Parliaments and the energy conflict

How to Create Majorities in a Hostile Environment

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Graph 1

1. Introduction

When Parliaments decide on energy policy, they normally start with proposals from the government. Governments like to swim in the mainstream – and they get information and advice from so called experts of organizations such as the International Energy Agency (IEA) or the International Atomic Energy Agency (IAEA).

But up to now you barely find an international body who is in favour of renewables. Why is this so?

Graph 2 Energy shares

To rely on a purely renewable approach for energy policy is, even in governments with strong green participation, a minority position up to now. Why are international agencies

overwhelmingly **against renewables**, teaching governments and Parliaments all over the world?

It is a fact that so called renewables or the interesting part of it – the "other renewables" – have only a small share of commercial energy consumption now.

Graph 3 Energy growth

But – and that's the good news – renewables are emerging in an explosive way.

And renewables have a high energy-return-on energy-investment compared to fossil and nuclear primary energy, where more than two thirds is lost in the user chain as waste heat and in "upstream"-investments for construction, mining, drilling or decommissioning.

In spite of the strong growth of most renewables – there remains a mainstream perception in many Parliaments that renewables and energy efficiency

- are expensive
- have small potentials only
- might be environmentally good but at a high cost
- and with negative economic impacts.

This perception is rarely scrutinized. There is stigma around renewables. Why for example is there only low media coverage on industries which – like wind and photovoltaics – grow at double digit numbers like mobile phones or electronics for more than a decade?

Why is there a strong contempt toward renewables, a deep rooted negative attitude in international Agencies like the IEA or in World Finance Institutions like IMF or World Bank?

2. The Economic Misperception of Renewables

Let's first talk on some structural disadvantages in the perception of renewables.

Externalities

First and foremost there is an economic misperception of renewables.

It is the difference of market prices and real cost, known as externalities.

Investment decisions in renewable energy and efficiency is decentralized and takes place on the micro level, based on prices.

This is done by millions of consumers who buy gas, oil, electricity or hot water, and with products such as cars, houses or electrical appliances.

Well managed renewables do have no or very minor externalities.

The hidden costs are on the side of fossil and nuclear energy: destruction of nature, health and climate, radioactive waste and incidents.

After 100 years discussing externalities, main stream economists still are unwilling and unable to internalize external costs in market prices.

And since the beginning of the Kyoto process, Parliaments were unable to do so in a harmonized way, and it would be wrong to wait for that.[1]

Graph 4 cost and pay-back-structure of renewables

[1] As a typical way to think about this question, a speech of former IEA-Director Helga Steeg from 1991 is usefull because IEA did not change its attitude much since: "[*Energy-]Prices that have been artificially set high through taxation to lower consumption can cause significant economic distress. Too high prices can increase unemployment, lower tax revenue, drain industrial investment and reduce overall quality of life and make it more difficult for society to meet environmental standards. They could also lower a nation's ability to invest in new technology and to create wealth - strengths essential to achieving sustainable development*."… "*Although great technological strides have been made in developing alternative energy resources, there is no question that fossil fuels will continue to dominate the world's energy mix through most of the 21st century.*" …"To be effective in reducing atmospheric greenhouse gas concentrations, a carbon tax would have to be significant and be applied to a base which is broader than the OECD countries. Even then, such a tax involves large macroeconomic costs and could distort trade. In addition, any system of taxes would have to be internationally harmonized. Even then it could change the competitive position of nations and thus lead to a less efficient use of the worlds resources." Regarding CO_2-problems, Steeg declared: "A significant contribution comes today from the use of nuclear power." The IEA never since changed its attitude. Cf. International Energy Agency (IEA) Briefing Notes on Carbon Taxes (by Helga Steeg) World Energy Forum Davos, Typoscript 1991

High upfront costs

Then there is a second economic misperception of renewables and efficiency.

These investments regularly have a high initial capital expenditure, and only later you enjoy the benefits like lower or no fuel costs, and low operation and maintenance expenditures.

Investments in renewables need deep pockets and access to capital and banks.

Even if you find capital you must expect an initial shortfall of income in the first years of heat or electricity generation.

The life expectancy of energy infrastructure such as solar, wind, hydro or geothermal normally goes far beyond the payback terms of three to seven years that you normally find in private companies and households.

And it also goes beyond the 15-20 years of investment calculations that you find in professional investment appraisals of power plant calculations.

The benefits of investments such as hydro dams or foundations/cabling for wind turbines might work for up to 40 or even 100 years.

After ten to twenty years or so, when depreciation has progressed and interest burdens are reduced, investments in renewables turn out to be cash cows, and some of them, like hydro plants in Switzerland, after 30, 40 or 60 years of operation, with generation costs less than 1-2 Euro-Cents/kWh, turn out to be real gold mines.

At the moment of investment though, these late benefits are not reflected in payback-plans. And it always remains an investment insecurity, in terms of market prices, costs and life expectancies of any new project and especially of new technologies.

3. 2004 – The Crucial Price Switch

Graph 5 the turning point – prices!

Now let's take a look at what happened those last two years. We have seen a turning point in energy prices.

All conventional energies suddenly turned out to get more expensive.

This could be seen in all primary energies: oil, gas, coal and uranium.

Construction of renewable appliances might remain, in a market framework, still a difficult task; the initial profitability is critical and the profits many times comes for the next generation only, in economic and environmental terms. But since 2004 and 2005, renewables look a lot better than ever before. And the cost of many of these technologies, namely wind power, geothermal, Photovoltaics and bio-mass, are coming down, driven by mass production and technical progress.

Every body in the energy business knows that, but not the mainstream media. The main stream media is talking about the "China factor". Demand went up, sharp price increases followed.

But this explanation is shortsighted. And it suggests a wait-and-see attitude to consumers. Wait a year or so, and everything will be as ever, we are told by the oil industry, with oil supply on the rise and renewables still called "too expensive".

Graph 6 US in the oil and gas trap

But the China factor was only one factor within a fundamental shift.

What we see today, and where international bodies are extremely hideous in reporting, is the shift from a buyer's market to a seller's market in the fossil fuel sector.

There is a peak in the oil and gas production visible in many parts of the world.

Take the US natural gas and oil case: It has nothing at all to do with China demand.

We clearly can identify:

- Steeper decline rates in new gas and oil fields
- Declining overall natural gas and oil output
- strong growth in drilling with ever deeper holes at higher costs, but
- Ever smaller fields found and ever smaller returns of energy per dollar invested.

Graph 7 Russia

Energy productivity of the fossil sector is diminishing, and for the first time in history and unlike in 1973, this is showing up in higher prices.

And this is not a US-story.

You find the same trend in Russia, more drilling and diminishing returns.

Graph 8 Opec Spare capacity

And OPEC nations have no spare capacity any more, they produce flat out, and the quality of additional production is worsening, leading to a call for additional refineries.

4. IEA, IAEA : stupid, manipulative or corrupt?

But what do Parliaments learn from that?

As a matter of fact, renewables are progressing fast, due to feed in tariffs or new standards in many countries. Photovoltaics, wind turbines, wood pellets and heat pumps are sold out for some time.

And higher prices for oil and gas create new majorities in Parliaments. And in elections like in Germany, where a conservative victory seemed to be for sure six months ago, a pro-renewables-majority stayed in place against a strong anti-renewables-lobby, led by main electricity multinationals.

Graph 9 Hulst, IEA Scenarios

But what did the advisers of IEA or elsewhere learn from the new oil price situation?

The message of IEA is: oil prices will come down and renewables won't make it.[2]

Renewables barely exist in the official agenda of IEA, you will not find a serious preview for wind power in the new World Energy Outlook 2005, and you find no reliable data on other renewables.

Even in the so called alternative case of the International Energy Agency renewables have no clear significance, and their status rests undefined at best.[3]

Graph 10 The looming crisis

As for consumers, there is another perspective: continued dependency on fossil fuels is getting expensive and dangerous in many ways.

A growing share of natural gas consumption for the coming years is unfound yet. The infrastructure and the imperial conflicts for expanding fossil fuel delivery from far away are expensive in terms of money, human lives and nature.

Graph 11 no joke any more

Prices are hurting private consumers and industries, and in the US a process of de-industrialization has begun, in Chemicals for example.

The blind belief that there is enough conventional energy is plain wrong, and soon it could bring cold winter nights.

Graph 12 IEA, EIA, IAEA, and USGS

Despite rising prices for fossil fuels, there is absolutely no willingness in the IEA or international bodies to understand renewables and the expectable advantages in their field.

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[2] This for example was exactly the message of IEA Expert Noé von Hulst in his September speech in Bern/Switzerland.

[3] cf. IEA: World Energy Outlook WEO 2005

As a member of the Swiss Parliament I would like to give you an example.

On 8 September 2003, the deputy director or the International Energy Agency, Mr. William Ramsay, was a guest in the Energy Committee in our capital.

Graph 13 The IEA view

The IEA-Country-Review for Switzerland denounced renewables as being expensive, it praised nuclear as the cheapest option, which evidently was not true, because the cost of accidents and the long term cost of radioactive waste were neglected, and hydro is much cheaper in Switzerland anyway.

Ramsay criticized that “renewables still get 40% of the Swiss Energy Budget” and he counseled Switzerland to reduce these contributions – (they are quite low though compared to our neighbors).

Insiders will not be surprised about this attitude.

Mr. Ramsay (of US origin) and the IEA boss of French origin, Mr. Claude Mandil, are the perfect couple for fossil and nuclear promotion, a main issue of IEA.

Graph 14 IEA methods to predict supply

A World record in wrong previews

There is no place for renewables in Paris. But the good news on this is: the IEA is a world champion in wrong previews, and their scenarios do not fit reality.

Let’s take a closer look at the World Energy Outlook (WEO), a bi-annual publication of IEA: The methodology of IEA for oil and oil price prediction was revealed in the 2002 edition of WEO, page 95:

“The oil supply projections of this Outlook are derived from aggregated projections of oil *demand*….

Opec conventional oil production is assumed to fill the gap.“[4]

In the 2005 WEO the3 methodology was slightly modified, leading to almost identical results, though.[5]

Graph 15 WEO 2005: quantities

The idea of IEA still is that you find any amount of oil in the Middle East, dependent only on investment cost, which will need to rise to 17 trillion $ from 2004-2030.

As usual the origin of reserves in the IEA preview is not clear.[6]

It seems that a growing part of resources are reserve additions in existing fields – a mechanism observed in the old fields of the US for book-keeping and tax reasons, but not in the fields of the Middle East.

And it seems that unconventional reserves are to be developed, the more pollution the better, one could think.[7]

Graph 16 IEA low prices for ever

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[4] World Energy Outlook 2002 p. 95

[5] WEO 2005 p. 144: *“The methodology for projecting oil production follows three steps:*
1. Production from currently producing fields is projected on the basis of each field’s current reserves, cumulative production to date, historical production trends, the age of the reservoir and current and expected future decline rates. Estimates of natural decline rates, based on published data and information obtained from oil service companies, vary from around 5% to 10% per year. This analysis takes into account and assesses all current and planned development projects. In general, the approach adopted is conservative about their impact on future production.
2. Production from fields awaiting development is projected on the basis of our assessment of official plans and forecasts, reserves, geography and technical factors.
3. Production from additions to reserves and new discoveries is then added. Production from additions to reserves is projected using a field-specific reserves-growth factor, based on the age and geological structure of known reservoirs, the amount of oil initially in place, the current recovery rate and historical trends in reserve additions. Where existing reserves are judged insufficient to meet future production and the potential for new discoveries is significant, production from new discoveries is projected on the basis of USGS data (mean values) on undiscovered resources and estimated development costs.
The final results were calibrated to the results of the top-down calculation of the call on MENA supply – the difference between world oil demand and non-MENA oil supply.

[6] The key is that a growing proportion of reserve additions are in *the proven undeveloped category*. In plain language, Proved Undeveloped Reserves (PUD) mean discovered reserves which are not included for financial purposes. They have been the mechanism used for under-reporting the size of discovery and thereby achieving impressive “reserve growth”, which misled the USGS in its 2000 Study. In short, the companies have been far from replacing their reserves by new discovery, and have had to resort to these book-keeping adjustments to maintain the illusion. Those days are fast coming to an end, which explains why the industry is belatedly coming to admit to depletion of not only reserves but of prospects too. ExxonMobil has confessed to peak world discovery in 1964; and now Total in its advertising admits that the resource is not infinite, emphasising how all of its special skills will be called on to produce what is left. Cf. Aspo Newsletter No.32, August 2003, p.3

[7] Cf. Robert Priddle and Fatih Birol(IEA): “IEA chief says energy security favors unconventional resources”, Oil & Gas Journal, Nov. 26 2002

One could mean that the necessary high investments would lead to higher prices in the oil sector. But not so in the IEA perspective.

Despite high investments, oil prices are expected to follow a deep fall, soon, and to stay low for decades,

So we are told in the 2005 outlook:

Oil at 35 $ a barrrel and gas at 6$ MBtu.

But how much of this is factual? Despite a steep rise of oil prices, the IEA oil and renewables projections in 2005 are almost the same as in former years

Graph 17 Differences WEO 2004/2005

The IEA omits the crucial questions:

- **How much will the prices rise in case that oil has peaked and you will not find more than now or maybe less?**
- **How much must they rise to stabilize or destruct demand?**
- **What efficiency technologies will emerge if oil rises above 100 $ as predicted in a Goldman Sachs report?**
- **And what renewable technology will be a good bargain with such prices?**

Graph 18 oil and gas prices - reality

Prices are different from what IEA reports. Oil is around 60 $ a barrel and natural gas tends to follow oil, as can be seen every day in the US and in Europe.

The IEA reports are similar to the Sowjet planning fulfillment reports, and this reminds me the famous sentence by Michail Gorbatchev:

“The numbers were always good”.

Yes IEA numbers sound good, but it is fantasy!

IEA is making up things which do not exist, and like in the Sowjet Union, people might starve if they do not act, investing in efficiency and renewables for example.

You find everything and nothing in the foggy IEA report, you might even find renewables. But the report is confusing and contradictory and the main objective seems to prove that the future will be a repetition of the past.

Graph 19 the Hubbert curve

It is difficult for IEA to accept the obvious, that most of the World's oil has been found.

IEA tries instead to blame the oil companies and producing countries with large reserves for not trying hard enough.

But the real source of the IEA fantasy is not in Paris, it is in Washington, with reference to the US Geological Survey (USGS).

There is a long history of overestimation of fossil resources which started with the Hubbert/Zapp debate in 1948.

Zapp from USGS estimated total US oil reserves of about 590 billion bbl when in reality it is something like 230 billion bbl.

They developed the idea of oil found per foot of drilling, and this was the basis for all high estimates on oil reserves until the mid-1970s when US production deteriorated.[8]

Graph 20 the mother of invention

Today the USGS predictions again are plain wrong, but in the Bush Cabinet, every minister is an oil minister, and re-newables do not exist, except for fun or for image.

If you go back only three years and look at the US price predictions, you can see how wrong they are.

The high price scenario in 2001 was at 25 to 29 $/barrel, but meanwhile we are at 58-70$.

Graph 21 no depletion visible

In the EIA perspective there is no decline of reserves visible – in no region of the world.

[8] Cf. ENERGY AND RESOURCE QUALITY, by Charles A.S. Hall, Cutler J. Cleveland, Robert Kaufmann, Univ Pr Colorado, 1992; http://dieoff.com/page197.htm; **http://www.amazon.com/exec/obidos/ASIN/0471087904**

Graph 22 IEA predictions

The same for IEA: It is predicting ever growing consumption and growing supply thanks to OPEC and the Persian Gulf.

To compensate the declining regions (blue area in the Graph) and regions which will fall in decline soon (yellow area in the graph) and to grow supply along growing demand (triangle on top within the red Opec production area), you need six new Saudi Arabias to satisfy overall demand!

Where will you find these six new Saudi Arabias??

Meanwhile the fantasy of these Paris based oil reserves is contested by renown analysts such as Colin Campbell (ASPO), Kenneth Deffeyes (Princeton) or Matthew Simmons (Houston).[9] They all criticize IEA previews since 1998 at least.[10]

Graph 23 British oil - the perception of IEA

But IEA is totally unwilling to learn, to give transparency or to adopt tested methods of oil reserve and price assumptions.

Take the case of British Oil production.[11] Since the mid 90es a lot of people in the oil business saw the decline of British oil coming.

But still in 2001 the US-Energy Information Agency projected a peak in North Sea Production at 6 Million barrel a day, and stable continued production on this level (red line in graph 23).

Since 1999 the British oil production began to decline, and meanwhile the reduction stands at minus 37% since the peak (yellow line in the graph).

[9] **http://www.peakoil.net/**

[10] Since the famous contribution by Colin J. Campbell and Jean H. Laherrère: The end of cheap oil", Scientific American March 1998

[11] The US Energy Information Agency wrote in its International Energy Outlook 2001 (p. 36)
"In the IEO2001 forecast, North Sea production reaches a peak in 2006, at almost 6.6 million barrels per day. Production from Norway, Western Europe's largest producer, is expected to peak at about 3.7 million barrels per day in 2004 and then gradually decline to about 3.1 million barrels per day by the end of the forecast period with the maturing of some of its larger and older fields. The United Kingdom is expected to produce about 3.1 million barrels per day by the middle of this decade, followed by a decline to 2.7 million barrels per day by 2020." In August 2005, British production stood at 1.392 MBd and Norwegian production stood at 2.643, which results in a combined 4.03 MBd, This is some 33% less than the peak number, predicted in the IEO2001 by EIA.

It is evident that wind power in Britain could make up for half of the energy consumption or more, when you have a well done framework with feed in tariffs, and a reasonable planning process including grid management and storage.

But this is not the thinking of IEA. They counseled the UK not to adopt feed in tariffs but a quota system instead. This system gives only reduced financial security for wind investments and makes it very difficult to develop second best sites or offshore sites, without heavy subsidies.

The main recipe seems to be more investment in the Middle East and North Africa area, which could mean: more wars in Iraq and else (Mid-East oil reserve inventories are exactly the subject of WEO 2005), to drill more anywhere in the world and to advance nuclear power, an issue recommended by the IEA for Spain too, for example, where a prospering wind industry is moving fast ahead but completely ignored by IEA, and to many other nations.

Graph 24
IEA view: Renewable Electricity as a permanent failure

The objective of this wrong reserve reporting and wrong price prediction is obvious:

- Parliaments and investors should be distracted from renewables as long as possible.
- The supposed low (and stable) oil and gas prices, and prices not corrected by externalities, renewables should stay in the cost trap for ever, they cannot advance and will not get cheaper than conventional energies.
- Only wind power in some best sites might be competitive with gas, this is the IEA message.

Graph 25 Electricity Generation: real world prices and dynamic costs

But watch this graph, that shows the cost of renewables, illustrated by the successful German feed in tariffs, and the price of gas based generation, with two changes of assumptions:

- We take the real natural gas price at 11 $/MBtu
- We suppose that this price will rise, following the oil price, as gas prices do now all over the world.

And you find out that all renewables are competitive or become competitive in the foreseeable future.

Graph 26 Electricity Generation: real world prices and dynamic costs, Photovoltaics included

In this graph, solar energy is included. With our assumptions, based on *real* prices, even photovoltaics are economic by 2025, compared to gas, and with net metering of solar production.

5. The case of global wind power

Fortunately – and this is the second good news – IEA is not only plain wrong on fossil fuel prices, but on renewables too. Let me show this for the case of wind power.[12]

Graph 27 Wind Energy: IEA Outlook and reality

In 1998 wind power stood at 10.2 GW after strong double digit growth for ten years.

At that time the prediction of IEA world energy outlook was for some 42 GW in 2020.

Graph 28 Wind Energy: IEA Outlook and reality

Then Greenpeace published its wind force 10 with 10% share of wind power in 2020.

In 1999 and 2000 wind power expanded at more than 30%.

Graph 29 Wind Energy: IEA Outlook and reality

In 2002 the IEA adopted a more favorable vision of wind energy with 100 GW in 2020.

Graph 30 Wind Energy: IEA Outlook and reality

[12] My thanks go to Werner Zittel, LBST, for these graphs and sources

But meanwhile the real development of wind power exceeded all predictions, even the one predicted by Greenpeace.

Wind power will reach 80 GW or one percent of electricity generation in 2007 most probably which will produce 1 percent of world electricity.

Graph 31 Expected Capacity (GW Wind Power) 1998-2030 in different market scenarios

IEA later again adjusted its wind power assessment.

in 2004 they predicted 206 GW in 2020. But meanwhile more and well known consulting firms have raised their predictions:

- BTM consult predicts 114 GW by 2010, 275 GW by 2014 and more than 1000 GW by 2025
- Greenpeace too has adjusted to 1250 GW in 2020.
- The 45 GW predicted by IEA for 2020 in 1998 were passed last year. Turbines in 2005 are practically sold out until 2008.

Looking back, the 1998 forecast of IEA was wrong by a factor of twenty.

But also wind industry insiders like BTM were normally wrong by 40-45%, they estimated wind power *too small* in their earlier predictions. Greenpeace only had a more or less realist view.

We have to ask for the reasons and the conclusion of this.

We find out:

- Renewable costs today are competitive in many aspects. Investment costs of wind power are lower than nuclear and there is no cost risk for the primary energy, because wind is free, and the same with solar and geothermal. This is a very interesting point for private investors.
- Insiders in the industry start to realize these facts and they invest. And IEA adapts behind, too little, too late.
- The prospects of renewables look good. Why is IEA ignoring permanently the cost situation and the positive prospects of renewables?

Governments and Parliaments are fundamentally misguided by advice of IEA.

The unwillingness and the foggy attitude of this organization toward clean, least cost energies of now and of the future is Mafia like.

Studying these reports, you ask the question, for whom they work – for the tax payers who pay them or for the oil and nuclear lobbies, like a criminal network?

6. Conclusions

We need to do a range of things to change this.

Renewable technologies are moving forward.

Governments urgently need a framework within which they can work.

We need better energy statistics and reserve analysis instead of data manipulation from Paris and Washington.

This can only be done by a truly independent international body. We have stop the permanent negative influence of the nuclear and fossil lobby, incorporated in IEA and IAEA.

The new German coalition government wants IRENA – the International Renewable Energy Agency to be founded at last, and Herrmann Scheer and the SPD deserve a name in World history for that.

What could be the task of IRENA?

Graph 32 IRENA duties

1. reliable data on reserves of non-renewables
2. Develop market structures for renewables which work
   - Feed in tariffs
   - Best practice transmission tariffs
3. Measuring potentials of renewables.

Graph 33 world wind potential
Graph 34 IRENA duties

4. Redirect funding

- There is enough research money in the system!
- Stop funding nuclear and fossil research
- Stop subsidies for non renewable infrastructure
- Internalize external costs of conventional energy

5. Technology transfer

- Local assessments
- We need a better grid

Graph 35 HVDC grids Graph 36 IRENA duties

6. Diversity for security

- We need all renewables
- We need offshore too!

And we have to speak out in a language that every one understands, in terms of energy.

Graph 37 Southern North sea Graph 38 Wind Power now at 20-60 €/Barrel

Parlamentarians and the Energy Conflict

How to create majorities
in a hostile environment

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Downloads:
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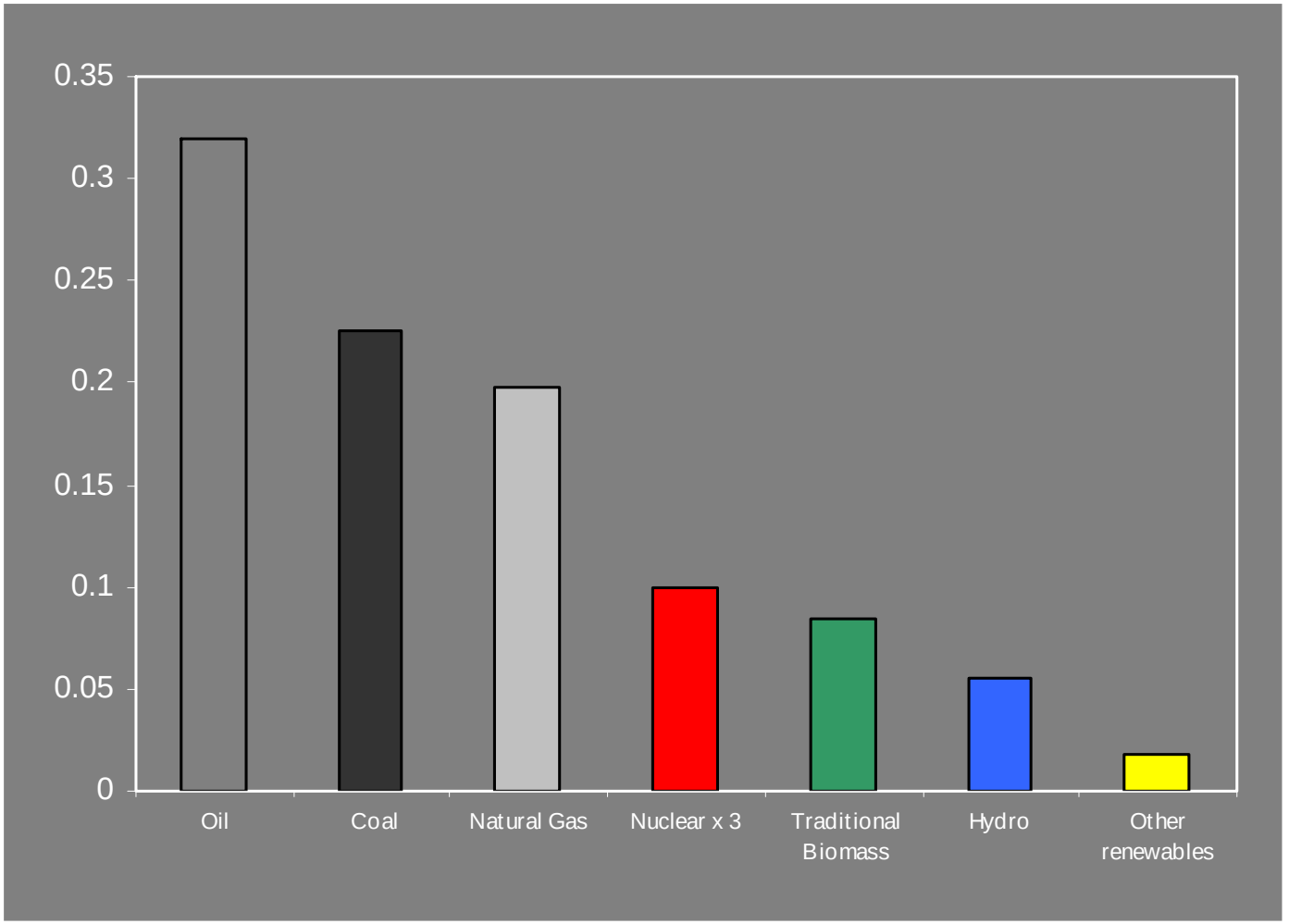
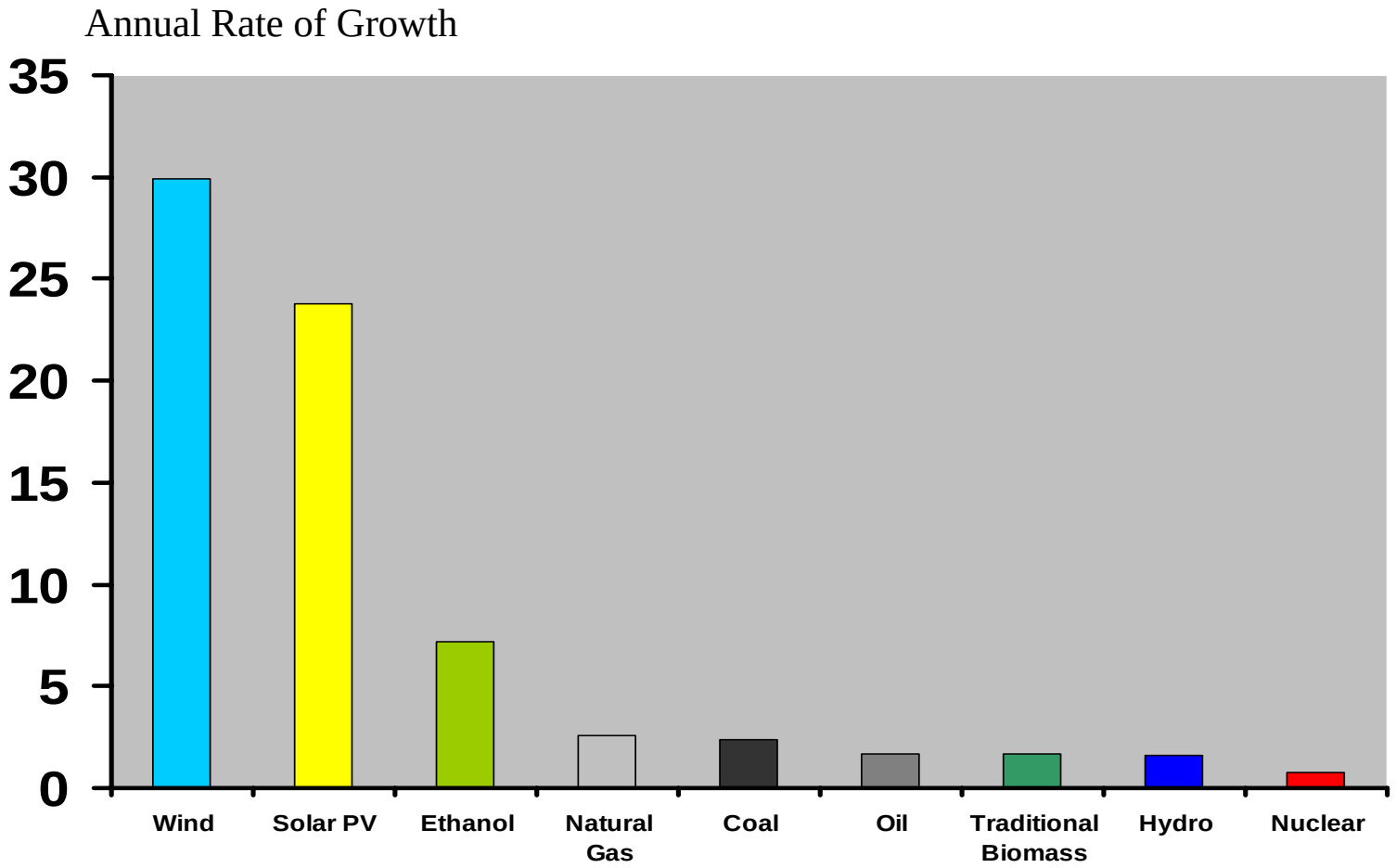
World Energy Use
(%) 2003



Source: IEA, Martinot / Worldwatch

World Energy Growth

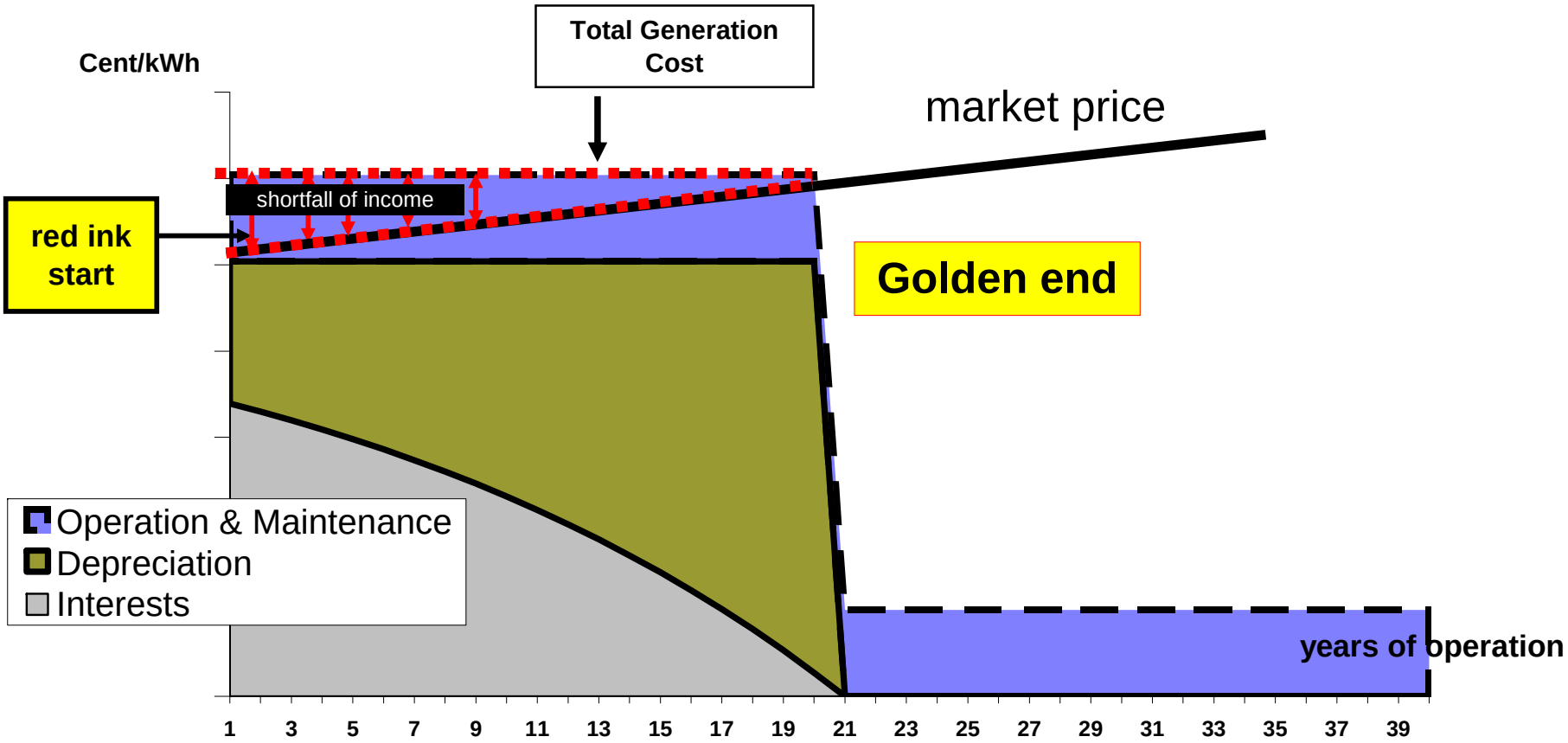
1994-2004



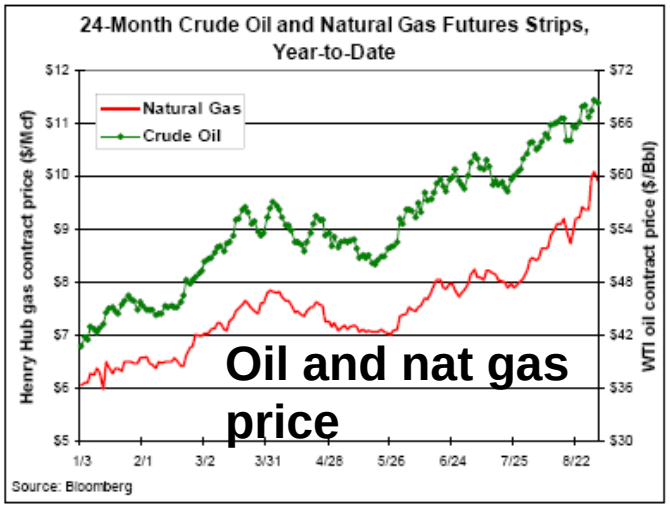
Source: Worldwatch Institute

Cost- and pay-back-structure of renewables

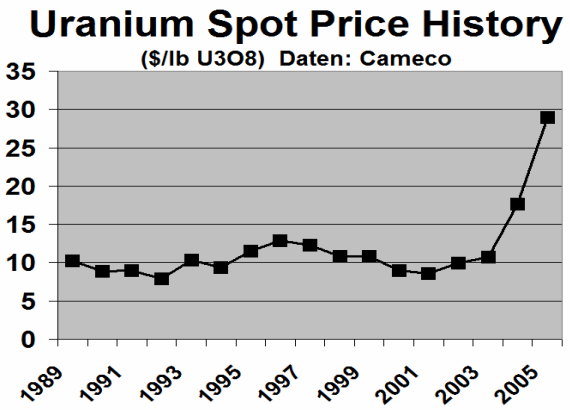
High initial capital cost, low fuel,O&M-costs bring inital income shortfall and golden end



The turning point: all energies more expensive – except renewables!



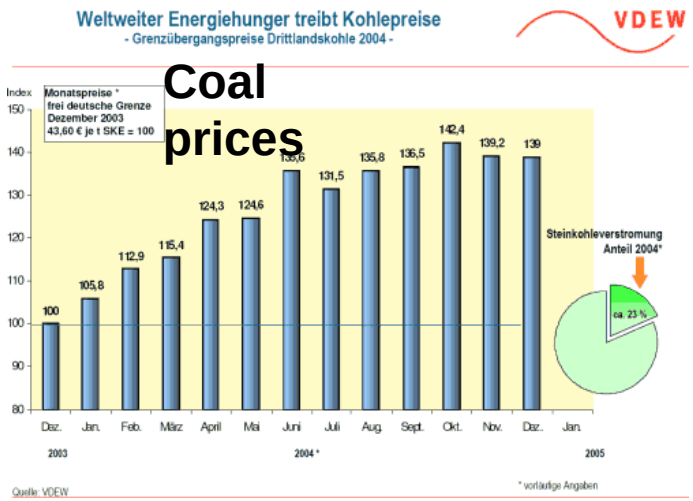
Oil and nat gas price



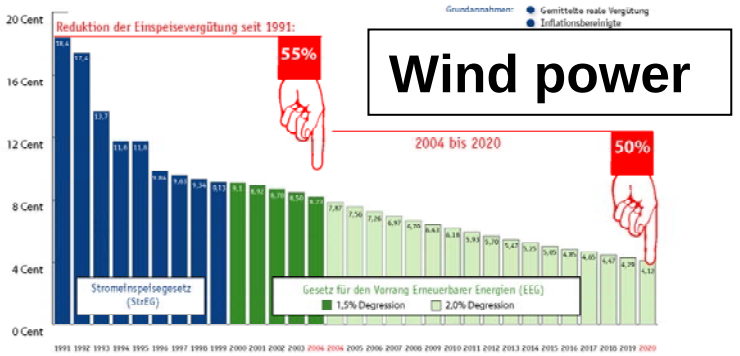
Uranium

U_3O_3

Wind Power feed-in tariffs:
55%-reduction and another 50% expected

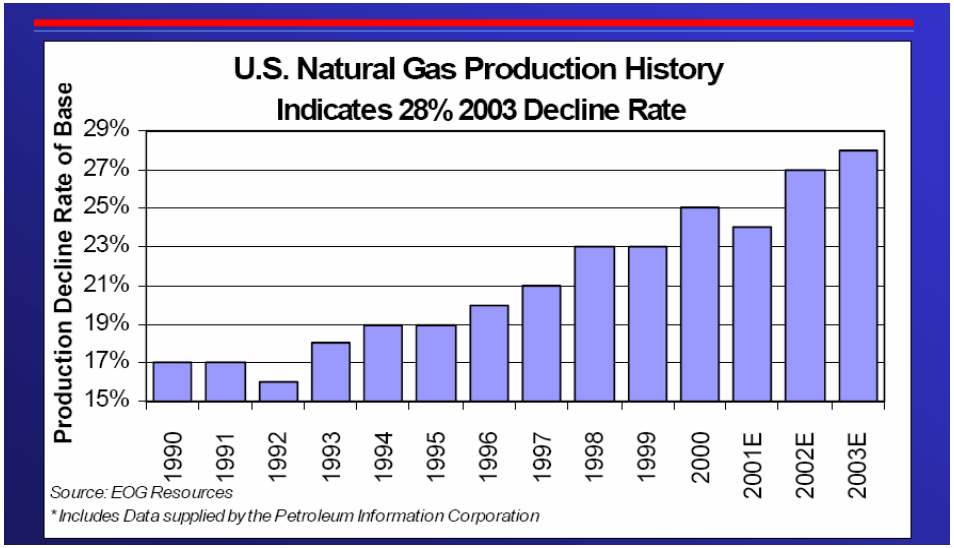


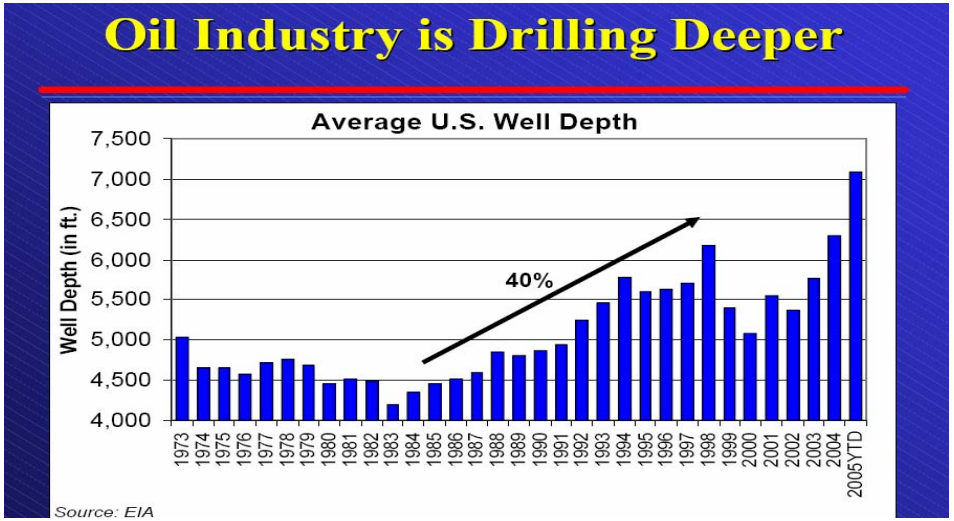
Coal prices

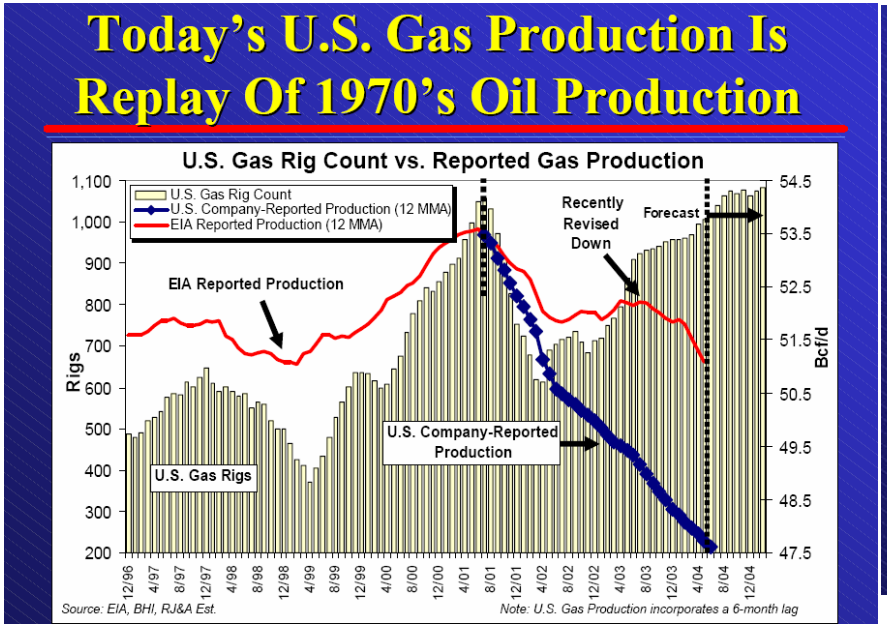


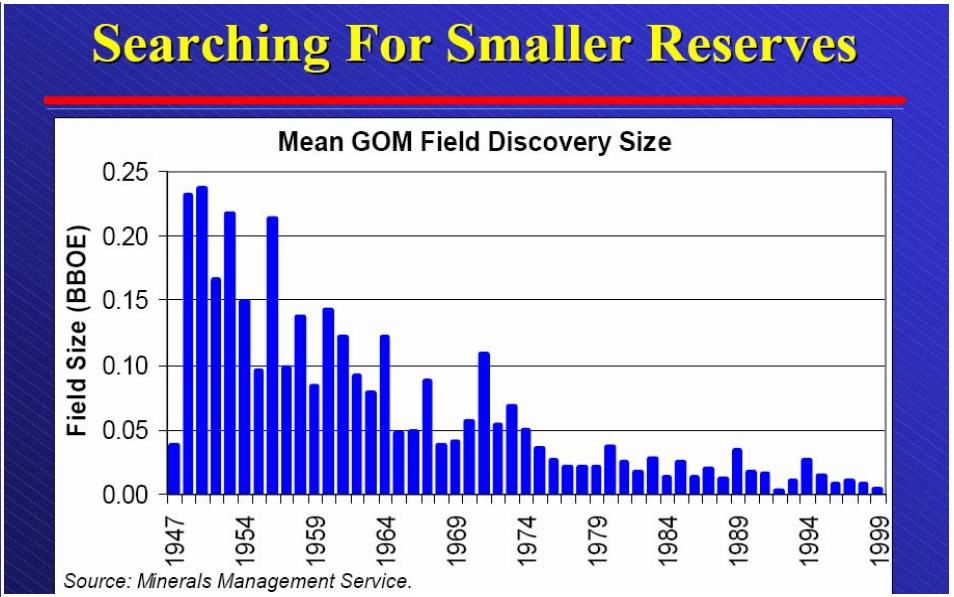
Wind power

US in the Oil and Gas Trap

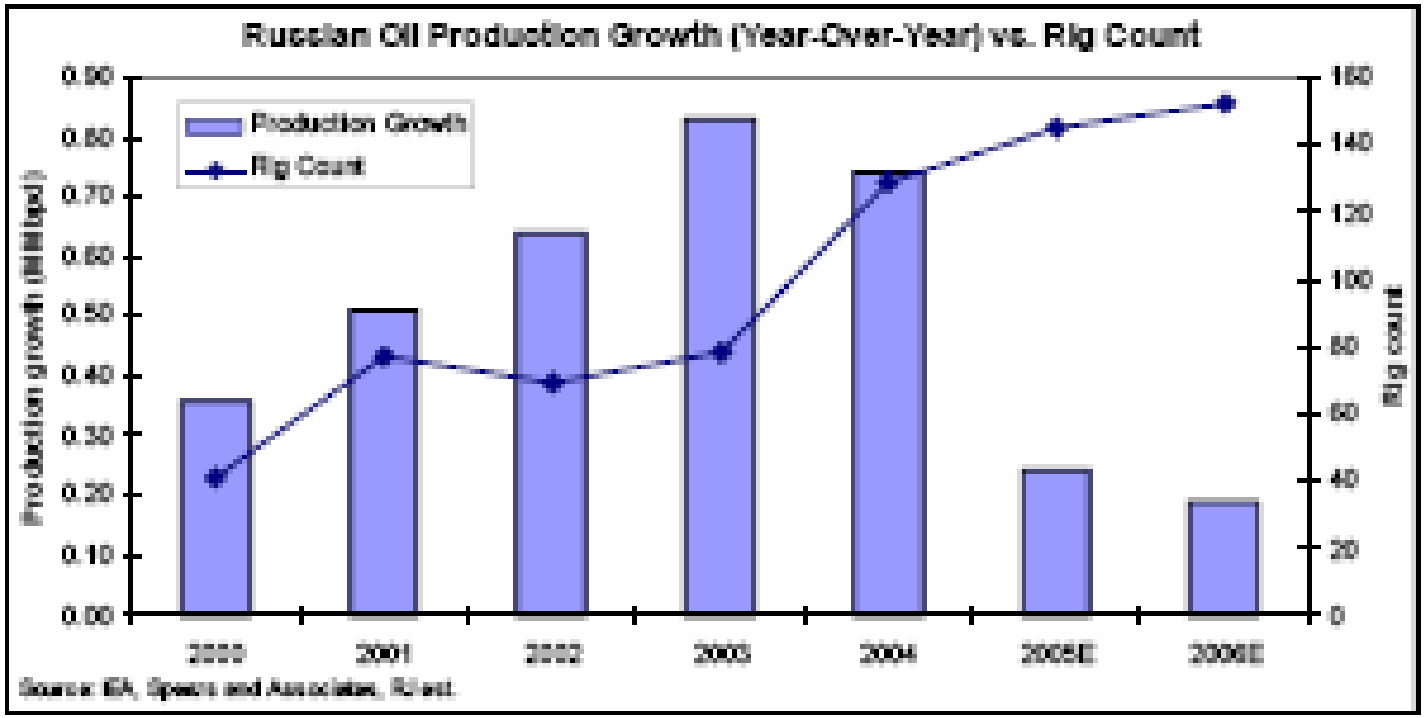






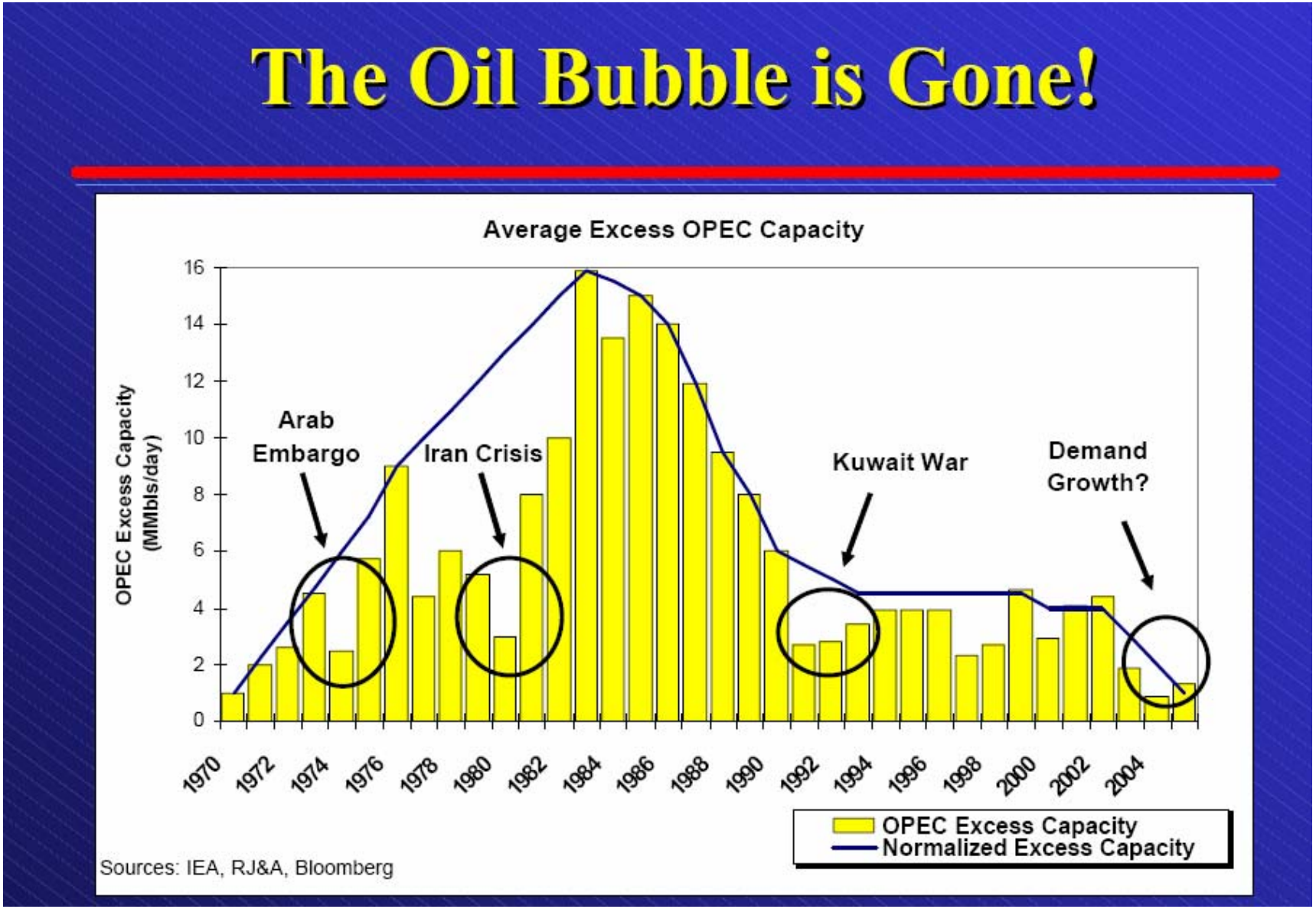


The Case of Russia



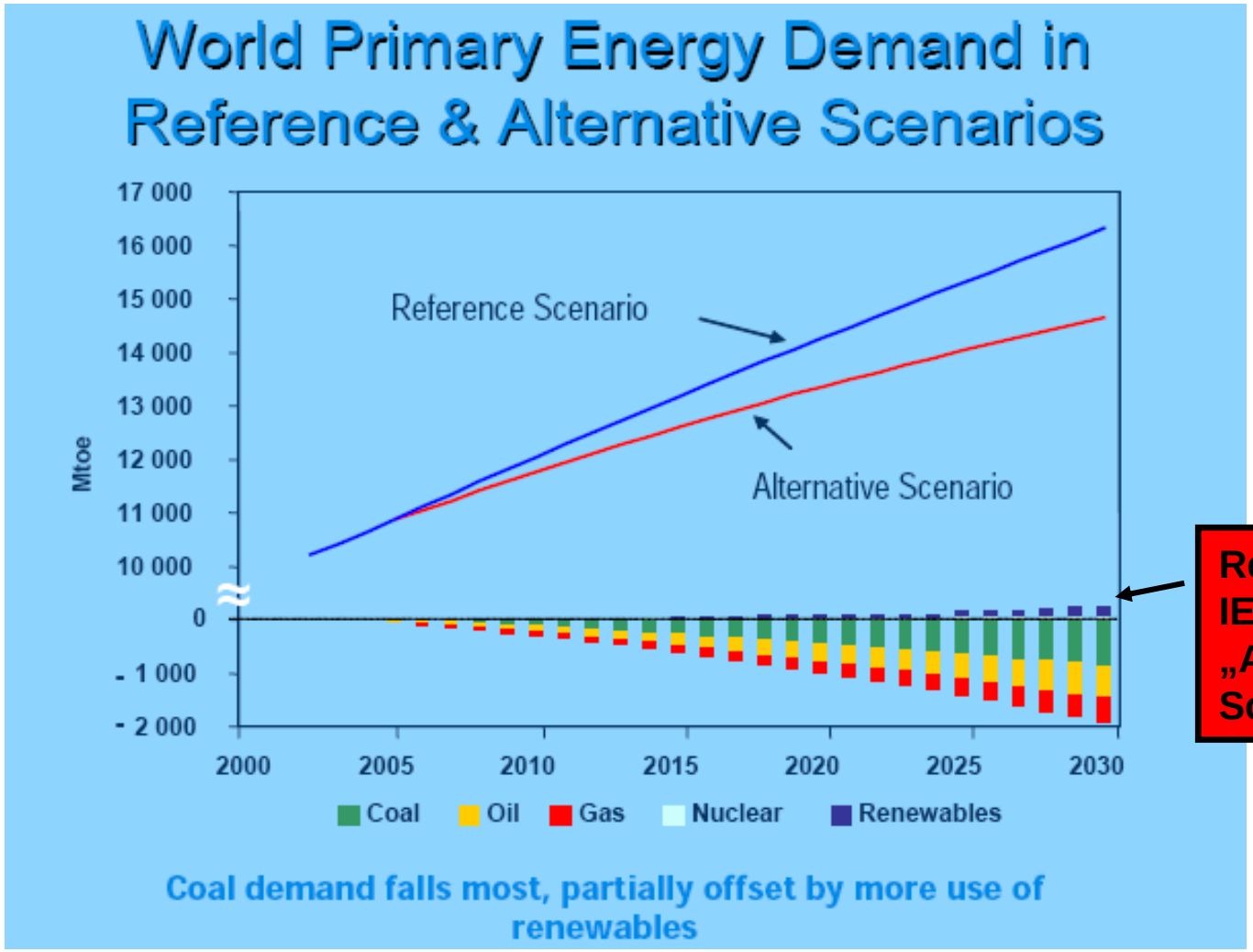
Source: Raymond James

Opec Spare Capacity 1970-2005



The perception of International Energy Agency IEA

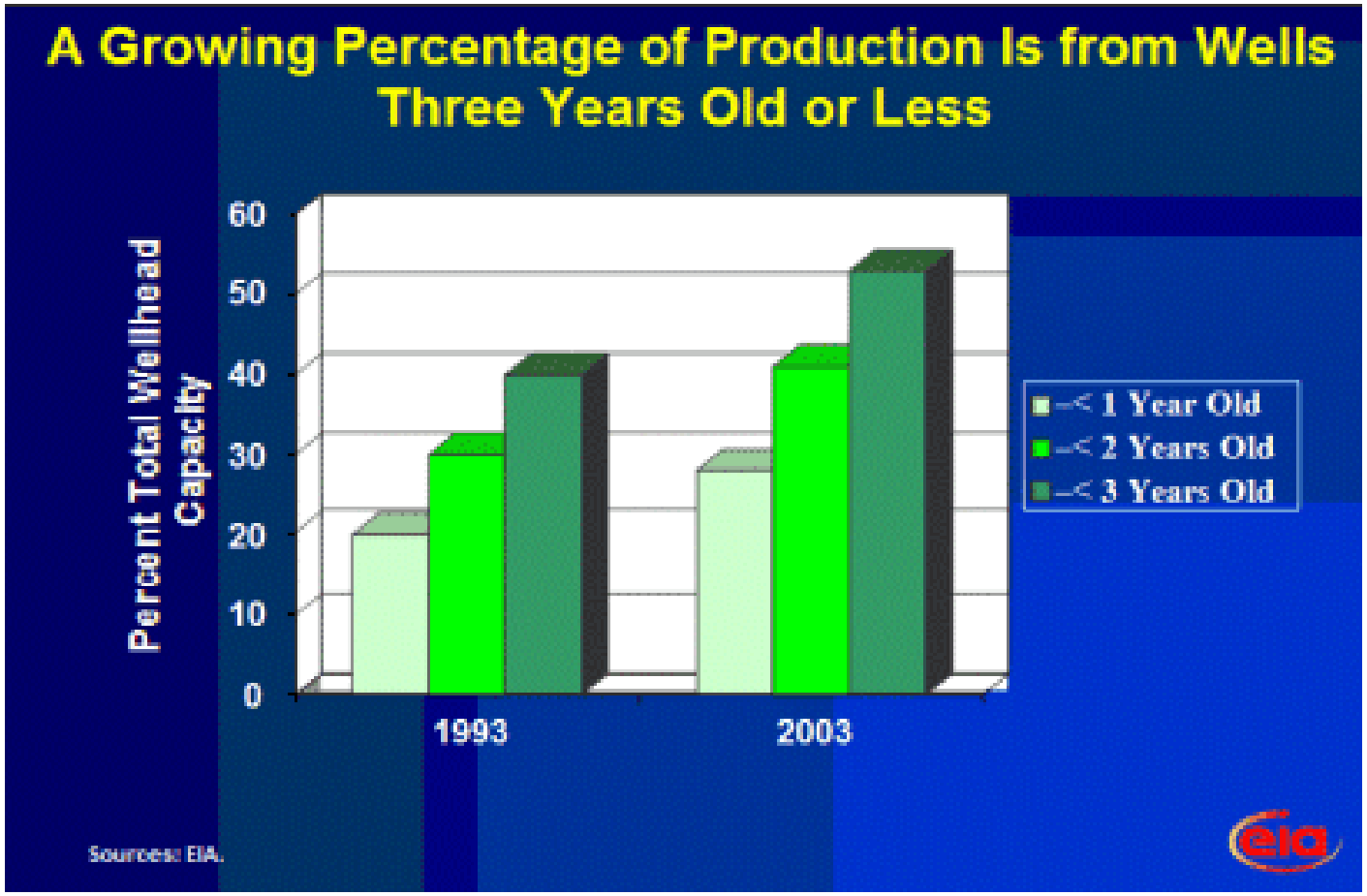
source: IEA (Noé van Hulst), Security of Supply and Climate Change
Challenges for National and International Energy Policy, Bern presentation 29.9.2005



Renewables in the IEA-Perspective: „Alternative Scenario“

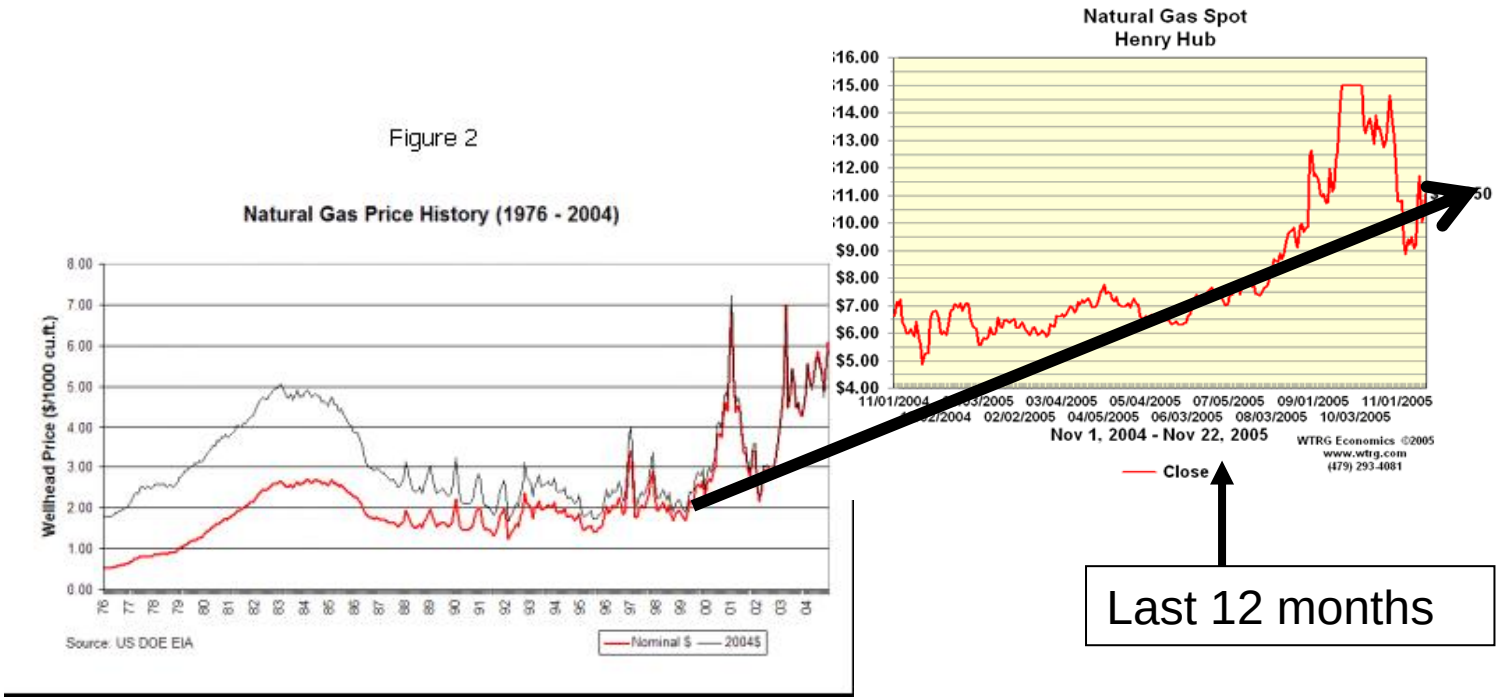
The Looming Crisis: US nat gas

Figure 6



No joke any more: impact on prices

US natural gas prices
Last 6 years
+ 500 percent!

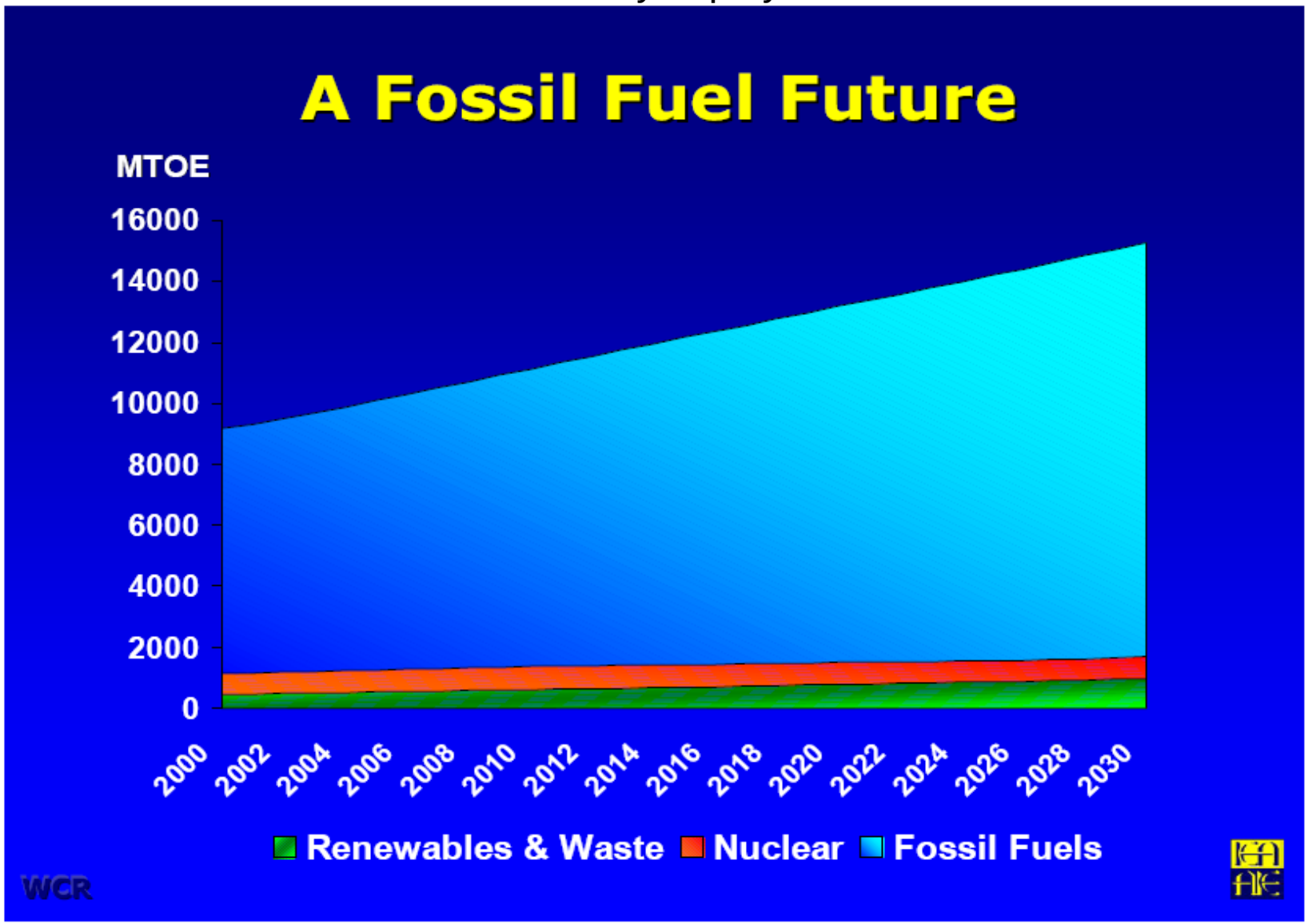


Wrong advice from these international advisers:

- IEA International Energy Agency (IEA)
  - Intergovernmental organization for fossil fuels
- EIA Energy Information Agency (EIA)
  - Part of the US-Department of Energy (DOE)
- USGS U.S. Geological Survey
  - Scientific information on resources/geology
- IAEA International Atomic Energy Agency
  - Founded in 1957 Promotion of Nuclear Power

The IEA view

source: William Ramsay deputy director IEA 2003



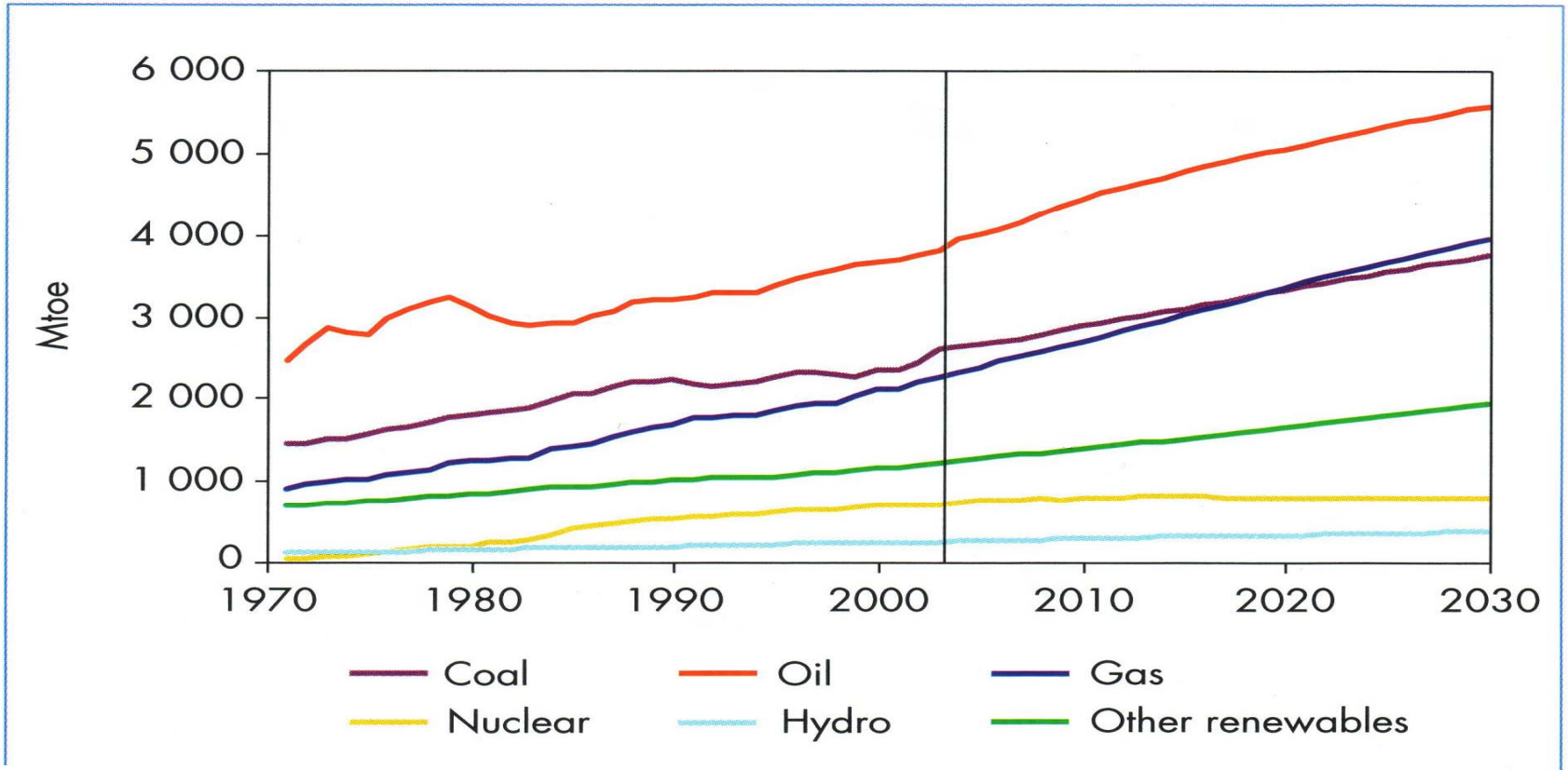
IEA method of supply prediction: ***predict demand!***

*„The **oil supply projections** of this Outlook are **derived from aggregated projections of oil demand**…. Opec conventional oil production is assumed to fill the gap.“*

World Energy Outlook 2002 p. 95

IEA World Energy Outlook 2005:
fossil fuel as an endless, renewable energy

Figure 2.1: **World Primary Energy Demand by Fuel in the Reference Scenario**



World Energy Outlook 2005, p. 81

….at low prices for ever: oil at 35 $ and natural gas at 5-6 $ MBtu !!

Figure 1.3: **Average IEA Crude Oil Import Price in the Reference Scenario**

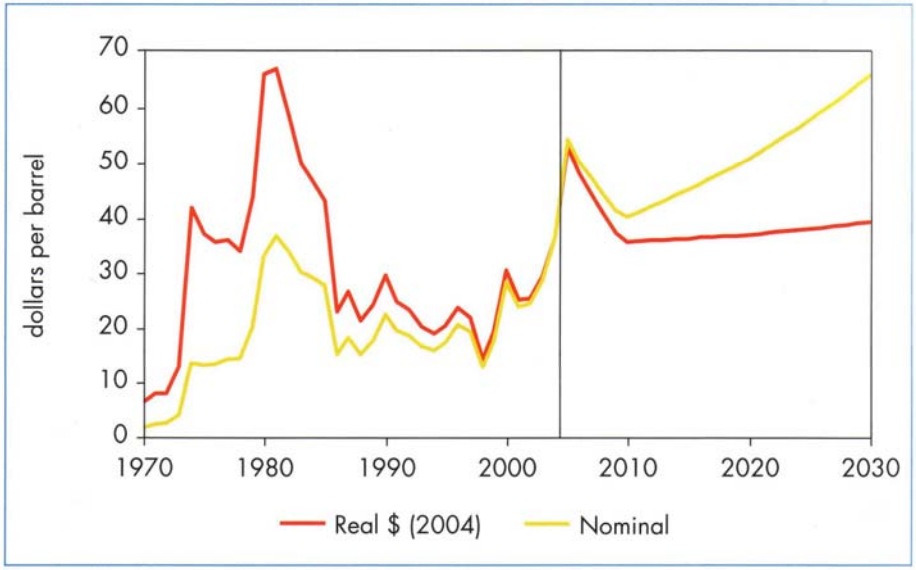
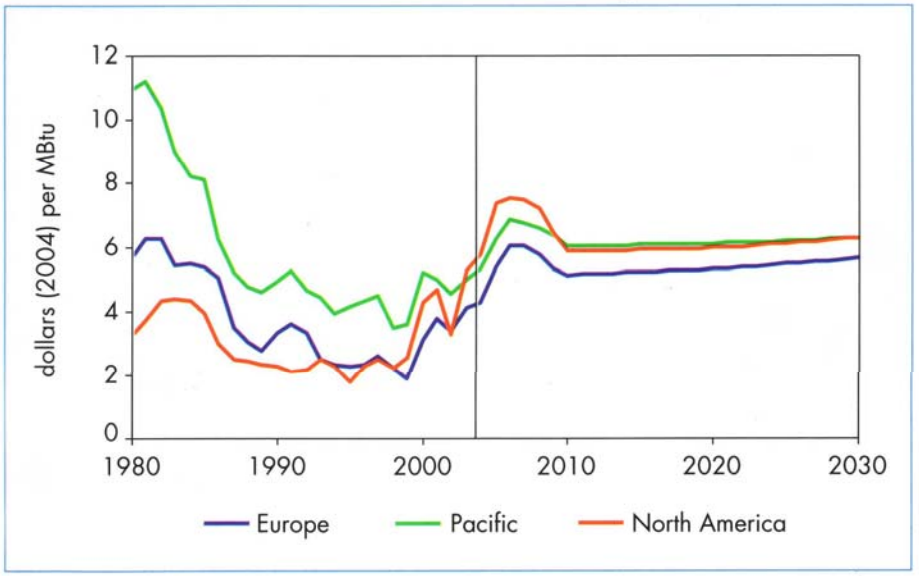


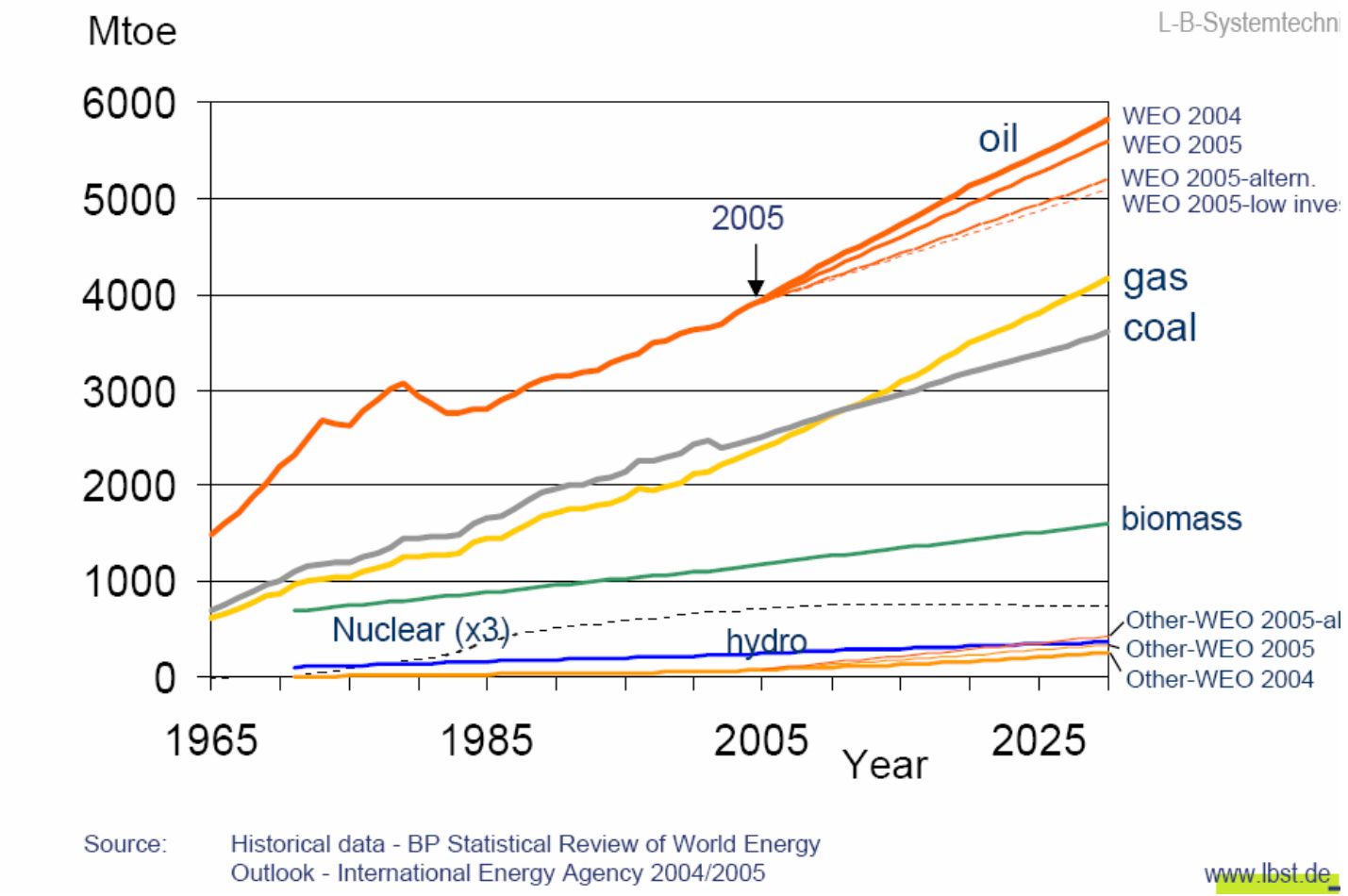
Figure 1.4: **Natural Gas Price Assumptions**



Source: IEA World Energy Outlook 2005, p.65 and p. 66

Despite rising prices of fossil fuels prospects of renewables unchanged

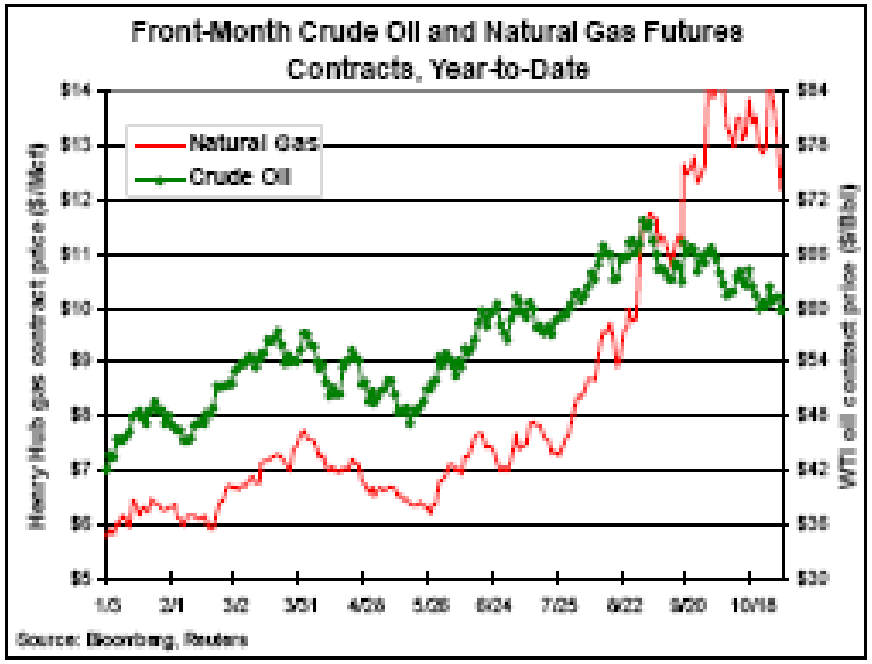
Graph by Werner Zittel

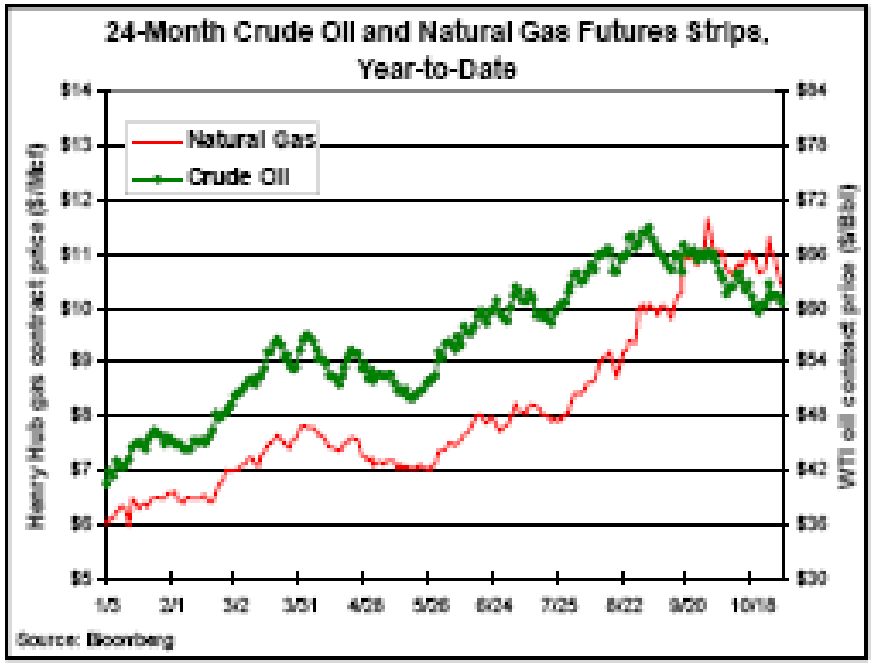


Reality is different !

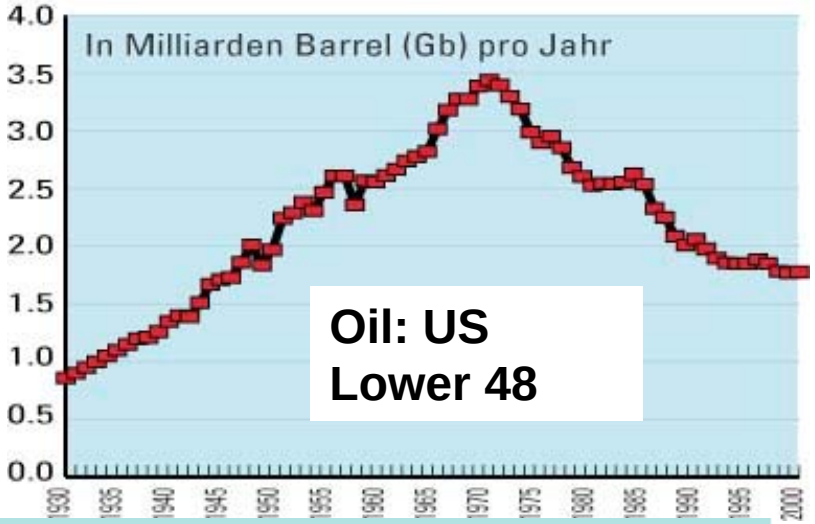
Real Prices (futures, 11/05):

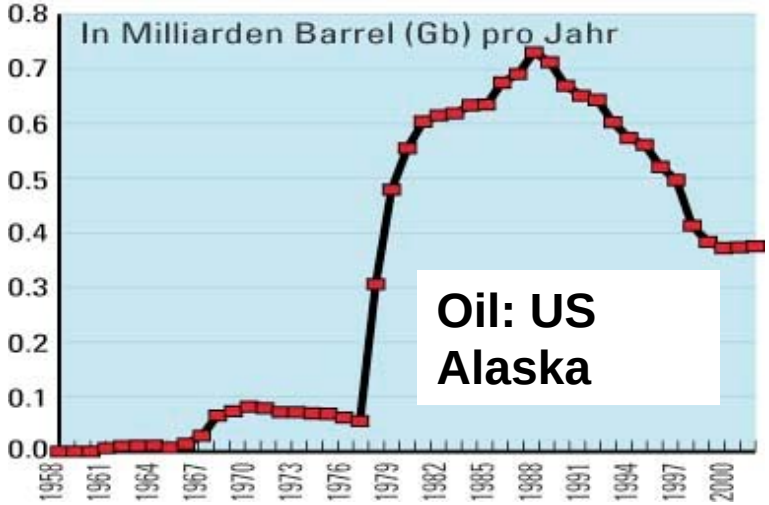
oil at 60$/b, natural gas at 11-14 $/MBtu

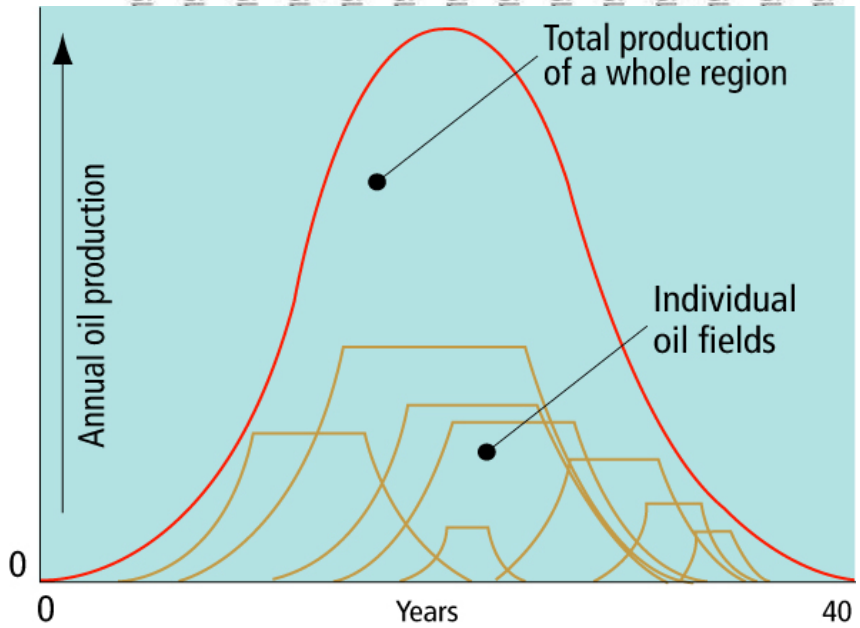


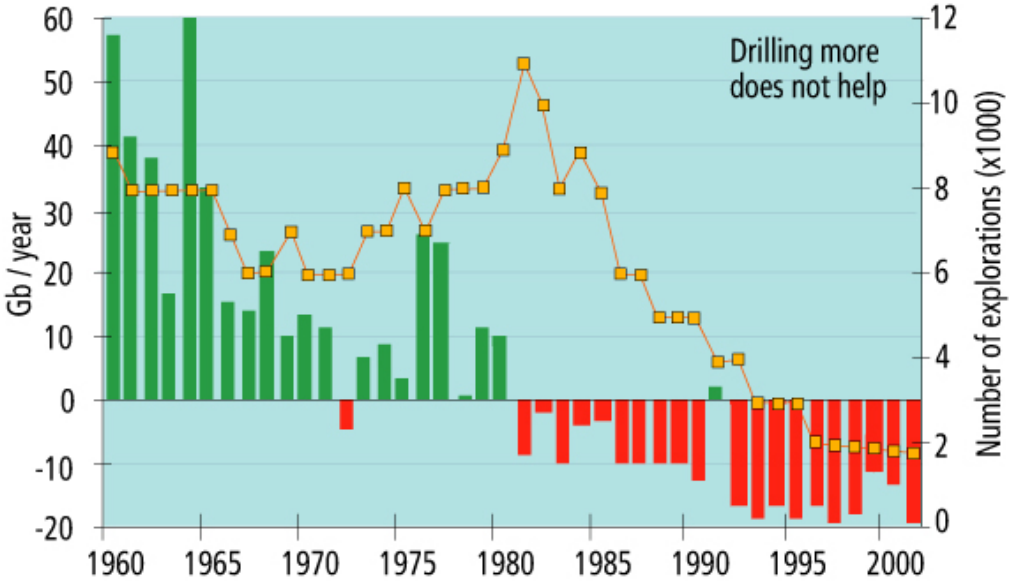


The Hubbert curve – a disliked reality









The mother of invention: USGS and EIA

EIA: Energy Information Agency, US-DOE

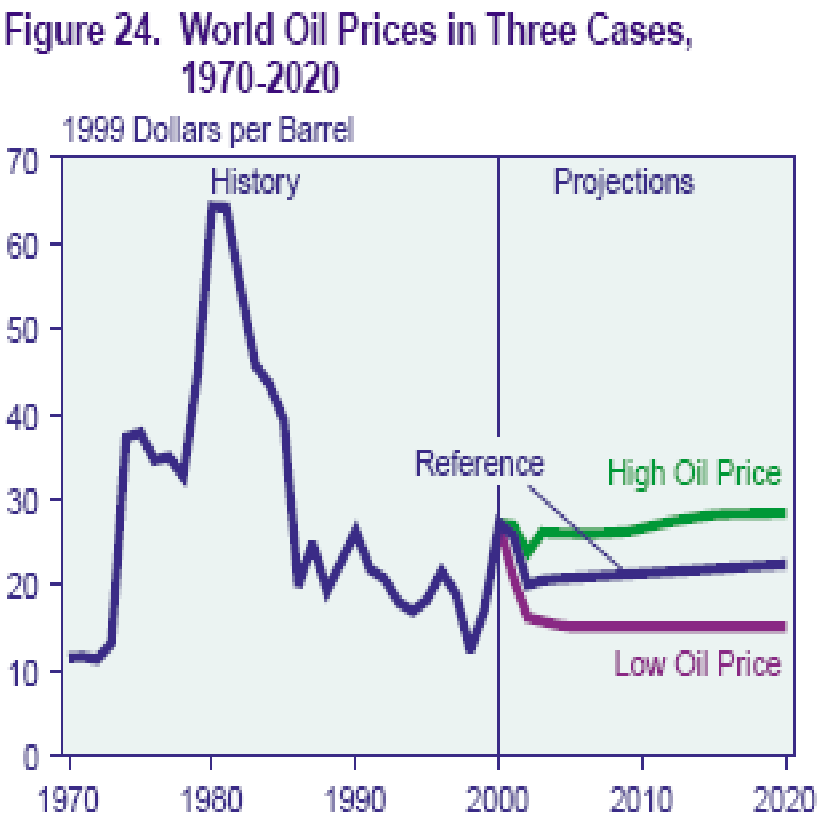
2001 Price Forecast

Source

"International Energy Outlook 2001 March 2001

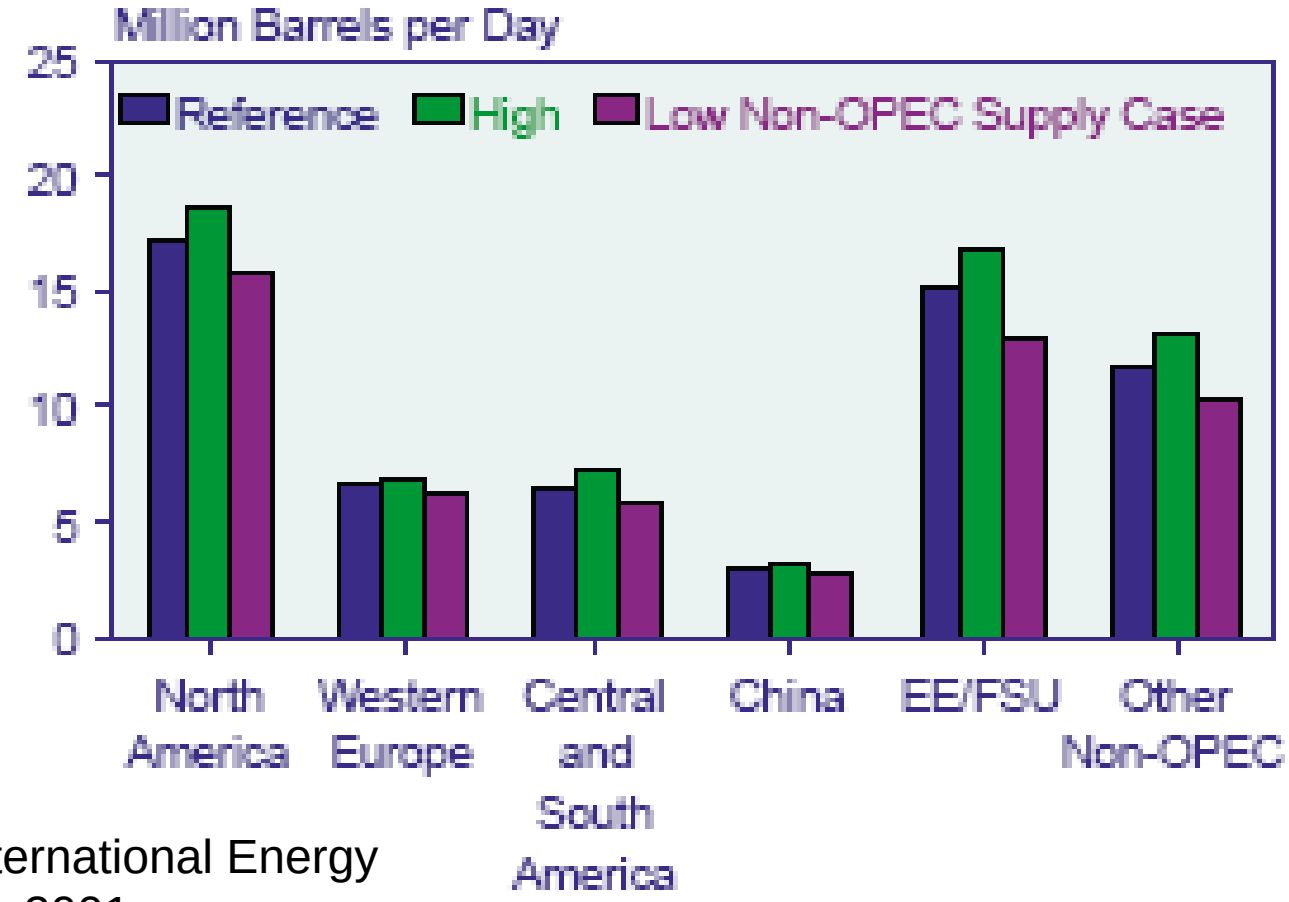
Energy Information Administration, Office of Integrated Analysis and Forecasting, U.S. Department of Energy Washington, DC 20585

This report was prepared by the Energy Information Administration, the independent statistical and analytical agency within the Department of Energy."



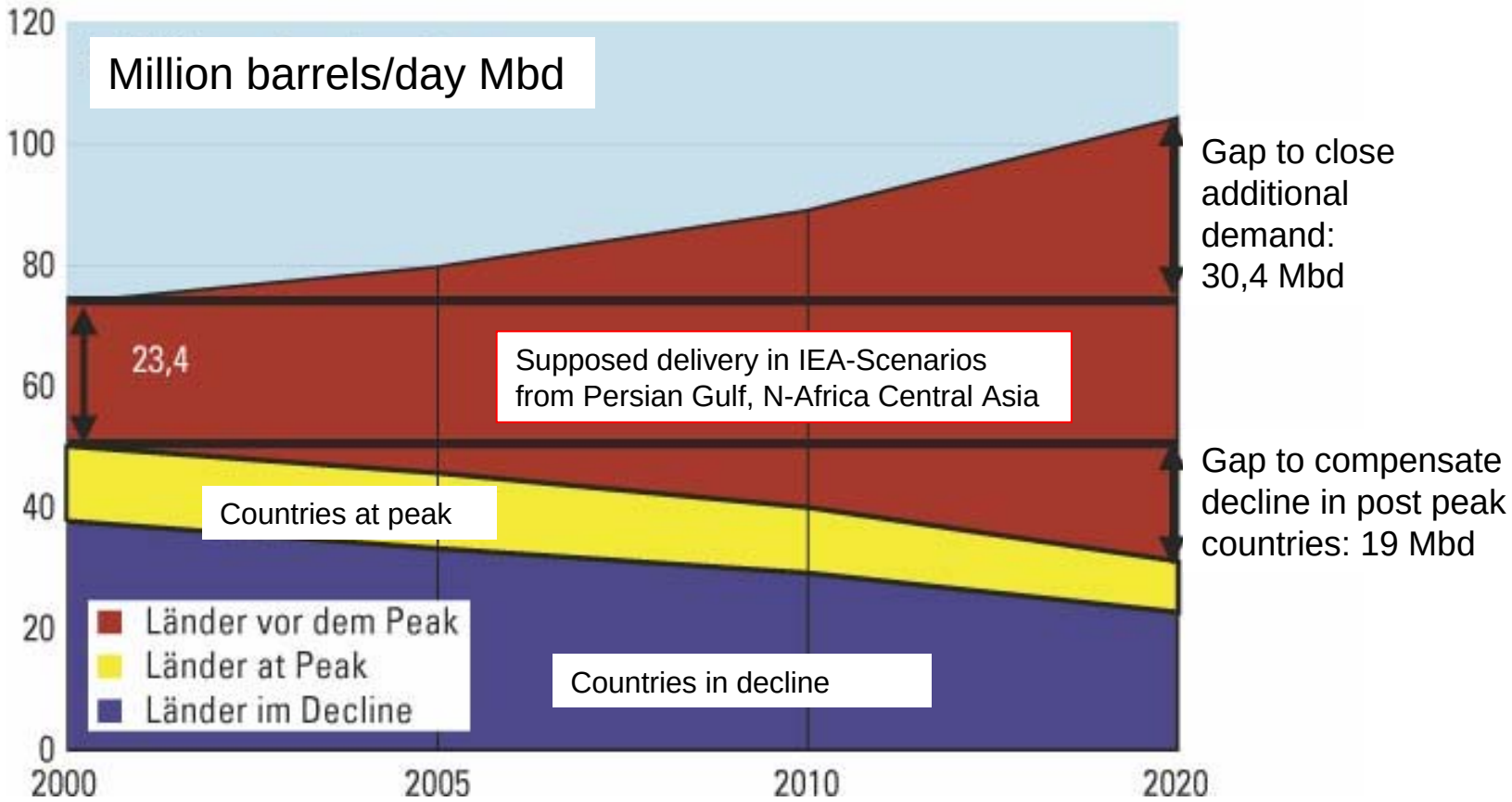
No depletion of oil visible at USGS: oil as a renewable resource

Figure 36. Non-OPEC Oil Production by Region in Three Cases, 2020



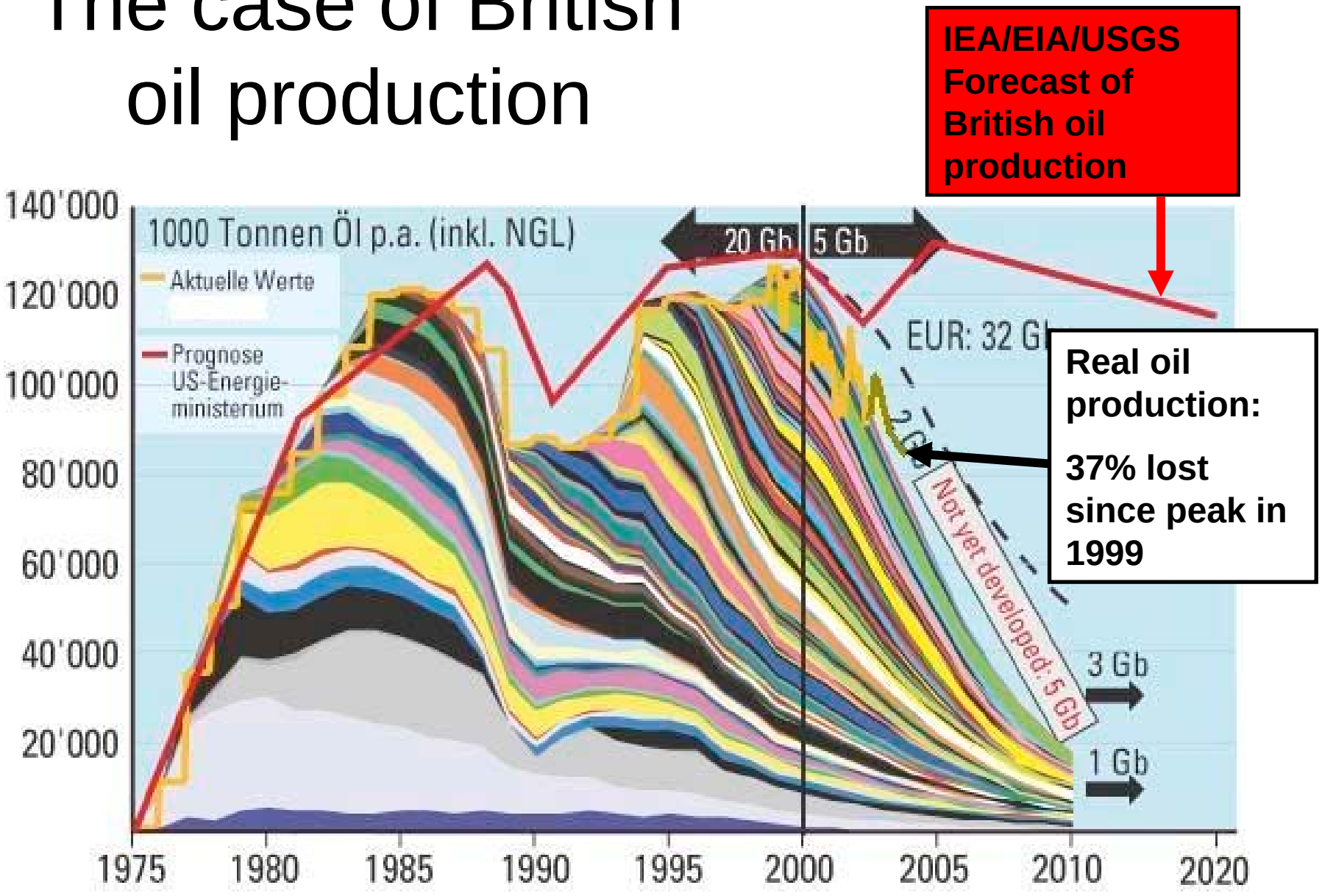
EIA: International Energy Outlook 2001

IEA-Predictions (WEO 98/00/02):
oil supply +1.3-1.6% /y until 2030 at 21-29$/barrel
where do you find six new Saudi-Arabias?



IEA-Price prediction per barrel:
21 $ in 2010, 25 $ in 2020, 29 $ in 2030

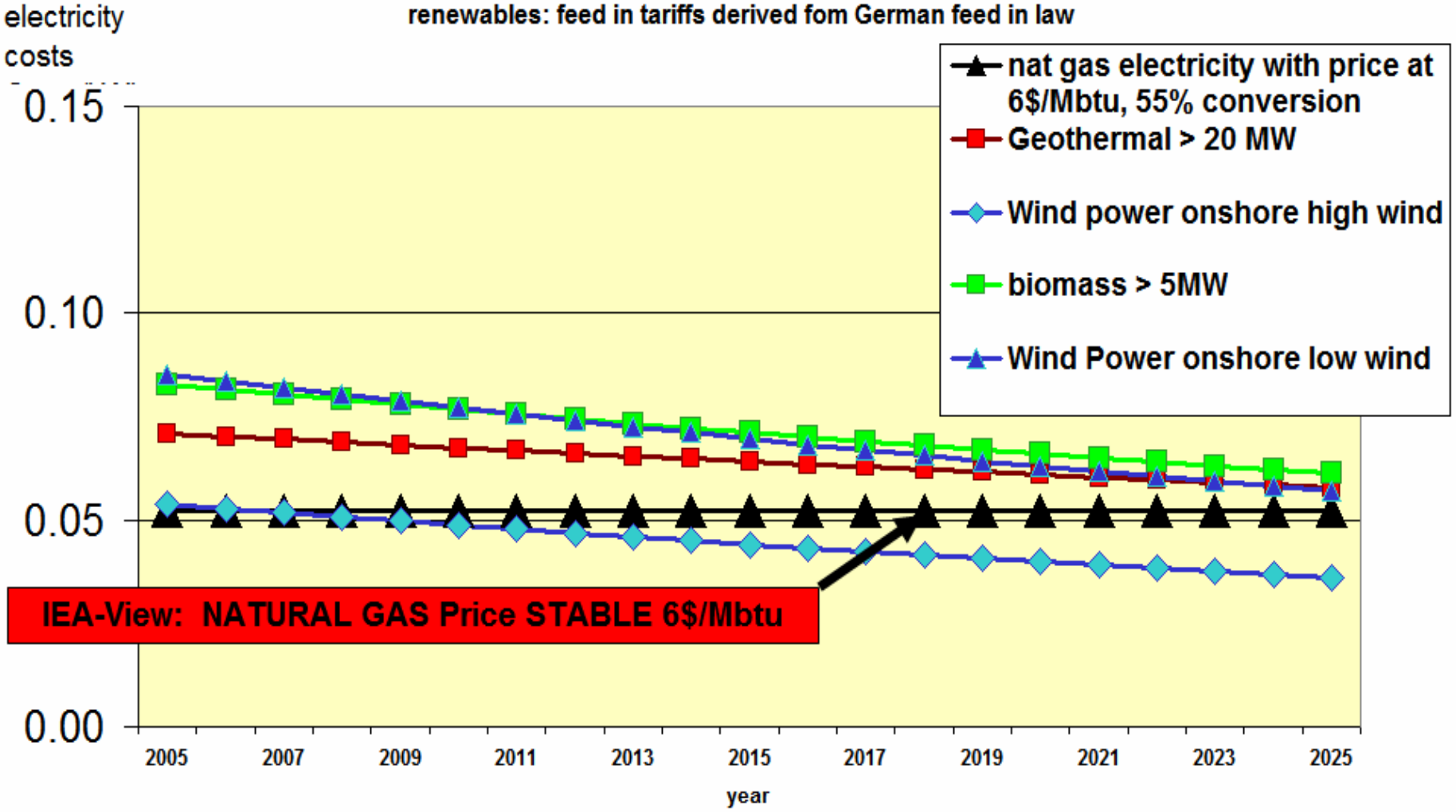
The case of British oil production



IEA view: Renewable Electricity as a permanent failure

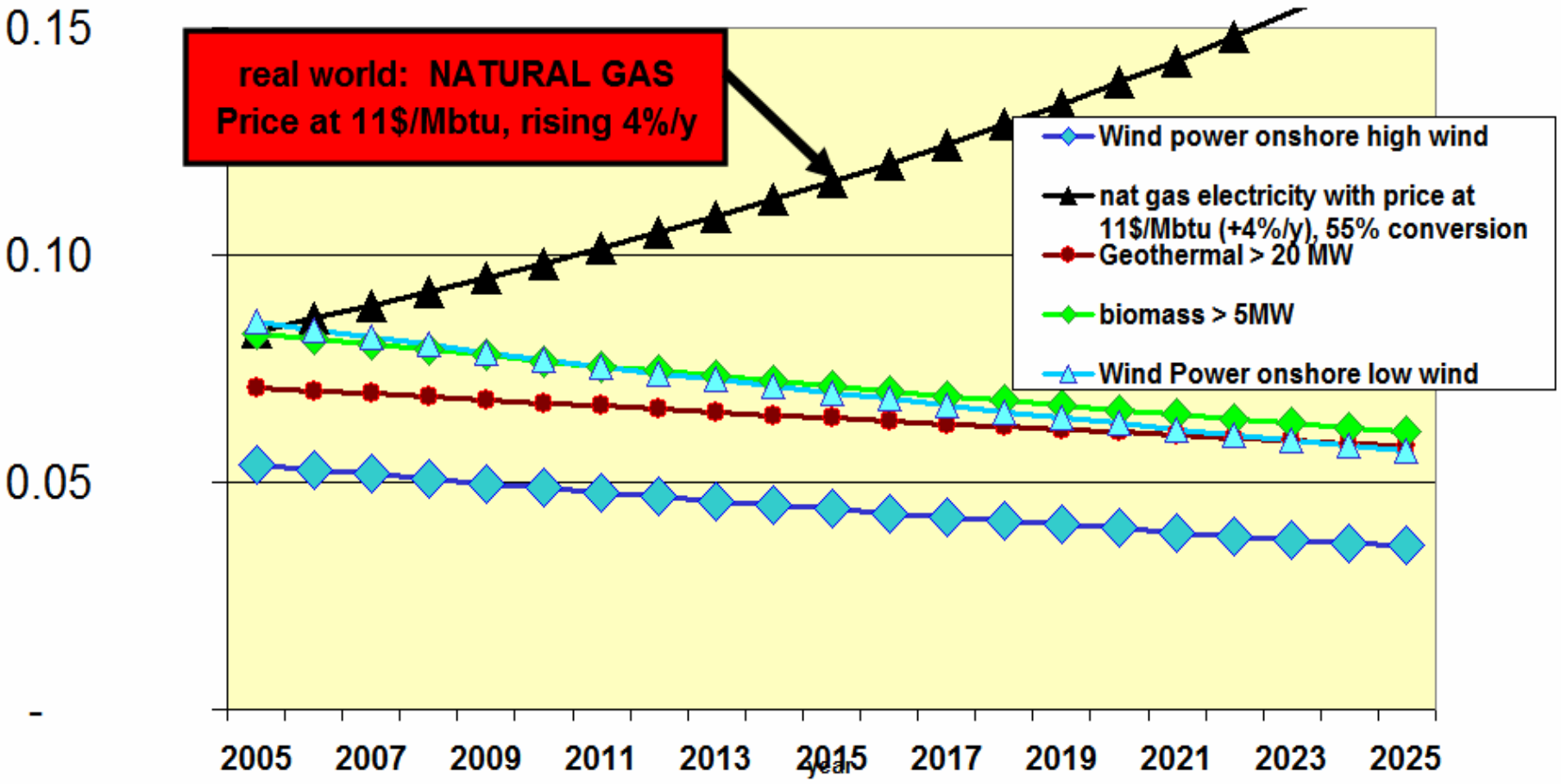
Static Cost predictions/Nat Gas Price Fantasy 6$/Mbtu until 2030

renewables: feed in tariffs derived fom German feed in law

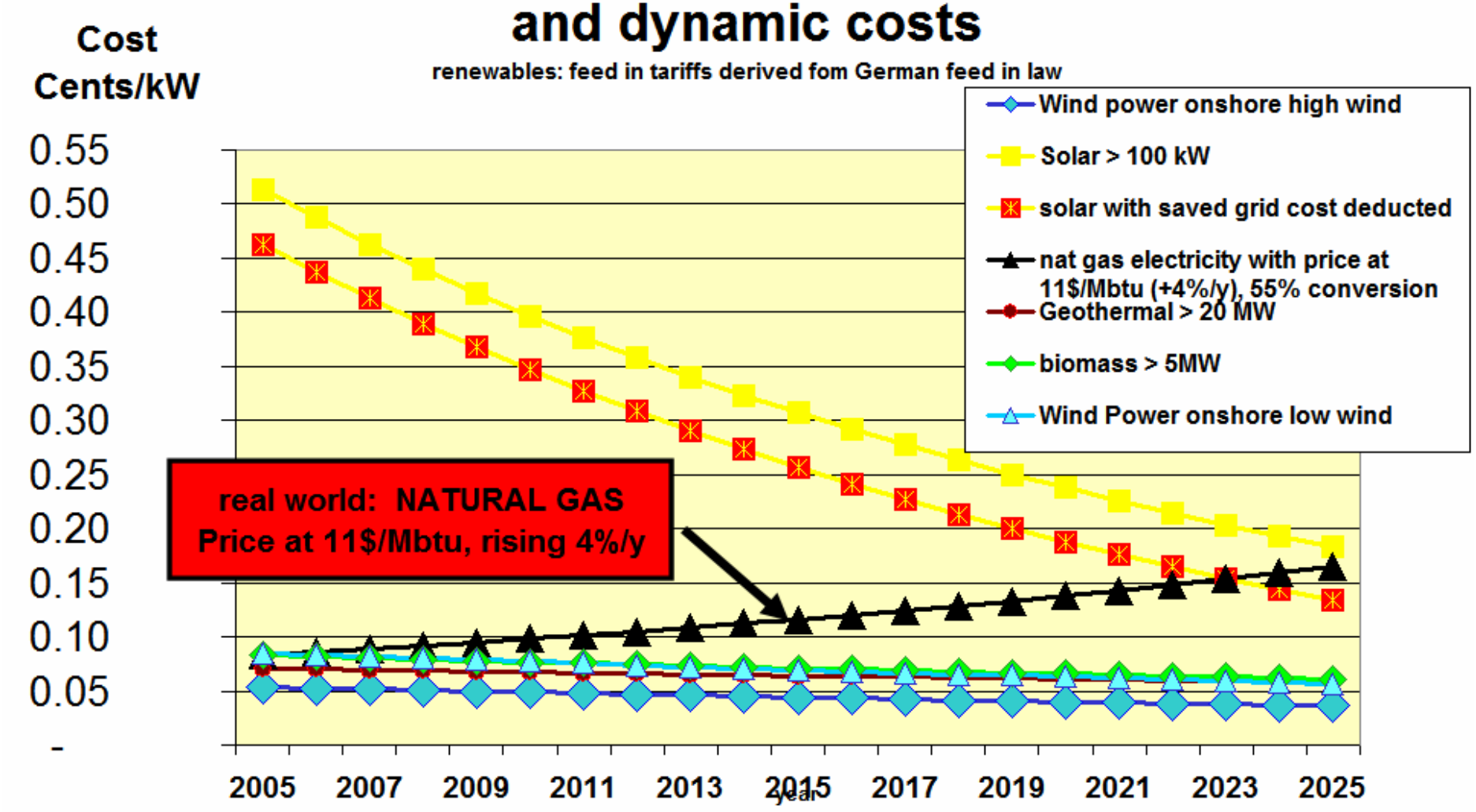


Electricity Generation: real world prices and dynamic costs

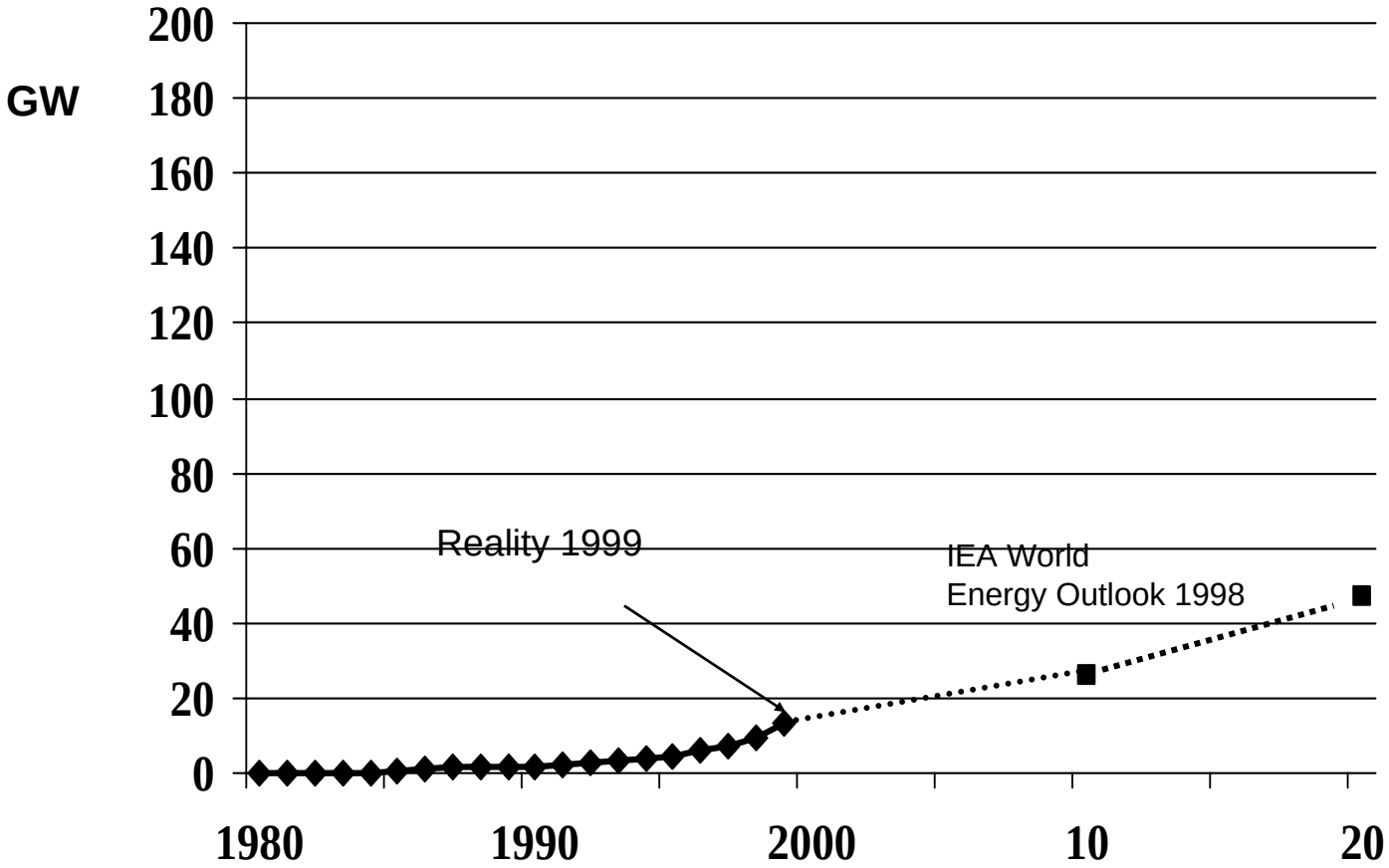
renewables: feed in tariffs derived fom German feed in law



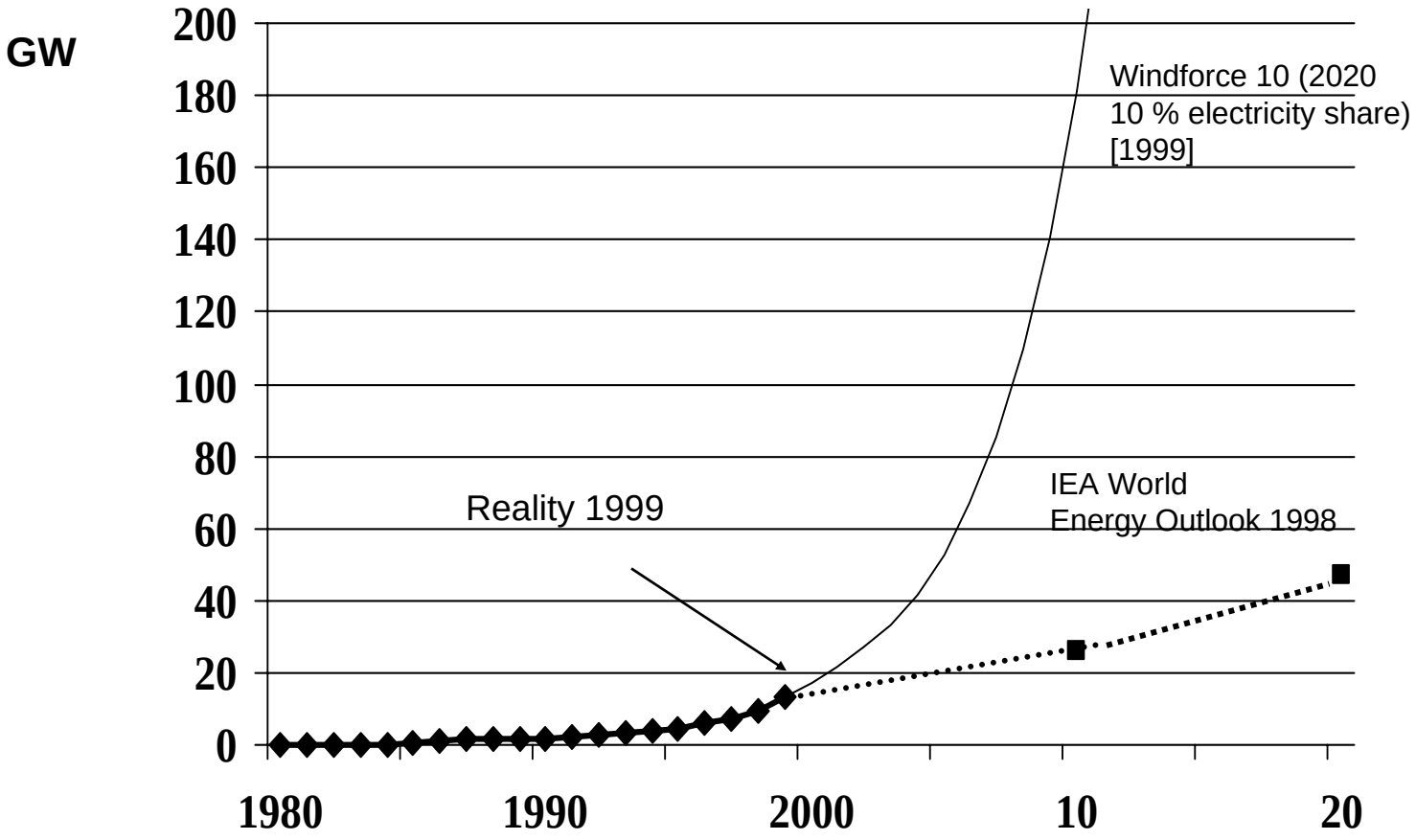
Electricity Generation: real world prices and dynamic costs



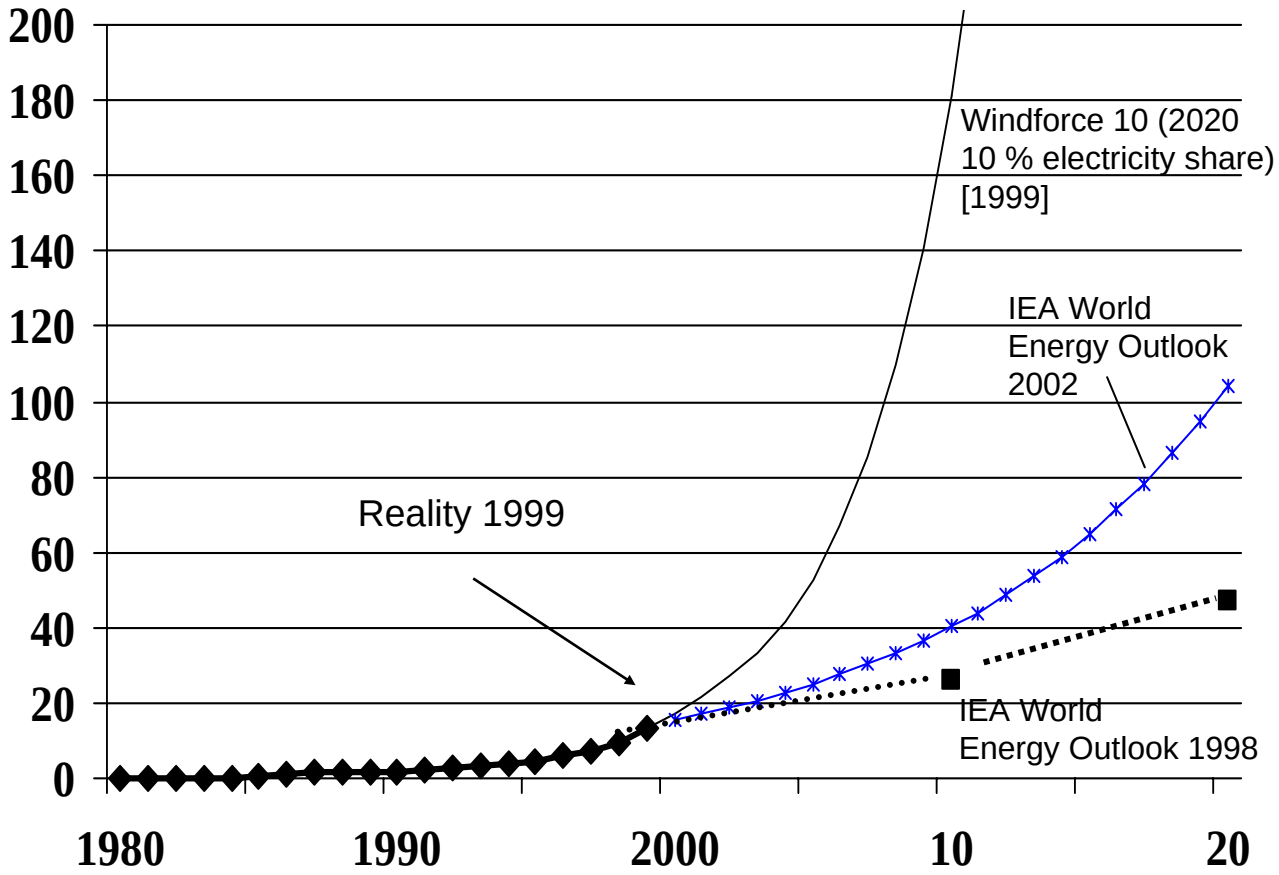
Wind Energy:
IEA Outlook and reality



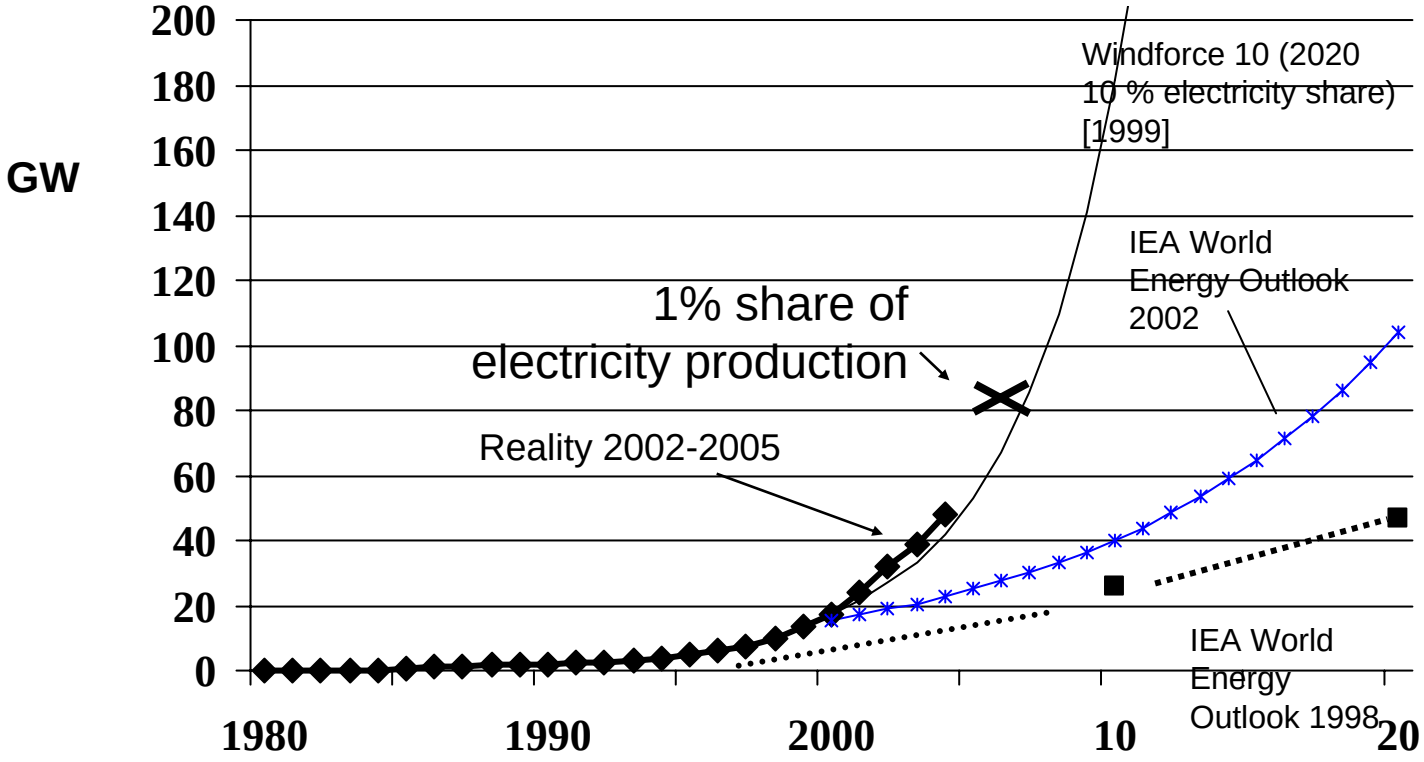
IEA-Outlook and Reality

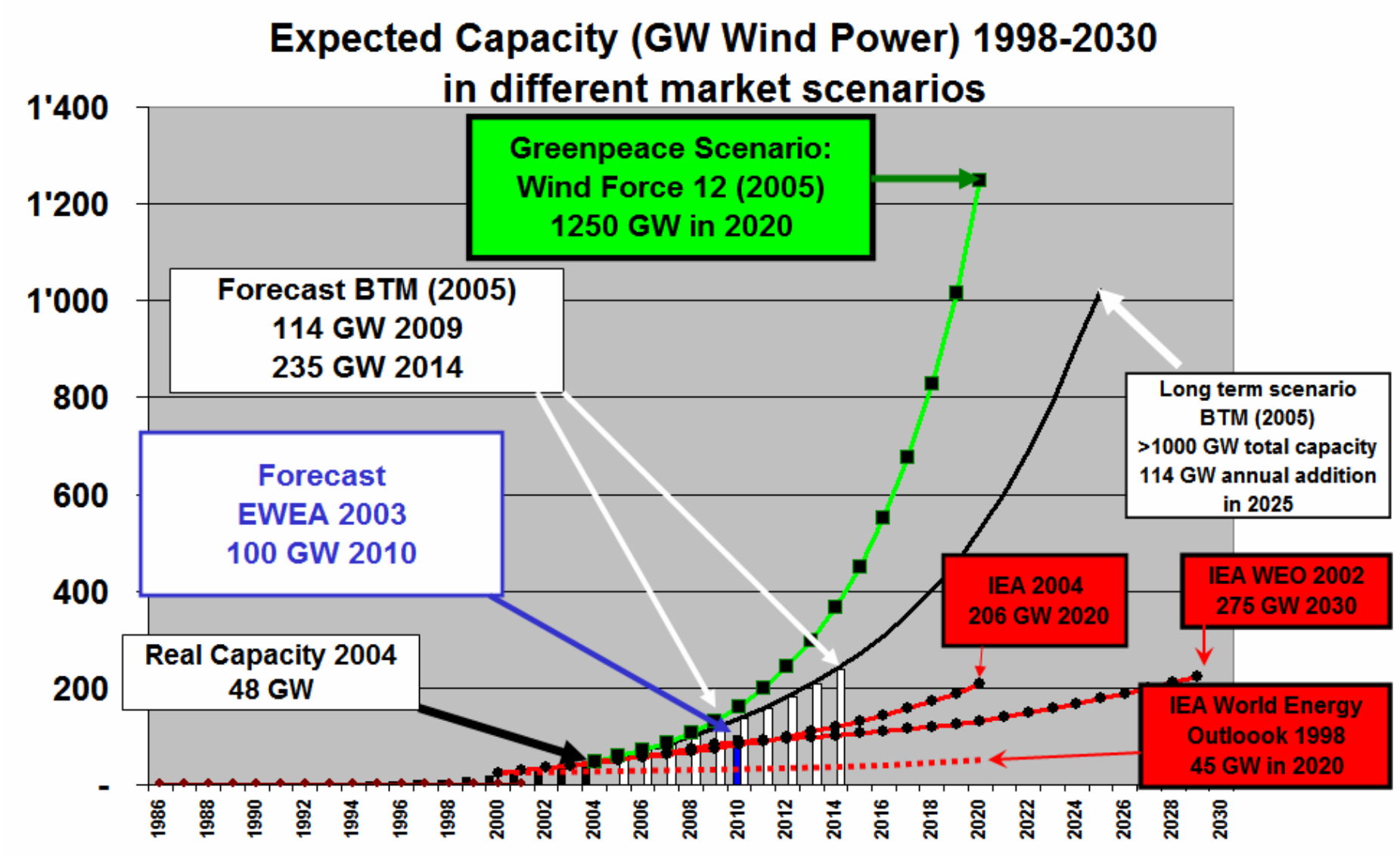


GW IEA-Outlook and Reality



IEA-Outlook and Reality



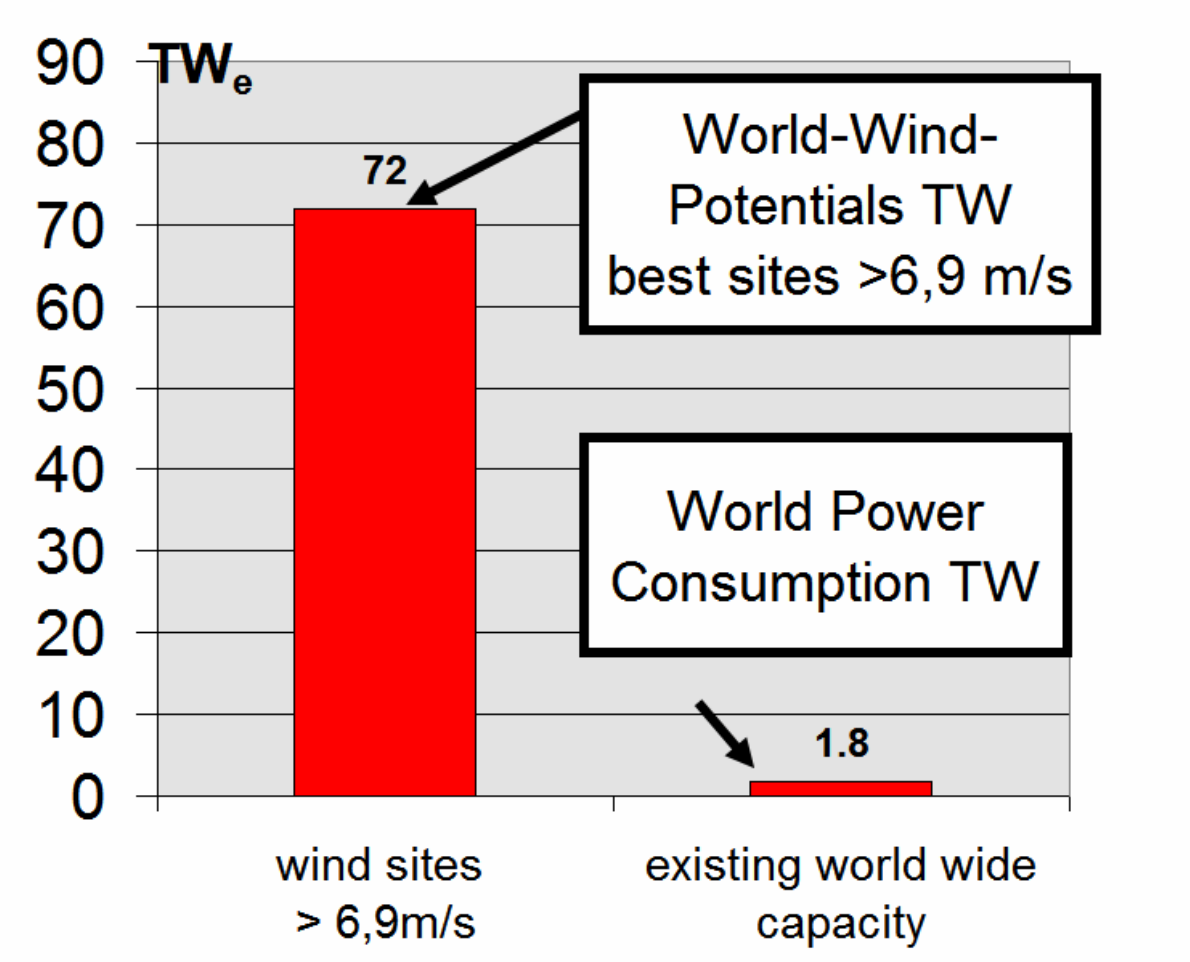

Expected Capacity (GW Wind Power) 1998-2030
in different market scenarios
1'400
1'200
1'000
800
600
400
200
-
Greenpeace Scenario:
Wind Force 12 (2005)
1250 GW in 2020
Forecast BTM (2005)
114 GW 2009
235 GW 2014
Forecast
EWEA 2003
100 GW 2010
Real Capacity 2004
48 GW
Long term scenario
BTM (2005)
>1000 GW total capacity
114 GW annual addition
in 2025
IEA 2004
206 GW 2020
IEA WEO 2002
275 GW 2030
IEA World Energy
Outloook 1998
45 GW in 2020
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030

IRENA duties

1. reliable data on reserves of non-renewables
2. Develop market structures for renwables which work
   - Feed in tariffs
   - Tranmission tariffs
3. Measuring potentials of renewables.

Wind Potential: sufficient for 40-100 times of global electricity demand

Source: Cristina Archer, Mark Jacobson/Stanford 2005




Gütsch, Andermatt

Utgrunden Schweden


US-Windfarm

IRENA duties

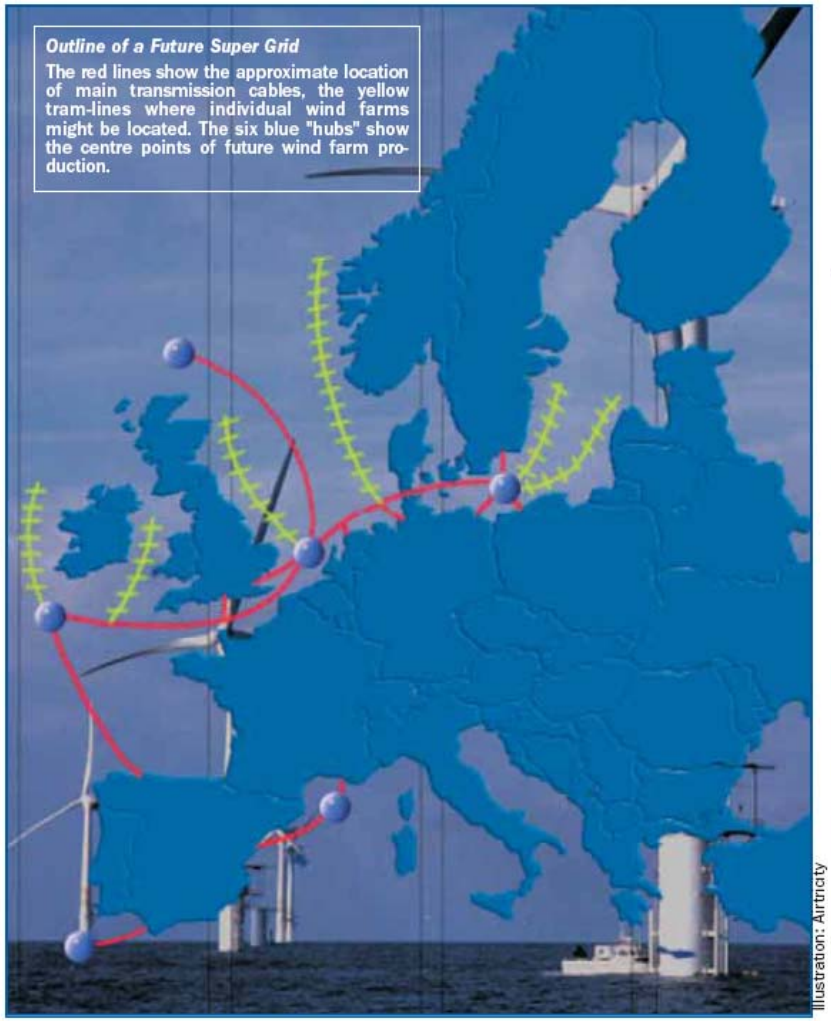
3. Redirect funding
- There is enough research money in the system!
- Stop funding nuclear and fossil research and infrastructure
- Internalize external costs of conventional energy

4. we have to know more on renewables
    - Technology transfer
    - Local assessments

5. We need a better grid

1000-km-HVDC-grids of 3 GW necessary in Europe and state of the art in China

Quelle:



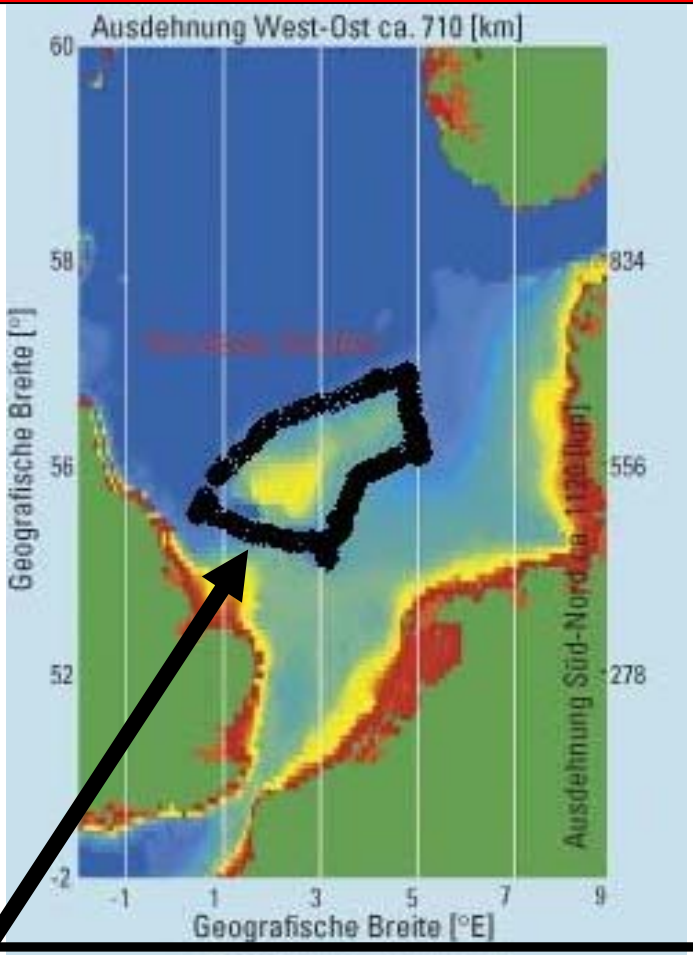
IRENA duties

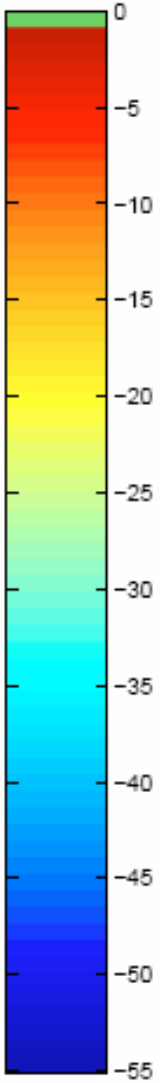
6. Diversity for security
   - We need all renewables
   - We need offshore too!

   - The potentials are immense!

Southern North sea:

250‘000 km^2< 45m = ~ 13 Mbd = 7500 TWh





Area in this Polygon with two 5 MW-turbines/square km is enough to cover EU-electricity consumption

Wind Power now at 20-60 €/Barrel

- Wind power on good onshore sites is now at 4-5 €C/kWh
- This corresponds to 21 € per „barrel oil for electrity“ with a 33% conversion efficiency or t 60 € per barrel on a purely thermal comparison
- Off-shore wind is not that cheap yet, but cost reductions are expected and will follow
- Renewable electricity reduces overall energy consumption:
  - Electric Motors are more efficient
  - Plug-in hybrid vehicles available soon
  - Heat pumps and solar for space heat