



THE IMPACT OF THE KYOTO PROTOCOL ON THE EXPORT REVENUES OF OPEC MEMBER STATES

An update in the light of recent developments

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Acknowledgement/Preface

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Abstract

The present study is an update of a study entitled ‘Analysis of the impact of the Kyoto Protocol on the export revenues of OPEC member states and on the oil import requirements of non-Annex I countries’ conducted in 2000 in the framework of the Dutch National research Programme on Global Air Pollution and Climate Change (NOP).

An update was needed because since the completion of the NOP study in 2000, several developments have occurred which could not have been foreseen during the execution of the study and which significantly affect the results of the NOP study:

- Poorer economic performance in the OECD countries than expected, which affects world oil demand.
- Decision by the United States not to ratify the Kyoto Protocol.
- New geopolitical situation in the Middle East as a result of the war in Iraq.

The present study presents updated BAU and mitigation scenarios for the future years 2010 and 2030. A comparison between the old and updated scenarios reveals that, due to the recent developments, the projected OPEC oil export revenues have declined from 275 billion US\$ in the NOP study to some 222 billion US\$ in the updated scenarios. However, this significant decline is mainly a result of the economic recession and the stronger than expected growth in non-OPEC production. The impact of the Kyoto Protocol on OPEC oil export revenues is only limited in the short term (2010).

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1. BACKGROUND

In 2000, the Dutch National Research Programme on Global Air Pollution and Climate Change (NOP) commissioned a study with the aim to:

- analyse the impact of the Kyoto agreements on the export revenues of the group of OPEC countries; and
- identify new modes of co-operation with the OPEC countries which could result in greater involvement of these countries in the implementation of the FCCC.

In the NOP study, a comparison was made between the Business as Usual scenario presented in the 1998 World Energy Outlook (IEA) and a mitigation scenario reflecting the agreements made in Kyoto to reduce the greenhouse gases emissions. The main results of this comparison are summarised in Table 1.1 below.

Table 1.1 *Impact of implementation of Kyoto on the OPEC petroleum export in the year 2010 for Case A, Case B and Case C*

	BAU 2010	Mitigation Scenario		
		Case A	Case B	Case C
Price per barrel in 2000 [US\$]	20	20	15	15
OPEC production [mb/d]	52.2	45	52.2	49.8
Non-OPEC production [mb/d]	39.9	39.9	32.8	35.2
OPEC export [mb/d]	44.7	37.6	44.7	42.4
OPEC export revenues [billion 2000 US\$]	326.7	274.7	245.0	232
OPEC market share [%]	55	52	60	57

Source: NOP study 2000.

Table 1.1 shows that if the agreed GHG emission reduction targets are realized, the petroleum export in 2010 of the OPEC countries is expected to decline by 7.2 million barrels per day to 45 mb/day compared to the BAU scenario. In the NOP study three options have been analysed with respect to OPEC's reaction to the decrease in petroleum demand: in Case A it is assumed that OPEC will try to maintain a stable oil price and will absorb the entire decrease in demand (OPEC as swing producer); in Case B it is assumed that OPEC will strive to maintain its market share and as a result it is assumed that the oil price will decrease to US\$15 per barrel; and, in Case C, a combination of Cases A and B in which OPEC countries absorb one-third of the decrease in Appendix A petroleum consumption.

To enhance the co-operation with the OPEC countries, the NOP study recommended to establish a fund managed by the IMF and the WB which can be used to assist in the achievement of macro-economic stability in the OPEC countries through support of payment balance (IMF) or restructuring of the petroleum economy (WB).

Since the completion of the NOP study in 2000, several developments have occurred which could not have been foreseen during the execution of the study and which significantly affect the results of the NOP study.

- Poorer economic performance in the OECD countries than expected which affects world oil demand.
- Decision by the United States not to ratify the Kyoto Protocol.
- New geopolitical situation in the Middle East as a result of the war in Iraq.

The present report aims to incorporate the above developments into the analysis carried out for the NOP study and to evaluate the impact on the NOP study results.

2. UPDATED ANALYSIS OF IMPACT OF KYOTO PROTOCOL ON OPEC OIL EXPORT REVENUES

2.1 Impact of poor economic performance on 1998 Business As Usual scenario

World oil demand is strongly linked to economic growth and, consequently, the poorer than expected economic performance experienced in the OECD countries in recent years affects the expected oil production in 2010. In addition, revisions in the historical data also contributed to the significant downward adjustment of IEA BAU scenario after 1998. The most recent BAU scenario presented in the 2002 WEO is given in Table 2.1 and compared to the WEO 1998 BAU scenario.

Table 2.1 *BAU scenarios presented in the IEA WEO 1998 and IEA WEO 2002*

	BAU 2010	BAU 2010-updated
Price per barrel in 2000 US\$	20	21
OPEC production [mb/d]	52.2	35.9
Non-OPEC production [mb/d]	39.9	47.8
Processing gains [mb/d]	2.1	2.2
Non-conventional oil [mb/d]		3.0
Total production [mb/d]	94.2	88.9
OPEC export [mb/d]	44.7	30.7
OPEC export revenues [billion 2000 US\$]	326.7	235.3
OPEC market share [%]	55.4	40.4

Source: IEA, WEO 1998, 2002.

Table 2.1 shows that the expected OPEC oil production in 2010 has been adjusted downward from 52.2 mb/d to 35.9 mb/d (OPEC oil production in 2003 amounted to 30.4 mb/d). This remarkable decline is a result of the following recent developments:

- Lower world oil demand than anticipated in the 1998 BAU scenario. World oil demand is adjusted from 94.2 mb/d to 88.9 mb/d.
- Stronger expected growth in non-OPEC production, especially in Russia, Kazakhstan, Azerbaijan, Brasil and Angola. Non-OPEC production in 2003 was 46.4 mb/d.
- Technological developments resulting in higher production of non-conventional oil (oil shales, oil sands-derived oil and derivatives such as synthetic crude products, and liquids derived from coal, natural gas and biomass).

2.2 Impact of the decision of the US not to ratify Kyoto on the Mitigation scenario

The decision of the United States (and Australia) in 2001 not to join the Kyoto Protocol greatly affects the environmental effectiveness of the Protocol. Table 2.2 gives the energy-related CO₂ emissions for 2010 with and without the United States.

Table 2.2 *Kyoto CO₂ emissions targets and reduction requirements*

	Kyoto emission targets for 2010	Updated BAU emissions for 2010	Gap [Mt CO ₂]
OECD Annex B countries	9,662	12,457	2,795
<i>OECD without the US</i>			<i>1,121</i>
Russia	2,212	1,829	-383
Ukraine/Eastern Europe	1,188	711	-477
Total Annex B	13,062	14,997	1,935
<i>without the US</i>			<i>261</i>
Non-Annex I		12,456	
Total World		27,453	

Source: IEA, WEO 2002, ECN.

Due to the decision of the United States not to ratify Kyoto, the CO₂ emission reduction requirement of the OECD Annex B countries decreases by some 60% to 1,121 Mton CO₂.¹ This amount could be off set to a large extent by the hot air available in the non OECD Annex B countries.² Given the agreements reached at the COP 7 in Marrakech on sinks which allow Annex B parties to meet part of their reduction obligation by means of sinks, another estimated 250 Mton CO₂ could become available to Annex B parties at relatively low cost. This reduces the need for mitigation measures aimed at a reduction of energy use in general and petroleum use in particular. The achievement of the Kyoto targets therefore does impact less on world oil demand than anticipated in the NOP study.

In Table 2.3 the updated mitigation scenario for 2010 is given. This scenario is taken from 2002 WEO (the Alternative Policy Scenario) and includes the policies currently under consideration in the OECD countries to reduce CO₂ emissions. The total reduction achieved through these policies in 2010 is 3 per cent, or 331 Mton CO₂ which, combined with 750 Mton CO₂ from flexible mechanism would be sufficient to meet the Kyoto targets.

The mitigation policies would result in a reduction of world oil demand by 1.9 per cent in 2010, or 1.7 mb/d.

Table 2.3 *Updated BAU and Mitigation scenario for 2010*

	Updated BAU 2010	Updated mitigation 2010	Mitigation 2010 old (Case A)
Price per barrel in 2000 [US\$]	21	21	20
OPEC production [mb/d]	35.9	34.2	45
non-OPEC production [mb/d]	47.8	47.8	39.9
processing gains [mb/d]	2.2	2.2	2.1
non-conventional oil [mb/d]	3.0	3	
Total production [mb/d]	88.9	87.2	87.0
OPEC export [mb/d]	30.7	29.0	37.6
OPEC export revenues [billion 2000 US\$]	235.3	222.3	275
OPEC market share [%]	40.4	39.2	52

Source: IEA, WEO 2002, NOP study 2000.

¹ The withdrawal of the US means that total GHG emissions of OECD Annex B countries in 2010 do not decrease by the anticipated 5.2 per cent but in fact will increase by more than 6 per cent.

² There is no official position of the EU with regard to the amount of hot air that can be purchased. The limit will be decided by each Member State but the intention is that a significant reduction of greenhouse gas emissions will take place domestically. One could expect that flexible mechanisms can be used to meet up to 50% of the reduction requirements.

A comparison between the results of the NOP study (Case A) and the updated mitigation scenario reveals that the OPEC export revenues have further declined by some 19% from 275 to 222.3 billion US\$ in absolute terms. However, the prime reason for this decline is the economic recession in the OECD countries and the higher than expected non-OPEC production. The impact of the implementation of the Kyoto Protocol (without the US) on the OPEC oil export revenues is limited (approximately 13.3 billion US\$ or 5.6% of total revenues).

Table 2.3 shows the impact of policies currently under consideration in the OECD countries in 2010. Because the lead-time for these measures is rather long, the full impact will only be felt in the longer term. Table 2.4 presents the impact of these measures in 2030.

Table 2.4 *BAU and Mitigation scenario for 2030*

		BAU 2030	Mitigation 2030
Price per barrel in 2000 US\$	[US\$]	29	29
OPEC production	[mb/d]	64.9	53.5
Non-OPEC production	[mb/d]	42.1	42.1
Processing gains	[mb/d]	3.1	3.1
Non-conventional oil	[mb/d]	9.9	9.9
Total production	[mb/d]	120.0	108.6
OPEC export	[mb/d]	55.5	45.7
OPEC export revenues in 2000 US\$	[Billion US\$]	587.5	483.7
OPEC market share	[%]	54.1	49.3

Source: IEA, WEO 2002.

If the mitigation policies currently under consideration are implemented, this will result in a reduction of oil demand by 9.5% in 2030, or 11.5 mb/d. This will result in a decrease of the OPEC oil revenues by 17.6% compared to the BAU scenario.

3. IMPACT OF CURRENT GEOPOLITICAL SITUATION IN THE MIDDLE EAST ON CO-OPERATION WITH THE OIL PRODUCING COUNTRIES

The current geopolitical tensions in the Persian Gulf region make co-operation in the context of the Kyoto Protocol difficult in the sense that the overriding political instability in the region is the focus of most governments' attention. Foreign and security policy in this sense can crowd out other policy co-operation. The political insecurities can easily heighten other concerns of the producing countries since the political climate is very bad for the business climate. The pressure on the government budgets, despite the higher income due to OPEC production measures in the last year, remains. This reduces the ability to invest in energy-related projects (new capacity but also energy-saving projects) that are much needed for future economic stability. Already we can see that the security measures that the producing countries must take because they have no certainty about the integrity of Iraq to be guaranteed, i.e. that Iraq will break-up in three parts with all the regional and political consequences, is a major drag on other parts of the government.

In January 2004, the Clingendael International Energy Programme presented the result of a study on Geopolitics and Security of Energy supply. This study was conducted for DG TREN, European Commission (see for the executive summary, presentation and full report: <http://www.clingendael/ciep/publication> under Energy Studies) and investigates the current geopolitical situation in the main oil and gas producing countries/ regions, including the Persian Gulf region. In this study two storylines are presented in which the geopolitical situation and the impact on the ability of these regions to continue in their role as main providers of oil and gas to the European Union. For a complete assessment of the current and future geopolitical situation we refer to the relevant chapters in this study. For this update, we have, in line with the results from the above mentioned study, prepared a short assessment of future world demand and supply, the growing structural dependence on oil imports (and LNG) from the Persian Gulf, all indicating that net-oil exporting countries remain very important for OECD (Annex I) countries.

Helping these countries to regain or maintain political and economic stability will be at our own advantage. Furthermore, we also argue that wider co-operation (see also DG TREN study) is the best route to energy security of supply and an integrated energy policy (including environmental concerns). It is in this light that we recommend that co-operation with net-oil exporters, particularly those in the Persian Gulf, should focus on including them in projects on energy-saving and technologies with lower carbon emissions. Co-operation in the economic sphere is also possible, although the success of diversifying their economies requires large structural changes that cannot easily be brought about and would also require huge funds. In the earlier study, stabilising oil income was a main argument to ask for some sort of mechanism to help them overcome the negative results of lower demand and lower income. In the current market situation where supply and demand are so tight that prices are relatively high and in which demand in developing countries is growing so strong that the countries have difficulties to meet this demand, such co-operation seems beyond the mechanisms of the Kyoto framework.

Given the energy intensity of many of the net-oil exporting economies, co-operation in energy-saving and technologies with lower emissions not only strengthens relations but also helps to save energy that they can export to world markets and thus underpin their income. Moreover, such co-operation also stays closer to the objectives of the Kyoto framework. Another advantage of such co-operation could be that countries can begin to feel at least a little bit included in the energy future and could create an opportunity for the countries not to be always on the defensive.

3.1 General characteristics of international oil markets

Slides 3-6

In order to answer the questions formulated above, one must first look at the general characteristics of the international oil markets. Past, present and future developments are summarised in Slides 3 and 4. It is generally assumed that world energy demand will grow, that import dependence grows, that there will be a growing competition among major net-importing countries and that the number of net-exporting countries will decline due to a relative shift in balance between OPEC-NOPEC producers. With respect to prices of energy sources, in particular of oil, a shift is expected from a consumer to a producer market. Slides 4 and 5 focus on security of supply issues. Concerns with respect to supply security will increasingly drive the oil agenda as oil policies of net-exporting countries become more and more income driven. Under investment in production capacity is possible because access to the world's major oil reserves remains limited for private investments. Economic and political instability in producing countries remains a main worry (Slide 5). Geopolitical tension is likely to grow.³ Increasingly major consuming countries have to import from politically and economically unstable producer states. In addition other concerns such as competition for resources amongst consumer states, choke points in trading routes, little possibility for diversification of supplier countries, decreased indigenous production of renewable energy making diversification of resources difficult to play a role.

³ See study *EU Security of Supply and Geopolitics*, carried out for DG TREN, January 2004.

Demand and supply developments (1)

- Future trends in international oil markets:
 - World demand is predicted to grow (IEA WEO 2002)
 - Import dependence grows
 - Growing competition among major net-importing countries
 - Number of net-exporting countries declines (relative shift in balance between OPEC-NOPEC)
 - Concentration of international oil trade flow origin
 - Shift from a consumer to a producer market (what drives the price demand or supply; 1985-1999 demand--- 1999- now supply; future?)
 - Oil remains fuel of choice in developing countries



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Demand and Supply Developments (2)

- Security of supply issues will increasingly drive the oil agenda:
 - Oil policy of net-exporting countries becomes more and more income driven
 - Underinvestment in production capacity possible because access to the world's major oil reserves remains limited for private investments
 - Economic and political instability in producing countries remains a main worry
 - Geopolitical tension likely (see study EU Security of Supply and geopolitics for DG TREN, January 2004 www.clingendael.nl/CIEP/publications/ under heading ciep energy studies)



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Security of supply concerns of major consumer countries

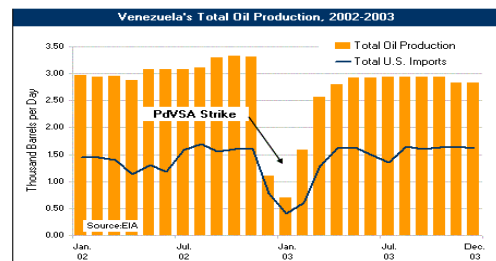
- Increasing imports from politically and economically unstable producer states
- Competition with other consumer states
- Choke points in trading routes
- Little possibility for diversification of origin
- Limited access to reserves/production assets for international oil companies; oil from these companies always reaches the market
- Low indigenous production of sustainable energy makes diversification to other fuels also difficult
- Limits to Energy Policy tools



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Example of effects of internal political difficulties on oil exports; The share of Venezuela in US imports is about 12-14%, which it had to replace during the strike



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3.2 Energy demand

Slides 8-17

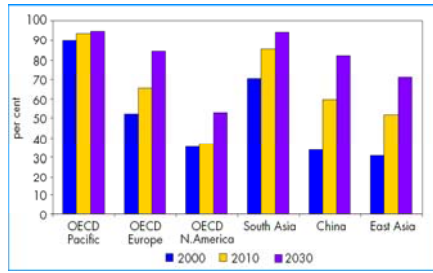
Recent studies clearly predict an increase in energy demand. The oil import dependence in Asia remains very high in some parts and is increasing in other parts of Asia, Europe and to a lesser extent of North America. The fact that Canada has substantial reserves in oil sands that have already been taken into production could show a great potential in the future as it creates a fundamental different outlook for the United States in terms of geopolitical import dependence.

Not only the demand for oil, also the demand for gas will increase. Most of the increase in gas demand will be realised in the major OECD consumer countries, while the increase in oil demand comes from developing countries where oil remains the fuel of choice. According to EIA forecasts, the *relative* share of oil in OECD energy consumption will decline in favour of gas.⁴ In the IEA forecasts current policy decisions are included which explains the low contribution of nuclear. However, when the time comes to really decide to close nuclear facilities in Europe the expectation is that the cost of renewing the lifespan of the facility is so much lower than a new fossil facility that the nuclear sector will continue to produce longer than predicted now. Also, some policymakers are trying to put nuclear back on the agenda because of the low CO₂ emissions (Slides 8 and 9).

There are several factors driving and constraining energy demand. Driving factors are economic growth, population growth, changing life patterns (household size and equipment, means of transport). Economic growth drives oil demand. Demand growth is strongest in the fastest growing economies. Due to huge efficiency benefits (better technology and equipment compared to low-standard Soviet practice) oil demand in Eastern Europe and the Former Soviet Union will only grow modestly. Constraining factors are technological changes that lead to higher energy efficiency and therefore energy savings and environmental policy restrictions (Slide 10 to 16).

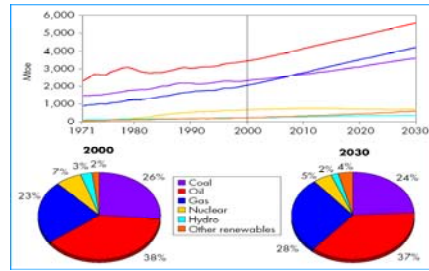
⁴ EIA-Energy Information Administration of the US Department of Energy. Not to be confused with the OECD International Energy Agency IEA.

Oil import dependence



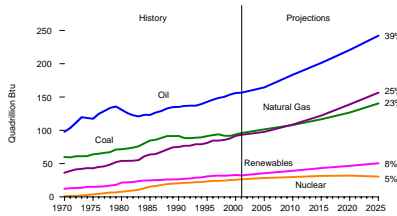
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World primary energy demand by fuel



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World primary energy consumption by fuel type, 1970-2025



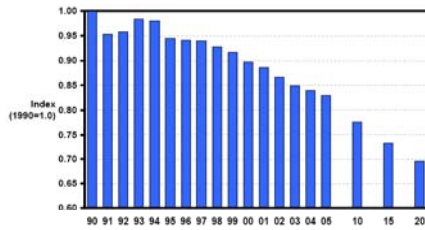
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Factors driving energy demand

- economic growth
- population growth
- changing life patterns (household size/equipment, transport etc.)
- technological change (higher efficiencies)
- environmental policy restrictions
- prices

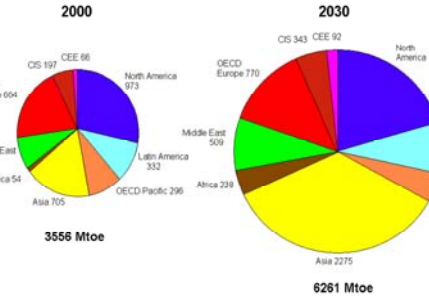
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Forecast: continued reduction in oil intensity



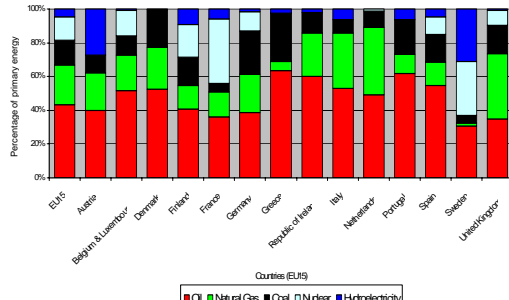
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World oil consumption in 2000 and 2030



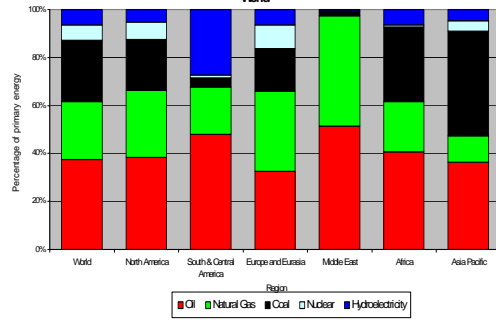
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Regional Consumption Pattern 2002 EU15 countries



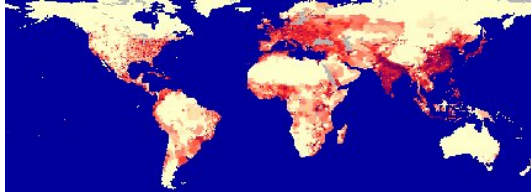
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Regional Consumption Pattern 2002 World



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Human population



<http://www.overpopulation.net/popmap.gif>



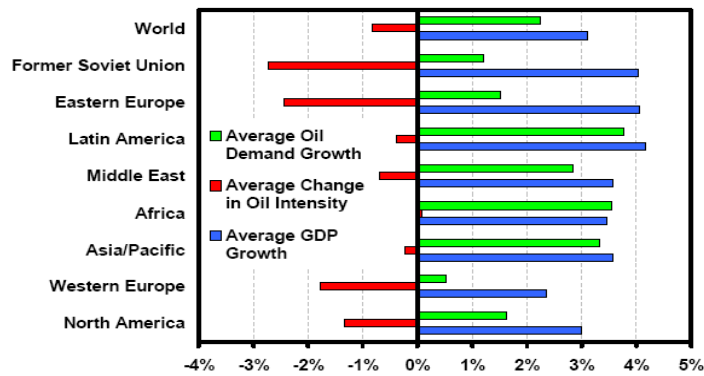
The world annual growth rate was around 0.5%/a before 1900, passed 1 % around 1925, peaked around 2.1 % in 1964 and is now at 1.2% and declining



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Outlook for oil demand and GDP growth for the period to 2020



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3.3 Current market pressures

Slides 19-23

To fully understand developments in the international oil market one needs to take into account market pressures at play. Current upward pressures on oil (product) prices can be divided into demand pressures and production pressures. Demand pressures are e.g. the relatively low commercial stocks, the buoyant growth of US and Chinese demand in the last two quarters and the growing gasoline imports to satisfy summer demand in the US.

Production pressures are e.g. OPEC's production policy, low levels of spare capacity in the world, political instability in the Gulf region, transportation constraint to increase exports in Russia and domestic political problems in countries like Nigeria and Venezuela.

Beside demand and production pressures there are other factors that can influence the prices of oil (products). Somewhere along the value chain there can be-for economic or political reasons-bottlenecks that may create substantial price movements. These are e.g. bottlenecks in crude production capacity in relations to demand (the market will stabilise at a higher price level; the consumer might decide to switch away from oil); bottlenecks between parts of the value chain, e.g. in transportation capacity (this could be incited by a decision to move to double hull ships creating scarcity in tanker capacity); bottlenecks in refinery capacity (when demand for gasoline is high but for the other products of the refinery stagnant or low which translates to overall low refinery margins); bottlenecks in the mobilisation of capital (when oil investment capital must compete with other investments by the government or when the government credit rating increases the cost to borrow on international markets).

Current upward pressures on oil (product) prices

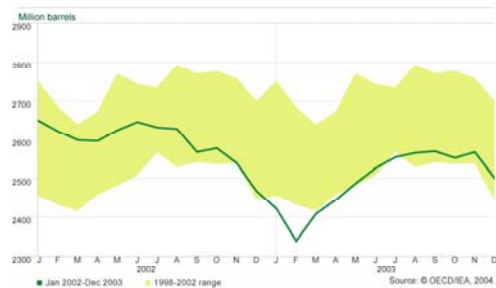
- Demand pressures:
 - Relatively low commercial stocks
 - Buoyant growth of US and Chinese demand in last two quarters
 - Growing gasoline imports to satisfy summer demand in US
 - US not self-sufficient in refining, import demand for gasoline
 - Capacity for reformulated gasolines (for summer) limited; further price pressures on a few export refineries
- Production pressures:
 - Production policy OPEC
 - Low levels of spare capacity in the world
 - Political instability in Gulf
 - Transportation constraint to increase exports in Russia
 - Domestic political problems in countries like Nigeria, Venezuela



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OECD Commercial Stocks



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United States not self-sufficient in refining capacity

- Decline in US refining capacity (closure of smaller refineries in 1990s due to environmental requirements (CAA 1991), concentration in big refining centers such as Baton Rouge, Elizabeth):
 - 1981: 18.6 mbpd
 - 2000: 16.5 mbpd
- As a result:
 - U.S. refinery utilisation is at historically high levels of 95%
 - Little flexibility to respond to sudden shifts in demand or supply due to unexpected factors such as weather, refining accidents or transportation interruptions
 - Seasonal increase in demand for oil products by U.S. is competing with European and Asian demand for products, driving prices up

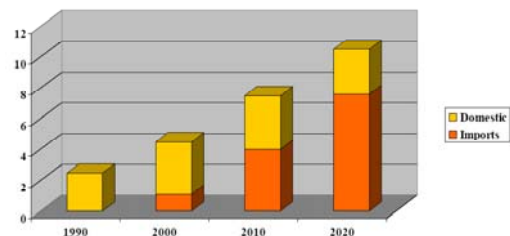


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Chinese oil supply forecast to 2020

China might import 7 mbpd by 2020 against 2.5 mbpd in 2003



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Bottlenecks

- Bottlenecks somewhere along the value chain for economic or political reasons can create substantial price movements:
 - Bottlenecks in crude production capacity in relations to demand (market will stabilise at a higher price level; consumer might decide to switch away from oil)
 - Bottlenecks between parts of the value chain, e.g. in transportation capacity (could be incited by a decision to move to double hull ships creating scarcity in tanker capacity)
 - Bottlenecks in refinery capacity (when demand for gasoline is high but for the other products of the refinery stagnant or low which translates to overall low refinery margins)
 - Bottlenecks in the mobilisation of capital (when oil investment capital must compete with other investments by the government or when the government credit rating increases the cost to borrow on international markets)
 - Etc.



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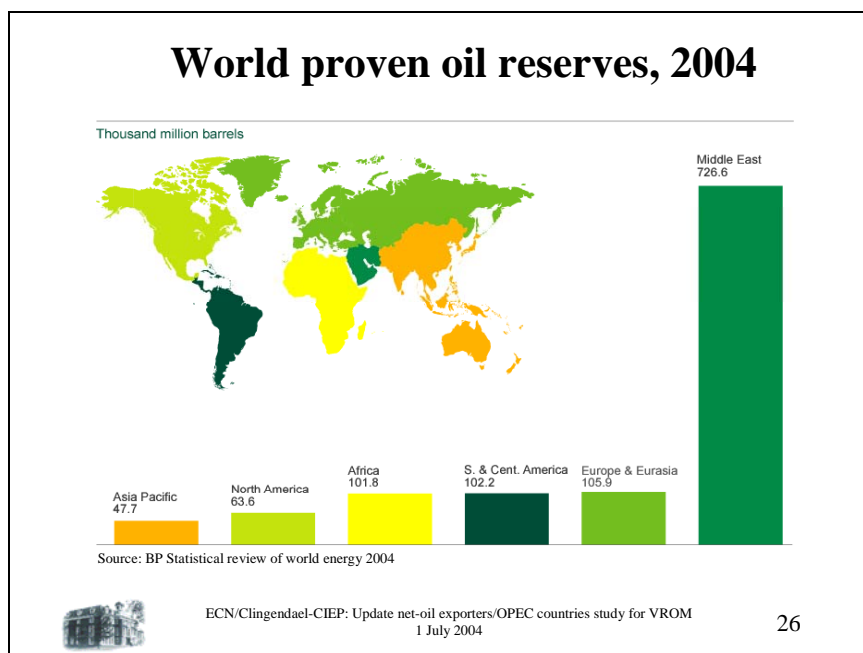
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3.4 Energy supply

Slides 25-33

To meet the growing energy demand and to deal with market pressure, consuming countries seek sufficient energy supplies. For the coming decades there is no global physical shortage of fossil fuels foreseen, i.e. there are enough proven reserves. However there is under investment due to insufficient capital mobilisation which could cause tight markets. Domestic political tension in producer countries could cause lower investments and temporary disruptions or lower production levels. One only has to think of the situation in Venezuela, Nigeria and Norway (strikes) to understand the impact. Furthermore regional and/ or global political tension could depress investment climate or cause disruptions (Iran, Iraq, etc). Finally, the concentration of resources in just a few countries (see also the part on OPEC) and the ownership structure of the international oil industry/access to equity oil are of concern to consuming countries (Slide 25).

The pressure on the oil trade choke points might increase in the future when more and more gas transport takes place by sea, influencing the supply streams. The LNG flows to Asia, Europe and US are expected to grow substantially particularly from the Gulf. The transportation costs of LNG are still sensitive to distance and LNG will have to be transported through the canals and other shortest routes to the market. The level of sea bound energy trading is increasing. The capacity of some narrow straits might easily be reached and other forms of transportation might have to be considered like gas pipelines to overcome these transportation strains. However, the costs of very long pipelines are very high and might prevent the potential of gas in the Middle East not to be reached soon (Slide 33).



Energy Supply

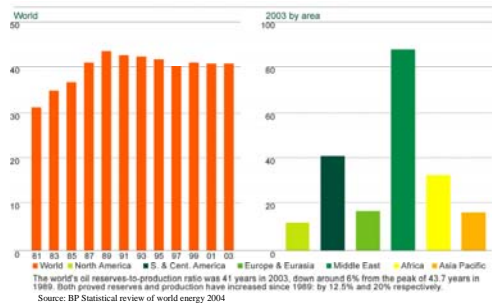
- No global physical shortage of fossil fuels foreseen in the coming decades (enough proven reserves). However:
 - Underinvestment due to insufficient capital mobilisation could cause tight markets
 - Domestic political tension in producer countries could cause lower investments and temporary disruptions or lower production levels (Venezuela, Nigeria, Strike in Norway)
 - Regional and/or global political tension could depress investment climate or cause disruptions (Iran, Iraq, ...)
 - Concentration of resources in few countries
 - Ownership structure of the international oil industry/access to equity oil



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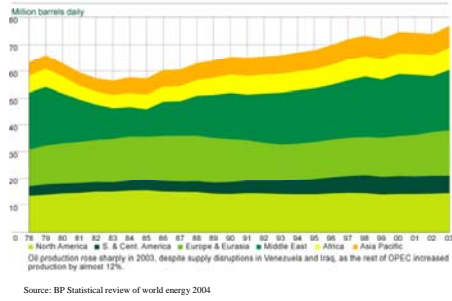
World R/P ratios, 2004



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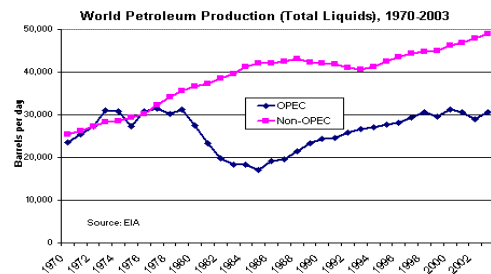
World oil production, 2004



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NOPEC viz. OPEC oil

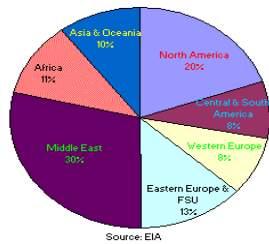


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Current Regional Shares in Oil Production

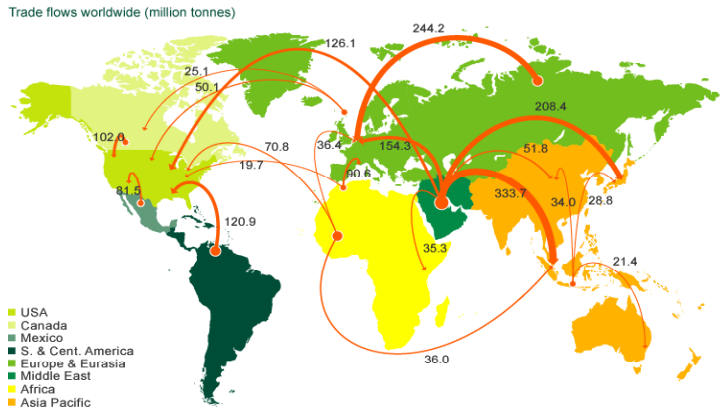
World Oil Production by Region, 2003



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Oil trade flows, 2003



Source: BP Statistical review of world energy 2004



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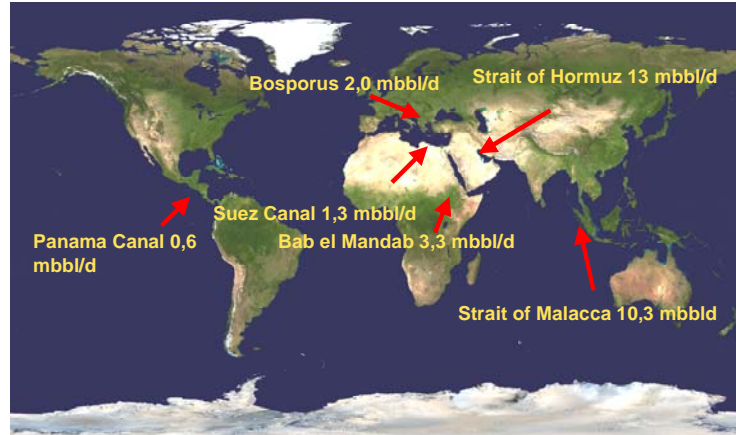
Some oil transportation chokepoints Bosporus, Panama Canal, Straits of Hormuz and Malacca



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Energy supply: Chokepoints in (future) oil and LNG shipping



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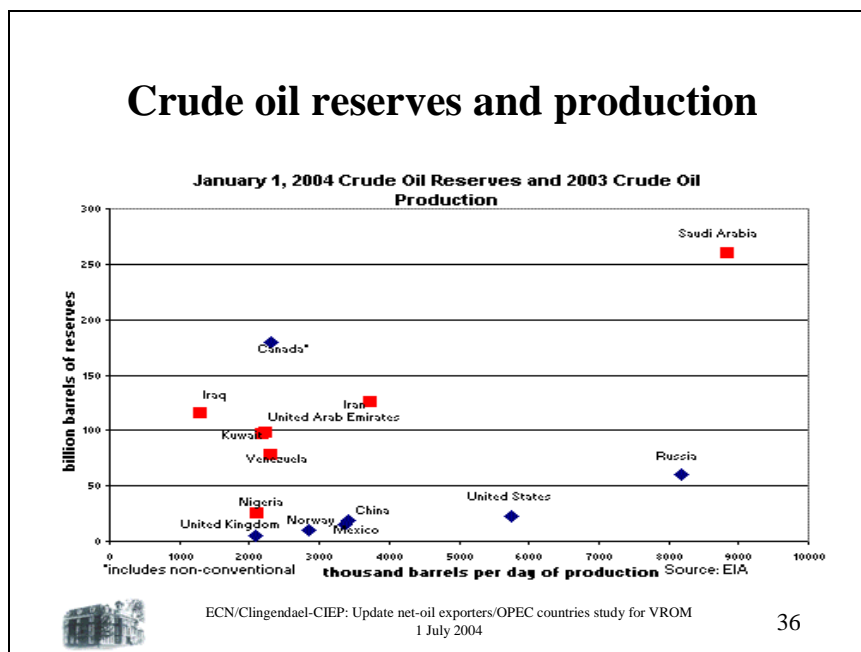
3.5 Middle East vital for future supply

Slides 34-39

The Middle East region is vital for future oil supply. Five Middle East countries-Saudi Arabia, Iraq, Kuwait, Iran and the United Arab Emirates have approximately 65 per cent of world proven reserves. Their share in world production is currently 30 per cent and is expected to grow. The questions that need to be raised though are how reliable OPEC proven reserves reporting is and whether these five OPEC members will be able to mobilise enough capital. Doubts are in place as from the 1990s OPEC reserves have remained constant without major new oil finds. Pressure on the government budget is increasing due to population growth (Slide 34). Measures are being taken to diversify energy supplier countries, e.g. the share of Russian oil trade towards the EU has increased while the share of the Middle East has decreased (see also Slide 31). There is a shift in Non-OPEC production from the North Sea and Alaska-the new oil producing areas of the 1970s-to new oil producing areas of the present decade. The fields in the North Sea and Alaska are maturing. The growth in production in Russia lies in the restoration of production after the steep decline in the early 1990s when Russia went into transition and the Former Soviet Union fell apart (Slide 37).

Compared to countries such as Russia and the US, reserves in the Persian Gulf are not intensely exploited. The reserve to production ratio is very high. Canada is an exception because last year oil sands were added to proven reserves. Oil sand exploitation is only just starting but is expected to grow in the future (Slide 36). Beside Canada, most growth is to be expected from Russia and the Caspian Sea region (Slide 38).

Although Non-OPEC oil production is predicted to grow, the call on OPEC oil is increasing as well. Already OPEC is nearing its maximum capacity while demand for oil is still growing. There are serious doubts about the ability of OPEC to increase production sufficiently and timely. Saudi Arabia claims that it will be able to produce 15 million barrels a day by 2015. That is an increase of 5 million barrels per day but perhaps not enough to meet demand. Other regions will have to increase production too (Slide 39).



Middle East vital for future supply

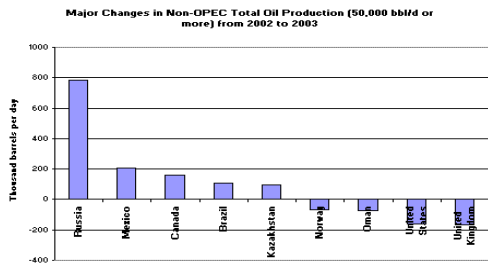
- Five Middle East countries have app. 65% of world proven reserves (Saudi Arabia, Iraq, Kuwait, Iran and UAE)
- Share in world production of these countries currently 30% and expected to grow (see slide 38)
- But: how reliable is OPEC proven reserve reporting and will they be able to mobilise enough capital?
 - From the 1990s OPEC reserves remain constant without major new oil finds
 - Pressure on the government budget is increasing due to population growth

Year	Abu Dhabi	Dubai	Iran	Iraq	Kuwait	Neutral Zone	Saudi Arabia	Venezuela
1980	28.0	1.4	58.0	31.0	65	6.1	163	18
1981	29.0	1.4	57.5	30.0	66	6.0	165	18
1982	30.6	1.3	57.0	29.7	65	5.9	165	20
1983	30.5	1.4	55.3	41.0	64	5.7	162	22
1984	30.4	1.4	51.0	43.0	64	5.6	166	25
1985	30.5	1.4	48.5	44.5	90	5.4	169	26
1986	30.0	1.4	47.9	44.1	90	5.4	169	26
1987	31.0	1.4	48.8	47.1	92	5.3	167	25
1988	92.2	4.0	92.9	100	92	5.2	167	25
1989	92.2	4.0	92.9	100	92	5.2	170	58
1990	92.2	4.0	92.9	100	92	5.0	258	59
1991	92.2	4.0	92.9	100	95	5.0	258	59
1992	92.2	4.0	92.9	100	94	5.0	258	63
1993	92.2	4.0	92.9	100	94	5.0	259	63
1994	92.2	4.3	88.3	100	94	5.0	259	65
1995	92.2	4.3	88.2	100	94	5.0	259	65
1996	92.2	4.0	93.0	112.0	94	5.0	259	65
1997	92.2	4.0	93.0	112.5	94	5.0	259	72
1998	92.2	4.0	89.7	112.5	94	5.0	259	73
1999	92.2	4.0	89.7	112.5	94	5.0	261	73
2000	92.2	4.0	89.7	112.5	94	5.0	261	77
2001	92.2	4.0	89.7	112.5	94	5.0	261	78
2002	92.2	4.0	89.7	112.5	94	5.0	261	78

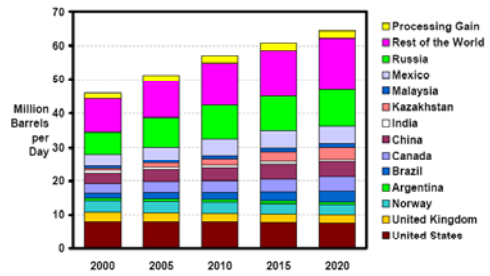
Spurious OPEC Reserve Revisions

Source: Campbell, 2004

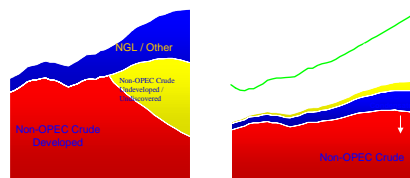
Shifts in NOPEC production



Although Non-OPEC oil production is predicted to grow...



... so will the future call on OPEC



3.6 OPEC


Slides 41-57

Governments of OPEC countries have great challenges to meet. Regional tension in the Middle East undermines the cohesion of the OPEC member states and policy co-operation. Internal political and/or economic problems in member states, political Islam and legitimacy of governments add to this tension. Governments of OPEC countries have continued difficulties to reform their economies, little progress has been made in the last decades. As there is a growing dependency on oil income to balance government budgets there is a tendency of OPEC countries to let short-term political and economic benefits determine their policies (Slides 50-52). Lower oil prices or lower production combined with strong population growth immediately lead to much lower per capita oil incomes (Slide 44).

How competitive is OPEC oil compared to Non-OPEC oil? OPEC countries can bring oil on the market at low costs. However state companies produce less efficient. They employ more people and many times are engaged in non-core business. They have budget constraints; expenditure grows while dependence on oil income is large (see OPEC fact sheets with statistics). Investments in new and enhanced capacity compete with social and other sector investments (Slides 46-48). Higher cost oil can easily reach the market at the OPEC Price Band (Slide 48).

Access to oil reserves is limited. Foreign parties have no access to more than half of the remaining world oil reserves. Access to Iraqi equity oil would substantially increase oil produced by international oil companies. This oil will always reach the market and would imply a technical withdrawal from the OPEC production regime. The ability of OPEC to set prices would decrease. *The opening up of Iraq for foreign direct investments could possibly have a larger effect on OPEC revenues than CO₂ emission policies (Slide 49).*

Energy Supply: Gulf and Caspian



- **Concentration**
 - Similar to pre-'73
- **Instability**
 - Economic
 - Political / Legal
- **Competition**
 - China, US, EU
 - Producers
- **Role OPEC**
 - Return of Iraq

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Challenges to governments of OPEC countries

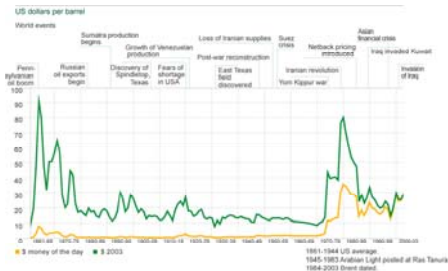
- Regional tension in the Middle East undermines the cohesion of the OPEC member states and policy co-operation
- Internal political and/or economic problems in member states; political Islam; legitimacy of governments
- Difficulties to reform their economies; little progress
- Growing dependency on oil income to balance budgets
- Tendency of OPEC countries to let short-term political and economic benefits determine their policies



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World oil prices since 1861



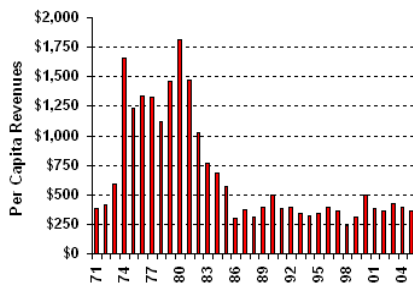
Source: BP Statistical review of world energy



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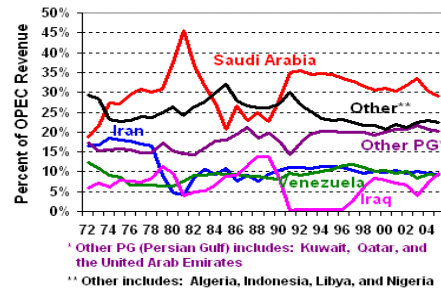
OPEC -- Per Capita Crude Oil Export Revenues (Constant \$2000)



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Share of OPEC Net Oil Export Revenues for Selected Countries, 1972-2005



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Competitive Edge?

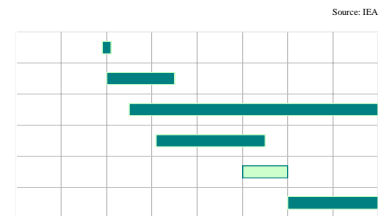
- OPEC countries can bring oil on the market at low costs... but
 - State companies produce less efficient; they employ more people and many times are engaged in non-core business
 - Budget constraints; expenditure grows while dependence on oil income is large (see fact sheets)
 - Investments in new and enhanced capacity compete with social and other sector investments
- Higher cost oil can easily reach the market at the OPEC Price Band



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Total oil supply costs



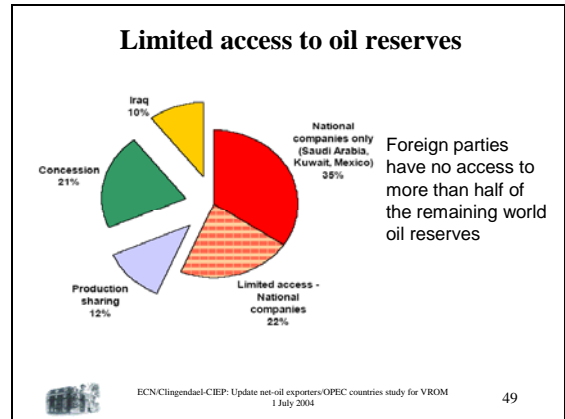
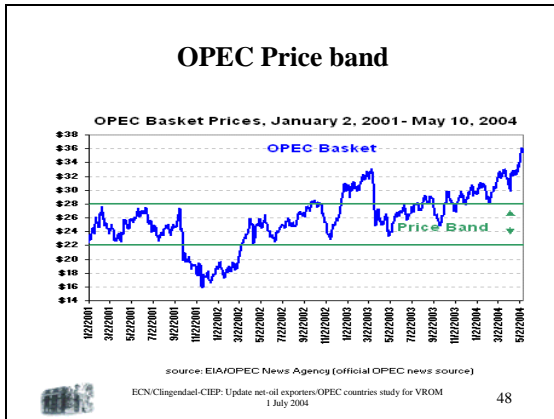
Source: IEA

But ME producers increasingly loose competitive edge due to expenditure needs



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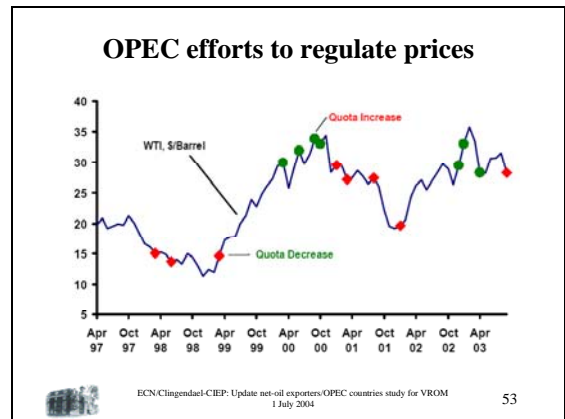
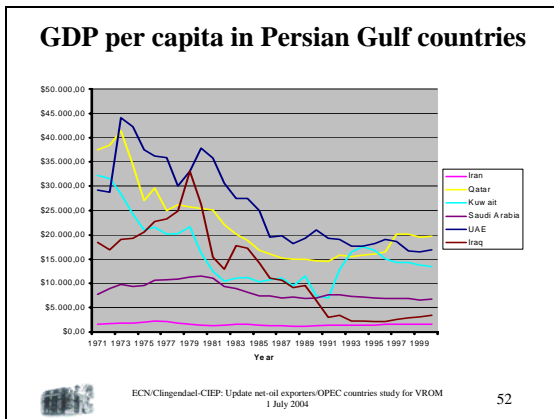
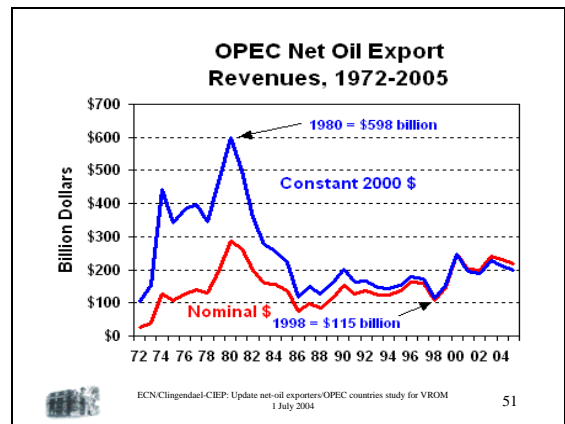
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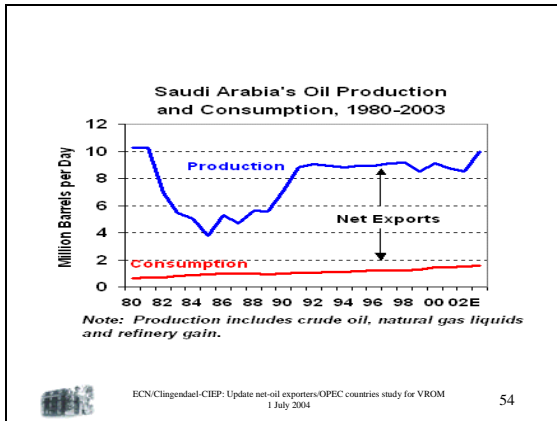


Instability in Exporting Regions: GDP

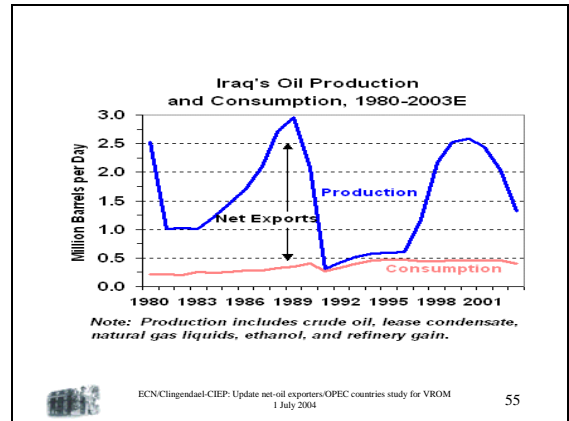
- OPEC countries have shown in 1997-1998 that they cannot 'live' with an oil price lower than \$12-14 per barrel, despite the low production costs— they need higher oil price to finance government budget. In 2004 this 'lowest' price was estimated at about \$22:
 - Demographic bomb ticking in Iran, Saudi Arabia and apparently also in Iraq; create jobs/future
 - Need investment capital particularly to develop gas sector/exports
 - Need to reverse the decline GDP per capita trend

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OPEC as swing producer

OPEC actual production (april 2004):	25.4 mbpd
OPEC sustainable production capacity:	27.9 mbpd
OPEC spare capacity:	2.5 mbpd
Of which:	
- Saudi Arabia: spare capacity can be increased to 2.2 mbpd within 90 days	1.2 mbpd
- UAE:	0.3 mbpd
- Iraq:	0.5 mbpd

With latest OPEC production increase little spare capacity is left and could create further tightness of the market

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Lessons from the past: oil market disruptions

- Most oil market disruptions have a (regional) political/strategic background, except for the crisis in 1985/86 and 2000, which had an economic origin
- Oil price collapses (except 2001) were due to lack of OPEC cohesion; like intra-regional conflicts; and 'mis-reading the market fundamentals for domestic economic purposes'; price of a panic barrel; government budget financing
- Gas flows have so far developed without disruptions; (pipelines connect countries for a long time, more private capital, long term contracts which have disappeared in the oil market in the early 1980s, and the regional orientation of gas until now)

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3.7 Diversification away from Gulf

Slides 59-63

Recent developments in the Gulf region form an incentive to look for diversification of energy supplies. The interest in Russian oil intensifies. Both the US and Europe look for a greater share of imports from Russia but also from elsewhere, e.g. the Caspian region. The Caspian region is increasingly important as an alternative source of supply. Hopes are that this region develops a similar role in the international oil market as the North Sea in the 1980s and 1990s. The African continent could be interesting as well but lack of stability forms a major obstacle to investments as there large risks involved. Sufficient availability of new supplies could continue to force OPEC (particularly the Middle East countries) in the role of swing producer but can they be generated in the future (Slide 59)? Russia and the Caspian region have considerable potential (Slides 60-63).

Diversification away from Gulf

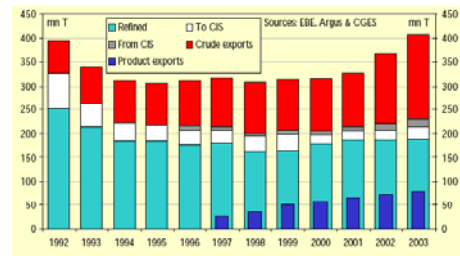
- Interest in Russian oil intensifies: both the U.S. and Europe look for a greater share of imports from Russia and elsewhere
- Caspian region also increasingly important as an alternative source of supply. Hopes are that this region develops a similar role in the international oil market as the North Sea in the 1980s and 1990s.
- Africa could be interesting but lack of stability major obstacle to investments; large risks
- Sufficient availability of new supplies could continue to force OPEC (particularly the Middle East countries) in the role of swing producer but can they be generated in the future?



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Russian oil balance: rising output and rising exports



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Caspian Sea Oil Potential

- Possible Production in 2010:
3.9 million barrels a day
- Present production in the Caspian Sea is:
about 1.5 million barrels a day
- Proven oil reserves:
18.5-35 billion barrels, that is 1.5% of 2003 world proven reserves
- Possible oil reserves:
235 billion barrels

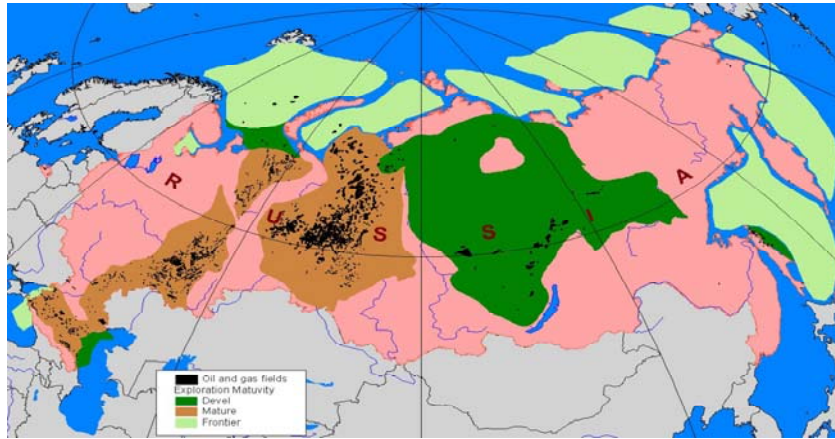


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Russian oil reserves

Far from markets, harsh climate, lacking infrastructure



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New potential



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3.8 Co-operation with OPEC within the Kyoto framework

Slides 65-66

What kind of co-operation is possible with OPEC countries within the Kyoto framework? It is clear that the available fund is relatively small. Furthermore, income support is not a suitable policy tool under Kyoto co-operation, as there are other UN-organisations that deal with this type of support. Therefore as oil income is influenced by more than CO₂ emissions alone, we suggest that the co-operation should focus on Kyoto related issues such as energy saving (domestic energy saving leaves more oil or gas available for export and thus supports energy export income) and more efficient energy technologies. Knowledge sharing by private companies on the latest, state-of-the art technologies is only one of the possibilities, but one can also think of innovations, e.g. in the field of alternative fuels and technologies with lower CO₂ emissions. The aim of this co-operation is to include countries in the progress rather than exclude or hurt their interests (Slide 65). Co-operation in the field of technology and particularly in the field of new energy technologies (and services) underlines the importance of oil (and gas) to their economies and is an important tool to develop joint interests. Energy saving projects help to make the economies more energy-efficient. Joint clean carbon technology projects make producer countries part of this cleaner fuel future. This is somewhat in contrast with the current situation in which producer countries feel that cleaner energies are a threat to their economic interests (Slide 66).

Co-operation (1)

- Given that the fund is relatively small and income support not a really suitable policy tool under Kyoto co-operation (other UN organisations deal with these topics) and that oil income is influenced by more than CO2 policies alone, we suggest that the co-operation should focus on Kyoto related issues such as:
 - Energy saving (and make available more oil or gas for export and thus support energy export income)
 - Enhance energy technologies
 - Knowledge sharing by private companies on latest, state-of-the-art technology
 - Technologies for Alternative fuels
 - Clean Carbon technologies
- The aim of this co-operation is to include countries in the progress rather than exclude or hurt their interests



Co-operation (2)

- Co-operation in the field of technology and particularly in the field of new energy technologies (and services) underlines the importance of oil (and gas) to their economies and is an important tool to develop joint interests
- Energy saving projects help to make the economies more energy-efficient
- Joint clean carbon technology projects make producer countries part of this cleaner fuel future
- This is somewhat in contrast with the current situation in which producer countries feel that cleaner energies are a threat to their economic interests



3.9 Concluding remarks

- After March 1999 OPEC boosted its oil income through its production policy.
- The GDP per capita development in the net-oil producing countries remains to be a concern.
- The domination of oil (and gas) of their economy will last for the largest producers for decades to come.
- The non-oil sector in the economies will have difficulty to be developed.
- Particularly labour intense industries will be hard to develop while some of the oil producers need to create many jobs in their economy.
- The discussion about facilitating negative income effects of CO₂ measures is difficult in the changing circumstances of market power of particularly OPEC and fluctuating oil prices.
- The effect is harder to establish.
- Cooperation seems much easier at the level of energy-saving projects (which could imply that energy saved in the domestic economy can be exported and helps export income from oil) and at the level of co-operation in technologies with lower CO₂ emissions.
- Cooperation of this kind recognises the importance of oil to their economies, while at the same time projects could be developed in the energy sphere.
- Oil exporting countries have repeatedly expressed their interest in technology transfer and co-operation.

APPENDIX A KEY OPEC STATISTICS

	Population 2003 [million]	Status Kyoto Protocol	National communications submitted	Oil export in 2003 [mbd]	GDP per capita 2003 [US\$]	Per capita CO ₂ in 2001 [metric tons]	Source/ Date oil export statistics
<i>OPEC Countries</i>							
Algeria	32.8	Not signed	30/04/01	1.64	2,186	0.7	EIA/Feb. 2004
Indonesia	231.3	Signed	27/10/99	0.3	786	0.4	EIA/Jan. 2004
Iran	68.3	Not signed	31/03/03	2.48	1,846	1.4	EIA/Nov.2003 and January 2004
Iraq	24.7	Not signed		1.0	1,012	0.8	EIA/March 2003 and January 2004 www.abcnew.go.com
Kuwait	2.2*	Not signed		2.00	18,090	30.4	EIA/March 2003 and January 2004 and CIA factbook
Libya	5.5	Not signed		1.25	3,537	2.3	EIA/January 2004 and CIA factbook
Nigeria	129.9	Not signed	17/11/03	1.93	316	0.2	EIA/March 2003 and January 2004
Qatar	0.81	Not signed		0.90	23,181	13.7	EIA/November 2003 and January 2004 and CIA factbook
Saudi Arabia	21.7	Not signed		8.38	9,668	4.0	EIA/June 2004
UAE	2.5	Not signed		2.29	31,960	13.3	EIA/February 2004
Venezuela	22.4	Not signed		2.23	3,973	5.7	EIA/June 2004

Notes:

1. GDP figures Indonesia, Nigeria, Qatar, Saudi Arabia and Norway are for 2002.
2. Population figures Indonesia, Nigeria, Saudi Arabia and Venezuela are for 2002.
3. Population figure Kuwait includes 1.3 million non-nationals.
4. Per capita CO₂ figure Venezuela is for 2002.
5. All OPEC countries except Iraq have ratified the Framework Convention on Climate Change.

APPENDIX B KEY NON-OPEC NON-ANNEX-1 STATISTICS

	Population 2002 [million]	Kyoto Protocol	National communications submitted	Oil export in 2003 [mbd]	GDP per capita 2001 [US\$]	CO ₂ emissions per capita in 1999 [metric ton]	Source/ Date oil export statistics
<i>Non OPEC non Annex I Countries</i>							
Argentina	38	Ratified	25/07/97	0.51	7,166	3.8	EIA/January 2004
Azerbaijan	8	Ratified	23/05/00	0.18	688	4.2	EIA/June 2003
Benin	7	Ratified	21/10/02	0.0007	368	0.2	EIA/EB 2001
Bolivia	9	Ratified	16/11/00	-0.013	936	1.4	EIA/October 2003
Chad	8	Not signed	29/10/01	N.A.	202	N.A.	
Colombia	44	Ratified	18/12/01	0.35	1,915	1.5	EIA/May 2003
Dem.Rep. Congo	54	Not signed	21/11/00	0.02	N.A.	N.A.	EIA/EB 2001
Ecuador	13	Ratified	15/11/00	0.29	1,754	1.9	EIA/February 2004
Egypt	66	Signed	19/07/99	0.19	1,511	2.0	EIA/February 2004
Guatemala	12	Ratified	01/02/02	N.A.	1,754	0.9	
Kazakhstan	15	Not signed	05/11/98	0.8	1,503	7.4	EIA/July 2003
Malaysia	24	Ratified	22/08/00	0.29	3,699	5.4	EIA/Nov. 2003
Mexico	101	Ratified	09/12/97	1.75	6,214	3.9	EIA/March 2004
Papua New Guinea	5	Ratified	27/02/02	0.07	563	0.5	EIA/EB 2001
Sudan		Not signed	07/06/03	0.19	395	0.1	EIA/January 2003
Tajikistan	6	Not signed	08/10/02	0.0001	169	0.8	EIA/EB 2001
Tunisia	10	Ratified	27/10/01	0.06	2,066	1.8	EIA/EB 2001
Vietnam	81	Ratified	02/12/03	0.15	411	0.6	EIA/June 2004
Yemen	19	Not signed	29/10/01	0.37	514	1.1	EIA/May 2003

Note: GDP per capita and CO₂ per capita obtained from Human Development Report 2003.