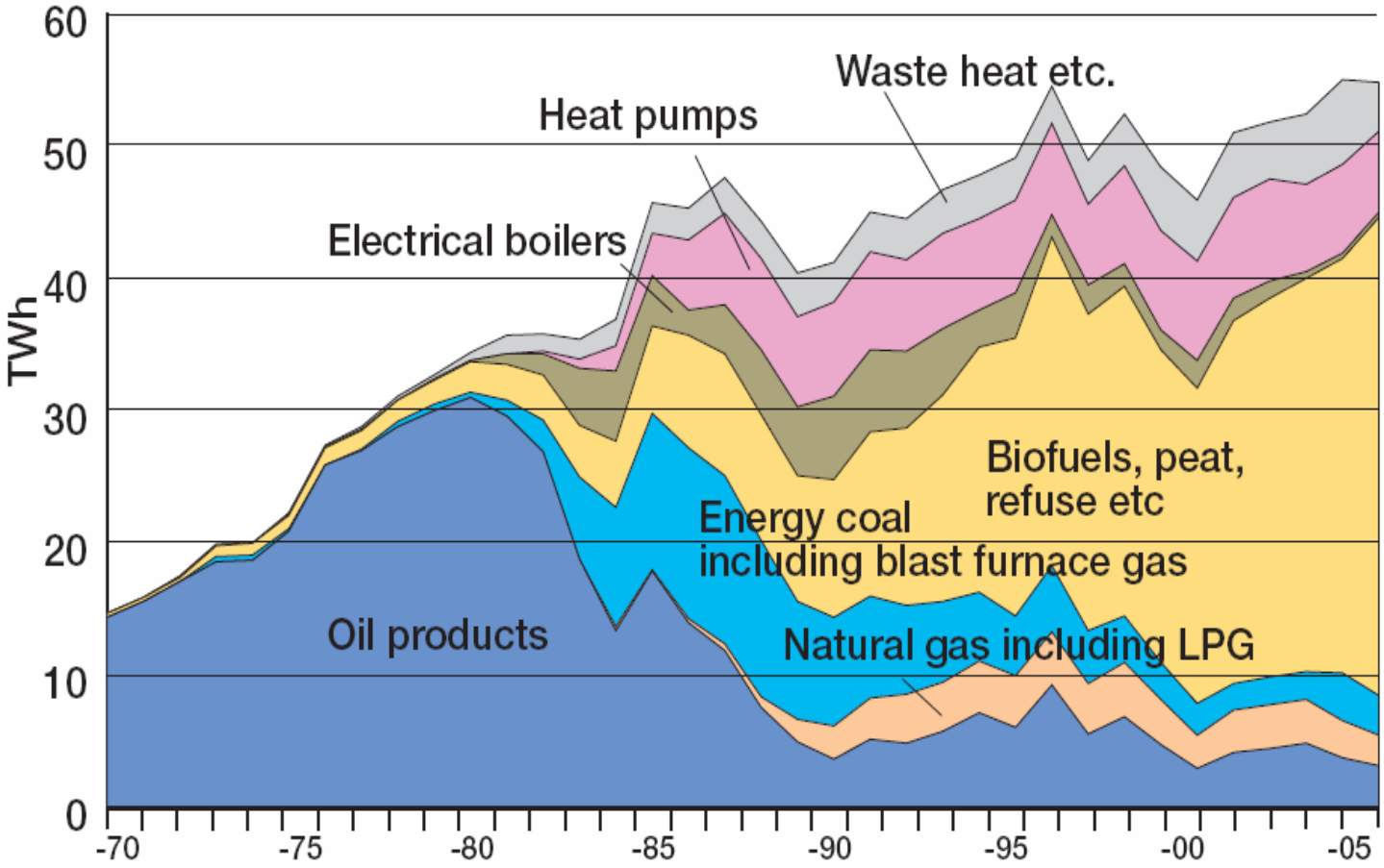
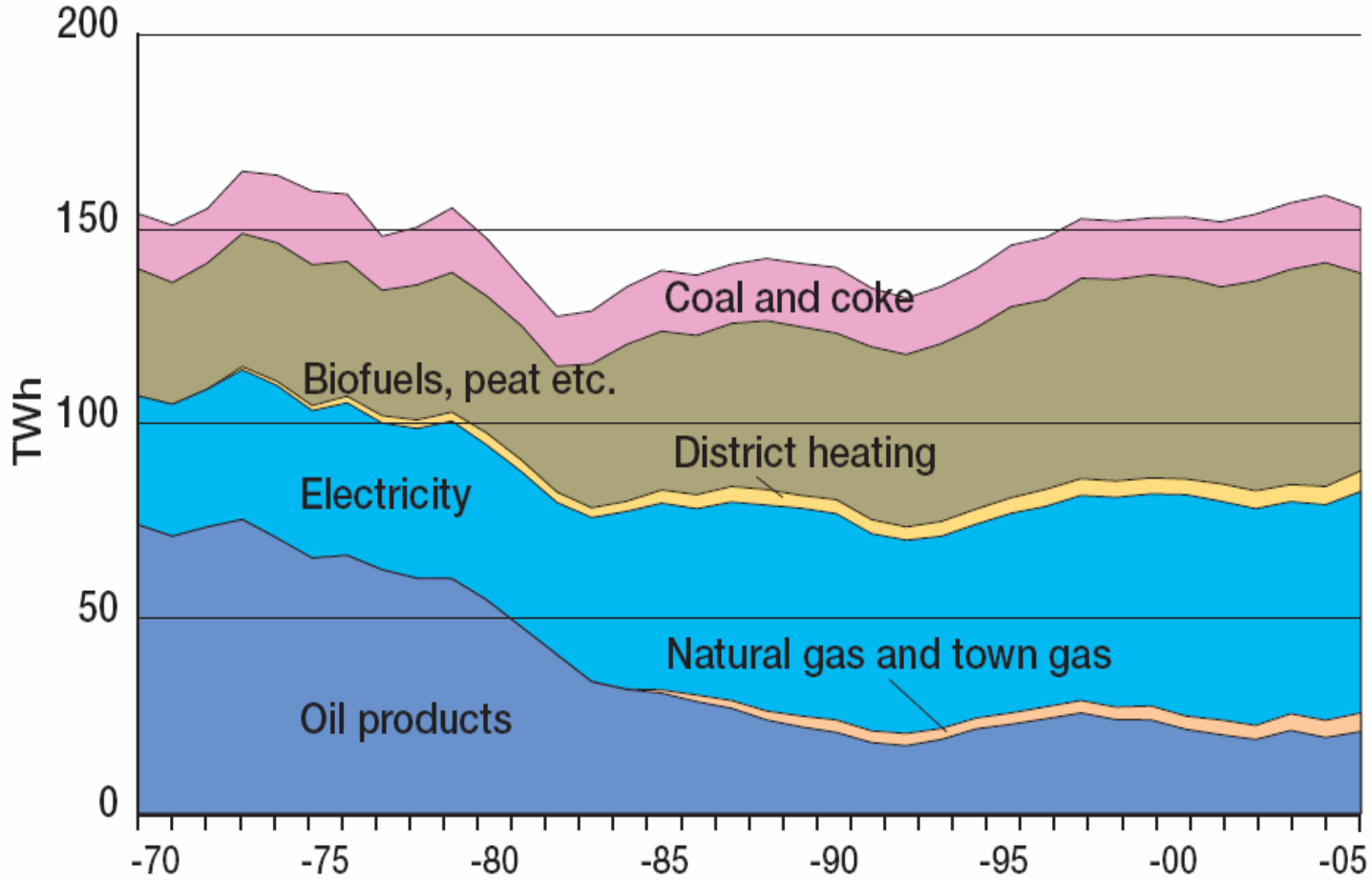
The residential and service sector has abandoned oil for electricity and district heating..



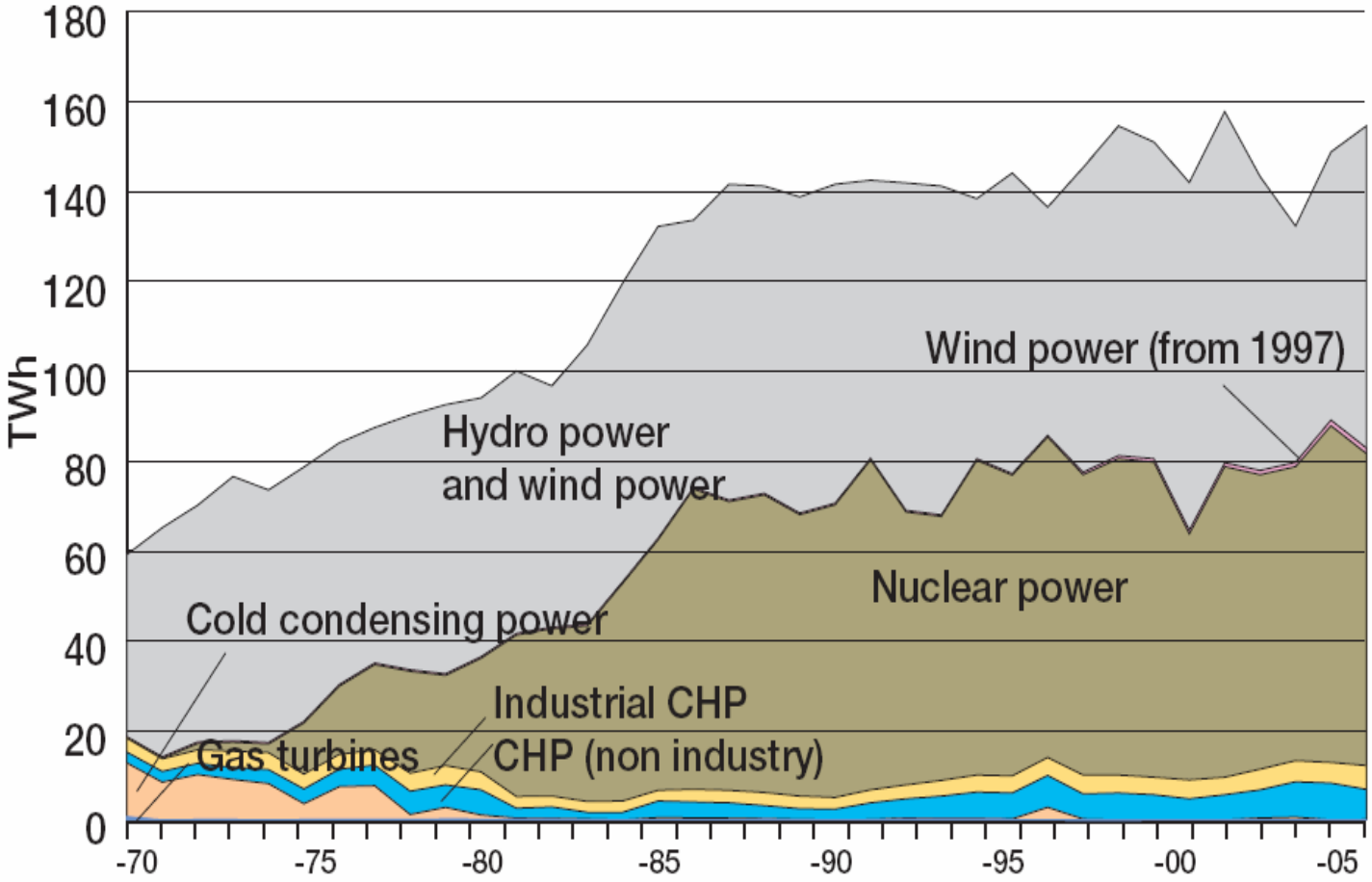
..and the base for district heating has gone from fossil fuel to biomass



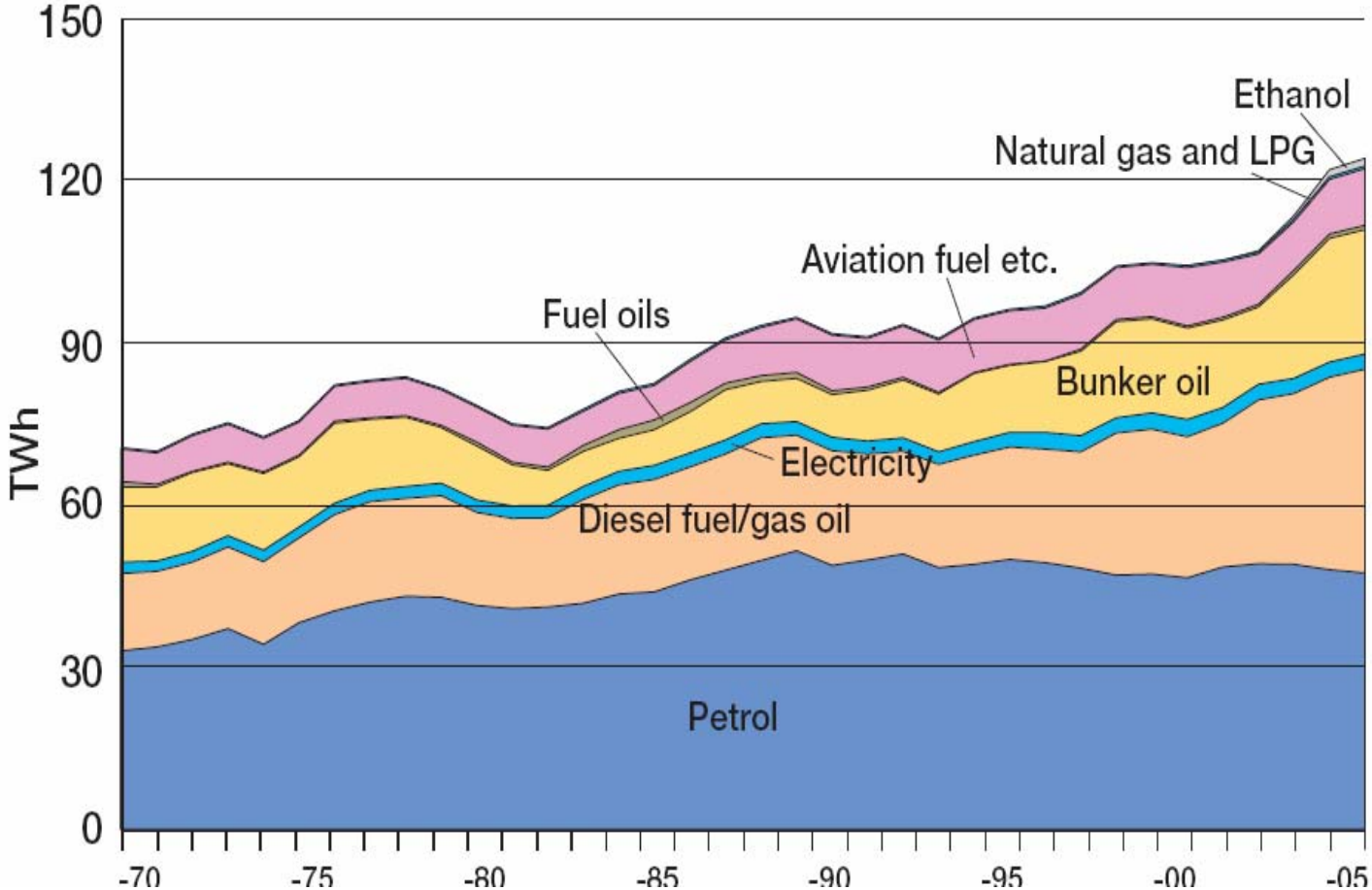
Simultaneously, industry has switched to biomass and electricity



In 2006, 97% of the electricty production was CO2-free



Only the transportation sector has stayed addicted to fossil fuels



How can the Swedish situation develop in an increasingly international context?

- Competitiveness?
- Contribution to EU goals?
- Nuclear policy?
- Competition over bio-mass?
- Increasing resistance against wind mills?
- Security of supply?
- Market development?

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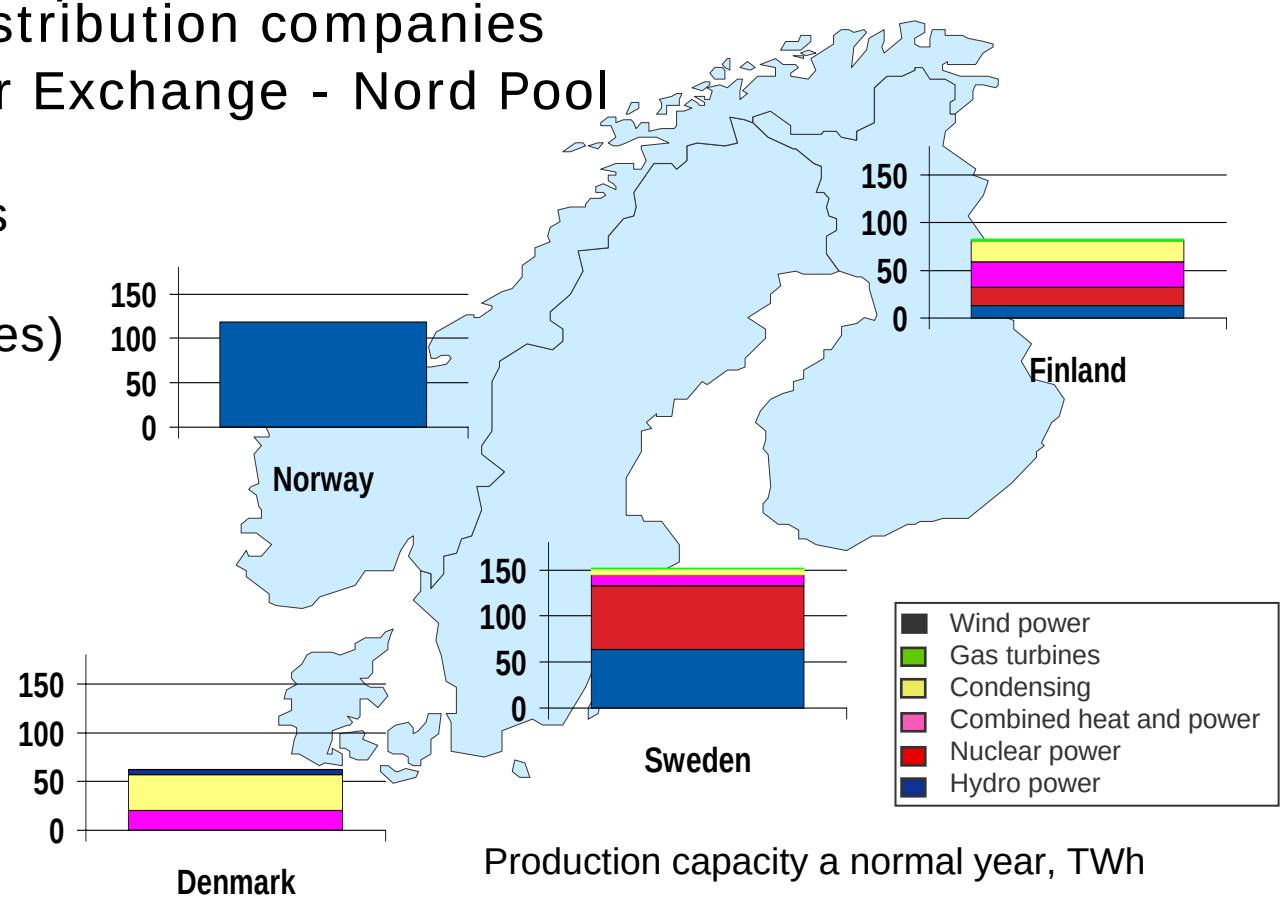
The Nordic Market - four countries

- 14 million customers, 73.000 MW, 390 TWh/year
- Full regulated TPA (third party access)
- National Grid companies, TSOs
- Some 350 power generating companies,
  450 supplying companies and
  550 regulated distribution companies
- The Nordic Power Exchange - Nord Pool
  - Spot Market
  - Futures Markets
  - (EUA, CER
  - Green certificates)



Production capacity a normal year, TWh

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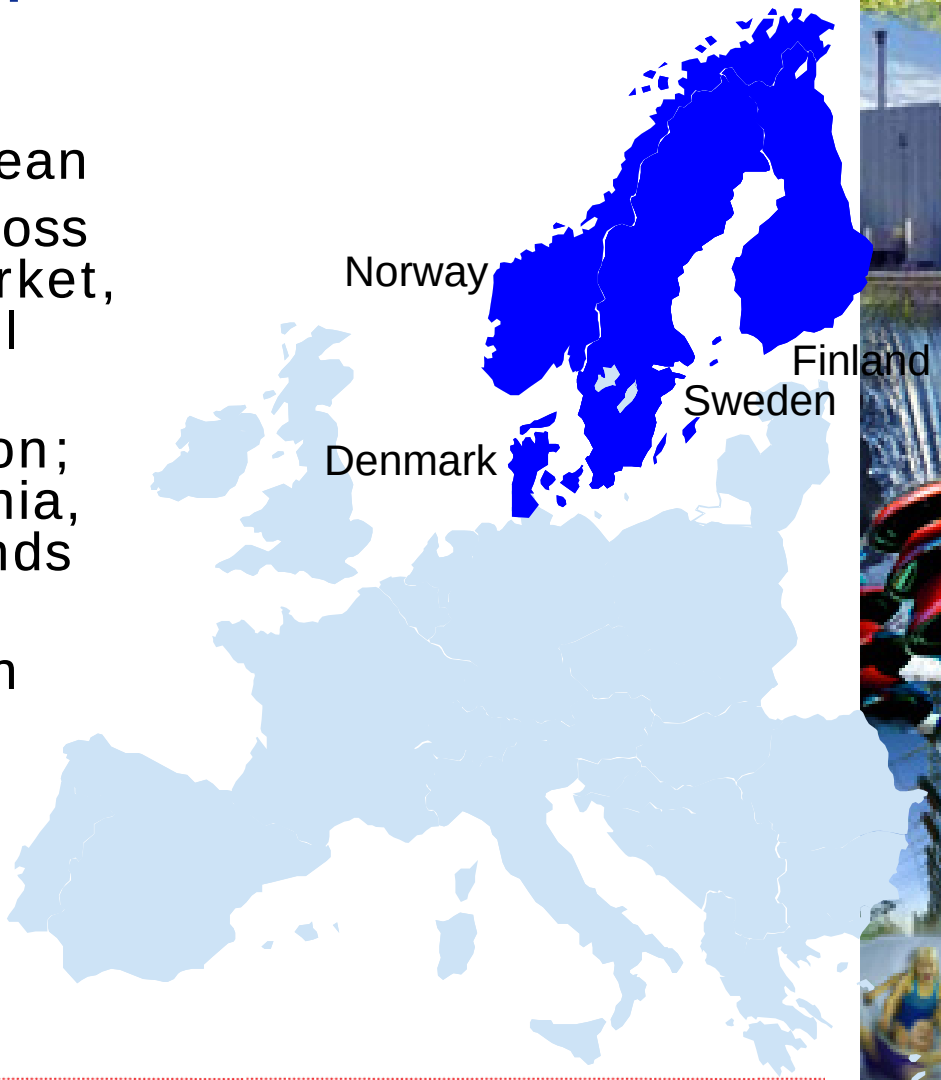
Market development; Swedish -> Nordic -> European

- Market development: From national to Nordic, to European
- Today: A well functioning cross border Nordic Electricity Market, but further development still needed
- Increasing market integration; connections to Russia, Estonia, Poland, Germany, Netherlands (2007) …
- Toward a common European Market:
  - Energy Policy (2006)
  - Energy Package (2007)
  - ….



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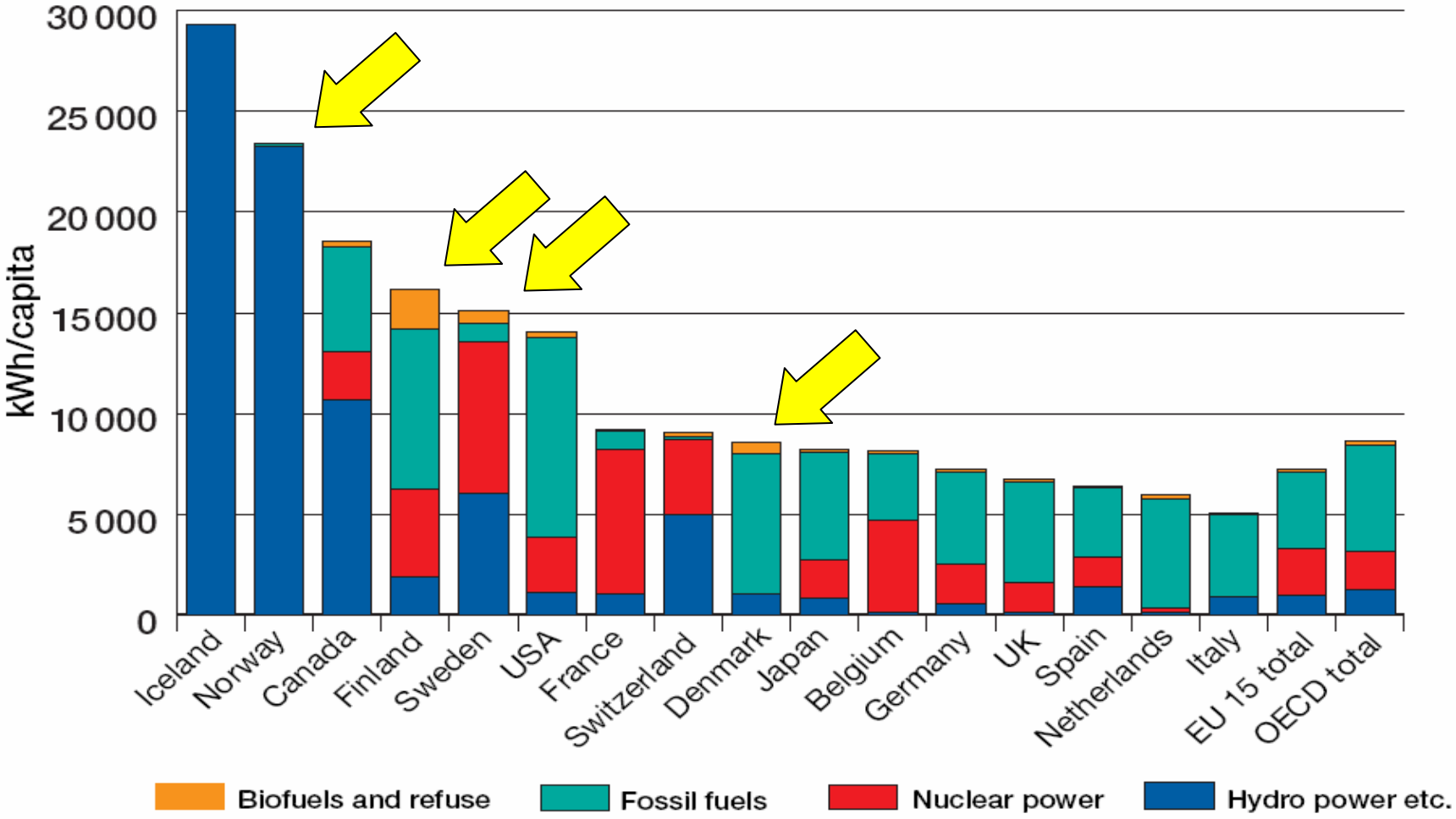
The region is extremely dependant on electricity



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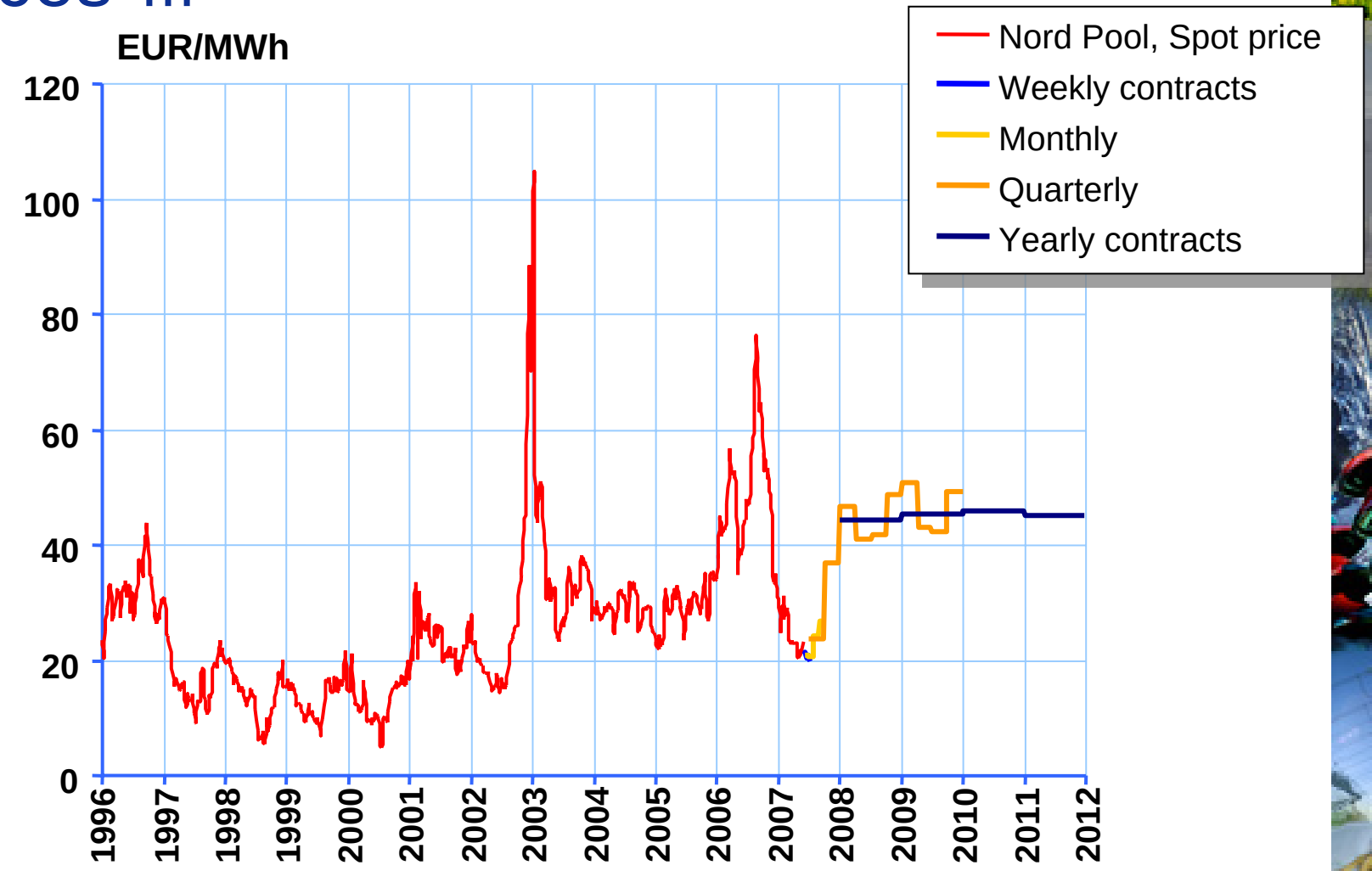
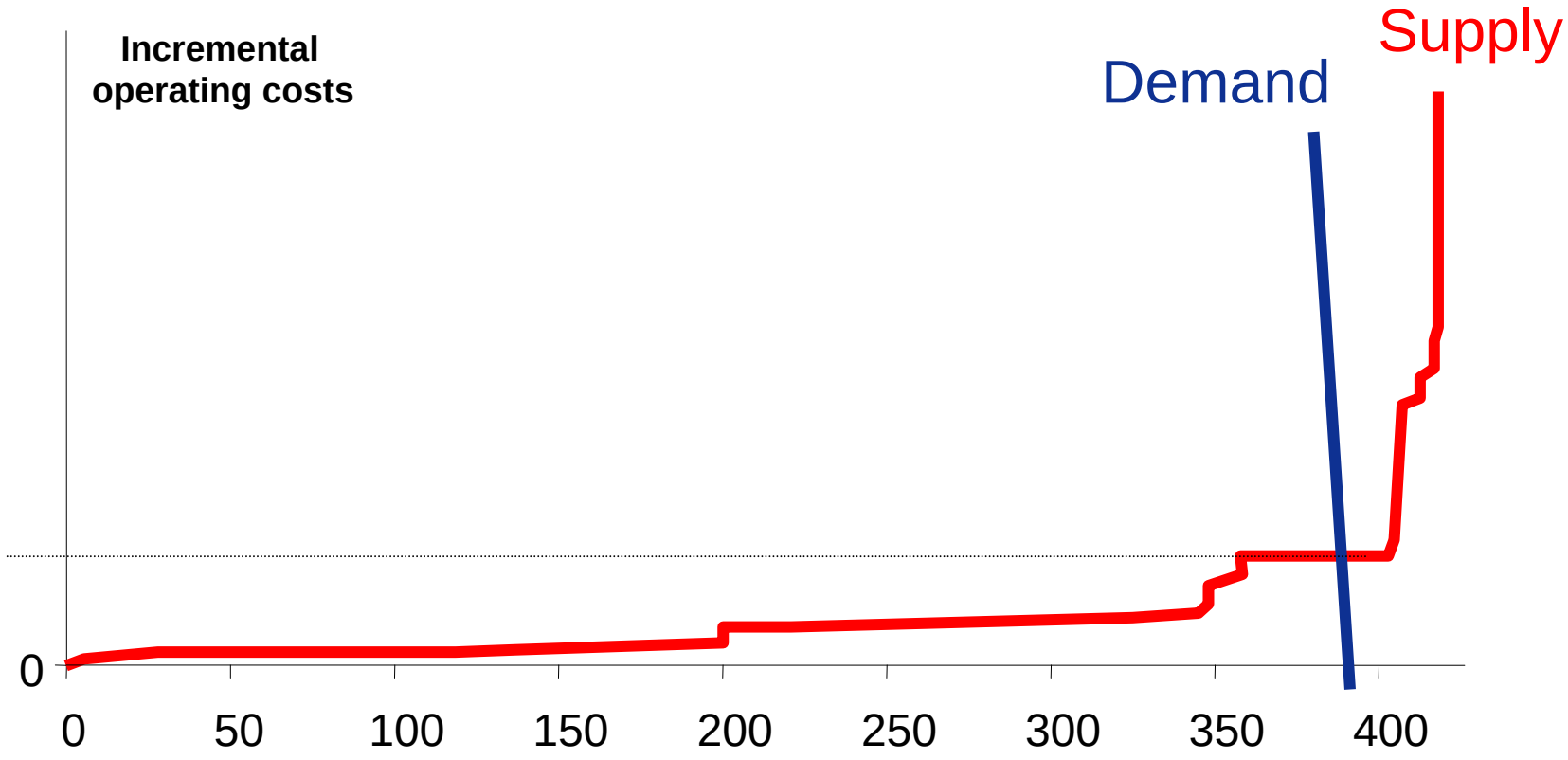
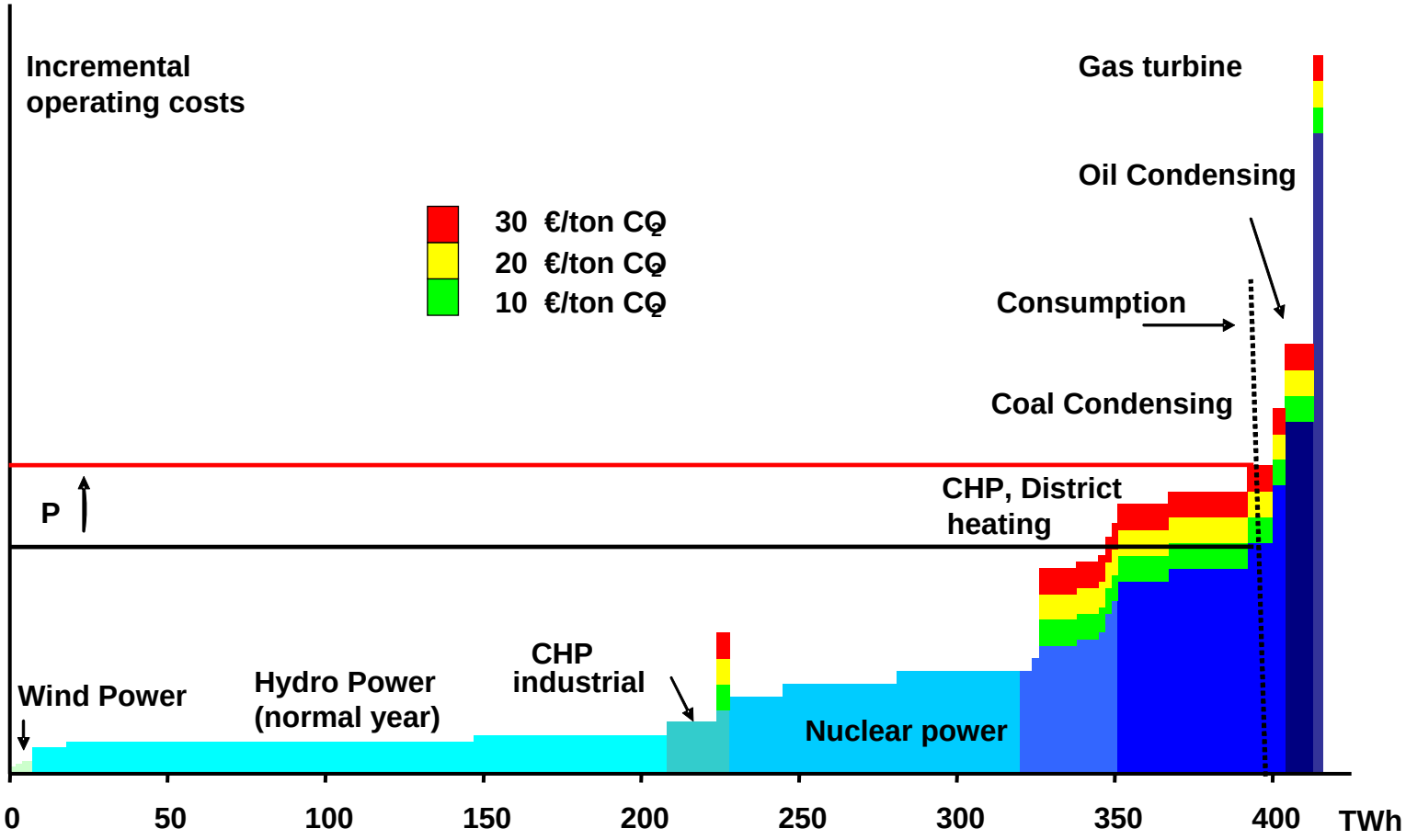
After liberalisation – high and volatile prices …



The Nordic Power System
- Supply and demand

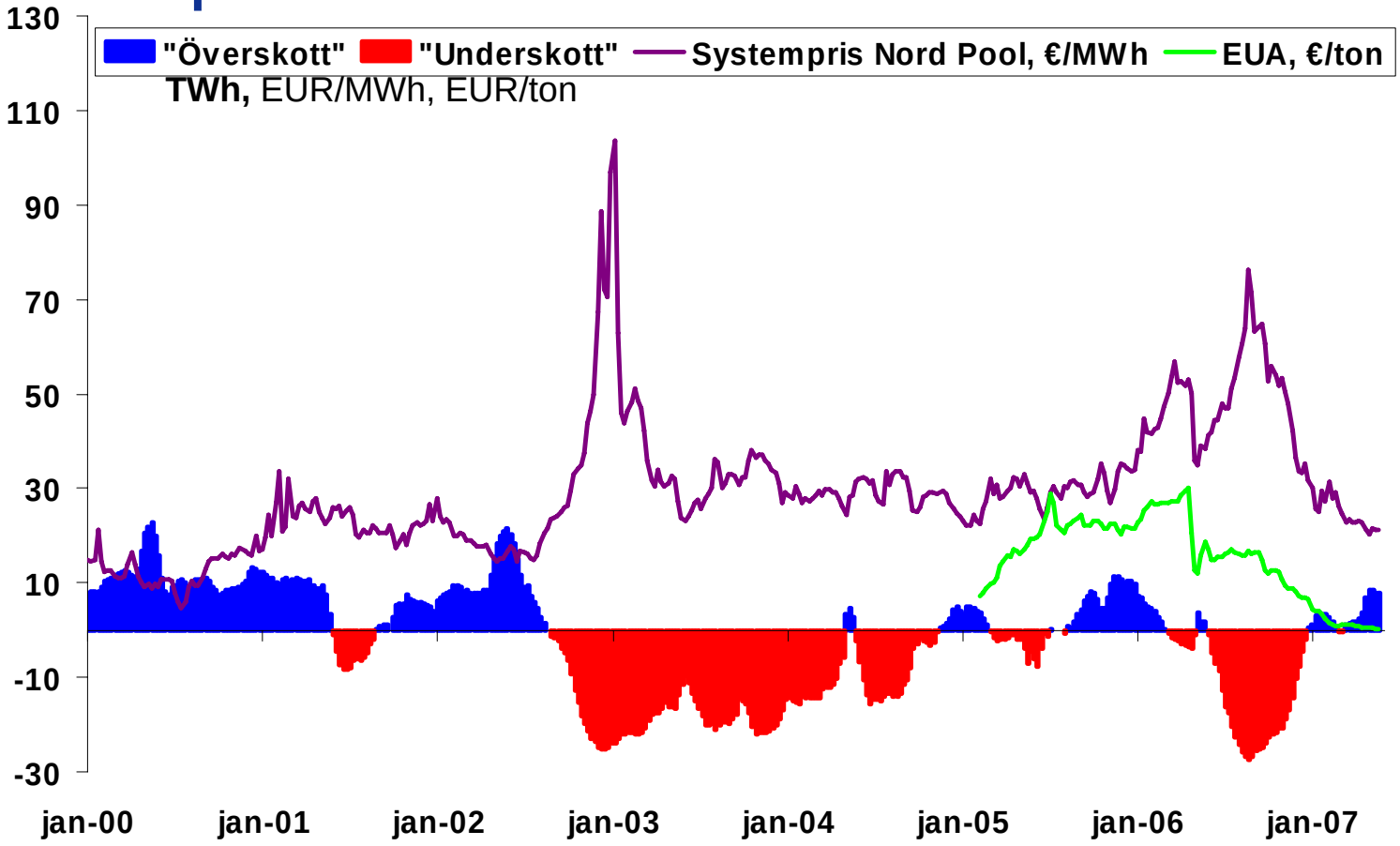


Climate policy (EU ETS) has a strong impact on prices



Source: Swedenergy

In the short perspective, the price is strongly influenced by hydrology and ETS price

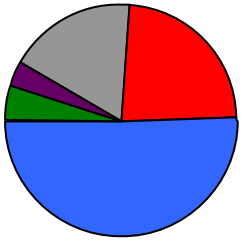


The integration of Europe brings new challenges

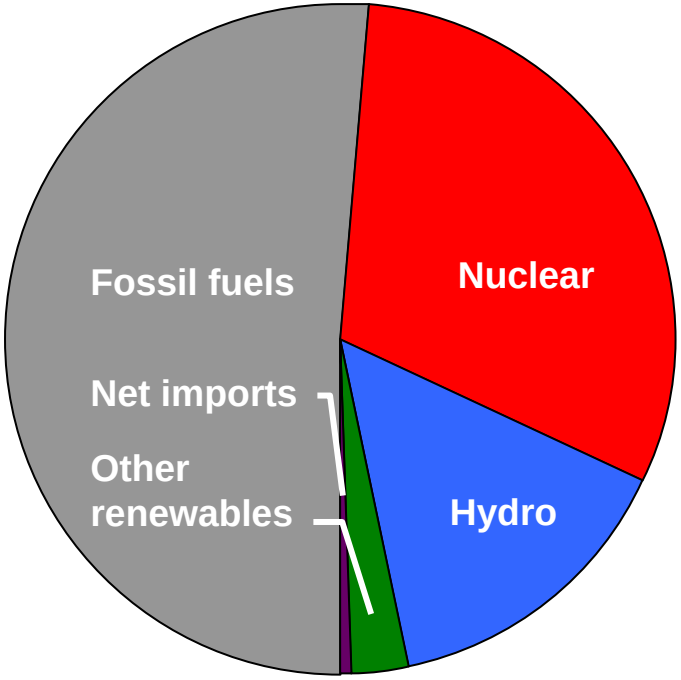
- Generation: Sweden, The Nordic region, Europe
- The 400/200 kV grid

Sweden ~ 150 TWh

The Nordic Countries ~ 380 TWh



EU 27 +Norway ~ 3000 TWh



EU's Energy Package is very ambitious

20 20 20

20% reduction of green-house gases

20% increase in energy efficency

20% renewable energy

- All by 2020

After that: 50% reduction by 2050

The Swedish and European power industry believes the climate goals are realistic, provided that..

- All potential sources of CO2-low production are considered (wind, hydro, nuclear, bio, CHP, CCS..)
- The potential of electricity for enhanced demand side efficiency is unleashed

The production of electricity can be adjusted to be “climate neutral” in a 30-60 years period ...

... a “window of opportunity” for the EU the coming 10-20 years!

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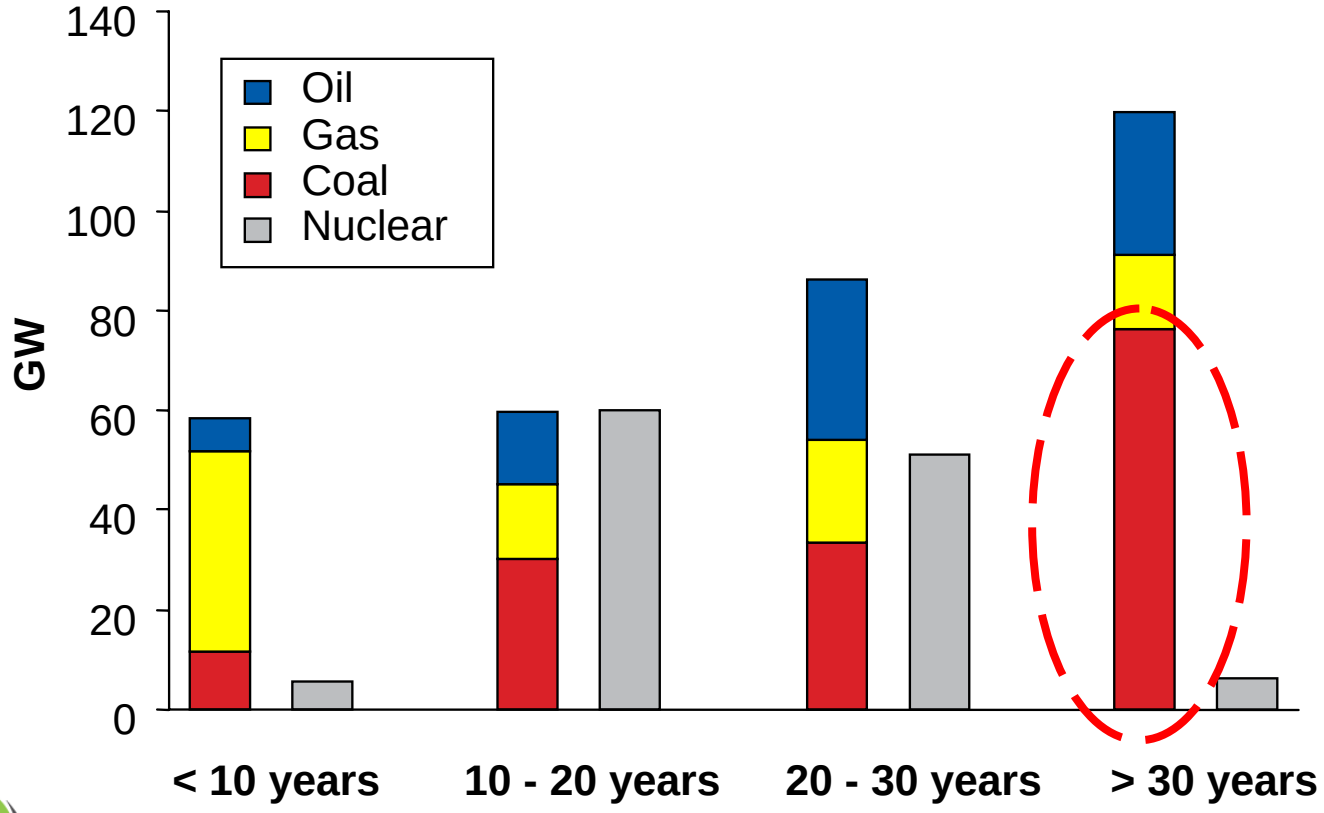
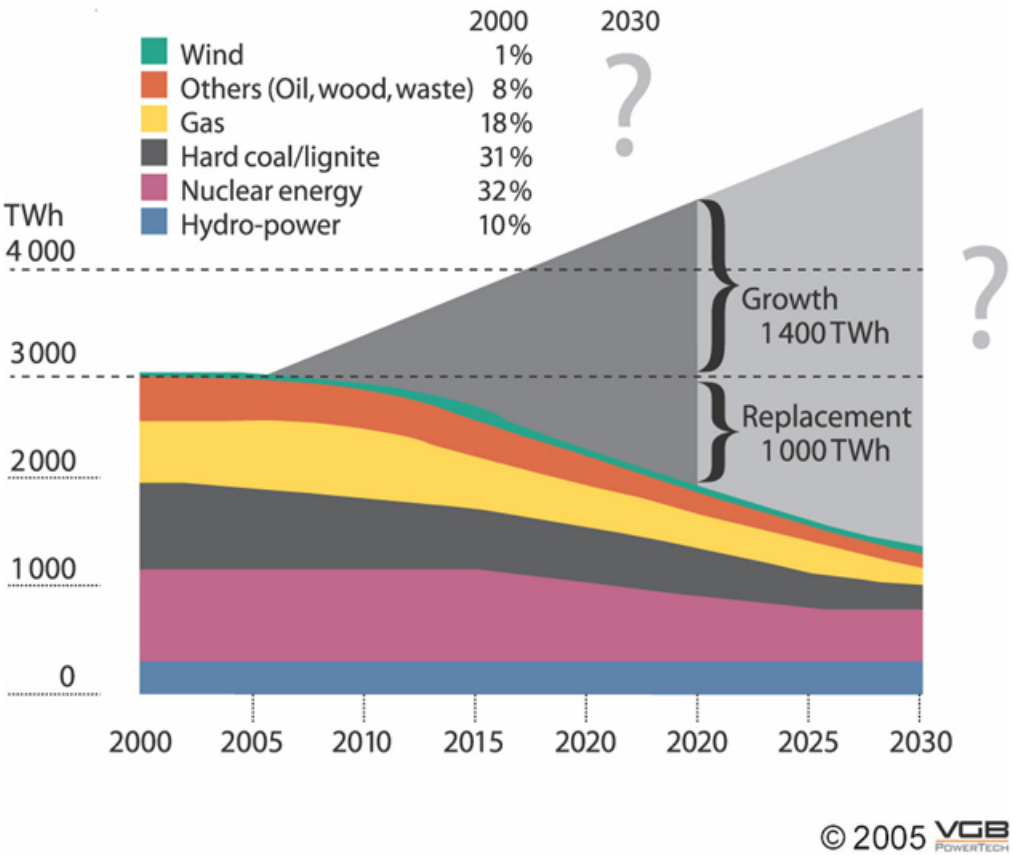
The European power plants are aging - half of the existing capacity will probably be decommissioned before the year 2030

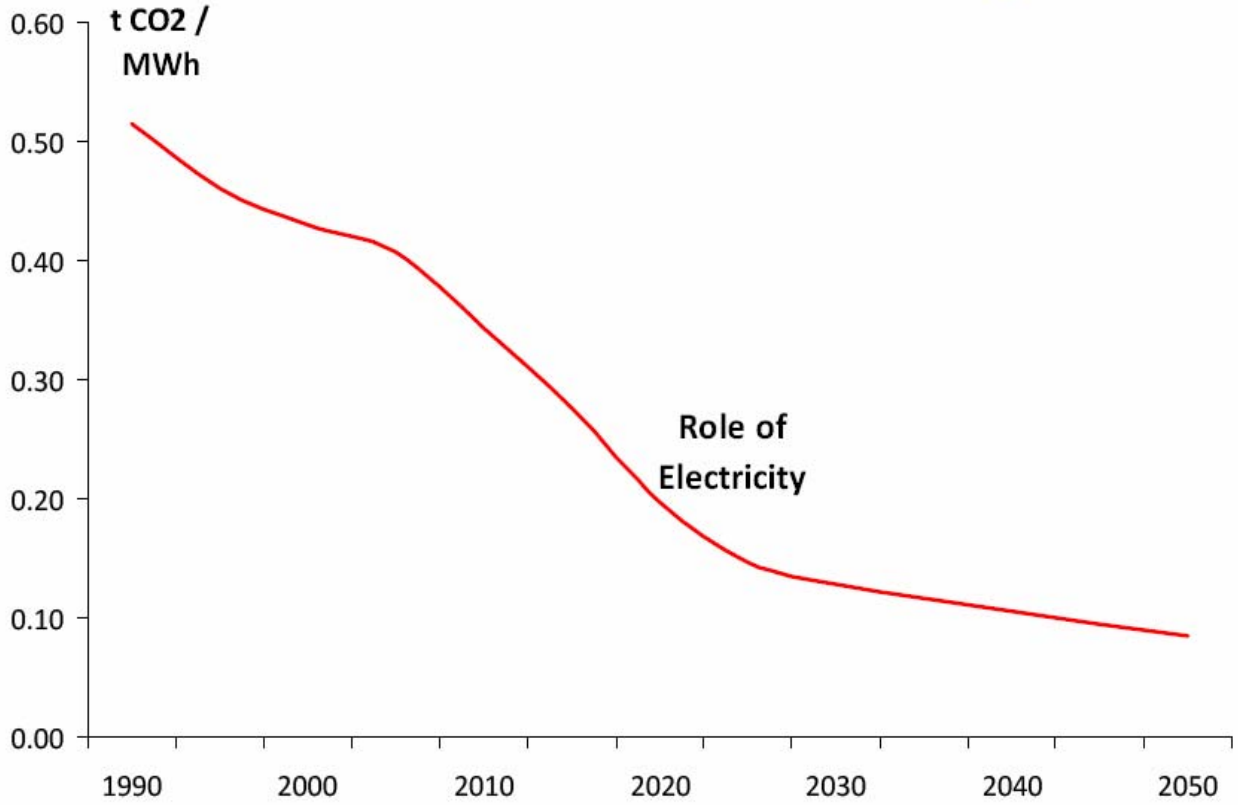


Source: IEA, World Energy Investment Outlook, November 2003

A window of opportunity for at rapid change to low-CO2 technology



Towards a low-carbon electricity mix



Source: PRIMES

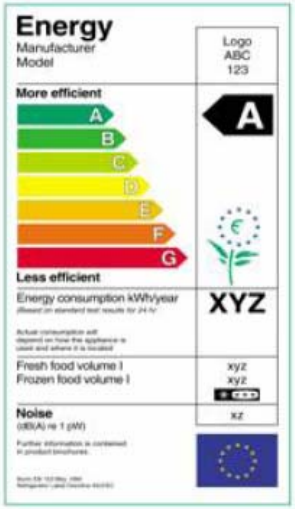
Unleash energy demand-side efficiency

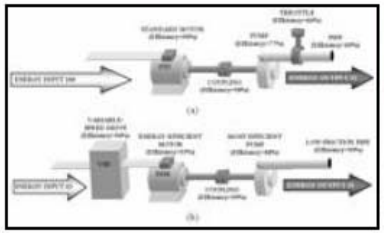
Industry

PHEV

Rail transport

Household Appliances



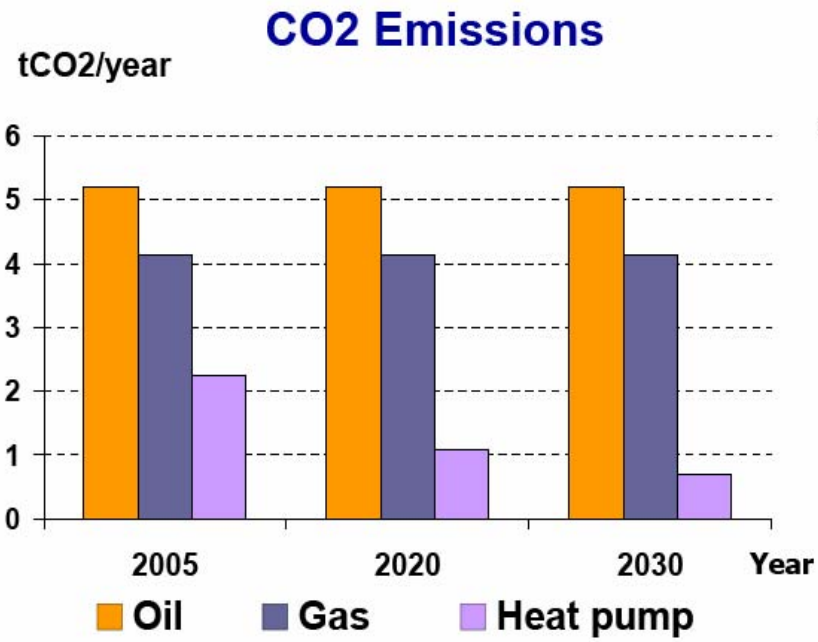


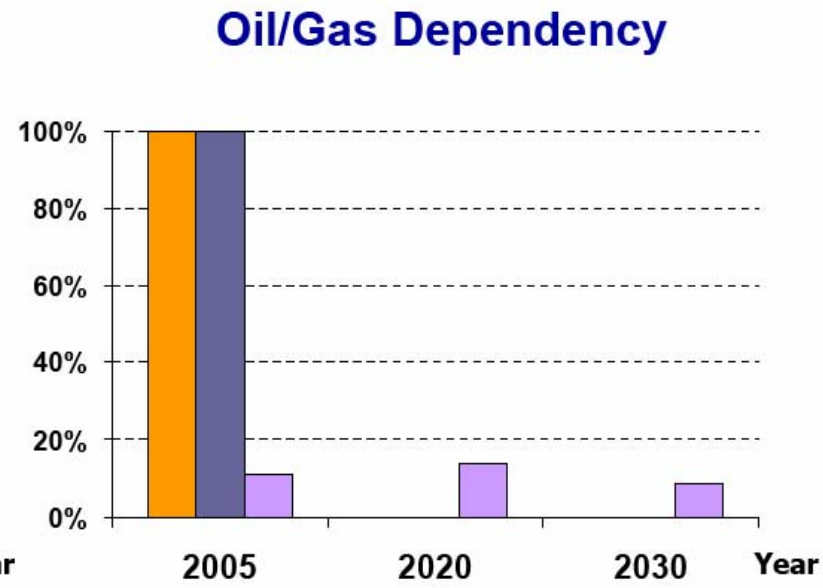
Motor Systems

Heat Pumps

Lighting

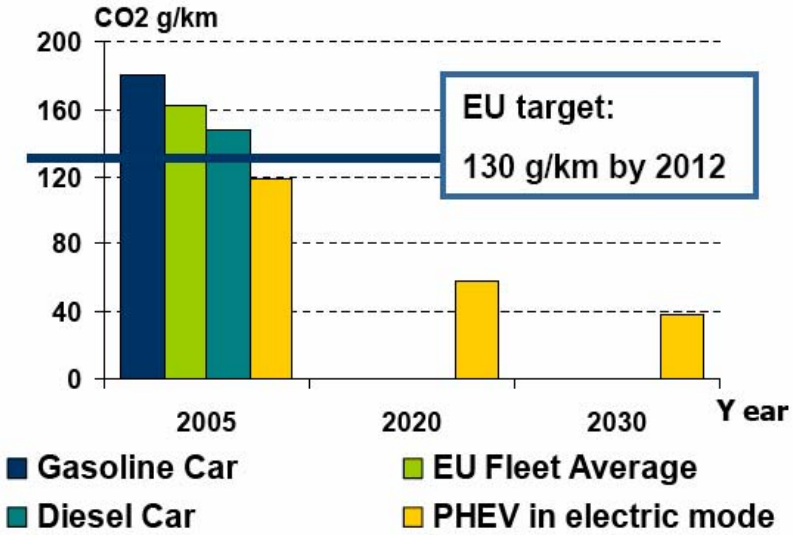
DEVELOPING SYNERGIES: HEATING A HOUSE
impact of electric heat pumps



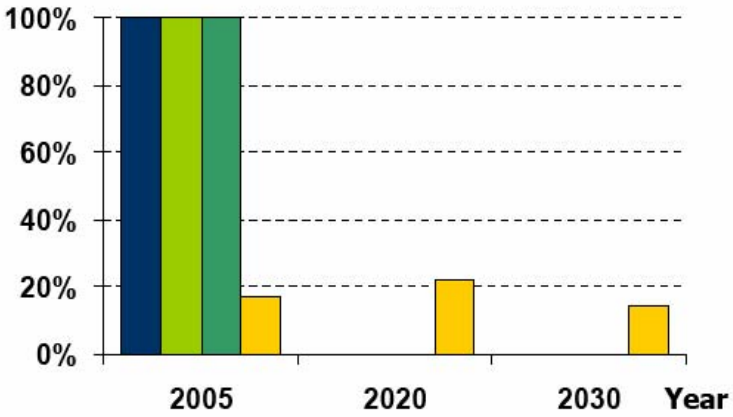


DEVELOPING SYNERGIES: DRIVING A CAR
impact of Plug-in Hybrid Electric Vehicle in electric mode

CO2 Emissions



Oil/Gas Dependency



The “Plug-in Hybrid” may offer the solution to reduce oil considerably also in transports

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Sweden is rich in potentials

Probably the best conditions in EU for new CO2-low production:

- Hydro power
- CHP on biomass or Natural Gas
- Wind power
- Nuclear power

Sweden has an important role to play in the implementation of Europe's climate policy

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Thank you for your attention!

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