Unlocking Remote Oilfield Development

Asia Oil Week : 25th to 27th June 2012
Singapore
Iain Baxter – Director of Business Development
Safe, operable & industry approved technology

Access & develop remote oilfields onshore & offshore
Increase NPV of oilfield developments
3 Proven & Operational GTL Processes Today

World Scale GTL Gas Monetization
300MMscf/d ++

Modular GTL Oilfield Access
<= 50MMscf/d
Conventional GTL vs CompactGTL

Shell Pearl - Qatar
140,000 bbl/d GTL Products
450 Football Fields

< 5,000 bbl/d
<< 1 Football Field
Stranded Oil!
What makes some oil “stranded”? 

Remote oilfields with enforced gas flaring legislation 

Gas re-injection is: 
- Not feasible or.. 
- Expensive or.. 
- A risk to the reservoir

No infrastructure 

Gas export is: 
- Not feasible or.. 
- Expensive or.. 
- Has no fair gas buyer

STOP!
≈ 800 Oilfields with Problematic Associated Gas @ <50MMscf/d

Analysis by Wood Mackenzie & Fugro Robertson
Options for Associated Gas

- Reinjection & Flaring
- Gas to Wire
- CNG
- FLNG
- Pipeline

Associated Gas MMscf/d

Distance to market for converted product [km]
Revolutionary Solution for Remote Oilfields

Modular GTL:
Convert Associated Gas to syncrude then
Co-mingle and transport with the natural crude

Image courtesy of SBM Offshore
25MMscf/d GTL Integrated FPSO – SBM Offshore

- Fully Integrated Design
- Up to 50,000 bbl/d Crude Production
- 2,000 bbl/d GTL Liquids Production
Facility Flow Scheme

Feed Water -> Separators -> Oil & Liquids Processing -> Crude Export

- Gas
- Waste Water

No Oxygen Required!

High CO₂ Possible!

Syncrude
Modular Plant – Critical for Oilfield Projects

- Inherent Reliability
- Scaleability
- Operability
- High Turn Down
- Access to Site
- Reactor Changeout

The number of active reactor modules can be adjusted to match the associated gas production profile over time.
GTL Economics vs Re-injection or Gas Export

Gas Re-Injection or Pipeline to Market

- Facilities Capital Cost PV
- Gas Disposal
- Crude Revenue PV
- Operations & Tax PV
- Penalties or Delay

Integrated CompactGTL

- Facilities Capital Cost PV
- GTL Plant
- Operations & Tax PV
- GTL Opex
- Syncrude PV
- Crude Revenue PV
- Oilfield NPV

10MMscfd ANG Processed to 1,000 bpd Syncrude
GTL Economics: Liberating Shut-In Production

Existing or Planned Field subject to ANG Flaring Cap

Integrated CompactGTL

- Liberated Crude Revenue PV
- Syncrude PV
- Crude Revenue PV
- Operations & Tax PV
- GTL Opex
- GTL Plant
- Facilities Capital Cost PV
- Existing Crude Revenue PV
- Facilities Capital Cost PV

Oilfield NPV

Facilities Capital Cost PV

Operations & Tax PV

GTL Opex

10MMscfd ANG Flaring cut liberates 10,000 bpd Production @ GOR=1,000
Case Study – Onshore West Africa

- Existing oilfield operation
- GOR = 1,000  >15 years life remaining
- Flaring reduction targets restricting production
- Re-injection prohibitive
- Terrain & distance prevent gas gathering

CompactGTL Solution

- 10MMscf/d plant gives 1,000 bpd syncrude
- 10,000 bpd liberated crude production
- Incremental NPV US$80MM
- Low sensitivity to CAPEX & OPEX
Case Study – Onshore West Africa
Incremental Cash Flow

### Economic Metrics

<table>
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<tr>
<th>Undiscounted Profit $MM</th>
<th>NPV 10 $MM</th>
<th>Reserves MMboe</th>
<th>NPV10/Boe $/Boe</th>
<th>DPIR $$</th>
<th>Payback Year</th>
<th>Maximum Exposure $MM</th>
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<td>-0.8</td>
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<td>22.31</td>
<td>0.91</td>
<td>2015</td>
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### Full Field Gross Cash Flow

- Full Field Annual Gross Cash Flow
- Full Field Cumulative Gross Cash Flow

Economics by Fugro Robertson
World’s first modular fully integrated GTL facility!

Plant commissioned in December 2010. CompactGTL technology now approved by Petrobras for deployment.

- Gas pre-treatment
- Pre-reforming
- Reforming
- Waste heat recovery
- Process steam generation
- Syngas compression
- Fischer Tropsch synthesis
- FT cooling water system
- Tail gas recycling

Image shown courtesy of Petrobras
Delivery – World Class Clients & Partners

Clients Include
Majors & IOC’s

Reactors Manufacture

FEED & PM / Execution

FPSO Integration & PM / Execution

Catalyst Manufacture
A ‘Win-Win’ for IOC’s, NOC’s & Governments

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