Growing world dependence on GCC oil supplies

Middle East exports share of global (ex-Middle East) demand 2010 vs 2030

Middle East oil and gas production change 2010 to 2030

Call for oil and gas production increase of 17 mln boe pd (c. 50% increase from 2010)

Source: BP Energy Outlook 2012
The cheapest exploitable oil and gas resources in the world

**Real oil and gas production breakeven costs 2011 and 2035E**

![Image of oil and gas production costs graph]

However, the ‘easiest’ oil is going and future production will be more challenging

**Technology Matrix**

![Image of technology matrix]

Source: IEA World Energy Outlook 2011

Source: Lambert Energy
Current fiscal terms and local market prices inadequate

Fiscal Take and Political Stability of leading Oil & Gas Producers

New Saudi gas fields are not economic on a stand alone basis

Source: IEA World Energy Outlook 2011

GCC states are amongst the most energy inefficient in the world

Primary energy use per capita generated for GCC states versus G20

Need for gas development

**Huge increase in gas demand in power and industry anticipated in the Middle East**

Regional demand by fuel

<table>
<thead>
<tr>
<th>Year</th>
<th>Renewables</th>
<th>Hydro</th>
<th>Nuclear</th>
<th>Coal</th>
<th>Gas</th>
<th>Oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td></td>
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<td></td>
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<tr>
<td>1990</td>
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<td>2010</td>
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<tr>
<td>2030</td>
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</table>

2010-30 growth by sector and fuel

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Billion toe</th>
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</thead>
<tbody>
<tr>
<td>Hydro</td>
<td>0.2</td>
</tr>
<tr>
<td>Nuclear</td>
<td>0.1</td>
</tr>
<tr>
<td>Renew.</td>
<td>0.1</td>
</tr>
<tr>
<td>Gas</td>
<td>0.3</td>
</tr>
<tr>
<td>Electricity</td>
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<tr>
<td>Oil</td>
<td>0.1</td>
</tr>
<tr>
<td>Coal</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Final energy use

- Transport
- Industry
- Other

**Inputs to power**

IOCs needed for complex gas developments such as the Shah sour gas field (ADNOC with Oxy) but IOCs have had mixed results so far, e.g. Eni and Repsol have pulled out of Saudi’s Empty Quarter and Shell’s gas exploration results there have been mixed.

Gas focus needed for power

**Electricity Production by Fuel Source**

<table>
<thead>
<tr>
<th>Country</th>
<th>Power Generation by Fuel (TWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UAE</td>
<td></td>
</tr>
<tr>
<td>Qatar</td>
<td></td>
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<tr>
<td>Oman</td>
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<tr>
<td>Saudi Arabia</td>
<td></td>
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<tr>
<td>Kuwait</td>
<td></td>
</tr>
</tbody>
</table>

- **Oil**
- **Gas**

**0.6 mln bbl pd** of oil demand could be saved (6% of Saudi output!)

- Bahrain, Oman, Qatar and UAE already have high gas share in electricity generation.

- Kuwait and Saudi Arabia would see significant benefits to increasing gas’ share in domestic electricity generation.

Source: IEA Electricity Information (2011)
Untapped gas potential

Huge disparity in Middle East reserves discovered (proved reserves + historic production) between oil and gas

590 bln boe less gas found than oil so far, 70/30 oil vs gas

By comparison USA discoveries have been 51/49 oil vs gas

Underdeveloped downstream sector and high net imports of oil products

Net imports of the GCC by oil product in 2009

UAE and Saudi major net importers of petrol

Source: BP Statistical Review of World Energy 2011

Source: IEA
The reality about renewables

Relative cost of fuels (USD per boe)
(full life cycle costs in power generation)

- CCS Coal
- Solar PV
- Onshore wind
- Nuclear
- Hard coal
- CCGT Saudi new gas
- CCGT Spot Gas USA

Full Life Cycle Cost (USD / boe)

High cost fuels may impair GCC competitiveness!

Gas could be the lowest cost, most secure and low CO2 energy source, all while rivals are costing over $100 per boe!

* Assume: ARA coal $105/ton, Saudi new gas $3.5-5.5/mln BTU, US spot gas $2.6/mln BTU, 80% load factor, no carbon price

Sources: Harvard, Lambert Energy, UK Carbon Trust, Bloomberg

Effect of the Arab Spring?

Arab Spring
Unrest Heat Map

Legend
- Revolution
- Unrest

Non-capitalist ideology and continued corruption over economic need
Stability restored but with continued stagnation

Openness, transparency of government
Job creation
Greater private sector involvement
Greater domestic investment in partnership with international capital
More economic growth

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