



Oil outlook to 2030

OPEC Secretariat background paper

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Table of contents

Executive summary	i
1. Introduction	1
2. Recent market behaviour	1
3. Oil outlook to 2030	2
3.1 Oil demand	2
3.2 Oil supply	6
3.2.1 Upstream	6
3.2.2 Downstream	7
4. Investment challenges	9
4.1 Reference Case investment requirements	9
4.2 Implications of a protracted recession	10
4.3 Uncertainty: a broader picture	11
4.4 Cost and human resources	12
4.5 Sustainable development	12
5. Concluding remarks	13

EXECUTIVE SUMMARY

Since the 11th International Energy Forum (IEF) in April 2008, there has been unprecedented turbulence in energy markets in general, and oil markets in particular. Oil prices have roller-coastered: starting 2008 at US\$92/b, the OPEC Reference Basket rose to a record \$141/b in early July before falling to \$33/b by the end of the year, the lowest level since summer 2004. In 2009, the price recovered from this low, reaching \$77/b by the end of the year. The price swings of recent years have led to more scrutiny from governments into the functioning of markets. It is important to recognize the role played by futures markets and unregulated exchanges in driving the crude oil price, in particular through increased speculative activity. Non-commercial investor activity in oil futures does provide liquidity to markets, a healthy feature for price discovery and risk transfer functions; however, when left unchecked and with no position limits, it is likely to exacerbate price movements and weakens their correlation with fundamentals.

The central element linked to the price volatility has been the global financial crisis, the ensuing deep and widespread recession in OECD countries and the sharp slowdown of economic activity in developing countries. The implications of this have stretched far and wide and have been felt on every front globally, with a contraction in economic activity, a decline in world trade and an erosion of wealth. This includes choking oil demand.

Against this backdrop of extreme oil price volatility, the global financial crisis and an economic crisis unseen since the Great Depression, a host of new challenges have arisen in preparing an outlook for oil. One of these challenges relates to assumptions for future price developments. For OPEC's Reference Case, the key to the oil price assumption is the perception of the behaviour of marginal supply costs in the medium- to long-run. For the next decade, nominal prices are assumed to stay in the \$70–80/b range, while longer term they are assumed to remain in the \$70–100/b range. This assumption reflects the current broadly accepted view that prices that are too low are not sustainable as they limit the flow of upstream investment, while prices that are too high could hamper the global economic recovery and medium- to long-term growth prospects. However, these assumptions do not reflect or imply any projection of whether such a price path is likely or desirable.

Although growth has returned in 2010, there is a growing perception that the economic slowdown will be 'U-shaped' and the recovery will gather momentum only gradually. For the Reference Case, it is assumed that by 2012, economic growth is back to trend values. The strongest growth is expected in developing countries and regions, in particular, China and South Asia, which expand at an average rate of 6.3% per annum (p.a.) and 4.7% p.a., respectively, over the period 2009–2030. The average global growth rate is 3% p.a.

Another major issue to address is the extent to which energy policies are introduced into projections. In the Reference Case, two sets of policy initiatives have been incorporated: the United States (US) Energy Independence and Security Act (EISA), which has been passed into law, and the European Union's (EU) climate and energy legislative package.

In the Reference Case, energy use increases by 42% from 2007–2030. Realistically, fossil fuels will continue to satisfy most of the world's energy needs, contributing more than 80% to the global energy mix over this period. And oil will continue to play the leading role to 2030.

Medium-term oil demand prospects are adversely impacted by the global financial and economic crisis. OECD oil demand is expected to have fallen by 2 mb/d from 2008–2010 and, in the Reference Case, remains flat to 2013. Indeed, it is likely that OECD oil demand peaked in 2005. The main source of incremental oil demand over this period will be developing countries. Looking further into the future, oil demand patterns become increasingly influenced by the implementation of policies. Oil demand in the Reference Case is less than 106 mb/d in 2030, down from 118 mb/d in the OPEC background paper prepared for the previous IEF Meeting in Rome, just two years ago. Developing countries are set to account for most of the long-term rise. Almost 80% of the net growth in oil demand from 2008–2030 is in developing Asia. Nevertheless, per capita oil use in developing countries will remain far below that of the developed world.

Total non-OPEC oil supply is expected to continue to rise slightly over the medium-term, increasing by just over 1 mb/d for the years 2008–2013. This increase comes mainly from non-conventional oil. The Reference Case thereby points to demand for OPEC oil, having fallen in 2009 in the face of the global economic contraction, rising slowly over the medium-term and returning back to average 2008 levels by around 2013. Large investments are currently underway in OPEC Member Countries to expand upstream capacity. Although the low price environment at the end of 2008 and early 2009 led to the delay or even postponement of projects, several of these projects have now been reactivated following the oil price revival in 2009. However, there is ample OPEC crude oil spare capacity today, exceeding 6 mb/d, and it is expected that, even with the delays, spare capacity is set to remain at comfortable levels.

The resource base is more than sufficient to meet demand for the foreseeable future. Total non-OPEC oil supply continues to rise due to the increase in non-crude sources, mainly Canadian oil sands, biofuels and natural gas liquids (NGLs). Up to 2020, crude production increases in Russia, the Caspian and Brazil largely compensate for declines in the OECD. By 2030 there is only a need for 77 mb/d global crude oil supply. The amount of OPEC crude that will be needed reaches just over 41 mb/d by 2030.

The recent extreme oil price volatility, the global financial crisis, and many of the uncertainties that complicate upstream investment decisions and implementation are also relevant to the downstream. Rising oil prices from 2003–2008, together with refining tightness and high margins, have in recent years brought forward an increasing number of projects. It is estimated that around 6 mb/d of new crude distillation capacity will be added to the global refining system from existing projects by 2015. The implication is for a sustained period of low refinery utilizations and, hence, poor refining economics: the refining industry will likely face rationalization and restructuring in order to maintain its viability.

A principal theme that emerges from the outlook, in both upstream and downstream assessments, is cyclicity, with its ensuing challenges of making the appropriate investments in an environment of uncertainty and in an industry characterized by massive upfront capital requirements and long-lead times. This has been further underscored as the current global financial and economic crisis has unfolded and many new energy-related policies are being introduced or envisaged in major consuming countries. The need for counter-cyclical measures to support stability in markets is now recognized more than ever.

The possible implications of a recession that is deeper and longer than assumed in the Reference Case have been explored. This scenario also assumes that crude oil prices are significantly softer than in the Reference Case. Low prices have significant impacts on oil supply prospects, reducing both profitability and cash flows. The scenario also has important implications on OPEC Member Country investment. OPEC Member Countries have legitimate concerns over security of demand and the risk that large investments will be made in capacity that is not needed. In this scenario, non-OPEC supply is reduced due to the low oil price, while upstream OPEC capacity investment is primarily focused on compensating for natural declines. If non-OPEC supply continues to be affected through a lack of investment, then spare capacity in OPEC Member Countries will dwindle. The lack of capacity is a direct result of the low prices that are assumed: the period of low prices in 1998–1999 was an important driver for the capacity shortages that presaged the 2004–2008 price rise. In this scenario, history, to an extent, repeats itself, as low prices sow the seeds of potential future lagging investments and price spikes.

On the issue of climate change, the COP-15 Climate Change Conference in Copenhagen in December 2009 led to more questions than answers. Nevertheless, it is clear that OPEC Member Countries, heavily dependent upon oil exports, will be significantly affected, not only by climate change, but also by the adverse impacts of response measures. We should never lose sight of the historical responsibility of developed countries regarding the state of the Earth's atmosphere. The need to adapt to a carbon-constrained environment will make the use of cleaner technologies, including fossil fuel technologies, all the more pressing. Of particular note is the technology of carbon capture and storage (CCS), which has a high mitigation potential. Developed countries, having the financial and technological capabilities, and bearing the historical responsibility for the state of the Earth's atmosphere, should take the lead in mitigation and adaptation efforts, as well as in providing adequate and predictable financial resources, and in ensuring the transfer of technology.

The outlook in this background paper points to increasing interdependencies among all stakeholders. This is in line with OPEC policy in favour of strengthening and broadening the dialogue between energy producers and consumers at the global level, in particular through the IEF.

1. INTRODUCTION

As with previous Ministerial meetings of the IEF, the OPEC Secretariat has prepared a background paper that looks at the outlook for oil demand and supply, and the associated current and future challenges and their impacts. Today's context throws several of these challenges into sharp focus, especially the recent history of extreme price volatility, and the uncertainties that continue to emerge from the aftermath of the global financial crisis.

The paper is organized into four sections. The first section focuses on recent developments, in particular, related to oil market behaviour. The second develops a Reference Case outlook for oil supply and demand to the year 2030.¹ The third then addresses some of the challenges ahead, covering, in particular, investment needs and the type and scale of uncertainties. A fourth section offers some conclusions.

2. RECENT MARKET BEHAVIOUR

Since the 11th IEF held in Rome in April 2008, there has been unprecedented turbulence in oil markets. Oil prices have roller-coasted: starting 2008 at US\$92/b, the OPEC Reference Basket rose to a record \$141/b in early July before falling to \$33/b by the end of the year, the lowest level since summer 2004. In 2009, the price recovered from this low, reaching \$77/b by the end of the year.

The central element linked to the collapse in oil prices was the global financial crisis, the ensuing deep and widespread recession in OECD countries and the sharp slowdown of economic activity in developing countries. In turn, this choked demand for oil.

Of course, such large price swings are not in the interests of either producers or consumers. Accordingly, two ad-hoc Ministerial Meetings focused on this issue were held in Jeddah (June 2008) and London (December 2008). Indeed, commodity market behaviour, particularly that relating to oil price volatility, has led to more scrutiny from governments into the functioning of these markets. Some regulatory institutions are currently discussing ways and means to better regulate commodity derivatives markets, aimed at improving transparency and tightening oversight.

It is now widely recognized that unsustainably high price levels observed in mid-2008 were to a large extent due to significant speculative investment inflows in oil and products futures and over-the-counter (OTC) markets. It is important, therefore, to identify and understand the role played by regulated futures markets and unregulated OTC exchanges in exacerbating crude oil price movements, both upwards and downwards, in particular through increased — though difficult to monitor — speculative activity. The likelihood is high that the emergence of oil as an asset class has contributed significantly to the price volatility seen in the recent past. In addition, the recent financial turmoil has provided more broad-based evidence of the possible adverse impacts of loosely regulated financial markets.

Non-commercial investor activity in oil futures does play a positive role in providing liquidity, as well as facilitating price discovery and risk hedging functions. However, when left unchecked and with no position limits, their activity tends to

¹ Based upon the OPEC World Oil Outlook 2009, published in July 2009 and available at <http://www.opec.org/library/World%20Oil%20Outlook/pdf/WOO%202009.pdf>

exacerbate price movements and weakens their correlation with fundamentals, especially when faced with such an uncertain economic environment as today.

3. OIL OUTLOOK TO 2030

Against the backdrop of extreme oil price volatility, the global financial crisis and an economic crisis unseen since the Great Depression, a host of new challenges have arisen in preparing an oil outlook to 2030. One of these challenges relates to assumptions for future price developments. For the Reference Case, the key to the oil price assumption is the perception of the behaviour of supply costs in general, and the medium- to long-run cost of the marginal barrel in particular. High costs have peaked and will continue to decline as cyclical elements separate from structural ones. Nevertheless, costs are expected to remain higher than in the past in developing the marginal barrel, and it is likely that in the longer term some environmental externalities will be internalized. For the next decade, nominal prices are assumed to stay in the range \$70–80/b, while longer term they remain in the range \$70–100/b. However, it is important to note that this is an assumption, and does not reflect or imply any projection of whether such a price path is likely or desirable. This price assumption reflects the broadly accepted view that prices that are too low are not sustainable as they will limit the flow of upstream investment, while prices that are too high could hamper the recovery of the global economy and medium- to long-term growth prospects.

The medium- and long-term assumptions for economic growth consider the potential depth and length of the global economic contraction. This includes the possible implications of the responses by governments and monetary institutions around the world, in particular, expansionary policies and monetary easing. Although the strength of the recovery remains uncertain, for the Reference Case it is assumed that 2009 represented the bottom of the cycle. In 2010, recovery is well underway, but not complete. Indeed, as noted by the IMF in its January 2010 revision to its World Economic Outlook, the global recovery has begun more strongly than had previously been anticipated.

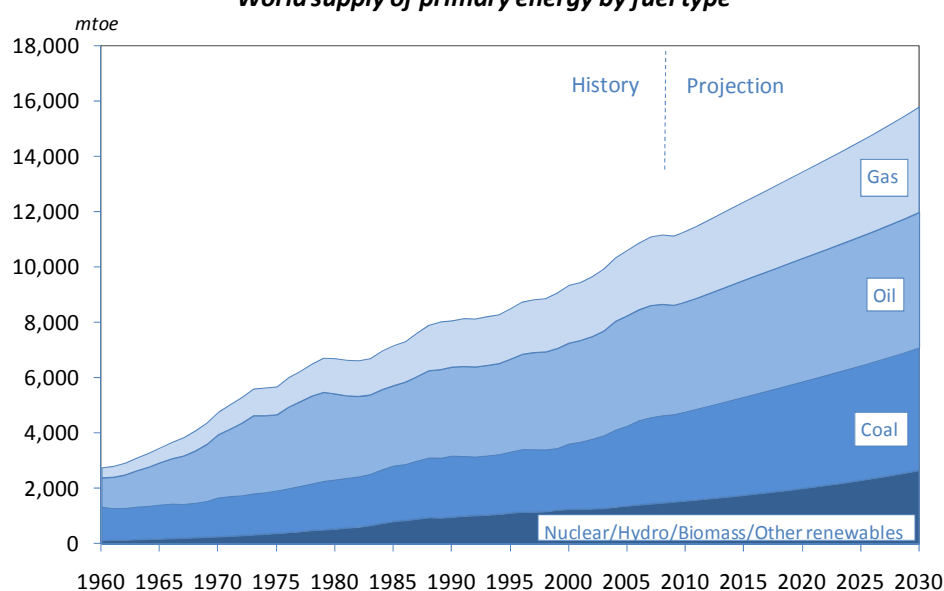
Long-term world economic growth assumptions in the Reference Case are based on demographic trends and productivity growth assessments. The strongest growth is expected in developing countries and regions, particularly, China and South Asia, which expand at an average rate of 6.3% p.a. and 4.7% p.a., respectively, over the period 2009–2030. The average global growth rate is 3% p.a. over the same timeframe. This is lower than the figure appearing in the OPEC background paper for the 11th IEF Meeting, partly due to the considerable downward revisions to economic growth prospects as the global financial crisis evolved, but also because of the use of updated purchasing power parity factors, which means that the weight is reduced for some of the fast-growing developing countries, such as India and China.

Another major issue to address in developing the Reference Case is the extent to which energy policies are introduced into the projections. In the Reference Case, two sets of policy initiatives have been incorporated: the US EISA, which has been passed into law, and the EU's climate and energy legislative package, for which related directives have now been adopted by both the EU Council and the European Parliament.

3.1 Oil demand

In the Reference Case, energy use increases by 42% from 2007–2030 (**Figure 1**). Developing countries will account for most of these increases, by virtue of higher population and economic growth. However, energy use in developing countries will remain much lower on a per capita basis than in the developed world. Globally, renewable energy will continue to grow fast, but from a low base. Nuclear grows faster than had previously been expected, at an average of 1.6% p.a., while hydropower is also set to expand. Realistically, however, fossil fuels will continue to satisfy most of the world's energy needs, contributing more than 80% to the global energy mix over this period. Oil will continue to play the leading role to 2030, although its share in the energy mix falls by five percentage points over this period.

Figure 1
World supply of primary energy by fuel type



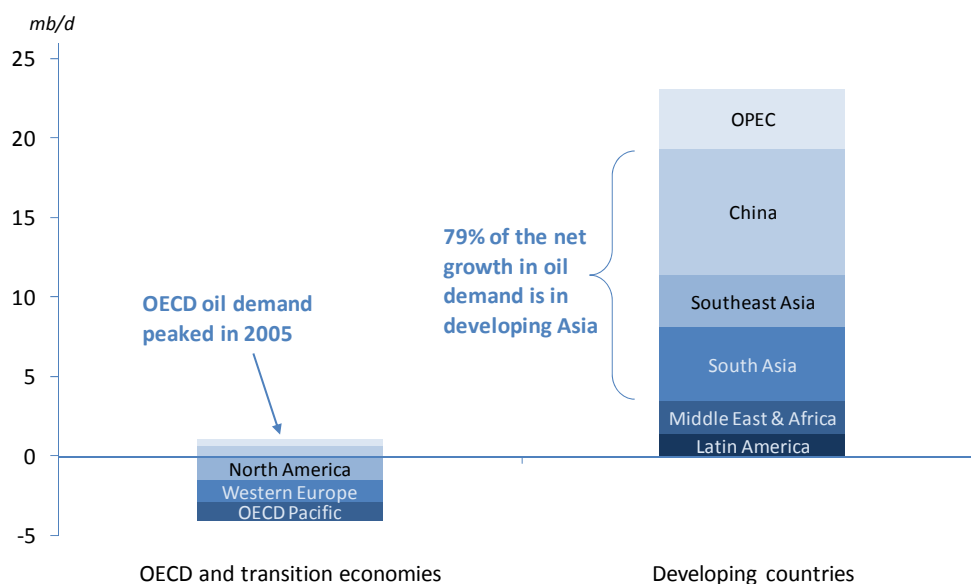
Medium-term oil demand prospects are adversely impacted by the global financial crisis and corresponding lower economic growth assumptions. OECD oil demand is expected to have fallen by 2 mb/d from 2008–2010, and in the Reference Case remains flat to 2013. The main source of incremental oil demand over this period will therefore be developing countries. However, the lower economic growth has clearly led to a major reassessment of medium-term oil demand compared to the previous background paper. By 2013, oil demand is 5 mb/d lower than in the previous outlook, with a difference of 4 mb/d already witnessed in 2009.

As we look further into the future, oil demand patterns become increasingly influenced by the implementation of policies. Efficiency improvements are greater than previously assumed, and this, compounded with the downward revision to medium-term expectations due to the global recession, has led to a significant downward adjustment to oil demand in the longer term. Oil demand in the Reference Case is less than 106 mb/d in 2030, down from 118 mb/d in the previous background paper (**Table 1**).

Table 1
World oil demand outlook in the Reference Case
(mb/d)

	2008	2015	2020	2025	2030
North America	24.3	23.6	23.4	23.1	22.8
Western Europe	15.2	14.5	14.3	14.1	13.8
OECD Pacific	8.0	7.4	7.2	7.0	6.8
OECD	47.5	45.5	45.0	44.3	43.4
Latin America	4.8	5.2	5.6	5.9	6.2
Middle East & Africa	3.2	3.7	4.2	4.7	5.2
South Asia	3.5	4.4	5.5	6.7	8.2
Southeast Asia	5.8	6.6	7.4	8.2	9.0
China	8.0	10.4	12.3	14.1	15.9
OPEC	7.7	9.0	9.8	10.6	11.5
Developing countries	33.0	39.3	44.8	50.2	56.1
Russia	3.1	3.3	3.5	3.6	3.7
Other transition economies	2.0	2.1	2.2	2.3	2.4
Transition economies	5.1	5.4	5.7	5.9	6.1
World	85.6	90.2	95.4	100.4	105.6

Figure 2
Growth in oil demand 2008-2030



Developing countries are set to account for most of the long-term rise, with consumption rising 23 mb/d over the period 2008–2030 to reach 56 mb/d. Almost 80% of the net growth in oil demand from 2008–2030 is in developing Asia (**Figure 2**). Nevertheless, per capita oil use in developing countries will remain far below that of the developed world. For example, by 2030 oil use per person in North

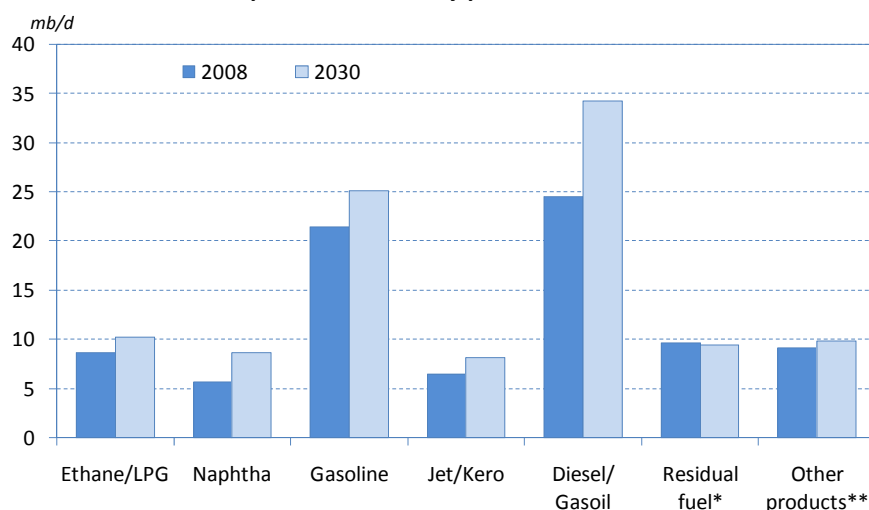
America will still be more than ten times that of South Asia. OECD oil demand falls over the entire projection period, having 'peaked' in 2005.

The transportation sector is the main source of future oil demand growth, accounting for 60% of the total increase to 2030, although this is also lower than the previous assessment. Once again this is due to the current global economic slowdown, as well as the assumed greater efficiency improvements. The total stock of cars rises from just over 800 million in 2007 to well over 1.3 billion by 2030, with three-quarters of this increase coming from developing countries. Car ownership per capita in developing countries rises rapidly from a low base of just 31 cars per 1,000 people in 2007 to 87 per 1,000 by 2030. This remains well below OECD levels, however, which average 530 per 1,000 by 2030. The expansion in commercial vehicles in developing countries is also stronger than elsewhere, accounting for over 80% of the increase.

Oil use is at the heart of much industrial activity. In addition to the petrochemicals industry, diesel and heavy fuel oil, in particular, are needed in construction and other major industries such as energy, iron and steel, machinery and paper. The strongest increase in the industry sector comes from developing Asia and OPEC Member Countries, particularly due to the fast growing oil demand in the petrochemicals industry.

On the products side, the continuing shift to middle distillates and light products over the entire period remains a dominant feature of the future demand slate. This is clearly reflected in the fact that out of 20 mb/d of additional demand by 2030, compared to 2008, almost 60% is for middle distillates and another 30% is for gasoline and naphtha (**Figure 3**).

Figure 3
Global product demand by product, 2008 and 2030



* Includes refinery fuel oil.

** Includes bitumen, lubricants, waxes, still gas, coke, sulphur, direct use of crude oil etc.

3.2 Oil supply

3.2.1 Upstream

Total non-OPEC oil supply is expected to continue to rise slightly over the medium-term, increasing by just over 1 mb/d for the years 2008–2013. This increase comes mainly from non-conventional oil. Non-OPEC crude oil plus NGLs are expected to stay flat over this period. This is lower than the medium-term expectations at the time of the preparation of the previous IEF background paper. This is largely the result of the low oil prices that emerged at the end of 2008 that led to cancellations and delays, with debt financing becoming more difficult and lower earnings limiting equity finance. Non-conventional oil supply, mainly Canadian oil sands, is expected to continue growing in the medium-term, but the low oil price environment has again dampened growth prospects compared to the previous outlook.

Table 2
World oil supply outlook in the Reference Case
(mb/d)

	2008	2015	2020	2025	2030
US & Canada	10.8	11.5	12.1	12.5	13.1
Mexico	3.2	2.5	2.5	2.4	2.3
Western Europe	5.0	4.0	3.8	3.7	3.6
OECD Pacific	0.6	0.7	0.7	0.7	0.7
OECD	19.6	18.7	19.1	19.3	19.6
Latin America	4.1	4.9	5.6	6.0	6.2
Middle East & Africa	4.4	4.2	4.1	4.0	3.8
Asia	3.8	4.2	4.3	4.2	3.8
China	3.8	4.0	4.0	4.2	4.4
DCS, excl. OPEC	16.1	17.3	18.0	18.3	18.3
Russia	9.8	10.2	10.5	10.6	10.6
Other transition economies	2.9	4.0	4.4	4.7	5.1
Transition economies	12.7	14.2	14.9	15.4	15.7
Non-OPEC	50.3	52.4	54.3	55.4	56.3
<i>of which: non-conventional</i>	3.1	5.0	6.8	8.6	10.7
<i>NGLs</i>	5.5	6.2	6.8	7.0	7.2
OPEC (incl. NGLs)	35.5	38.1	41.4	45.3	49.6
<i>OPEC NGLs</i>	4.3	5.8	6.7	7.4	8.0
<i>OPEC GTLs</i>	0.0	0.3	0.4	0.4	0.5
<i>OPEC crude</i>	31.2	32.0	34.3	37.4	41.1
World supply	85.8	90.5	95.7	100.7	105.9

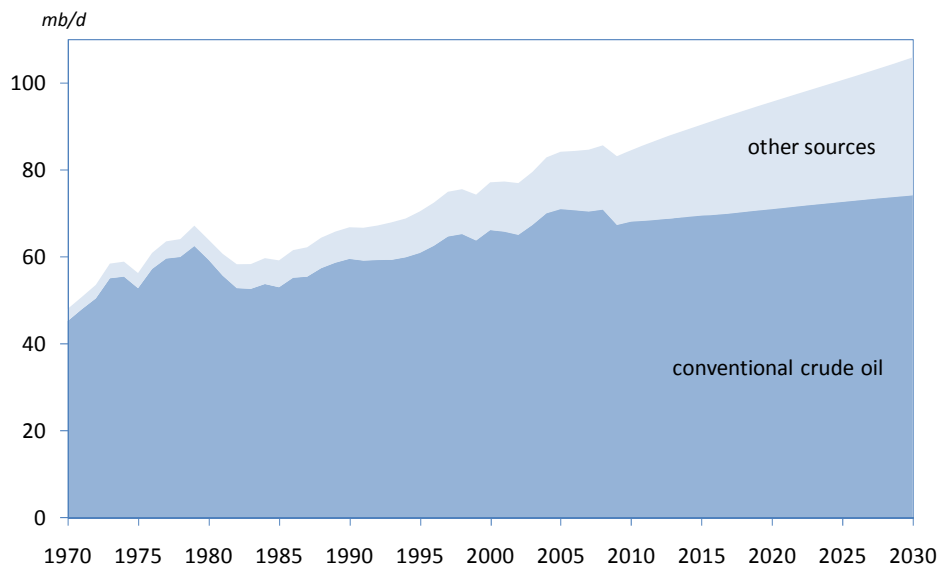
The Reference Case thereby points to demand for OPEC oil, having fallen in 2009 in the face of the global economic contraction, rising slowly over the medium-term and returning back to 2008 levels by around 2013. Large investments are currently underway in OPEC Member Countries to expand upstream capacity.

Although the low price environment at the end of 2008 and the early part of 2009 led to the delay or even postponement of projects, several of these projects have now been reactivated following the revival of oil prices. However, there is ample OPEC crude oil spare capacity today and it is expected that even with the delays, this spare capacity is set to remain at comfortable levels.

In the long-term, total non-OPEC oil supply continues to rise as the increase in non-crude sources is stronger than the slight decline in total non-OPEC crude supply. Up to 2020, crude production increases in Russia, the Caspian and Brazil largely compensate for declines in the OECD. Non-conventional oil supply (excluding biofuels), chiefly from Canadian oil sands, rises in the Reference Case by 4 mb/d from 2008–2030. The Reference Case also sees strong biofuels growth. On top of this, OPEC and non-OPEC NGLs are expected to grow. As a result of these developments, the amount of OPEC crude that will be needed continues to rise, reaching just over 41 mb/d by 2030 (**Table 2**).

The expansion in Reference Case demand is largely met with non-crude supply from both OPEC and non-OPEC sources, leaving the contribution of crude only modest. Indeed, while global crude oil supply in 2015 is 71 mb/d, the same as 2008, by 2030 there is only a need for 77 mb/d (**Figure 4**). The resource base of conventional crude, together with non-conventional oil, is more than sufficient to meet future demand. Therefore, the key issue is not related to availability, but to deliverability and sustainability, as well as the uncertainties surrounding the extent to which increases in demand for crude will actually materialize.

Figure 4
World oil supply 1970-2030: crude and other sources of oil



3.2.2 Downstream

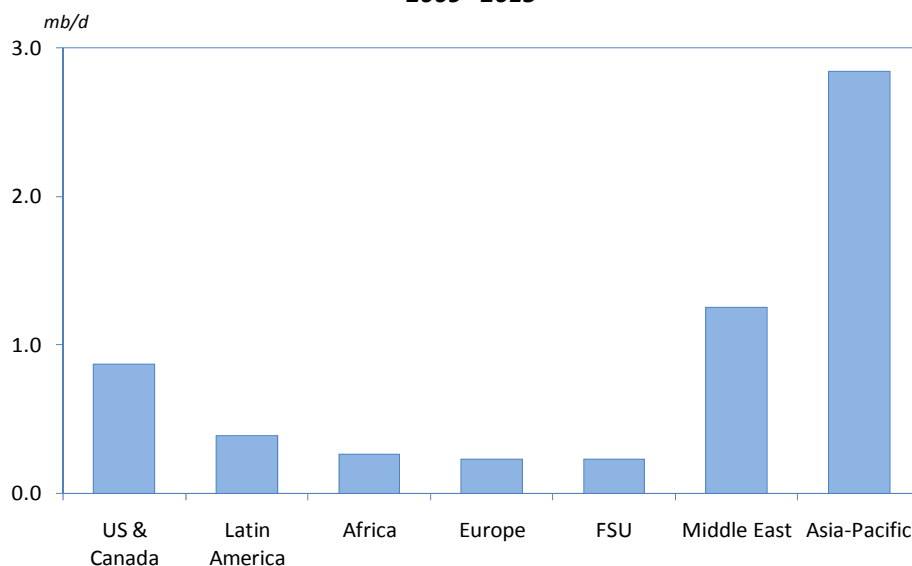
The recent extreme oil price volatility, the global financial crisis, and many of the uncertainties that complicate upstream investment decisions and implementation are also relevant to the downstream. Rising oil prices from 2003–2008, together with refining tightness and high margins, have in recent years brought forward an increasing number of projects. However, several factors are now acting to delay,

postpone or even cancel some projects. These include, among other things, the prospect of sharply reduced oil demand across almost all world regions, difficulties in arranging debt and equity financing and the expectation of further falls in construction costs.

Over the base of 2008, it is estimated that around 6 mb/d of new crude distillation capacity will be added to the global refining system from existing projects by 2015. Almost 50% of this new capacity is located in Asia, mainly China and India (**Figure 5**). In addition to distillation capacity, 5 mb/d of associated new conversion capacity and over 6 mb/d of desulphurization capacity is expected to be constructed worldwide by 2015.

The implication of these capacity additions, in combination with demand projections and increases in non-crude supply, is for a sustained period of low refinery utilizations and hence, poor refining economics. In the Reference Case, the continuing increases in refineries' potential to run crude, and the slow return to positive additional required crude runs, result in the distillation capacity surplus widening to over 4 mb/d by 2010, and around 5 mb/d by 2012, where it is expected to remain for some years. If the current recession extends further than the Reference Case assumes, this surplus will evidently be even greater. The Reference Case already envisages that the refining industry will face some rationalization and restructuring in order to maintain its viability.

Figure 5
Distillation capacity additions from existing projects
2009 - 2015



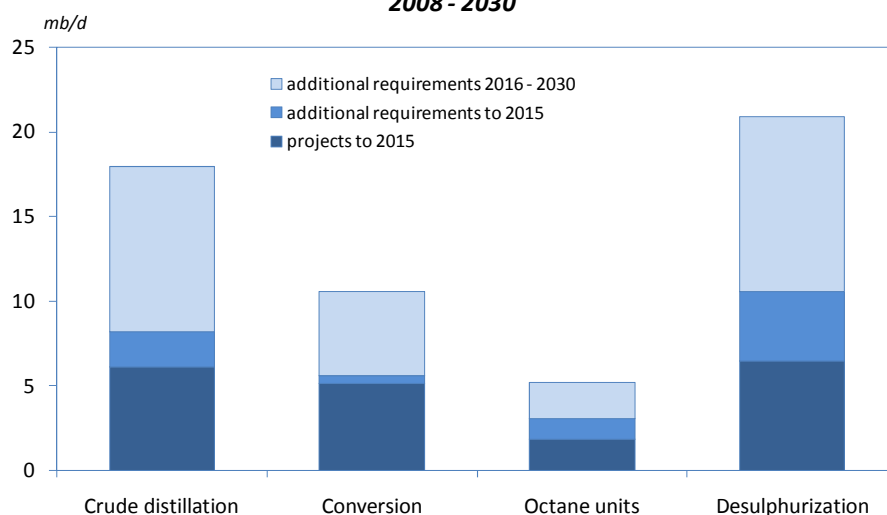
The implications are not, however, regionally uniform. The refining sector in the US & Canada is projected to be most impacted by a combination of an ethanol supply surge and a decline in gasoline demand, as well as the continuing effects of dieselization in Europe that generates low-cost gasoline for US export. Based on the outlook, crude throughputs in the US & Canada steadily decline throughout the period to 2030. Other OECD regions will also suffer a seriously depressed period for refineries, especially those focused on gasoline rather than distillates. This indicates a

need for widespread consolidation and closure to bring back operating rates and refinery viability.

The outlook in the OECD stands in stark contrast to that for developing regions, especially the Asia-Pacific. The vast majority of the refining capacity expansions to 2030 are projected to be in the Asia-Pacific and the Middle East, at around 10 mb/d and 3 mb/d, respectively, out of a global total of 18 mb/d. Expansions in the Asia-Pacific are dominated by China with more than 5 mb/d of required additional distillation capacity by 2030.

In addition, projections highlight a sustained need for conversion capacity, with incremental hydrocracking, above existing projects, accounting for 4.3 mb/d of the 5.4 mb/d of global conversion capacity requirements to 2030 (**Figure 6**). Substantial desulphurization capacity additions will also be necessary to meet sulphur content specifications, with some 14.5 mb/d required to 2030, which is over and above existing projects of 6.4 mb/d.

Figure 6
Global capacity requirements by process type
2008 - 2030



4. INVESTMENT CHALLENGES

4.1 Reference Case investment requirements

The Reference Case points to the need for investments along the entire supply chain. Up to 2030, cumulative upstream investment requirements are estimated to amount to \$2.3 trillion (2008 dollars) in the Reference Case. Costs have been sharply inflated since 2003, but a reversal, albeit still slow, has recently been observed, which might indicate a shift towards a new cost cycle. This has been factored into estimates for upstream investment requirements.

In the downstream, to have Reference Case capacity in place, the global refining system will require around \$780 billion (2008 dollars) of investment to 2030. The Asia-Pacific region should attract the highest portion of these investments.

4.2 Implications of a protracted recession

A principal theme that emerges from the outlook, in both upstream and downstream assessments, is uncertainty, with its ensuing challenges of making the necessary investments in an industry characterized by massive upfront capital requirements and long-lead times. This has been further underscored as the current global financial and economic crisis has unfolded and many new energy-related policies are being introduced or envisaged in major consuming countries.

The possible implications of a recession that is deeper and longer than assumed in the Reference Case have been explored. Risks for the global economy remain skewed toward the downside, despite an improvement in business and consumer confidence. Risks stem, in particular, from possible delays in implementing appropriate policies to stabilize financial markets, the health of banks that could lead to more tightness in credit availability, country rating downgrades, and deflation. In addition to the more pessimistic view of the rate of recovery of the global economy, the *protracted recession* scenario also assumes that crude oil prices are significantly softer than in the Reference Case. In this scenario, world demand in 2013 is 2.4 mb/d lower than the Reference Case.

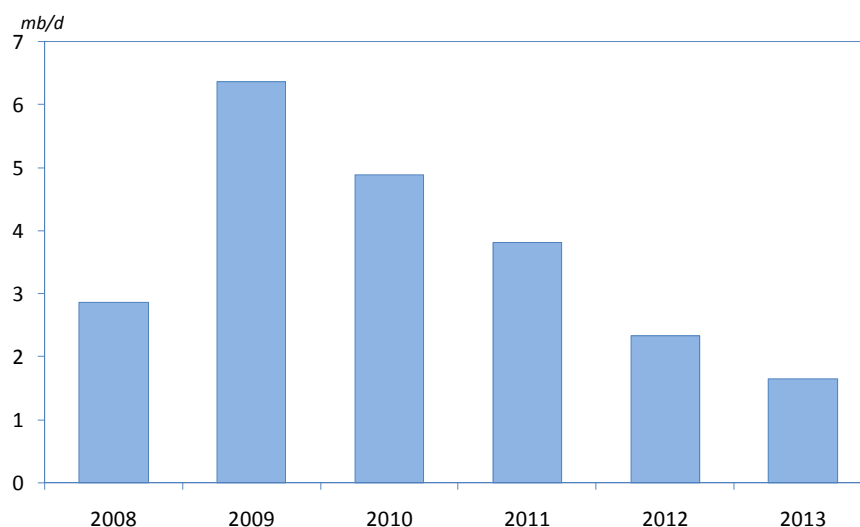
Low prices had significant impacts upon oil supply prospects, reducing both profitability and cash flows. Indeed, the rig count fell swiftly in the US and a similar picture emerged elsewhere. The link between price movements and upstream activity is nothing new. The economics of non-conventional oil supply would also be adversely affected by a prolonged soft price.

This scenario also has important implications on OPEC Member Country investment activity. Indeed, history has clearly shown the dilemma of having to make investment decisions in a climate of demand pessimism and low oil prices. OPEC Member Countries have concerns over security of demand and the risk that large investments will be made in capacity that is not needed. The *protracted recession* scenario combines the mix of low oil prices, demand uncertainty and significant initial levels of spare capacity as a result of a tide of investments undertaken in the face of high oil prices.

In the scenario, OPEC is assumed to respond to the increased demand for its oil as non-OPEC supply is reduced because of the low oil price, while upstream capacity investment is primarily focused on compensating for natural declines. Nevertheless, if non-OPEC supply continues to be affected by a lack of investment, then spare capacity in OPEC Member Countries will dwindle. The scenario suggests that spare capacity could be reduced to less than 3 mb/d by 2012 and below 2 mb/d by 2013 (**Figure 7**). Should this tightness occur, prices must react. The lack of capacity that emerges is a result of the low prices that are assumed over the medium-term. Prices would rise as capacity shortages increasingly characterize markets. The period of low prices in 1998–1999 was an important driver affecting future investments and capacity expansion at a time of economic growth and rising oil demand in 2004–2008. In this scenario, history, to an extent, repeats itself, as low prices sow the seeds of future tightness and price spikes.

Figure 7

OPEC spare capacity in the Protracted Recession scenario

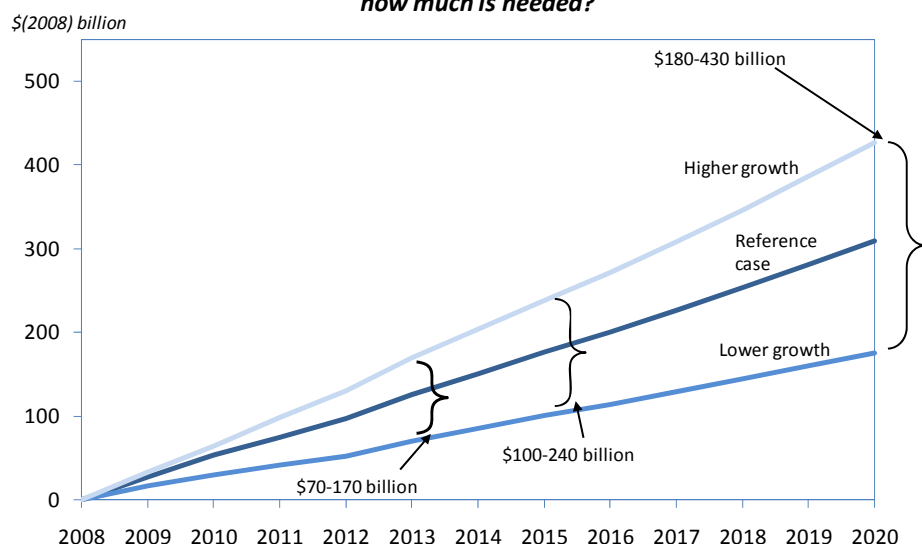


4.3 Uncertainty: a broader picture

It is evident from both the Reference Case and the *protracted recession* scenario that the overarching challenge facing the energy industry in general, and OPEC in particular, stems from the large uncertainties about future demand levels for energy and oil. This applies to both upstream and downstream. The uncertainties that lie ahead, and the corresponding difficulties associated with making appropriate and timely investment decisions, underline the importance of exploring alternative oil supply and demand paths to those depicted in the Reference Case. With this in mind, *lower growth* and *higher growth* cases have been developed.

In the *lower growth* case, downside demand risks from lower economic growth than in the Reference Case are coupled with a strong policy drive — over-and-above Reference Case assumptions — to further increase oil use efficiency in the longer term. In the *higher growth* scenario, the possibility of a swifter recovery from the global recession than assumed in the Reference Case is considered, combined with a more positive outlook for longer term growth prospects. The results show a wide range in OPEC upstream investment requirements. By 2020, the difference between the *higher growth* and *lower growth* cases reaches \$250 billion in real terms. Even to 2013, which represents a timeframe over which investments are effectively locked in, requirements could be as low as \$70 billion or as high as \$170 billion (**Figure 8**).

Figure 8
Cumulative OPEC investment requirements:
how much is needed?



4.4 Cost and human resources

Further uncertainties and challenges include those related to upstream and downstream costs and the future availability of skilled human resources. On the cost issue, for the past few years the oil industry has seen costs that have been significantly inflated, in part as a result of the low oil price environment and low margins ten years or so ago that led to the implementation of downsizing and cost-cutting strategies. While costs have fallen a little recently, the much debated industry question is whether this cost behaviour is structural or cyclical. On the human resource front, the past has shown that it is critical to maintain and advance the adequacy of the industry's skills base, even during an economic downturn. The present workforce in many oil and service companies leans towards the retirement end of the age spectrum, thus creating an experience gap that may grow wider. Up to half the current workforce is likely to retire within the next ten years, with pressure to replace skills most likely to be felt in the technical side of the business where shortages are more acute and demands from business more intense. There is thus a need to advance the numbers of students taking energy-related courses, and to make sure these are open and accessible to all students from across the world. The industry needs to make sure it is an attractive proposition for students looking to enrol at university, as well as to current and future employees. To this end, further co-ordinated efforts should be undertaken by international oil companies (IOCs), national oil companies (NOCs), service companies, governments, regulators and academia.

4.5 Sustainable development

Rising to environmental challenges has always been important to the oil industry, which has a good track record in reducing its environmental and emissions footprints. And with the world expected to rely heavily on fossil fuels for many decades to come, it is vital to ensure the early and swift development, deployment, diffusion and transfer of cleaner fossil-fuels technologies. This is true for both local and global environmental protection. The need to adapt to a carbon-constrained

environment will make the use of these cleaner technologies all the more pressing. Of particular note is the proven technology of carbon capture and storage (CCS), which can be cost effective and has a high mitigation potential.

Developed countries, having the financial and technological capabilities, and bearing the historical responsibility for the state of the Earth's atmosphere, should take the lead in mitigation and adaptation efforts, as well as in providing adequate and predictable financial resources and transfer of technology, as enshrined in the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol.

Despite the fact that the COP-15 Climate Change Conference in Copenhagen in December 2009 led to more questions than answers, it is clear that OPEC Member Countries, heavily dependent upon oil exports, will be significantly affected, not only by climate change, but also by the adverse impacts of response measures.

A broader set of challenges concerns the issue of sustainable development and its corollary, fighting energy poverty. It is important to remember that poverty eradication is the very first UN Millennium Development Goal. And a major part, as well as a catalyst in helping alleviate poverty, is making sure that every person has access to modern energy services. It is critical that the world community makes sure access to reliable, affordable, economically viable, socially acceptable and environmentally sound energy services is available to all.

5. CONCLUDING REMARKS

The past 18 months have seen much upheaval as the world has faced up to a massive financial crisis and an ensuing deep economic contraction, one not witnessed since the 1930s. The implications have stretched far and wide, with its ripple effects carrying it far beyond the country where the crisis originated. It has ushered in some extraordinary changes in such a short period of time.

Of course, for the oil market in general, and OPEC in particular, the adverse impacts were dramatic too. This is especially evident when looking at oil price movements over that period, with the OPEC Reference Basket price hitting highs of over \$140/b in July 2008, before falling by more than \$100 to below \$40 only six months later.

Few could have predicted the rapid and widespread adverse impacts that resulted from the US sub-prime mortgage crisis. Over-leverage, poor risk management and speculation drove the financial system to the edge of a total meltdown when Lehman Brothers collapsed in September 2008. While it is apparent that the world has now stepped back from the abyss, the lessons need to be taken on board.

From an oil market perspective, OPEC and many others have clearly stated that the high oil prices in the middle of 2008 were not justified by physical supply and demand fundamentals. Price movements were exacerbated by massive direct and indirect investment inflows by non-commercial players looking to gain exposure to commodity markets. This was facilitated, among other things, by the possibility of high leverage and the absence of position limits. Indeed, OPEC has repeatedly called for better regulation and increased transparency in these markets, for the benefit of both producers and consumers alike. And it is a positive development that, further to the Jeddah and London ad-hoc energy meetings in 2008, a high level steering group has identified a set of related recommendations to be considered at the 12th IEF.

This background paper inevitably raises a number of important questions focused on the current crisis – in particular, just how long and deep this recession may be, and which path the economic recovery might follow. Perhaps the most important question is whether this recession is a game-changer that indeed brings about profound changes in the longer term, much as happened after the Great Depression.

OPEC, as an Organization, has maintained its commitment to ensure stable supplies of crude oil to the market at all times, undertaking an ambitious programme of investment, aware of the importance of responding to the demand for its crude in a timely manner, while offering an adequate level of spare capacity. However, it is not without concern that the Organization observes a potential repetition of the past, where a large drop in oil demand leads to significant levels of costly idle capacity.

Nevertheless, we also believe in the widely held view that low oil prices are not sustainable. The levels for most of the first half of 2009 were considerably below that required to attract industry-wide investments and ensure sufficient production capacity to meet future demand. Stable and fair prices should take into account energy supply, demand and investments over all timeframes, including such core issues as costs and human resources.

On the issue of climate change, 2009 was originally viewed as an important milestone, with the ongoing negotiations within the UNFCCC and its Kyoto Protocol. As it turned out, however, the COP-15 Climate Change Conference in Copenhagen in December 2009 led to more questions than answers. Notwithstanding, OPEC welcomes the decision of COP-15 and the CMP-5 to extend the mandate of the two ad-hoc Working Groups as the legitimate fora for negotiations on further commitments of Annex-I Countries and on long-term cooperative action.

What the world should not lose sight of is the historical responsibility of developed countries regarding the state of the Earth's atmosphere. They account for the majority of cumulative greenhouse gas emissions. Developing countries should be left to focus on their recognised overriding priorities of economic development and poverty eradication. In addition, developed countries, having the financial and technological capabilities, should take the lead in mitigation and adaptation. In particular, the focus needs to be on the early development and deployment of cleaner fossil fuel technologies, such as CCS.

The outlook confirms the important role that oil will continue to play in the energy mix for the foreseeable future. To this extent, the overall goal is a stable and enabling environment to continue to develop, produce, transport, refine, deliver and use oil in an ever more efficient, environmentally-friendly and economic manner, to the benefit of both producers and consumers.

With this in mind, it has become increasingly evident that there is a need for derivatives markets to function more efficiently in terms of price discovery and risk transfer functions, and appropriately reflect the true state of the physical supply and demand fundamentals.

It is evident from this background paper that the world is becoming increasingly interdependent, from both an economic and oil market viewpoint. This is fully in line with OPEC's policy in favour of strengthening and broadening the dialogue between energy producers and consumers at the global level, in particular, through the IEF, as well as through various regional fora.