Offshore Trends

Deep Pockets, Deepwater

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Group Publisher

Offshore

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Factors Shaping Energy Expansion for the Next Decade:

• Peak Oil
• Climate Change
• Energy Nationalism
• Growth in World Population
• EuroZone
• China and India
• Shale development
Crude Production Bucking 40 year Trend

Graph showing Total U.S. Crude Production (Excluding NGLs) from 1970 to 2014E. The production trend is downward from 1970 to 2006, with a dip in 1998, and then rises sharply with Up 3 MMBpd in 5 yrs. and Down ~4 MMBpd in 20 yrs. The source is EIA, RJ estimates.
Changes in US Oil & Gas

• U.S. Reversing 40 Years of Oil Declines
• Oil Prices Now Range-Bound
• U.S. Natural Gas Poised for Long-Term Recovery
• Implications Go Way Beyond Energy

Source: EPI; DOE
US becoming exporter of refined products
China & India

- Economic Nationalism
- Growth in Population
- Consumption
Primary energy consumption is slow but oil and natural gas still account for 57% by 2035

U.S. primary energy consumption
quadrillion Btu per year

<table>
<thead>
<tr>
<th>Year</th>
<th>Oil and other liquids</th>
<th>Natural gas</th>
<th>Nuclear</th>
<th>Coal</th>
<th>Renewables (excluding liquid biofuels)</th>
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<tbody>
<tr>
<td>2010</td>
<td>32%</td>
<td>25%</td>
<td>9%</td>
<td>20%</td>
<td>11%</td>
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<tr>
<td>2035</td>
<td>32%</td>
<td>25%</td>
<td>9%</td>
<td>20%</td>
<td>11%</td>
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</tbody>
</table>

Source: EIA, Annual Energy Outlook 2012 Early Release
Liquids supply by type (MMboe/d)

Source: ExxonMobil, 2012 The Outlook for Energy: A View to 2040
Gulf of Mexico deepwater drives production increases

U.S. crude oil production
million barrels per day

Source: EIA, Annual Energy Outlook 2012 Early Release
Oil prices in the Reference case rise steadily

annual average price of light low sulfur (LLS) crude oil
real 2010 dollars per barrel

Source: EIA, Annual Energy Outlook 2012 Early Release
Spending growth for the Upstream market

Deepwater Spending

- Capex - $235 billion (2012-2016), up 92%
- Gulf of Mexico, Brazil and West Africa to drive new expenditures
- Australia emerging
- 6%/yr growth between 2010 and 2030; ultra deepwater – 12%/yr
- 10% of global liquid fuels supplies by 2025
<table>
<thead>
<tr>
<th>Region</th>
<th>No. Of deepwater fields onstream (&gt;300m)</th>
<th>Deepwater reserves onstream (Mmbble)</th>
<th>No. Subsea wells</th>
<th>No. FPSOs</th>
<th>No. FPSs</th>
<th>No. FSOs</th>
<th>TLP</th>
<th>Spar</th>
<th>Rigid flowlines (KM)</th>
<th>Flexible flowlines (KM)</th>
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<td>694.18</td>
<td>80.62</td>
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Source: *Offshore* magazine, Infield Systems
Enabling technology

• Increasing investment in subsea boosting and processing
• Flow assurance
• Well intervention
• Subsalt seismic interpretation
• Stranded gas solutions
• HIPPS
• Dry tree FPS
Global water depth capabilities - E&P

Source: Offshore magazine, 2012 Deepwater Solutions & Records for Concept Selection
Deepwater projects

Source: Offshore magazine, 2012 Deepwater Solutions & Records for Concept Selection
Deepwater platforms

Source: Offshore magazine, 2012 Deepwater Solutions & Records for Concept Selection
Deepwater platforms

216 projects in bidding, design, or planning stage

Source: International Maritime Associates, Inc.
Subsea Advantages

- **Reservoir**
  - Increase ultimate recovery by lowering abandonment pressure
  - Enable oil recovery from low pressure reservoirs

- **Production**
  - Increase production rate by reducing flowing wellhead pressure
  - Reduce OPEX by reducing recovery time

- **Facilities**
  - Longer subsea tiebacks
  - Reduce CAPEX on topsides, pipelines
Subsea Advantages

Source: Offshore magazine, 2012 Worldwide Survey of Subsea Pumping Systems
Operators/developers are building and planning more than 5,800 mi of large-diameter oil and gas pipelines in the 2012-2017 period

Europe leads with +2,500 mi of systems being built and planned

South Stream – Russian gas through the Black Sea to Bulgaria via a 560-mi, 32-in. pipeline by 2015

The Middle East is next, with nearly 1,100 mi of oil and gas pipelines being built and planned
South Asia Gas Enterprise (SAGE) pipeline project – would move natural gas from Oman to Gujarat, India, with 807 mi of 24 to 27-in. pipe through the Arabian Sea.

South Pacific also an active region for offshore pipeline activity.

Chevron’s Gorgon and Wheatstone projects will both have associated pipeline systems.

Ichthys project offshore Western Australia – involves 552 mi of 42-in. pipe to move gas from offshore processing facility to Darwin by 2014.
Gulf of Mexico – some 500 miles of pipeline being studied and planned

Williams/DCP Midstream Partners will build the Keathley Canyon Connector, a 215-mi, 20-in. gas pipeline by mid-2014

Enterprise Products Partners/Genesis Energy will build the SEKCO pipeline, a 149-mi, 18-in. crude oil gathering line to be completed by mid-2014

Offshore South America, Petrobras is moving forward with plans to move gas from the Guara and Lula Northeast FPSOs in its Lula field to other systems that will take the gas to onshore markets.
Thank you! Questions?

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