Measures to decrease fossil fuel dependency for heat and electricity generation – Sweden as a case

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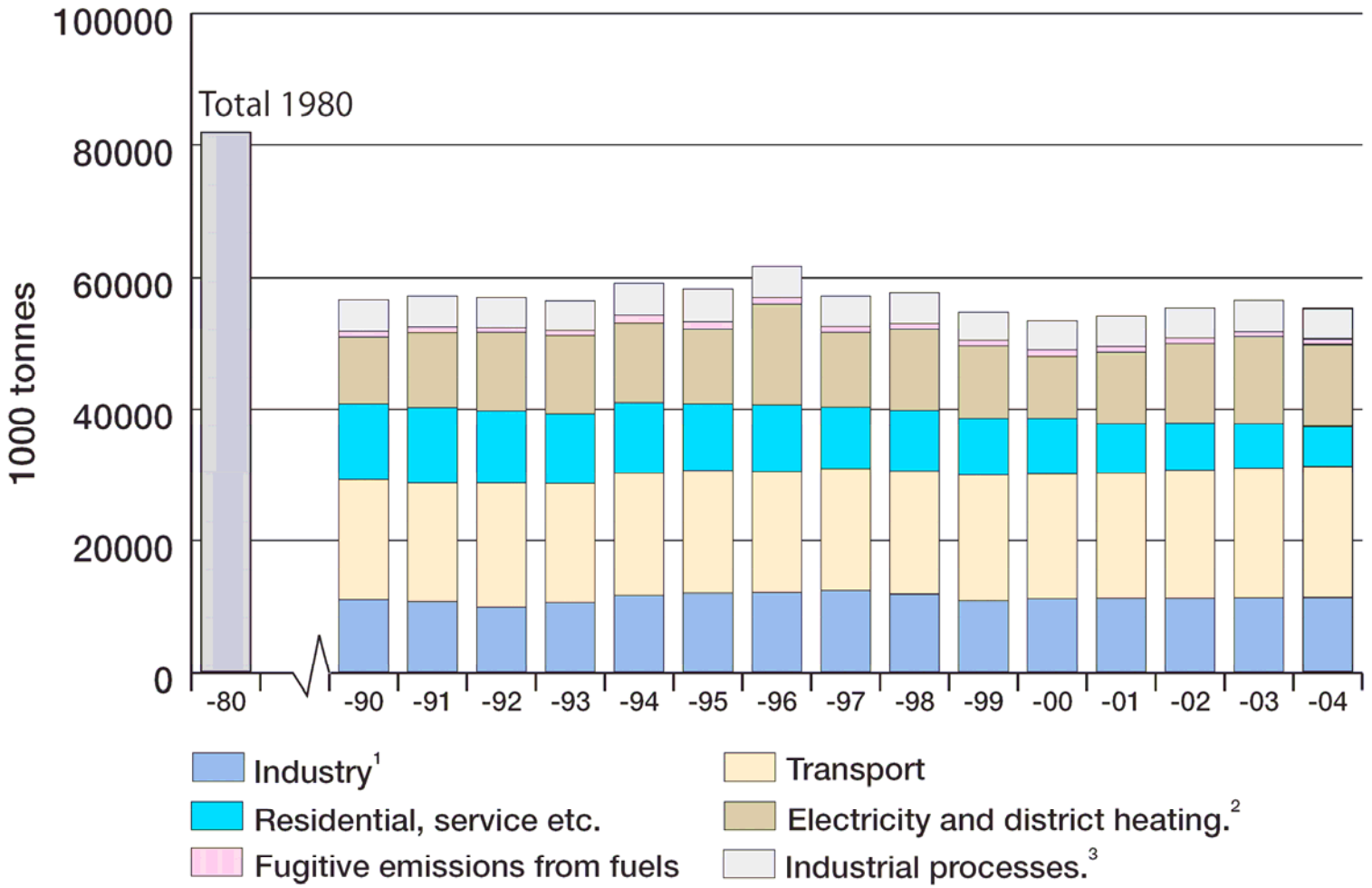
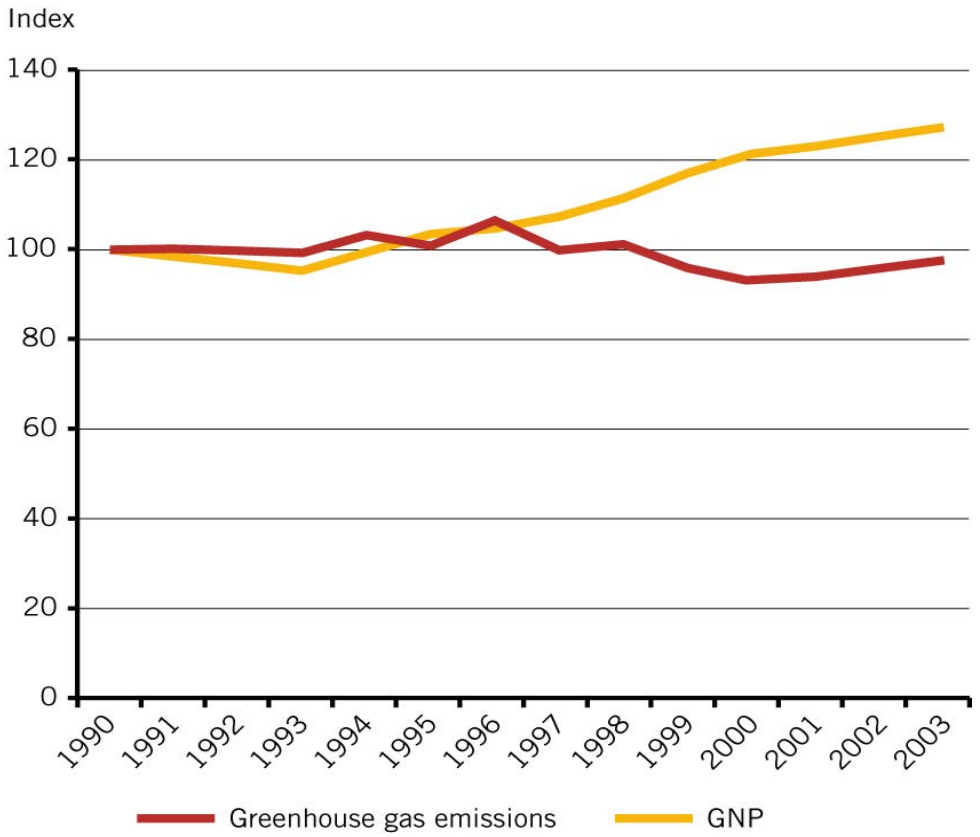
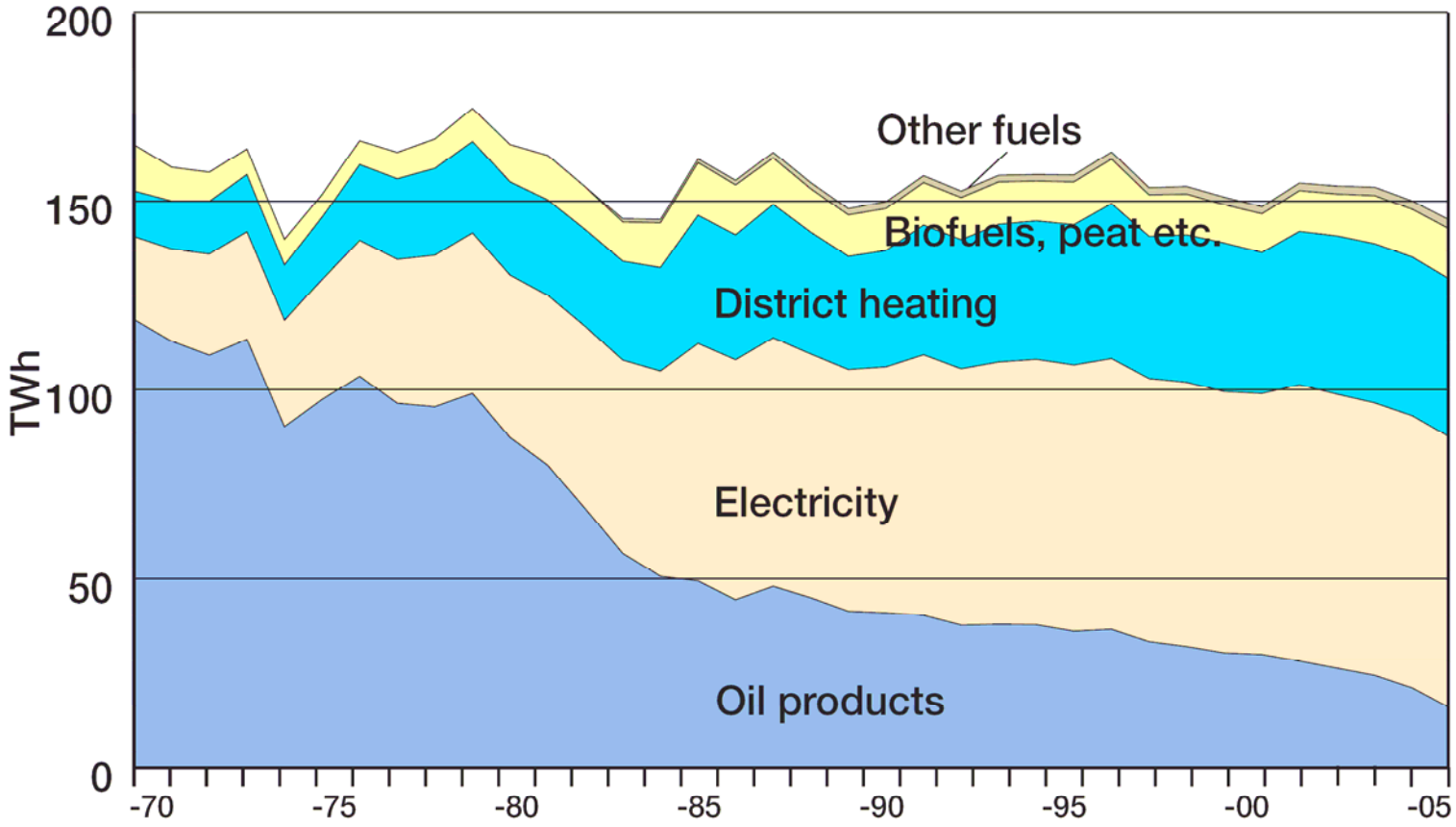
Carbon dioxide emissions in Sweden, 1980, 1990-2004



GHG emissions and economic growth have been decoupled

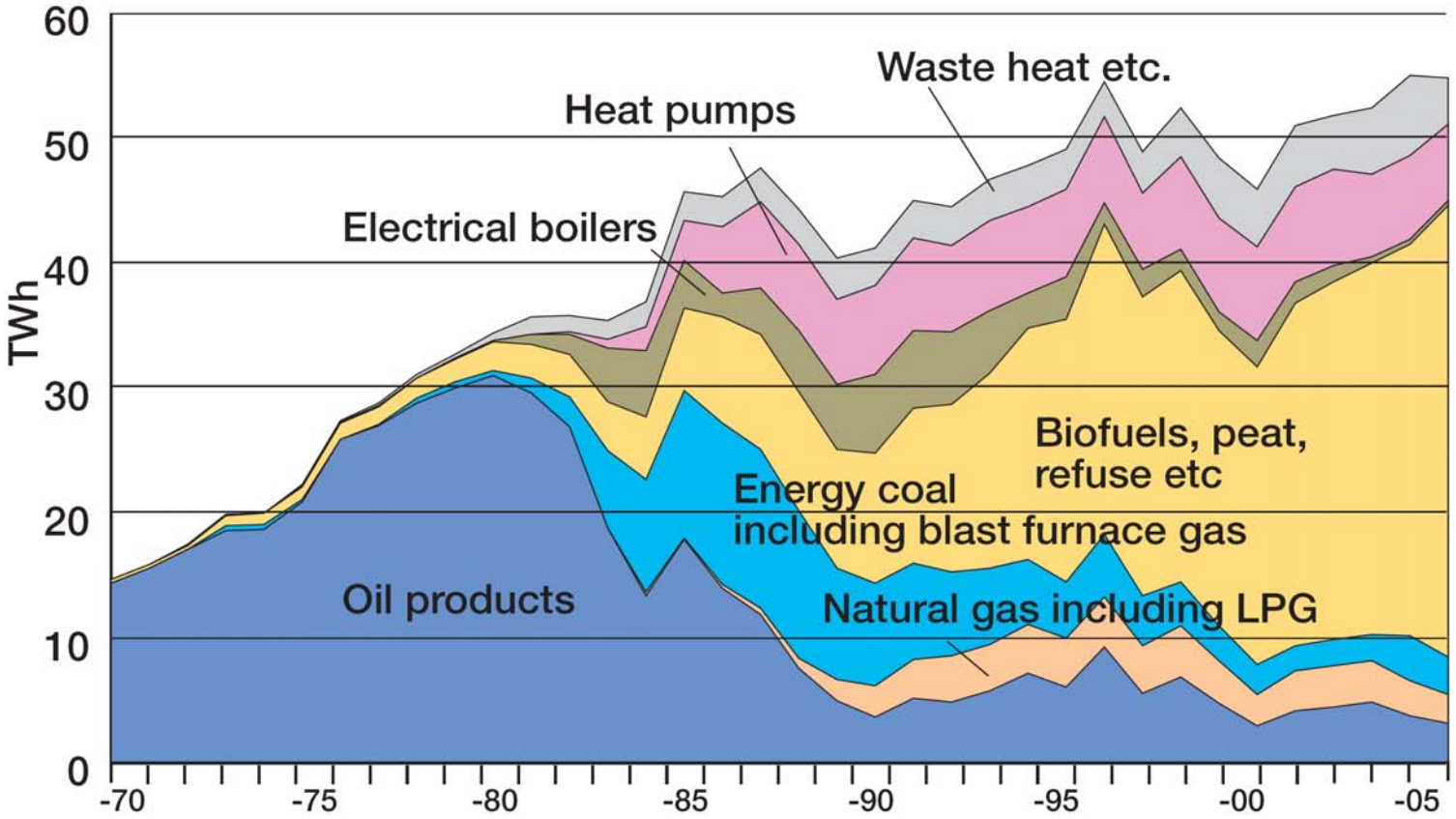


Final energy use in residential and service sector 1970-2005



Source: Swedish Energy Agency

Energy input in district heating 1970-2005

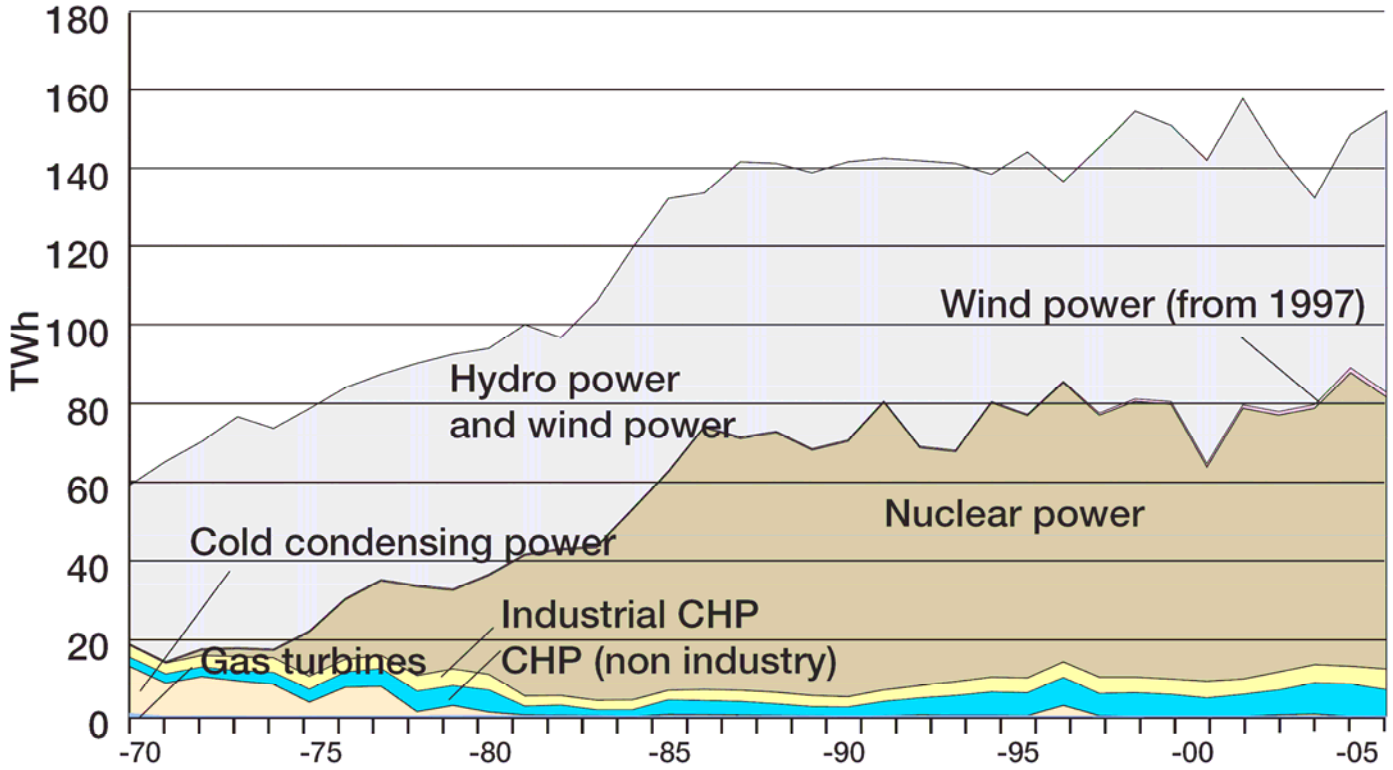


Source: Swedish Energy Agency

District heating systems are strategic resources in environmental policy…..

- They reduce local pollution
- They are feasible for efficient utilisation of biomass
- They enable utilisation of industrial waste heat and energy from waste incineration
- They increase the potential for efficient cogeneration of heat and power

Electricity production in Sweden, by source, 1970-2005

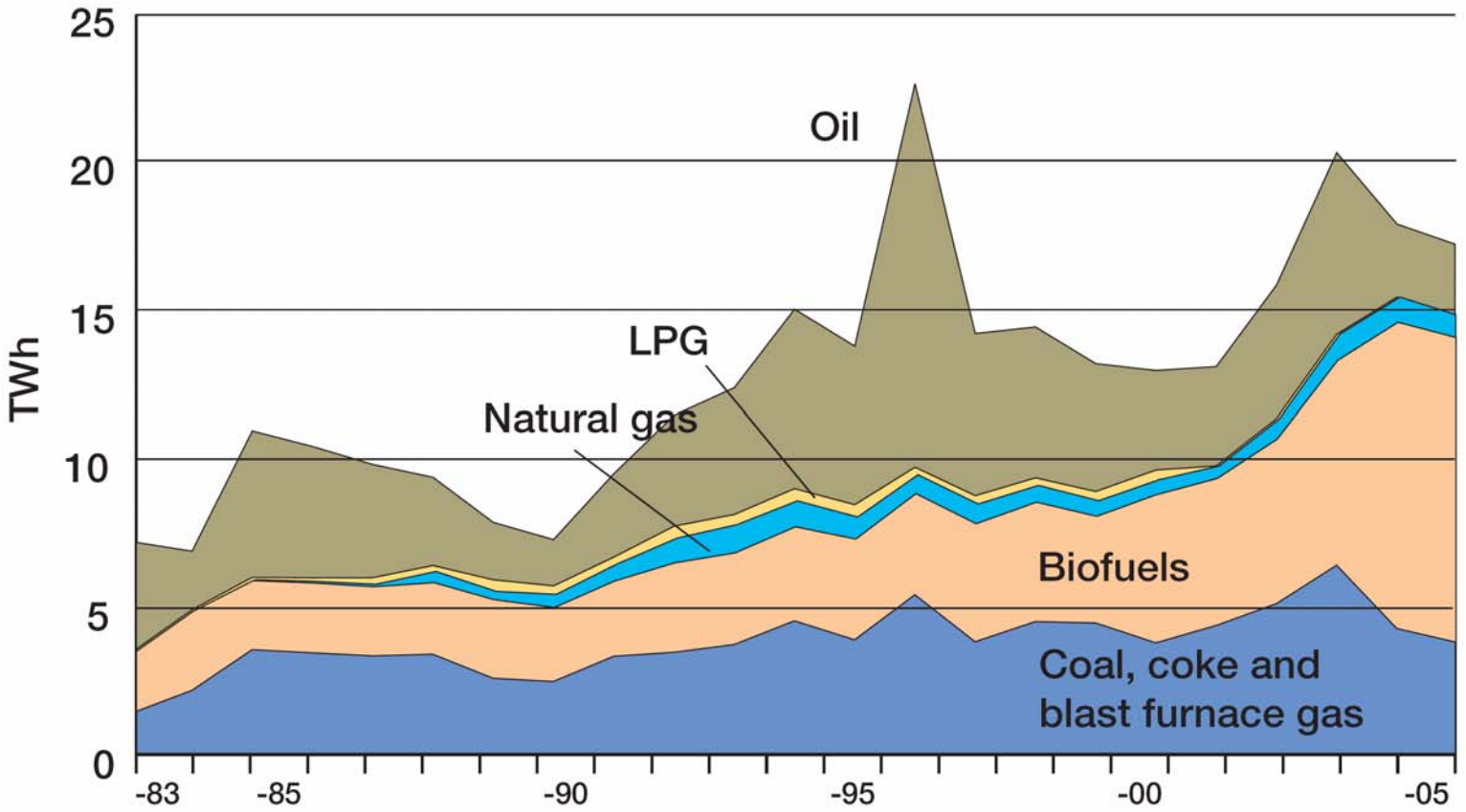


Source: Swedish Energy Agency

Green certificate system

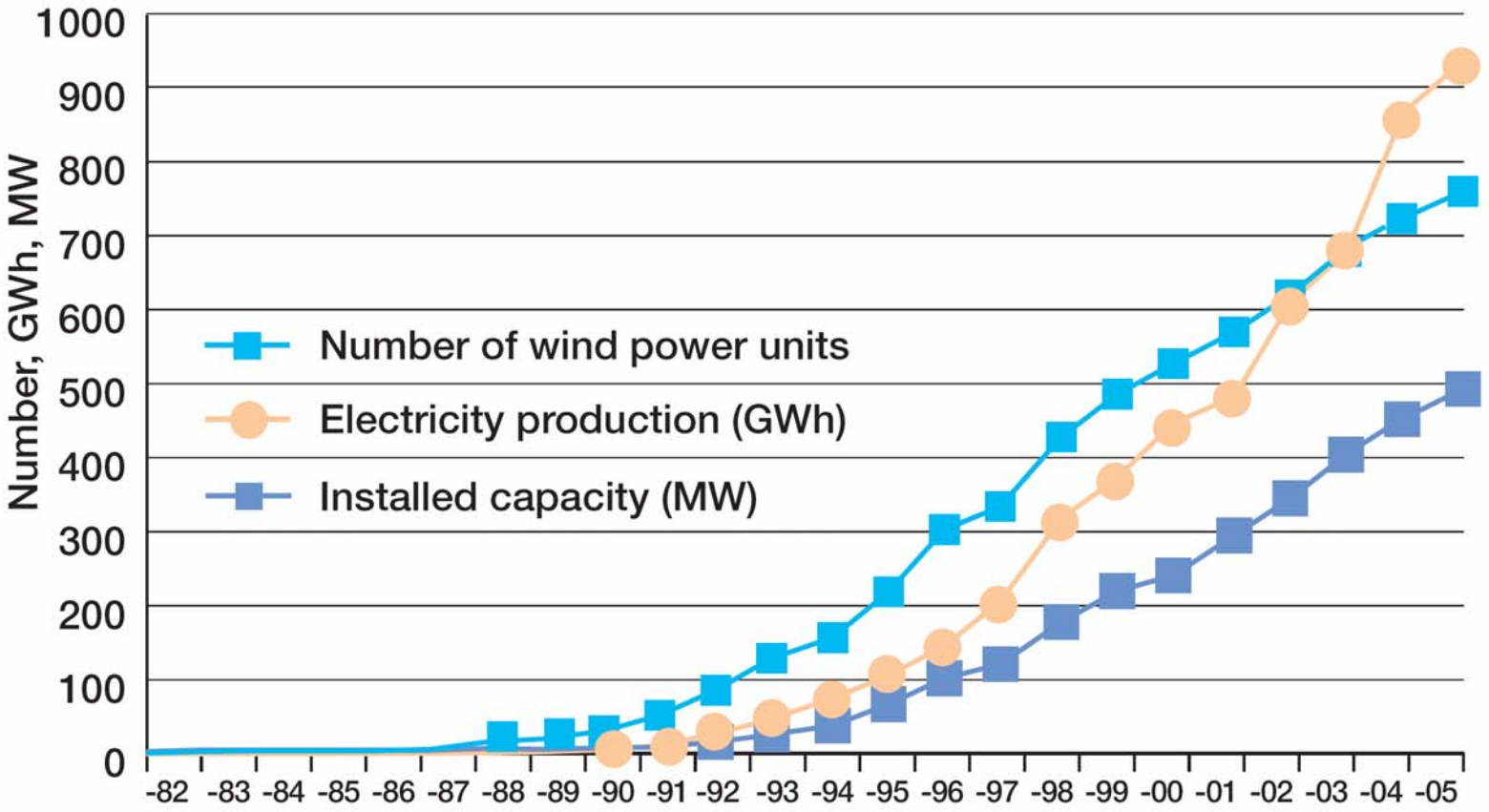
- The aim is to increase renewable electricity by 17 TWh/yr by 2016 (Today Sweden´s total electricty production is about 150 TWh/yr)
- A significant expansion of both biomass CHP and wind power has been realised during recent years
- By 2020, electricity production is estimated to be 20 TWh/yr higher than demand
- Fossil fuel based production estimated to be apppr 10 TWh =6-7%

Fuel input for electricity (excluding nuclear) 1983-2005



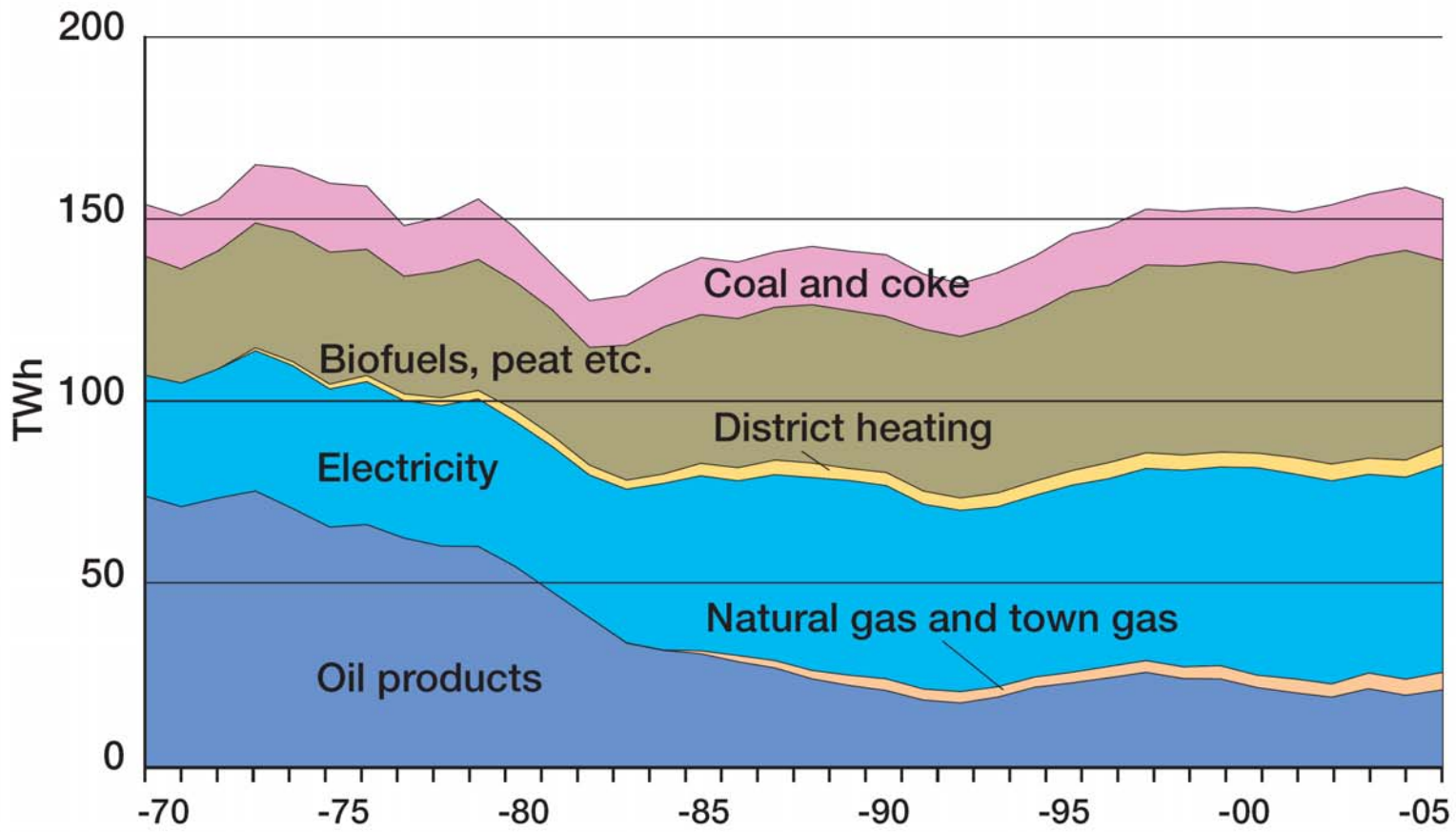
Source: Swedish Energy Agency

Wind power production in Sweden 1982-2005



Source: Swedish Energy Agency

Final energy use in industry 1970-1995.



Source: Swedish Energy Agency

Factors important for low fossil fuel use for heat and power in Sweden.

- Focus on oil substitution since the 1970s – including expansion of hydro and nuclear power
- High carbon tax for fossil fuels for heating purposes (approximately 100 Euro/tonne CO_2 , lower rate in industry)
- Currently the green certificate system supports expansion in biomass and wind power
- The important forest industry uses and supplies large amounts of bioenergy
- Large renewable energy sources!