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European Association
for Coal and Lignite

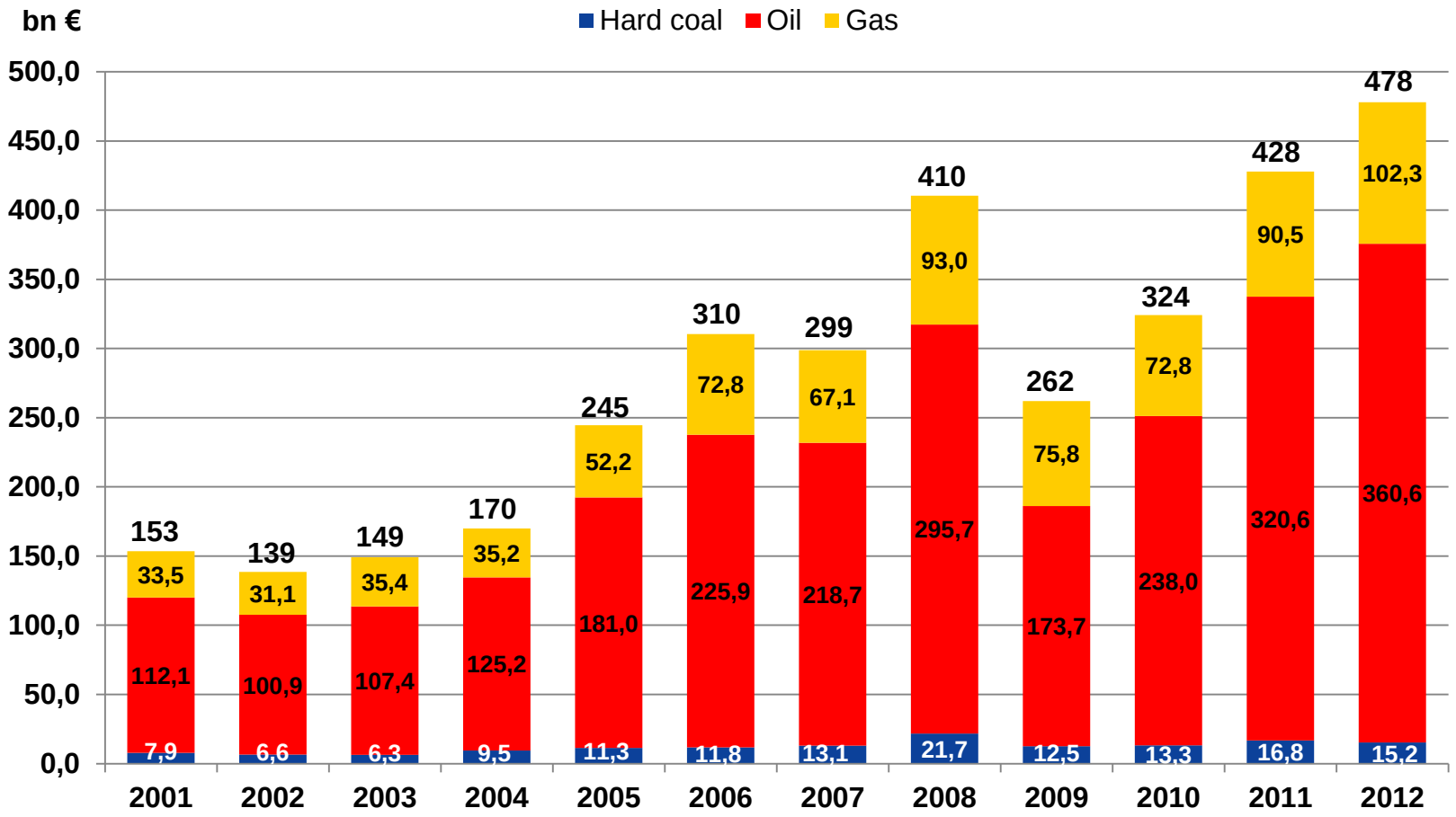
Clean Coal – Importance for prosperity and growth

Energy Realism - Climate Pragmatism

Working Breakfast, 15th November 2012

Dr. George Milojcic

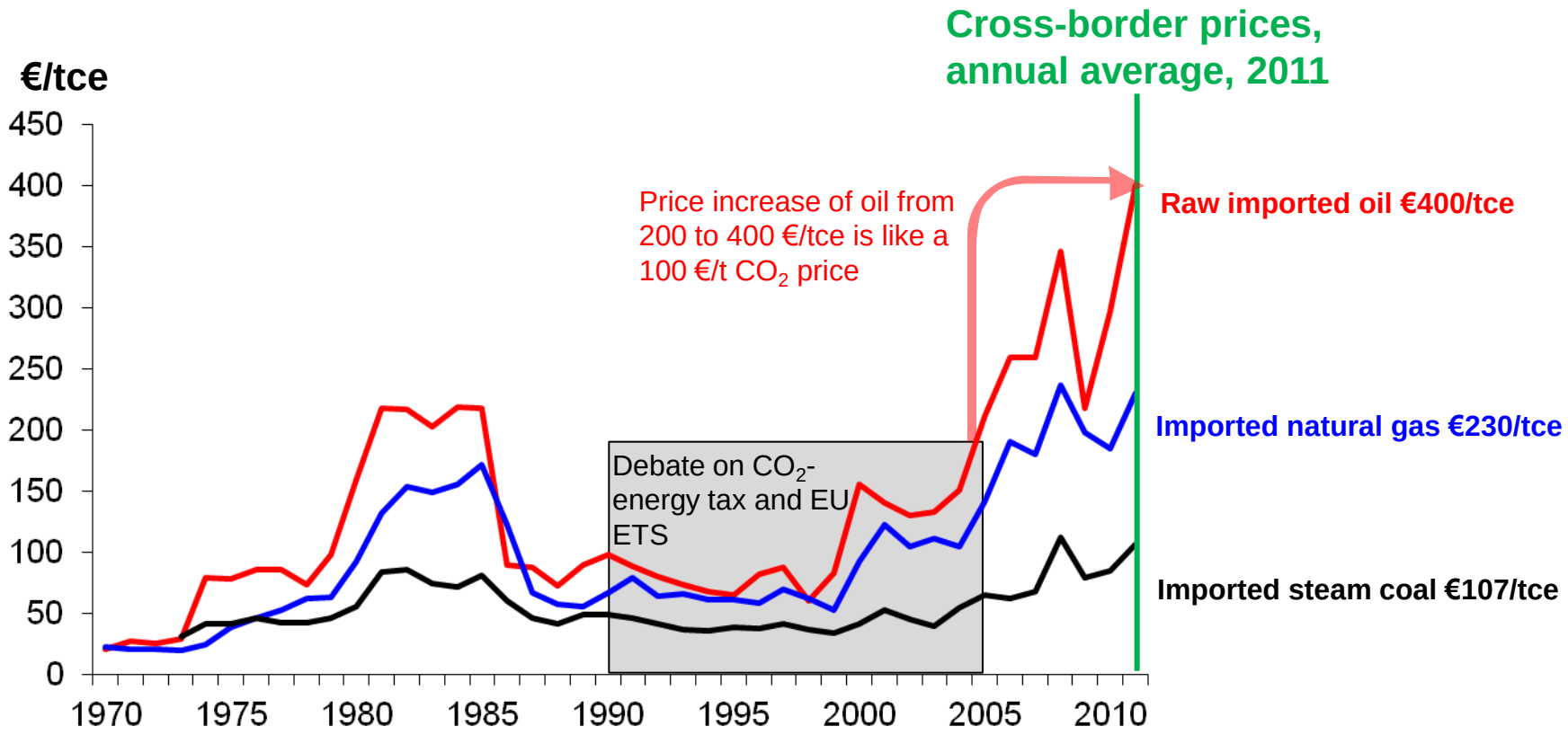
The external energy bill EU 27



Source: Statistik der Kohlenwirtschaft

GDP 1.000 bn €	10,3	10,4	10,6	10,9	11,1	11,4	11,8	11,9	11,3	11,6	11,8	11,8
Share on GDP in %	1,5	1,3	1,4	1,6	2,2	2,7	2,5	3,5	2,3	2,8	3,6	4,1

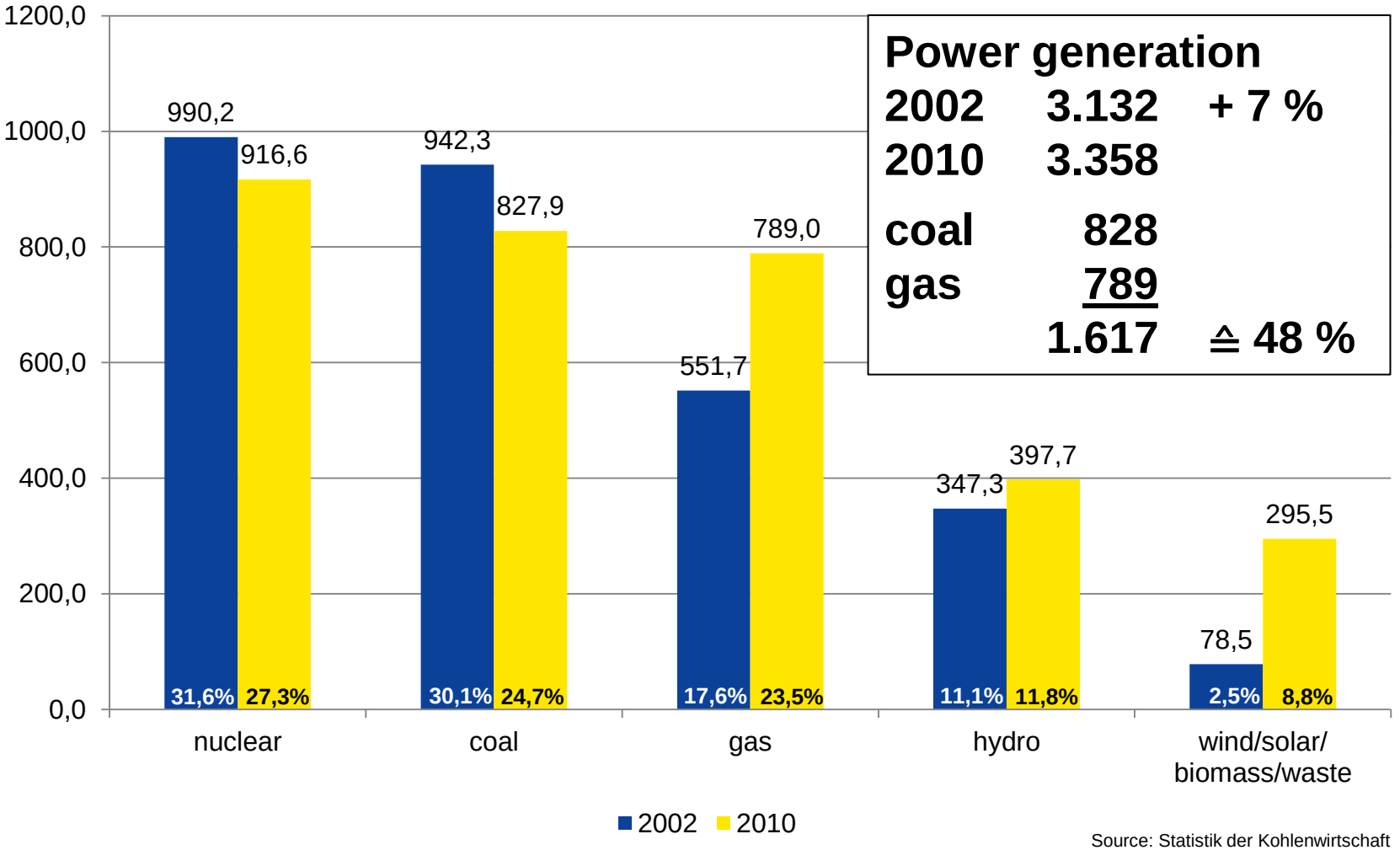
The prices for imported oil and gas have risen 10-fold on average since 1970



Source: Statistik der Kohlenwirtschaft

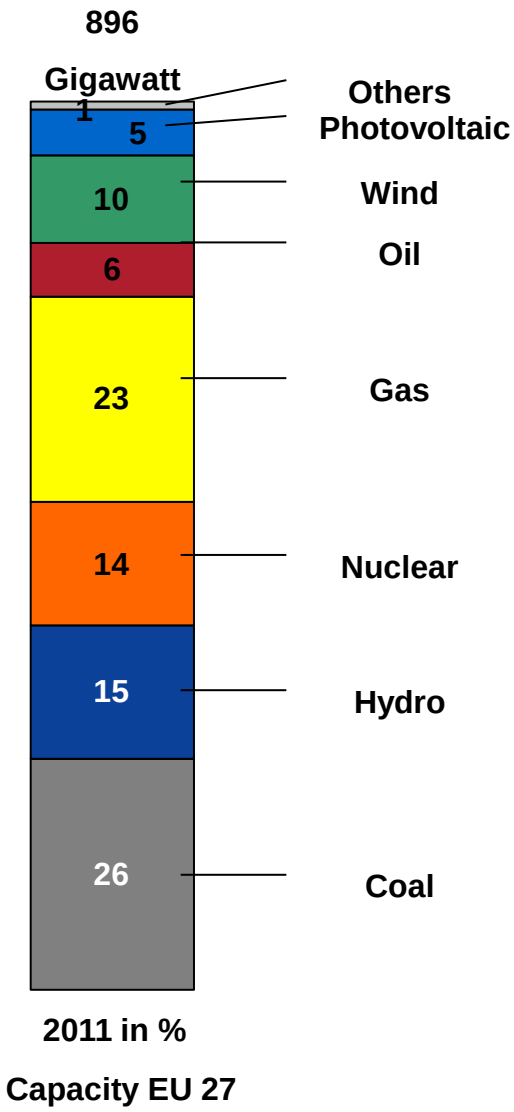
Data: partially provisional (position: 03/2012)

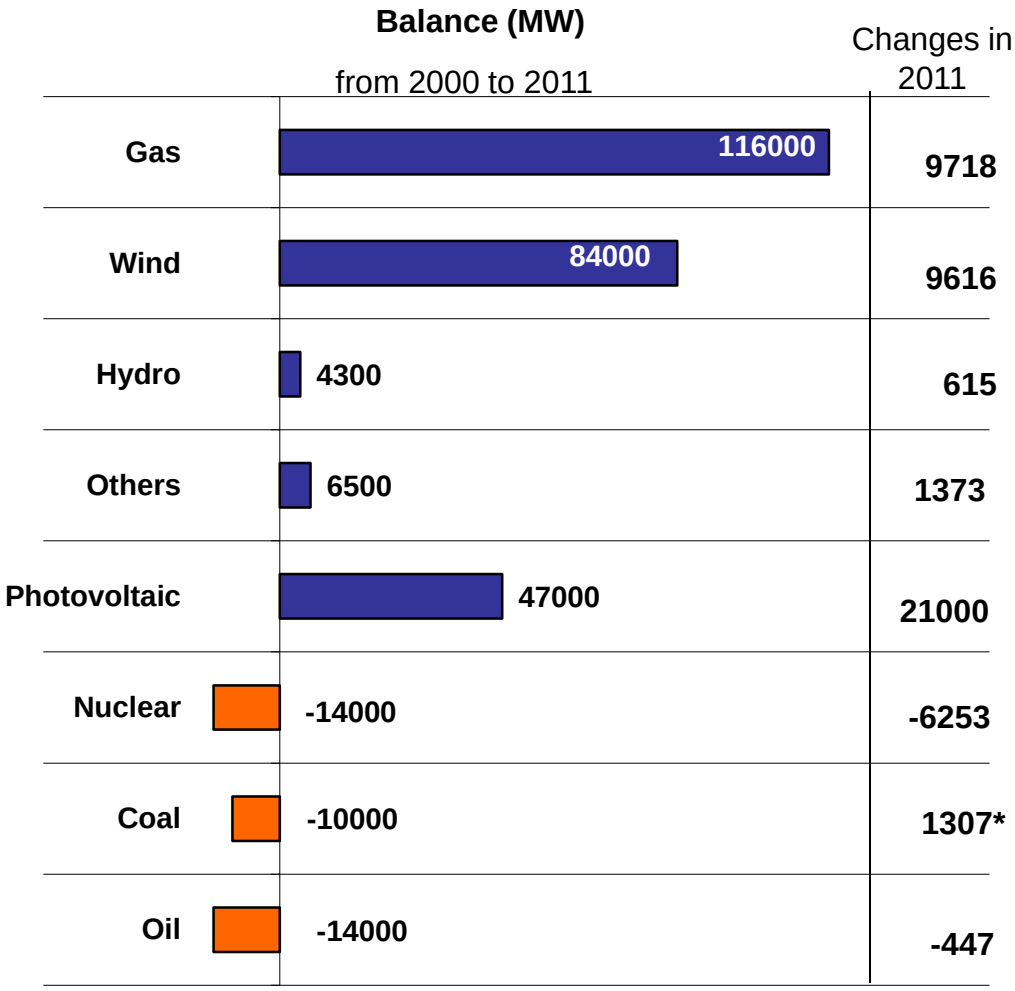
Power generation structure EU 27 by comparison 2002 - 2010



Source: Statistik der Kohlenwirtschaft

EU 27 power plant capacity and balance 2000 - 2011





* In 2147 MW – Out 841 MW

Soucre: EWEA, Wind in power 2011

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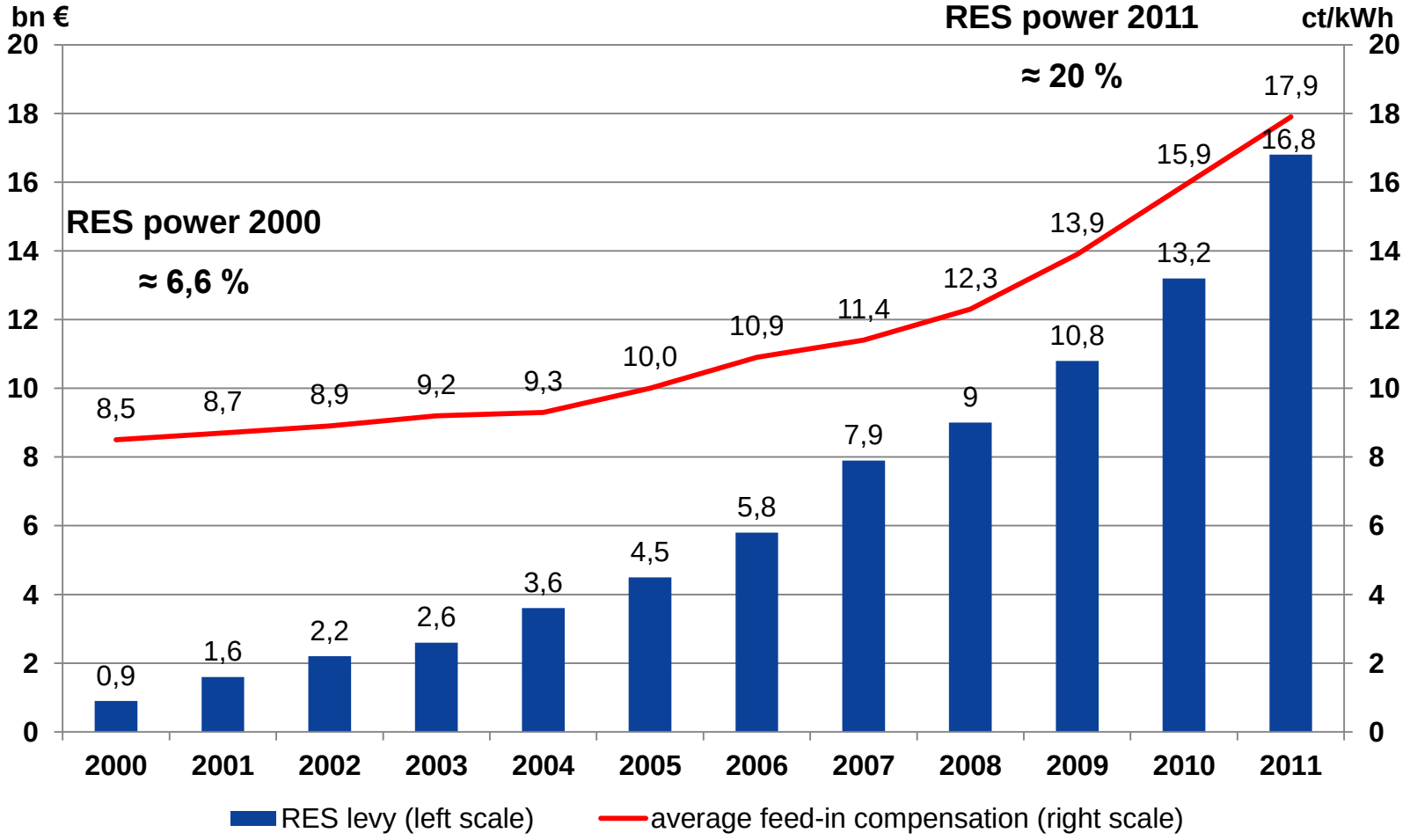
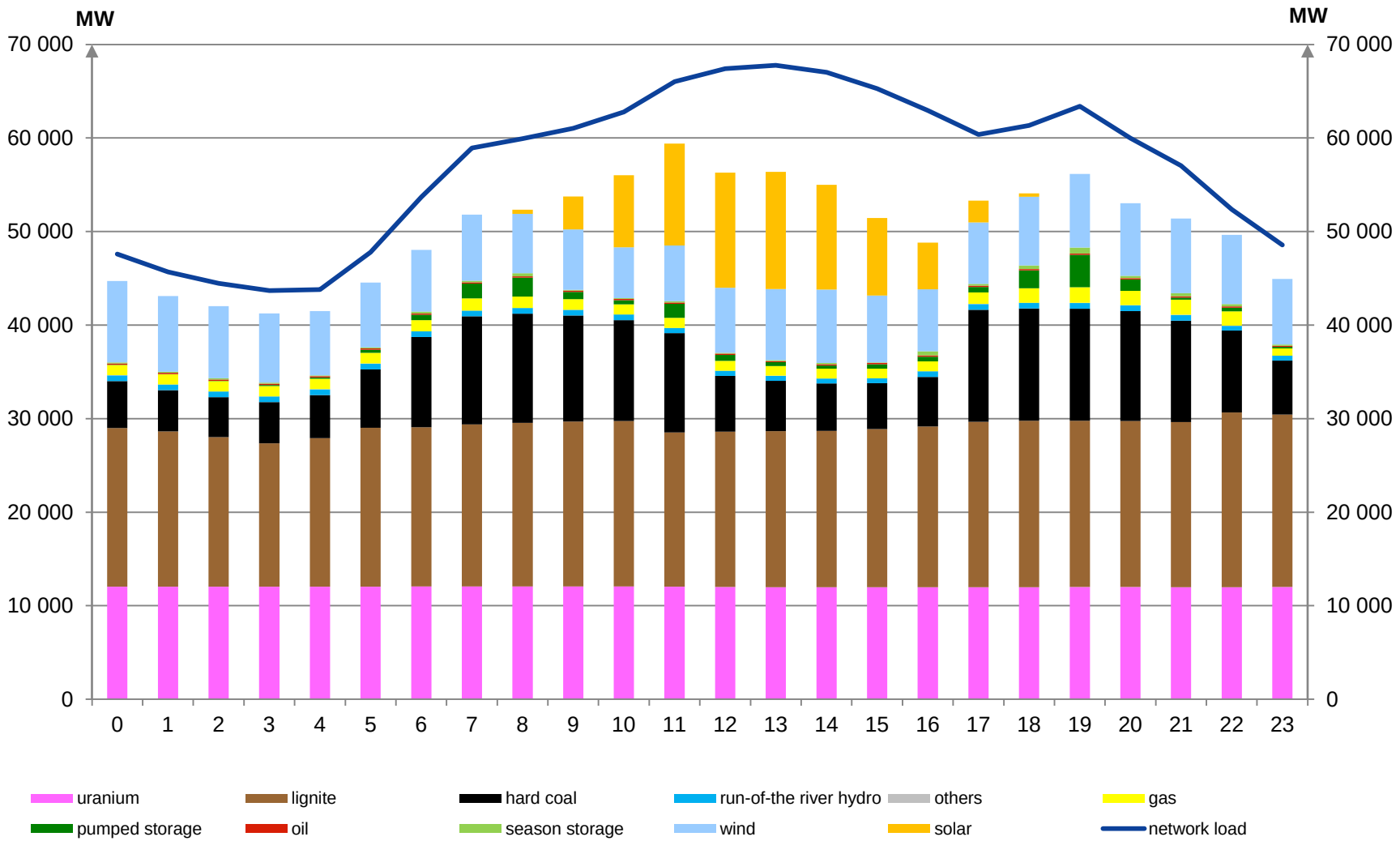
Compensation package for „green power“

2000 bis 2011



Source: BDEW (2010)/RWI-Position #45; BMU, Juli 2012, Erneuerbare Energien in Zahlen

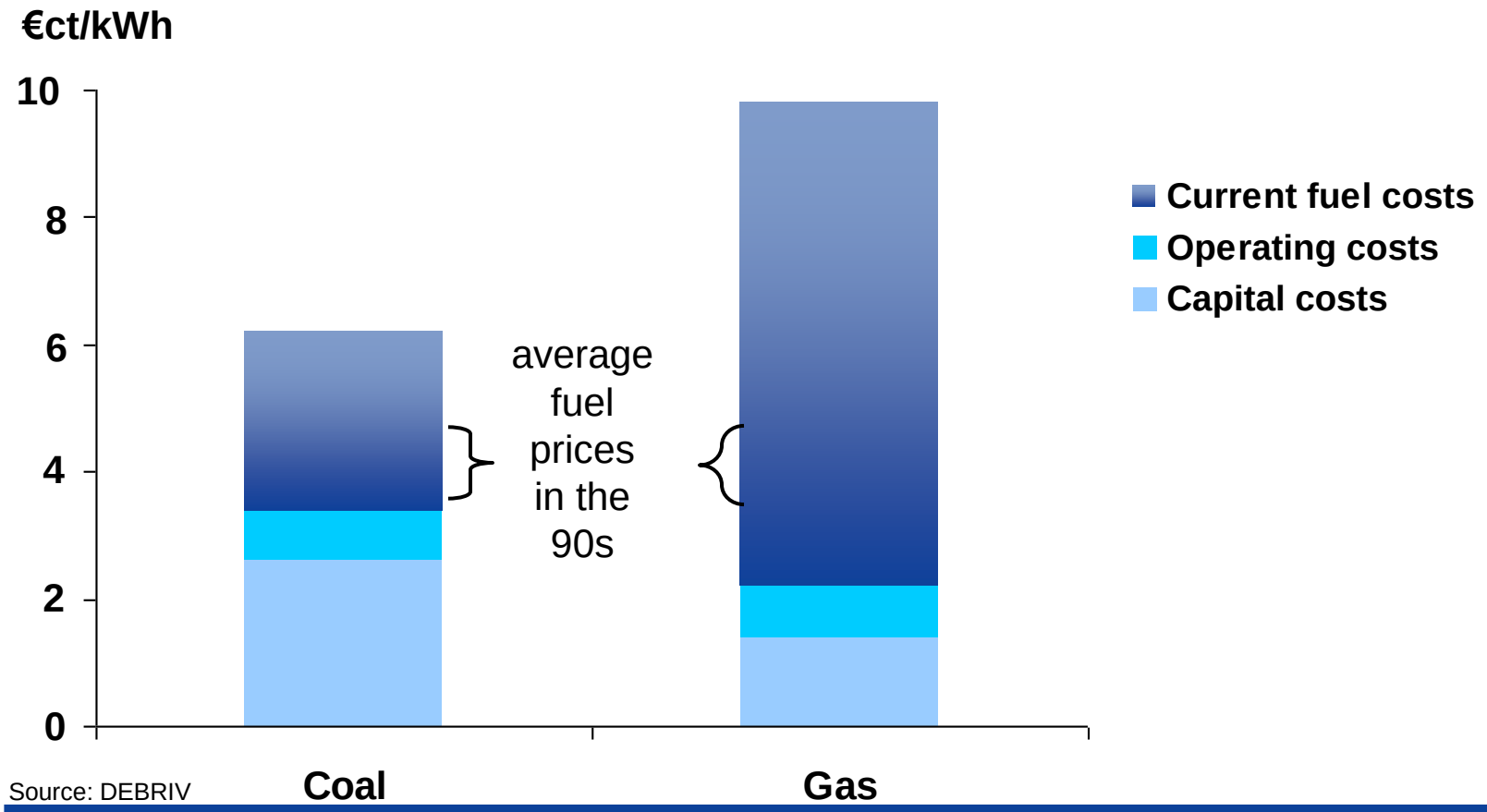
Net power generation at 17.10.2012



Comment: The eex issued the net generation previous day depending on energy source of basis voluntary information. This presentation includes data for facilities < 100 MW and not for facilities > 100 MW. This data couldn‘t directly compared with the sum of obligatory announcements, who will shown as an added constant line. However shows the slide quite demonstrative the proportion and the role of wind and photovoltaic.

Quelle: eex, entsoe

Average Generation Costs of Different New Base-Load Power Plants



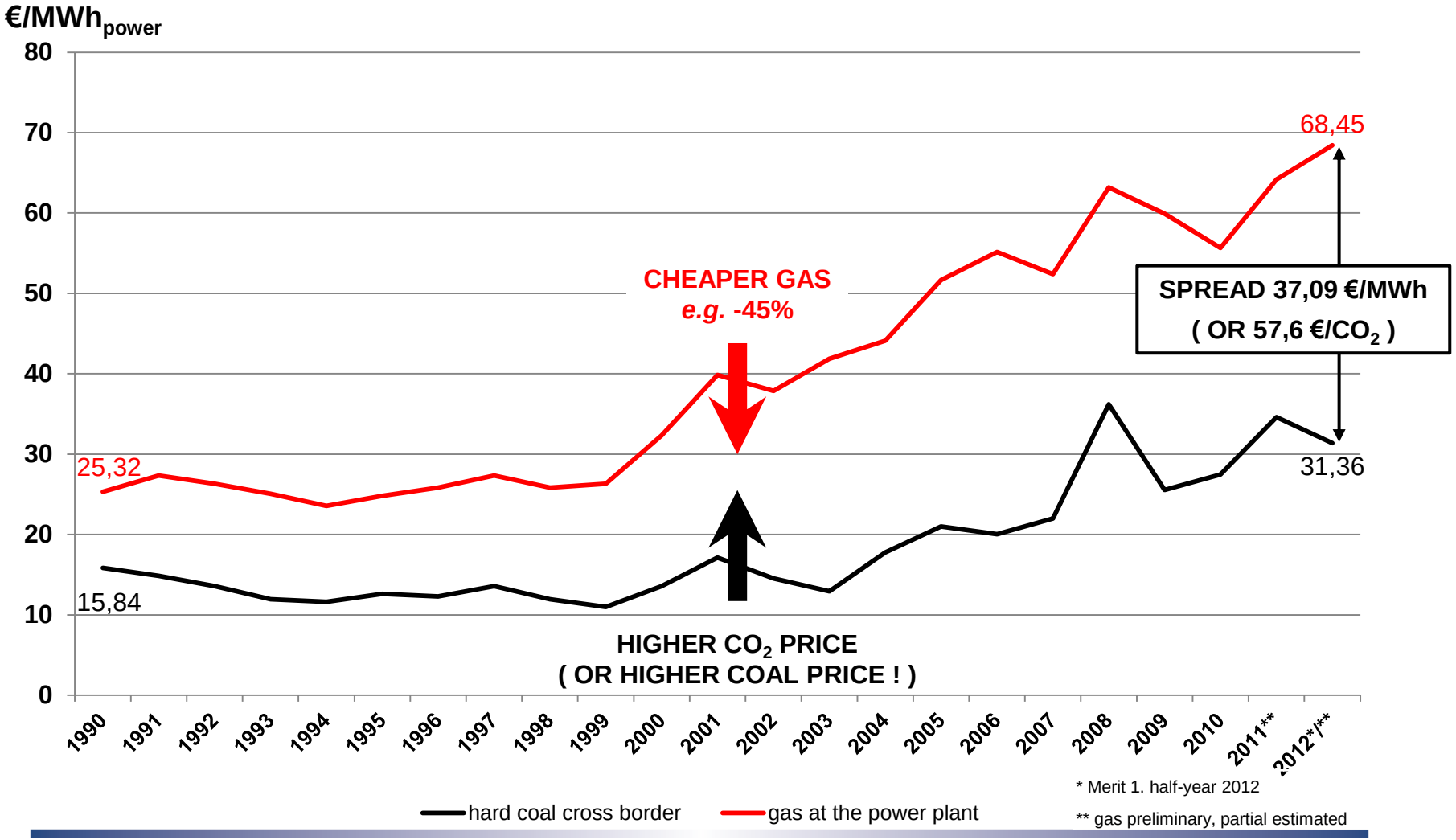
Source: DEBRIV

High gas prices are high risk for generators and customers
Rising coal prices have less effect
EU ETS is an additional risk to fuel and power prices

Fuel cost for coal and gas power generation

German prices

Efficiency coal-fired power plant η = 38 %; gas-fired power plant η = 49 %



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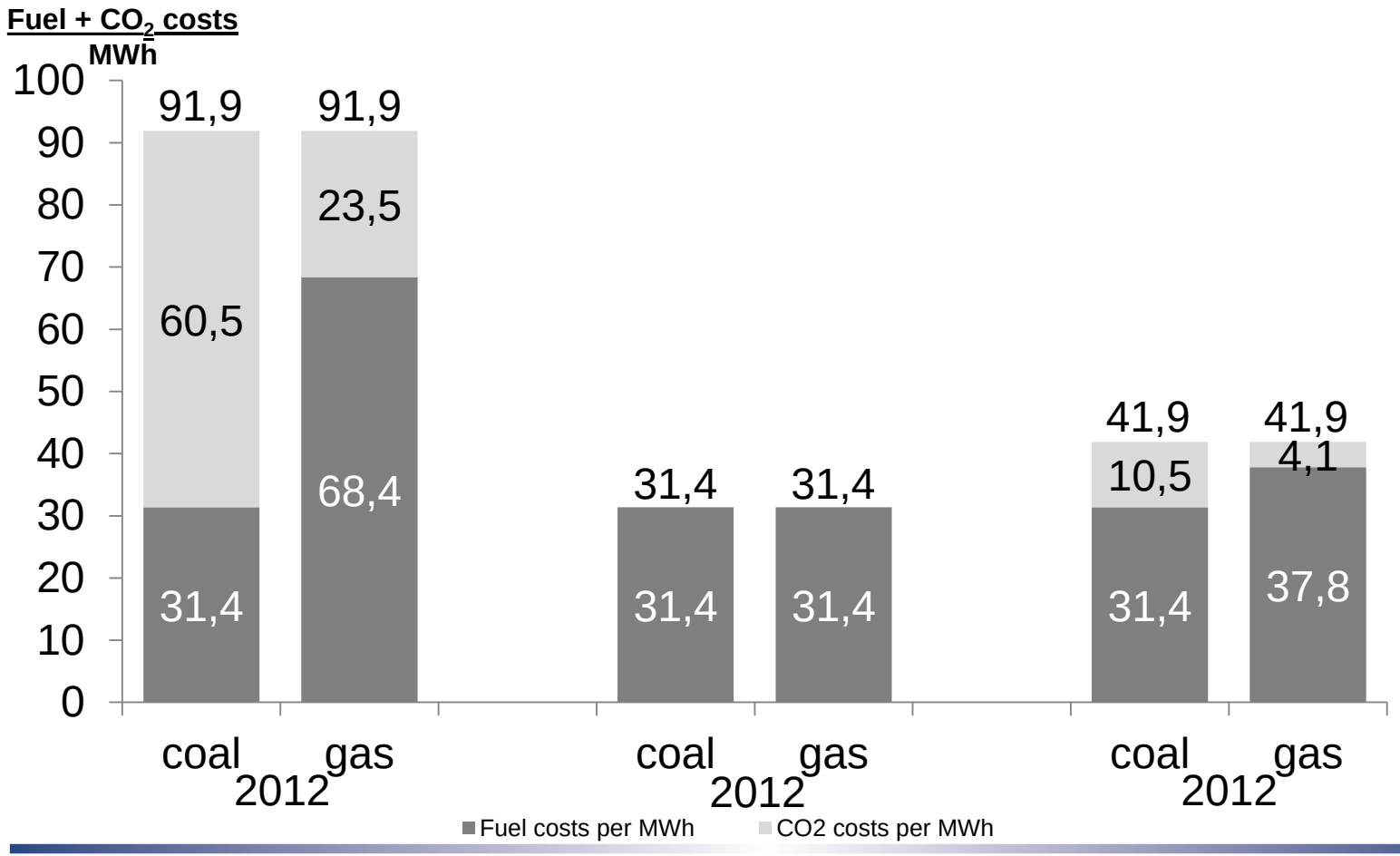
Cases – High and low price differencial

Coal price [€/tce]:	**97**	**97**	**97**
Gas price [€/tce]:	**273**	**125**	**150**
CO_2 price [€/t CO_2]:	**57,6**	**0**	**10**



Coal – clean, efficient and flexible

A three phase modernisation strategy

I. Reducing emissions, increasing efficiency and flexibility in ecologically and economically optimized steps

- Modernization of existing plants: SO_2, NO_x, dust, retrofit
- Construction of new state of the art power plants

II. Development of high-efficiency power stations with the aim to minimize consumption of resources and reduce specific emissions, particularly those of CO_2

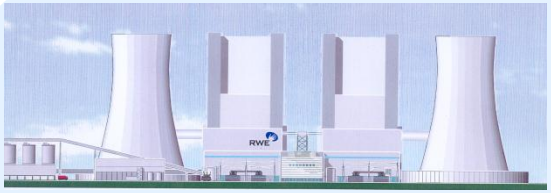
III. New Technologies for CO_2 capture and storage

Clean Coal is a flexible concept which can be implemented by all countries depending on their specific situation.

Energy flow is cash flow

€ 7.0 billion turnover for a 1,000 MW power plant over 20 years operating 7,000 hours/year at a base-load-price of € 50 /MWh

Coal power plant



plant costs: 2/3 share of turnover

fuel costs: 1/3 share of turnover

70 up to 100 % domestic added value

Gas power plant

plant costs: 25 % share of turnover

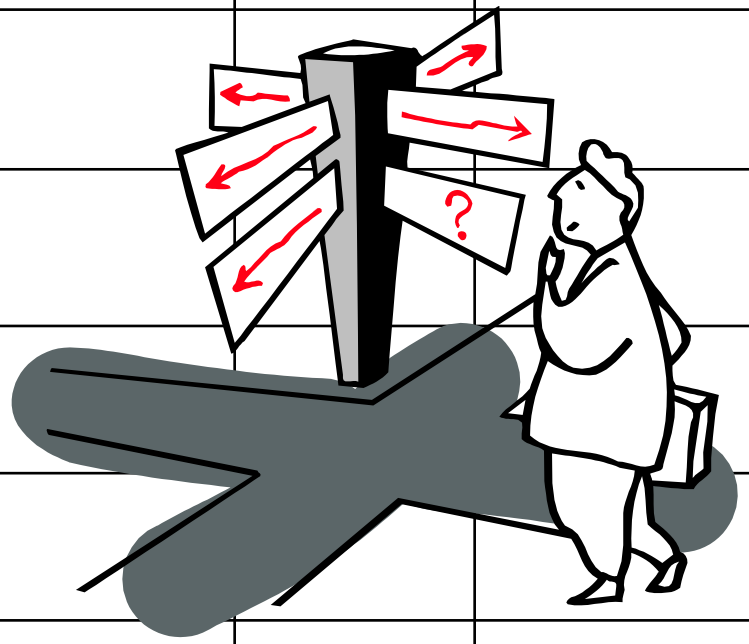
fuel costs: 75 % share of turnover

up to 100 % imported

Power generated from coal promotes growth in the EU

Different Fuels for Power Generation - different questions, answers and views

	Coal	Oil	Gas	Nuclear	Renewables
Security of supply	+++				
Price risk / competitiveness	+++				
Transport / waste risk	+++				
CO_2 emissions	+				
Consumer acceptance	++				
Importance for the power sector	+++				



Backup

To the competition between coal and gas power plants

- Assumption: Fuel and CO_2 cost determine on the utilisation of a power plant (marginal cost consideration) GC = generation cost
- $GC_{power} = FC + E * P_{CO2}$
- E = CO_2 demand $[\frac{t}{MWh_{power}}]$; FC = fuel cost $[\frac{€}{MWh_B}]$; P_{CO2} = CO_2 price $[\frac{€}{t\ CO_2}]$
- Case example:

constant: coal: η = 38 % $E_C = 1{,}05\ [\frac{t\ CO_2}{MWh}]$

gas: η = 49 % $E_G = 0{,}41\ [\frac{t\ CO_2}{MWh}]$

variable: FC_C; FC_G; P_{CO2}

I: $GC_C = FC_C + E_C * P_{CO2}$

II: $GC_G = FC_G + E_G * P_{CO2}$

⇒ $GC_C = GC_G$

$$P_{CO2} = \frac{FC_G - FC_C}{E_C - EG}$$

Differencial fuel costs gas – coal and thereof inferred CO_2 price

Efficiency coal-fired power plant η = 38 %; gas-fired power plant η = 49 %