

Transition to Renewable Energy until 2030 – 2050 in the EU, Denmark, and more - The INFORSE Visions

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EU Stakeholder Seminar on
Low Carbon European Energy
Scenarios 28. April 2010

The INFORSE Vision

- Phase out fossil fuel and nuclear power
- Provide everybody with basic energy needs



INFORSE Sustainable Energy Visions

- Global Vision
- **Vision for EU-27**
 - Bulgaria
 - Denmark
 - Hungary
 - Latvia
 - Lithuania
 - Romania
 - Slovakia
- UK Zero Carbon Britain
 - Belarus
 - Russia
 - Ukraine

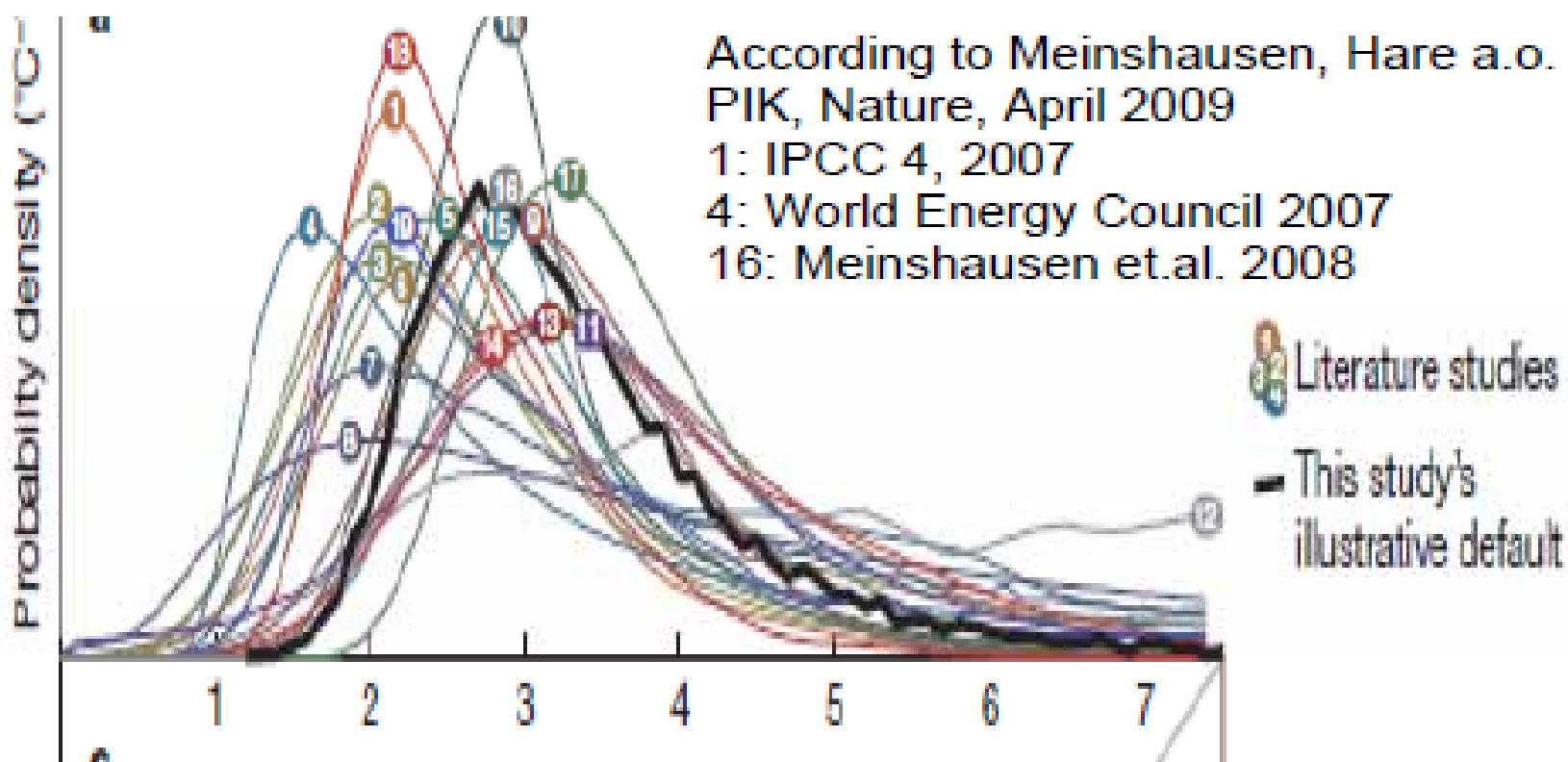
We need to limit global climate change
to 2°C (or better 1.5°C)

Only then can we avoid catastrophes for nature and
humanity

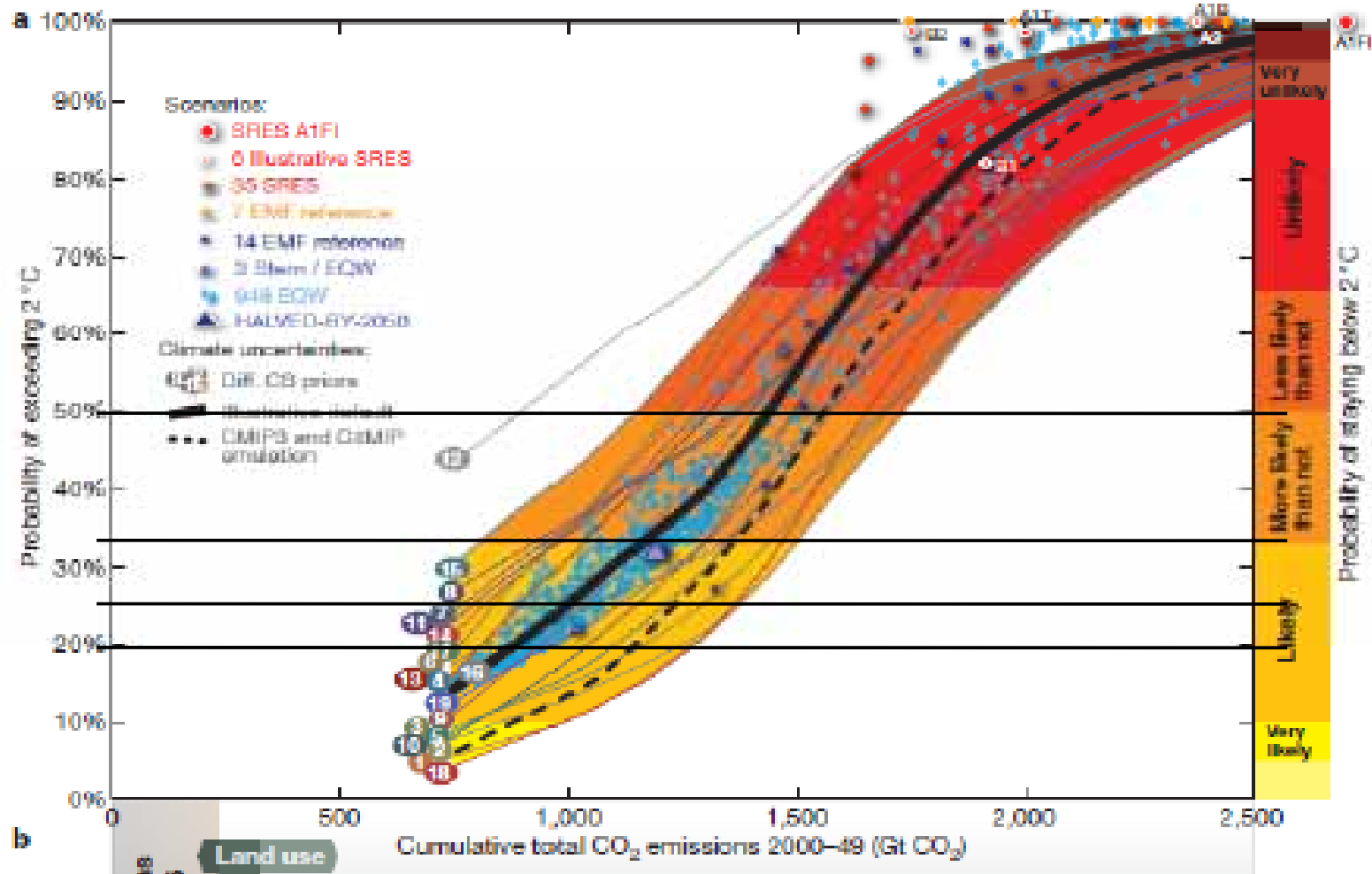
In spite of recent press there has been very broad
scientific consensus on this for several years

It is expressed in the IPCC 4th Assessment report
(2007) and stronger emphasized in later studies

Climate Sensitivity: How much will global temperature increase with a doubling of atmospheric greenhouse gases?

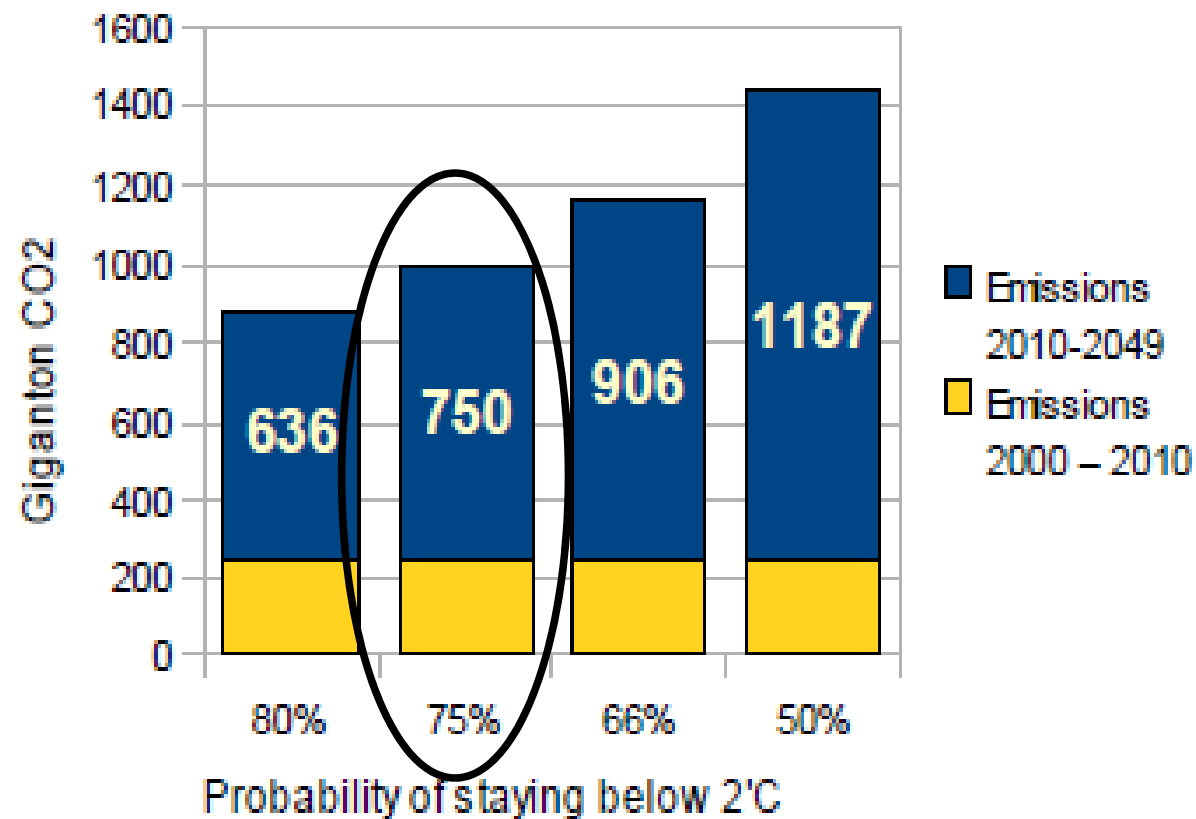


The risk to exceed 2°C global warming – depending on CO₂ emissions 2000 – 2049 (The Climate Budget)



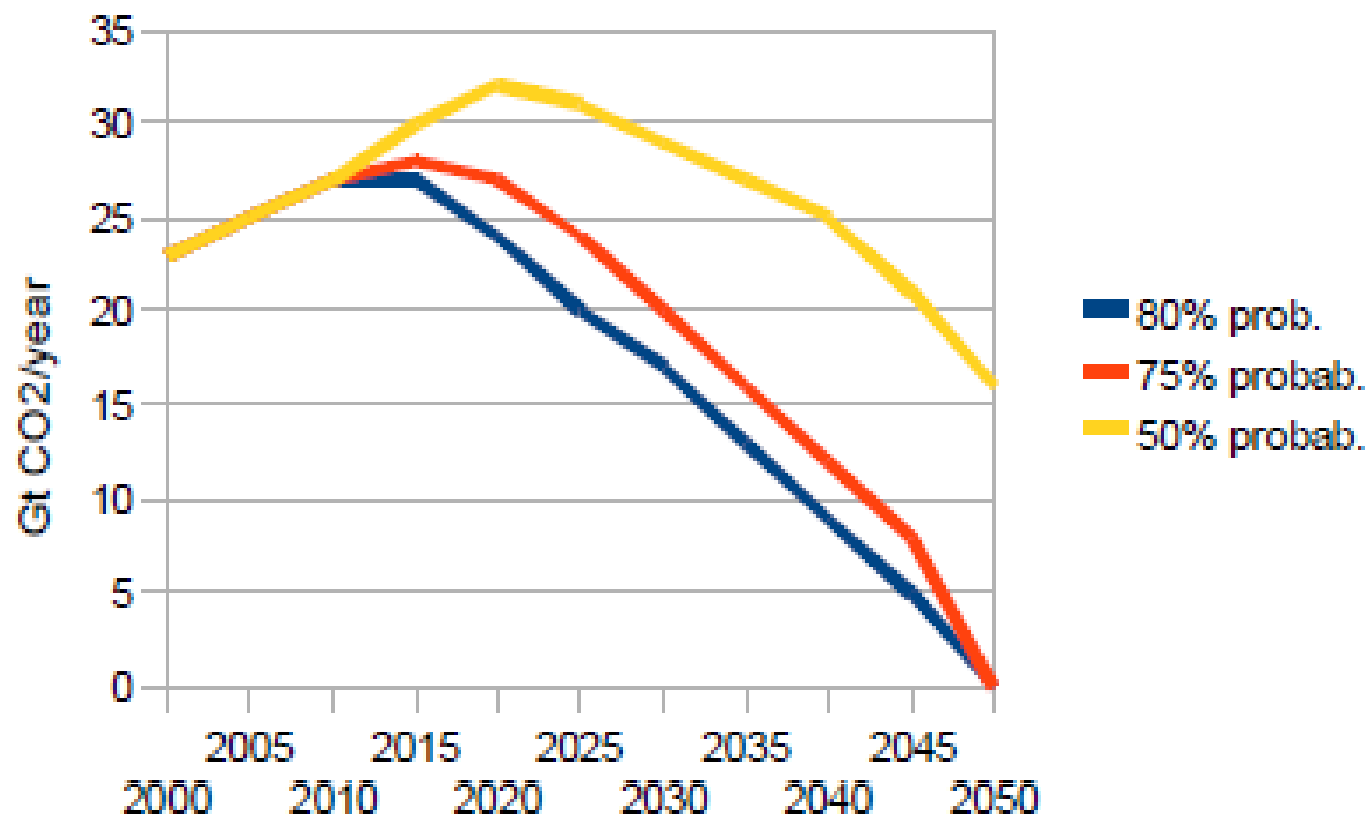
Climate budget

CO2 emission budget 2000 - 2049

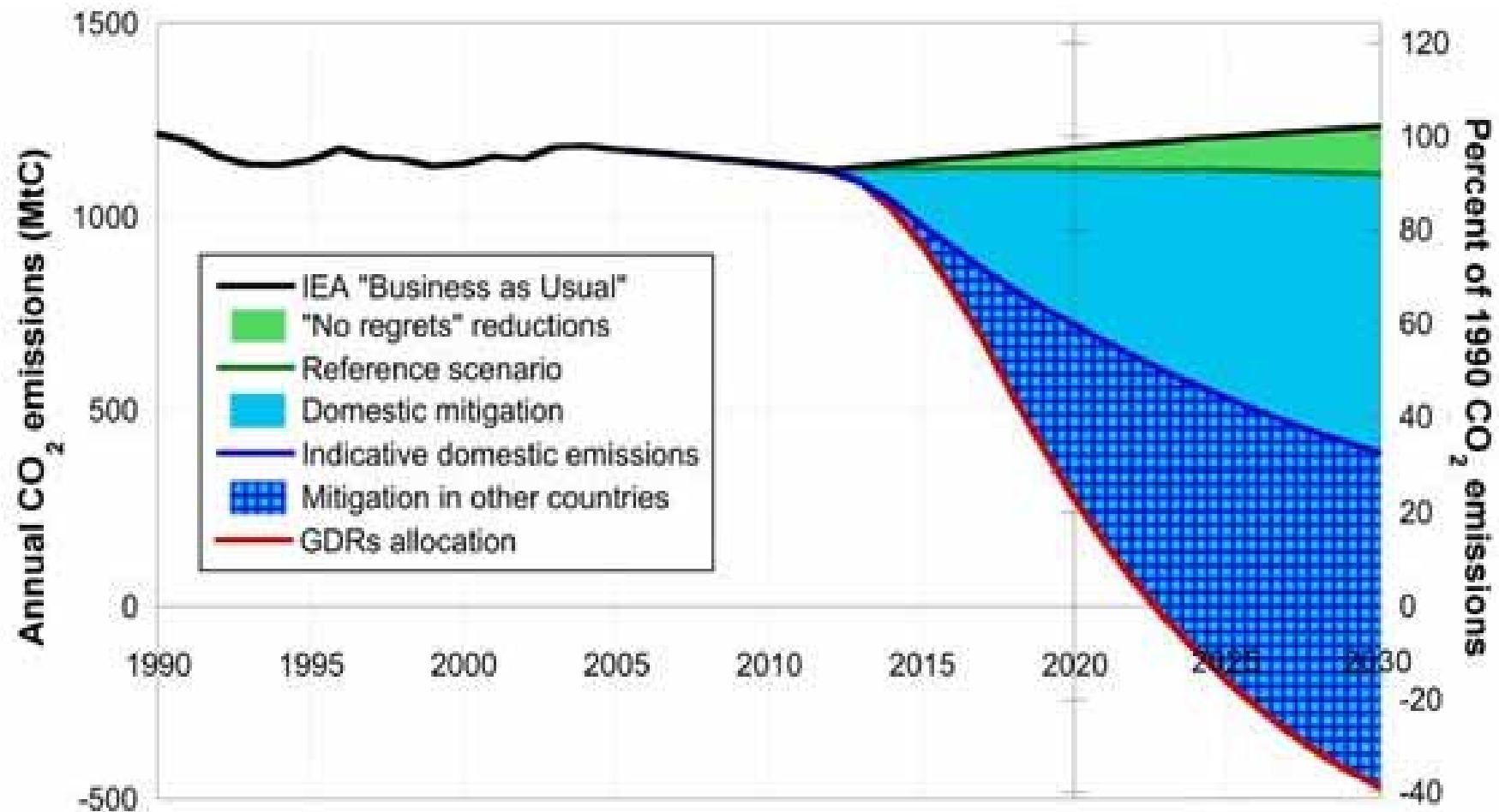


Pathway

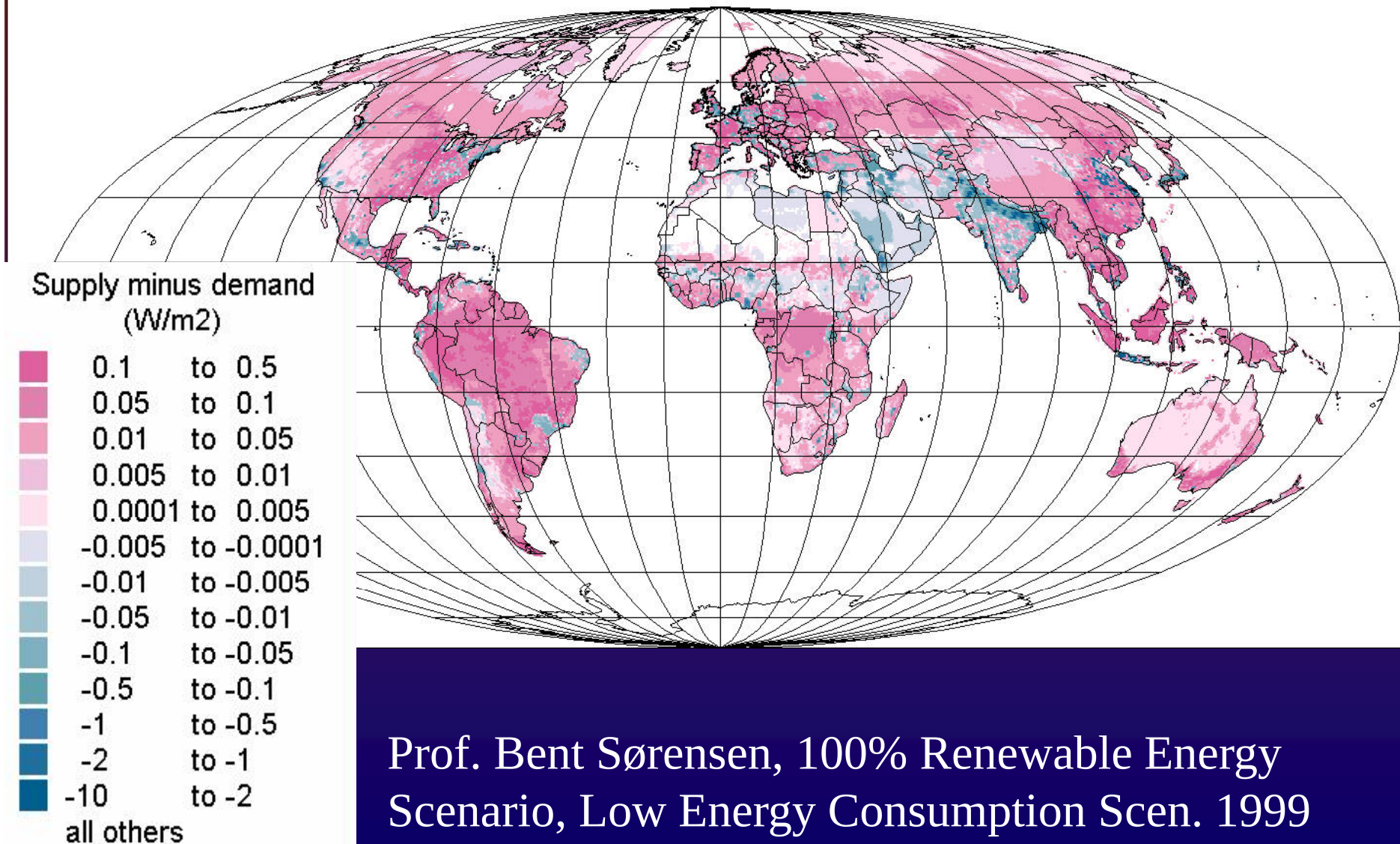
Global CO₂ emissions to keep below 2°C



EU's Challenges in a Global Development Rights Framework



The Global Vision



Prof. Bent Sørensen, 100% Renewable Energy
Scenario, Low Energy Consumption Scen. 1999

EU-27 Sustainable Energy Vision

Methodology of the study:

- Energy balances per decade for EU-15, EU-12 and selected countries
- Trends from decade to decade based on realised examples and studies/documentation
- Based on energy service level trends, not GDP
- Based on low growth/sustainable development

Targets & guidelines:

- Above 95% reduction by 2050 (98%),
- Fast application of known solutions to 2020 and 2030
- Sustainability issues addressed (biomass, biofuels)
- No net import or export over longer periods

EU-27 Sustainable Energy Vision

Demand side:

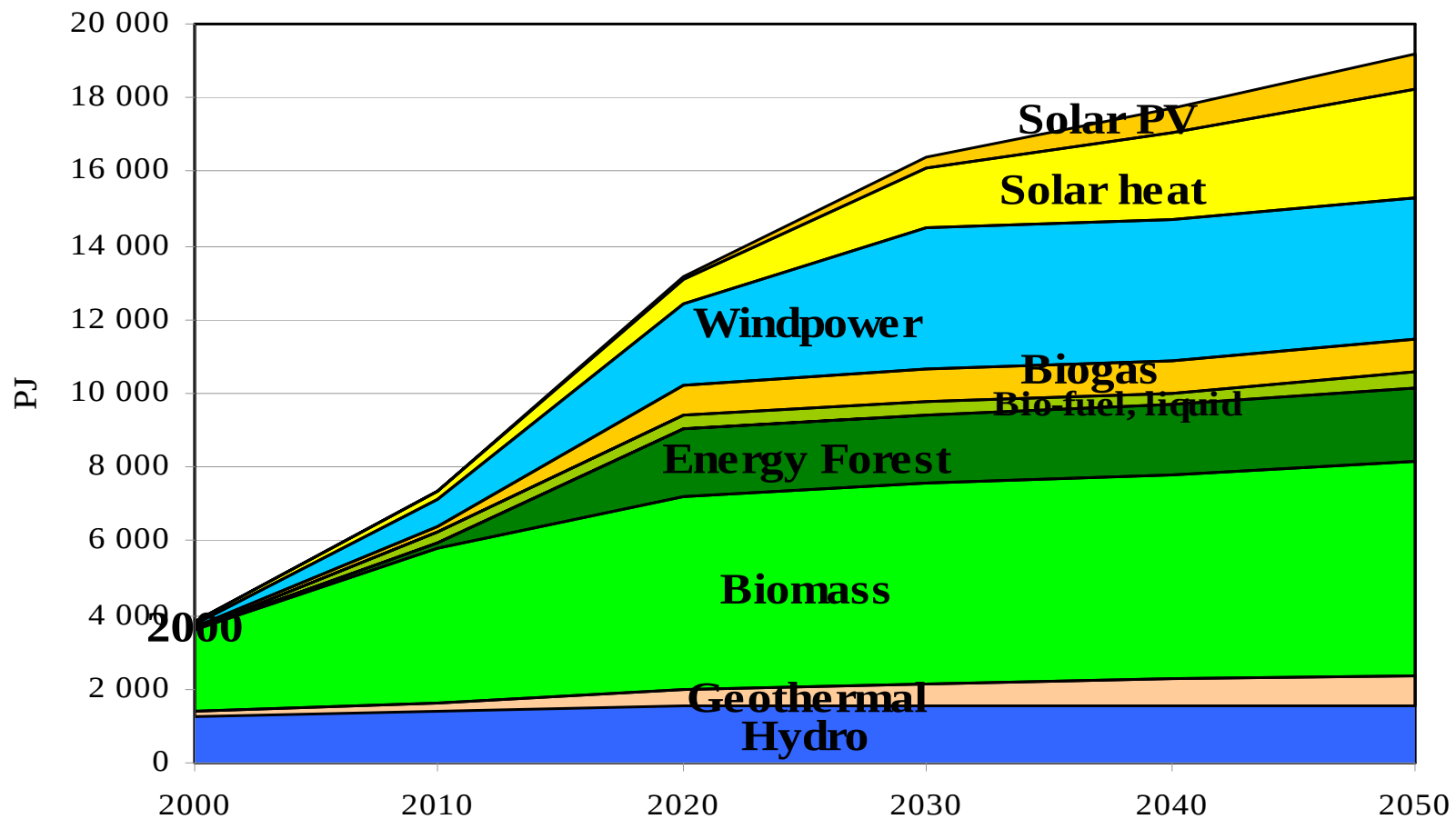
- **Modest increase in energy services (sufficiency/sust.)**
- **Less road transport in EU-15 (sufficiency, environm.)**
- **Large increase in energy efficiency, factor 4 in end-use sectors when possible until 2050**
- **Transition to electric and hydrogen transport, 97%**

Supply side:

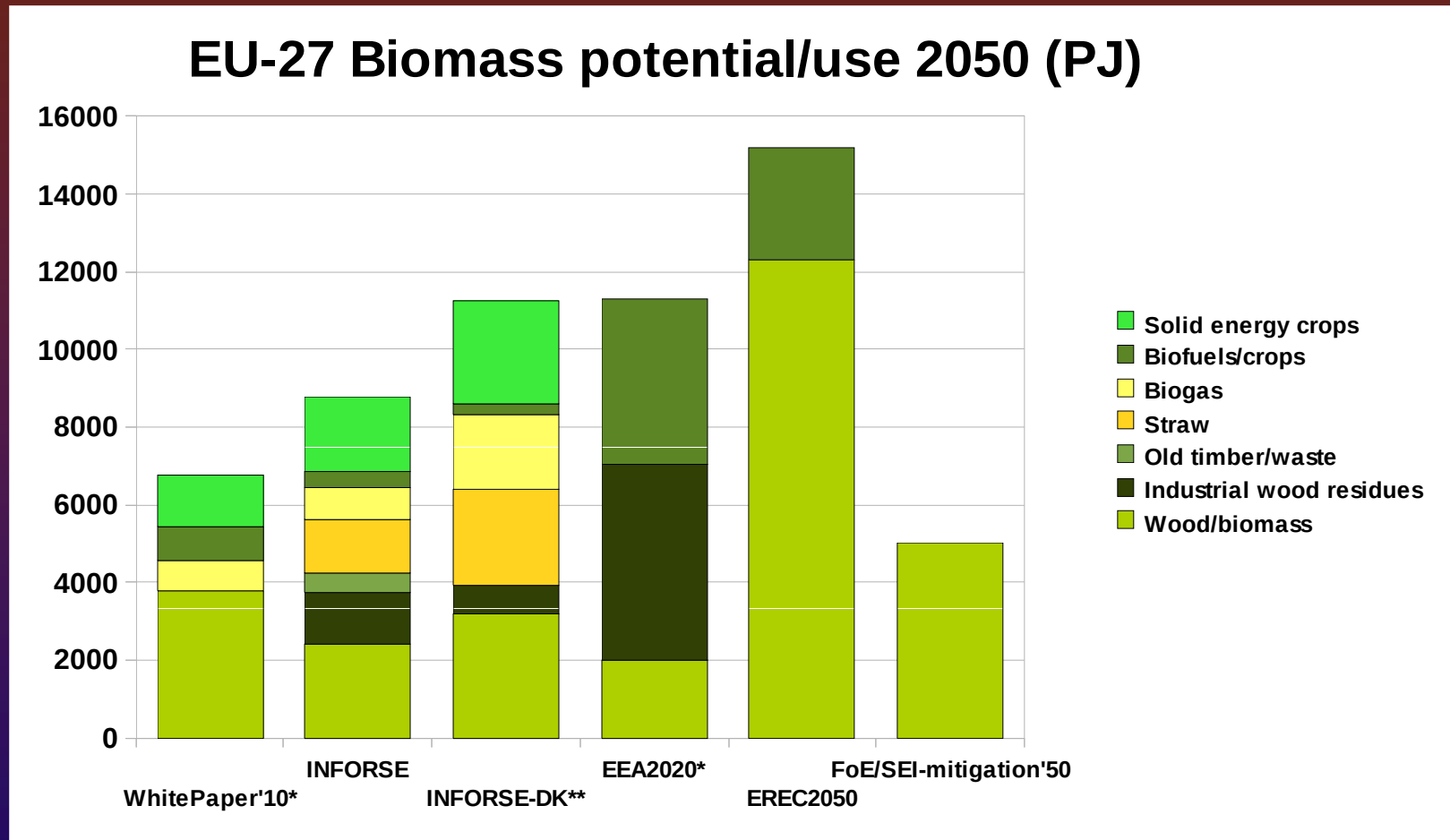
- **Efficient energy supply with combined heat and power(CHP), smarter and more efficient grids**
- **Rapid development of renewable energy**
- **Phase out of nuclear until 2025, no CCS**

Renewable Energy Supply - EU27

Renewable Energy Supply, EU27



Is the Biomass Use Sustainable?



* EU-15 figures up-scaled with 20% to EU-27

** DK figures up-scaled with population ratio to EU-27

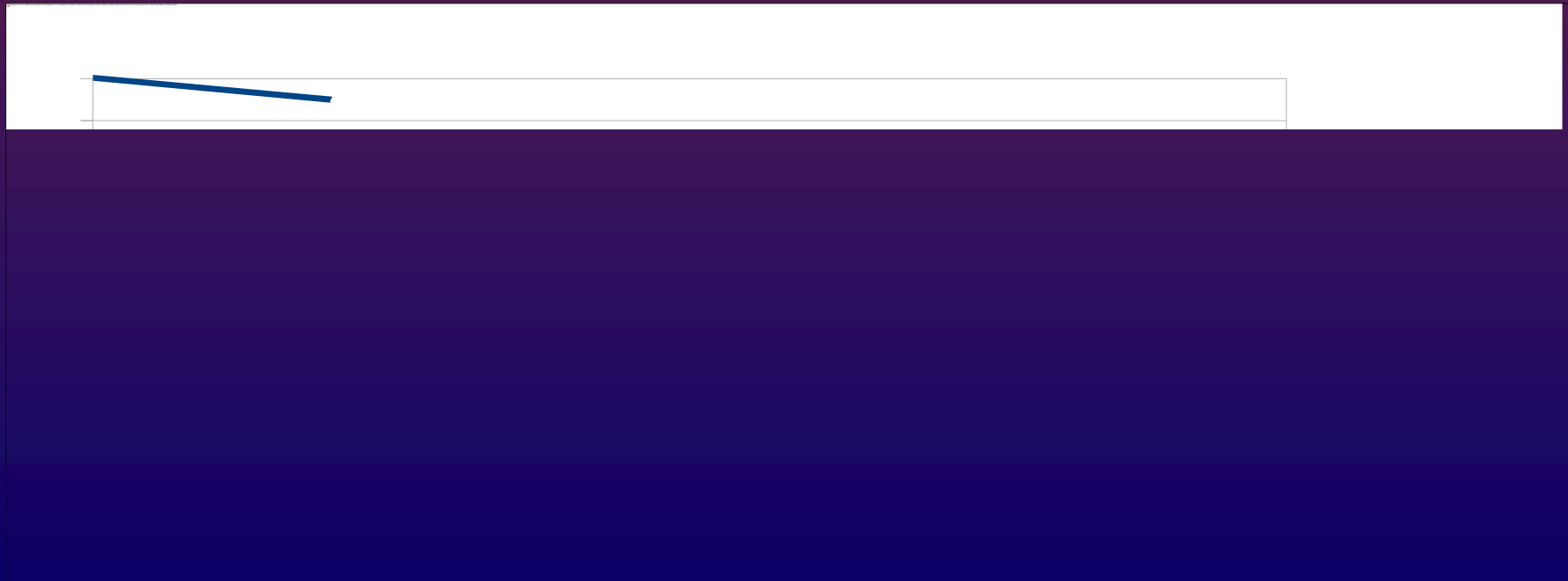
Energy Efficiency Increases

Small development until 2010

Factor 4 for personal cars, industry, until 2050

55% for space heating, until 2050

40% for railways, 60% for road freight until 2050



Energy Service Developments

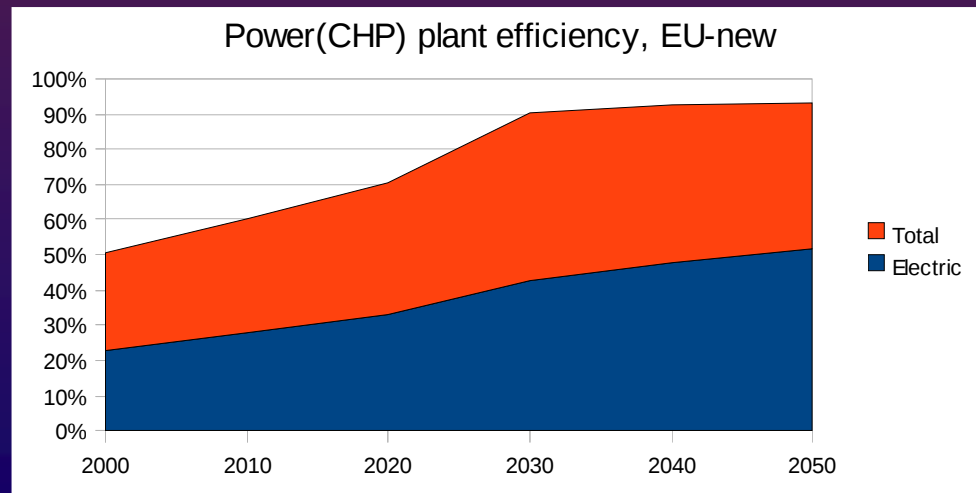
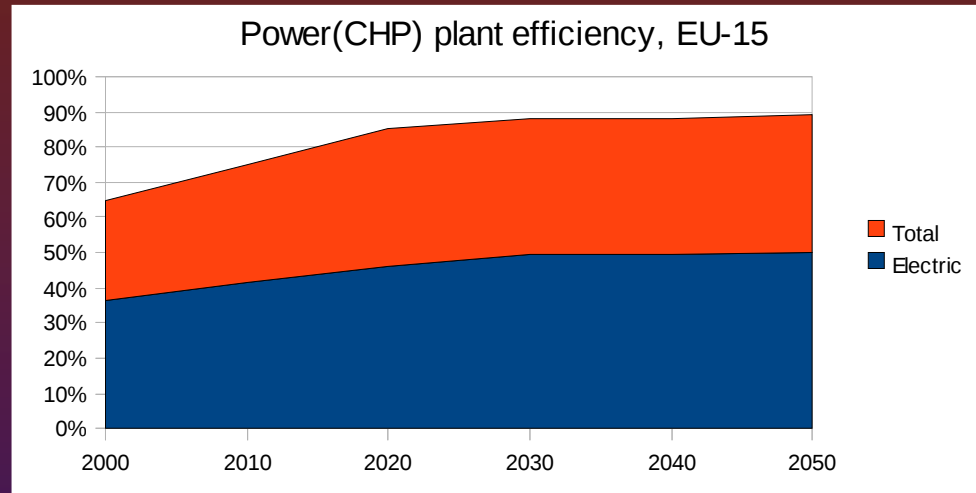
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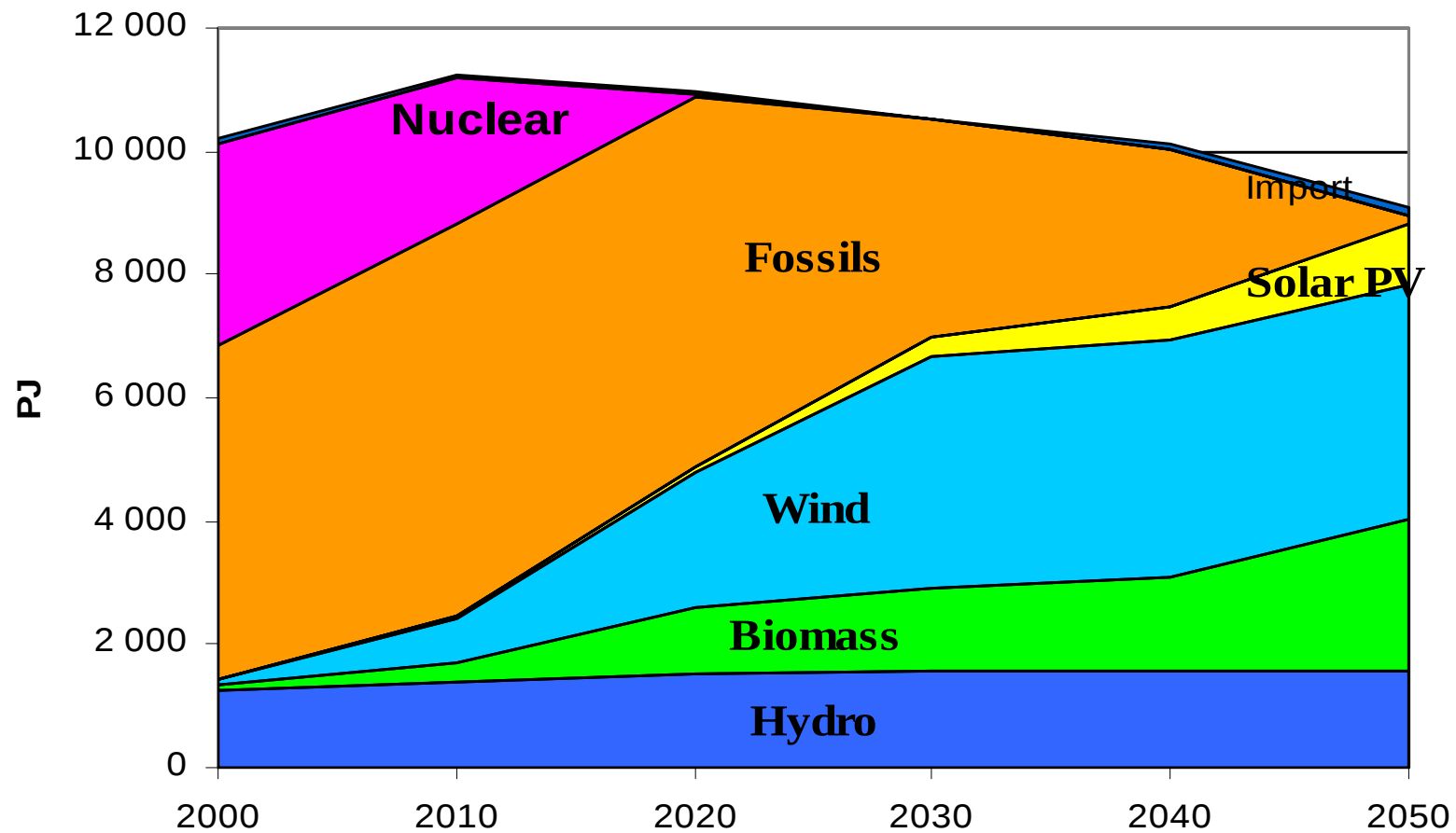
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Increase in Energy Sector Efficiency



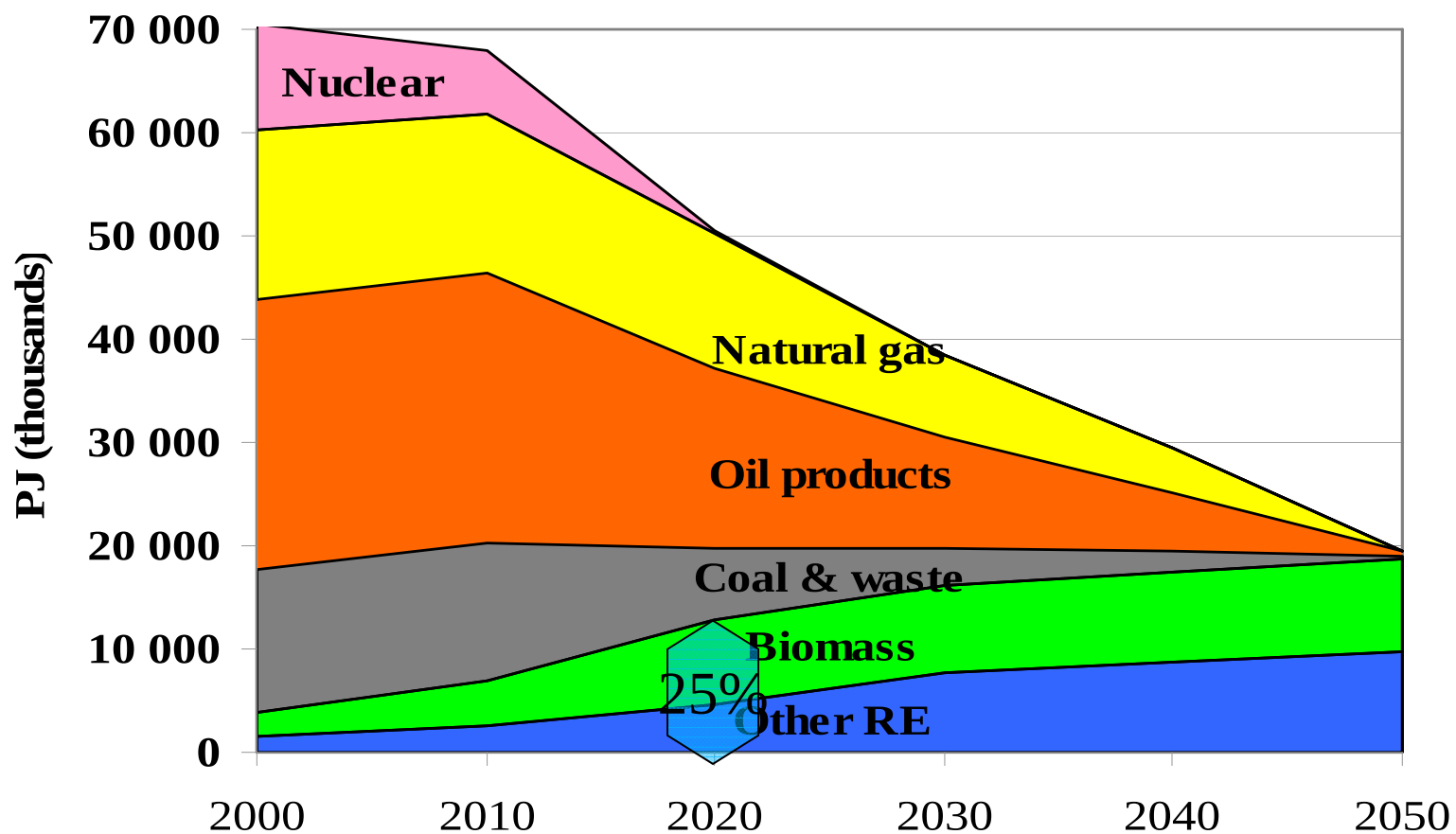
Electricity

Electricity Divided in Supply, EU-27



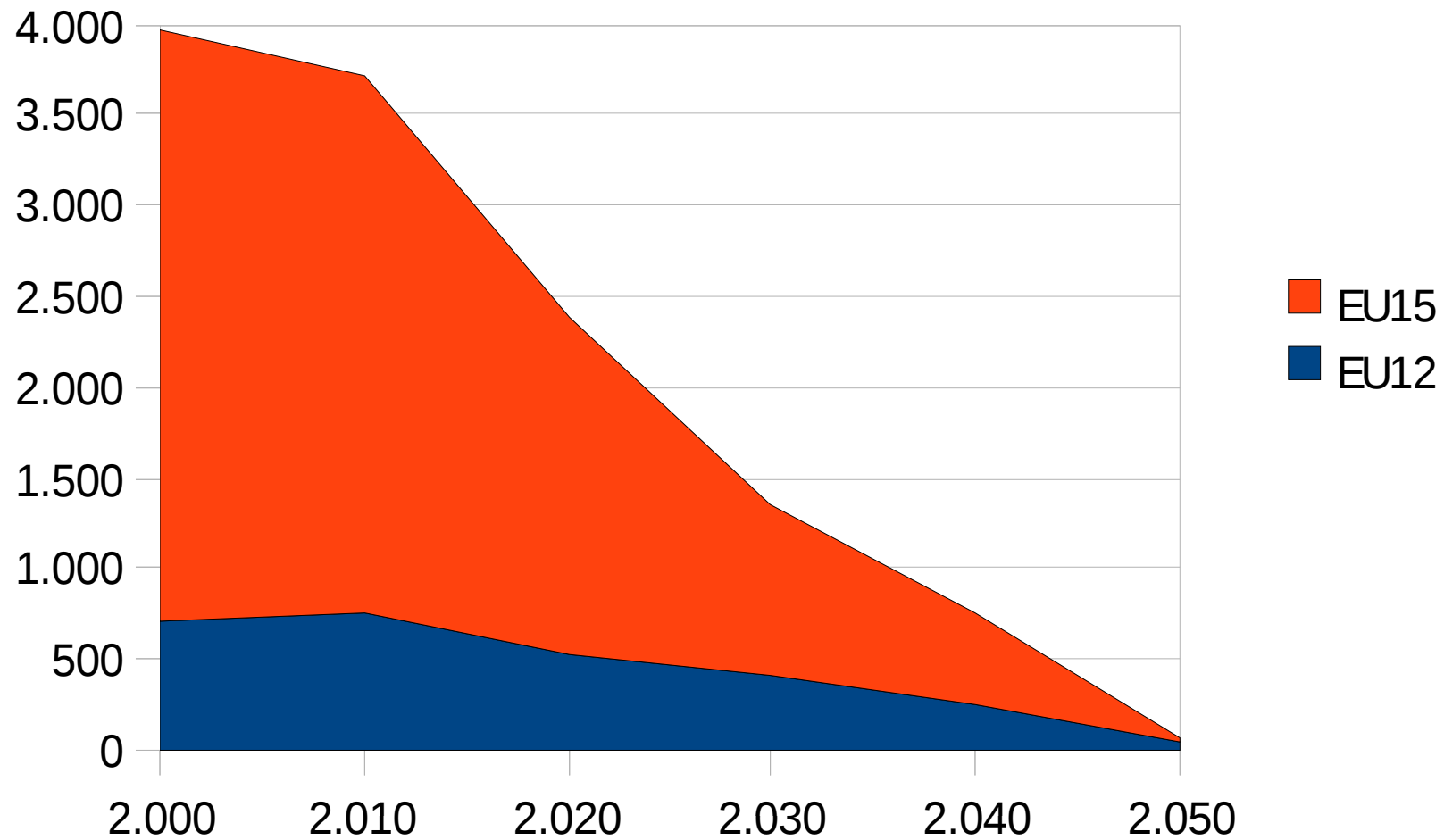
Primary Energy

Total Primary Energy Supply, EU-27



EU CO2 emissions from energy - mill. tons

INFORSE Vision

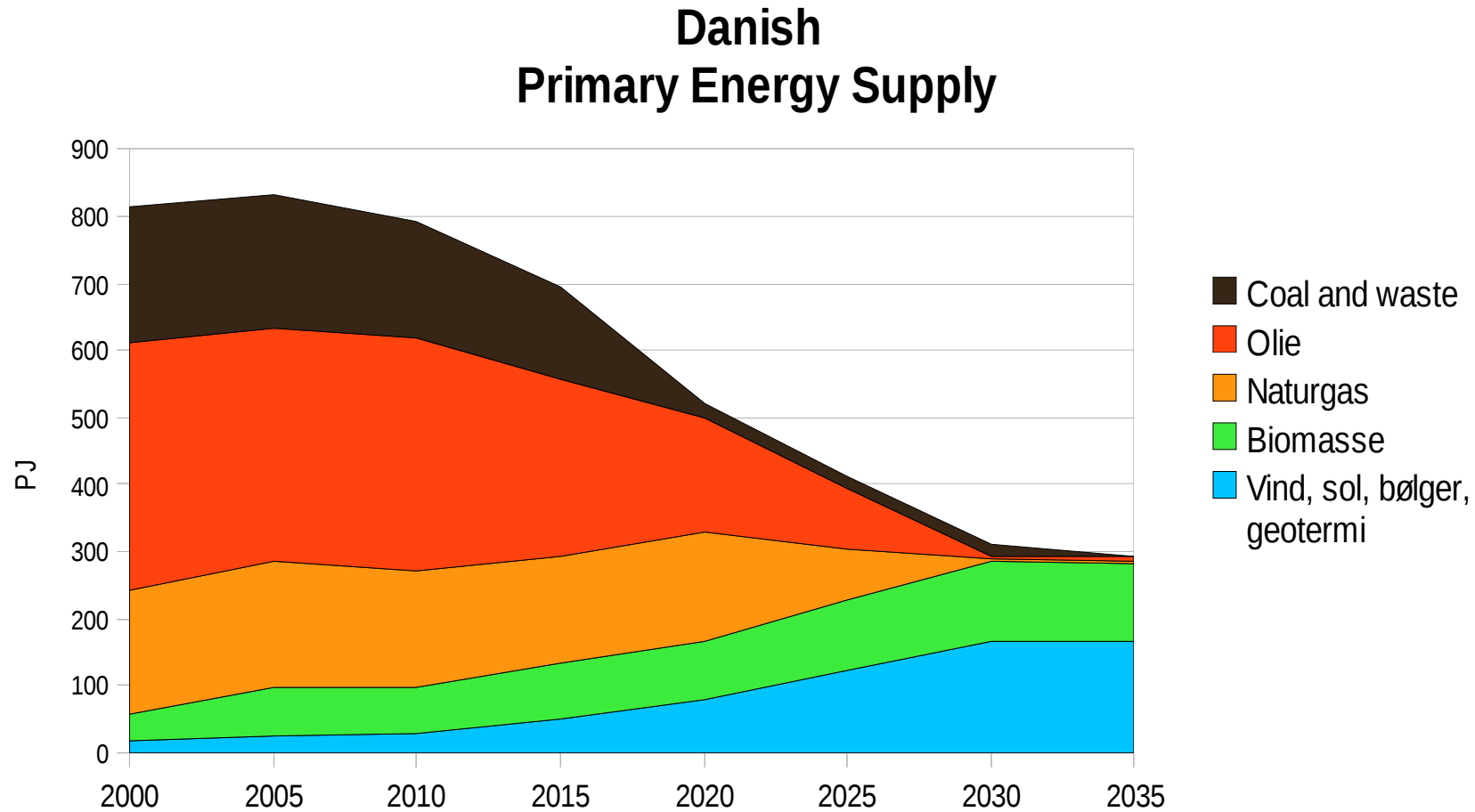


Vision for Denmark (OVE) 2030

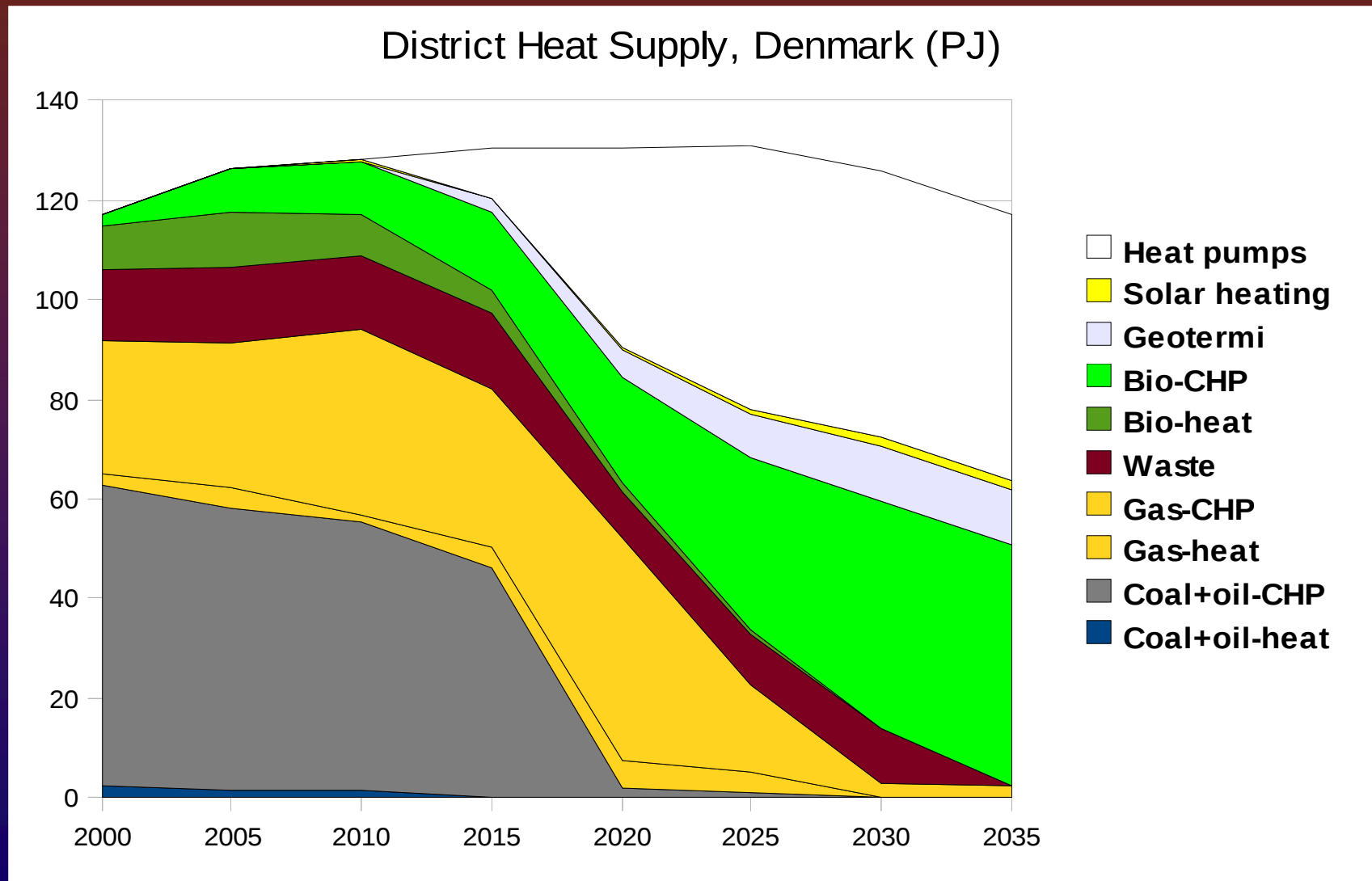
- ❖ Strong growth in windpower, sust. biomass
- ❖ Reduce specific building consumption 39% to '30
- ❖ Reduce specific electricity use, industry 42% to '30
- ❖ Flexible energy: district heating, heat pumps, electric cars and hydrogen
- ❖ Sustainable transport system, 80% more efficient
- ❖ No new international power lines



Danish Primary Energy Demand



District Heating = 70% of Heat



DK CO₂ emissions from energy



- In total 2 t/capita per year in average 2010 – 2049
= sustainable level

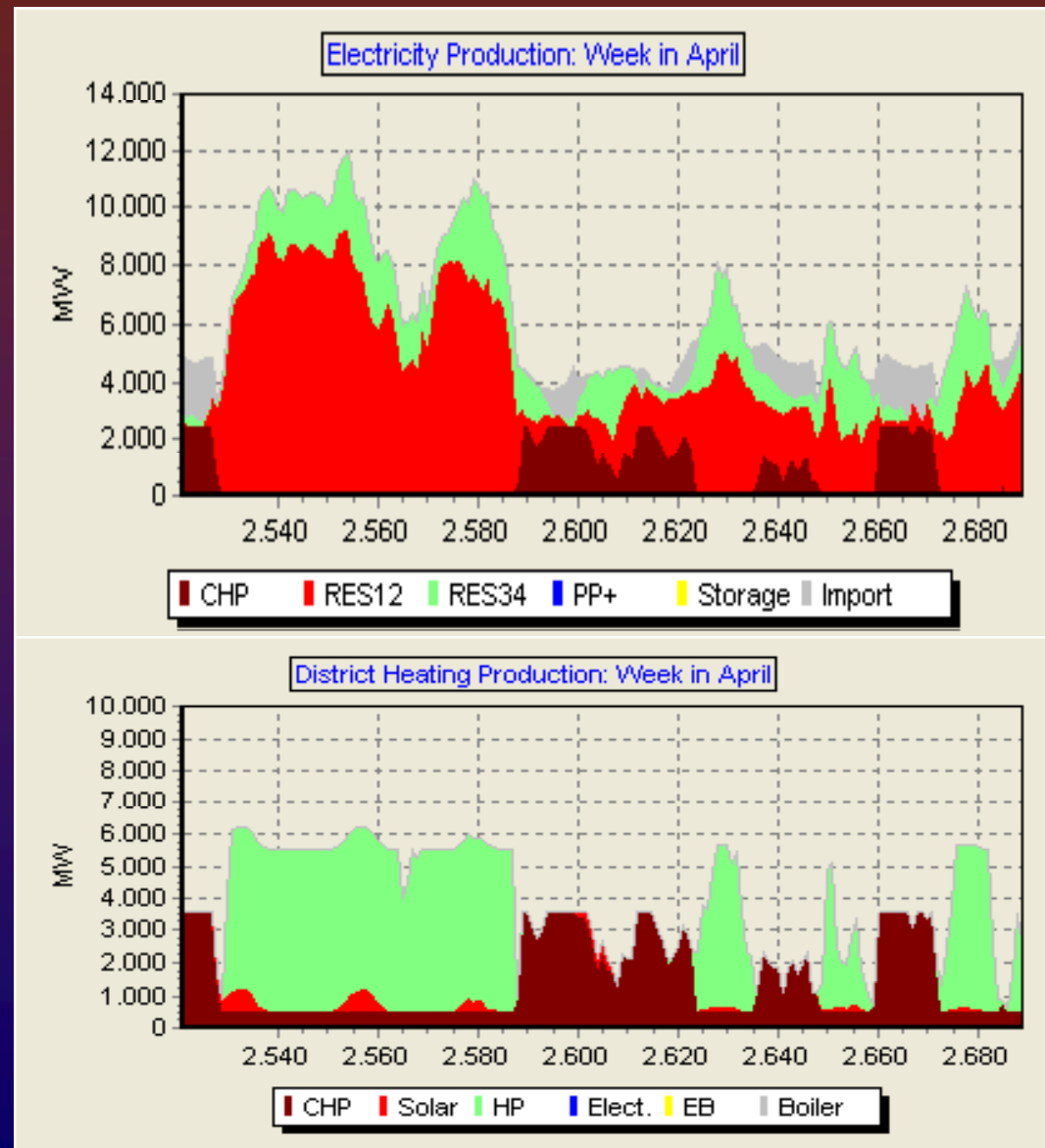
DK System in balance in 2030

- Hourly balances made with Energy Plan programme
- 1% unused windpower
- Existing import/export lines

RES12 = Wind

RE34 = wave+PV

CHP incl. geothermal



ZeroCarbonBritain

Scenario for UK

Up to 50% reduction in energy use

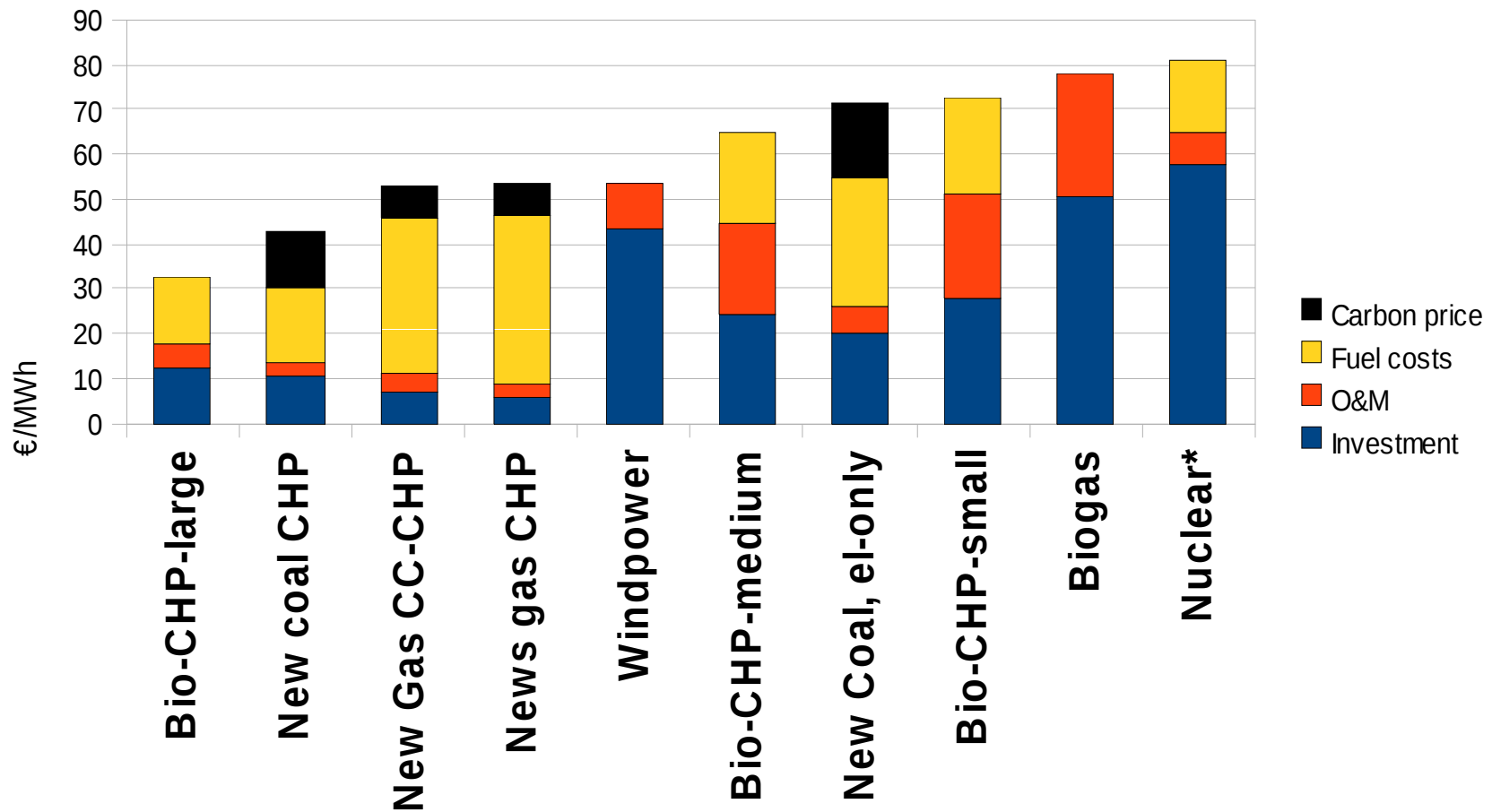
Transition to electric transport

Phase out of fossil fuels in 20 years

Suggested measures, including personal CO2 allowances



Power prices, new plants, reference conditions, Latvia Nov'08



Gas price: 350 USD/1000m³
 Coal price: 100 USD/ton
 Biomass price: 12€/MWh(7Lat/m³)
 Uran price: 100 USD/pund

Operating hours: 5500 h/year
 (biogas 8000, wind 2000)
 Heat selling price:
 30€/MWh(21Lat)/MWh

Thank you



See
www.inforse.org/europe

