

Sustainable Energy Vision for EU - 27

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International Network for Sustainable Energy

April 26, 2008

INF  **RSE-EUROPE**

International Network for Sustainable Energy - Europe

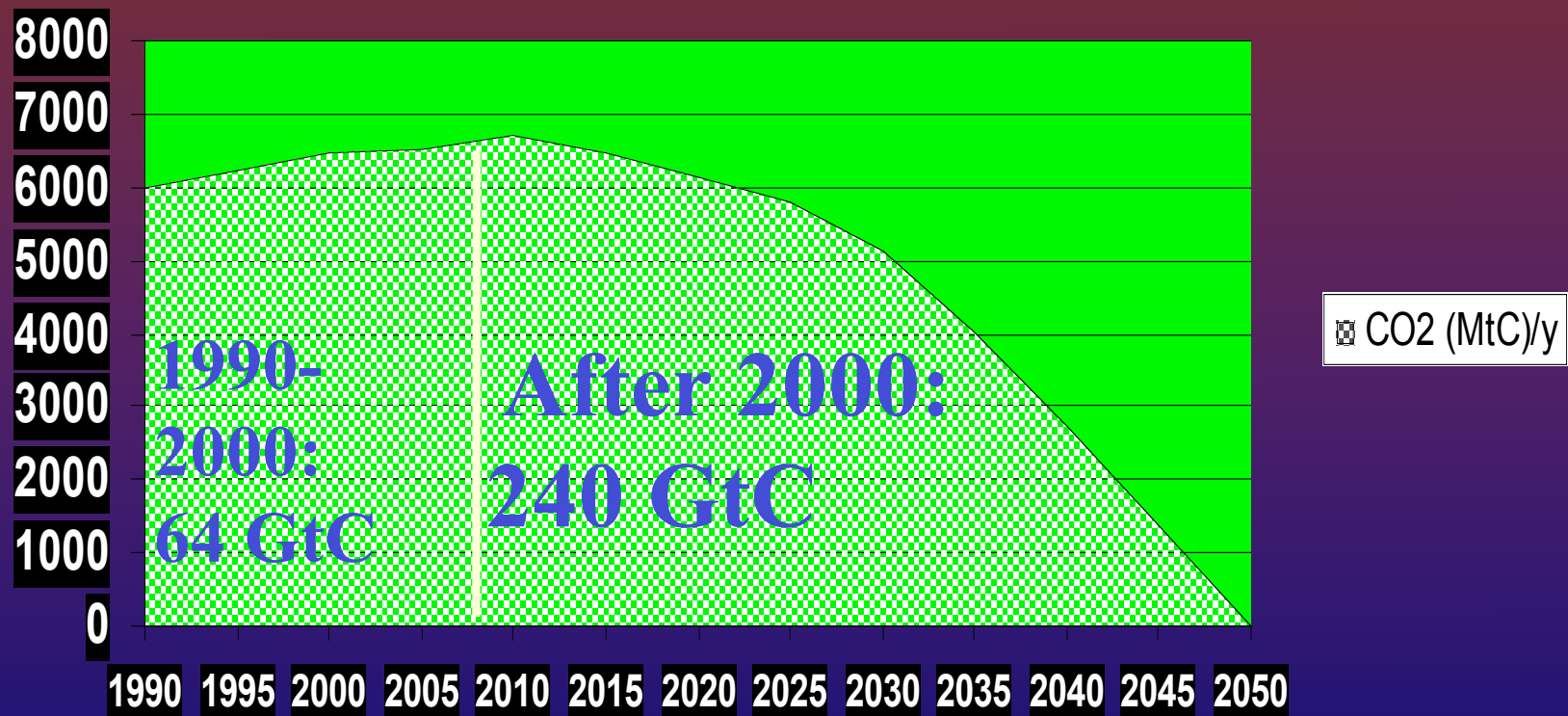
Global Energy Challenges

Global imperatives:

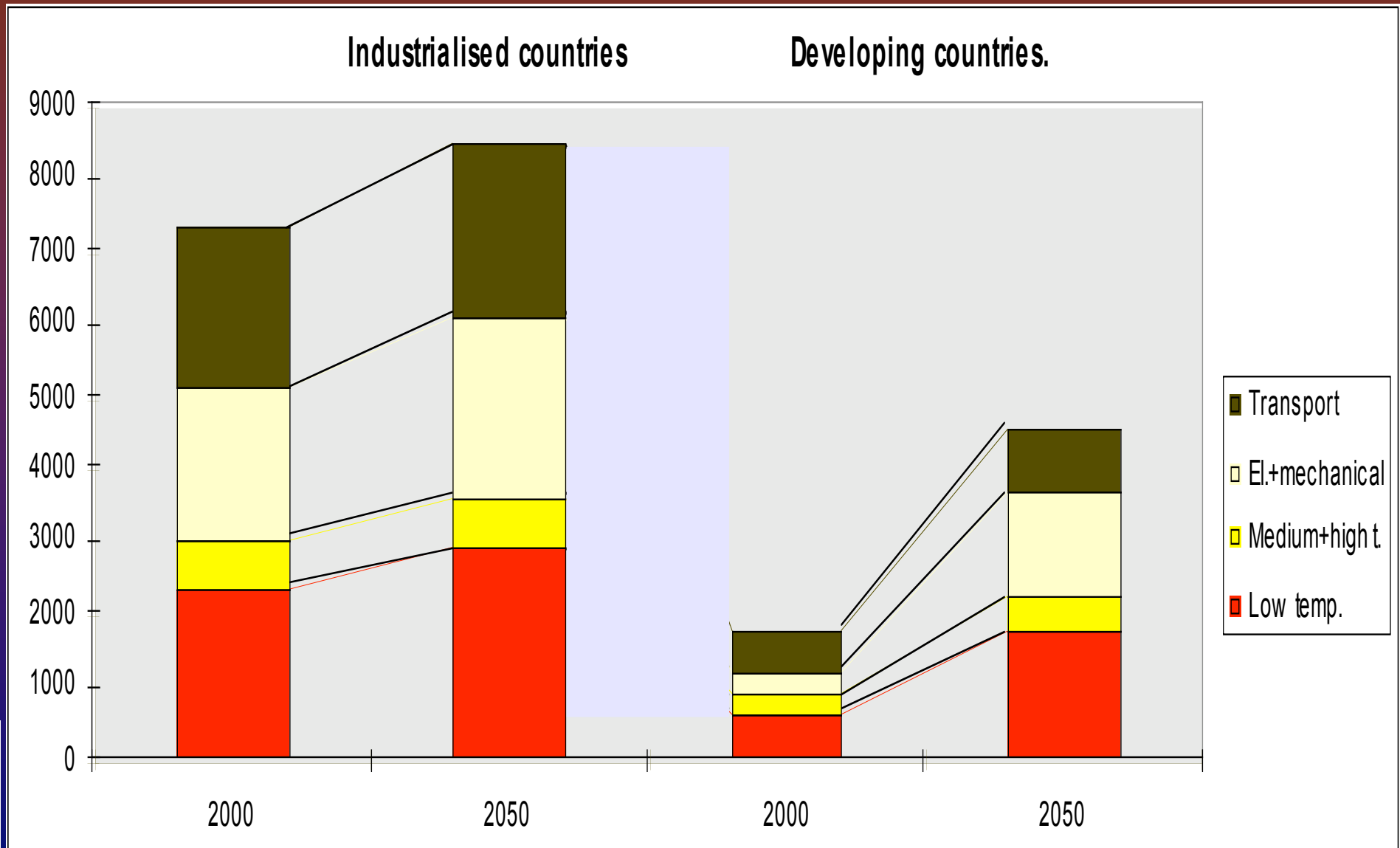
- ❖ The world energy use is beyond the environmental limits, e.g. Greenhouse gas emissions
- ❖ does not provide basic energy needs as light and healthy cooking facilities to 1/4 of the world's population
- ❖ We must limit global warming to 2°C above pre-industrial level
- ❖ EU must take the lead

INFORSE Global Sustainable Energy Vision

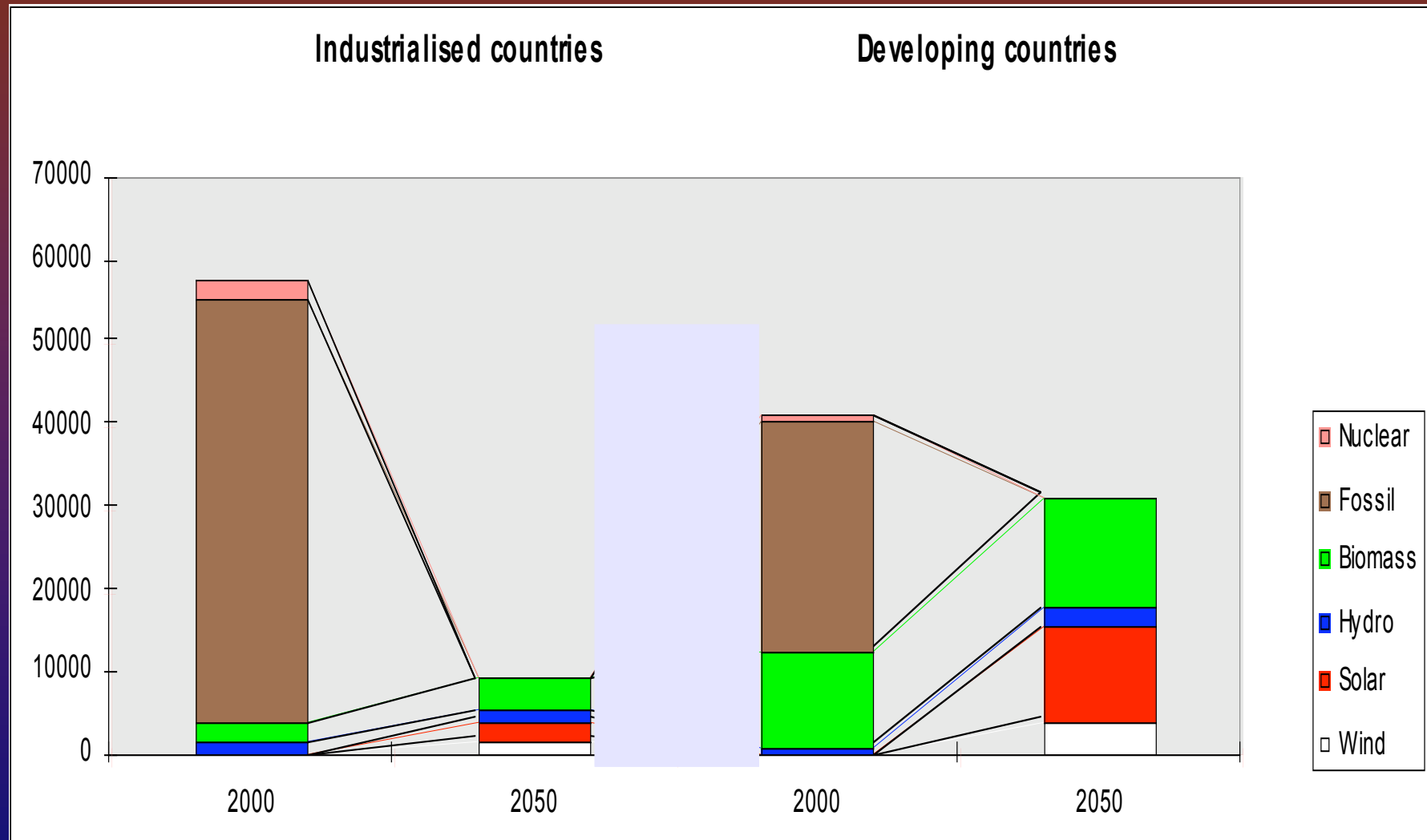
CO₂ (MtC)/y



Energy Services per capita



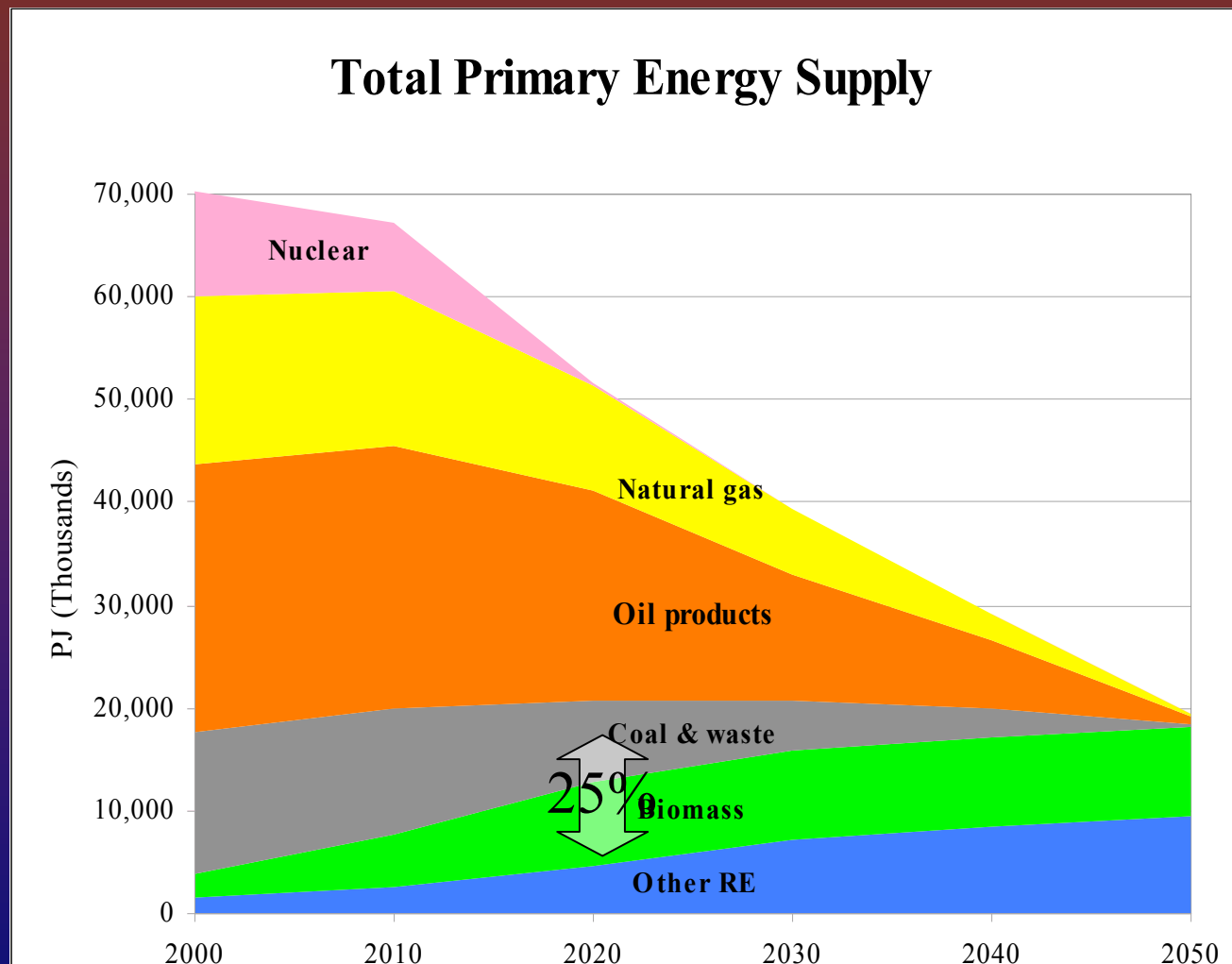
Primary Energy (TWh/y)



INFORSE Sustainable Energy Visions

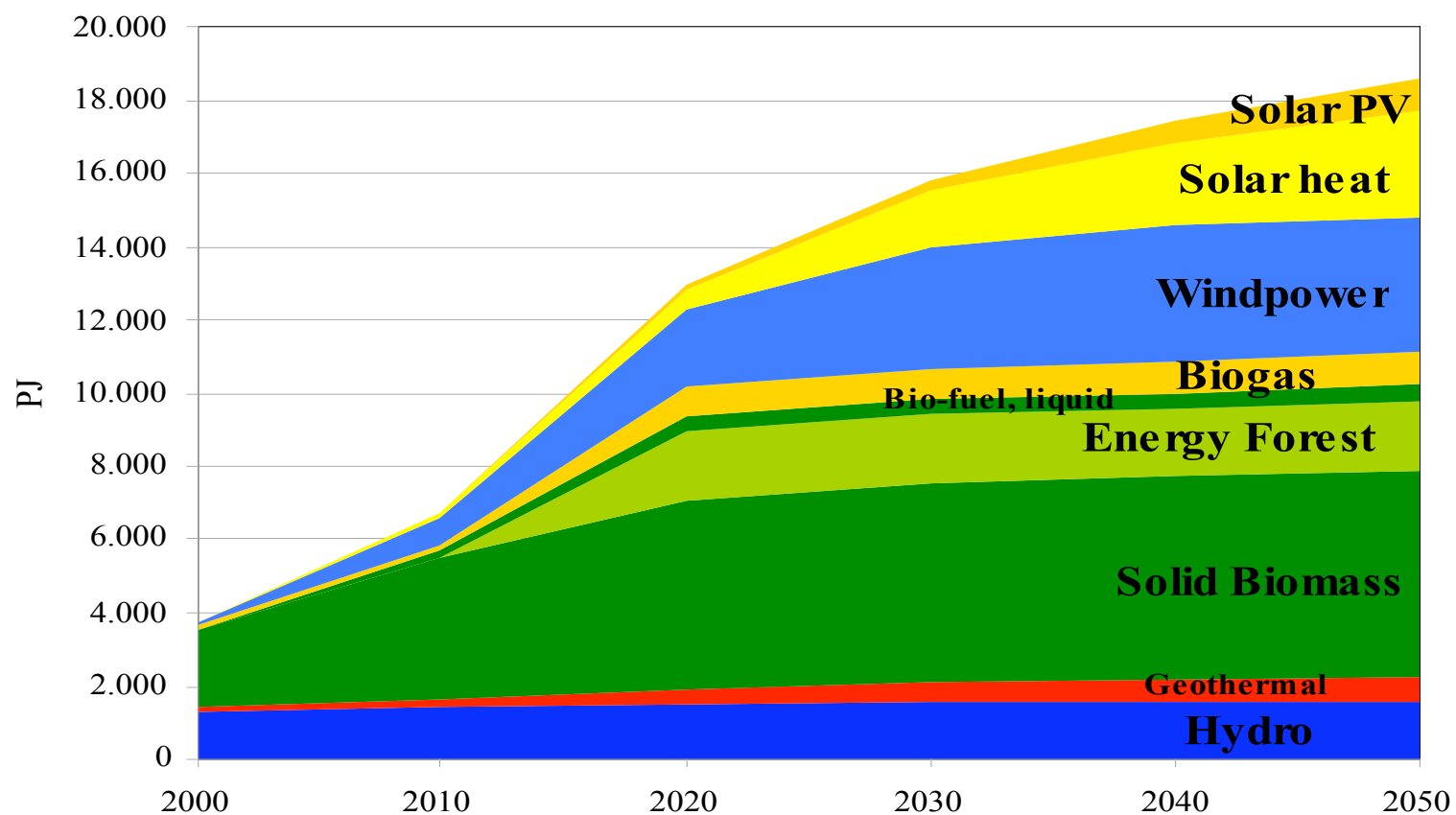
- Vision for the World
- Vision for EU-27
- For Denmark, Latvia, Lithuania, Romania, Slovakia, Ukraine, (Bulgaria, Russia, Belarus)
- Phase out nuclear 2025 and fossils '30-'50
- Factor 4 energy efficiency when possible
- Sustainable use of national renewables
- Efficient energy systems
- Electric and hydrogen transport
- Energy Balance for every decade to show path

INFORSE's EU-27 Vision



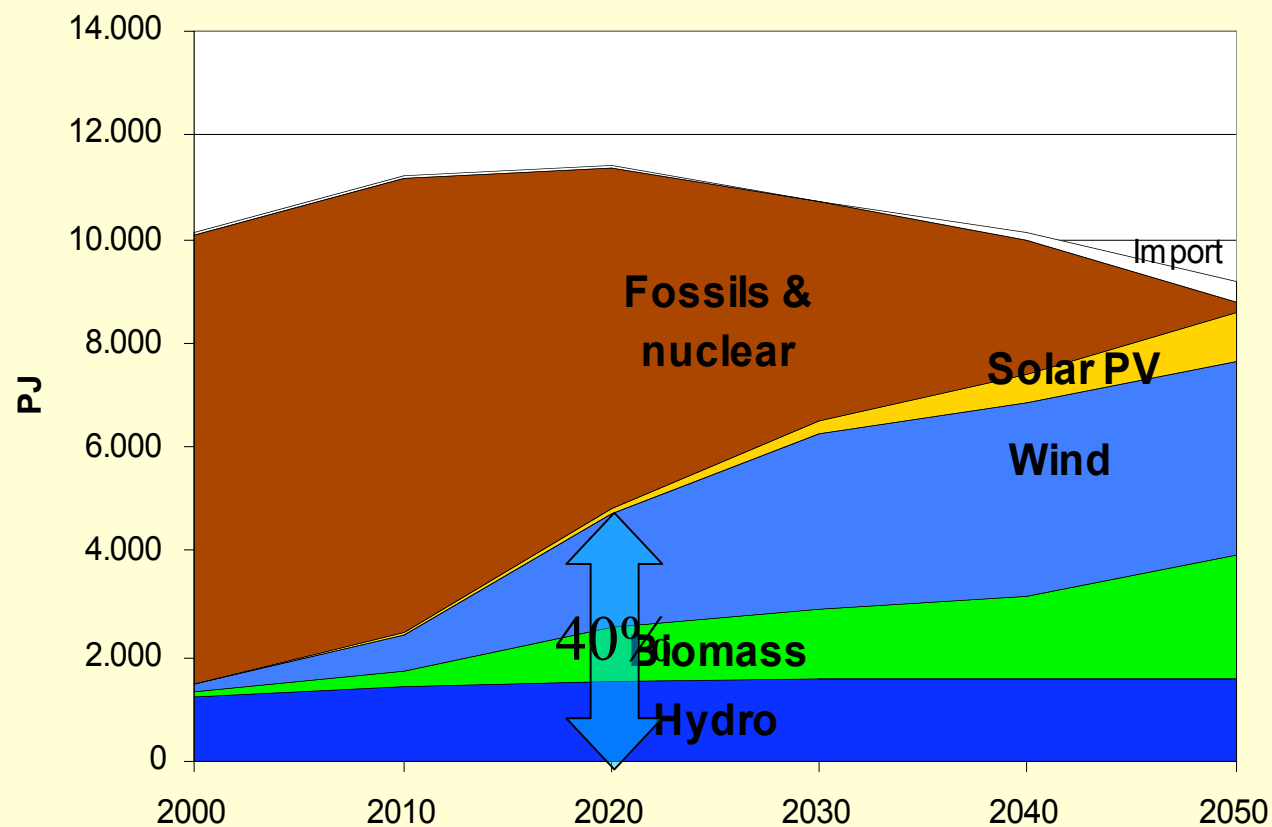
INFORSE's EU-27 Vision

Renewable Energy Supply

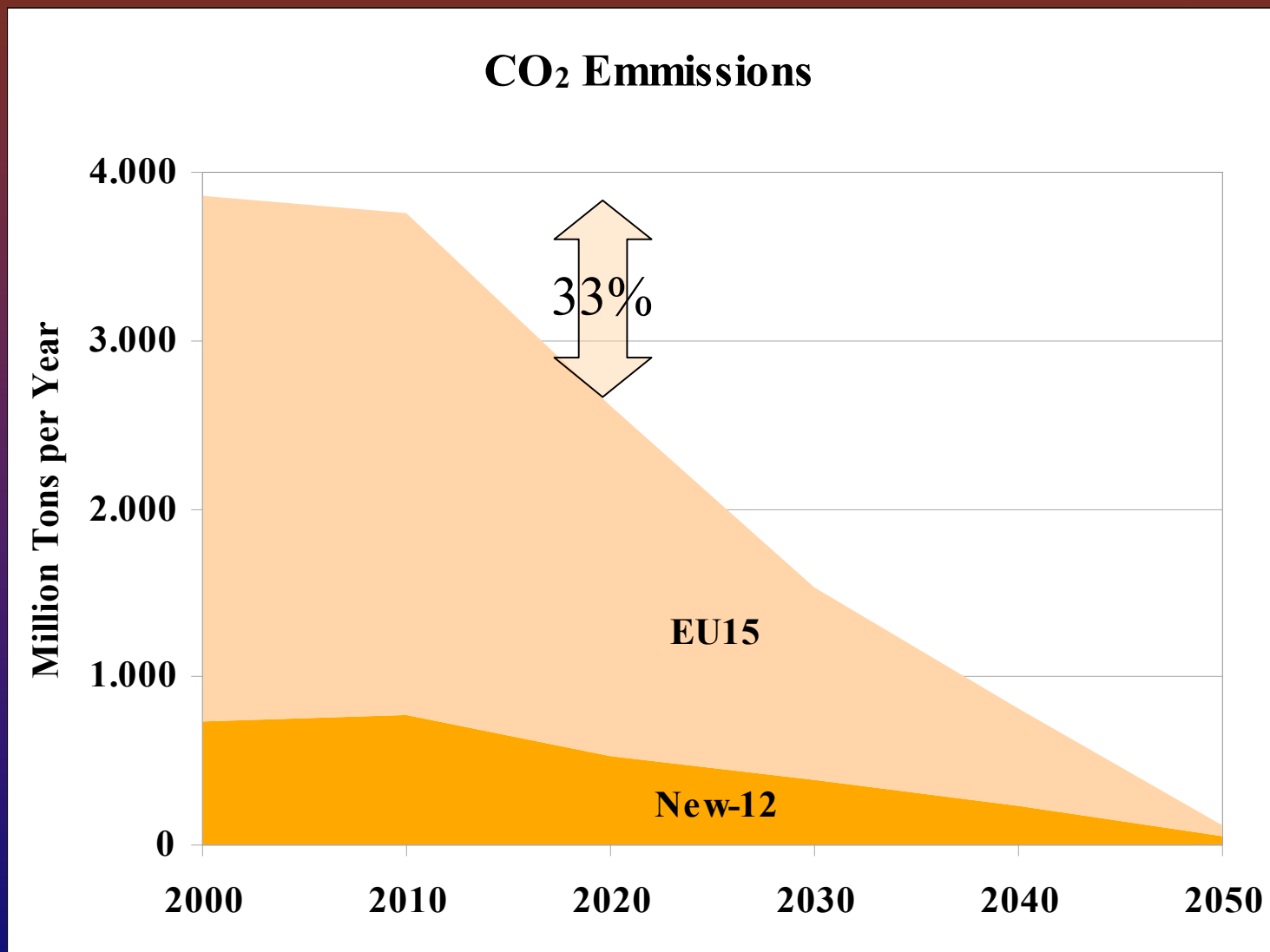


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Electricity Divided in Supply



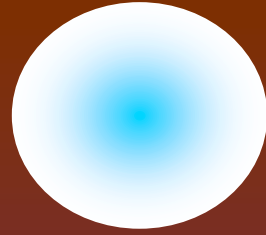
INFORSE's EU-27 Vision



EU Sustainable Energy Vision

Develop energy balances for 2010, 2020, 2030, 2040 and 2050

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	A	B	C	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK
3																
4	TABLE 1						Primary - summarized:						Secondary			Total
5	Year 2020						Fuels				Other Renewables		Electricity1	District heating	Hydrogen	
6				PJ	Wind	Hydro Wave Tidal	Solar electr.	Oil products	Coal, gas, waste	Nuclear	Biomass fuels	RE electric.	RE heat			
7	Primary Production			7,20	2,65	0,00	12,23	0,35			84,72	9,85	3,06			110,21
8																
9	Refineries/gas works/blast furnaces/peat briquette						- 11,60	0,04			- 0,05					- 11,62
10	Import / export (incl. bunkering and international flights)						105,05	51,85			- 0,25			- 1,07		155,59
11																
12	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
13	Oil, coal and gas sector	Energy sect. other/misc					0,09	0,12						2,45	0,35	3,01
14		Exploitation own consumption, flaring					0,00	0,00						0,03		0,03
15		Refineries own consumption					15,54	0,03						1,80	1,17	18,54
16	Electricity and	District heating stations					2,00	4,17			4,88		2,90	1,01	- 15,04	1,92
17	District heating sector	Heat pump stations														
18		Condensing power stations					2,23				- 0,06			- 1,12		1,12
19		Cogeneration stations					0,59	9,61			49,50			- 25,14	- 20,38	13,19
20		RE (solar, wind, hydro, wave, tidal)		7,20	2,65	0,00						9,85		- 9,85		
21		Hydrogen stations														
22		Grid losses etc.					0,23	1,13						3,76	6,04	11,16
23	Final Energy consumption	Non-energy purposes					5,75	23,34								29,08
24		Transport					67,04				7,56					74,60
25		Road														
26		Rail					3,47							1,53		5,00
27		Aviation					1,16									1,16
28		Navigation					0,35									0,35
29		Pipeline												0,09		0,09
30		Production	Chem. ex feedst				0,10	0,15			0,00			1,77	0,39	2,41
31			Iron and Steel				0,00	0,03			0,00			0,21	0,01	0,22
32			Paper, pulp, wood				0,10	0,89			0,73			1,37	0,14	3,22
33			Other industry				4,41	5,24			1,17			5,66	1,40	17,88
34			Construction				1,33	0,47			0,16			0,60	0,14	2,70
35			Agriculture				1,47	0,72			0,43			0,74	0,42	3,78
36		Service sector	Private+ public				- 0,02	3,73			2,67			7,58	7,78	21,76
37		Housheholds					- 0,14	2,62			18,31		0,16	6,44	15,56	42,94
38	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
39	Total Consumption			7,20	2,65	0,00	105,68	52,25			84,41	9,85	3,06	- 1,07	- 0,00	254,18
40	Specific CO2-emissions(ton CO2/PJ)															
41	CO2-emissions (million ton CO2)						7,24	3,07								10,31
42																
43													Intermittent Flexible	20%		



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, 1/4 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

Biomass, sustainably in EU (PJ)

Energy Demand

- ❖ Most energy consuming equipment will be replaced many times before 2050. Factor 4 energy efficiency increase is possible (consumption per unit 25% of today). 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

Realise efficiency

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

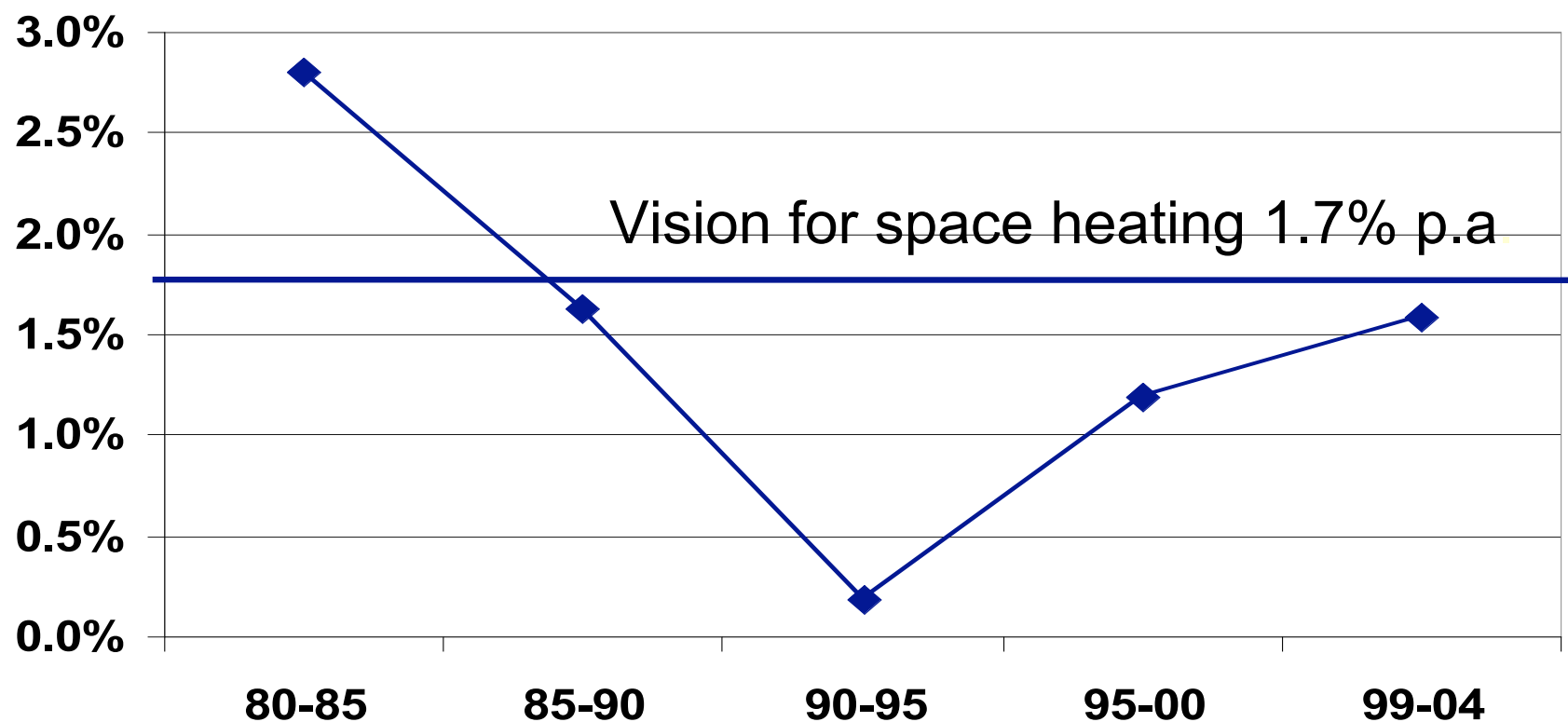
- ❖ Computer screens: change to flat screens save 50 - 66% in one generation.
- ❖ A hydrogen car can be 4 times as efficient as present petrol cars, electric cars are 6 times as efficient.

Buildings:

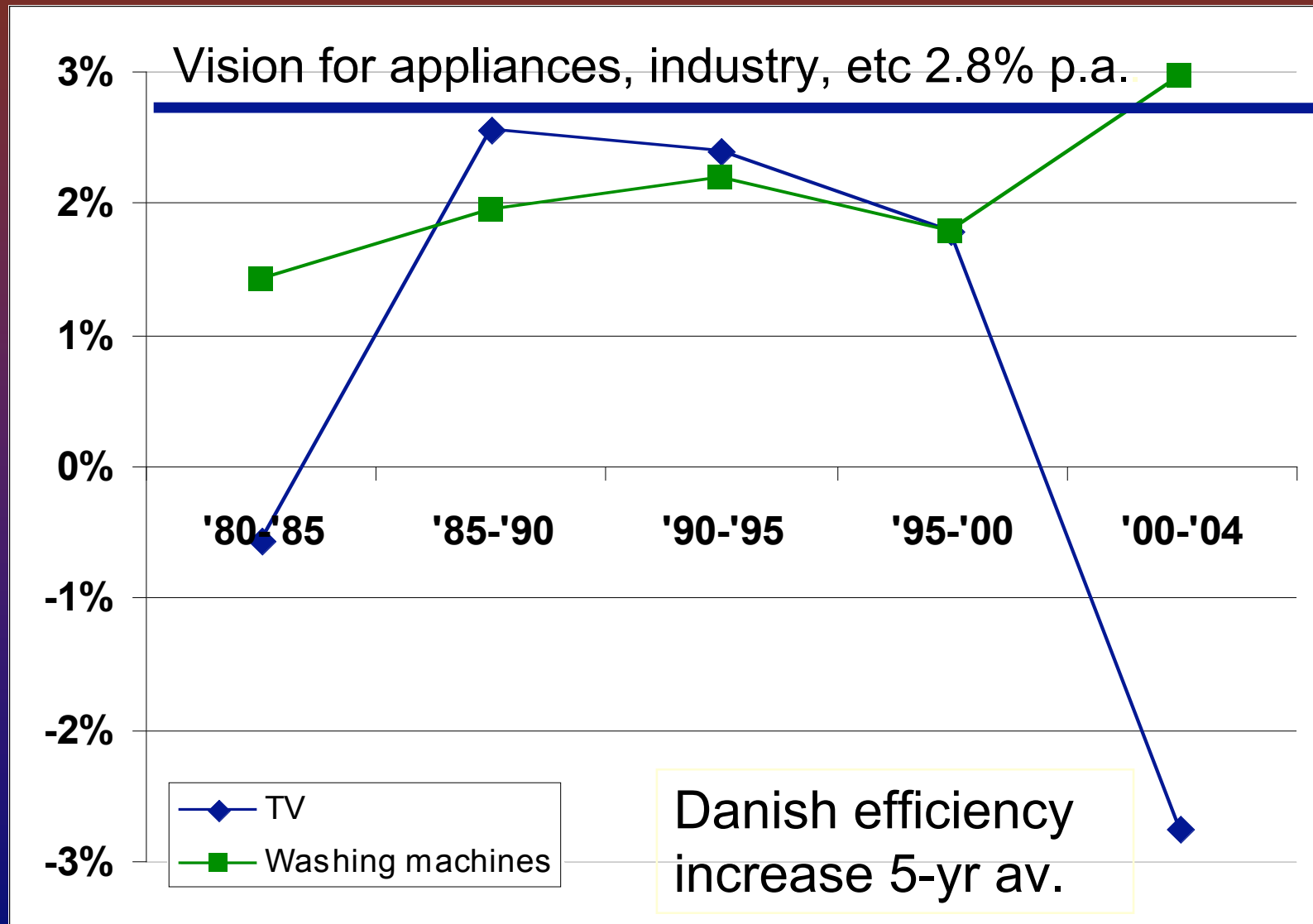
- ❖ Industry (Eurima/EuroACE) finds that more than 50% of energy use in buildings could be reduced – INFORSE-Europe proposes 57% until 2050.

Realise efficiency – macro scale

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



Realise efficiency – macro scale



EU Policies for Energy Close to Vision

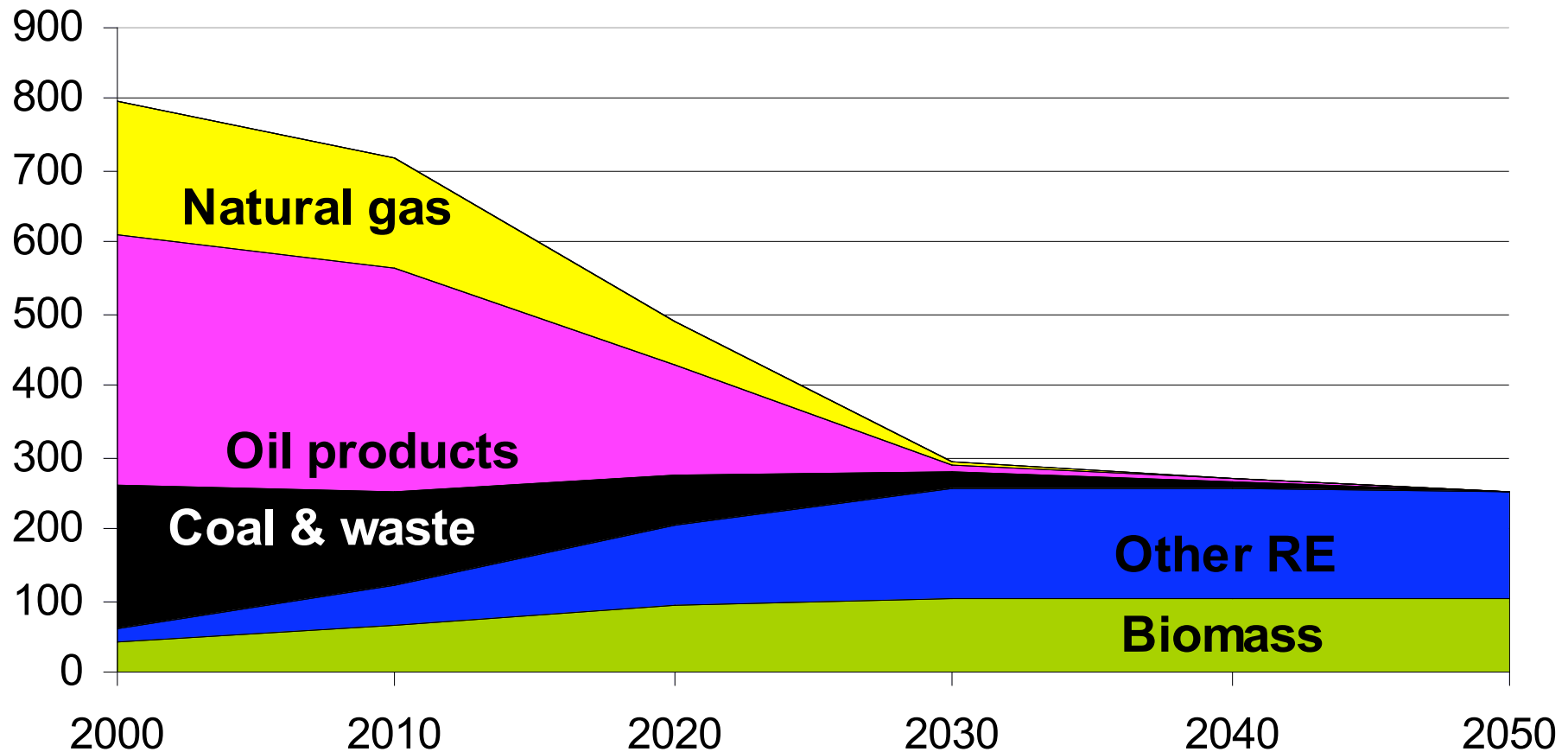
- ❖ Limit global warming to 2°C above pre-industrial
- ❖ Reduce CO₂ 8% by 2010 (Kyoto) and 30% by 2020 (if others reduce, and countries agree)
- ❖ Increase energy efficiency 20% 2005-2020 with equipment standards, national plans, improvements of buildings, etc.
- ❖ 12% Renewables by 2010 (White Paper) and 20% by 2020 (25% proposed by EU Parliament, Dec.06)

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)

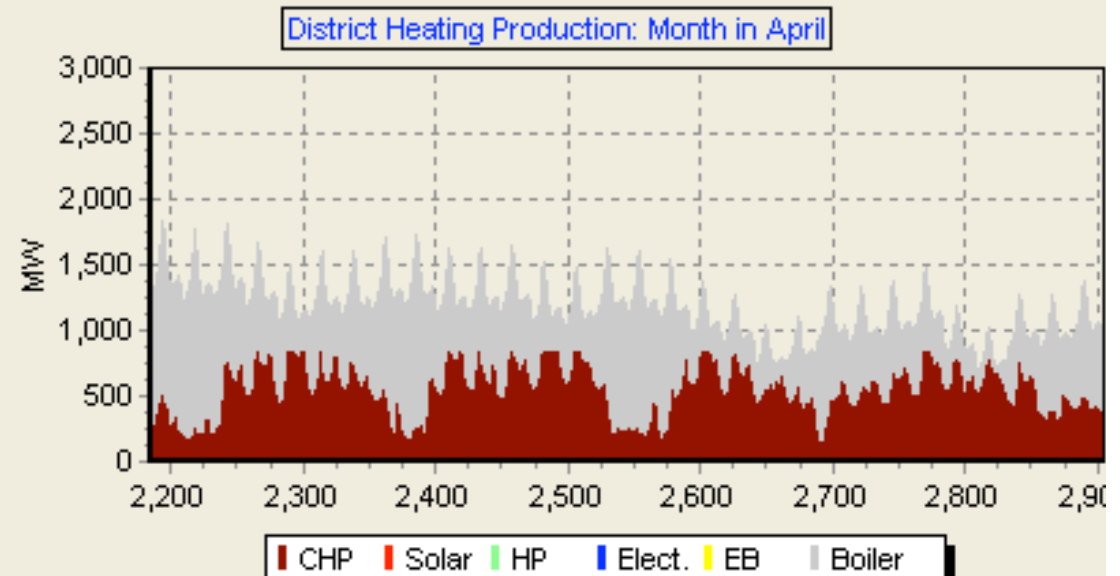
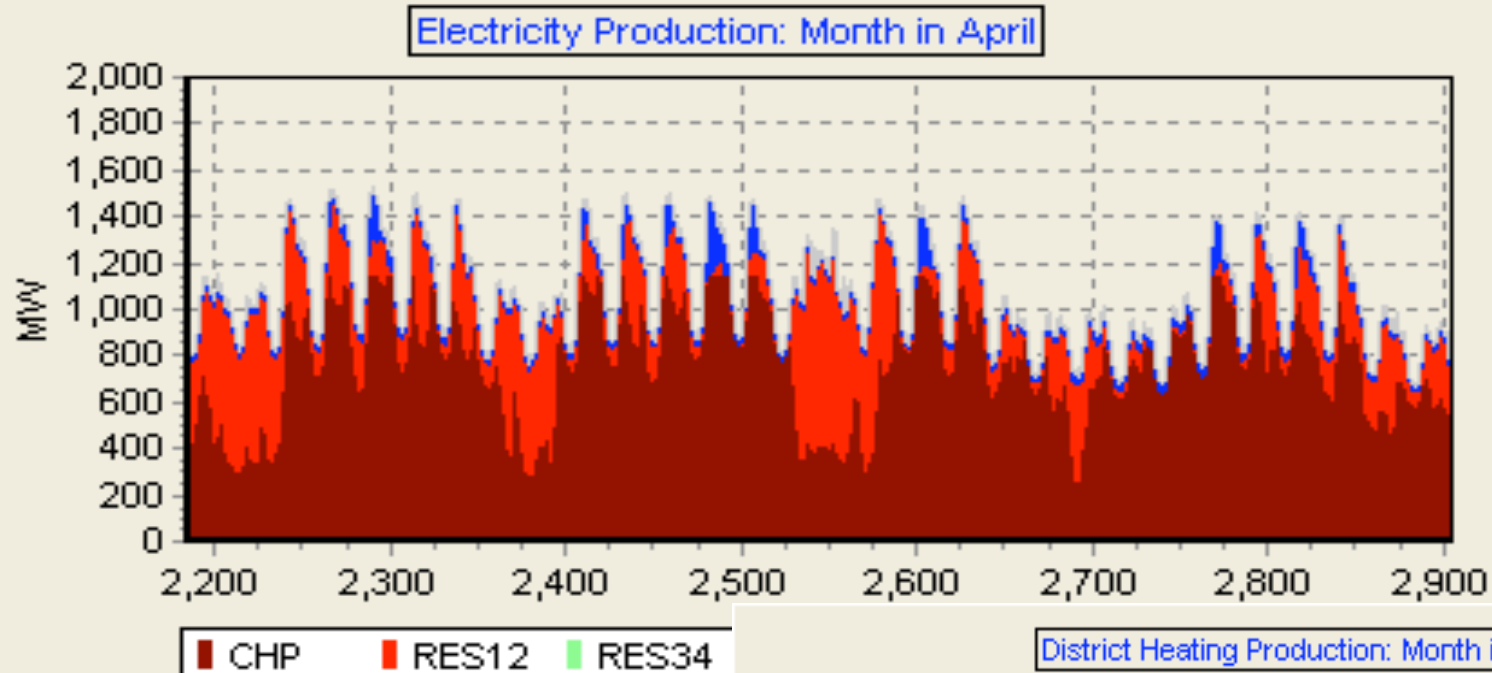


Thank you

read more:
www.inforse.org/europe



Evaluate hourly energy balance



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
- ❖ Biomass CHP important part of new structure

Proposals for Actions until 2020

- ❖ Windpower development
- ❖ Better biomass use
- ❖ Straw use and energy plantations
- ❖ District heating and CHP plans
- ❖ Transport strategy to reduce fossil fuel use
- ❖ Strategies for biogas, solar, geothermal, hydro
- ❖ Energy efficiency strategies for heating, electricity, service sector, production

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