Presentation to SPE Melbourne:

The Tassie Shoal Methanol and LNG Projects

- Monetising stranded Timor Sea gas

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John Robert, Development Engineering Manager
Bonaparte Basin gas fields

~25 Tcf is stranded due to location &/or gas quality issues

Most have CO₂ & distance issues

<table>
<thead>
<tr>
<th>Field</th>
<th>Volume (Tcf)</th>
<th>CO₂ (%)</th>
<th>Production (bbl/MMscf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evans Shoal (Santos, Shell, Petronas, Osaka Gas)</td>
<td>~6+</td>
<td>25%</td>
<td>4</td>
</tr>
<tr>
<td>Barossa/Caldita (ConocoPhillips/Santos)</td>
<td>~3.4</td>
<td>12%</td>
<td>5</td>
</tr>
<tr>
<td>Greater Sunrise (FLNG? Land?) (WPL/Shell/ConocoPhillips/Osaka Gas)</td>
<td>~5.4</td>
<td>4%</td>
<td>40</td>
</tr>
<tr>
<td>Abadi (FLNG?) (Inpex/Pertamina)</td>
<td>~10</td>
<td>8%</td>
<td>20</td>
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Others just distance

MEO discoveries, NT/P68

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<tr>
<td>Blackwood (MEO – 100%)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Heron (MEO – 90%)</td>
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Appraisal planned 2010
Tassie Shoal – a natural hub
Solution to location & gas quality issues

Tassie Shoal
• Relatively mild metocean conditions
• 25 Tcf of undeveloped gas within 150km
• Eliminates long pipelines to shore
• CO₂ sequestered into Methanol derivatives

Environmental approvals secured
• 1 x 3 Mtpa (expandable to 3.5 Mtpa) LNG plant
• 2 x 5,000 tpd (1.75 Mtpa) Methanol plants
• MPF status granted until Dec 2011

Methane + CO₂ + Steam ⇒ Methanol

3× + 1× + 2× ⇒ 4×

Methanol Production absorbs 25% CO₂
Why Methanol?

Can be made from high CO₂ gas

Methanol Derivatives %

- Formaldehyde: 42%
- Acetic Acid: 13%
- DMT, MMA: 15%
- MTBE: 3%
- Solvents and Other: 27%

Methanol Demand

- Global demand ~40 Mt/y
- Growth historically @ GDP + 1%
- Diverse predominantly non-fuel uses
- Significant growth potential
- Usually premium over fuel value
- Price correlates with energy prices
- Coal-based production (China) sets floor price
Tassie Shoal Methanol Project (TSMP)

Main Elements

- Methanol Storage inside CGS
- Product loadout via SPM avoids jetty and tugs
- Separate structure for Accommodation and Control
- Ready for FEED studies in 2010 once gas supply confirmed
- All potentially re-locatable, subject to water depth
TSMP Process Features

- Condensate, water, sulphur removed from raw gas
- DPT Steam Methane Reforming (SMR) Process
  - not $O_2$ based so can consume $CO_2$
  - 3 column distillation saves air cooler plot area
- Robust power generation, steam, nitrogen and thermal desalination systems
Methanol topsides, sub-structure & storage
Proven Technology

- Substructure CGS: ~200,000 t
- Base: 170m x 93m x 35m height
- Process deck: 180m x 100m (wave deflection)
- Installed by ballasting in 14m water depth
- Storage in steel tanks for 20 days final product

- Methanol capacity: 5,000 tpd, 1.75 Mt/y
- Topsides 35,000 t
- Total height CGS & topsides 95m
- Enhanced ‘stick-build’ on deck
Substructure Precedent
ExxonMobil Adriatic LNG Re-gas terminal constructed by Aker Kvaerner in Spain

Very similar footprint to TSMP but higher structure due to greater water depth at Adriatic site
LNG Project Elements

• 3 Mt/y LNG Production Module
  – Standard pretreat section: CO₂, H₂O & Hg removal
  – Air Products (APCI) DMR chilling and liquefaction
  – Fractionation plant for refrigerant makeup
  – Utilities: power gen, steam, water cooling systems

• Production ACE self-installing barge platform
  – 100m x 50m, on six caisson legs

• LNG Storage – 170,000m³ conventional tank on CGS

• LNG Load out Jetty or Hi-Load semi-sub

• Separate structures for ACP and possibly flare
LNG Substructure
Production ACE platform for LNG process equipment

Similar to Hang Tuah Compression platform for ConocoPhillips, Indonesia
Compact Water Cooled Exchangers

- Indirect seawater cooling with closed loop circuit
- Extensive use of compact printed circuit heat exchangers (PCHEs) – up to 1/25th plot area of air coolers

Image courtesy of Heatric
Nickel Steel LNG Tank Inside GBS

Conventional secondary containment LNG tank on concrete caisson
Possible *HiLoad* LNG Loading System

Replaces Jetty and Tugs service
Timor Sea LNG Project
Continued Innovations

- Indirect seawater PCHE cooling
  - dramatically reduces plot area

- Electric drives with N+1 power island
  - increases service factor

- Aero-derivative gas turbines
  - increased efficiency and uptime

- APCI DMR process
  - approaches onshore plant efficiency
  - compact and avoids propane hazards

- Single module built on ACE platform
  - LNG tank on CGS caisson

- HiLoad system for LNG offloading
  - eliminates need for tugs
  - avoids close vessel approaches to facilities
Tassie Shoal Projects

LNG from 10% CO₂ gas

**Diagram**

1. **RAW GAS** → **CO₂ SEPARATION** → **LNG PLANT** → **LNG PRODUCT**
2. **LPG & CONDENSATE PRODUCTS**
3. **TASSIE SHOAL HUB**
   - 25% CO₂
   - 0% CO₂
   - CO₂ vent

**Emissions Calculations**

- **Conventional LNG**
  - Total emissions = 0.5 tonnes CO₂ per tonne of LNG (100% reservoir CO₂ vented)

- **With One Methanol Plant**
  - Total emissions = 0.35 tonnes CO₂ per tonne of LNG (50% reservoir CO₂ vented)

- **With Two Methanol Plants**
  - Total emissions = 0.20 tonnes CO₂ per tonne of LNG (0% reservoir CO₂ vented)
Tassie Shoal Projects
– a regional gas commercialisation solution

• Conservative technologies
  – innovative combinations

• Competitive delivered cost of product

• Strategically located
  – access to Asian growth markets

• Environmental approvals in place

• Rapid gas commercialisation path

• Ready for FEED studies pending gas supplies
The Tassie Shoal Projects

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