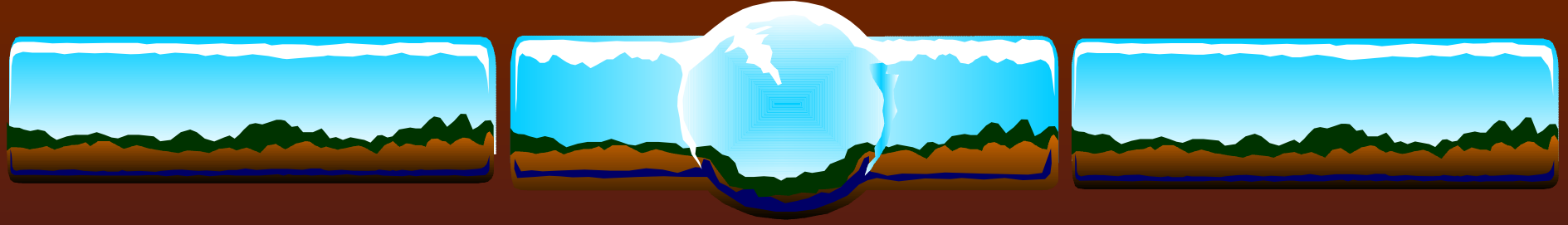

Sustainable Energy Vision for EU - 27

By Gunnar Boye Olesen

International Network for Sustainable Energy

European Sustainable Energy Seminar, Organised by INFORSE, EUFORES, EREF

March 20, 2007

http://www.inforse.org/europe/seminar07_BXL.htm

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EU-27 Sustainable Energy Vision

The EU leaders has recognized:

- The world 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

- We must limit global warming to 2'C above pre-industrial level
- EU must take the lead

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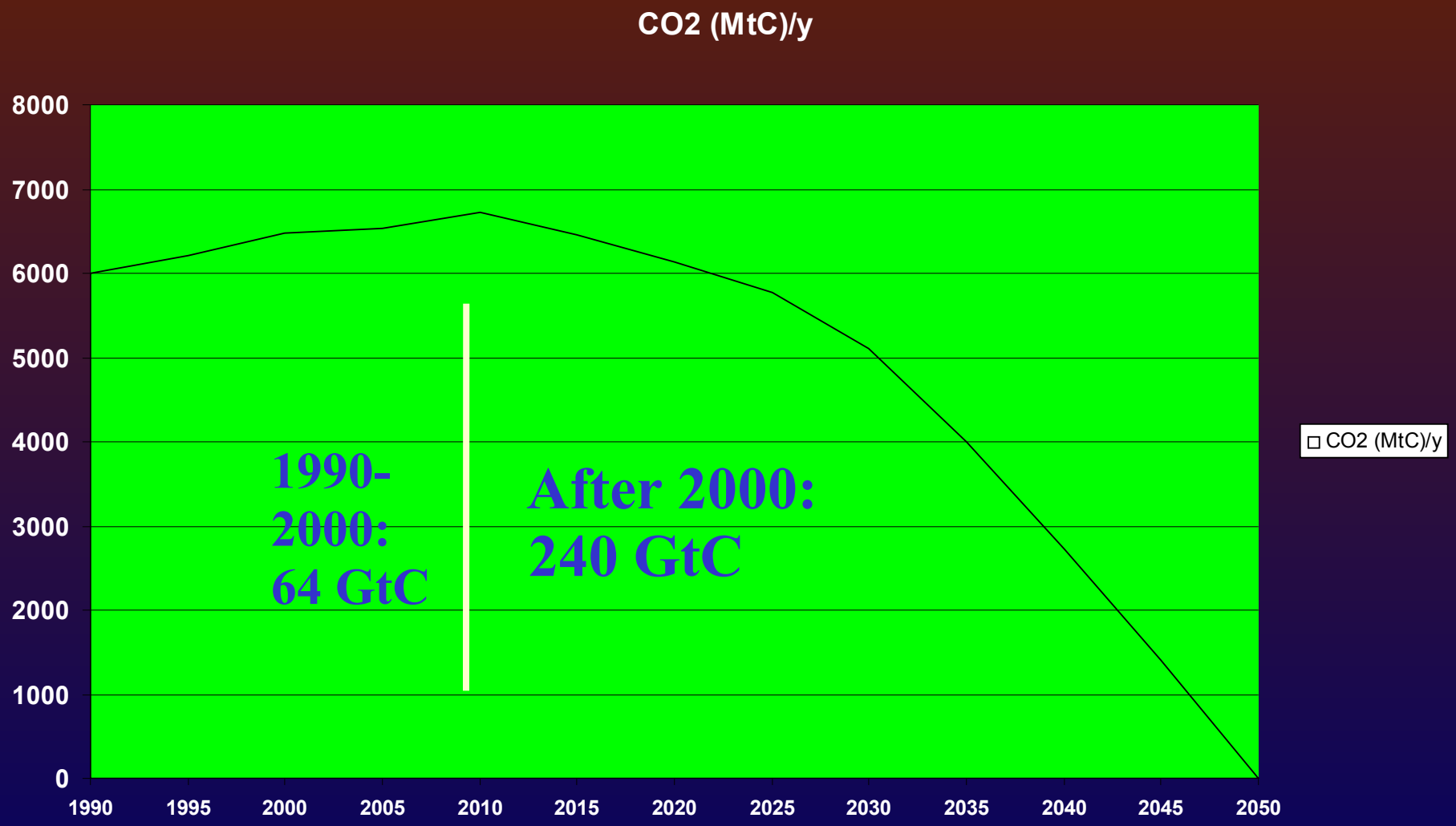
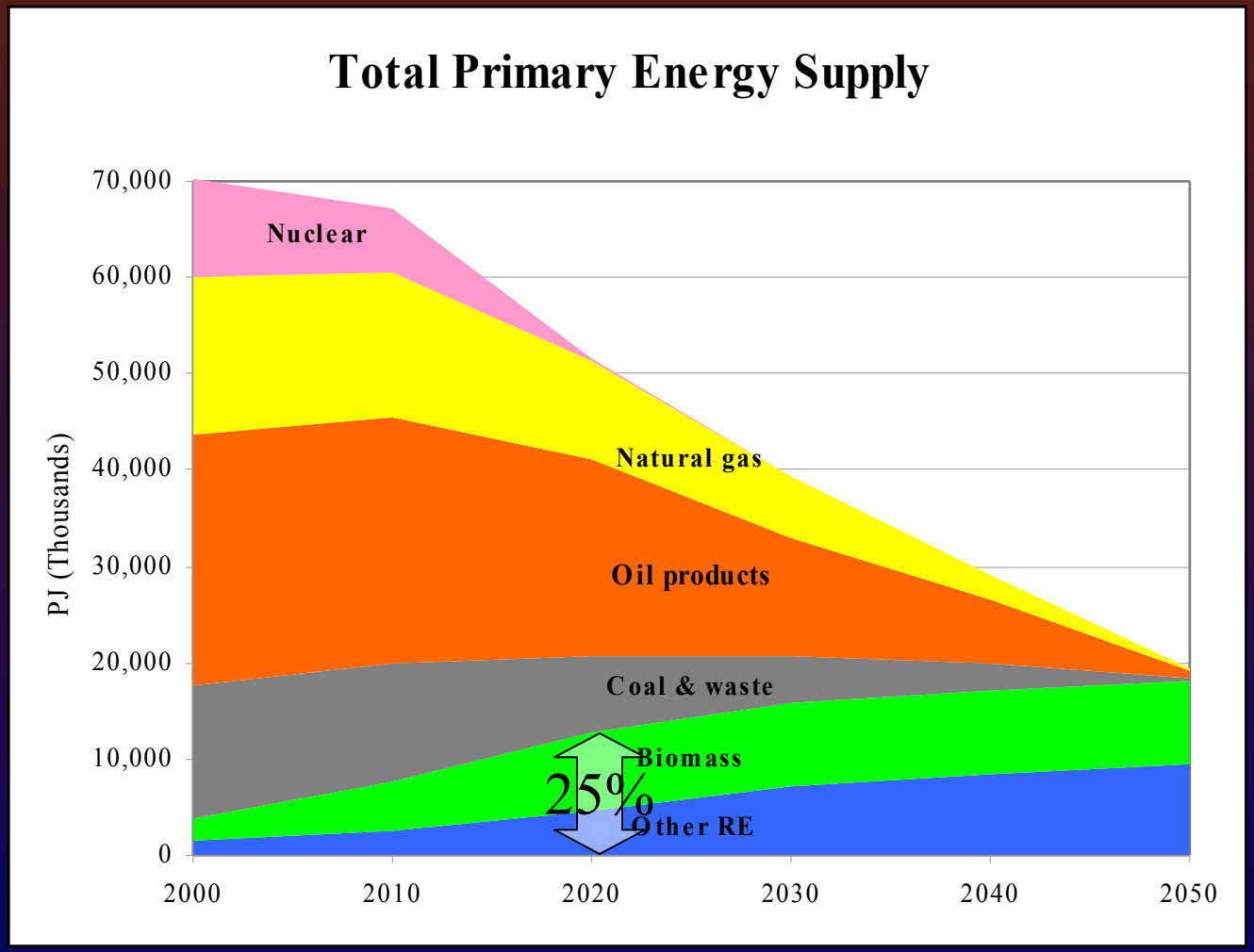
A Global Sustainable Scenario



EU Policies for Energy

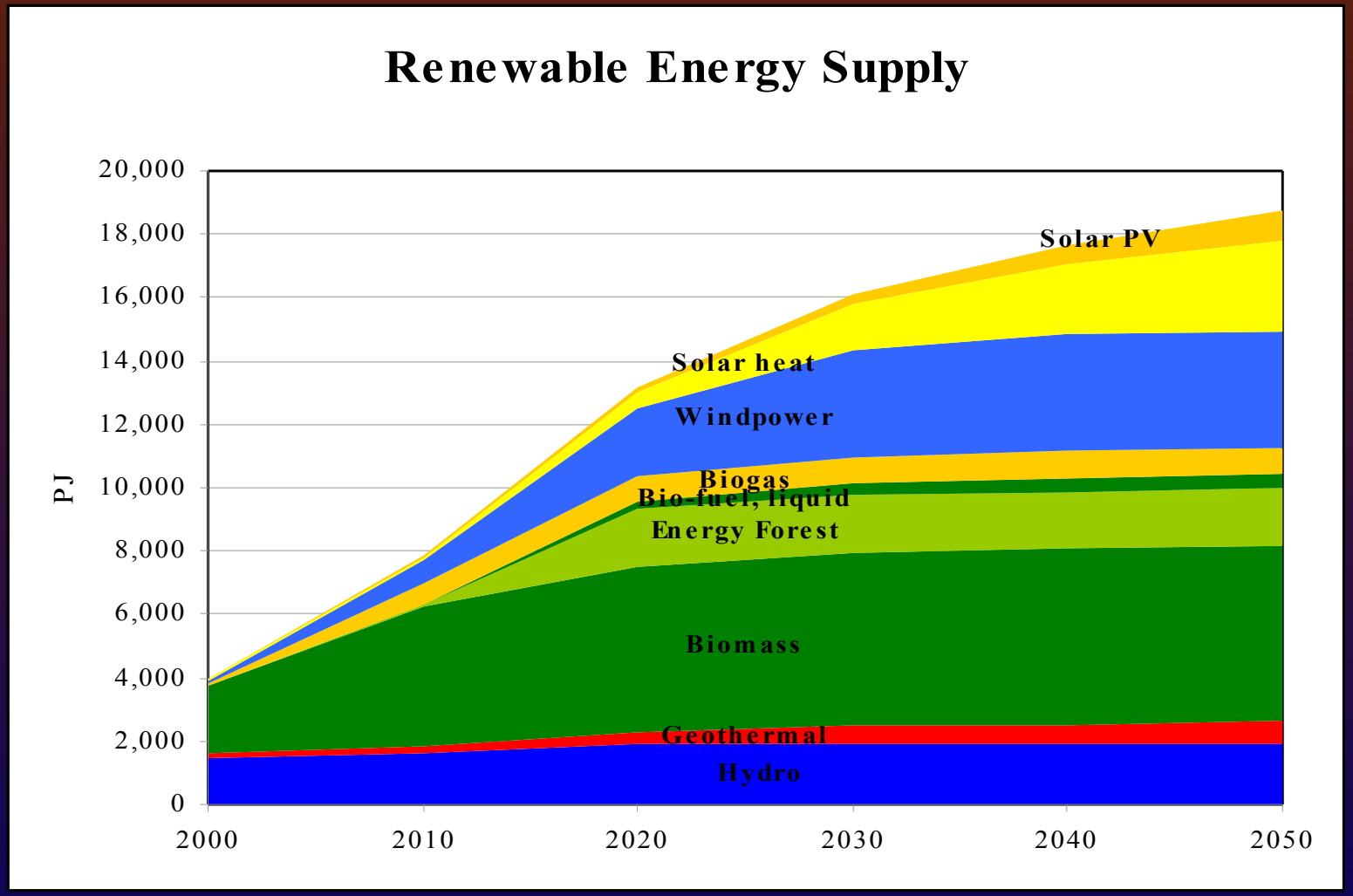
- Limit global warming to 2'C above pre-industrial
- Reduce CO_2 8% by 2010 (Kyoto) and 30% by 2020
- Increase energy efficiency 20% 2005-2020 with equipment standards, national plans, improvements of buildings, etc.
- 12% Renewables by 2010 (White Paper) and 20-25% by 2020 (EU Parliament, Dec.06)

INFORSE's EU-27 Vision



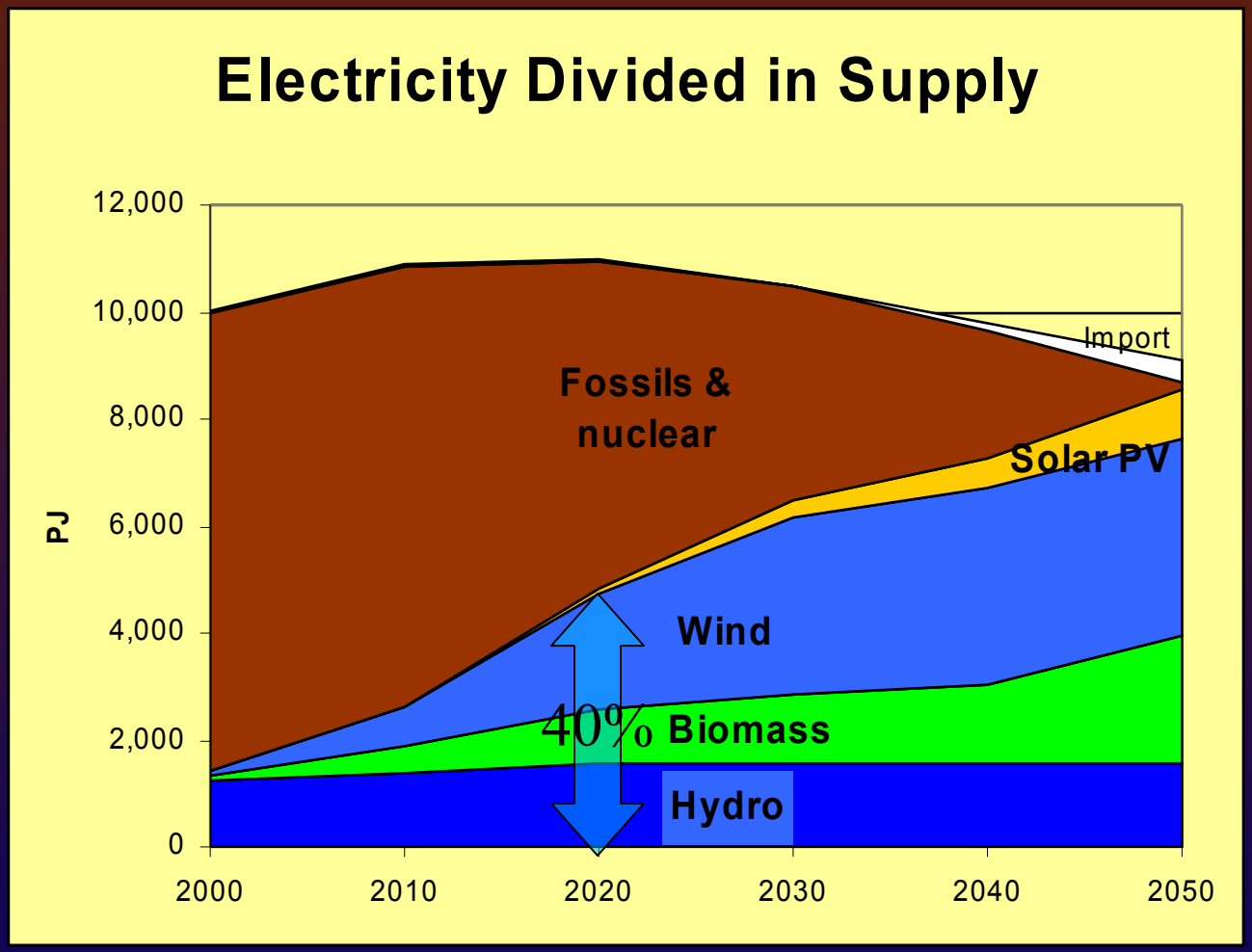
Preliminary version – March 2007

INFORSE's EU-27 Vision



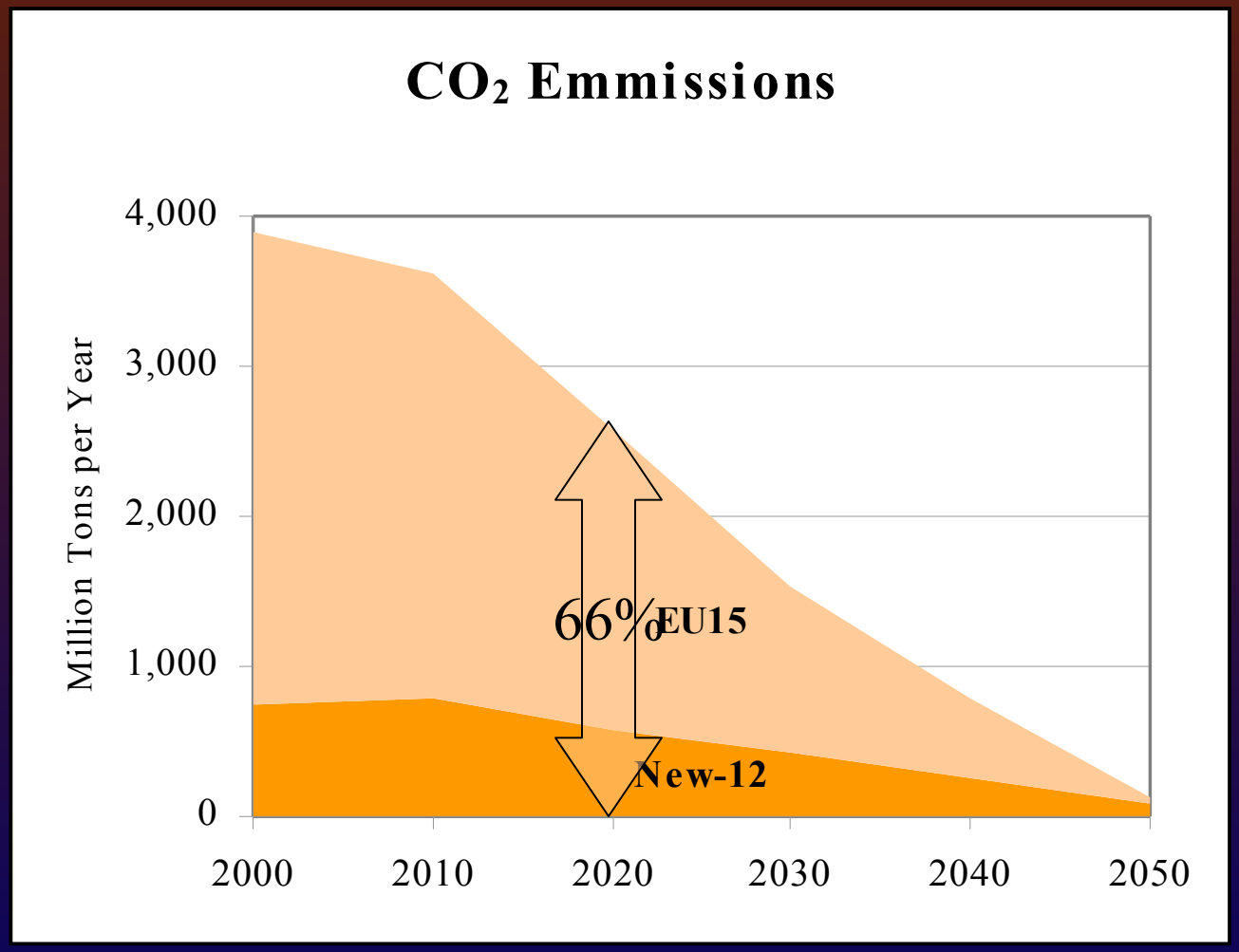
Preliminary version – March 2007

INFORSE's EU-27 Vision



Preliminary version – March 2007

INFORSE's EU-27 Vision



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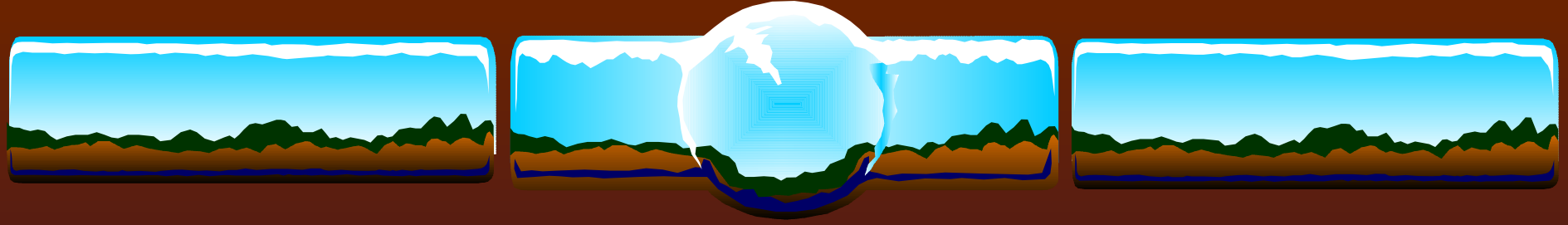

How do we reach it?
Developments to reach it
Efficiency trends
National examples

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), now 6000 MW/year),

¼ expected offshore. This is 20-30% higher than EWEA/EREC forecasts for 2020.

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

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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, 0-100%
- -33% in car use in EU-15, but
  + 100% in Lithuania

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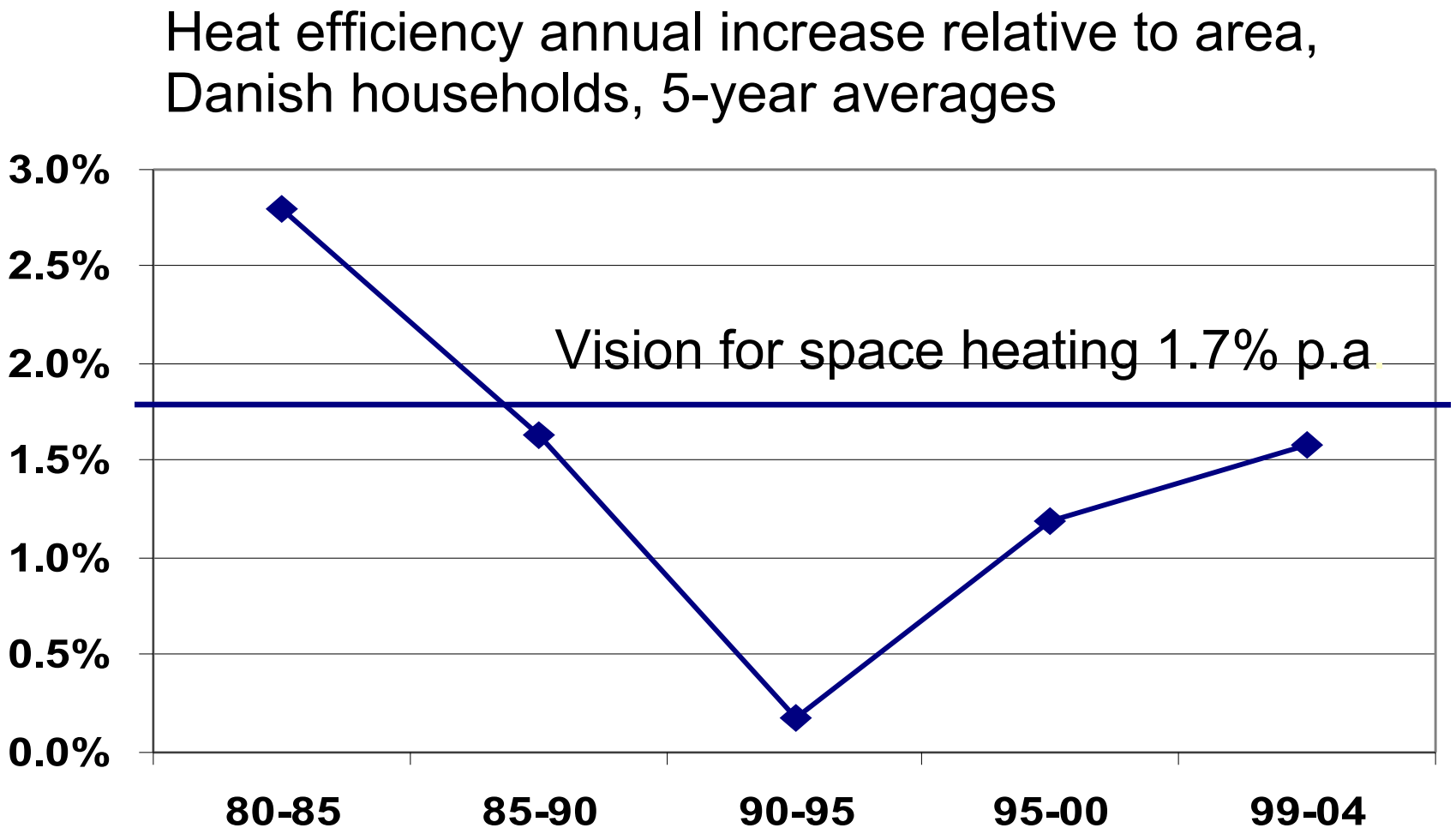
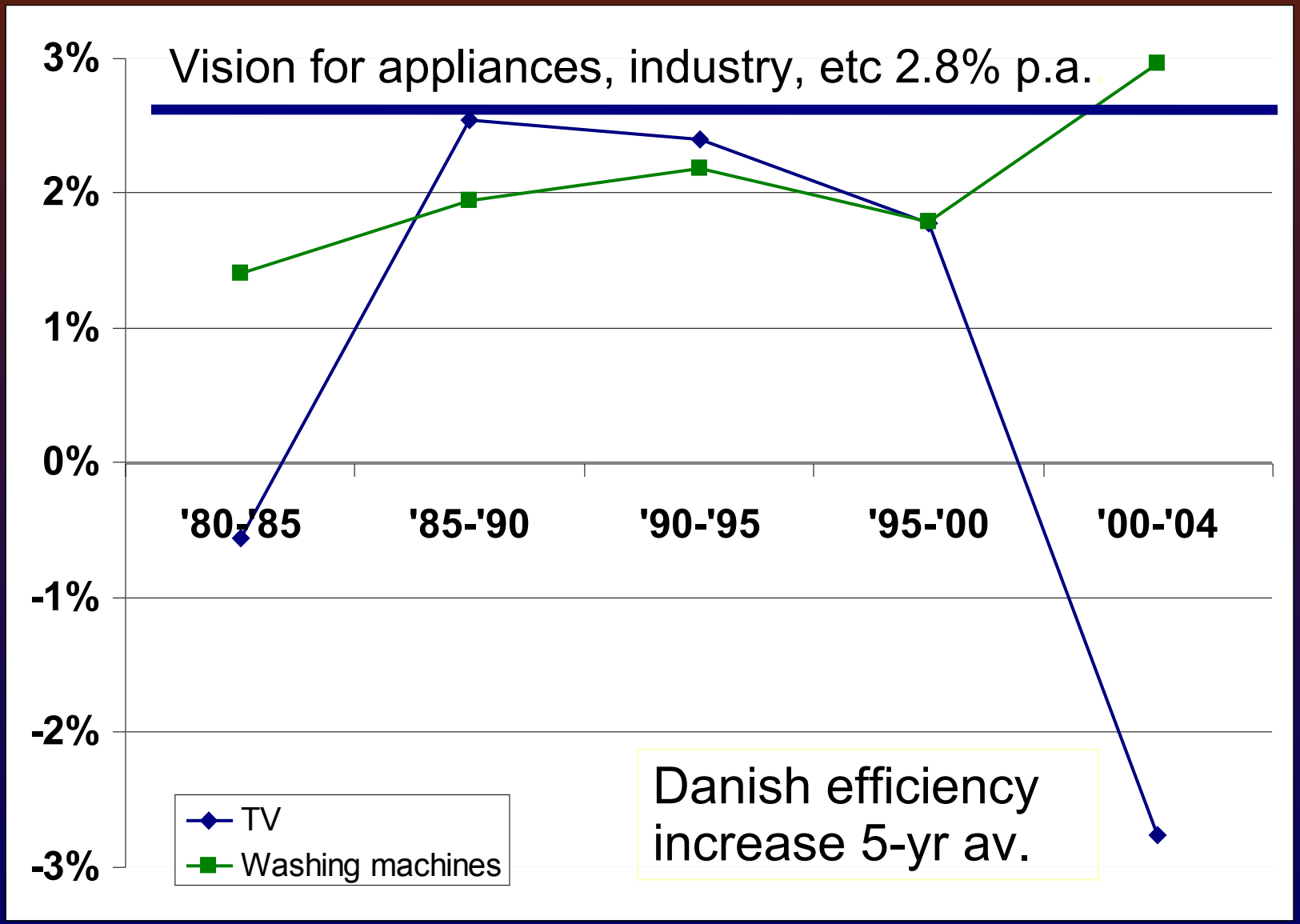
Realise efficiency – macro scale

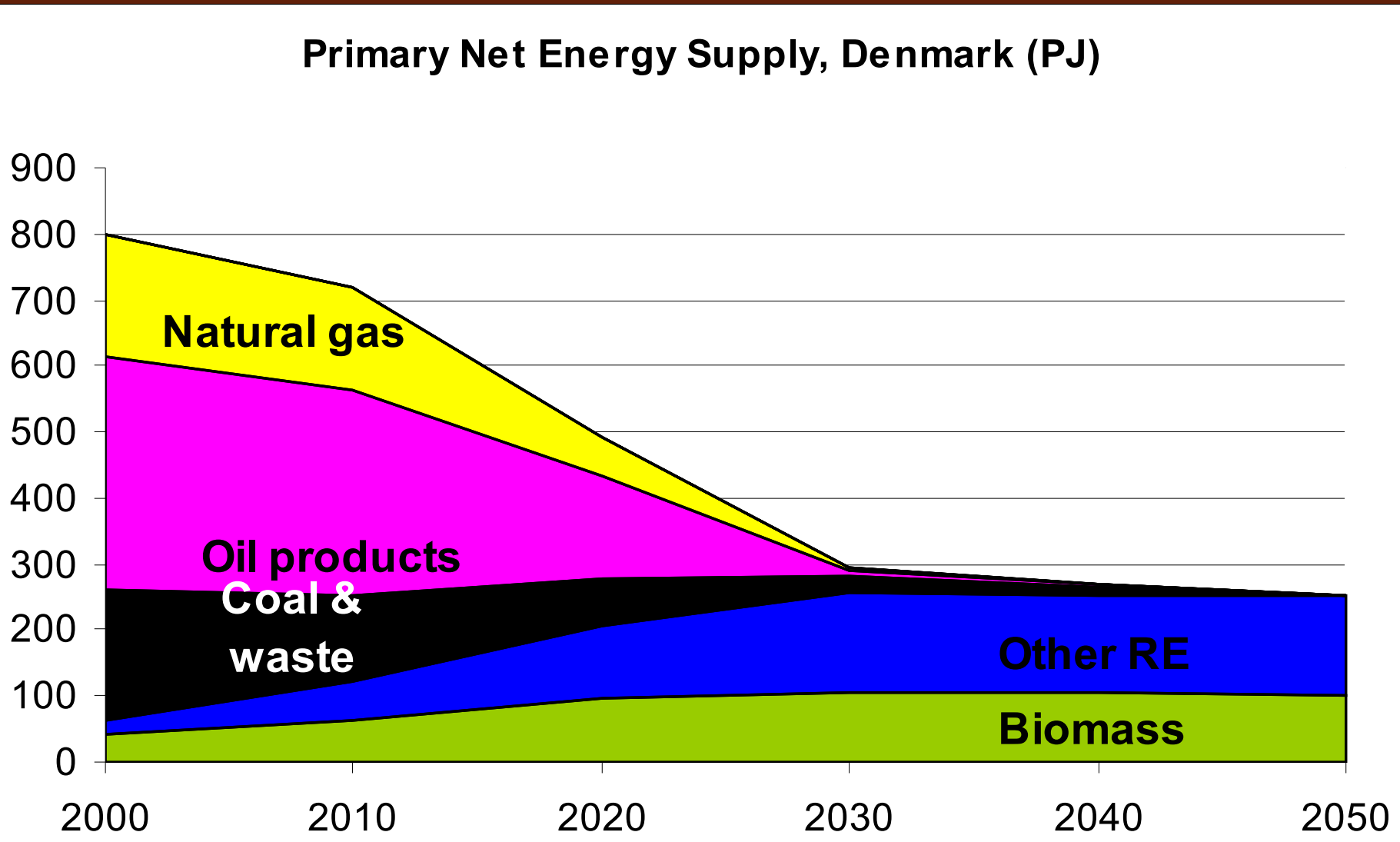


Realise efficiency – macro scale



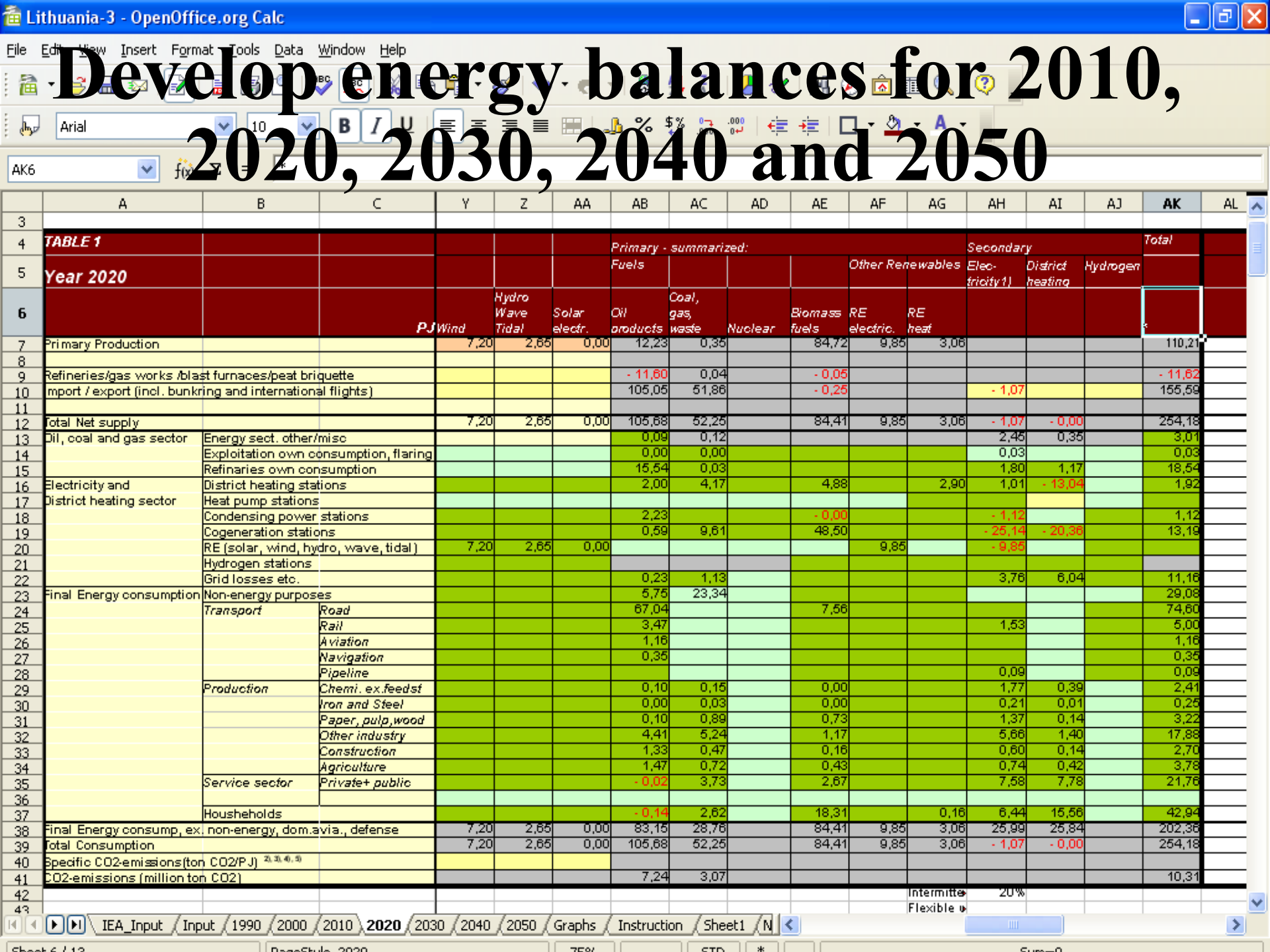
Vision for Denmark (OVE'05)

- 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

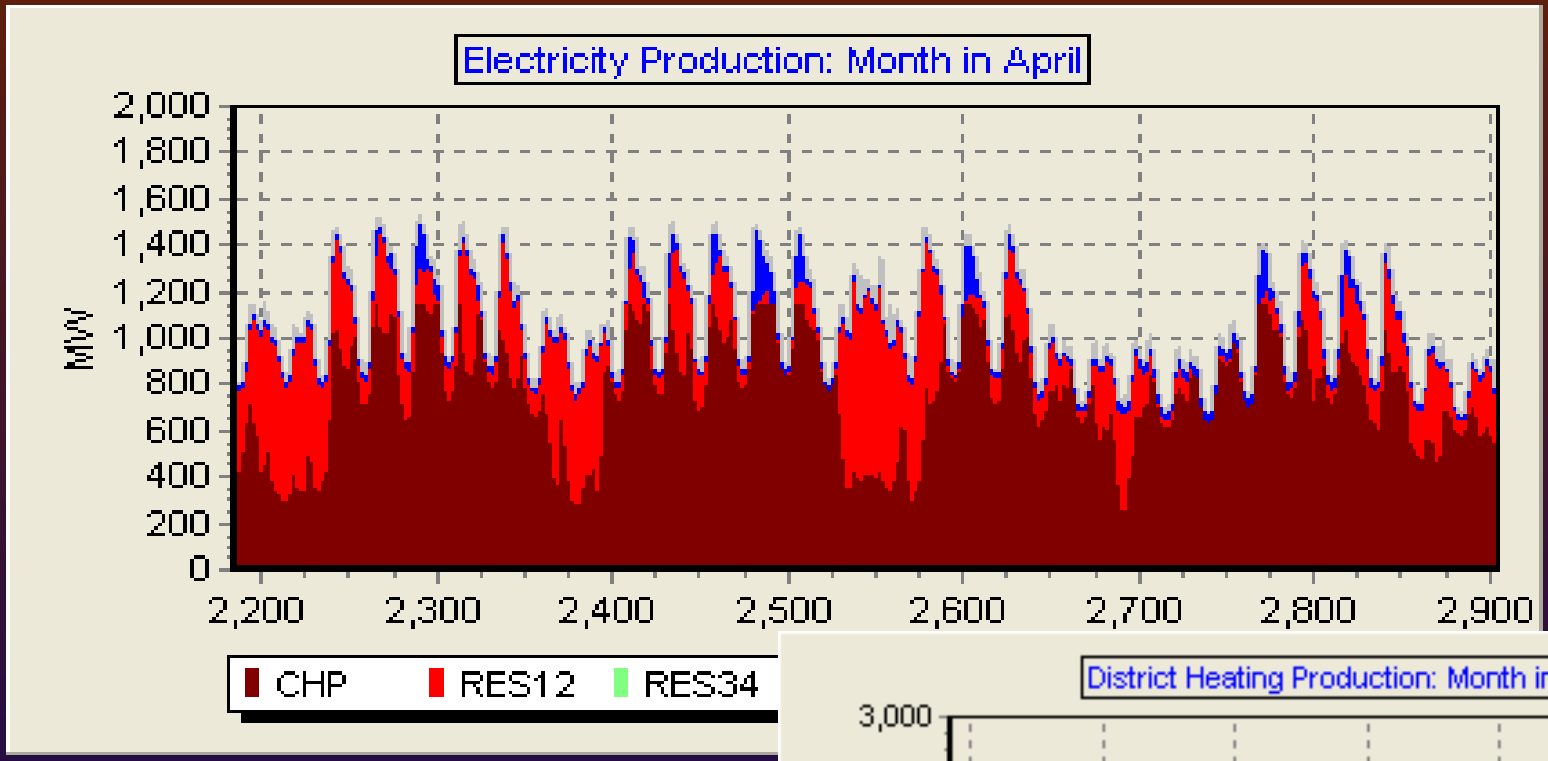


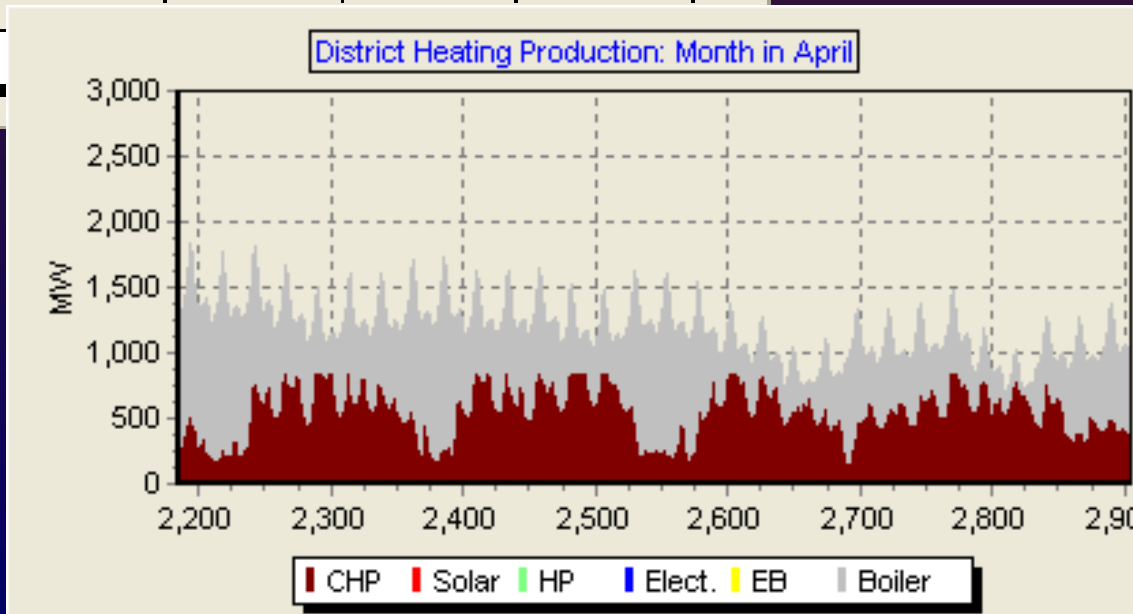
A Sustainable Energy Vision for Lithuania

- Potentials for renewable energy divided in windpower, solar, wood, straw, energy plantations, biogas, geothermal
- Assuming high growth of windpower, straw, wood, energy plantations until 2020, then growth in solar
- Growth trends in transport, construction etc. will continue till 2015, and then level off gradually
- Energy efficiency potentials to be realised
- Biomas CHP important part of new structure


Lithuania-3 - OpenOffice.org Calc
File Edit View Insert Format Tools Data Window Help
Arial
10
AK6
Develop energy balances for 2010, 2020, 2030, 2040 and 2050
TABLE 1
Year 2020
PJ
Primary - summarized:
Fuels
Other Renewables
Secondary
Total
Wind
Hydro Wave Tidal
Solar electr.
Oil products
Coal, gas, waste
Nuclear
Biomass fuels
RE electric.
RE heat
Elec-tricity1)
District heating
Hydrogen
Primary Production 7,20 2,65 0,00 12,23 0,35 84,72 9,85 3,06 110,21
Refineries/gas works /blast furnaces/peat briquette - 11,60 0,04 - 0,05 - 11,62
Import / export (incl. bunkring and international flights) 105,05 51,86 - 0,25 - 1,07 155,59
Total Net supply 7,20 2,65 0,00 105,68 52,25 84,41 9,85 3,06 - 1,07 - 0,00 254,18
Oil, coal and gas sector
Energy sect. other/misc 0,09 0,12 2,45 0,35 3,01
Exploitation own consumption, flaring 0,00 0,00 0,03 0,03
Refinaries own consumption 15,54 0,03 1,80 1,17 18,54
Electricity and District heating sector
District heating stations 2,00 4,17 4,88 2,90 1,01 - 13,04 1,92
Heat pump stations
Condensing power stations 2,23 - 0,00 - 1,12 1,12
Cogeneration stations 0,59 9,61 48,50 - 25,14 - 20,36 13,19
RE (solar, wind, hydro, wave, tidal) 7,20 2,65 0,00 9,85 - 9,85
Hydrogen stations
Grid losses etc. 0,23 1,13 3,76 6,04 11,16
Final Energy consumption
Non-energy purposes 5,75 23,34 29,08
Transport
Road 67,04 7,56 74,60
Rail 3,47 1,53 5,00
Aviation 1,16 1,16
Navigation 0,35 0,35
Pipeline 0,09 0,09
Production
Chemi. ex.feedst 0,10 0,15 0,00 1,77 0,39 2,41
Iron and Steel 0,00 0,03 0,00 0,21 0,01 0,25
Paper, pulp,wood 0,10 0,89 0,73 1,37 0,14 3,22
Other industry 4,41 5,24 1,17 5,66 1,40 17,88
Construction 1,33 0,47 0,16 0,60 0,14 2,70
Agriculture 1,47 0,72 0,43 0,74 0,42 3,78
Service sector
Private+ public - 0,02 3,73 2,67 7,58 7,78 21,76
Housheholds - 0,14 2,62 18,31 0,16 6,44 15,56 42,94
Final Energy consump, ex. non-energy, dom.avia., defense 7,20 2,65 0,00 83,15 28,76 84,41 9,85 3,06 25,99 25,84 202,36
Total Consumption 7,20 2,65 0,00 105,68 52,25 84,41 9,85 3,06 - 1,07 - 0,00 254,18
Specific CO2-emissions(ton CO2/PJ) 2) 3) 4) 5)
CO2-emissions (million ton CO2) 7,24 3,07 10,31
Intermitte 20%
Flexible
IEA_Input Input 1990 2000 2010 2020 2030 2040 2050 Graphs Instruction Sheet1

Evaluate hourly energy balance





Proposals for Actions until 2020

- Windpower development
- Better biomass use
- Straw use and energy plantations
- District heating and CHP plans
- Biofuels strategy for transport
- Strategies for biogas, solar, geothermal, hydro
- Energy efficiency strategies for heating, electricity, service sector, transport

Coming visions

- Vision for Latvia (next week)
- Vision for Poland, depending on funding
- Vision for Romania, update, fall'07 (dep. on funding)
- Consolidate vision for EU-27, comments welcome
- If possible: vision for India

Thank you

Biomass, sustainably in EU (PJ)