Swedish renewable energy supply – present status and expected role of woody biomass in the future

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Swedish Energy Agency

The Swedish Energy Agency

- The Swedish Energy Agency is a government agency for national energy policy issues.
- Our mission is to promote the development of Sweden's energy system so that it will become ***ecologically, socially and economically sustainable***.
- The Swedish Energy Agency works for the use of ***renewable energy***, improved technologies, a smarter end-use of energy, and mitigation of climate change.

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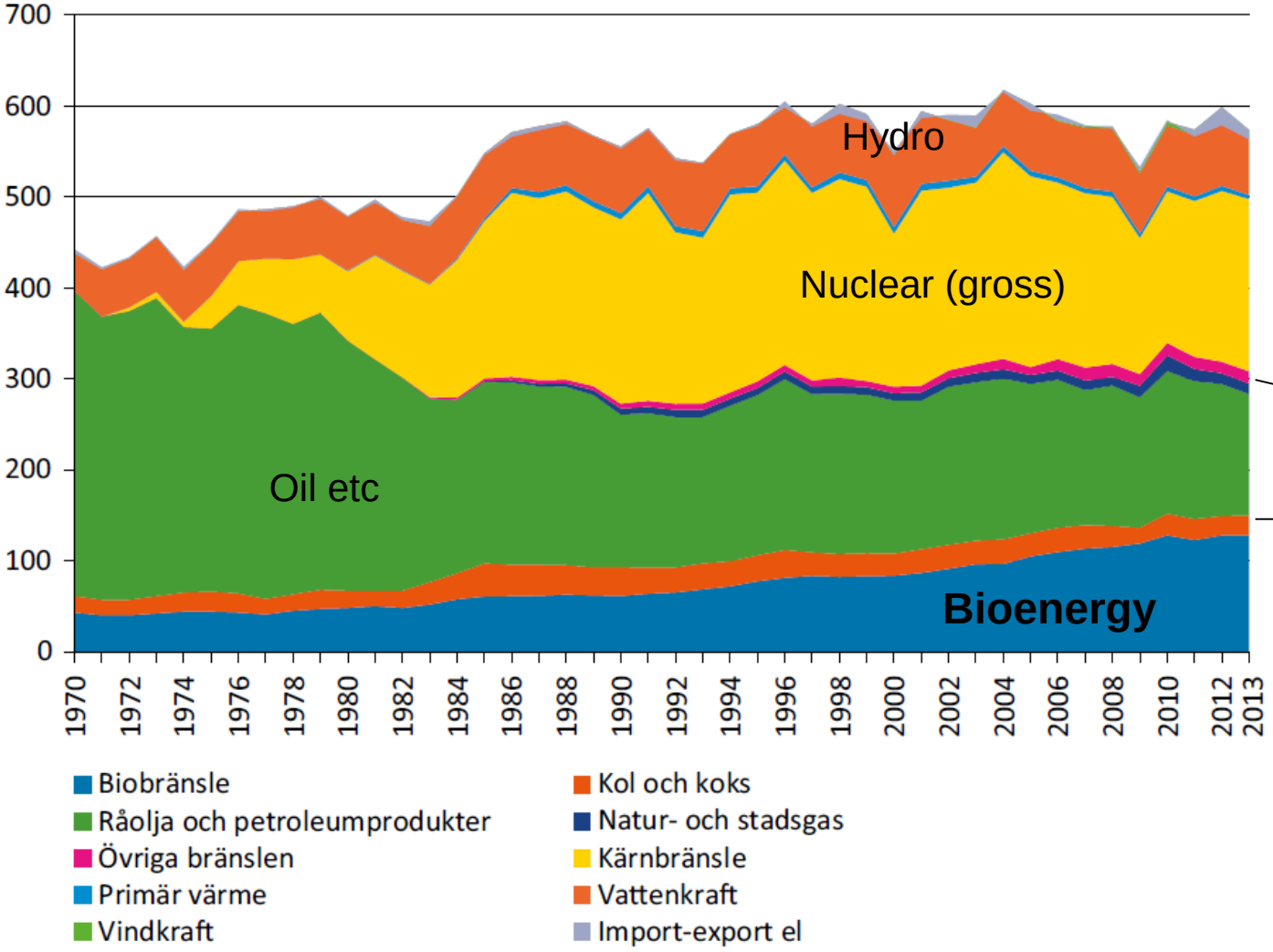
Energy supply in Sweden

Figur 15. Totalt tillförd energi per energibärare, TWh, 1970–2013



Other fuels

Natural gas

Coal, coke

Källa: Energimyndigheten, SCB

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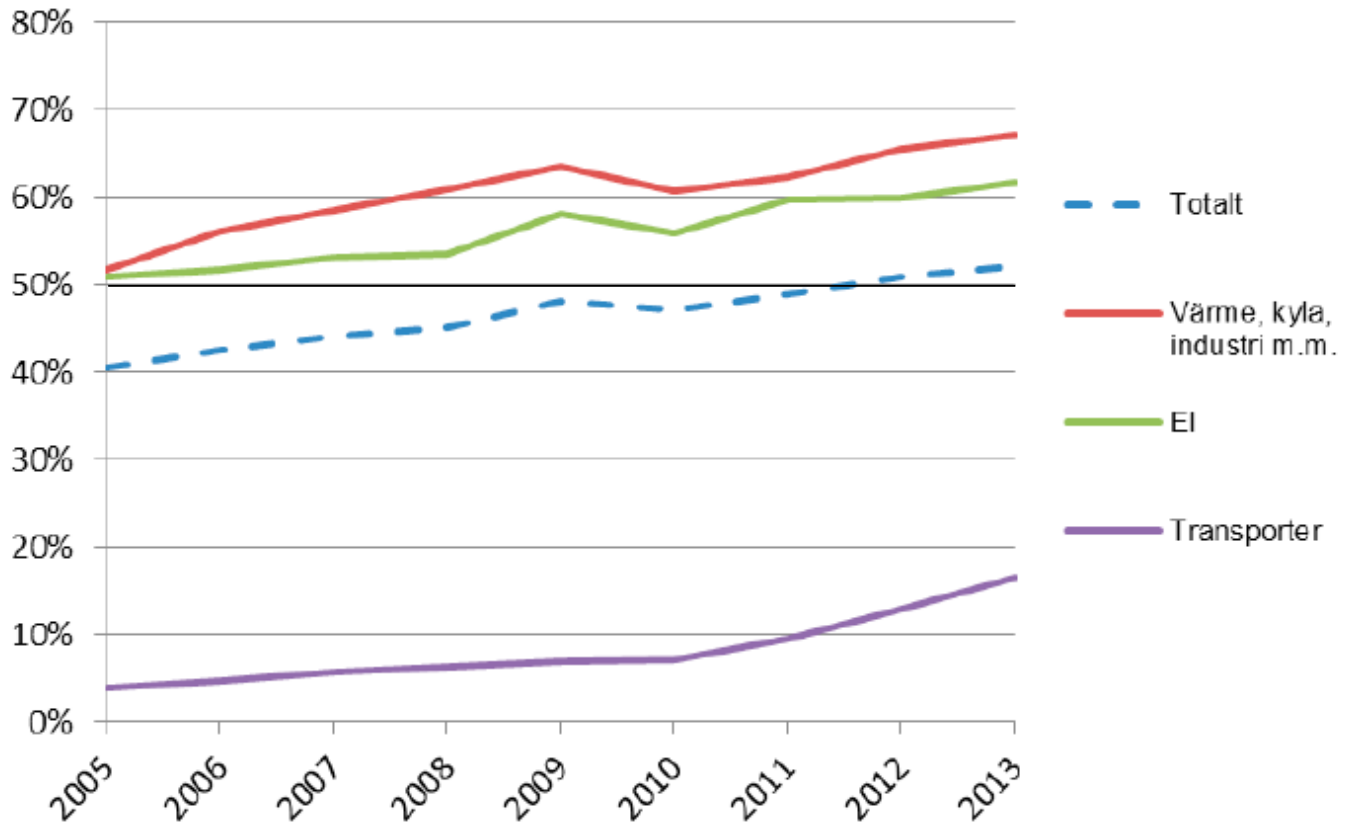
Renewable energy in Sweden %.
50 % target reached!

Figur 25. Andel förnybar energi i Sverige, procent, 2005–2013



Heating, cooling, industry

Källa: Energimyndigheten, Eurostat

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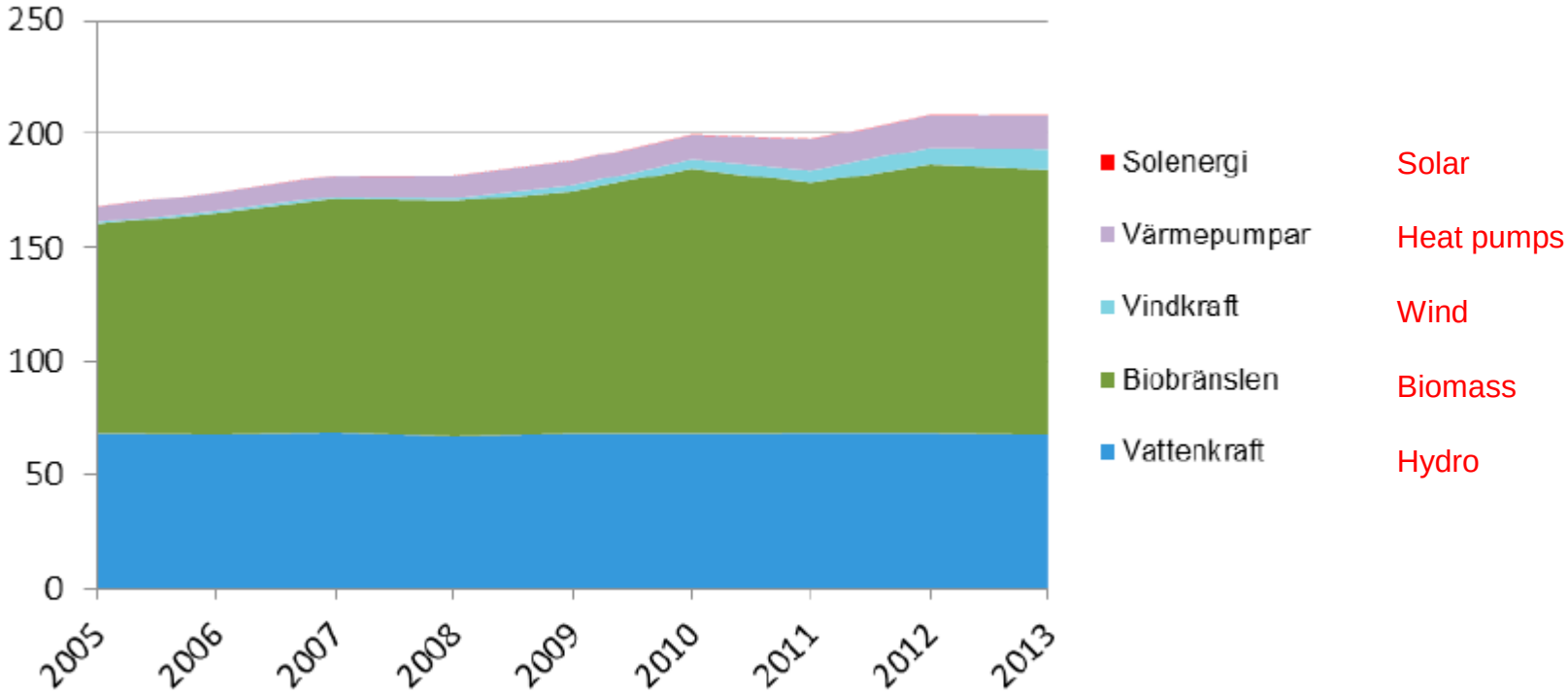
Renewable energy according to RED

In the Swedish public discussion, sun and wind are THE renewables …

Figur 26. Förnybar energi enligt förnybartdirektivet, TWh, 2005–2013



Källa: Energimyndigheten, Eurostat

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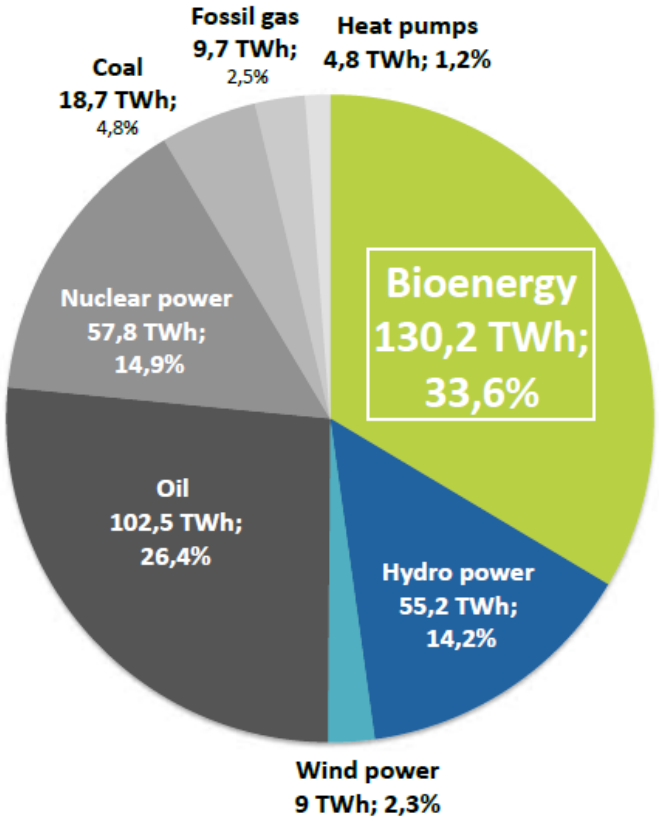
Bioenergy important in Sweden



ENERGY USE 2013

Final domestic energy use in 2013 – industry, electricity production, heat, transport etc.

Source: Svebio calculation based on Swedish Energy Agency preliminary statistics.

Photo by Bioenergiportalen.se

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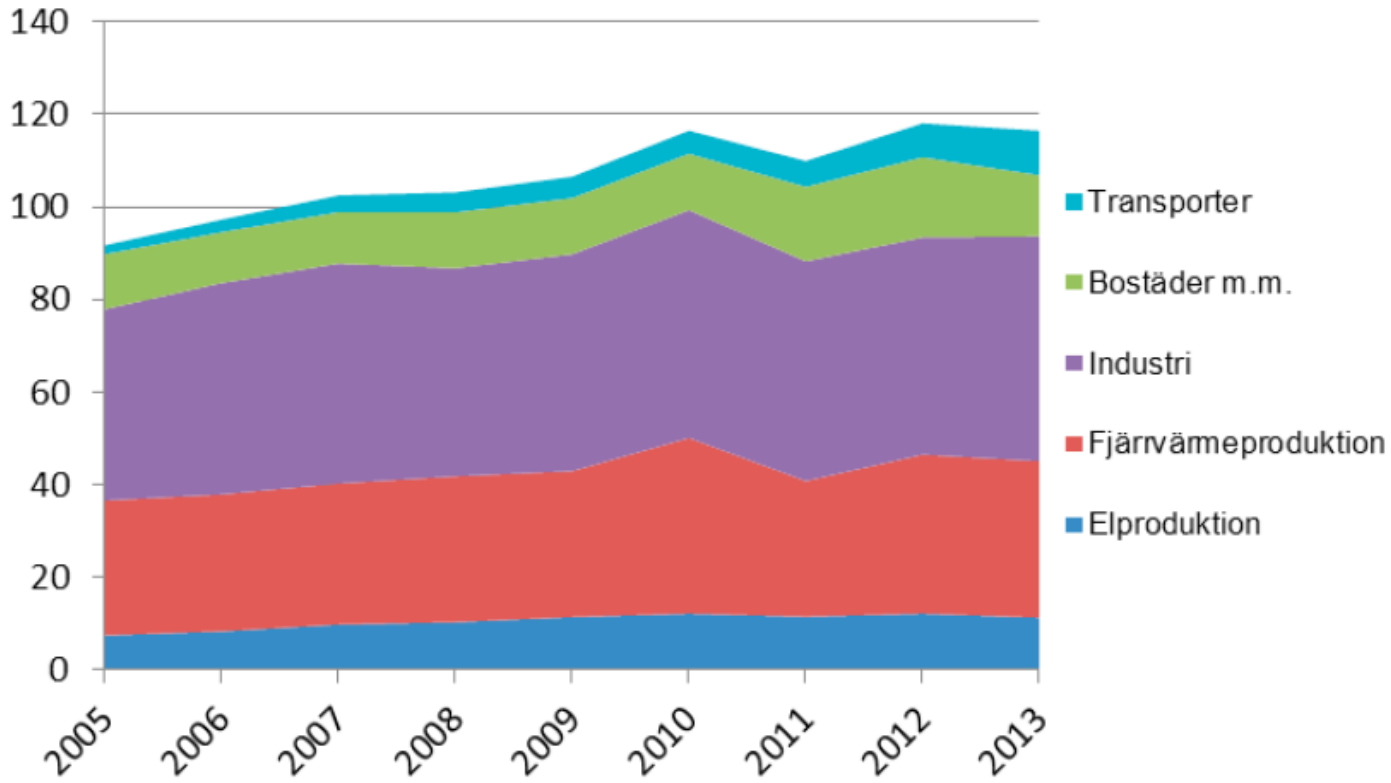
Biofuel use in Sweden

Figur 27. Användning av biobränslen, TWh, 2005–2013



Housing, buildings

District heating

Electricity

Källa: Energimyndigheten, Eurostat

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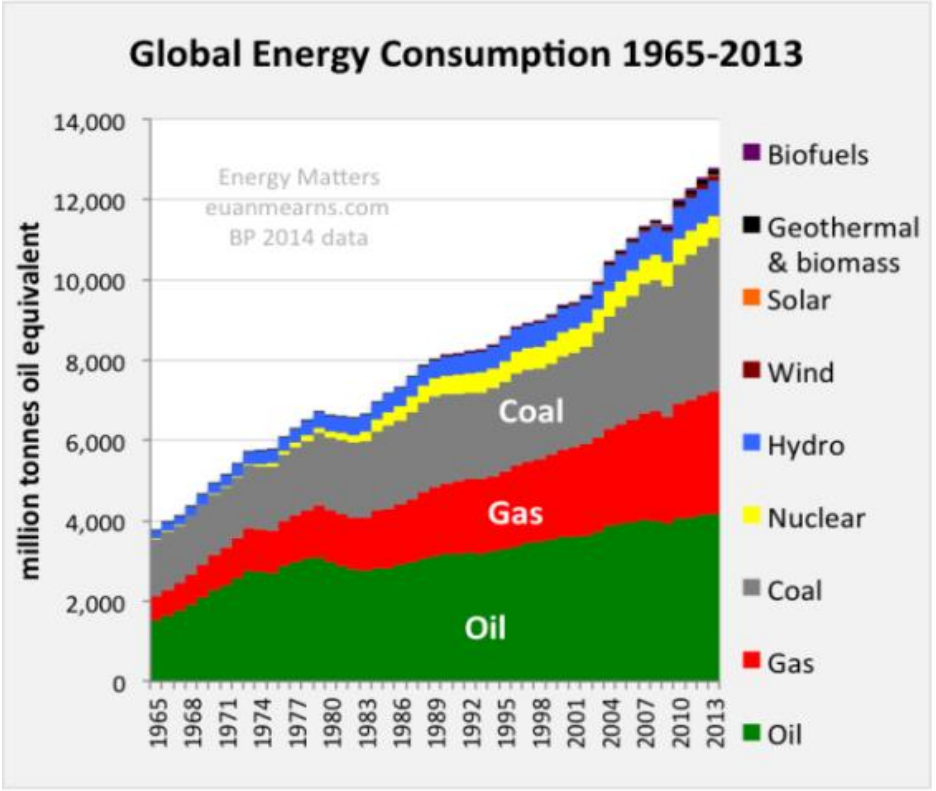
And the future…

- **EU Targets for 2030**
  - a 40% cut in greenhouse gas emissions compared to 1990 levels
  - at least a 27% share of renewable energy consumption
  - at least 27% energy savings compared with the business-as-usual scenario

IPCC 2013 for policy makers
Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased.



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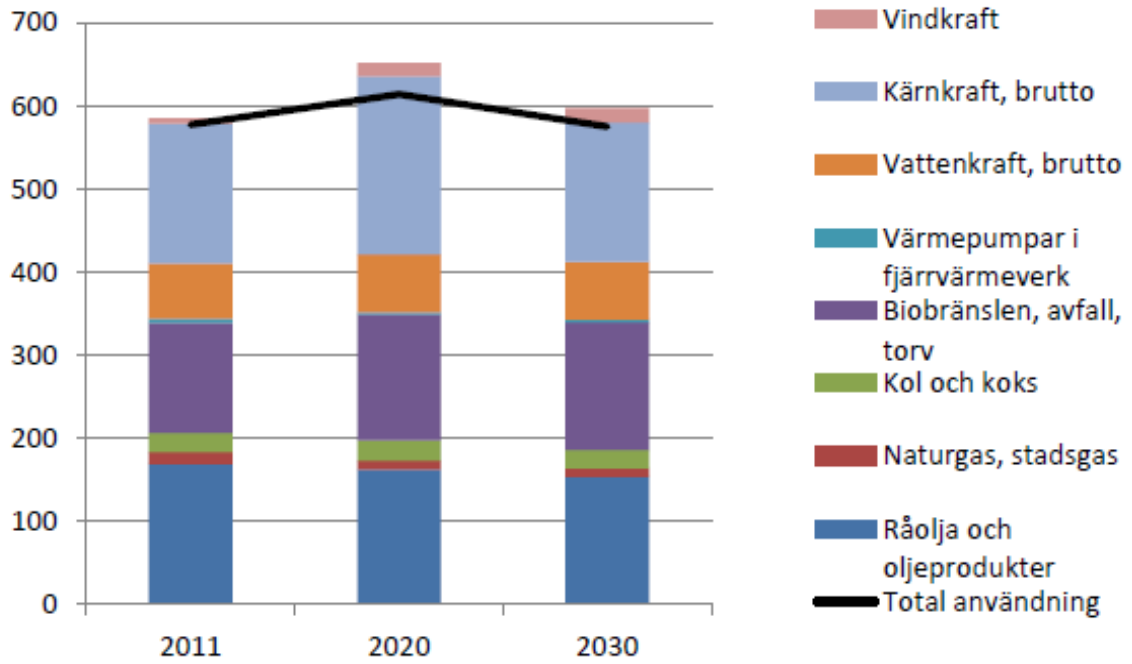
Energimyndighetens långsiktiga energiscenario diskuterar att tillförsel av biobränslen, torv och avfall ökar med 28 TWh 2011 till 153 TWh år 2030 samtidigt som råolja och oljeprodukter minskar. Scenariot är en *konsekvensanalys av dagens styrmedel* och övriga förutsättningar som antagits.
Scenarier över Sveriges energisystem ER 2014:19

Analysis of consequences of present policys and policy instruments

Energy supply

Total energitillförsel för åren 2011, 2020 och 2030, TWh



Wind

Nuclear gross

Hydro

Heat pumps in DH

Biomass, waste, peat

Coal, coke

Natural gas etc

Oil… petroleum

Total use

Anm: Skillnaden mellan total tillförsel (staplarna) och användning (linjen) i figuren utgör nettoexport av el.

Black line is energy use. The difference is net electricity export

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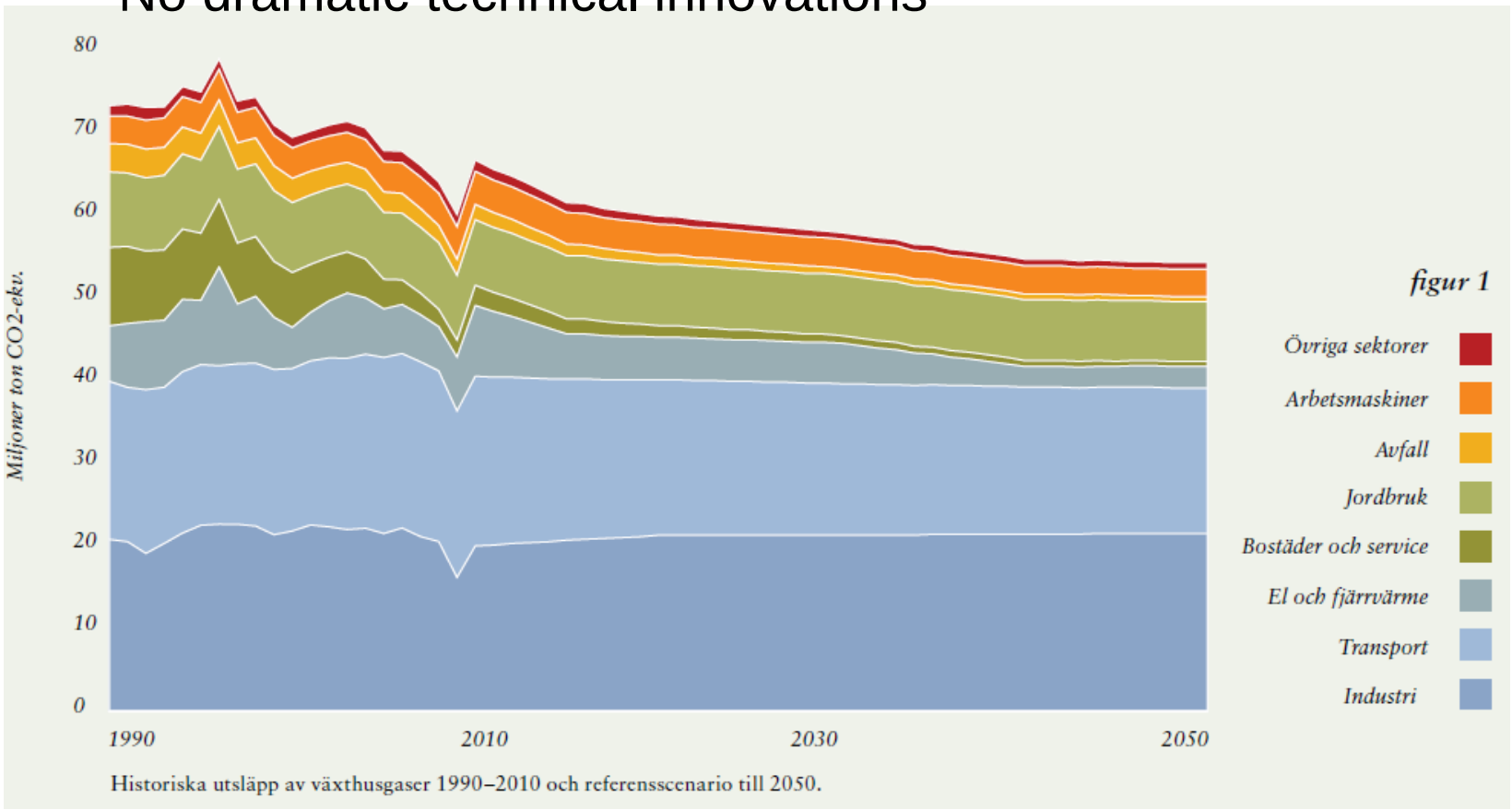
EPA, Färdplan 2050 (Roadmap 2050), 2012
CO2 emissions, different sectors
Reference scenario, present policy instruments,
No dramatic technical innovations



Historiska utsläpp av växthusgaser 1990–2010 och referensscenario till 2050.

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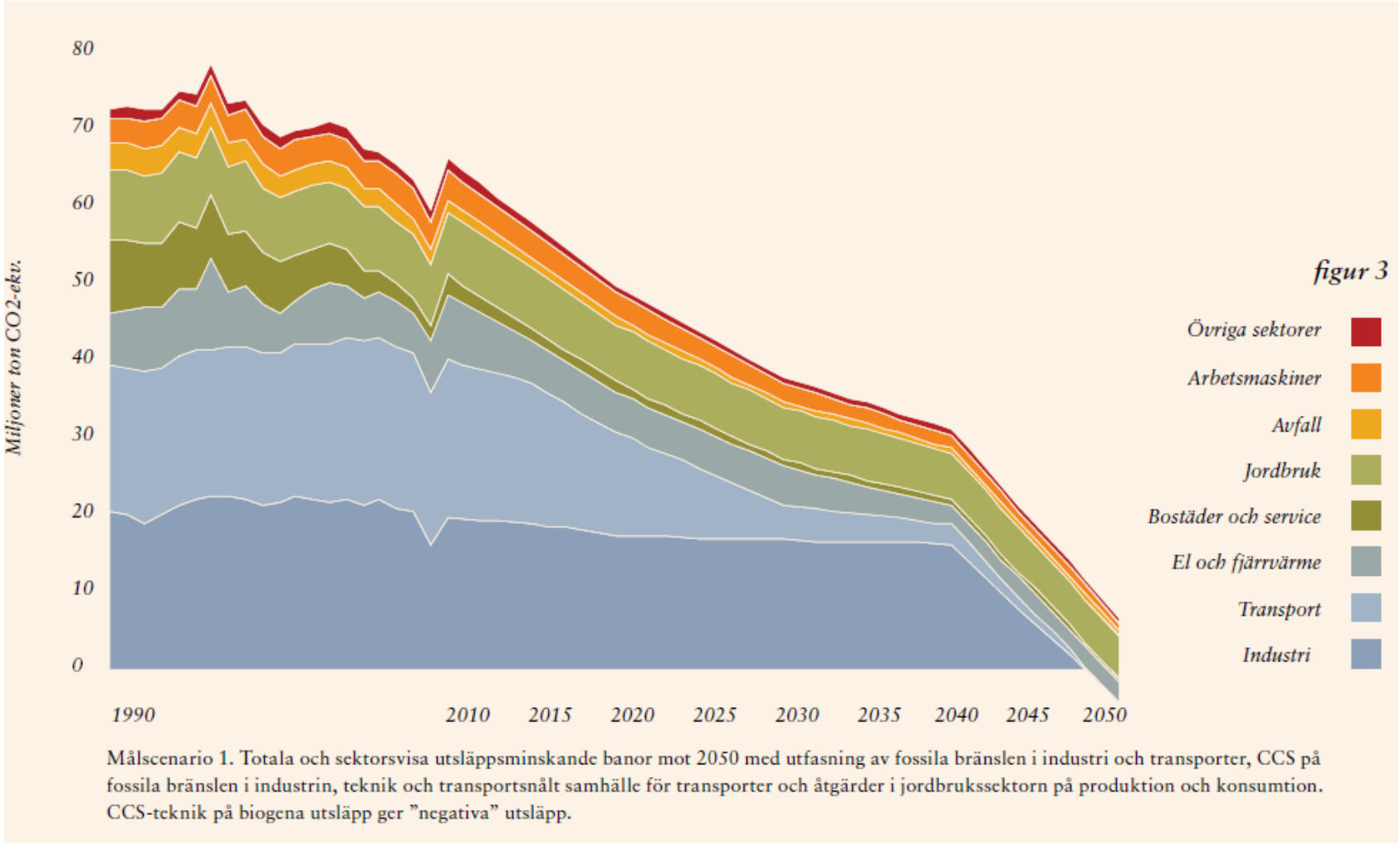
GHG reduction not good enough !!!

But dramatic GHG reduction needed…

EPA, Färdplan 2050 (Roadmap 2050), 2012



Målscenario 1. Totala och sektorsvisa utsläppsminskande banor mot 2050 med utfasning av fossila bränslen i industri och transporter, CCS på fossila bränslen i industrin, teknik och transportsnålt samhälle för transporter och åtgärder i jordbrukssektorn på produktion och konsumtion. CCS-teknik på biogena utsläpp ger ”negativa” utsläpp.

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Bioenergy challenges and uncertainties

100 TWh more bioenergy may be possible – but future development depends on a number of more or less uncertain external factors

- Climate policy and related instruments
- Detailed formation of sustainability criteria
- Public acceptance
- The future of nuclear energy
- The development of biofuels for transports
- The development of wind and solar energy
- Energy efficiency and future heat requirements
- Energy from waste
- The development in the forest sector including new biobased products

How can woody biomass contribute? Considerations for future R&D

- **Present policy instruments - Moderate market development**
  - By-products from forestry and industry. Waste.
  - Who wants stumps, Salix, Populus…
- Bioenergy R&D relevant for the moderate development
  - Reduce forest fuel costs, ensure sustainability and GHG-efficiency
- **More ambitious climate policy - Much more biomass needed**
  - Biofuels for transports
  - Bio-based economy…
  - Bio-electricity, CHP
- R&D for future effective climate policy
  - Increased biomass production (increase 100 TWh is discussed)
  - More sustainability aspects
  - Fast growing trees for fast climate benefit
  - Systems to use ”new” feedstock qualities

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