Oil outlook: challenges & opportunities

Dr. Adnan Shihab-Eldin
Acting Secretary General

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Outline

- Current oil market assessment
- Medium-to-long term outlook
- Oil outlook beyond 2010
- Resource availability
- Uncertainties
- Energy technology in the oil equation
Current oil market assessment

Key features of the present oil market

- Resilient economic growth & high demand
- Supply chain tightness
  - OPEC & non-OPEC oil supply
  - Downstream bottlenecks
- Persistent price volatility: enhanced by geopolitical tensions, increasing speculative activity in Futures market
- Destructive impacts of Hurricane Katrina & Rita
Strong economic growth in DCs (e.g., China, India): growing faster than the world with increasing share in global GDP

Globalization process (export-led growth, increasing role of FDI)

Robust oil demand growth (particularly in Asia)

China has become the 2nd largest consumer

Expected growth is higher than historical trend (last 10 years avg: 1.4 mb/d), but lower than the average for last 3 years (1.9 mb/d)
Strong growth in Chinese oil demand

- China has become the second largest oil consumer.

- Structural change in the economy - growing faster than the rest of the world, fueled by strong growth in oil

- Long-way to go: in line with rising per capita income levels, low per capita oil demand is yet to approach levels of other countries!
While growth in non-OPEC supply up to 2003 were exceeding that of demand, since then had been significantly below demand growth.

However, Non-OPEC supply in 2005 has been affected by unplanned shut-downs & a lower rate of growth from Russia.

Gradual recovery & growth in West Africa, Brazil, Canada & FSU.
OPEC response: higher production leading to significant stock build up

Note: OPEC production excludes OPEC NGL & non-conventional oil (estimated to be 4.3 mb/d in 2005).
*/ based on actual OPEC production until September and then maintaining September levels for the rest of the year.

OPEC response:
- additional supplies on the market by using the spare capacity (>4mb/d)
- accelerated projects to expand production capacity to meet rising demand & maintain spare capacity

Cumulative increase: Demand, OPEC, Non-OPEC (mb/d)

Source: OPEC

OECD commercial oil stocks

Closing levels, mb

Days of forward cover

Min-Max range: 1994-2004
Overloading of Refining Industry

Shrinking Refining Spare Capacity in key refinery regions

Increasing Refinery Utilization Rate in key markets

*m/Asia = Japan, South Korea, China, India and Singapore. For some Asian countries May is estimated.*
Increasing activity in the Futures market

- Growing use of oil futures as a form of financial instrument
  - NYMEX hit a record high in 2005 surpassing the record in 2004. The average volume of contracts rose in 2005 to 237 million contracts compared to 179 million contracts in 2003.
  - OPEN interest also shows a higher record in 2005 of 792 million contracts compared to 542 million contracts in 2003.
Medium-to-long term outlook

- Mid-term upstream & downstream capacity
- Resource availability
- Oil outlook beyond 2010
- OPEC / Middle East oil & gas: Importance of investments
- Uncertainties & investment requirements
- Energy technology in the oil equation
Upstream
- Over 100 projects (excluding Iraq)
  - 80% UD/advance planning stage
  - Mix of light, medium, and some heavy grades
- All Member Countries have projects
- > 50 projects involve IOC’s
- Cumulative capex ~ $100 bn
- Net capacity expected to increase 5.0 – 5.5 mb/d
- Production of other liquids to increase 1.5 - 1.8 mb/d
- Iraq production expected to recuperate progressively

Downstream
- Expansions are underway
- 4.6 mb/d new capacity (i.e. about 3.8 mb/d refinery capacity and 800,000 b/d condensate splitter).
Accelerated OPEC capacity expansion plans

**OPEC-10 capacity expansion**
(by country)

(end 2004 – end 2005)

- Algeria: 70
- Indonesia: 80
- Iran: 198
- Kuwait: 278
- Libya: 28
- Nigeria: 200
- Qatar: 94
- KSA: 238
- UAE: 28
- Ven:

(end 2005 – end 2006)

- Algeria: 70
- Indonesia: 100
- Iran: 110
- Kuwait: 70
- Libya: 200
- Nigeria: 25
- Qatar: 300
- KSA: 26
- UAE:

Non-OPEC supply:
Increase in non-OPEC supply up to 2010 is expected to be ~5 mb/d, or even more according to some other sources.

- Accordingly, increase in total oil supply capacity is expected to reach ~12 mb/d, or more.
Production, capacity growth & quality

The chart shows the production and capacity growth for various categories from 2005 to 2010. The categories are Heavy, Medium, Light, and Net Capacity Addition (mb/d). The percentages and quantities are visualized across the years, with a trend line indicating the capacity growth over time.
OPEC is attending to rising product demand both domestic & Asia-Pacific region, as well as to meet higher product specifications.

- Pursue global downstream investments, particularly in Asia-Pacific region.
- By implementing these plans, they would be able to install over 4.6 mb/d new capacity (i.e. about 3.8 mb/d refinery capacity and 800,000 b/d condensate splitter).
- Major part of these new capacities will be invested by Saudi Arabia and Kuwait. Similarly most of these projects would be either in the Middle East or in Asia.
Incremental product demand compared with crude and refining capacity expansion

Sources: Capacity estimates based on published reports by different sources as well as Secretariat assessment
Oil outlook beyond 2010

- Oil will remain single largest fuel in primary energy mix
- Major part of the increase in world oil demand to come from developing countries
- OPEC increasingly supplies incremental barrel
- Upstream investment challenge not dissimilar to the past: nevertheless, ensuring market stability will be complicated by considerable uncertainties driven by:
  - Growth of world economy
  - Energy policies (substantial downside risk to demand)
  - Technological developments
  - Oil price path
- Importance of reducing uncertainties to ensure sufficient & timely investments
- Global downstream investments are critical to market stability
### Oil Demand Outlook, mb/d

<table>
<thead>
<tr>
<th>Reference</th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
<th>2025</th>
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<tbody>
<tr>
<td>OECD</td>
<td>51.4</td>
<td>52.7</td>
<td>53.8</td>
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<tr>
<td>DCs</td>
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<td>Total World</td>
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<td>Soft market scenario</td>
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<td>94.4</td>
<td>99.0</td>
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</tbody>
</table>

“Four-fifths of the increase in demand of 30 mb/d over the period 2005–2025 comes from developing countries

**Transportation** continues to be the dominant source of growth (~60 %)

Many **uncertainties**: GDP, technology, policy – **substantial downside risks**
## Oil production outlook, mb/d

<table>
<thead>
<tr>
<th>Reference</th>
<th>2005</th>
<th>2010</th>
<th>2020</th>
<th>2025</th>
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<tbody>
<tr>
<td>OECD</td>
<td>20.9</td>
<td>20.9</td>
<td>19.9</td>
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<tr>
<td>DCs excl. OPEC</td>
<td>16.1</td>
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<tr>
<td>Russia &amp; Caspian</td>
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<td>13.1</td>
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<tr>
<td>Non-OPEC</td>
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<td>56.4</td>
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<tr>
<td>OPEC (incl. NGLs)</td>
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<td>36.6</td>
<td>49.1</td>
<td>57.0</td>
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<tr>
<td>World</td>
<td>83.6</td>
<td>90.9</td>
<td>105.9</td>
<td>113.4</td>
</tr>
</tbody>
</table>

**OPEC Market Share %**

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>2010</th>
<th>2020</th>
<th>2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPEC (incl. NGLs)</td>
<td>40</td>
<td>40</td>
<td>46</td>
<td>50</td>
</tr>
</tbody>
</table>

**Key sources of non-OPEC increase:** Latin America, Africa, Russia and Caspian

**OPEC increasingly supplies incremental barrel**

**Significant medium- to long-term uncertainties**
Regional oil demand & net import requirements (mb/d)

- M.East OPEC contribution to world oil trade is expected to increase from ~30% to ~40% in 2025.

<table>
<thead>
<tr>
<th>(mb/d)</th>
<th>Oil Demand</th>
<th>Net Oil Import Req.</th>
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</thead>
<tbody>
<tr>
<td>North America</td>
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<td>Latin America</td>
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<td>Europe</td>
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<tr>
<td>FSU</td>
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<tr>
<td>Asia</td>
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<td>3</td>
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</tr>
<tr>
<td>OPEC</td>
<td>7</td>
<td>9</td>
</tr>
</tbody>
</table>
Oil resources & uncertainties

- Current & evolution of oil reserves in OPEC MCs
- Potential and best practices
  - Iraq
  - Saudi Arabia
  - Venezuela
- Uncertainties
  - Evolution of URR
  - Reserve growth
- Unconventional oil
- Energy technology in the oil equation
**OPEC crude oil**

- **Proven reserves**: 891 billion barrels, **78% of world figure**
- **Production**: > 30 million barrels a day, **~40% of world figure**
- **Exports**: > 21 million barrels a day, **~50% of world figure**

- Cheaper to exploit than non-OPEC oil
- Increasing call on OPEC oil in coming years
- **>50% world oil market projected for 2025**

**Rich in natural gas as well!**
Evolution of oil reserves in OPEC, 1960-2004

Reasons for sharp increase during the period 1987-1990:
- Change in motivation of Member Countries to publish reserves
- Reserves growth in old fields (applying best practice)
- Adjustments of the technical and economic conditions
- Conservative initial estimates of field reserves

Source: OPEC
Oil reserves given by selected sources end 2004

Note: OGJ data include non-conventional reserves for Canada. IHSEnergy data refer proven and probable liquids reserves.
Oil resources in Iraq, (bn barrels)

Potential* = Growth + Undiscovered.

Reserve appreciation: ‘Ain Dar Shedgum/Arab-D’

Source: Saudi Aramco
Member Countries’ best practices
Saudi Aramco example

- Sustainable performance
- Life-cycle economics
- Prudent reserve management
  - Maximum hydrocarbon recovery
  - Reservoir monitoring
  - Low depletion rates
  - Advanced diagnostics
  - Cutting-edge technologies
  - Development of reservoir models
- Excellence in health, safety and environment

Maximize reserves
Ensure reliable supply of oil
Keep costs low
Venezuela Orinoco tar sands, bn barrels

Sources: OPEC
We add more than we produce: Between 1994-2003, the new discoveries were 138 bn bbl, and growth in existing fields was 175 bn bbl, while cumulative production totaled 236 bn bbl (133% replacement).


* By make a hypothetical equal distribution of global reserves growth over the period end-1994-2003.
Evolution of URR estimation (conventional)

Sources: Steve Andrews and Randy Udall, 2003; Red color Campbell
Conventional resource base is sufficient...

- Resources are plentiful...
- ...but prices can affect estimates
- Technology blurs distinction between conventional and non-conventional oil
- Resource base likely to continue to grow
- ...especially as non-conventional oil is included
- Broad agreement among international agencies on this idea,

USGS estimates for oil resources

Cumulative production

27% 27% 30% 25% 48%
New Field Wildcats (NFW) per 10K km² of Sedimentary basin

Source: IFP.
Crude oil reserves and cumulative production, 1980-04

**OPEC**

- Reserves 1980: 434
- Reserves 2004: 890

**OECD**

- Reserves 1980: 109
- Reserves 2004: 82

Source: OPEC

Mexico revised down their reserves by 32 bn (SEC) - 1998
World oil supply: cumulative production and reserve growth

Unconventional Oil supply to 2020 (mb/d)

Sources: CERI, CGES, OPEC, OIES
Energy technology in the oil equation

Technology & oil supply:
- Increase URR, including unconventional oil,
- Further reduce cost of non-OPEC oil,

Technology & oil demand:
- Increased efficiency leading to longer resource availability

Examples of very Promising Technologies:
- CO2 sequestration – Status: technical feasibility demonstrated; Statoil has pilot project of the CO2 sequestration technology (>10-20 years). High potential impact
- Gasoline-based Fuel Cell- M/H
- Clean oil integrated gasification combined cycle (IGCC) pp ; M
126 gigatonnes of CO₂ storage in EOR Projects (IEA estimate)
  - Includes major basins in N. America, Europe, Middle East, Western Siberia
  - More potential if Africa, Latin America, and Asia are included

Win-win scenario of increasing oil supplies while storing large quantities of CO₂

EOR can provide financial incentive for early implementation of CO₂ capture technologies, thus helping to bring down the costs

Revenue from EOR can help support infrastructure investments necessary to transport CO₂ to other geologic storage sites
The price of oil: distinguishing between nominal and real, (US$/b)

- Average, Nominal, Real

* inflation & exchange-rate adjusted.
(Base: August 2005=100, US$/b)

- Searching for new price level to mobilize sufficient investments following the global restructuring, with stronger demand to continue from emerging DC & compensate for delay in investment, downstream
- Most likely above the 2000-2003 price band level (average 33$) i.e. > above $40/b and below current levels not supported by fundamentals
Typical expansion cost by additional barrel

- Canada (HO)
- Non OPEC (marginal)
- Deepwater
- OPEC excl. Middle East
- OPEC Middle East

$/boe

2000
2005
Thank you