Toil for Oil Spells Danger for Majors
Unsustainable Dynamics Mean Oil Majors Should Become Energy Majors

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1) Brief explanation of key themes

2) Toil for Oil: E&P a much harder game since 2005

3) The IEA’s projections to 2035: a critique

4) Capex risk, pricing scenarios, and EROCI
   (energy return on capital invested)
"It goes so heavily with my disposition that this goodly frame, the earth, seems to me a sterile promontory; this most excellent canopy, the air, look you, this brave o’erhanging firmament, this majestical roof fretted with golden fire, why, it appears no other other thing to me but a foul and pestilent congregation of vapours"

William Shakespeare

Hamlet

(Act II, sc. ii)
"Like one that draws the model of an house
Beyond his power to build it, who, half-through,
Gives o’er, and leaves his part-created cost
A naked subject to the weeping clouds,
And waste for churlish winter’s tyranny"

William Shakespeare
King Henry IV Part II
(Act I, sc. iii)
1) Toil for Oil:  
E&P a much harder game since 2005
The capital intensity of US shale-oil production is phenomenal

Key points

- North America accounts for 18% of global oil production but 50% of global upstream capex
- The decline rates for US shale-oil plays are astronomical, averaging 30-40% already in the second year of production
- By contrast, oil sands are also very capital-intensive upfront but have very long production lifetimes

Source: IEA, 2013 World Energy Outlook, (© OECD/IEA)
Upstream oil & gas capex, costs, and prices

Key points

- Upstream capex has nearly trebled in real terms since 2000, reaching $700bn in 2013 versus $250bn in 2000
- Prices have also increased roughly threefold in real terms over 200-13, but since 2011 prices have been flat
- Over the same period, however, headline production of petroleum liquids has increased by only 14%

Budgeted spending. Notes: The IEA Upstream Investment Cost Index, set at 100 in 2000, measures the change in underlying capital costs for exploration and production. It uses weighted averages to remove the effects of spending on different types and locations of upstream projects.

Source: IEA, 2013 World Energy Outlook (© OECD/IEA)
Oil majors’ capital productivity has declined sharply since 2005

Key points

- The majors’ capital productivity has declined more sharply than that of the industry overall
2) The IEA’s Projections to 2035: A Critique
IEA estimate of future production from currently producing oil fields if all capex were stopped today

Key points

- IEA estimates that if all upstream-oil capex stopped today, output would fall to 13mbd by 2035 v. 74mbd today
- This implies an average annual natural rate of decline in production of c.2.6mbd, or c.3mbd for all petroleum liquids
- We estimate that this implies just over half of all currently producing fields are past their peak

Source: IEA, 2013 World Energy Outlook, (© OECD/IEA)
Key point

- IEA is betting very heavily on Iraq, Brazil and Kazakhstan to limit the decline in conventional crude-oil production
- At the same time, the world will become much more dependent on unconventional crude in future
The IEA has recently increased its capex estimates for the upstream oil industry over 2013-35

Key points

<table>
<thead>
<tr>
<th>Country</th>
<th>2013 WEO *</th>
<th>WEIO 2014*</th>
<th>Change ($bn)**</th>
<th>Change (%)**</th>
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Source: *IEA, 203 WEO, and IEA World energy Investment Outlook, June 2014 (© OECD/IEA); ** Kepler-Cheuvreux estimates
3) Pricing Scenarios, Future Capex Risk, and Energy Return on Capital Invested (EROCI)
Projected growth in world oil demand by activity to 2035 (mbd)

Source: Kepler-Cheuvreux estimates based on IEA data from 2013 World Energy Outlook

Key points

- Transport accounts for overwhelming majority of future oil-demand growth
Projected growth in world oil demand by country and region (mbd)

Key points

- China is 43% of total global demand growth to 2035, and China ad India together 75%

Source: Kepler-Cheuvreux estimates based on IEA data from 2013 World Energy Outlook
IEA base-case projection for fuel-mix in road Transport over 2012-35

Key points

- Transport accounts for 12mbd out of total projected demand growth of 14mbd by 2035
- However, IEA sees only minimal growth in EVs by 2035, which makes investments made today and over next decade in high-cost, high-carbon oil projects vulnerable to stranding if real oil prices rise and renewable-energy costs continue to fall.

Source: IEA, 2013 World Energy Outlook (© OECD/IEA)
Net EROCI of oil versus solar PV and wind based on today’s economics (2014)

Key points

- Onshore wind already today almost competitive with oil at $25/bbl for powering EVs versus conventional automobiles
- All renewables more competitive than oil at $100/bbl – renewables have a higher net EROCI today than oil at $100/bbl

Source: Kepler-Cheuvreux estimates
Net EROCI of oil versus solar PV and wind based on KC estimates of 2020 economics

Source: Kepler-Cheuvreux estimates

Key points

- Assuming higher real oil prices of $125/bbl by 2020 (in constant 2012 $), and cost reductions of 10% in real terms for onshore wind and 15% for solar PV and offshore wind.
- All renewables much more competitive than oil at both $100/bbl and $125/bbl.
Net EROCI of oil versus solar PV and wind based on KC estimates of 2035 economics

Key points

- Assuming higher real oil prices of $145/bbl by 2035 (again, in constant 2012 $), and real-terms cost reductions of a further 10% versus 2020 for onshore wind and 15% for solar PV and offshore wind.

- Net EROCI of all renewables much more competitive than oil at both $125/bbl and $145/bbl.

Source: Kepler-Cheuvreux estimates
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