

Biomass/Energy-Timber- Pulp/Paper

*Swedish Biomass Equipment, Harvest
Operations and Markets*

What effect will Energy have in the
Future on the Swedish Forestry?

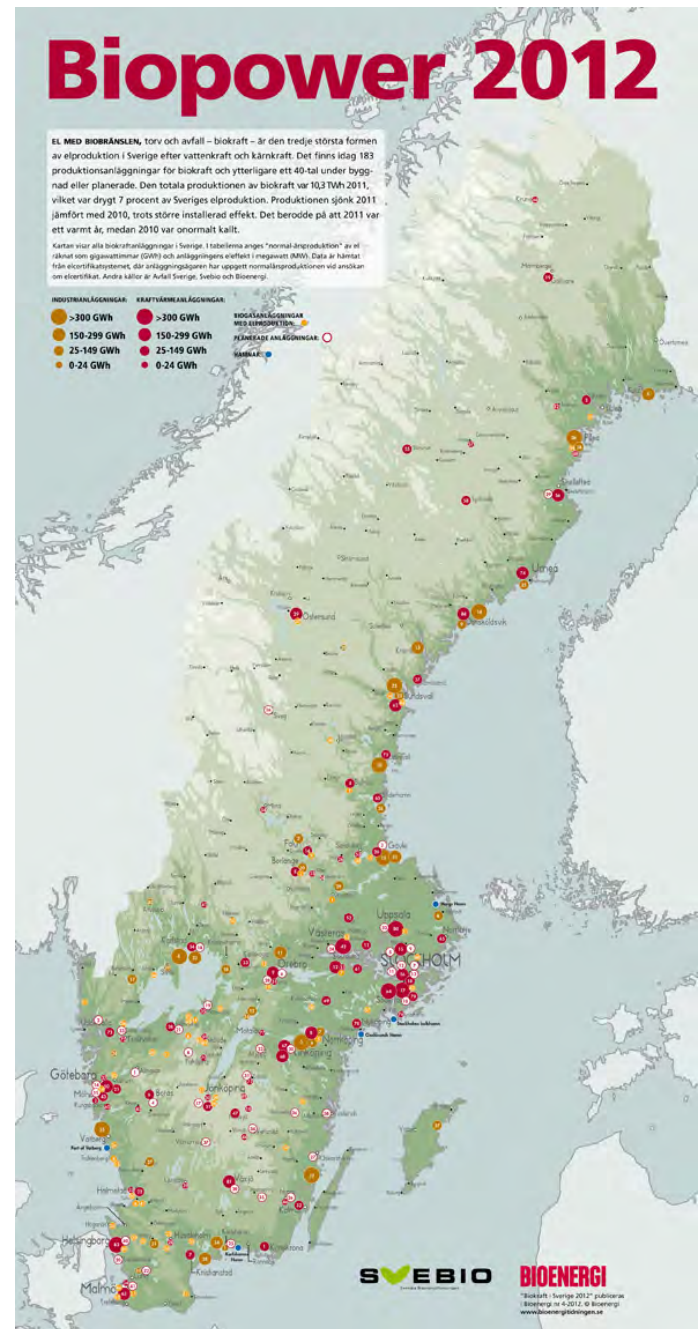


Peter Nyström Head of fuel department



ENKÖPING
Sveriges närmaste stad

BIOPOWER IN SWEDEN 2012



Heat plant around 1 MW using local wood chips and supplying heat to village with school, a few apartments buildings, and small industries



Example CHP in Östersund



Drottningholm - The royal palace

- Pellets boiler, 900 kW
- Grate-fired
- Delivered by:
 - Järforsen Energisystem AB
- Saving 1,500 000 SEK
- Converting from 67% oil and 33% electricity to 92% biofuels, 5% electricity and 3% oil
- Prepared for energy crops



Ena Energy



April 27-30, 2014 - Seattle, Washington

Consumption - Production

Almost 100 % biomass

400 GWh

(ca 500 000 m³ or ca 160 000 ton)

70 - 100 GWh Electricity

200 - 250 GWh Heat

1 GWh = 1 000 MWh

= 1 000 000 kWh

= about 50 villa/House energy consumption during 1 year

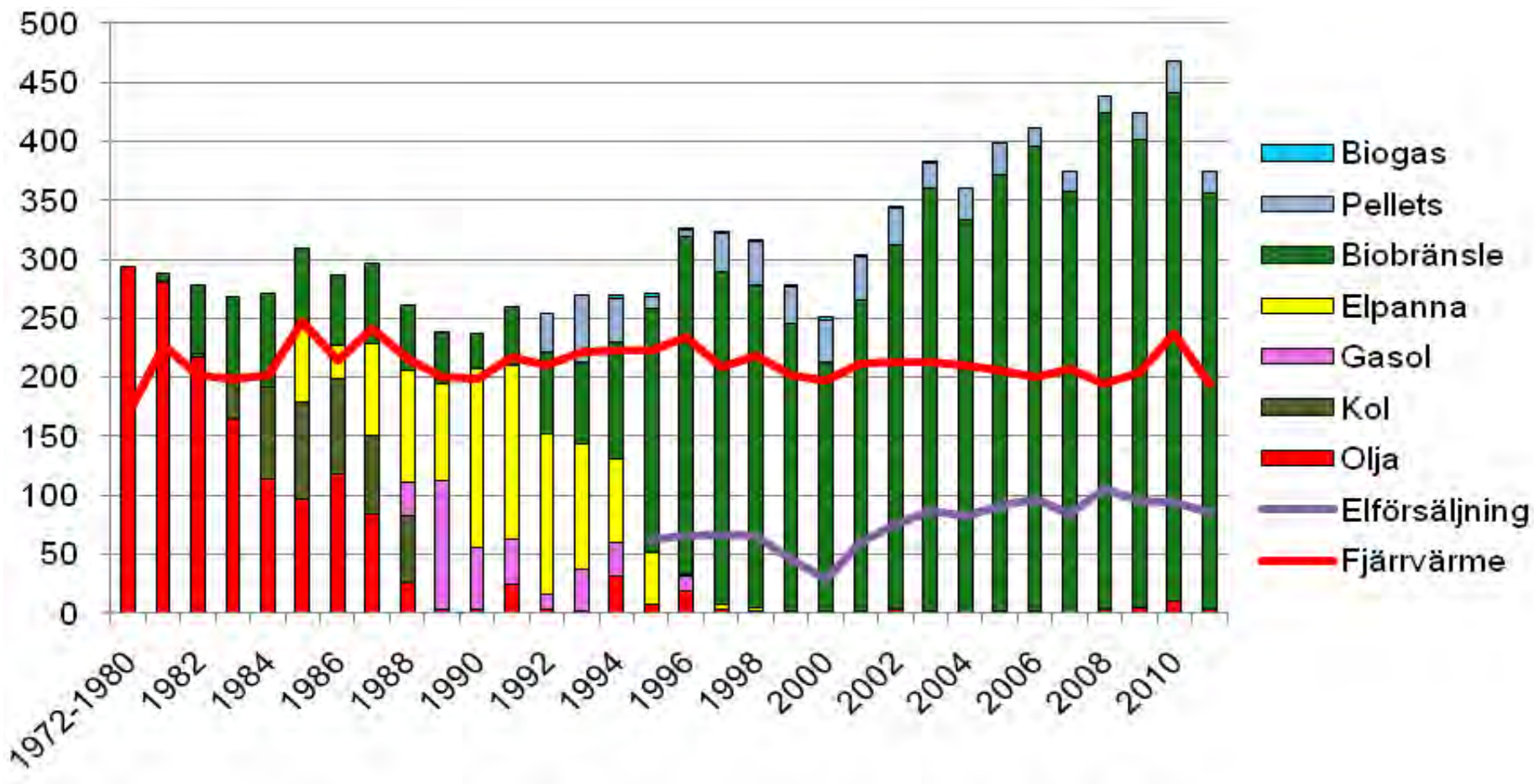
Distribution net



Fakta:

Consumers:	1653 st
Anslutningsgrad	95%
Villa	77 %
Length of Net :	10 mil
Water volym net:	3900 m3
Volym Ackumulator:	7000 m3

Biofuelmix history









Nu är valet lättare!
Tjänstevikt från 8000kg

CAI
ATRANS

unite





MON:06 <H>

CAM:08>

11/25/13

10:56:22



Background to the Swedish development

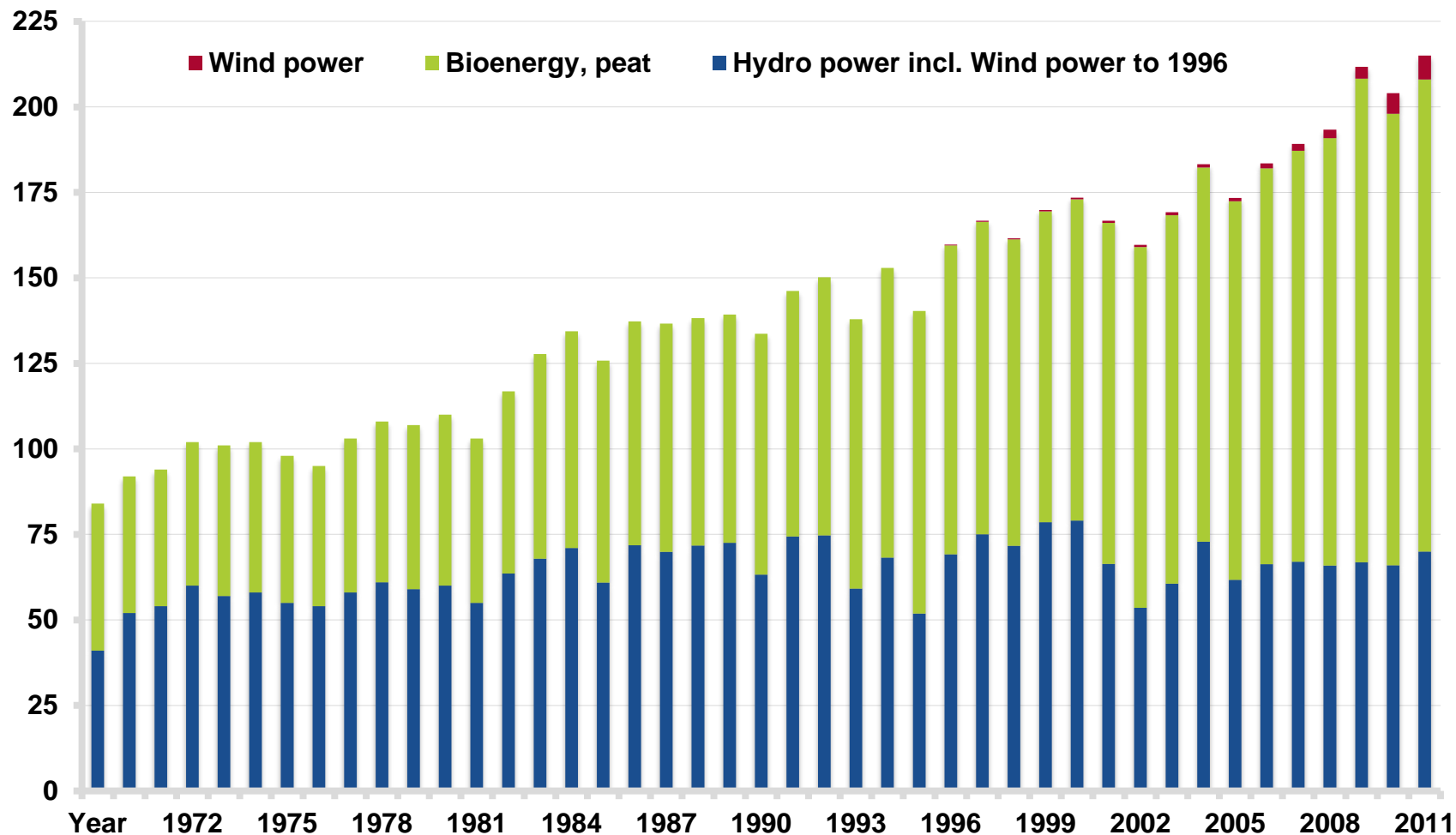
1. No domestic fossil energy sources
2. Large forest resources and efficient forest industry sector
3. District heating common
4. A common view - free market and market conditions - general incentives.
5. Good political support



The city of Sundsvall in middle Sweden is located between two mountain ranges. Before district heating was introduced, smoke from hundreds of chimneys and smoke stacks caused serious air pollution, particularly on cold winter days. Today almost all of the houses are connected to the district heating grid, supplying 80,000 people with heat. And the air quality has improved accordingly.

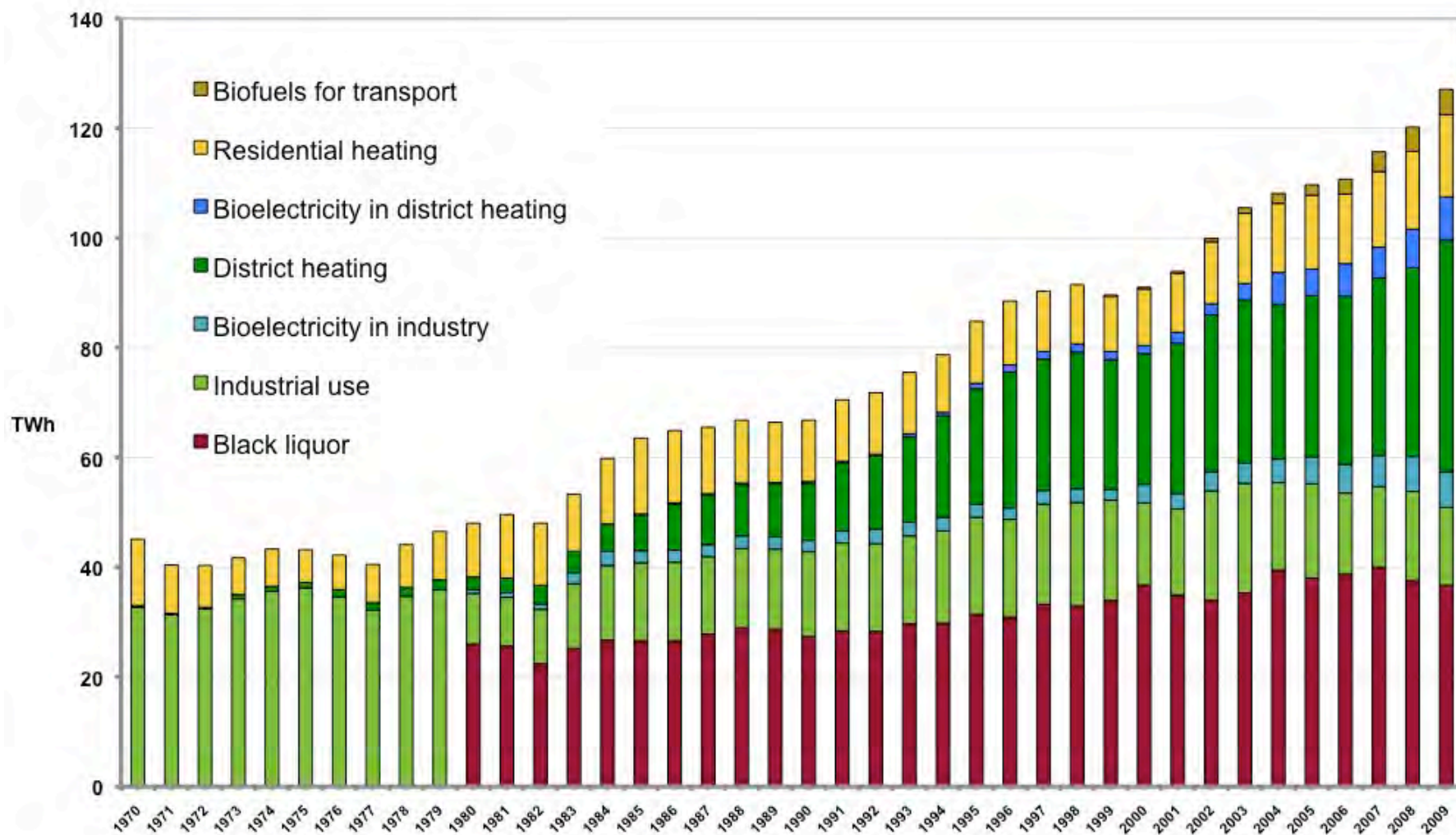
Pictures supplied by Sundsvall Energi, photo Torbjörn Berhkvist

Renewable energy supply in Sweden, 1970-2012, TWh

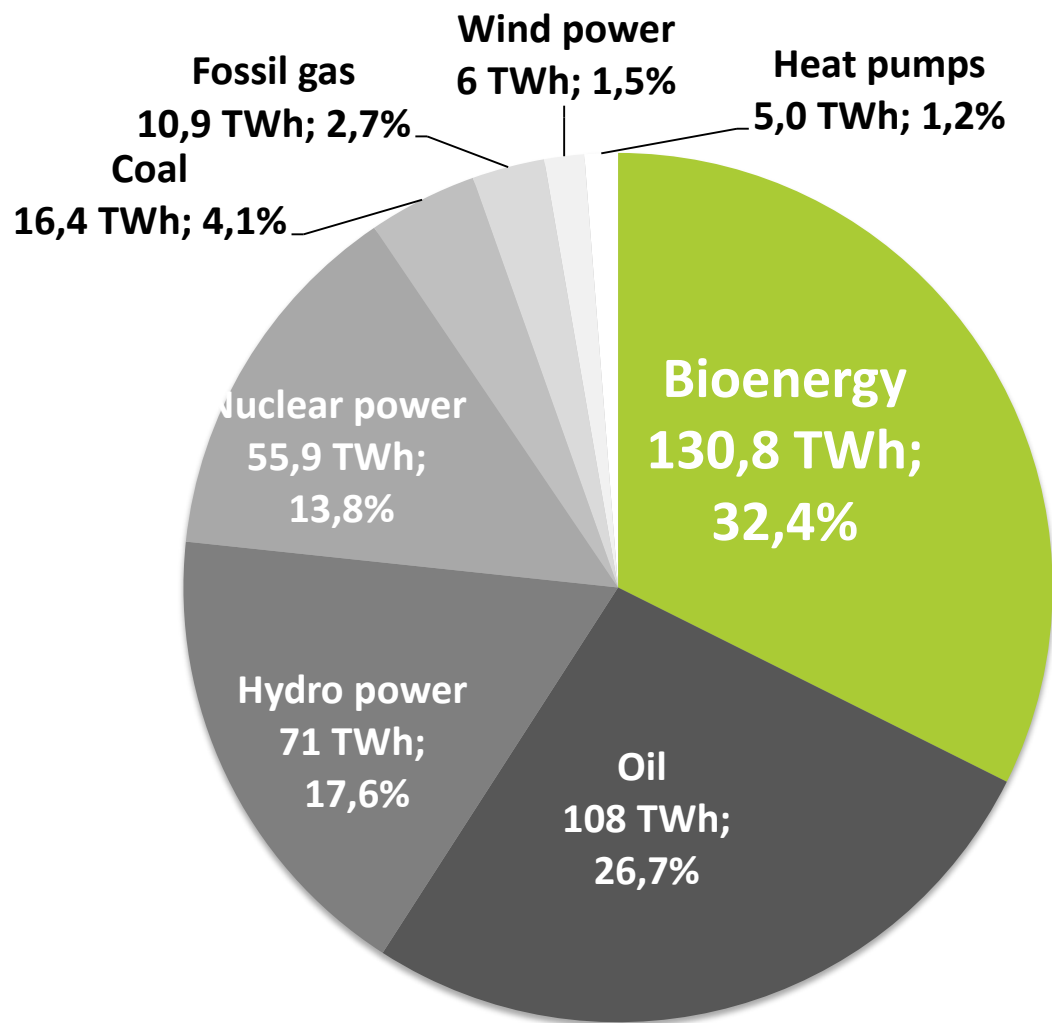


Source: Energimyndigheten och SCB

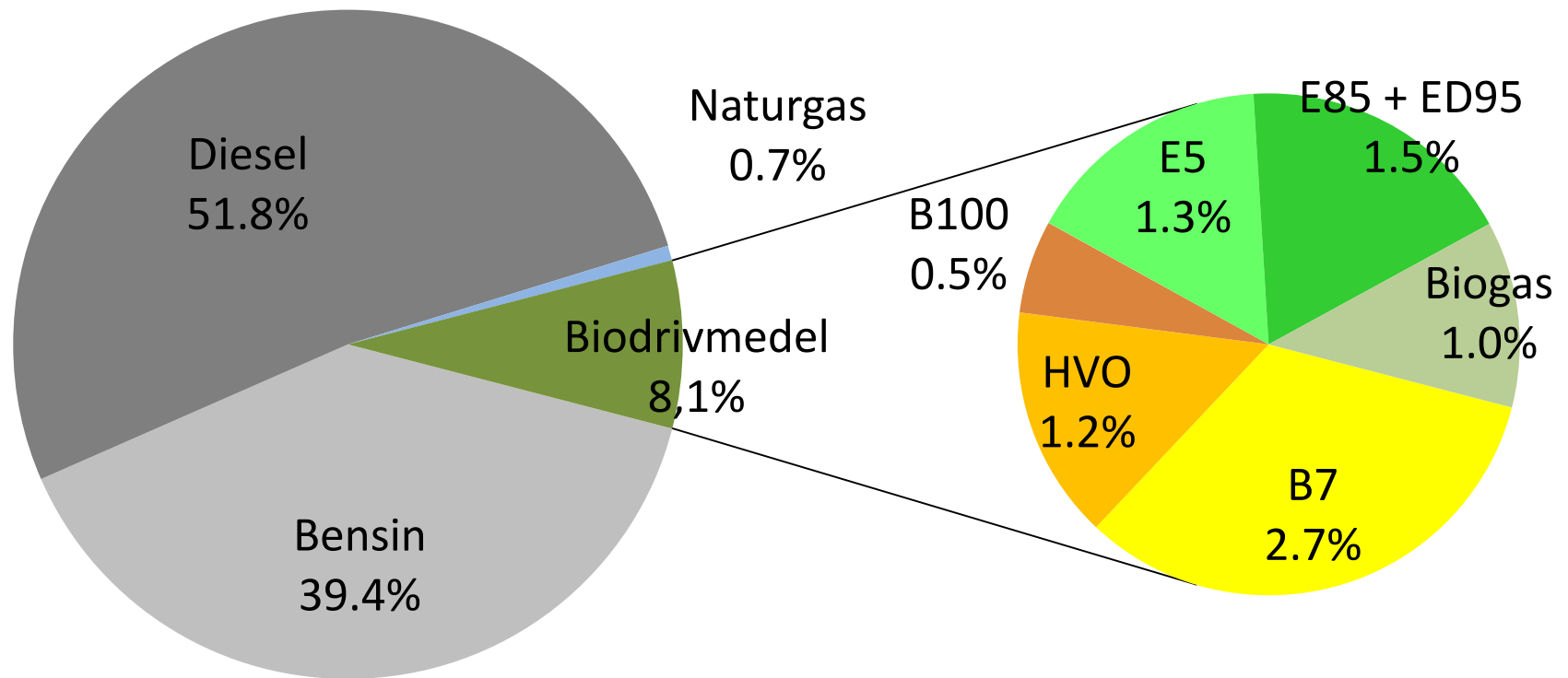
Swedish bioenergy use 1970 to 2009 – from 40 TWh to 127 TWh



Final energy use and electricity exports 2012



Biofuels in road transports 2012



Biomass – Timber – Pulp/Paper

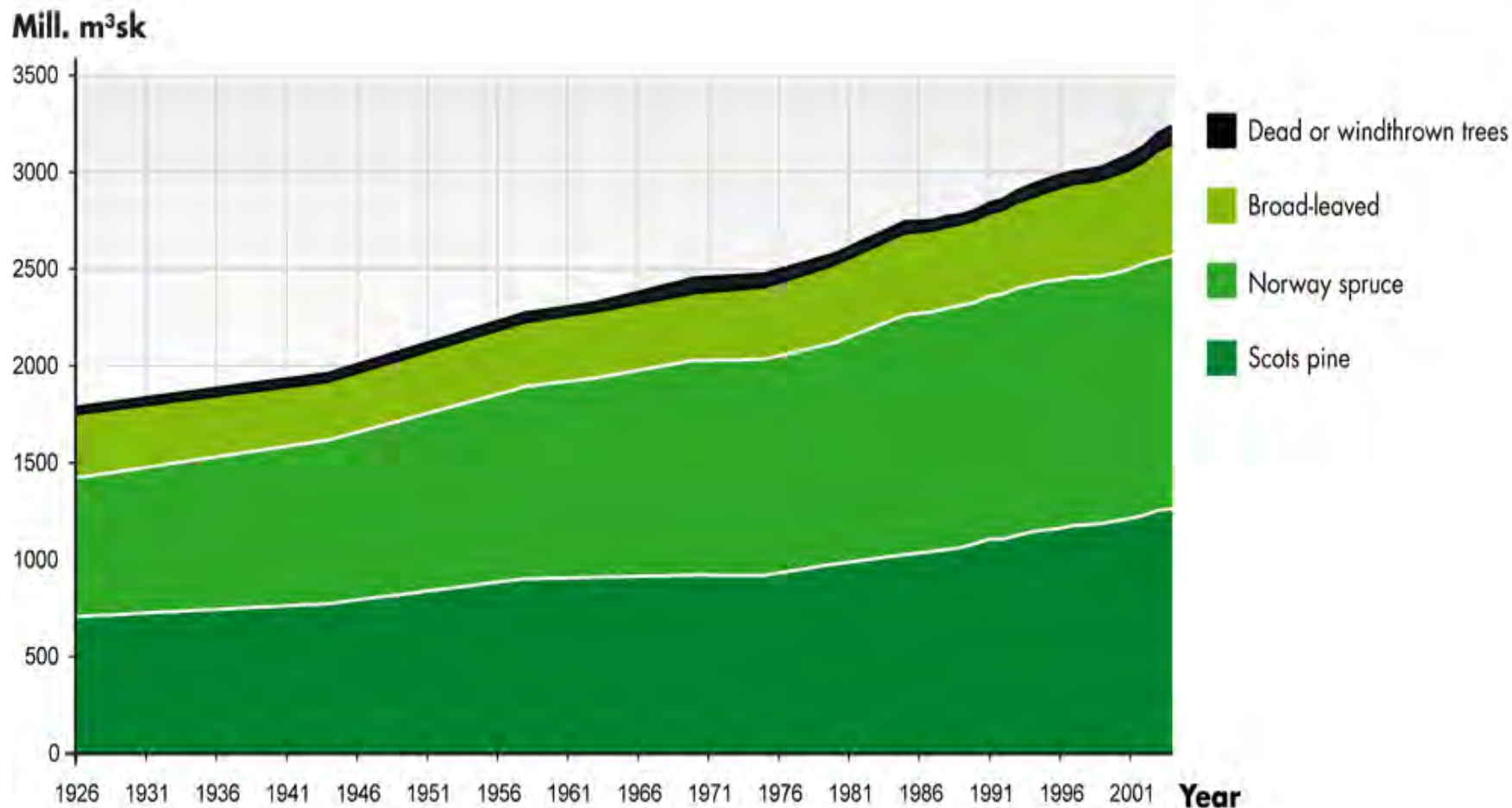
- Is it possible for the Forest in Sweden to supply all the needs in future?
- 28,5 milj. hektar
- 20,5 milj. hektar = 50,6 milj.acres

An aerial photograph of a vast, dense forest landscape. The forest is composed of many small, green trees, with some areas showing hints of autumnal colors like yellow and orange. The forest stretches out to the horizon under a bright blue sky filled with large, white, fluffy clouds. The text "The Swedish standpoint ..." is overlaid in a green, sans-serif font in the upper middle part of the image.

The Swedish standpoint ...

... sustainable, well-managed forests can play an important role in a switch-over to renewable energy systems with low impact on climate and environment

Trend for total standing volume since 1920, all land-use



¹ Excl. high mountains, restricted military areas, urban land and water surfaces.

Millions cubic metre standing volume (stem volume over bark from stump to tip)

Source: National Board of Inventory



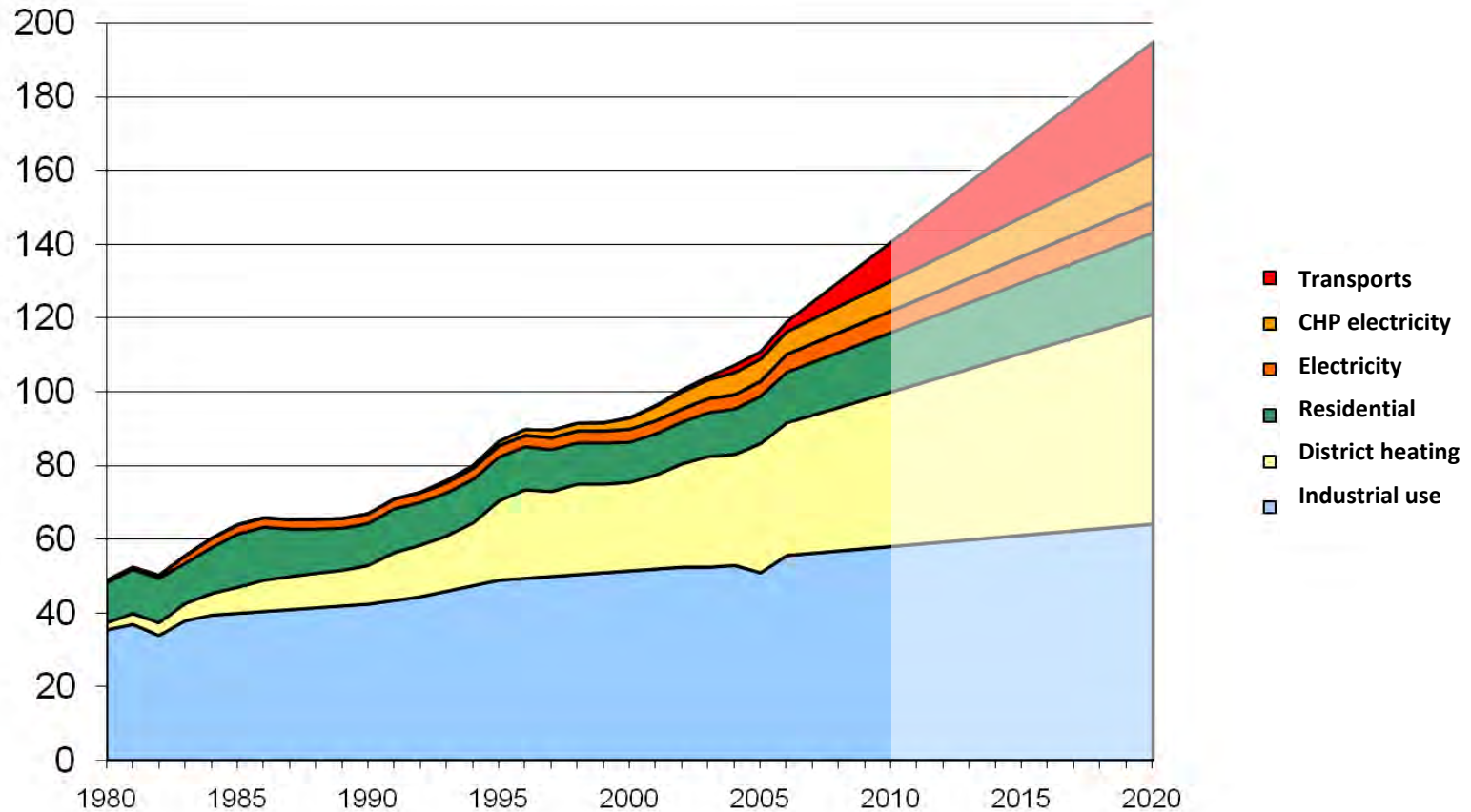
A postcard from 1902 shows barren surroundings around this church in western Sweden. Today there are trees everywhere. This is a common development in most parts of Sweden during the last 100 years. Less grazing (fewer milk cows and sheep), less use of firewood, better management of forests, etc, are the causes of this development.

Swedish bioenergy use

Development so far and forecast...

Bioenergy use

TWh/yr



... 2-3 TWh/yr

... corresponding to over
 1 Mm^3 solid/yr!

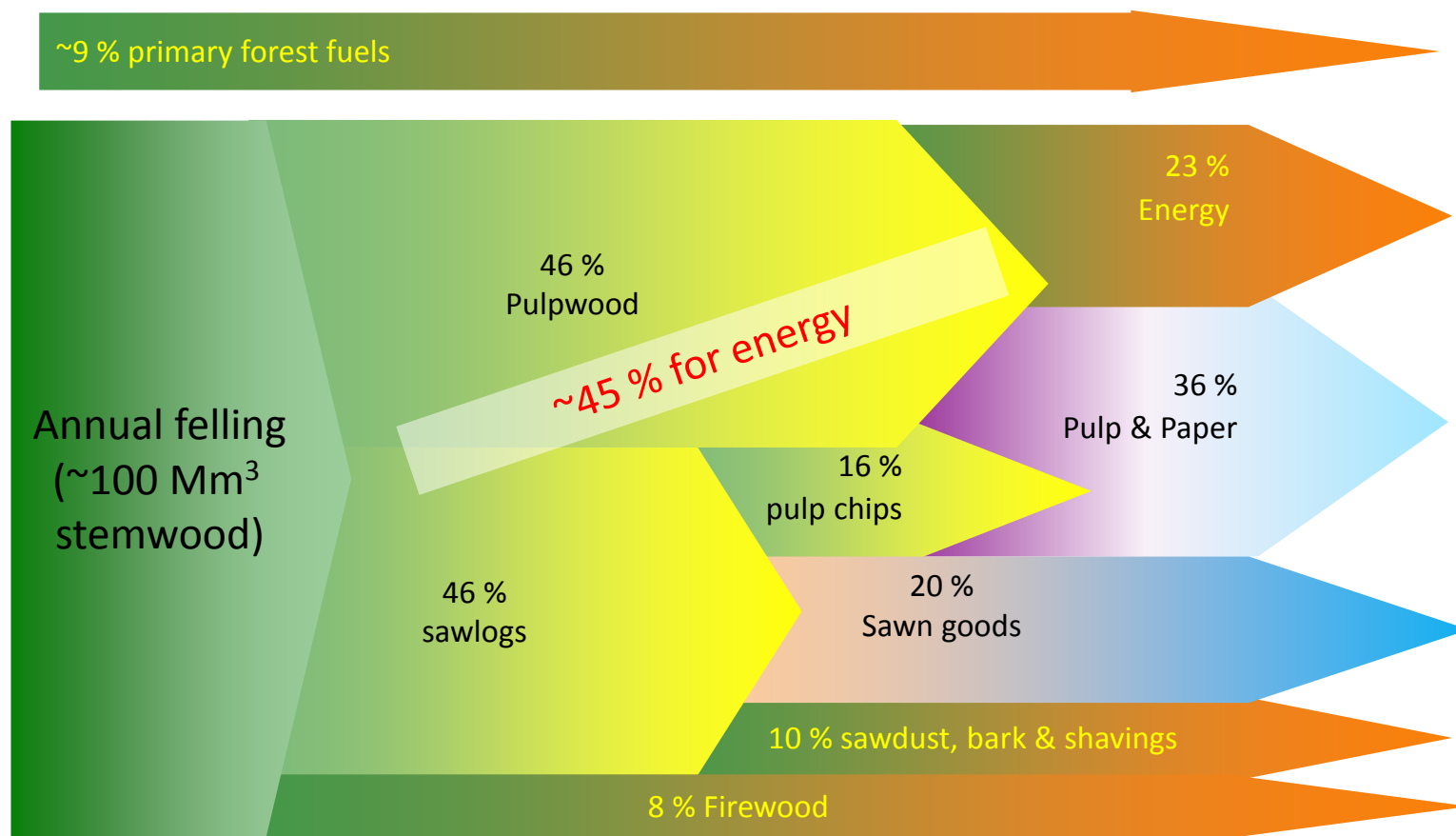




Supply routes

Overview of forest
fuel supply routes in
2010

Energy share of Swedish annual felling

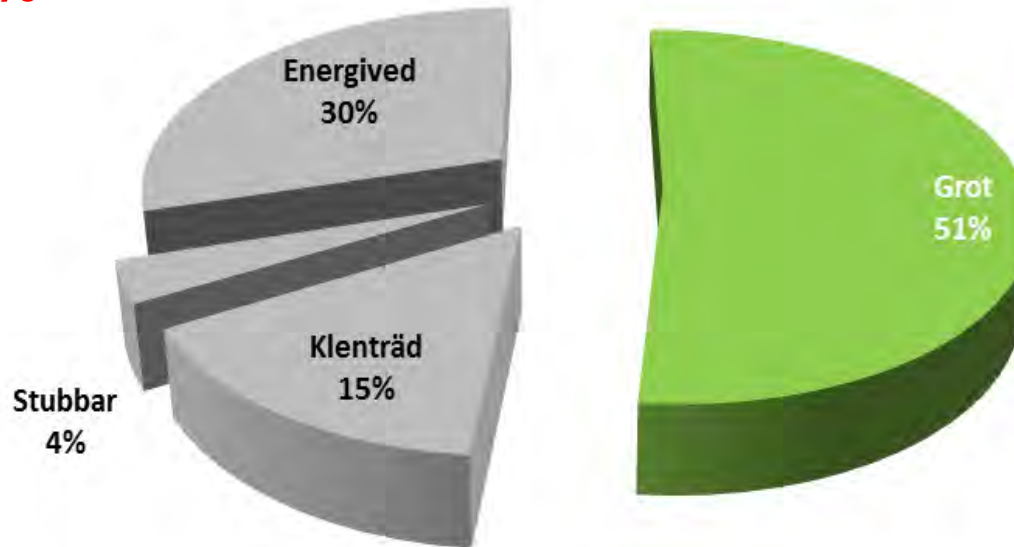


Sources: Swedish Forest Industries & Official Statistics Sweden

Residues 2010

10,1 M m³ loose, 8,9 TWh

+ 11 %



Utilization may be doubled
Not publicly controversial



Residues

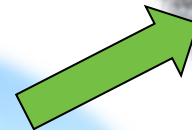
Drying

Concentration,
operation

Storage

Concentration
Spec tools

Comminution, integration





M3f ?

MWh ?

Ton ?

Terrängtransport

Råa ton ?

M3s ?

TTV ?

MWh ?

Sönderdelning



A red truck with a blue container is parked in a forest. A crane is lifting a large metal bucket from the container. The background is a dense forest of tall trees.

Lastbilstransport

MWh ?

TTV ?

M3s ?

Tågtransport

TTV ?

MWh ?

M3s ?

Råa ton ?





SORTIMENT



Råa ton ?

M3f ?

M3s?

MWh ?

Terminal / Industri

M3fub?

MWh ?

TTV?

Comminution



Where can it be done?



Effects on transport economy

15 - 25 %, loads 18-22 ton



25 - 45 %

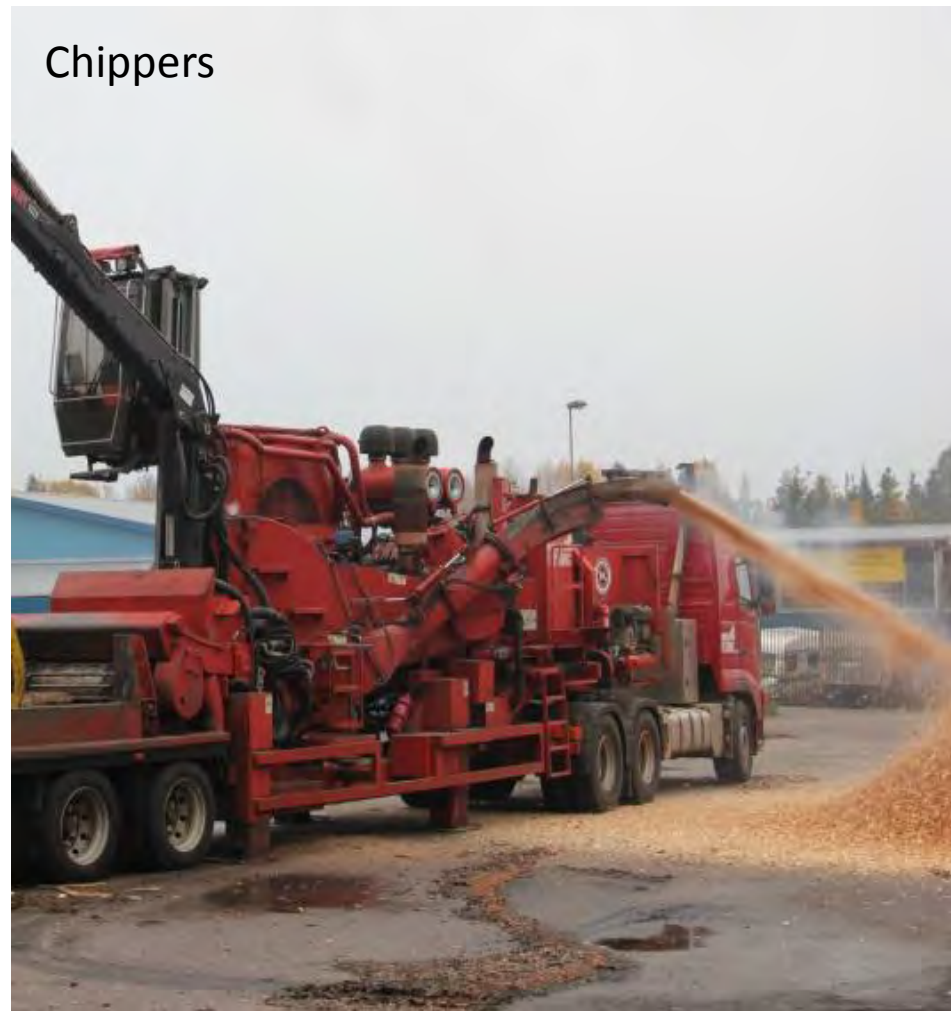


35 - 40 %, loads 28-32 ton

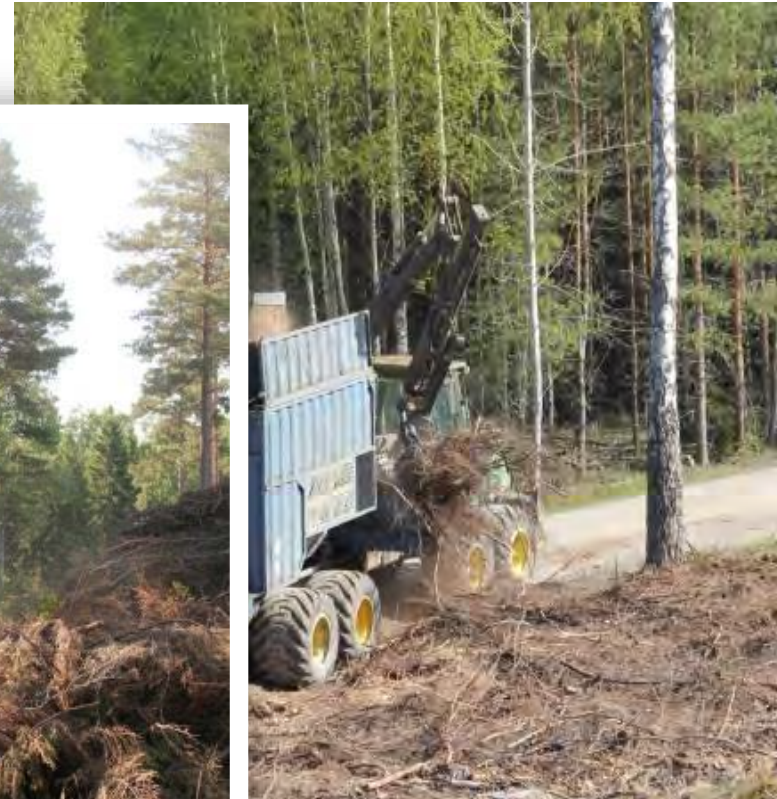


50 - 65 %, loads > 35 ton

Machine selection



System alternatives





Policy and legislation

The Swedish Energy Agency is subordinate to the Ministry of Enterprise, Energy and Communications and regulated by the Government through the instruction.

Parliament and the Government decide on the assignments and budget of the Agency.

Figur 24

Energitillförsel och energianvändning i Sverige 2010, uttryckt i TWh

Total tillförd energi i Sverige 2010 uppdelat på energibärare, 614 TWh

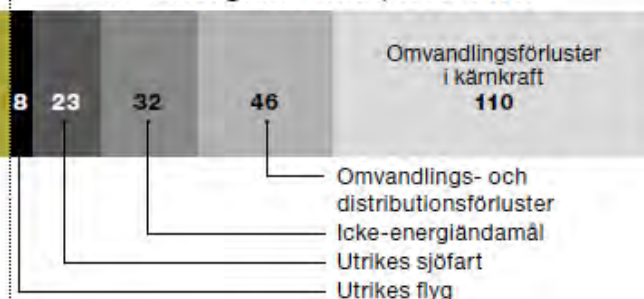


Omvandling i kraft- och värmeverk, raffinaderier, gasverk, koksverk och masugnar. Distribution av el och fjärrvärme samt internationell bunkring och överföring av energiråvaror till exempelvis färg- och kemindustrin.

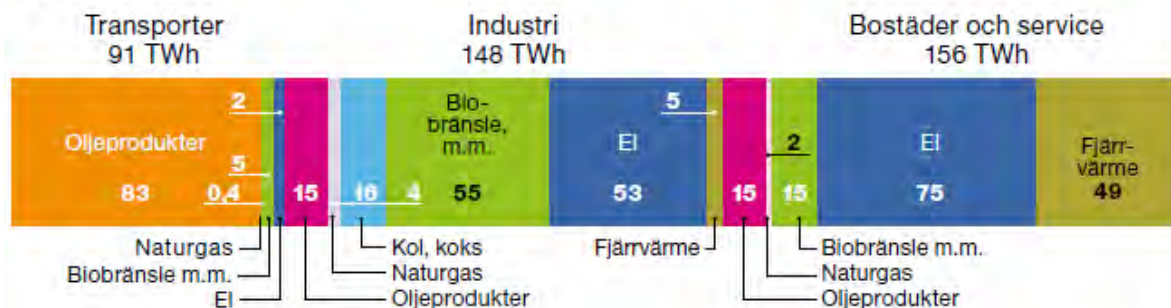
Total slutlig användning uppdelat på energibärare, 395 TWh



Förluster och användning för icke-energiändamål, 219 TWh



Total slutlig användning uppdelat på sektorer, 395 TWh



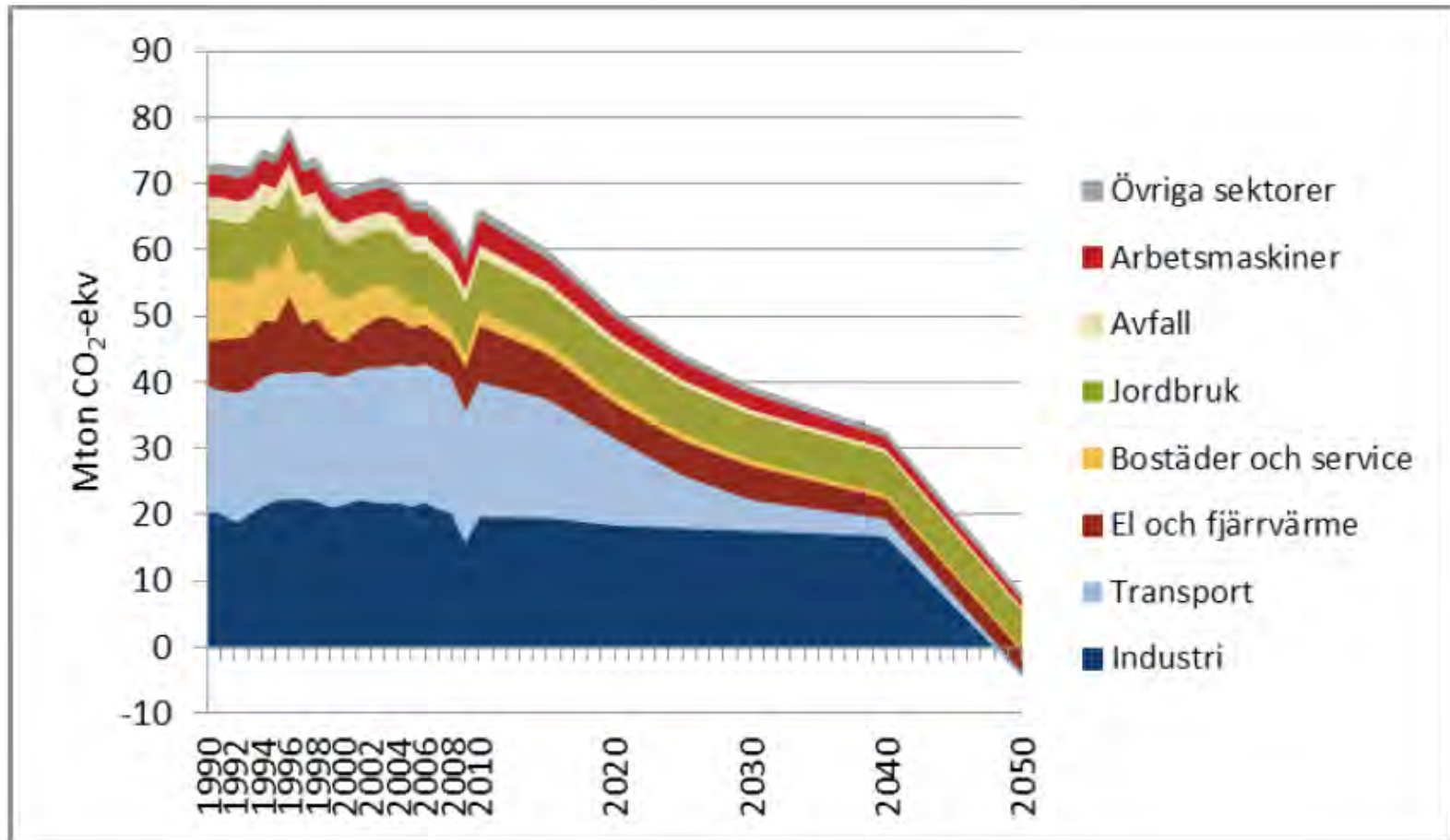
Källa: Energimyndigheten och SCB.

Anm. 1. Värmepumpar avser stora värmepumpar i energisektorn.

2. Kärnkraft redovisas brutto, dvs. som tillförd kärnbränsleenergi enligt FN/ECE:s riktlinjer.

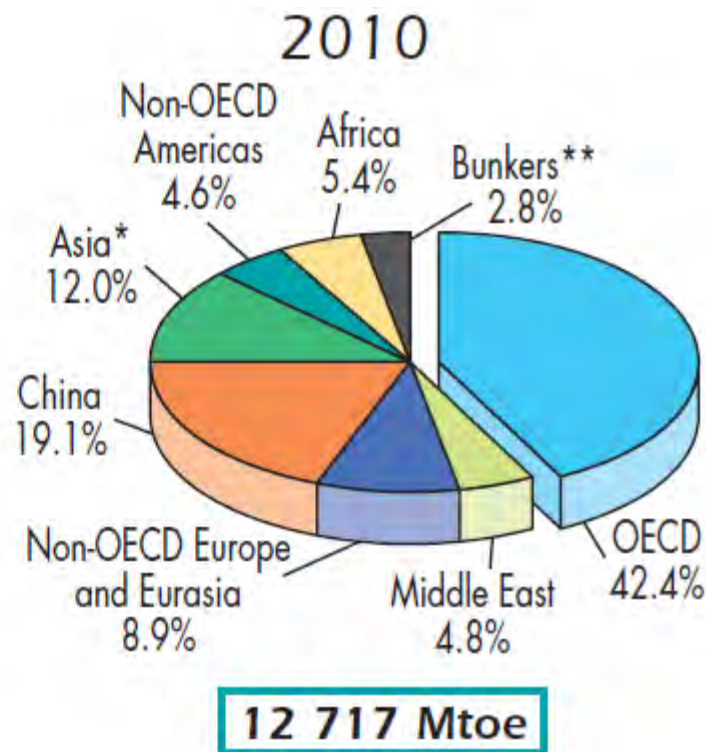
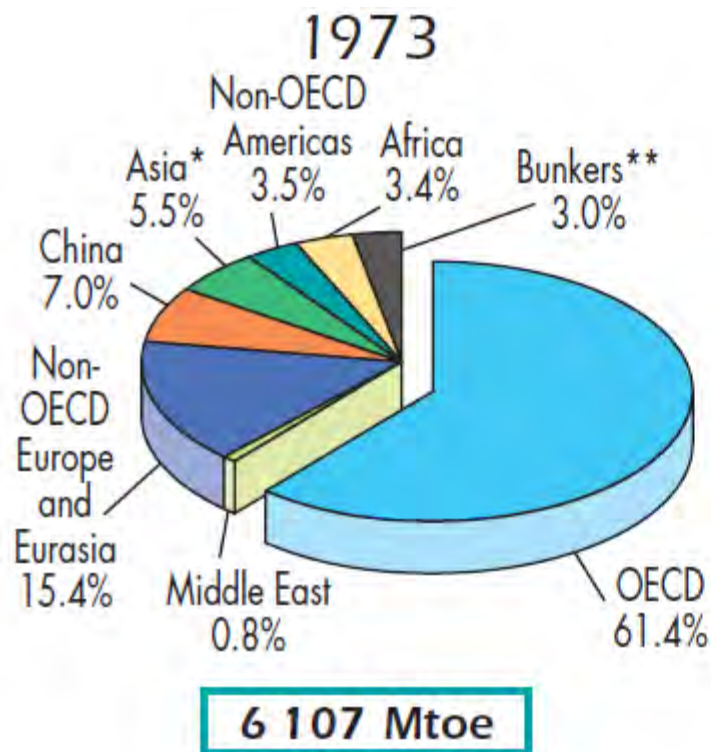
3. Nettoimport av el räknas som tillförsel.

Och framtiden då? Ett tufft scenario från Färdplan 2050.
Vägen dit är en mix av tuffare styrmedel och teknikutveckling.



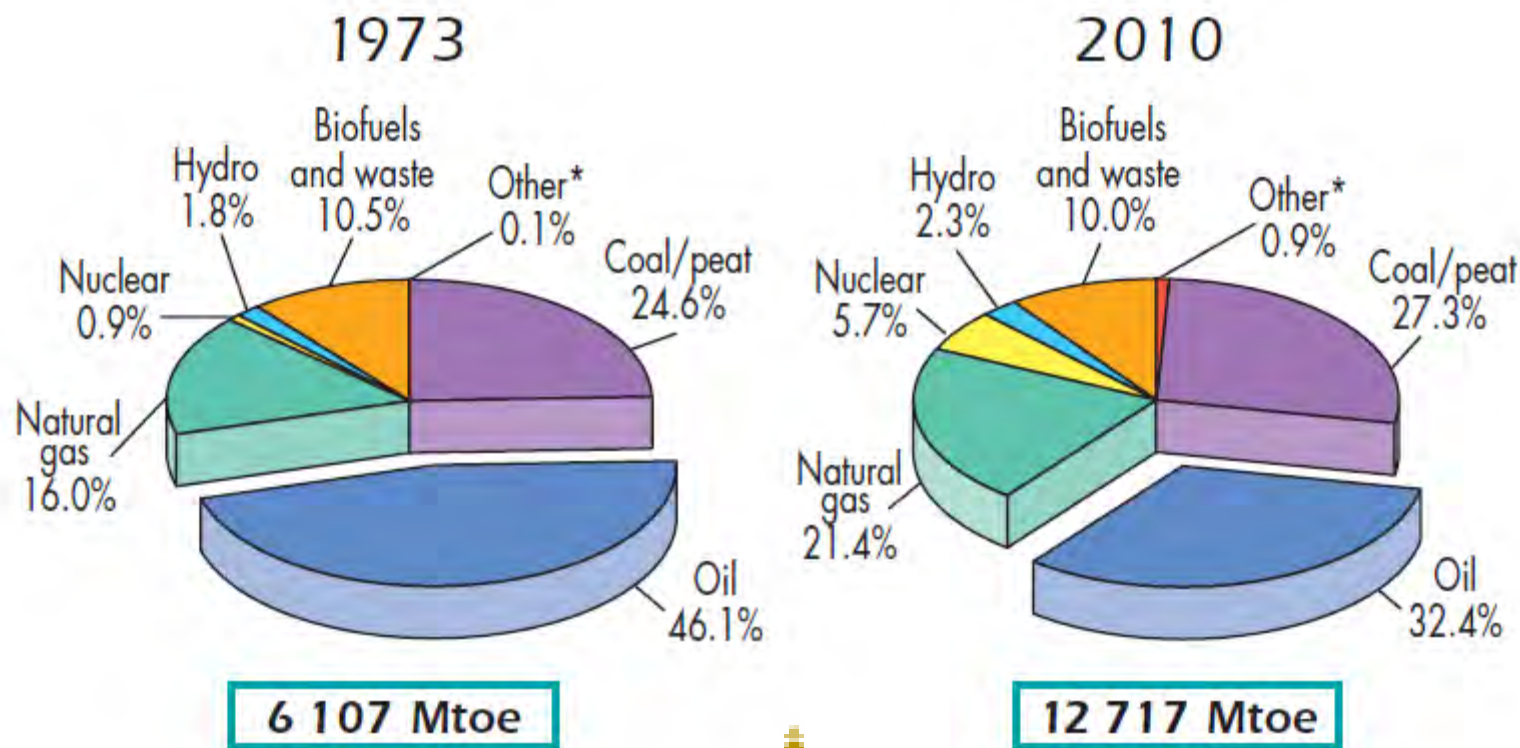
Figur 1. Målscenario Teknikåtgärder och CCS på fossila och biogena utsläpp från industrin. Teknik och transportsnålt samhälle för transportsektorn.

Världens energianvändning fördubblades mellan 1973 och 2010



REGERINGSKANSLIET

Oljans andel minskade med en tredjedel

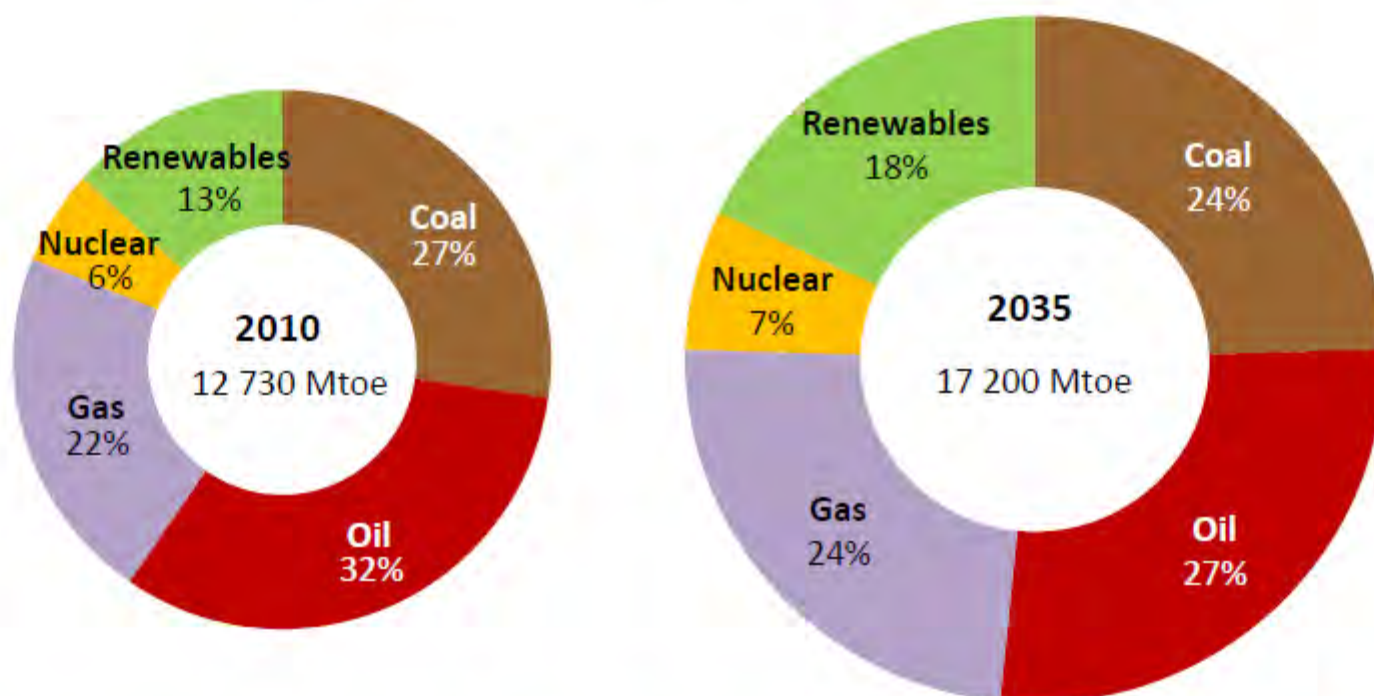


REGERINGSKANSLIET

The energy mix is (slowly) changing

WORLD ENERGY OUTLOOK

Energy demand by fuel, 2010 & 2035



Global energy demand grows by more than one-third over the period to 2035, with China, India & the Middle East accounting for 60% of the increase



Thank you for your attention

Peter Nyström