

Sustainable Energy Vision 2050

The world energy system:

- ❖ is beyond the environmental limits
- ❖ does not provide basic energy needs as light and healthy cooking facilities to 1/4 of the world's population
- ❖ Environmental imperative: keep global warming to 1°C in 21. century (1.6°C above pre-industrial)
- ❖ Social imperative: provide all with basic energy needs and allow developing countries to develop, including use of cheap energy supply

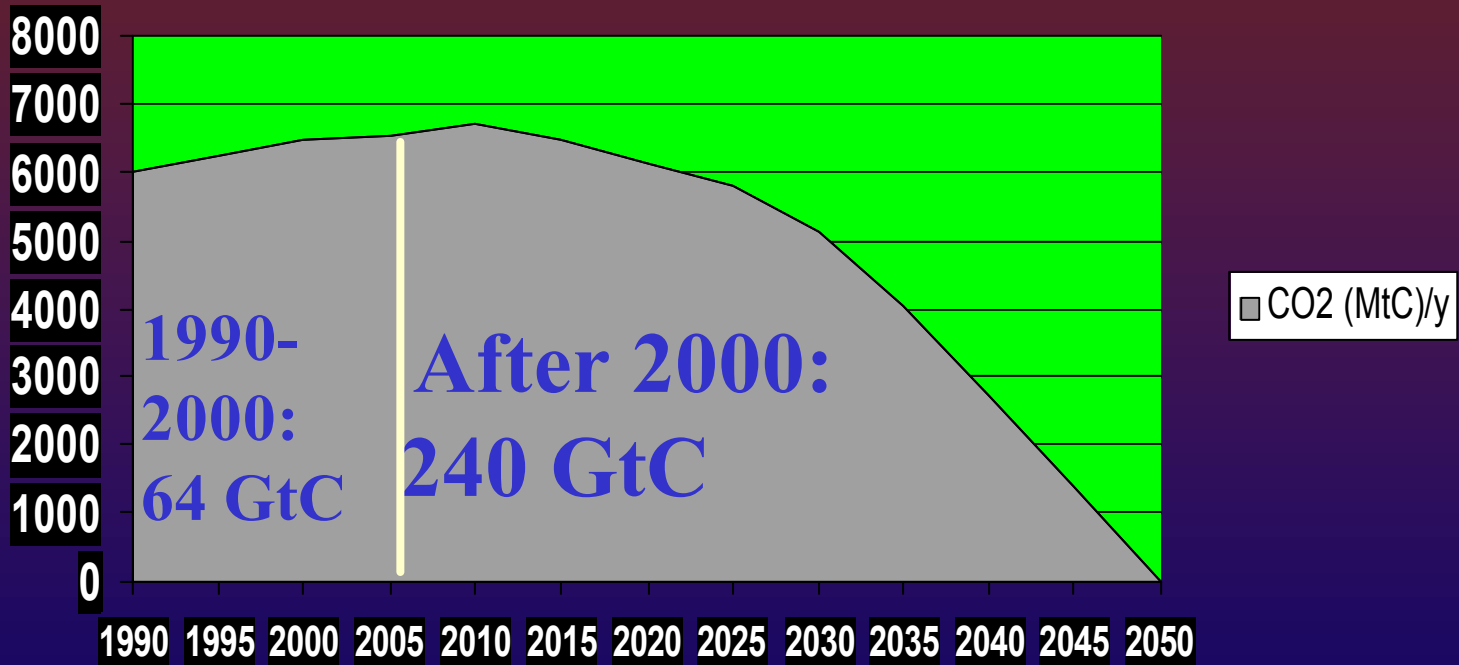
European Sustainable Energy Policy Seminar,
March 29, 2006, Brussels
By Gunnar Boye Olesen

Environmental Imperative

- ❖ To be sure to keep global warming below 1 °C during the 21. century, we must limit global CO₂ emissions to 225 Gigaton of Carbon in this century = 35 years of current consumption (assumed climate sensitivity of 3.5°C)
- ❖ This can be done by phasing out fossil fuel use until 2050

A Global Sustainable Scenario

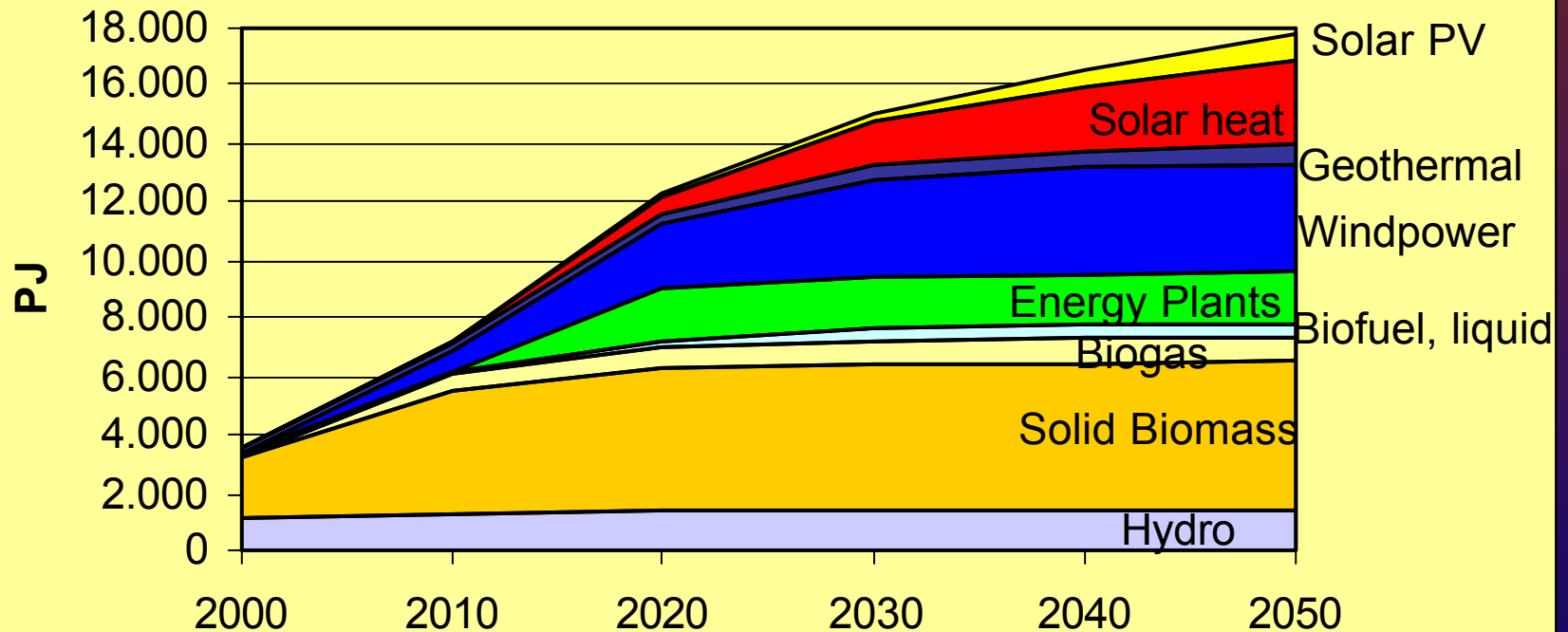
CO₂ (MtC)/y



INFORSE-EUROPE
International Network for Sustainable Energy - Europe

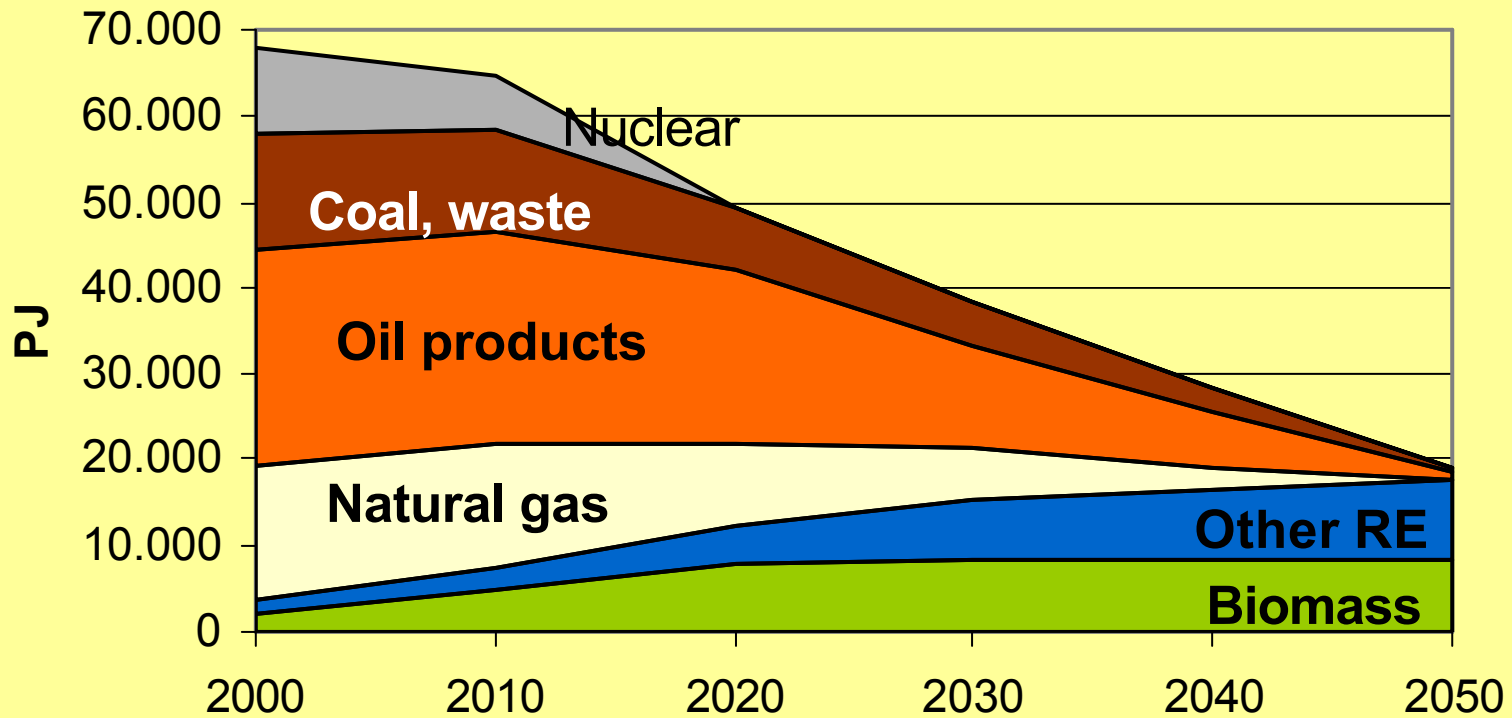
EU-25 Vision

Renewable Energy



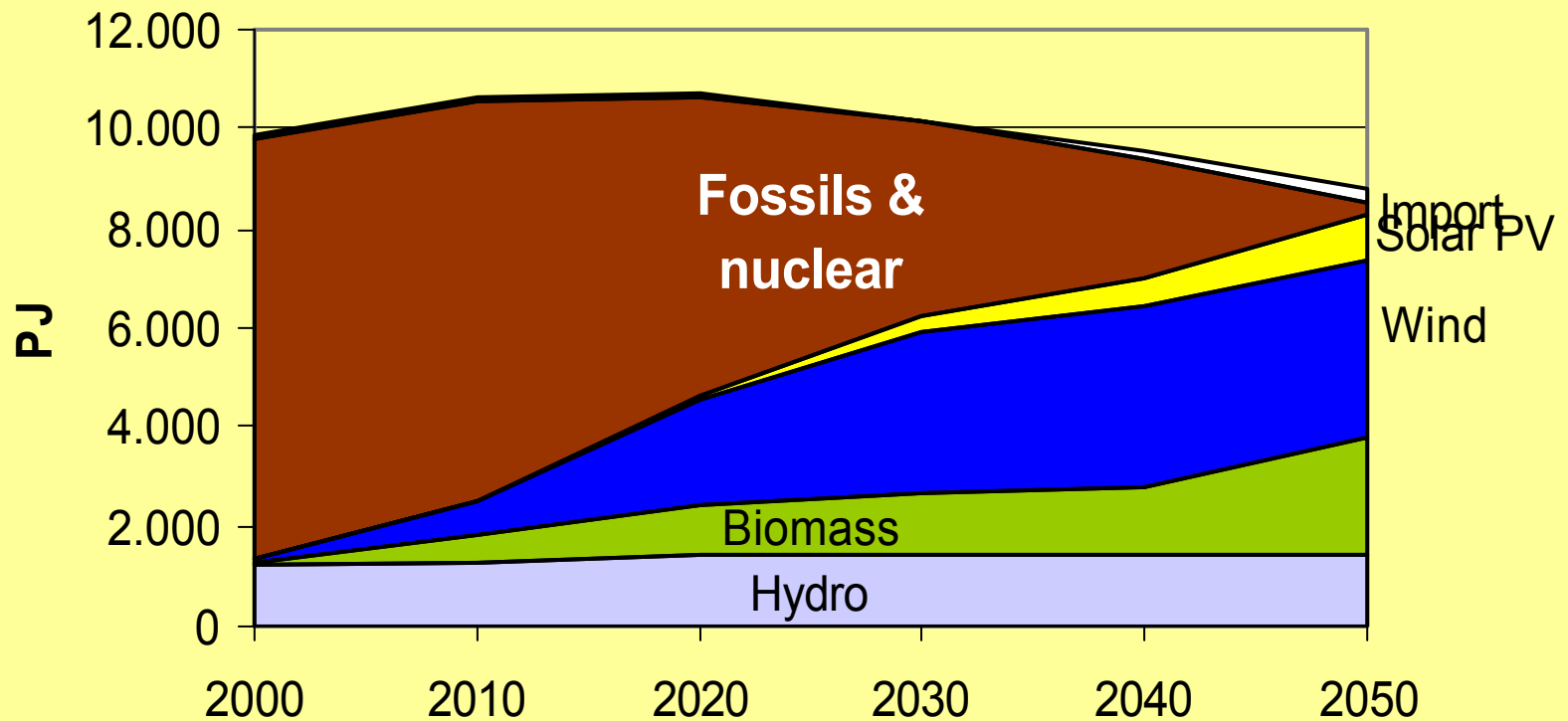
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Total Primary Energy Supply



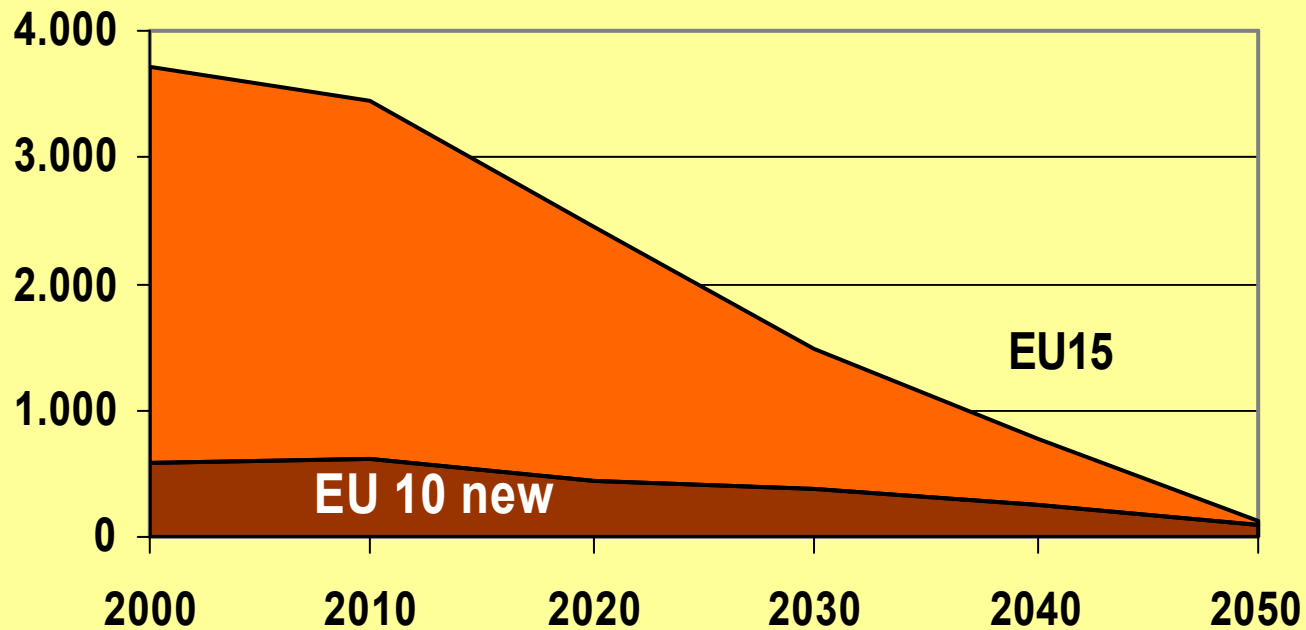
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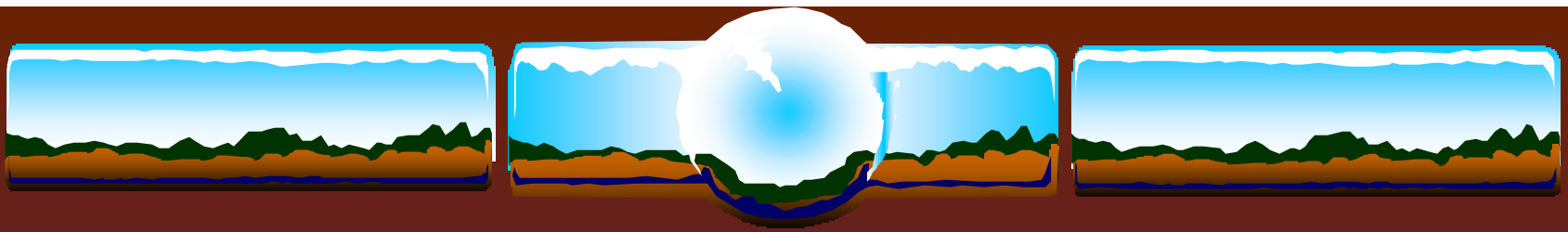
Electricity Divided in Supply



EU-25

CO₂ emissions, million tons/year





Can we reach it?

or

What does it take to reach
the goal ?

EU Energy Supply

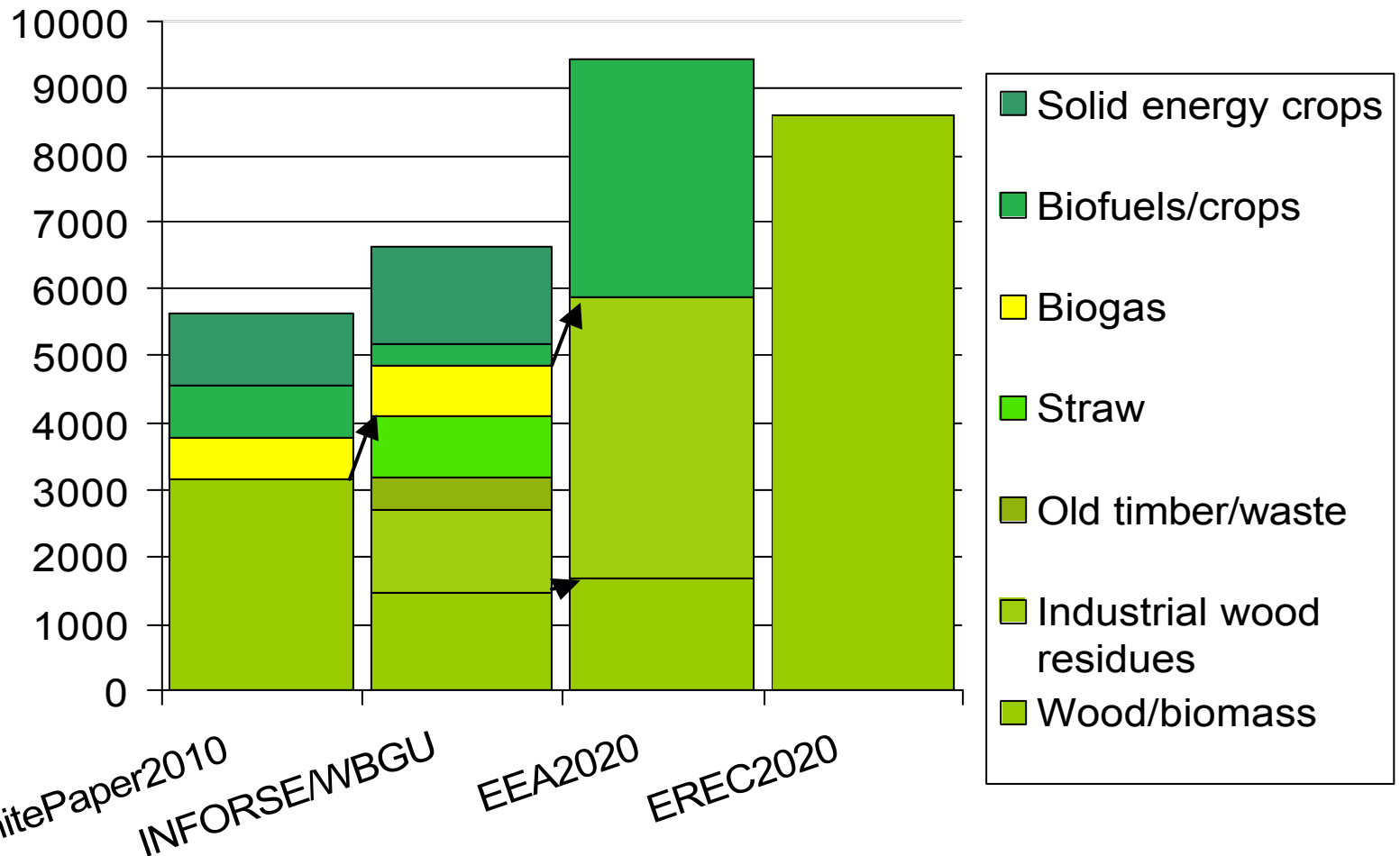
Wind: Growth to 70,000 MW in 2010 (current trend), 220,000 MW in 2020 and 375,000 MW in 2040 (up to 15,000 MW/year), it was 6000 MW in 2005), $\frac{1}{4}$ expected offshore. This is 20-30% higher than EWEA/EREC forecasts for 2020.

Large windpower development programs are cost-effective: extra costs today will be paid back with future cost reductions due to technology learning. Many sites cost-effective today.

Solar: PV market has reached the critical 500 MWp/year globally, and grows $> 25\%$ pr. year



Biomass, Sustainably in EU



Energy Demand

- ❖ Most energy consuming equipment will be replaced many times before 2050: new generations of equipment should maximize efficiency. Technology learning drives prices down.
- ❖ One exception is houses. In EU houses could use only 1/7 of today's heat demand in 2050. For the vision is proposed 1.7%p.a. specific reduction leading to 57% reduction 2000 – 2050.
- ❖ For transport is expected increase in conversion efficiency from today's 15-20% to 50%, and re-gain of “break energy”: factor 4 efficiency increase
- ❖ Energy service demand will increase, from 0% in industry to 43% in electric equipments.
- ❖ -33% in car use/Transp.vision

Realise Efficiency

Realising factor 4 in electric equipment, industry, transport, many examples:

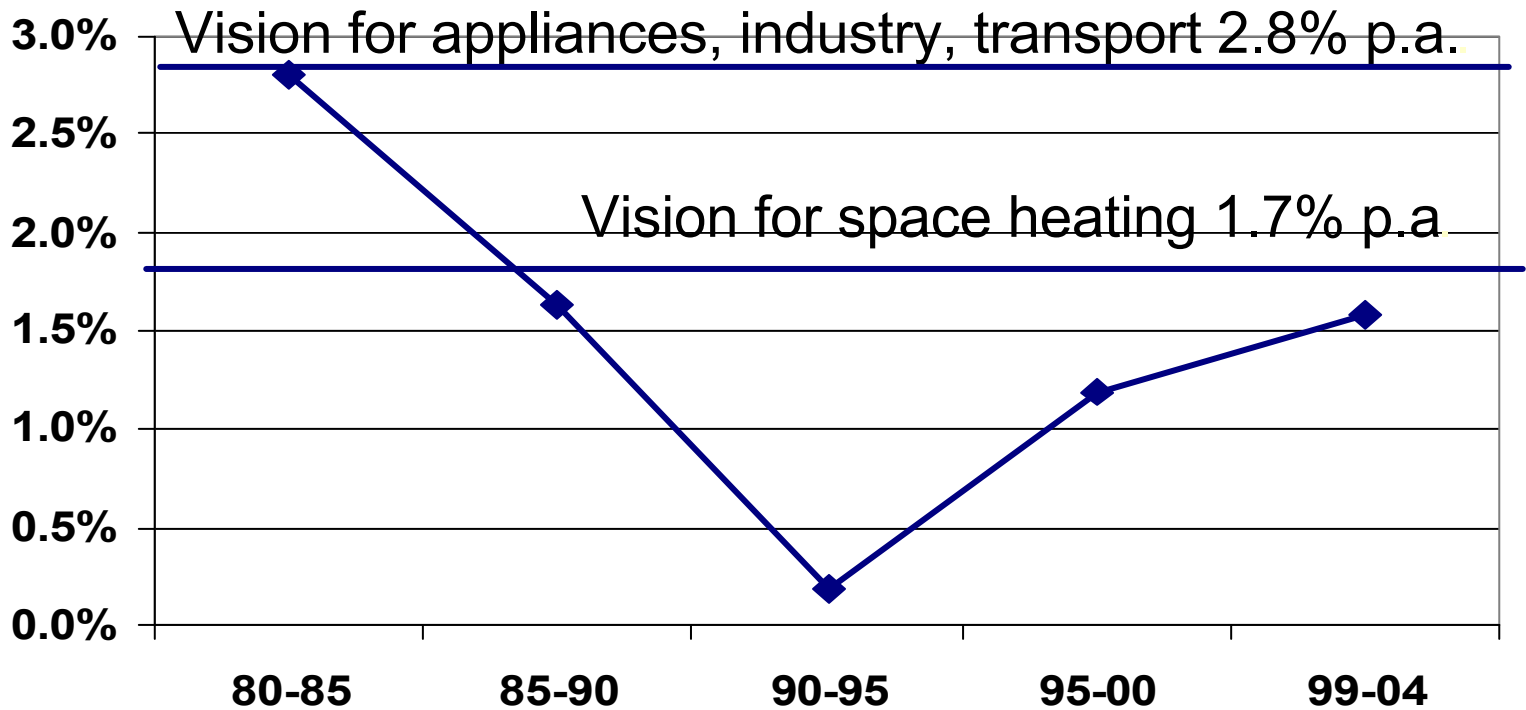
- ❖ Computer screens: change to flat screens save 50 - 66% in one generation.
- ❖ A hydrogen car can be 4 times as efficient as present petrol cars, electric cars are 6 times as efficient.

Buildings:

- ❖ Industry (Eurima/EuroACE) finds that more than 50% of energy use in buildings could be reduced – INFORSE-Europe proposes 57% until 2050.

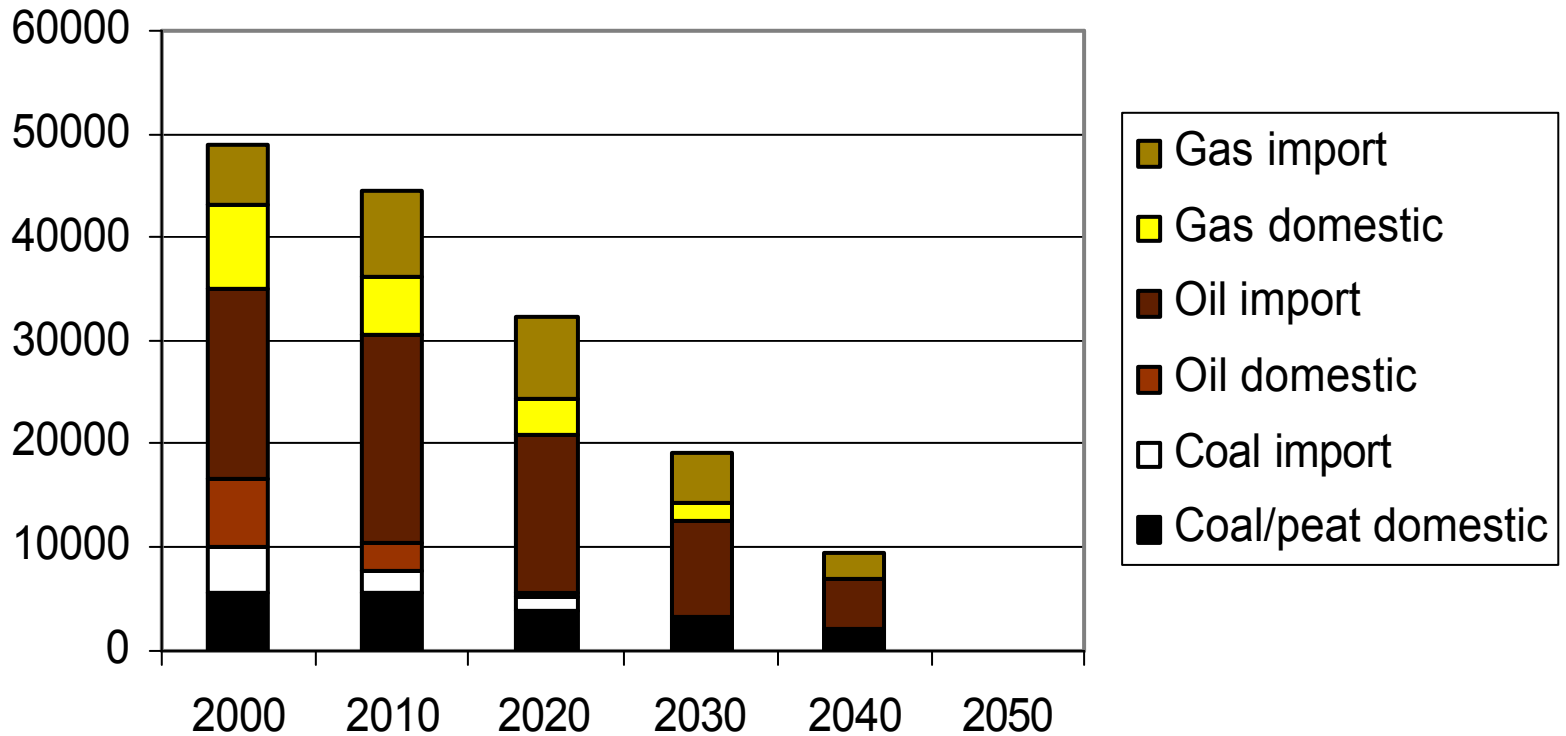
Realise Efficiency – Macro Scale

Heat efficiency annual increase relative to area,
Danish households, 5-year averages



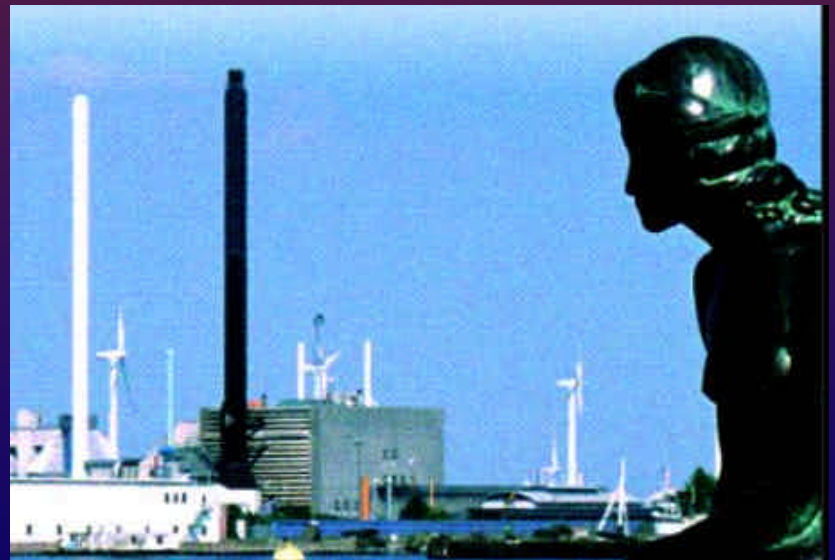
EU-15

Fossil fuel supply (PJ)

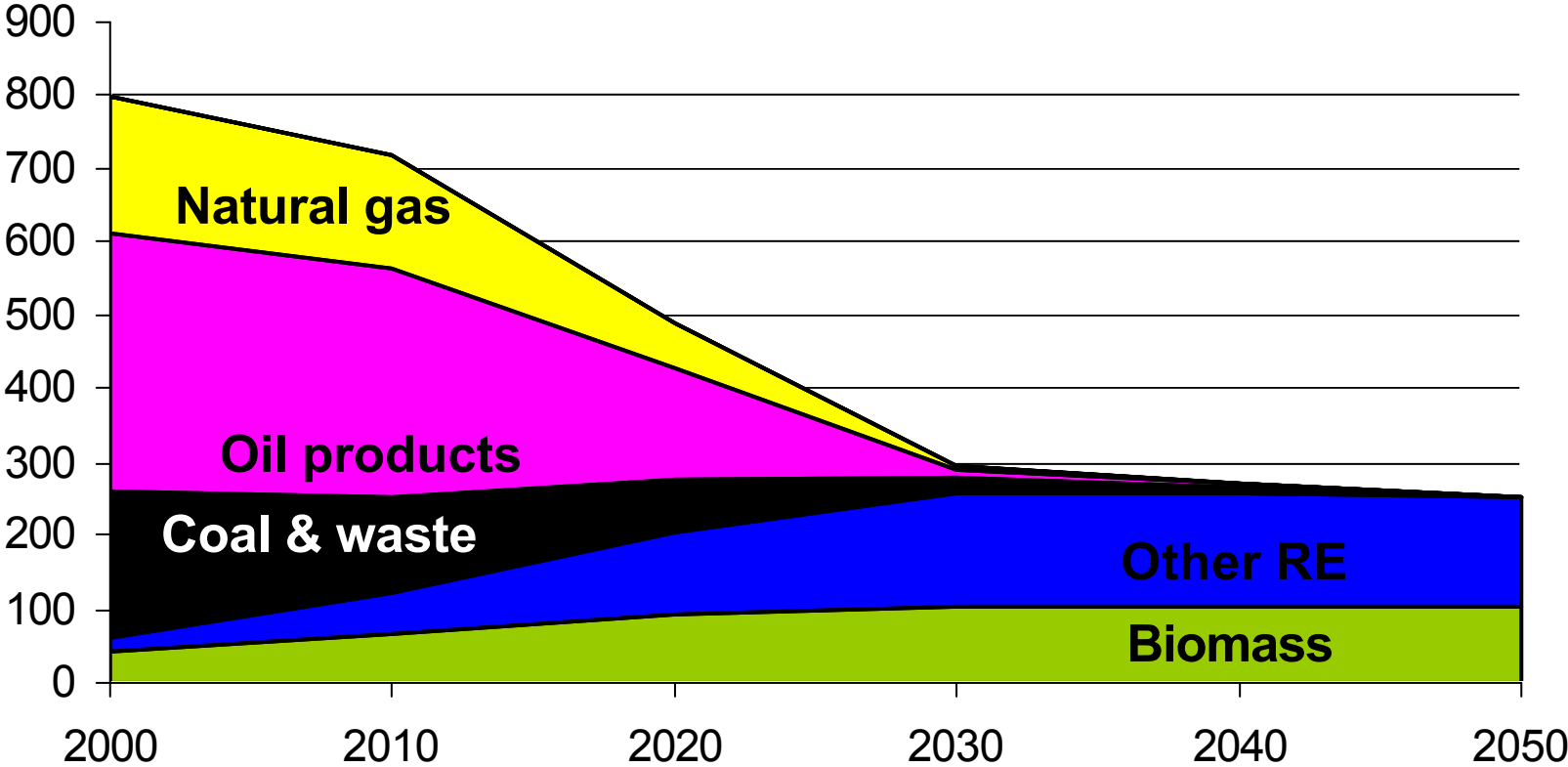


Vision for Denmark (OVE'05)

- ❖ Strong growth in windpower until 2030
- ❖ Half specific building consumption 2005-2025
- ❖ Flexible electricity use: heat pumps and hydrogen
- ❖ Sustainable transport system by 2030 (33% reduction in car use)
- ❖ el-storages from 2030



Primary Net Energy Supply, Denmark (PJ)



Thank you



www.inforse.org/europe



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Gunnar B. Olesen, INFORSE-Europe, INFORSE-EURFORES-EREF Seminar, March 29, 2006 Brussels