Liquid biofuels

and

Biogas

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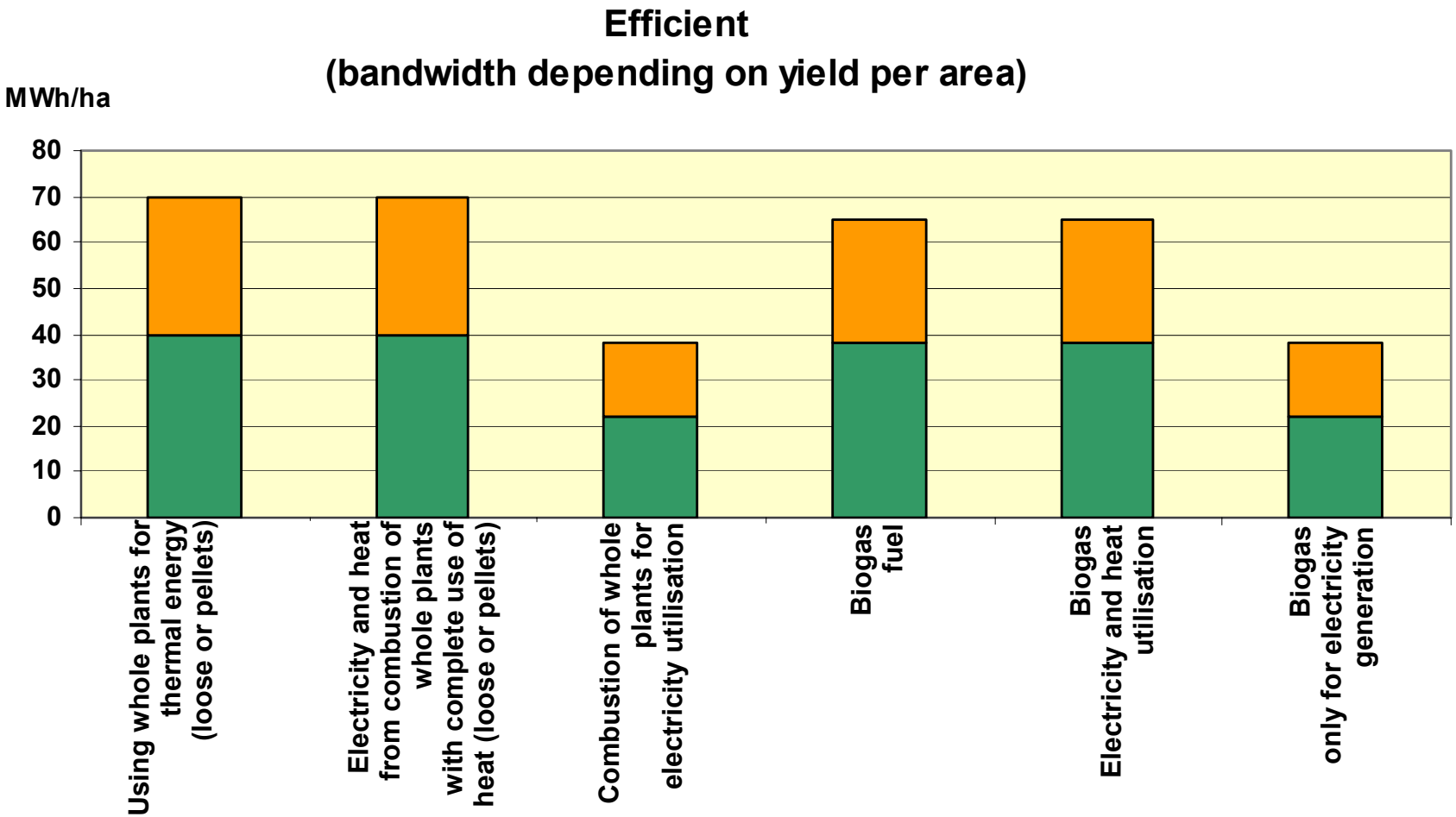
Efficient use of space for energy production
(bandwidth depending on yield per area)



Global market for bioenergy: between climate protection and development policy/Bonn – Federal Republic of Germany Dipl.-Ing. Josef Plank/ 12 October 2006, Chamber of Agriculture Styria

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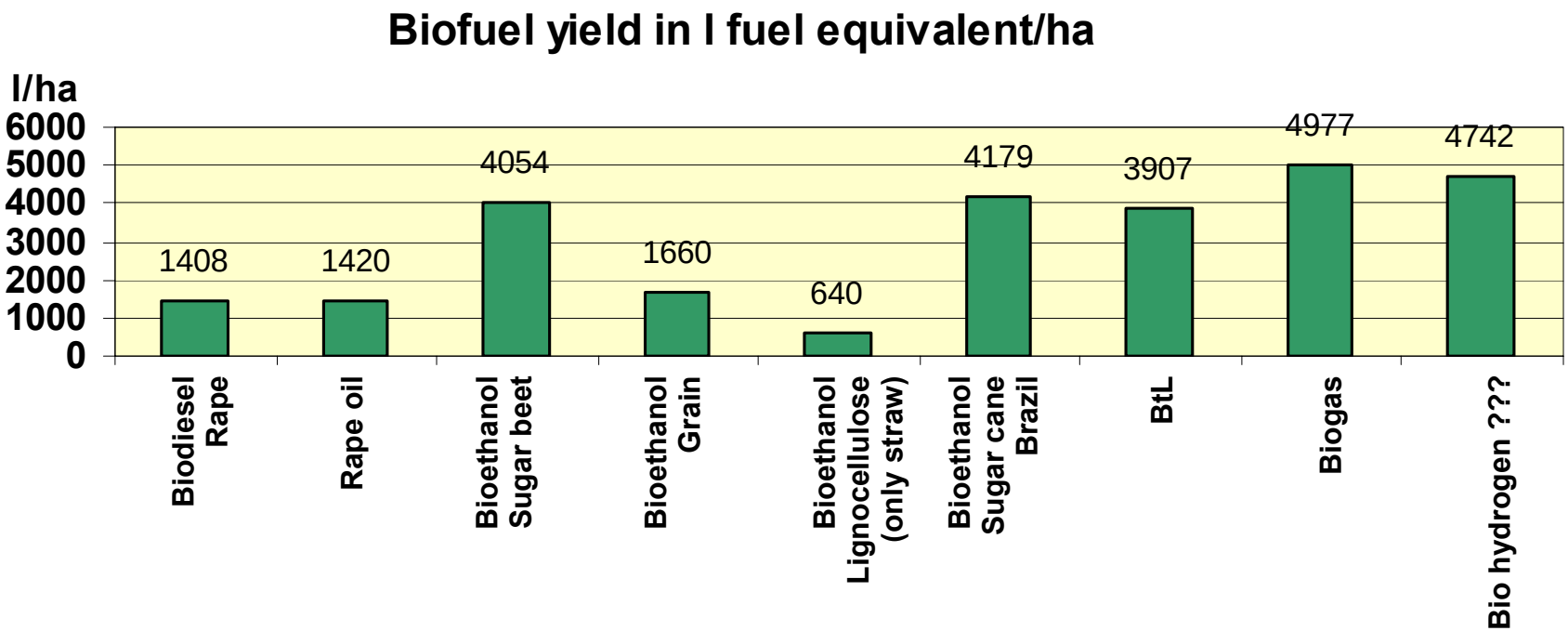
Biofuel yield in l fuel equivalent/ha
Gross yield



Source: FNR study biofuel – comparative analysis

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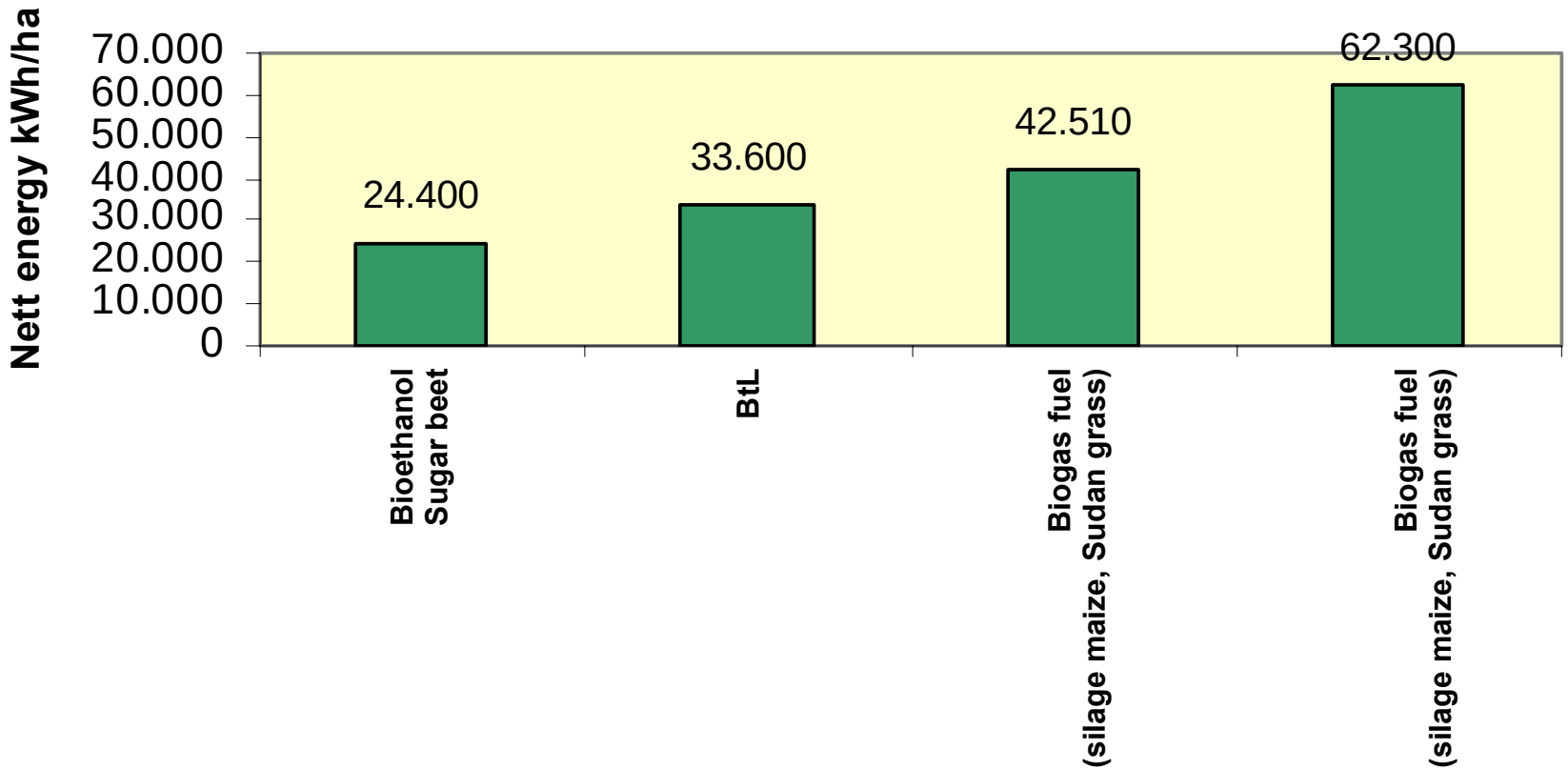
Efficient biofuel production
Net yield in kWh/ha

	Bioethanol sugar beet	BtL	Biogas fuel (Silage maize, Sudan grass)	
Yield	58 t	15 t TS	15 t TS	20 t TS
Energy content	52.000 kWh	67.500 kWh	67.500 kWh	90.000 kWh
Cultivation	500	500	500	500
Care	200	200	200	200
Fertilisation	2.000	1500	500	600
Harvest	1.000	800	800	1.000
Transport	1.000	900	300	400
Conversion	22.900	30.000	5.160	6.500
Residual energy in fermenter			17.530	18.500
Nett energy	24.400	33.600	**42.510**	**62.300**

Source: FNR study – own calculations with practical experience

Biogas is by far the best and most effective bioenergy fuel

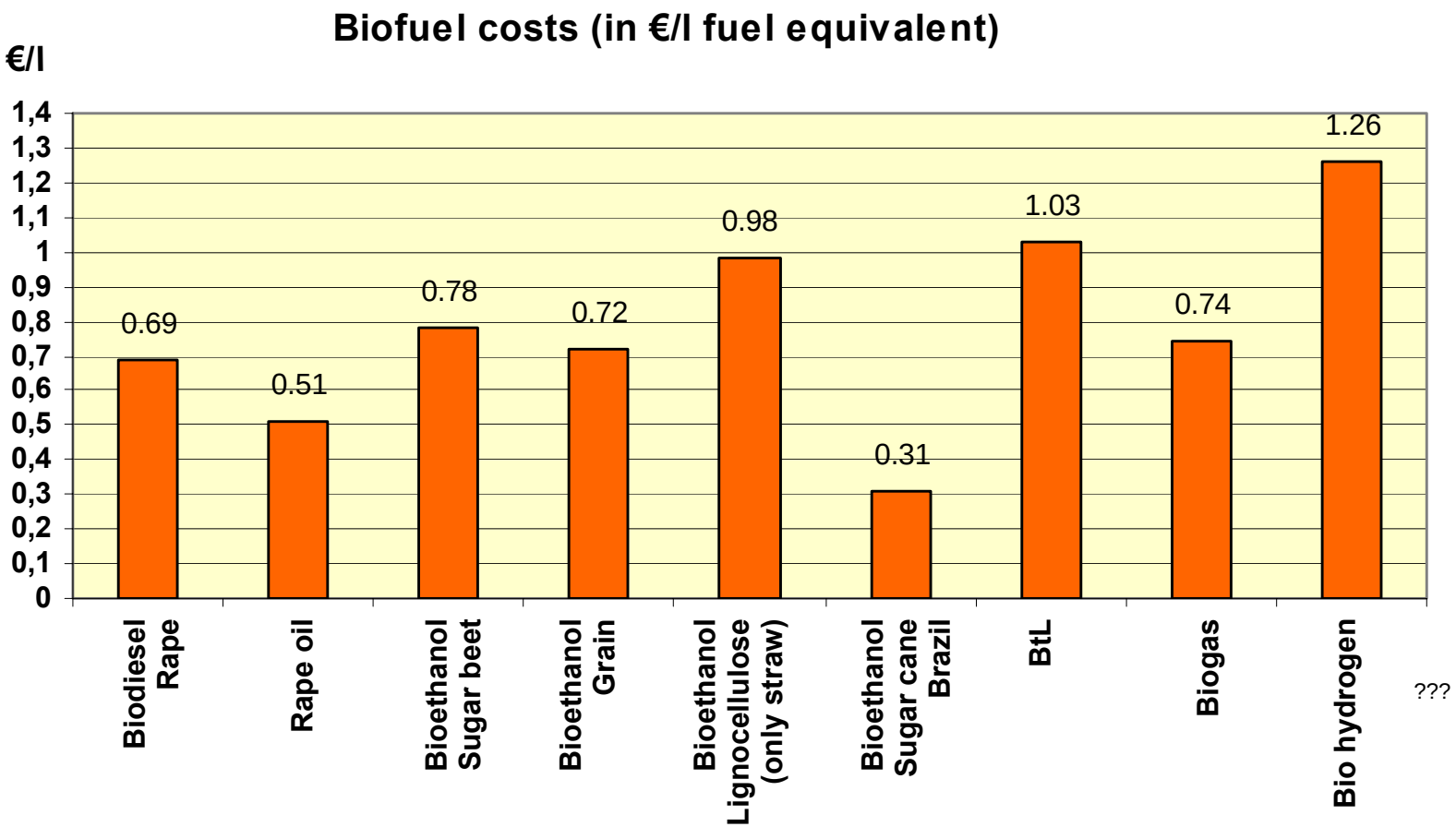


CO2 saving costs in the fuel sector

	Bioethanol sugar beet	BtL	Biogass fuel (silage maize, Sudan grass)	
CO_2 saving	6.58 t	9.07 t	11.47 t	16.82 t
Production costs €/l Fuel equivalent	0.78	01. Mrz	0.74	0.72
Added costs compared to fossil diesel €/l	0.51	0.71	0.44	0.42
CO_2 avoidance costs €/t	189	285	163	155

Source: FNR-study – own calculations with practical experience

Biofuel costs (in €/l fuel equivalent)

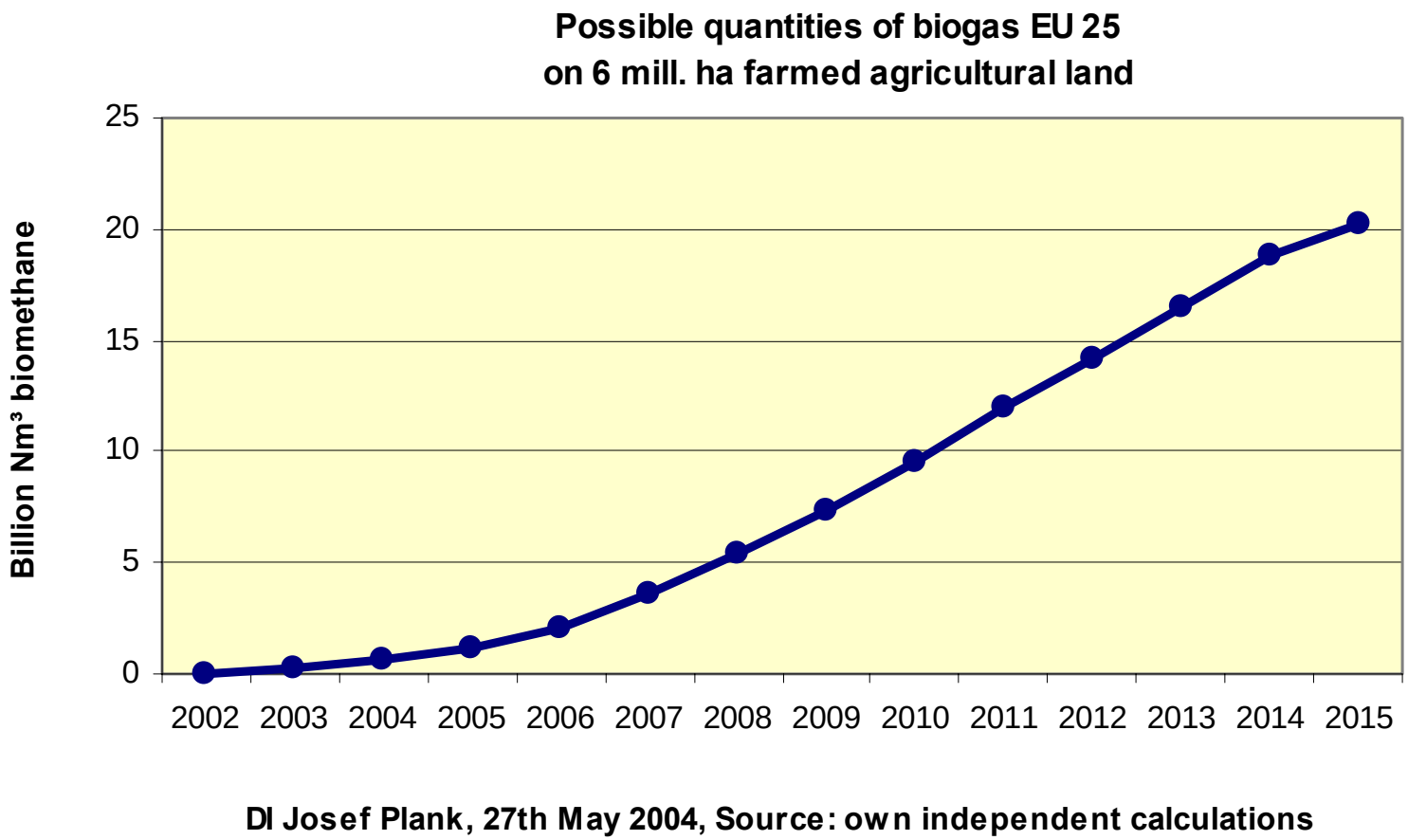


Source: FNR study

Austrian biogas fuel marketing programme

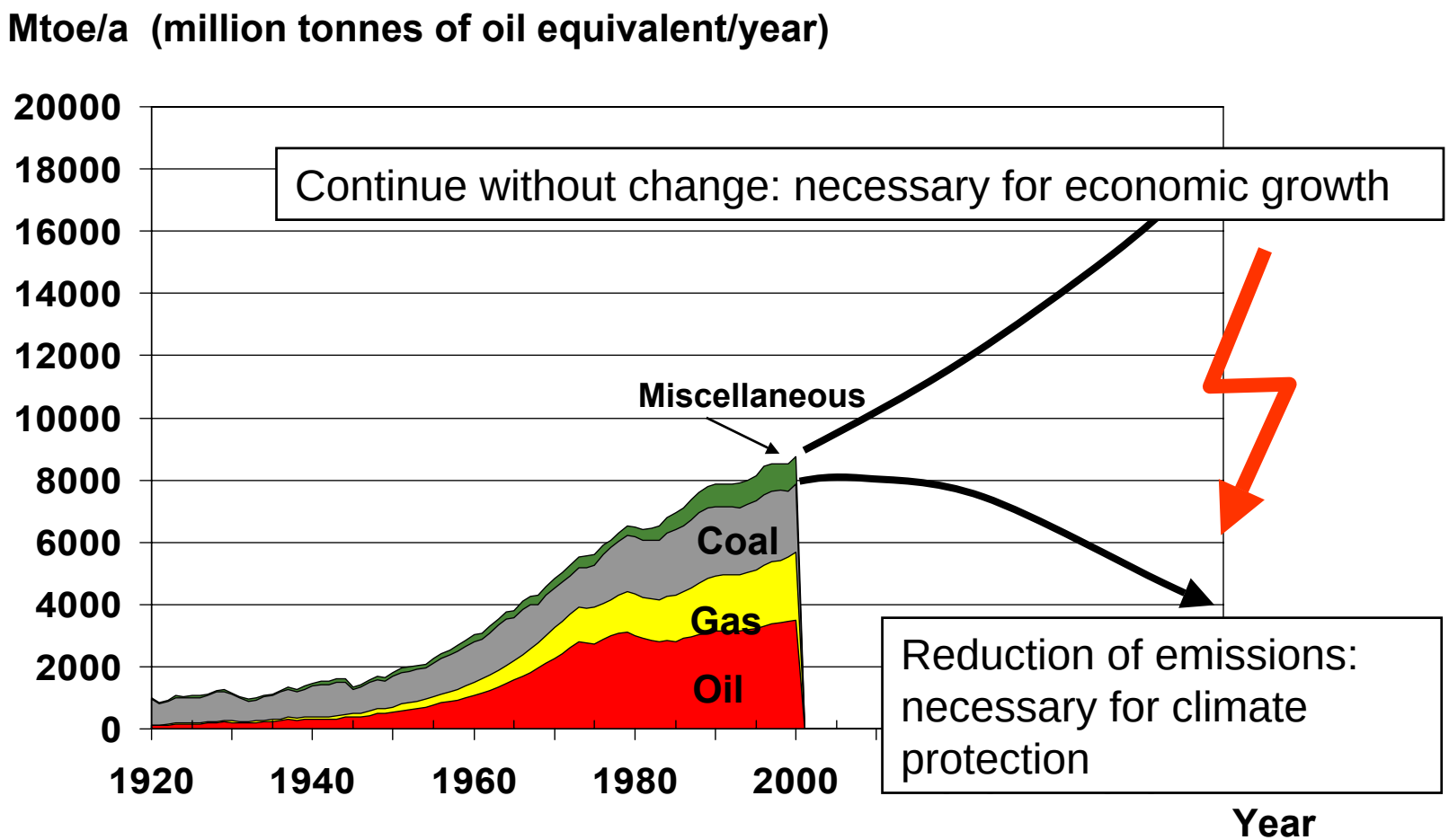
- 5-point agreement Federal Minister Pröll and OMV general director Dr. Wolfgang Ruttenstorfer
- Parliamentary working group dealing with implementation
- Biogas/CNG fuel min. 20 % biomethane
- By 2010 min. 50,000 biogas/CNG vehicles
- By 2013 min. 100,000 biogas/CNG vehicles
- Expansion of biogas/CNG filling station network from currently 30 to 200 - 300
- Urging all vehicle fleet operators to use biogas/CNG vehicles for local transport
- Urging all politicians to guarantee that these new types of vehicles are exempted from mineral oil tax when they are launched on the market
- Additional call for towns and cities to give preferential treatment to biogas/CNG vehicles with regard to traffic measures.

Possible biogas fuel quantities EU 25 on 6 mill. ha of farmed agricultural land 30-35 mill. ha unused land available



DI Josef Plank, 27th May 2004, Source: own independent calculations

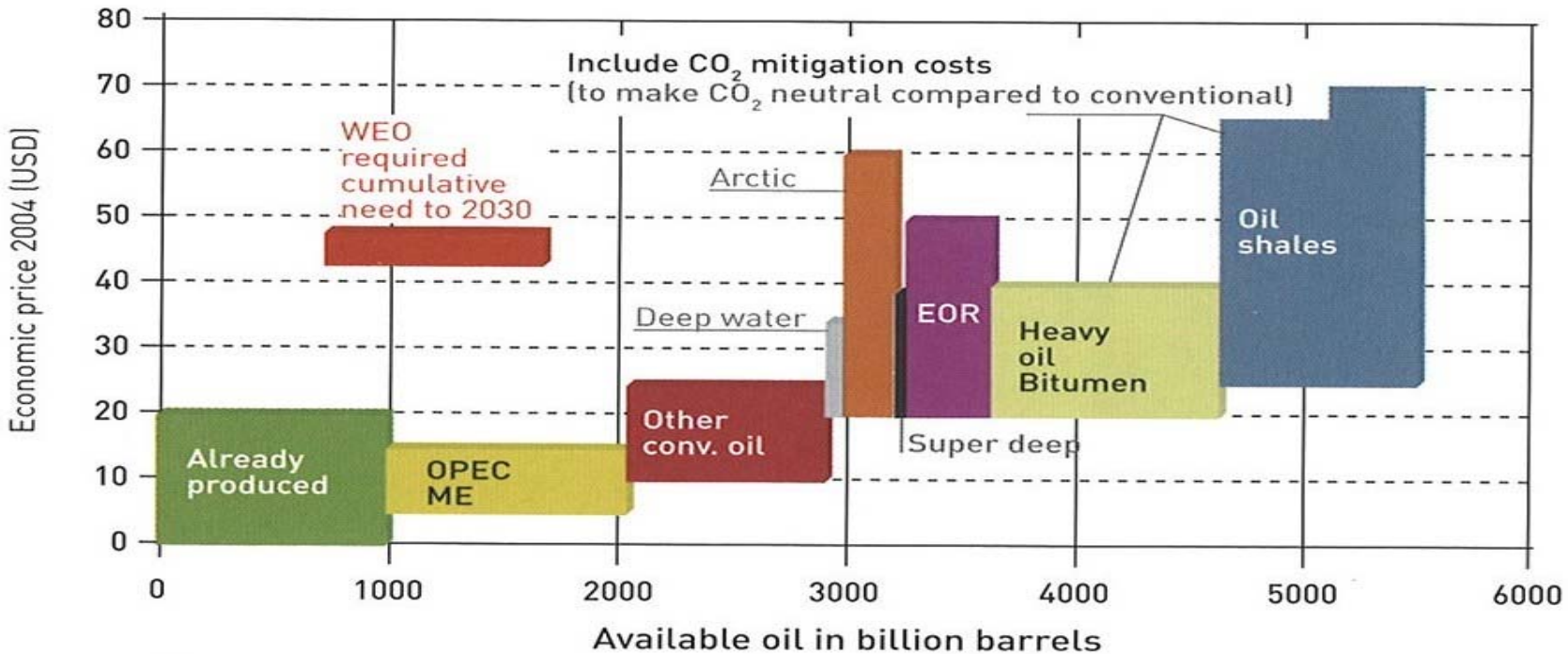
Unsolved contradiction of industrial society



Source: BP Statistical Review of World Energy

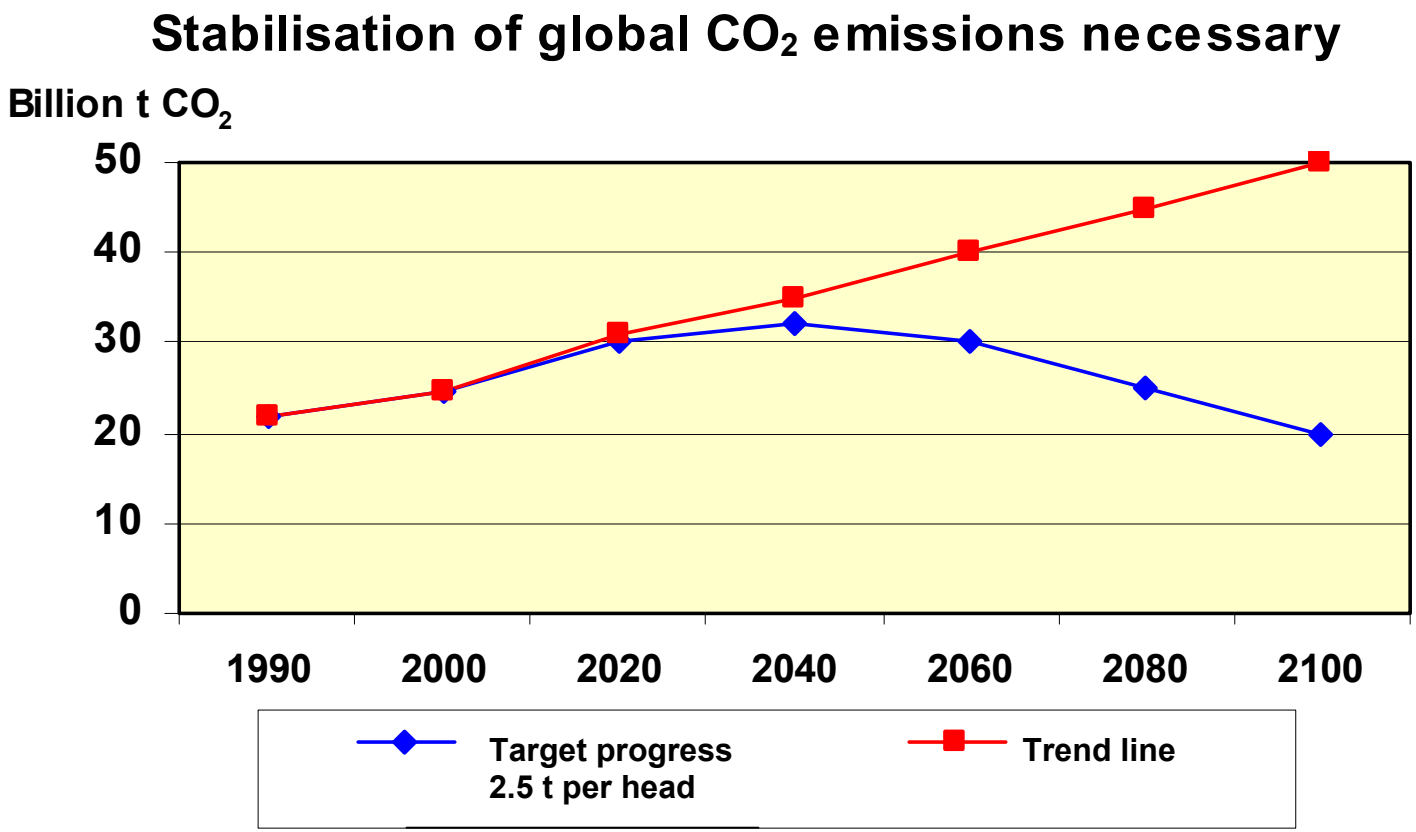
High costs of further oil exploitation

Figure 1: **Oil cost curve, including technological progress: availability of oil resources as a function of economic price** | **Source:** IEA



The x axis represents cumulative accessible oil. The y axis represents the price at which each type of resource becomes economical.

Stabilisation of global CO2 emissions



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More energy efficiency

- **4-litre car instead of 8-litre car**
- **5-litre apartment instead of 15-litre apartmt.**
- **4,500 litre diesel equivalent instead of 1,500 litre diesel equivalent per ha farmed land**
- **At least 80 % overall efficiency for electricity generation**

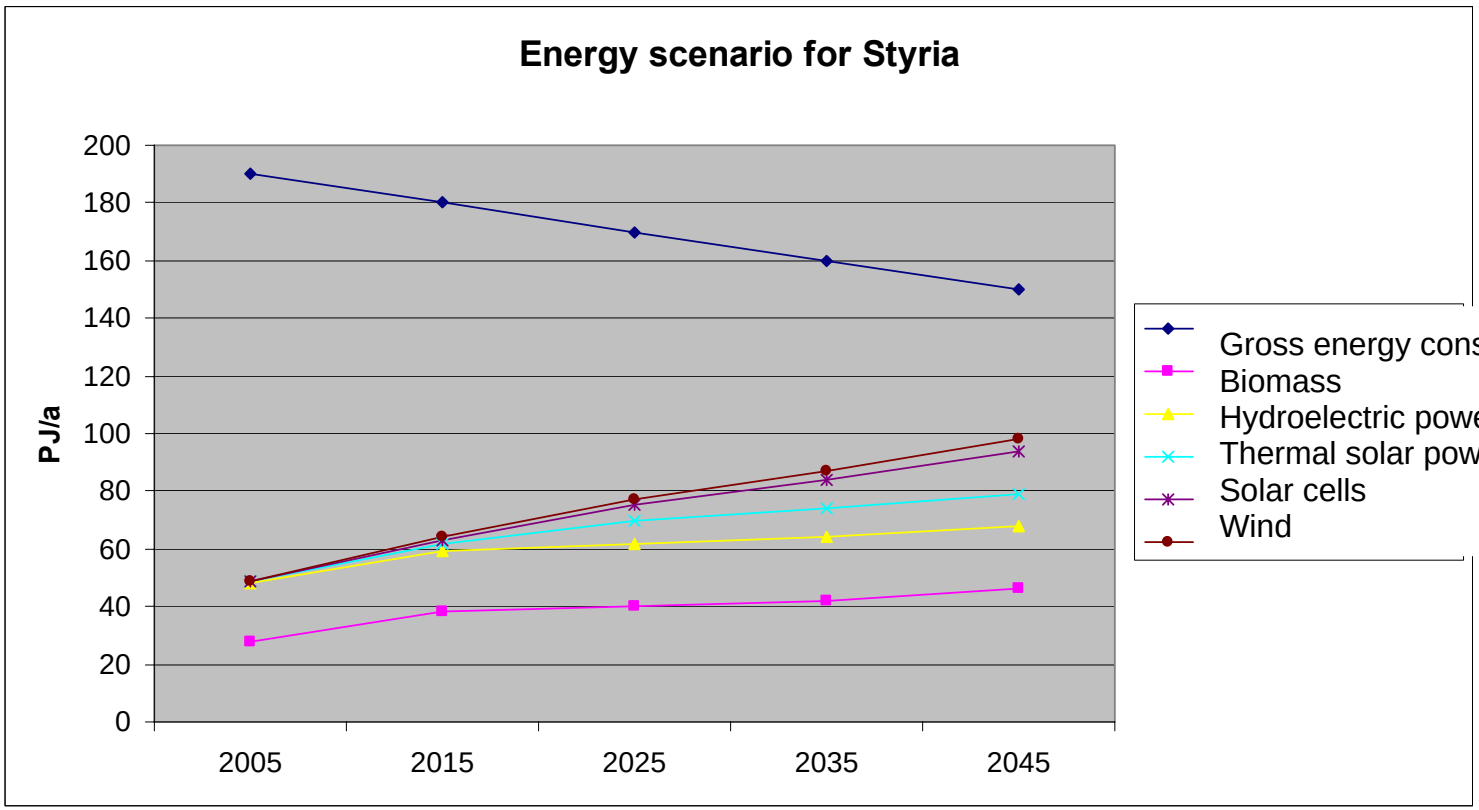
Expanding and developing renewable energy – securing future markets

- Hydroelectric power plants
- Wind power plants
- Geothermal power plants
- Wave power plants (tidal power plants)
- Solar thermal power plants
- Photovoltaic power plants
- Biogas power plants
- Biomass power plants (steam, ORC, Stirling, gasifier …)
- Thermal solar utilisation
- Plant oil engines
- Biodiesel power plants
- Whole-plant biogas fuel
- New biofuels
- Passive solar energy utilisation
- New solar technologies …

10 Theses on the energy industry

- **We live in a globalised world.**
- **We have a global market.**
- **The (global) market is incomplete.**
- **The (global) market can only react to short-term issues (max. 3 - 5 years' forecast possible).**
- **Energy problems as quantity-availability-price problem – wars …**
- **Climate problem + 3°C global average temperature increase unacceptable, annual climate damage exceeds GNP growth (up to $ 1000 /year).**
- **High costs and risks of developing additional fossil resources are no longer acceptable.**
- **Solutions can only be achieved using a free-enterprise approach.**
- **Market signals have to be strong enough to enable sustainable energy supplies.**
- **Two ways → 1. Control through taxation**
  2. Quota specifications (too complicated, difficult to control)

Energy scenario for Styria



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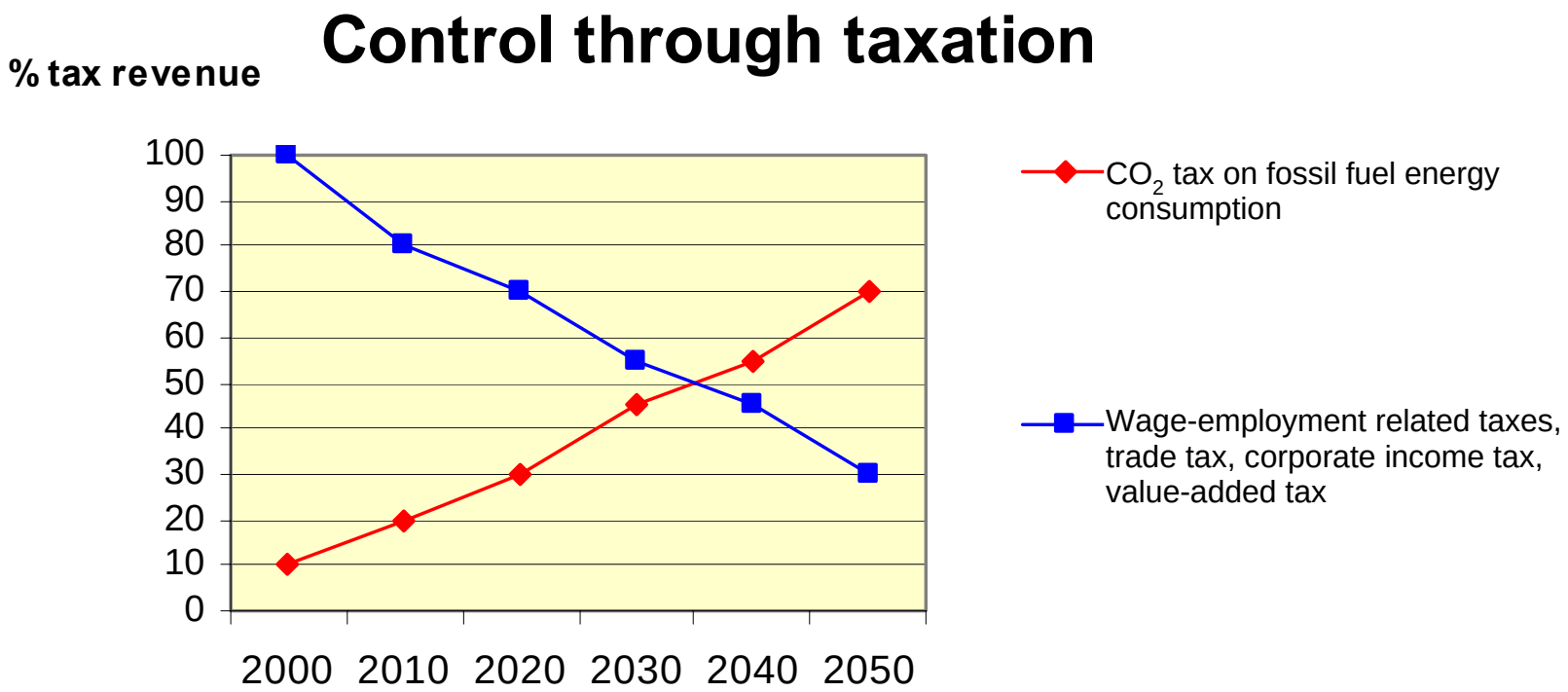
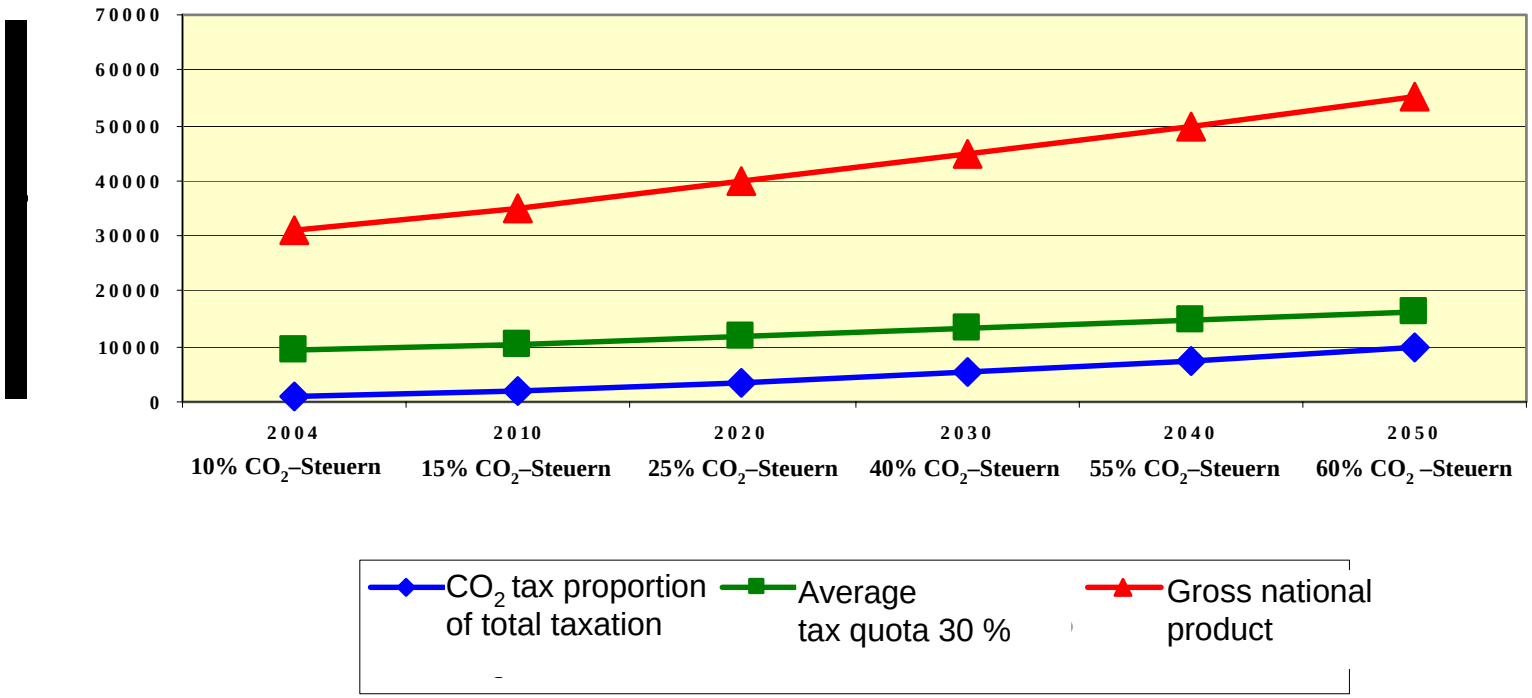
Control through taxation



monika:

reorientation through global CO_2 taxes (at constant values 2004)



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Global CO^2 tax revenue in billion €
(assuming consumption remains consistent)

	2005 50 c/kg CO_2	2010 100 c/kg CO_2	2020 200 c/kg CO_2	2030 300 c/kg CO_2	2040 400 c/kg CO_2	2050 500 c/kg CO_2
Oil	479	958	1.916	2.874	3.832	4.790
Coal	498	996	1.992	2.988	3.984	4.980
Gas	269	538	1.077	1.615	2.154	2.692
	1.246	2.492	4.984	7.476	9.968	12.460

International tax reorganisation – German example – could apply similarly for OECD – only large items taken into consideration – (Federal, Länder (state), local)

	2005 Mrd. €	2010 Mrd. €	2015 Mrd. €	2020 Mrd. €	2025 Mrd. €	2030 Mrd. €
Wage tax	118	100	70	40	30	25
Income tax	10	8	6	4	3	2
Capital gains tax	17	14	12	11	10	9
Corporation tax	16	12	10	8	7	6
Value-added tax	108	80	60	50	40	35
Tobacco tax	14	14	14	14	14	14
Trade tax	32	25	18	15	12	10
Property tax	10	8	7	6	5	4
*)Mineral oil tax (CO_2 tax fossil energy)	40	114	183	222	249	265
Other taxes	50	40	30	30	30	30
	415	415	410	400	400	400

Result of the international agreed tax reorientation:

- 80 % reduction on wage tax and income tax
- 50 % reduction on capital gains tax
- 63 % reduction on corporation tax
- 67 % reduction on value added tax
- 70 % reduction on trade tax
- 60 % reduction on property tax
- 40 % reduction on other taxes

Counter arguments of the fossil fuel industry

- **The CO2 tax cripples the economy.**
- **Interference in the freedom of the economy.**
- **This hinders development in developing countries.**
- **There is no international tax law.**
- **And in any case; what would happen to us if our monopolistic business transactions were influenced.**

Arguments to counter any counter arguments

- **Up until 2000 all representatives of industry unanimously said that the economy would collapse if oil prices reached 30 – 35 $/barrel.**

- **Today the price has reached 60 $/barrel and more, but the boom in economic growth is greater than when oil prices were at their lowest level.**

Also

- Nearly all financial and economic policy makers from all countries either have a direct relationship with or are at least closely allied to one or several monopolistic fossil fuel supply companies.
- Many employees' representatives support this fatal fossil fuel cycle, by opposing any reorientation and thereby unwittingly support the monopolistic fossil fuel control and domination structure.
- Renewable energy provides considerably more employment potential through the building and operation of plants in local regions and does not cost any more than fossil fuel.
- Renewable energies, for instance biogas creates regional autarky (electricity, fuel, heat).

THANK YOU FOR YOUR ATTENTION

It is time to awake from the fossil fuel (and nuclear fuel) dreams.