

# A General Overview of Swedish Bioenergy Industry

Michigan February 2008

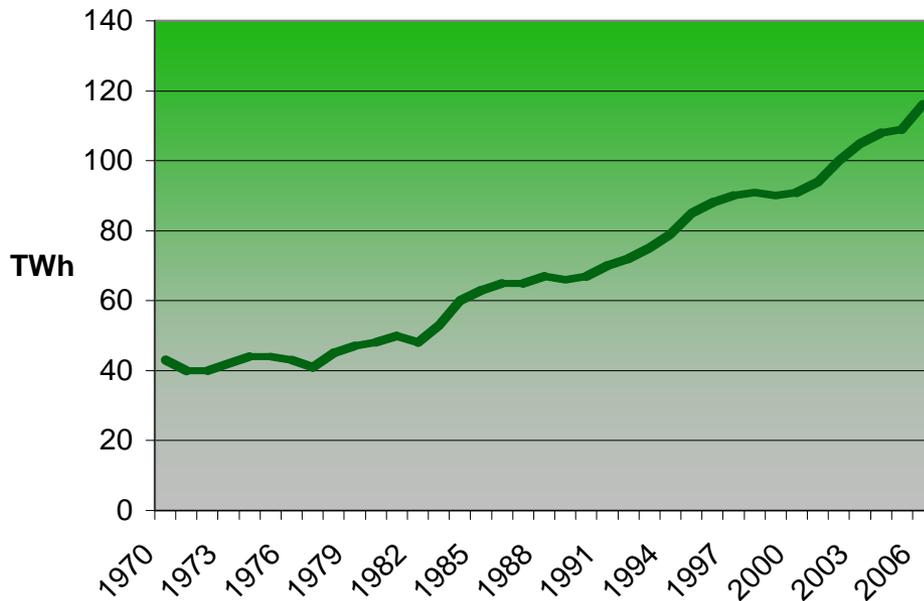
Kjell Andersson

# Swedish Bioenergy Association

- Non governmental, non profit organisation
- 400 members, 300 companies & organisations
- Representing both supply and demand of fuel, equipment and knowledge
- Aim: to increase the use of bioenergy in an economically and environmentally optimal way

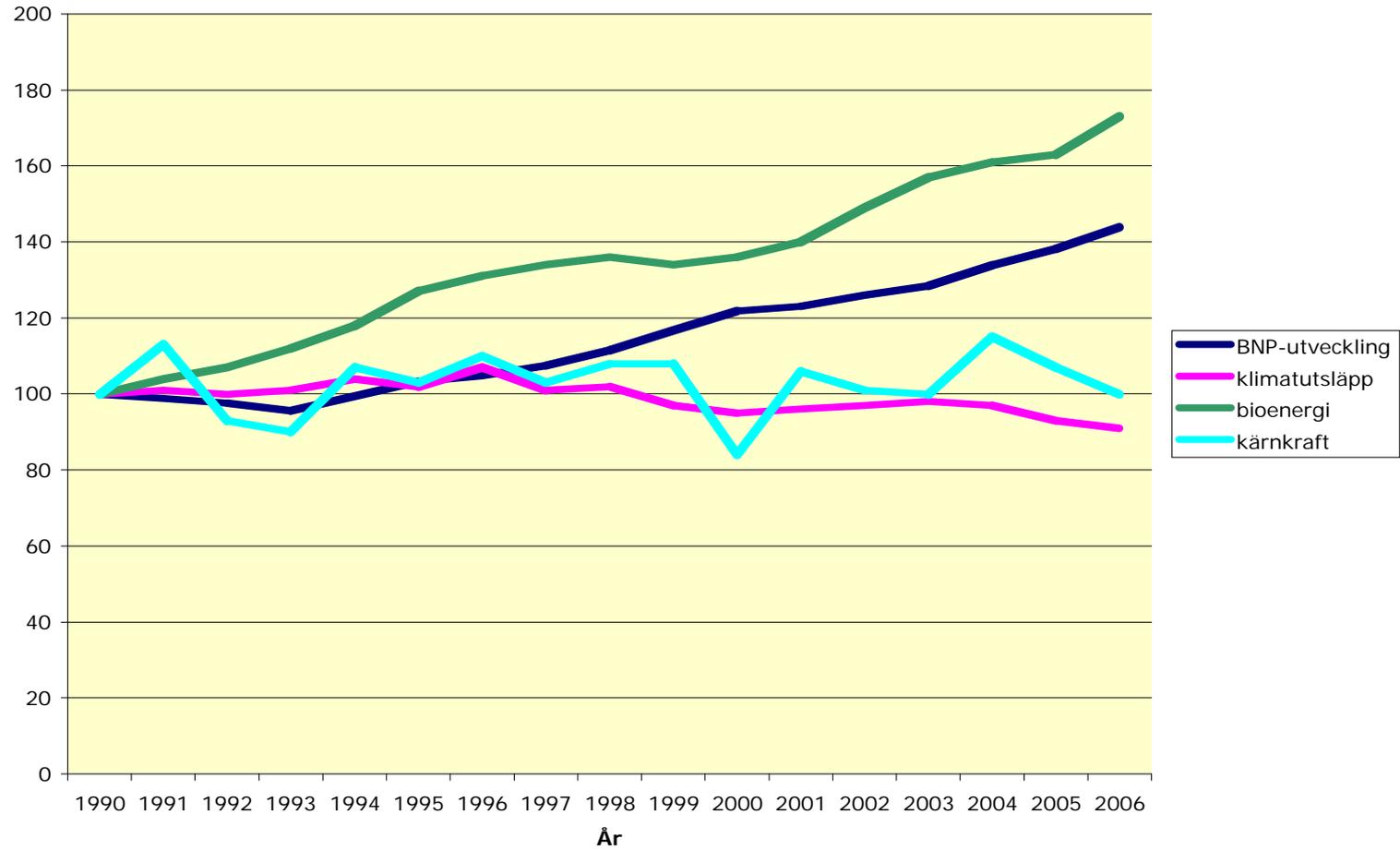
# Bioenergy development in Sweden 1970-2005

The bioenergy share of the total energy use



- 1970: 9%
- 1980: 11%
- 1990: 15%
- 2000: 20%
- 2006: 27%

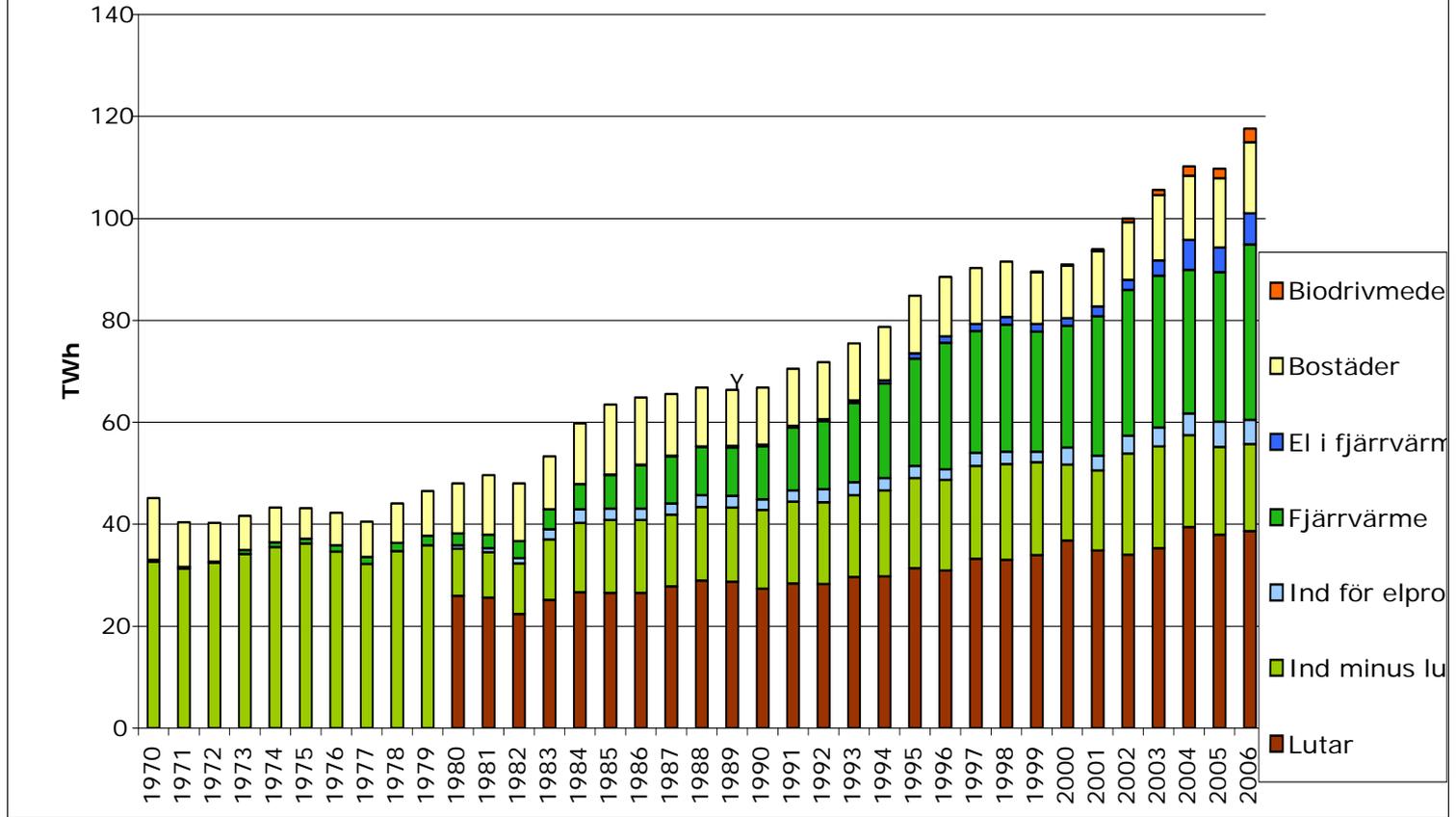
### Mer bioenergi gav lägre klimatutsläpp



# Driving forces for bioenergy development

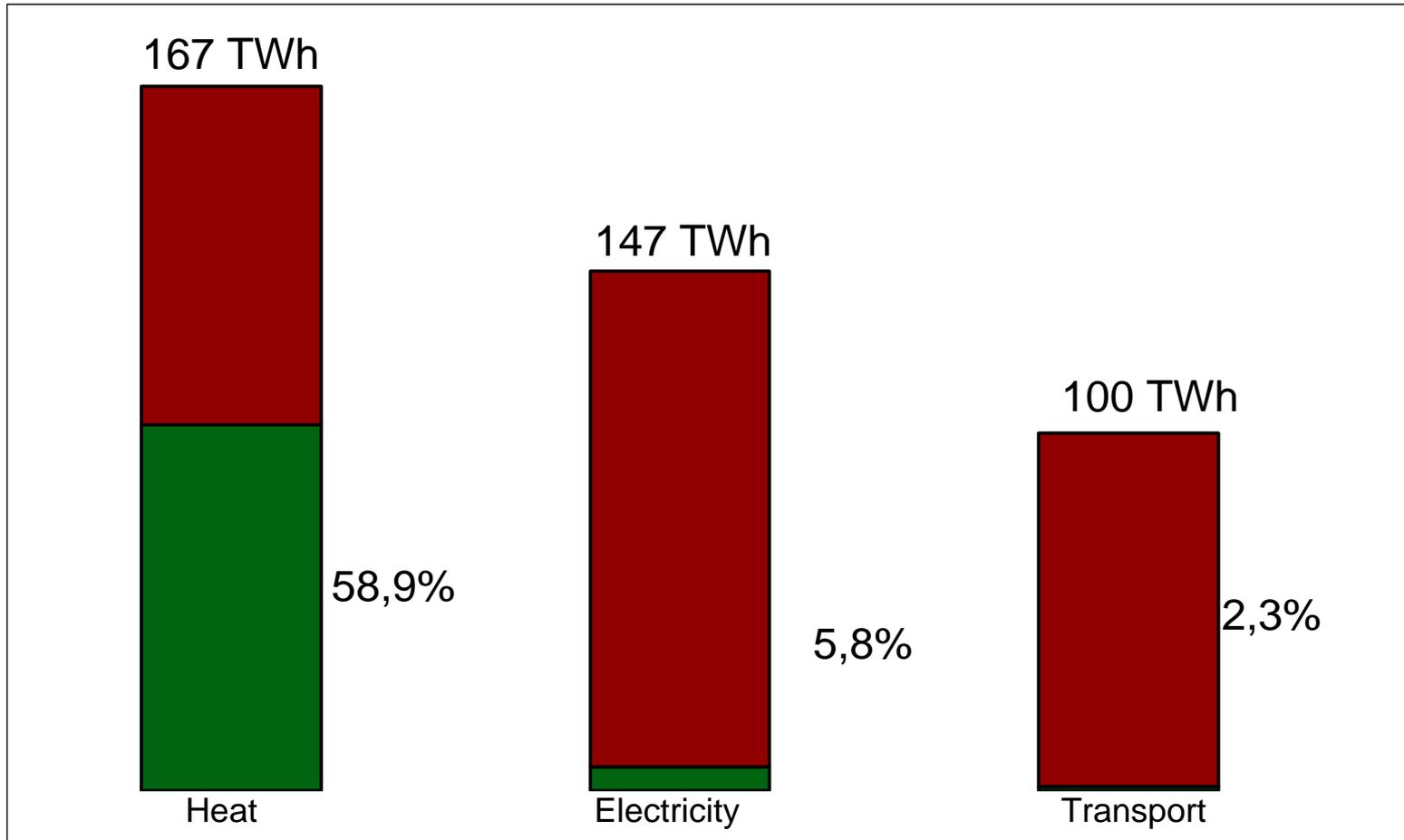
- External
  - Climate Change
  - Security of supply (EU)
  - Increased oil- and gas prices
- National
  - Political will in Sweden
  - Industrial traditions and relevant raw material resources

## Bioenergy use 1970.



Bottom to top: black liquor, industry, industrial biopower, district heating, district heating biopower, firewood and pellets, biofuels for transport.

# Share of bioenergy in total use in 2005

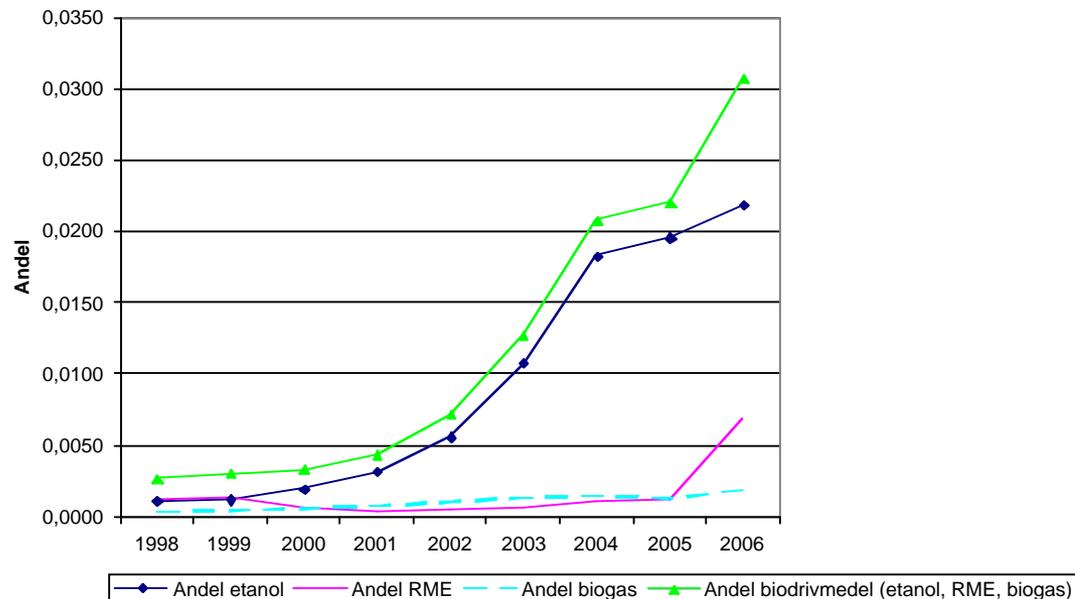


# Current trends in Sweden

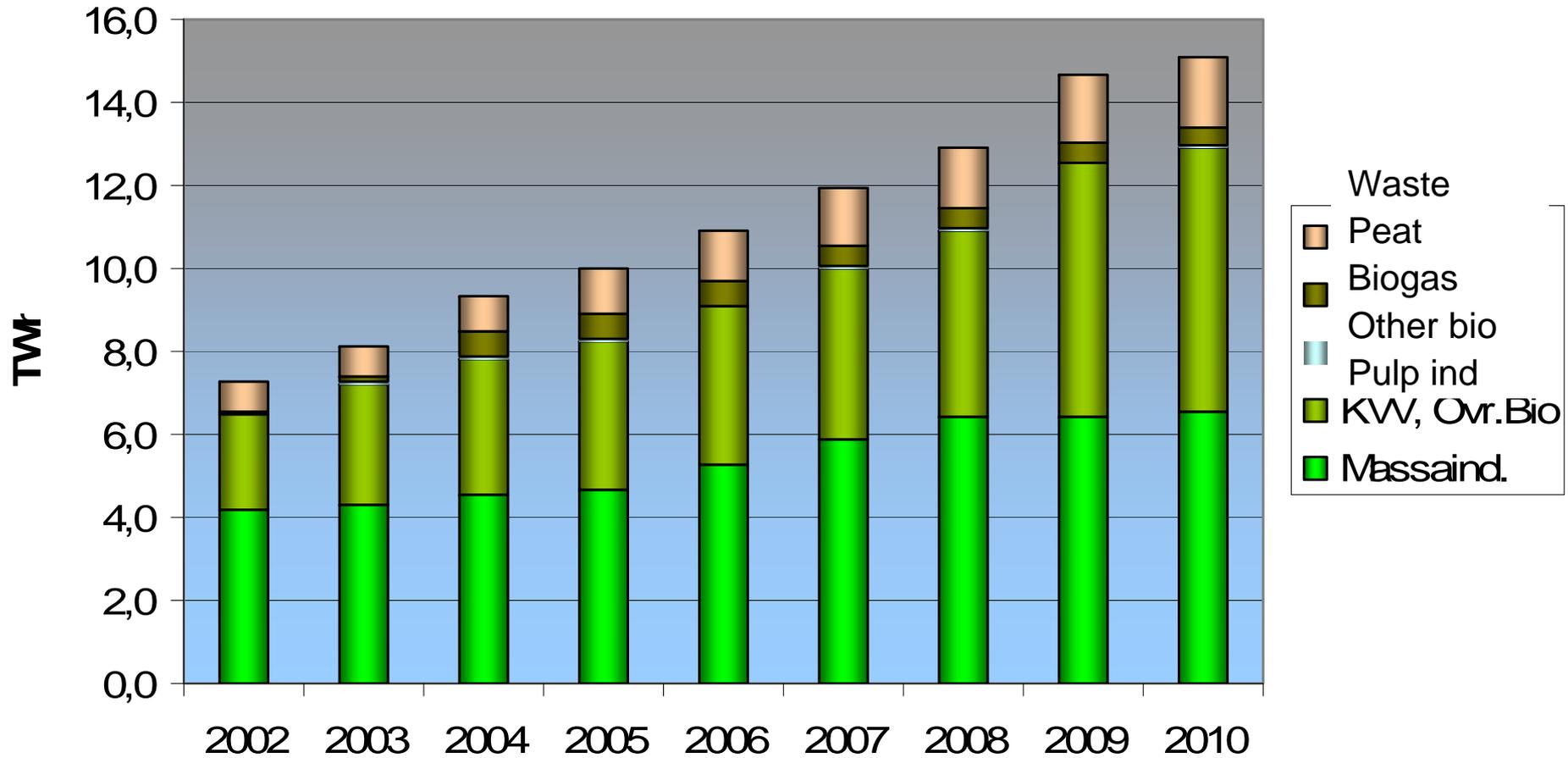
Bio energy sectors growing fastest:  
Liquid biofuels, Biopower, Pellets,

# Share of biofuels on the transport fuels market in Sweden

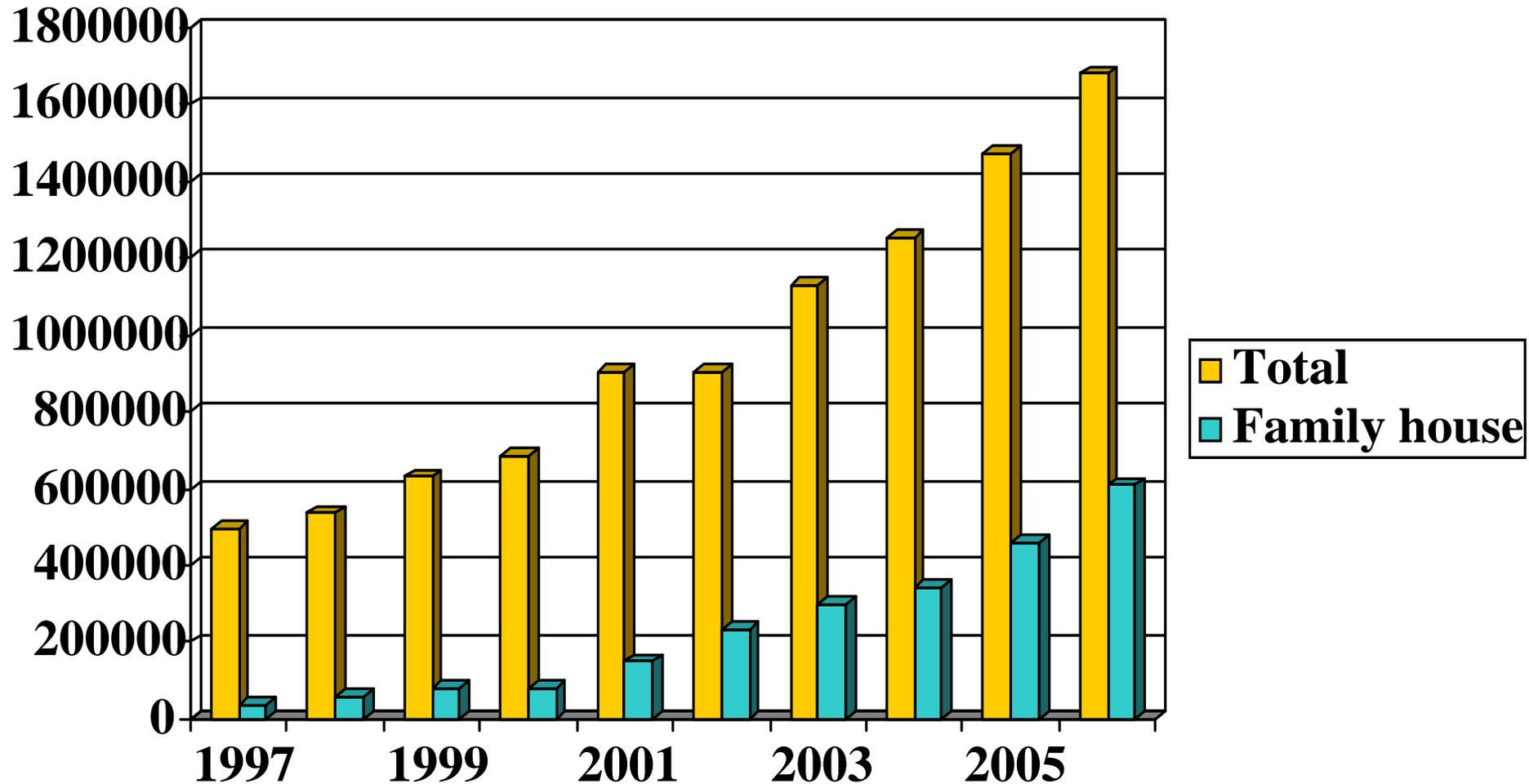
20:2. Andel biodrivmedel i f rhold till total m ngd bensin, diesel och biodrivmedel utifr n energiinneh ll



# Biopower 2002-2010



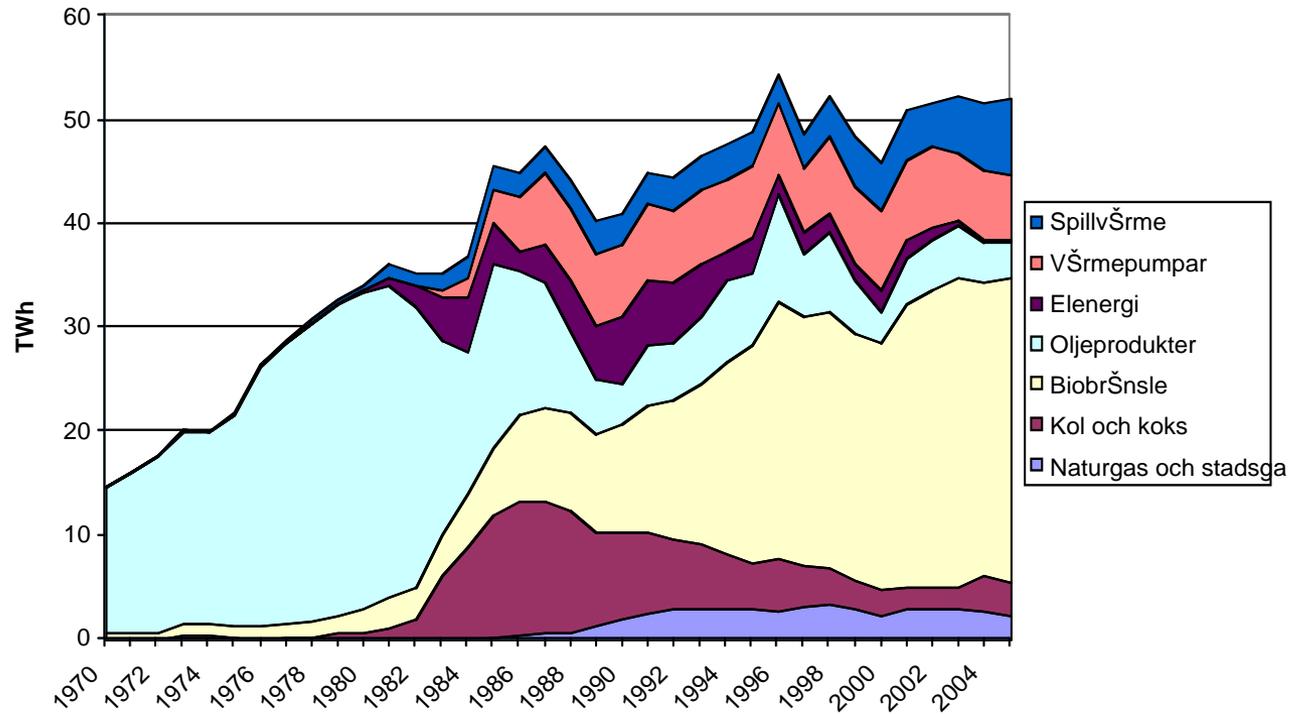
# The Swedish pellets market (tonnes/year)



Source: Swedish Association of Pellets Producers

# Now 66 percent bioenergy in district heating

E. Totalt tillförd energi för fjärrvärmeproduktion fördelad på olika energibärande



# Forest residues - tops, branches and trees of no industrial value



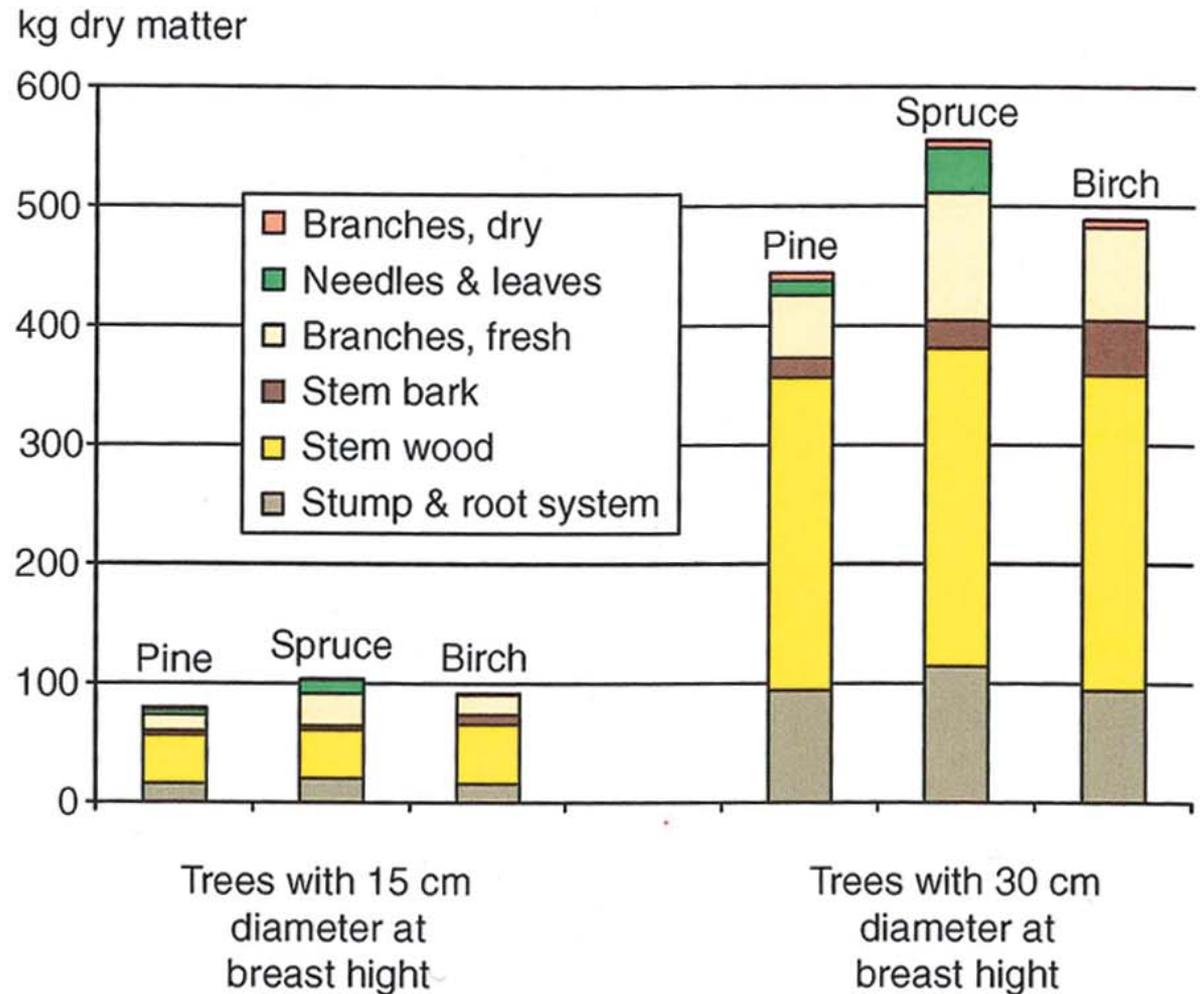
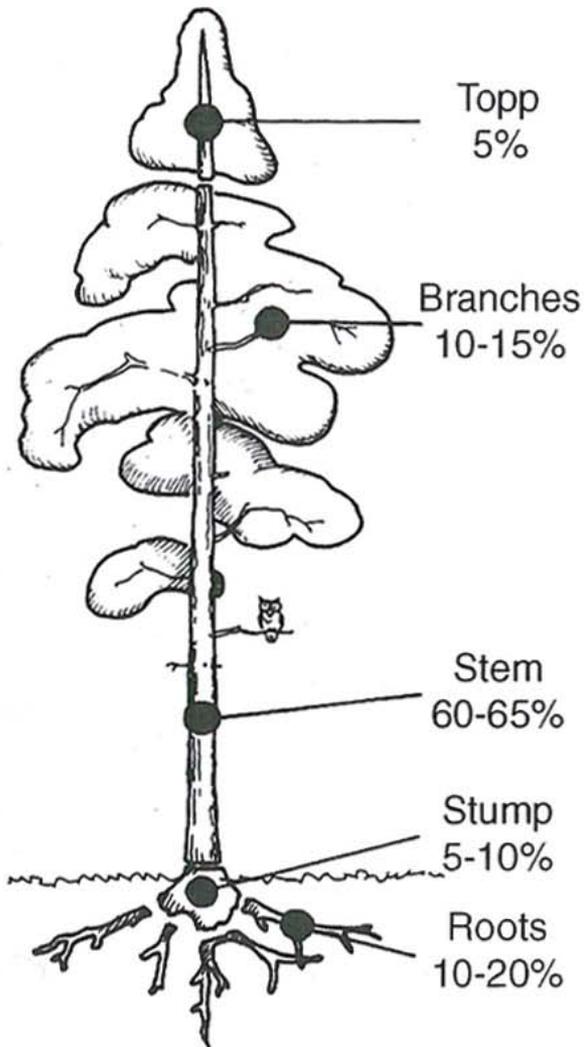
# Tops and branches harvested after clear-cutting



Residues from felling stacked to dry over summer, to be chipped



# Biomass available after cutting down the trees



# Traded wood fuels in Sweden 2005

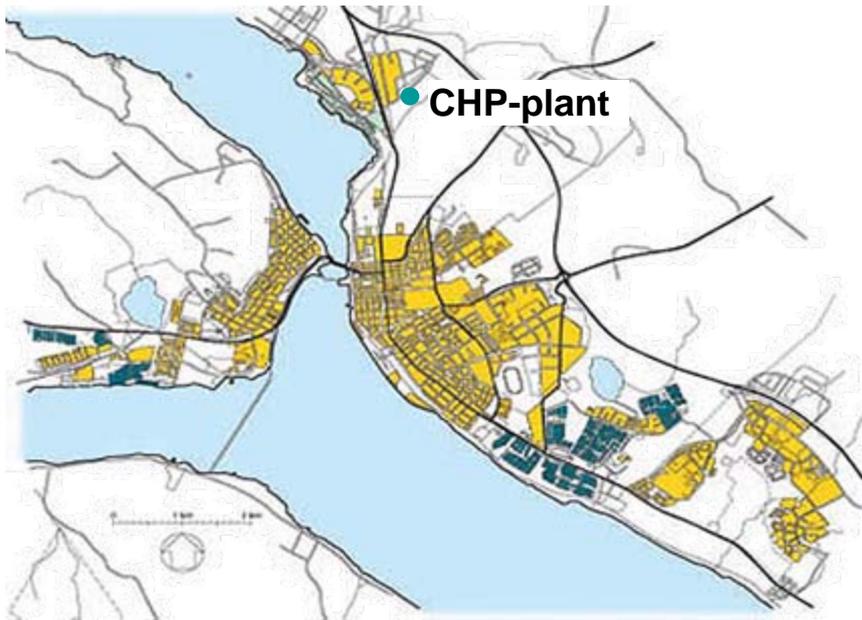
# Users of traded wood 2005

# Example CHP in Ostersund



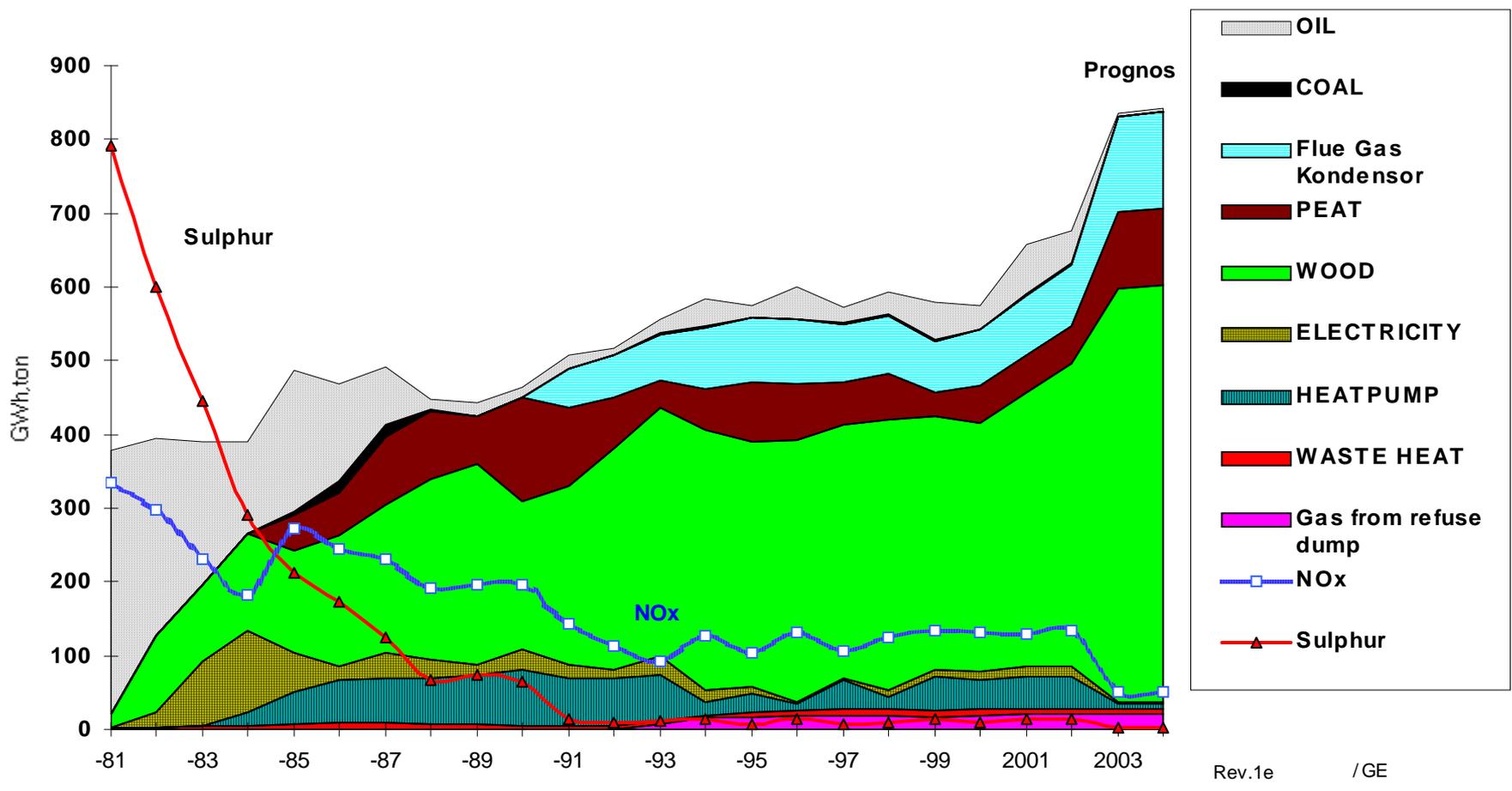
# District heating in Ostersund

- Investment in new CHP (about 100 million \$)
  - In operation December 2002
  - Covers 80 percent of the heat demand in Ostersund (500 GWh thermal/year)
  - Covers 20 percent of the total electricity demand (200 GWh electric)



# Fuel use Östersund 1981 - 2004

ENERGY BALANCE DISTRICT HEATING  
ÖSTERSUND



# Biofuels waiting to be burned



# Handling forest residues



# Bark and other residues



# Recycled wood



# Ash recycling from clean wood fuels

- A way to compensate for woodfuel removal
- A way to fertilize stands for higher yield
- A substitute or complement for liming
- An environmentally positive way to get rid of a waste problem

Either way - a strong increase in ash recycling is a positive development!



# Driving forces behind the growth in the heating market

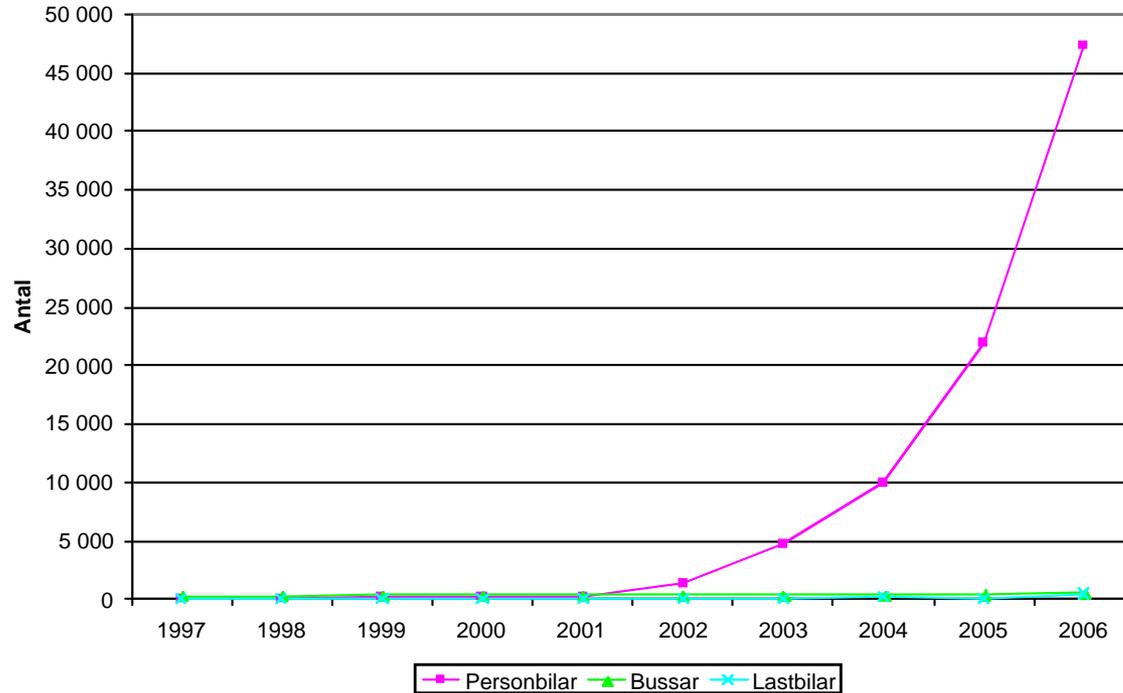
- CO2 tax introduced in 1990/1991 - on all fossil fuels
- Further raised CO2 tax paired with lower income tax
- Support for district heating
- Investment grants for biofuel projects
- Investment grants for conversion from oil heating to heating with pellets.

# What we need to make further growth possible

- Stable prices on wood fuels
- Stable incentives like the CO<sub>2</sub>-tax and the green certificates
- Technical development to cut costs, to be able to collect forest residues from thinning, and for energy crops
- Better logistics - transports by train and boat
- Political support on all levels (local, national, European)

# Total number of Biofuel cars in Sweden

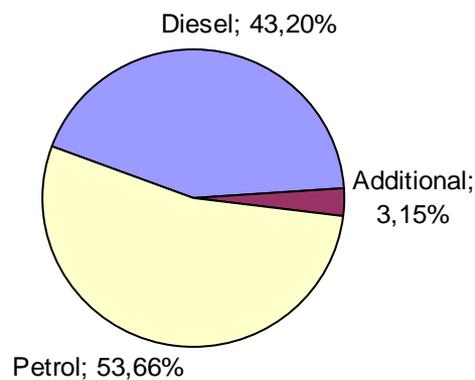
20.1. Totalt antal registrerade biodrivmedelsfordon



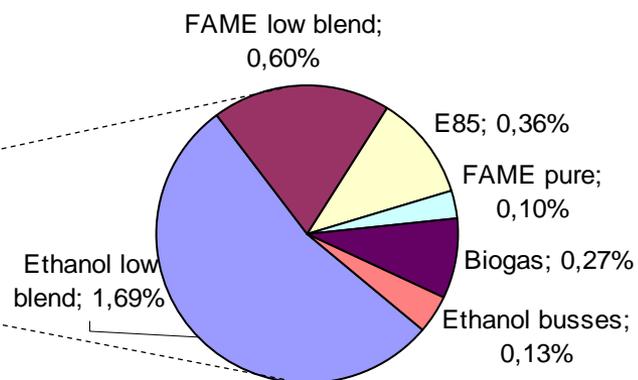
**SVEBIO**

# Transport fuels – Sweden 2006

**Total**



**Additional**



# Driving forces behind the quick growth of liquid biofuels sector

- Carbon (CO<sub>2</sub>) taxation since 1991
- Project support (tax deduction) for the first ethanol factory
- Public support for ethanol vehicles (buses in Stockholm, procurement FFV cars)
- Good support from some oil companies (e.g. OK-Q8)
- Long term tax exemption for transport biofuels
- Low level blending expands market
- Requirement for gas stations to offer biofuels
- Free parking for environmental friendly cars and exemption from congestion charges
- Government subsidy for environmental friendly cars (2007)
- Etc, etc...

# Sweden's first ethanol factory in Norrköping

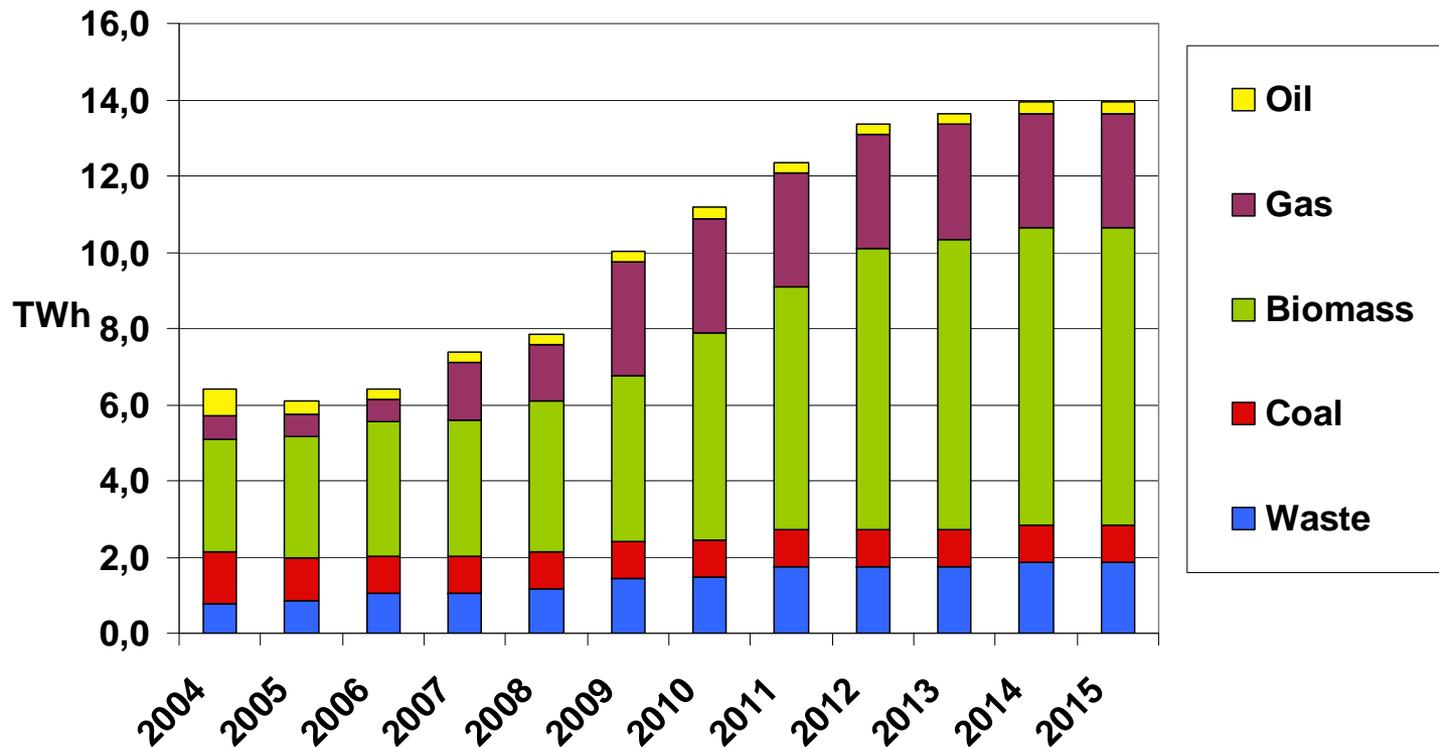


# Ethanol from cellulose - Örnsköldsvik



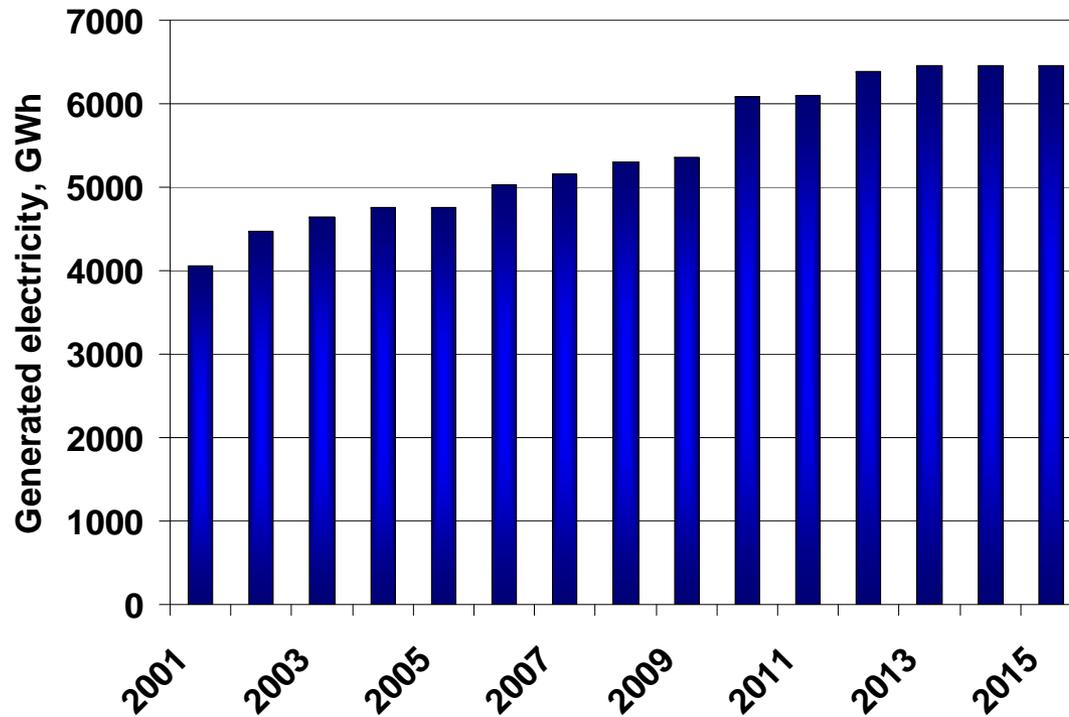
# Electricity from heat and power production 2004 to 2009

Electricity from CHP plants 2004-2015



# Generated Electricity from Forest Industry

Increase in electricity production



# Summary Bio power

- Investment plans in forest and energy industry, € 4.8 billion
- 66 plants; 19 forest industry, 47 energy industry
- In total 6.5 new TWh will be produced, 5 from energy industry and 1.5 from forest industry (Total 2016 about 15 TWh from biomass)

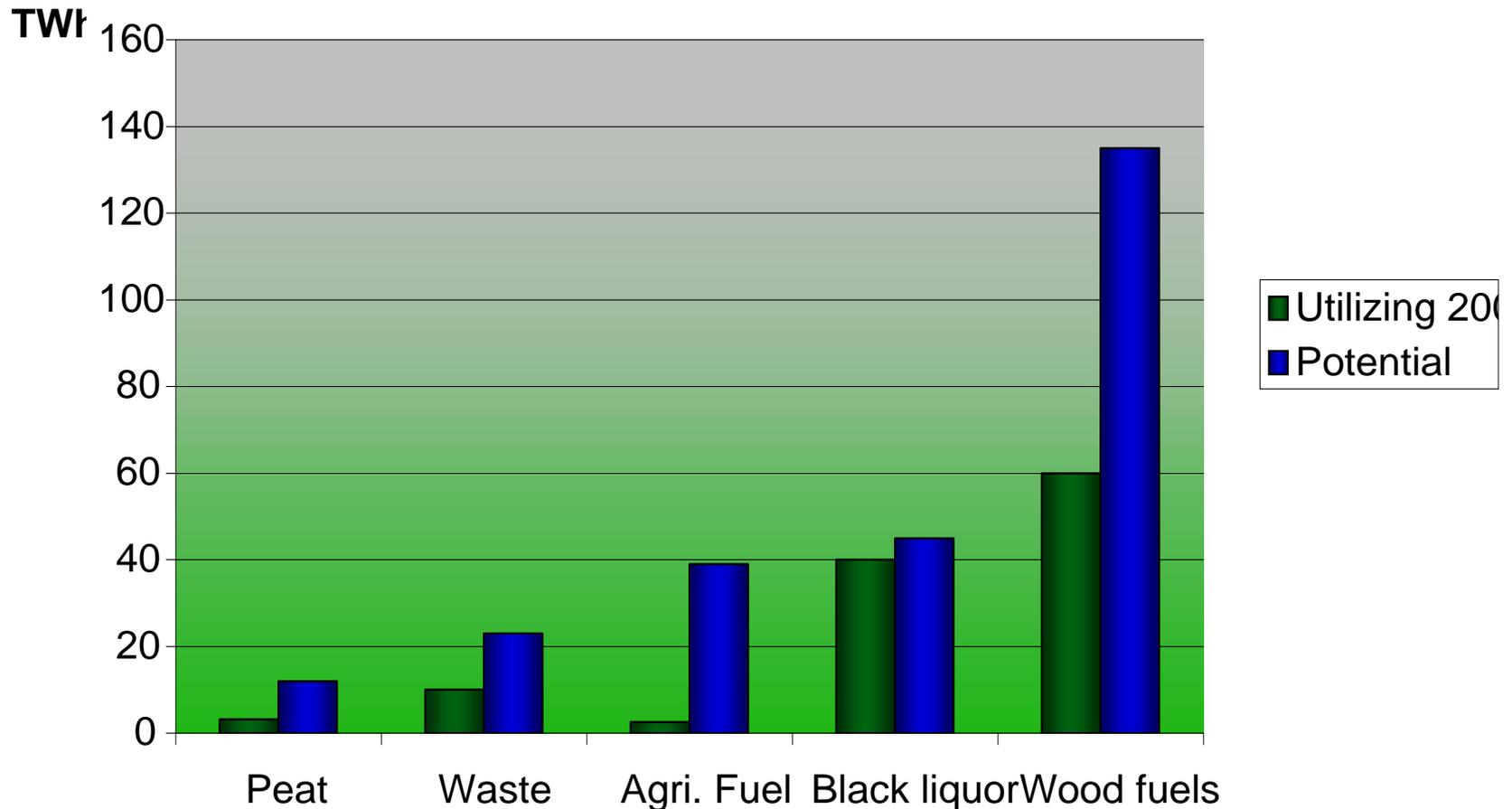
# Bio power policy

- 1991: Investment grants, 25-30%. No CO<sub>2</sub>-tax on electricity, only on heat.
- 1997: Investment grants, 1 billion SEK to biomass based CHP plants
- 2003: 6.5 TWh biopower produced partly as a result of earlier policy
- 2003: Renewable Electricity certificates

How much more bioenergy can we produce and use in Sweden?

Svebio's calculations show that we can double

# Utilization and potentials for different biofuels in Sweden



Sources:

”Utilizing 2006”: Swedish Energy Agency

”Potential”: The Geological Service of Sweden, The Swedish Association of Waste Management, LRF, SLU, Skogsstyrelsen

# Salix - short rotation plantations with willows

- Planted in the spring on regular fields with cuttings.
- First harvest after 3 - 4 years, full harvest after 7 - 8 years. Replanted after 25 - 30 years.
- Grows back from the same stumps.
- Harvested in winter, chipped in the field. No further drying.
- Total area in Sweden 15 000 hectares, most of it planted in early 1990:ies. New plantations 500 - 1000 hectares per year.
- High per acre yield. Low input of energy, thus very good energy and carbon balance.
- Can be used to clean waste water and contaminated soil.
- Contact [www.agrobransle.se](http://www.agrobransle.se)



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Thank you for your attention!

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