



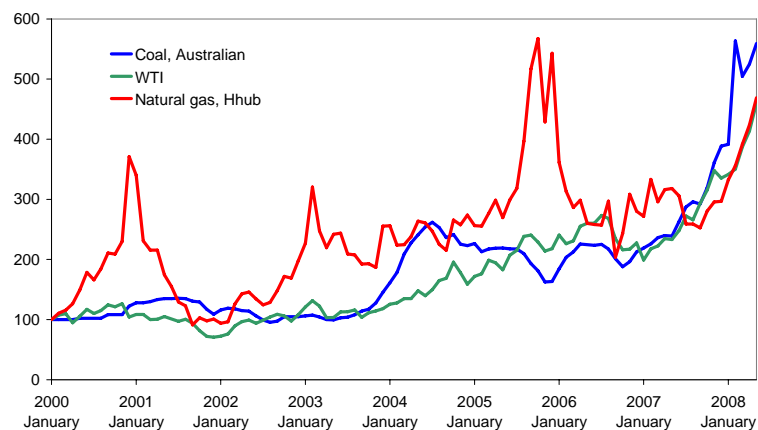
5th Ministerial EU–OPEC Meeting Brussels, 24th June 2008

World Oil Outlook OPEC Background Paper

This background paper, prepared especially for the occasion of the 5th Ministerial EU–OPEC Meeting, is based upon the World Oil Outlook 2008 which will be formally released by the OPEC Secretariat in Vienna on 10th July 2008. The projections in this document are therefore not yet in the public domain, and should be considered for information only, specifically for the purpose of supporting this High-Level meeting.

In the summer of 2007, the OPEC reference basket of crudes averaged \$71/b. By June 2008, it had passed \$130/b. Of course, these recent oil price movements need to be seen in the context of a price surge in all commodities, be they energy, metals or agricultural products. For example, in the energy group, coal and uranium prices have risen even more than light sweet crude. (The Figure shows monthly average price indices for coal, oil and natural gas, since January 2000.)

Energy price developments: coal, oil and natural gas, January 2000=100



Oil price rises have occurred when there has not, at any time, been a shortage of oil. What have been the drivers?

Prices were very low throughout most of the 1980s and 1990s. This had a dramatic impact on the oil industry. It meant investments were scaled down; drastic cost-cutting strategies were put in place; R&D spending was reduced and, more importantly for the longer term, the oil industry no longer attracted the much needed skills from those just beginning their careers. Low oil prices were bad for the oil industry and oil producers, and in the longer term they were also bad for consumers. Indeed, at the beginning of this century, when faced with above-trend global economic growth, the world was caught unprepared for the dramatic surge in energy demand. In addition to this, there were the hurricane-related supply disruptions in the US.

OPEC spare capacity has played a critical role in ensuring that oil markets remained well supplied. OPEC has increased its crude supply by 4 mb/d since 2003, with another 1 mb/d increase coming from its natural gas liquids (NGLs). Today, there is no shortage of oil and OECD commercial oil stocks are at comfortable levels.

Clearly, elements other than supply and demand fundamentals are at play.

The first element is related to the fall in the value of the dollar in relation to other currencies. For example, it went from 1.3 dollars per euro in August 2007 to around \$1.6 in June 2008. This represents a significant weakening in the value of the dollar.

Another element driving oil prices relates to the role of regulated oil futures and unregulated over-the-counter (OTC) exchanges. The trade in paper barrels has expanded dramatically in recent years. For example, the ratio of paper barrels traded on the NYMEX to the physical barrels actually supplied has exponentially increased over the last four years. In 2003, for each physical barrel, six paper barrels were traded; today, that ratio has risen to more than 18 barrels traded, three times as high. And these ratios are even higher if London and Singapore futures exchanges, the unregulated Atlanta-based Intercontinental Exchange, as well as OTC transactions, index trading and derivatives products are taken into account. Many believe that the proper functioning of futures markets has been altered by the various loopholes that effectively allow unlimited and undetected speculation, far beyond the limits of healthy liquidity-providing levels towards damaging price-distorting ones.

In developing a supply and demand outlook for oil and energy to 2030, an assumption needs to be made with regard to how the price of crude oil will evolve. Having witnessed the OPEC reference basket of crudes increase from an average of \$28/b in 2003 to over \$130 in June 2008, attention has gradually shifted to the observation that both economic growth and oil demand are more resilient to higher oil prices than had been thought, although recently, some impacts have been observed in the form of policy reactions and consumer behaviour changes. On the other hand, rapidly rising upstream costs point to higher breakeven prices for some capital-intensive and highly costly oil investments projects. The marginal cost of producing alternative fuels, be they oil sands, or Fischer-Tropsch liquids, is probably now higher than \$70/b.

The reference case

With world economic growth in the reference case assumed at an average of 3.5% per annum (on a power purchasing power basis) over the years to 2030, and no significant departure from current trends in policies and technologies, energy demand grows by an average of 1.7% p.a. in the reference case. Fossil fuels will continue to provide most of the world's energy needs, with a share consistently over 85%. Oil remains in the leading position in the world energy mix, while coal regains its importance and gas is expected to grow at fast rates. The total contribution of non-fossil fuels will grow. However, despite the extreme high growth rates for some renewables, the rather low initial base makes the growth in absolute terms rather limited.

Oil demand in the reference case rises by 29 mb/d from 2006–2030, when it will reach 113 mb/d. Although developing countries are set to account for most of this rise, by 2030, they will consume, on average, approximately five times less oil per person, compared with OECD countries.

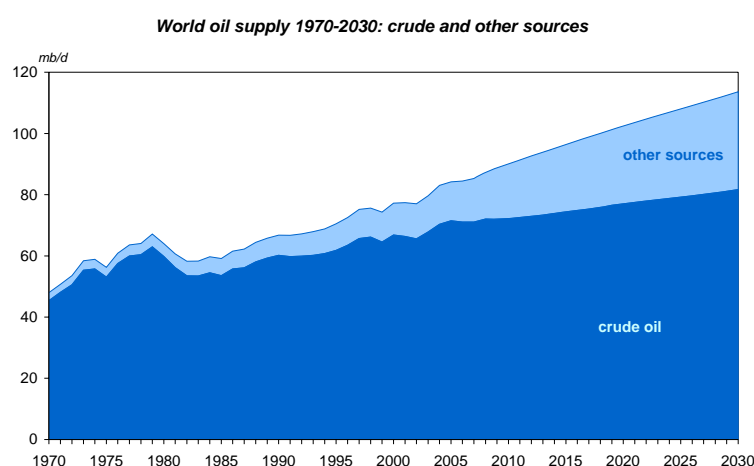
**World oil demand and supply outlook in the reference case
(mb/d)**

	2006	2012	2020	2030
World oil demand	84.7	92.3	102.2	113.3
Non-OPEC supply	49.0	55.1	58.9	60.3
of which: non-conventional	2.5	4.6	7.7	10.9
OPEC NGLs/non-conventional	4.1	6.6	8.0	9.8
Call on OPEC crude	31.6	30.9	35.5	43.6

The transportation sector will be the key to future oil demand growth. The potential for increases in vehicle ownership is greatest in developing countries: four billion people currently live in countries with an average of less than one car per 20 people, while this ratio is well over one for every two in many developed countries. Oil use is also expected to rise in other sectors in the developing world, for example, as the petrochemical industry expands in these countries.

There will be a wide range of sources of oil to satisfy this demand. Over the years 2007–2012, total non-OPEC oil supply is expected to grow rapidly by close to 6 mb/d. Decreases in some non-OPEC regions are more than compensated for by rises in other regions, together with a rise in biofuels and Canadian oil sands. On top of this, NGLs and non-conventional oil from OPEC Member Countries are also expected to continue rising. Over the medium-term, total liquids supply, other than OPEC crude, should increase by an annual average that is slightly higher than expected demand growth, pointing to similar OPEC crude supply levels in 2012 compared to 2008. With the investments currently underway in OPEC Member Countries to expand upstream capacity, spare capacity is set to grow in the reference case.

Beyond 2012, non-OPEC supply is expected to maintain its growth, particularly from non-crude sources, such as the Canadian oil sands, and biofuels, mainly in the US, Europe and Brazil. In total, almost 11 mb/d of non-conventional oil supply comes from non-OPEC by 2030 in the reference case, an increase of more than 8 mb/d from the 2006 level. By 2030, total non-OPEC supply reaches 60.3 mb/d. These figures suggest that an additional 12–13



mb/d of OPEC crude will be required by 2030, but the share of OPEC crude is not expected to be markedly different from that of today. In addition, total demand for conventional crude will not exceed 82 mb/d by 2030.

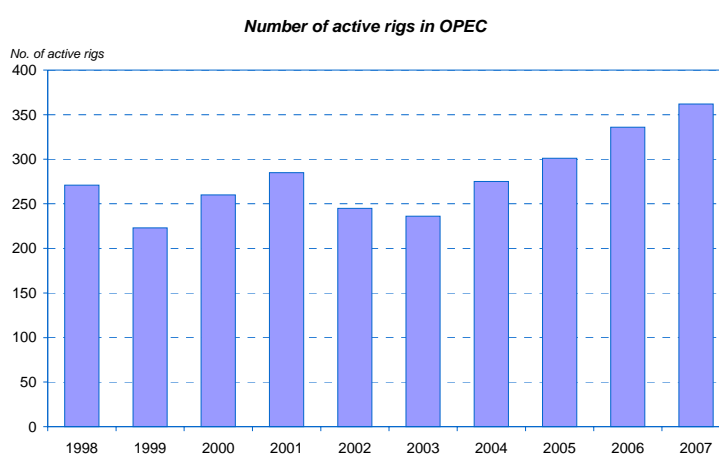
Of course, bringing these supplies to market implies major challenges for the oil industry. However, one area that has been mistakenly

identified as a constraint is the oil resource base. The level of ultimately recoverable reserves is clearly more than sufficient to supply the amount of crude oil and NGLs that will be

needed. With this large and increasing resource base, together with the vast amounts of non-conventional oil, availability is not an issue. To put it simply: there *is* enough oil to meet the world's needs for the foreseeable future. Instead, attention should be focussed upon the deliverability of the required oil. Here the industry faces several key challenges, as well as associated opportunities.

An important factor that today hampers the economics of upstream projects is the cost of engineering, procurement, construction and petroleum services, as well as the cost and availability of skilled labour. In recent years, the oil industry has witnessed huge increases in the cost of raw materials, as well as in all segments of petroleum services. Some estimates point to upstream costs having doubled since 2000, with 75 per cent of the increase coming in the last two and a half years. While there some of this upward movement is cyclical, structural changes, such as the continued move toward deeper water and frontier regions, suggest that an element of higher costs is here to stay.

Nevertheless, despite these increasing costs, the industry is investing heavily and advancing activities to expand production and replace reserves. An illustration of the acceleration of upstream activity can be viewed in the recent growth in the number of worldwide active rigs, and in 2007, exploration and production spending were at their highest level for the past two decades.

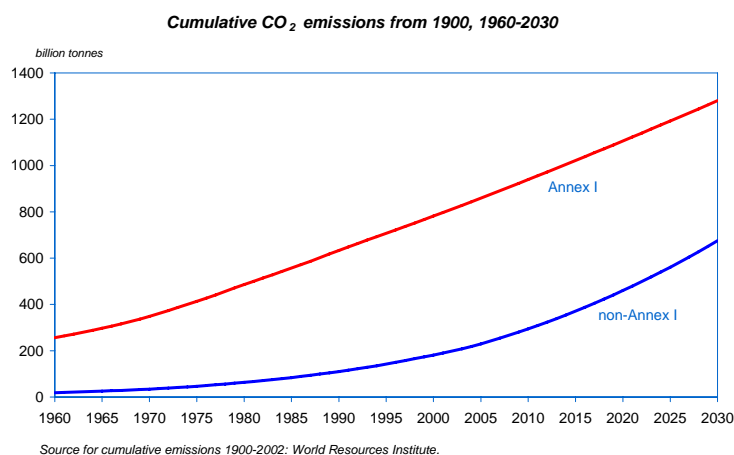


The continual shortage of a well-trained and experienced work force in the oil industry also deserves due attention. Today, co-ordinated efforts between all the various players, namely IOCs, NOCs, service companies, academia and governments, are needed to restore this essential capacity. From OPEC's perspective, much work is being done in this area and the training of industry professionals in Member Countries continues to expand. But to alleviate the skills shortage more work needs to be done globally to help further facilitate education and training in energy disciplines. The industry should be made more attractive to prospective graduates — this includes making it easier for students to enrol in universities across national borders — and employees the world over.

With the world expected to rely on fossil fuels for many decades to come it is critical to ensure that future energy growth that supports both economic growth and social progress is compatible with the need to tackle the issue of climate change as we move towards a more carbon-constrained world.

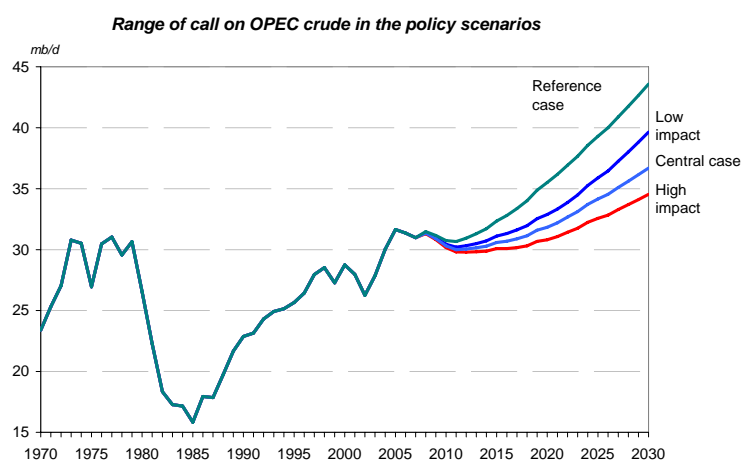
It points to the need to promote the early development and deployment of cleaner fossil fuel technologies. Carbon capture and storage (CCS) can be applied to large stationary sources of

CO₂ emissions, such as power, cement and steel plants and can achieve, according to the Intergovernmental Panel on Climate Change, a mitigation potential of between 200-to-2,000 gigatons of CO₂ by 2100. To date, three industrial-scale CCS demonstration projects are underway, one being located in an OPEC member country, Algeria. Developed countries, having the financial and technological capabilities, and bearing the historical responsibility, should take the lead in moving CCS towards full-scale deployment. It is important to remember that, as the Figure demonstrates, the cumulative contribution to CO₂ emissions of Annex I Parties will continue to dominate the global picture.



Policy scenarios

On top of these challenges, the oil industry faces great uncertainties over how much to invest. For example, the recent policy proposals to address climate change and renewables



targets could have substantial impacts upon the amount of oil that would need to be supplied by OPEC. Even greater uncertainty exists for the required amounts of OPEC oil if we move beyond specific policy announcements. Scenarios for the call on OPEC crude oil suggest that the range of uncertainty for OPEC oil is considerable. By 2020, the amount of crude oil needed is in the range 29–38 mb/d, a gap of 9 mb/d. This translates into an uncertainty gap for upstream investment needs in OPEC Member Countries of over \$(2007) 300 billion.

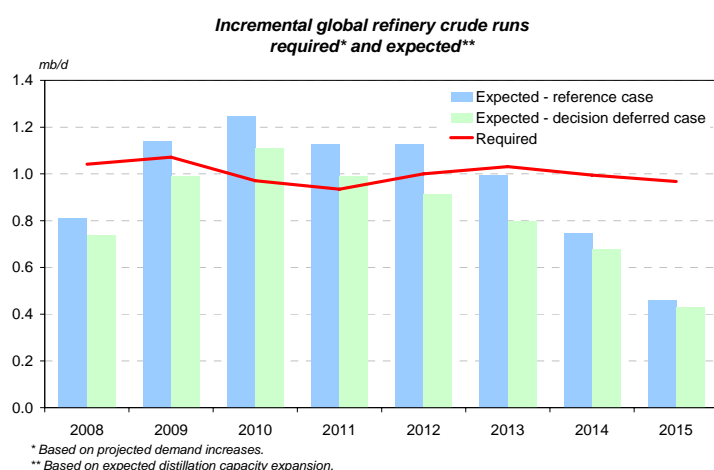
Downstream

Turning to the downstream, a primary question concerns refining tightness and there are several factors that play into this, such as: refining projects; supply levels of non-crudes that essentially bypass refineries; crude quality; demand growth and mix; the continued move towards more stringent quality specifications; and the possible imposition of carbon emissions targets on refineries.

How refining projects evolve over the next few years will materially impact the refining balance and the sector's economics. In the period up to 2015, it is estimated that, in the reference case, around 9 mb/d of new crude distillation capacity will be added to the global refining system, including capacity creep. The analysis indicates that distillation capacity additions should exceed requirements in each year from 2010 to 2013, as a range of new projects come on-stream, thereby potentially easing refining tightness and margins. However, if refining projects are delayed or cancelled, then cumulative additions will not keep pace with demand requirements, indicating no capacity excess.

While crude unit additions by 2015 appear close to sufficient in the reference case, those for secondary processing units are not. Substantial further additions are needed, especially for hydro-cracking and desulphurization. In particular, the gap between supply and demand for middle distillates will grow, unless more diesel-oriented projects are implemented. This evolving gap will likely drive price differentials towards a premium for diesel and could also have an impact on the absolute level of product and crude prices.

Another critical parameter is that the proportion of non-crudes in the total supply rises, while that for crude to be processed per barrel of additional product demand declines. Despite



biodiesel growth, Europe's diesel deficit sharply widens. A further consequence is that proposed biofuels mandates are adding to the uncertainty surrounding the need for future refining investments, and in some cases, this might lead to refiners deferring major investment decisions.

A third key factor impacting refining requirements and economics over the medium- to

long-term is the make-up of crude supply and the resulting quality of the global crude slate. However, the overall global crude slate quality will remain relatively stable over the forecast period. Moreover, the results indicate that, on a global basis, the effect of any potentially declining crude quality would be of secondary importance to changes expected on the demand side.

A primary factor for the long-term downstream investment requirements is the level and quality of product demand. Of central significance is the move toward distillates, notably diesel, and toward low and ultra-low sulphur fuels as the OECD regions complete conversion and non-OECD regions progressively adopt these standards.

The most notable trend in this respect is the continuing shift to middle distillates and light products over the entire period. The fact that out of around 27 mb/d of additional demand

by 2030, almost half is for gasoil/diesel and another more than 40% is for other light and medium products poses one of the biggest challenges for refiners. This change in product mix, along with overall product demand growth, will necessitate expansion of refinery downstream conversion capacity to increase desired product yields.

To meet future demand, a total of almost 20 mb/d of additional distillation capacity will be required by 2030, compared to existing capacity at the end of 2007. In addition, the downstream sector will also require close to 12 mb/d of new conversion capacity and almost 8 mb/d of octane-enhancing units by 2030. With regard to conversion, there is a growing emphasis on hydro-cracking over coking and FCC units. Desulphurization requirements, dominated by those for diesel, continue to be very substantial to 2030. This is reflected in the projection that the global refining system will need more than 23 mb/d of additional desulphurization capacity by 2030 over the 2007 base.

Concluding remarks

In conclusion, it is important to understand the growing complexity of the global energy system. The oil industry continues to successfully and efficiently find, develop, produce, refine and transport oil to the consumer. The deliverability of oil is linked to a host of challenges — and opportunities — as this outlook highlights, and in turn, there has always been, and continues to be, an evolutionary process that requires the system to adapt to new realities.

Given future demand growth uncertainties, a key challenge will be to anticipate the level of demand to make the appropriate investments to maintain and expand oil capacity, as well as the corresponding downstream infrastructure, without over- or under-investing. This is a fundamental basis for long-term market stability. Security of demand is a real issue. It is intrinsically linked to security of supply. It is not just a question of whether there will be enough supply to meet demand; it is equally a question of whether there will be enough demand to meet current and predicted supply. Both are needed for a stable world oil market.

All of this points to growing energy interdependence and complexity. This, if anything, is the new world of energy; something that all stakeholders will increasingly need to embrace. This 'new world' is nothing new for the energy industry, and the oil industry in particular, which has a long and successful history of adapting to change, and will continue to do so. One fundamental way forward is pragmatic dialogue among all parties, a positive, forward looking dialogue that is to be cognizant of needs and responsibilities of oil producers and consumers, oil exporters and importers, developed and developing nations, and present and future generations.