Investments in fertilizers and other gas based industries - the Qatar case
Norsk Hydro

- Over 100 years based upon natural resources
  - Oil & Gas
  - Hydroelectric power
  - Fertilizers
  - Petrochemicals
  - Aluminium
  - Magnesium
  - Fish farming
- Today a major aluminium company in the world with captive power production
Qatar story- main take-away

How can countries which do not have an industrial base build up a leading portfolio in the world of oil and gas industry and associated industries from scratch?
Qatar

- Tiny geographical area, 140 x 60 km
- 250,000 nationals
- Migrant work force of 2 million not allowed to stay
- Largest GDP per capita in the world
- Sheikhdom - «Enlightened autocracy»
Qatar’s gas story started with domestic gas based industry- Qatar Fertilizers Company (Qafco)

“QAFCO's inception in 1969 as a joint venture company to produce chemical fertilisers was the first and a significant step in Qatar's industrial diversification program to utilize its abundant natural gas resources.”

[From Qatar Petroleums internet home page]
Hydro in Qatar- QAFCO

- First industrial joint venture partner with the state of Qatar
- Hydro providing technology, project management, operational experience – and doing marketing
- Qatar Petroleum to deliver associated dry gas as feedstock
- Today the biggest fertilizers plant in the world with 40 times the initial capacity
- 25 pct ownership now owned by Yara after Hydro’s fertilizers activities were demerged in 2004
Qafco has become the world’s largest single site urea producer
Hydro in Qatar- Qatar Aluminium Company (Qatalum)

- Qatar Aluminium Company (Qatalum) in production from 2010
- 600 000 tons per year, total project cost $ 6 bn
- Hydro and QP 50/50 ownership
- Hydro providing technology, project management, operational experience- and doing marketing
- QP supplying dry gas for power
Qatar oil and gas – three quarters of a century of development and competence building

Courage, Cooperation, Determination – and Foresight
Qatar industrial development- success factors

- Qatar Petroleum very competent national oil company (NOC)
- National champion
- Size and ownership of North field allows for composition of multiple LNG and industrial partnerships
- Careful selection of partners
- Partners with technological-, project management-, operational capabilities
- Partners with market outlets
- Stable and predictable business conditions
- Qatar high score for combatting corruption
North Field - largest natural gas field in the world

- Owned by State of Qatar
- No negotiations for purchase of resources from field owners
- Not dependent on co-offshore extraction with LNG projects
- High content of petroleum liquids
Qatar natural gas in billion cubic meters (bcm)

- **Total resources discovered**: bcm 25,400,000
- **Annual sales capacity**: 154 bcm/y
  - LNG: 105 bcm/y
  - Piped gas: 17 bcm/y
  - For domestic use: 32 bcm/y
  - Qatar Fertilizers Company (Qafco): 3.5 bcm/y
  - Qatar Fuel Additives (Qafac) methanol: 1 bcm/y
  - Qatar Aluminium Company (Qatalum): 1.5 bcm/y
  - Oryx GTL: 3 bcm/y
  - Pearl GTL: 13 bcm/y
  - Power other than aluminium: 10 bcm/y
Qatar domestic gas consumption

Bcm/y industrial gas consumption

- GTL (Pearl)
- Power GC
- Fertilizers
- GTL (Oryx)
- Methanol
- Power Alum
Qatar industrial development - national strategies 2030

• Oil & gas from 55 pct of GDP to 25 pct
• Production of petrochemicals and chemicals to be doubled from 2012-2020.
• Qatar Science and Technology Park
  • Home for more than 30 international technology companies
• Education City with branches of foreign universities
• Qataris in skilled positions («Qatarisation»)
Difficult to emulate success stories

National strategies depending on;

- Resource base and characteristics
- Market conditions
- Status of industrial and national developments
- Individual national priorities

Find your own way, but learn from others!
East Africa employment in industrial projects

- Onshore more bricks and mortar
- Onshore construction and civil works need more local content
- Offshore oil and gas platforms often constructed piece by piece abroad
- Recent steel platforms with topsides towed from Asia

Doha, Qatar - 14 September 2013: Four offshore platform topside modules, started their long journey by sea from Ulsan, South Korea to Qatar's North Field
Qatar onshore development - job creation

• Construction phase huge demand
  • Shell GTL- 52 000 persons on site at peak
  • Qatargas II LNG- 30 000 persons
  • Qatalum aluminium smelter – 20 000 persons
• Operations less labor intensive
  • Qatalum 1600 own or contractor personnel
• Large service industries
• Workforce mostly migrant
East African gas

- Abundant resources in Tanzania and Mosambique
- International, regional and local need
- Domestic industrial use for fertilizers, methanol, power and GTL due to low liquids ratio
- Lower development and operating cost since little gas treatment is needed
- Future prospects for MTO (methanol to olefins)
Illustration of East African LNG development

Mosambique

• Anadarko 2 trains with 5 mill tons/y = 14 bcm/y
• Joint project Anadarko/ ENI?
  – 4 trains = 28 bcm/y
## Dry gas projects - characteristics

<table>
<thead>
<tr>
<th>Plant</th>
<th>Capacity</th>
<th>Capital cost</th>
<th>Gas consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNG</td>
<td>5 mill tons/y</td>
<td>Bn USD 5.5</td>
<td>7 bcm/y</td>
</tr>
<tr>
<td>Urea</td>
<td>1.3 mill tons/y</td>
<td>Bn USD 2</td>
<td>0.8 bcm/y</td>
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<tr>
<td>Methanol</td>
<td>1.6 mill tons/y</td>
<td>Bn USD 1.4</td>
<td>1.5 bcm/y</td>
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<tr>
<td>Aluminium</td>
<td>600 000 tons/y</td>
<td>Bn USD 6</td>
<td>1.5 bcm/y</td>
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<tr>
<td>GTL</td>
<td>30 000 b/d</td>
<td>Bn USD 4</td>
<td>3 bcm/y</td>
</tr>
<tr>
<td>Power</td>
<td>1000 Megawatt</td>
<td>Bn USD 1</td>
<td>1.5 bcm</td>
</tr>
</tbody>
</table>
East Africa- dry gas for fertilizers

- Limited volume requirements for ammonia/ urea
- Community effects considerable
- Supplies to domestic agriculture
- Plant near local and regional markets which needs to be developed
- Opportunities for local and regional support industries and suppliers
- Variety of derivative products, like oxygen, industrial gases, melamine
Fertilizer consumption

Tons of nutrients

- Ethiopia
- Kenya
- Tanzania
- Zimbabwe
- Zambia
- Mosambique
- Uganda
Fertilizer consumption cont.

Tons of fertilizer nutrients

- East Africa
- South Africa

Series 3
Series 2
Series 1
World Urea Export

Global trade estimated at 45–46 million tonnes. Top 10 countries account for approximately 70 percent of total.
Criteria for selection of partner for fertilizer plant

- Deep technological knowledge and capabilities in designing plant
- Project steering competencies
- Excellent plant operating skills
- Large customer base in existing and new markets to support take-or-pay obligations
- Deep understanding of African market and its need for products
- Demonstrated respect for industrial and other partners
- Willingness to transfer operating and marketing competence
National industrial participating interest

• Different risk profiles for states and industrial companies
• Project economy dependent on product price during first years of operation
• Should start with lower participating interest
• Can increase when capacity extentions
Sales of government owned gas

- Subject of direct negotiation with industry customer
- Limited volumes of «in-kind gas» available initially
- Small volumes of royalty gas
- Supply of profit oil under Production Sharing Agreement dependent on cost oil profile
Sales of gas owned by field owners

• Volumes designated for domestic use under concession agreements
• Cost basis or depending on negotiation?
• NOC «sandwiched» between field owners and industrial customers
Negotiating competence development

NOC should consider seeking assistance from negotiators with experience from sales and purchase of gas for industrial use.
Pricing of natural gas for domestic use

- LNG net-back

- Fixed starting price escalated by chosen retail/consumer price index

- Fixed starting price with escalation related to industrial product price
Stable and predictable business framework

• Production sharing agreements quite complete
• More difficult to regulate all aspects of onshore industries
• Onshore industries subject to general legislation
• Tax holiday normal in emerging economies
• Long term gas supply agreement- 25 years short time from industry perspective
Aluminium production in East Africa

- Steady supply of electricity from gas fired power needed
- Large investments - Qatalum $ 6 bn for 600 000 tons/y
- Prevailing business conditions difficult
- Low electricity prices needed long term
Epilogue

• East African gas nations braced for success
• Neighbouring countries stand to benefit