Oil & Gas: Frontier Issues
Competition for New Supplies

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Adam Sieminski
Deutsche Bank
Frontier Oil & Gas: Balancing the Risks

- Deepwater GOM gas
- Deep water average
- Angola deep water
- UK gas
- Deep water Nigeria
- Libya oil
- Russia oil
- Venezuela oil
- Caspian oil
- Piped gas OPEC oil
- Oil sands
- OPEC piped gas
- Iran
- Gas-to-liquids
- LNG
- Exploration
- Development-led

Source: Company reports; Deutsche Bank estimates
Oil: Who Produces More Than One Million b/d

...super-majors lagging the national oil companies

Source: PIW; Deutsche Bank estimates
Gas: Who Produces More Than One Million b/doe

...national oil companies lagging the super-majors

Source: PIW; Deutsche Bank estimates
Non-OPEC Production Grows Strongly this Decade
…but political risk is rising with new market entries

Source: IEA; Deutsche Bank estimates
Russia, Azerbaijan and Kazakhstan

...projected steady increases from the old Soviet frontiers

Source: IEA and US DOE/EIA (historical); Deutsche Bank estimates
Russia’s Long-term Export Capability
...new fields, new pipelines

Source: Company reports; Deutsche Bank estimates
Russia’s Export Capacity Growth
...no let-up?

Source: Company reports; Deutsche Bank estimates
Deepwater Angola - Differentiated Results

**Ultra-Deep - Block 31**
Plutao was first discovery in Angolan ultra-deep and followed earlier Jupiter-1 disappointment. Rumoured to be heavy oil. Signature bonus: $330m. BP 27% ExxonMobil 25% Statoil 13% Marathon 10% TOTAL 5%

**Ultra-Deep - Block 32**
Rumoured 200-300 million barrel Gindungo find. Signature bonus: $250m. TOTAL 30% Prodev Int.20% ExxonMobil 15% Marathon 10% Petrogal 5%

**Ultra-Deep - Block 33**
First well, Funge-1, rumoured dry hole. Signature bonus: $325m. ExxonMobil 45% TOTAL 15% Falcon Oil Holding 10% Naphtha 5% Petrogal 5%

**Ultra-Deep - Block 34**
N'Demba drilled and expensed as dry hole. Signature bonus: $350m. Norsk Hydro 30%, ConocoPhillips 20%, Shell 15%, Petrobras 15%.

**Block 15**
12 of first 14 wells discover 2 bn bbls of oil+, including Kizomba A & B. ExxonMobil 40%; BP 26.7%; Eni 20%; Statoil 13.3%

**Golden Block 17**
13 of first 15 wells discover 3 bn bbls of oil+, including Girassol, Dalia, Rosa Lirio. Total 40%; ExxonMobil 20%; BP 16.7%; Statoil 13.3%; Norsk Hydro 10%

**Greater Plutonio**
First 2 wells make 2 oil discoveries. Approval granted to BP (50% partner with Shell). Prequalifications out for an FPSO. First oil due 2005-06?

Source: Deutsche Bank estimates, Wood Mackenzie
Bi-Polar OPEC Production Growth for this Decade

...is this acceptable to Saudi Arabia?

Source: IEA; Deutsche Bank estimates
Emerging OPEC: Big Volume Potential
...but beware the quota conflict

Corporate expectations...new pressure (2002-07E)

Source: Deutsche Bank estimates
Iraq Has a Long and Volatile History, With Industry Decimated by Conflict Since 1980

Source: Wood Mackenzie
Saddam and Iraq - Back to the 1970s?

Source: US DOE, IEA, Deutsche Bank estimates
Oil Production Supported by Reserves

...OPEC produces below its potential compared to non-OPEC countries

Source: Oil & Gas Journal; BP; IEA; Deutsche Bank estimates

Current Iraqi reserves would support production near 3.5mmb/d and as much as 6mmb/d in a high reserves case.

Source: Oil & Gas Journal; BP; IEA; Deutsche Bank estimates
Production is Likely to be Constrained by OPEC
...4 million b/d is a reasonable expectation

Source: Wood Mackenzie
Venezuela Production Has Been Volatile

...slipping on investment cutback and quotas
...rising after first strike, but devastated by second strike

Challenge to the Saudis comes to a head in Jakarta

Chavez elected Dec. 1998, OPEC cooperation

Post-coup make-up, heavy oil projects rise strongly

OPEC cuts, low oil investment, 25% decline rates

OPEC quotas up... then down

April coup attempt

Strikes take January to 0.6mmb/d

PDVSA flouts OPEC quotas and boosts production with help of foreign companies

Source: IEA, Deutsche Bank
Where Is LNG? Global Supply: Two Regional Basins

- USA Alaska
  - Kenai
- Latin America
  - Trinidad
  - Venezuela
  - Bonny
  - Angola
- North Africa
  - Algeria
  - Arzew, Skikda
  - Libya
  - Marsa-el-Brega
- Middle East
  - Iran
  - Oman
  - Snøhvit
- Persian Gulf
  - Abu Dhabi
  - Das Island
- South East Asia
  - Indonesia
  - Tangguh
  - Brunei - Lumut
  - Malaysia - Bintulu
- Australia
  - Australia - North West Shelf
  - Darwin
  - Gorgon

Probable Greenfield Projects:
- Indonesia
- Russia
- Sakhalin

Possible Greenfield Projects:
- Iran
- Oman

Existing LNG Plants/Expansions:
- Angola
- Bonny
- Indonesia
- Tangguh
- Australia - North West Shelf
- Darwin
- Gorgon

Source: Deutsche Bank estimates, Company data, Wood Mackenzie

Graphs:
- Atlantic Basin Demand
  - 17% AAGR 2000-2005
- Pacific Basin Demand
  - 6% AAGR 2000-2005

Deutsche Bank
LNG is Cost Competitive

... and there is 1000 TCF

$ per mmbtu Henry Hub equivalent

0.00 1.00 2.00 3.00 4.00 5.00

- Trinidad Expansions
- Nigeria Expansions
- Venezuela
- Henry Hub Average 1993-2003
- Algeria
- Abu Dhabi
- Qatar Rasgas Expansions
- Henry Hub Forecast 2003-2006
- Indonesia Bontang I
- Qatar Rasgas first trains
- Angola Greenfield
- Oman expansions
- Nigeria Greenfield
- Egypt LNG
- Iran
- Alaska Gas Pipeline
- Norway Snoevhlt

Source: Company data; Deutsche Bank estimates
Exploration Success
...boom and bust since 1995

Source: Company reports; Deutsche Bank estimates
1995-2002 - Who Were the Key Explorers?

Source: Company reports; Deutsche Bank estimates
Growth Plans Reflect New Pragmatism on Cost and Pace

...spending back at mid-90s’ levels but for lower growth

Industry growth expectations have fallen...but spending has \textit{increased}

Source: Company reports; Deutsche Bank estimates
Intense Competition for New Upstream Hubs
…global options for the largest players, scale risk for mid-caps

Source: Company reports; Deutsche Bank estimates
New Battlegrounds for New Legacy Provinces
....different appetites for politics, costs and returns

$315bn of Growth Opportunities

Source: Company reports; Deutsche Bank estimates
Global Upstream: Opportunity Rich to Meet Declines

Mackenzie Delta pipeline gas
- Commitment in 2003?

Canada
- Were Sable Island exploration results disappointing?

North Sea
- Will ExxonMobil rationalise Mobil legacy in 2003?

Sakhalin
- Sakhalin gets sanction for 2005/6 oil, but will Japanese LNG utilities feel threatened by Exxon’s gas pipeline?

More Russia?

Saudi Arabia
- Core Venture decision 2003?

Qatar
- Huge gas reserves provide secret of Exxon’s reserves replacement?

West Africa
- Strong progress
- OPEC limitations?

PNG pipeline
- Low returns?

Canada
- Where’s the Atlantic Basin LNG?

China
- West East decision in 2003?

North Sea
- Will ExxonMobil rationalise Mobil legacy in 2003?

Canada
- Were Sable Island exploration results disappointing?

Mackenzie Delta pipeline gas
- Commitment in 2003?

Exploration
- US, Angola, Malaysia, Nigeria
- Deepwater disappointments?

Successful future production hub development

Potential new plays - or exits

Source: Company reports; Deutsche Bank estimates
Capital Recycling Credentials Well Established

- Lower 48 gas...more to come after Apache?
- An Arco failure... sell out?
- Infrastructure deals for gas with Norway... Forties exit, SNS gas exit
- Arco and Amoco assets with little upside
- GOM deep water Trinidad
- Algeria oil
- Pakistan
- Angola
- JDA swapped with Amerada Hess for Colombia

Source: Company reports; Deutsche Bank estimates
Shell’s Upstream Options

**NORTH SEA**
- UK rationalisation
- Norway gas deals

**ASIA PACIFIC**
- Push for China and Russia gas
- FLNG Australia?

**US LNG**
- Working on import solutions for US LNG (Mexico/US)

**OMAN**
- Negotiating PDO extension to justify water-floods

Source: Company reports; Deutsche Bank estimates
The Growth in Capital Employed Can Be Accretive

Source: Company reports; Deutsche Bank estimates
Oil and NGL Reserves in North America

...Mexico’s mysterious mesa and Canada’s quantum leap

Mexico upgrades on combination of discoveries and financial crisis, then downgrades on stricter engineering

Canada adds 175b bbls of oil sands bitumen

Source: BP, Oil & Gas Journal
Crude Oil Reserves over Time in Key OPEC Nations

...have some of the reserves been politically motivated?

Source: BP, Oil & Gas Journal
World Conventional Crude Oil Endowment

...a lot left to find

Billion barrels

Source: USGS World Petroleum Assessment 2000
$\text{Deutsche Bank}$

$\text{Global Oil & Gas Research}$

**US & European Oils**
JJ Traynor * (44 131) 240-7648  
Caroline Cook * (44 131) 240-7642  
Nick Aldridge (44 131) 240-7641  
Nick Griffin (44 131) 240-7645  
Mohan Mandrekar (1 212) 469-5073  
Paul Sankey (44 131) 240-7646  
Al Stanton (44 131) 240-7647

**Australia/Asia/S. Africa**
John Hirjee (61 39) 270-4318  
David Hurd (852) 2203-6242  
Johan Rode (27 11) 775-7268

**Latin America**
Carlos de Leon (44 207) 545-7855

**Emerging Europe/Russia**
Krisztina Kovacs (44 207) 547-7905  
Leonid Mirzoyan (7095) 797-5196

**Energy Strategy**
Adam Sieminski (44 207) 545-1202

**US Independents**
Jay Saunders (1 212) 469-2998

**US Exploration & Production**
John Bailey (1 212) 469-4616  
Neil Brown (1 212) 469-8163  
Jeff Wyll (1 212) 469-8084

**Oil Services & Equipment**
Michael Urban (1 212) 469-3113  
Thomas Rinaldi (1 212) 469-5696

**Marketing Analysts**
Sam Fennell (44 207) 547-5528  
Jennifer Gordon (44 207) 547-5527  
Mark Hastings (1 212) 469-8636

* Co-heads of global team
Deutsche Bank AG Equity Sales Offices
Principal Locations

<table>
<thead>
<tr>
<th>Location</th>
<th>Address</th>
<th>Phone Numbers</th>
</tr>
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<tbody>
<tr>
<td>Winchester House</td>
<td>1 Great Winchester Street</td>
<td>+44 20 7545 8000</td>
</tr>
<tr>
<td></td>
<td>London EC2N 2EQ</td>
<td></td>
</tr>
<tr>
<td></td>
<td>United Kingdom</td>
<td></td>
</tr>
<tr>
<td></td>
<td>+44 20 7545 8000</td>
<td></td>
</tr>
<tr>
<td>Große Gallusstraße 10-14</td>
<td>60272 Frankfurt am Main</td>
<td>+49 69 910 41339</td>
</tr>
<tr>
<td></td>
<td>Germany</td>
<td></td>
</tr>
<tr>
<td></td>
<td>+49 69 910 41339</td>
<td></td>
</tr>
<tr>
<td>31 West 52nd Street</td>
<td>New York, NY 10019</td>
<td>+1 212 469 5000</td>
</tr>
<tr>
<td></td>
<td>USA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>+1 212 469 5000</td>
<td></td>
</tr>
<tr>
<td>Level 19, Grosvenor Place</td>
<td>225 George Street</td>
<td>+61 29258 1234</td>
</tr>
<tr>
<td></td>
<td>Sydney, NSW 2000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Australia</td>
<td></td>
</tr>
<tr>
<td></td>
<td>+61 29258 1234</td>
<td></td>
</tr>
<tr>
<td>Level 55</td>
<td>Cheung Kong Centre</td>
<td>+852 2203 8888</td>
</tr>
<tr>
<td></td>
<td>2 Queen’s Road Central</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hong Kong</td>
<td></td>
</tr>
<tr>
<td></td>
<td>+852 2203 8888</td>
<td></td>
</tr>
<tr>
<td>2-11-1 Nagatacho, 20th Floor</td>
<td>Sanno Park Tower</td>
<td>+813 5401 6990</td>
</tr>
<tr>
<td></td>
<td>Chiyodu-ku, Tokyo 100-6171</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Japan</td>
<td></td>
</tr>
<tr>
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