Sea NG Alliance
DELIVERS NATURAL GAS

Marine CNG Transportation
PLATTS CARIBBEAN ENERGY CONFERENCE
24 January 2013
Drivers for Projects

Producer:

• Monetize stranded/underdeveloped fields
• Sell gas at higher prices
• Reduce flaring

End User:

• Dramatically reduce reliance on oil
• Convert to gas-fired power generation
• Reduce emissions and OPEX
Global Gas Markets

ENVIRONMENTAL DRIVERS

Reduce Flaring
Reduce CO² Emissions

PRODUCERS
MARKET
CONSUMERS

Produce & Sell Gas
Fuel Cost Savings

ECONOMICS DRIVERS
Sea NG Alliance

Owns all rights to patented Coselle™ System

Marubeni Corporation
US$50 billion in assets with 5680 employees

TEEKAY CORPORATION
US$10 billion in assets with 6100 employees

ENBRIDGE
US$40 billion in assets with 9,800 employees
Technology and Project Development

• Sea NG Corporation
  • 14 years of engineering, testing and development
  • Owns all rights to patented Coselle™ System
  • >6 years committed to Caribbean, Mediterranean and range of offshore regions

• Sea NG’s team
  • Invented Coselle™
  • Experienced in international project development and execution
Marubeni Corporation – Alliance Partner

• Project financing and implementation
• Global network to assist project development
• Management of steel procurement (Marubeni-Itochu)

A long history of financing and implementing energy projects worldwide
Shipping Reliability

Teekay Corporation – Alliance Partner

- Transports 10% of world’s seaborne oil
- World’s largest owner and operator of shuttle tankers
- Ship construction and fleet operations

Safety and environmental leadership are our highest priority
Gas Infrastructure

Enbridge – Alliance Partner

• Operates the world’s longest crude oil pipeline
• Pipeline and operating expertise
• Assist with gas infrastructure and contracting

Canada’s largest natural gas distribution company
MARINE CNG
Natural Gas Compression

• Freeze or squeeze
  • Density determined by pressure and temperature

<table>
<thead>
<tr>
<th>Pressure</th>
<th>Temp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNG</td>
<td>Ambient</td>
</tr>
<tr>
<td>CNG</td>
<td>275 BAR</td>
</tr>
</tbody>
</table>

• LNG (600:1) vs. CNG (300:1)
• Maximum density does not always maximize economics
• Compression costs much less than liquefaction, especially offshore
CNG Market Focus

Delivered Volume (MMscf/d)

Distance to Market (Km)

PIPELINE

LNG

PROJECT FOCUS

CNG

STRANDED

13
History of CNG Transportation

• Gas pipelines transport gas as CNG
• CNG is trucked in bulk in CNG “tube trailers”
• CNG fuels over 13 million motor vehicles
• CNG is a quickly growing segment of land-based gas transportation
Marine CNG Applications

1. Replacing liquid-fuel markets with natural gas
2. Transportation of offshore associated gas
3. Development of “stranded” offshore natural gas both the primary markets and as second generation feed stock to LNG plants
Active Markets
Marine CNG

Loading: Dehydration, compression
Terminals: Onshore or offshore (buoy/platform)
Ships: Shuttle carriers with storage
Receiving: Decompression and connection to customer
Jetty Loading Facility
Jetty Discharge Facility
CNG Project Requirements

Gas Supplier

Transporter

Customer
Customer Demand

Volume of ~30–300 MMscf/d (but not limited to)

Long-term, “take-or-pay” agreement

- Pipeline style tariff - US$/Mmbtu
- Usually <2000km of gas source
- Creditworthy ("investment grade")
- Contract term: usually 10-20 years
Transporter

Producer approved transporter

Focus on safety and reliability

First ship delivery: 28 months

Challenges

• First project hurdle
• Stage-gate development
• Contracting terms
Gas Supply

Volume of ~30–300 MMscf/d

Dedicated gas supply

Pipeline quality gas

Emerging gas sources

• United States
• Colombia, Venezuela, Trinidad
• Local: Block 22, Cardon IV
• Global: vast offshore opportunities

• Challenge has been availability
### Gas Monetization

<table>
<thead>
<tr>
<th>LNG/CNG</th>
<th>Number of Fields</th>
<th>Field Size (TCF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small scale LNG</td>
<td>16</td>
<td>50 - 500</td>
</tr>
<tr>
<td>CNG</td>
<td>163</td>
<td>5 - 50</td>
</tr>
<tr>
<td>Floating LNG (FLNG)</td>
<td>641</td>
<td>1 - 5</td>
</tr>
<tr>
<td>Floating CNG (FCNG)</td>
<td>668</td>
<td>.5 - 1</td>
</tr>
<tr>
<td>Marginal</td>
<td>940</td>
<td>.25 - .5</td>
</tr>
<tr>
<td>&gt;10,000</td>
<td></td>
<td>&lt;.1 - .25</td>
</tr>
</tbody>
</table>

Data Source: Eni’s Development of Gas to Liquids Technologies - Hydrocarbon World (V.5 I.1)
14 Years in Development

New CNG containers: Coselle™ development

Classification rules: DNV and ABS rules

Efficient ship design: Coselle™ CNG ship

Classification Approval: Ship approval (ABS)

Commercial model: Licensing / build, own & operate

Industry support: Leading producer support
Coselle™ System

A1 Compressed Natural Gas Carrier
Coselle™ System

Coselle: coil in carousel
Coselle™ System

21 Kms of 6” (168mm) - X80 ERW pipe
Coselle™ System

Capacity: 4.2 mmscf ~ 120,000 scm
Coselle™ System

Nitrogen inerted
Coselle™ CNG ship design

- Coselles form part of structure
  - Results in a very strong and efficient ship
  - Reduces ship steel (lowers cost)
  - Cargo hold is also nitrogen inerted
Fully Approved

• 14 Years of research, engineering and testing resulted in full approval

• MAOP 275 bar (4000 psi)

• Exceeded all ABS requirements by >300%
## Sea NG Ship Fleet

<table>
<thead>
<tr>
<th>Ship</th>
<th>C16</th>
<th>C20</th>
<th>C25</th>
<th>C30</th>
<th>C36</th>
<th>C42</th>
<th>C49</th>
<th>C84</th>
<th>C112</th>
<th>C128</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coselles</td>
<td>16</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>36</td>
<td>42</td>
<td>49</td>
<td>84</td>
<td>112</td>
<td>128</td>
</tr>
<tr>
<td>Net Capacity* (million scf)</td>
<td>66</td>
<td>83</td>
<td>104</td>
<td>125</td>
<td>149</td>
<td>174</td>
<td>203</td>
<td>349</td>
<td>465</td>
<td>531</td>
</tr>
<tr>
<td></td>
<td>1.8</td>
<td>2.3</td>
<td>2.8</td>
<td>3.4</td>
<td>4.1</td>
<td>4.8</td>
<td>5.8</td>
<td>9.9</td>
<td>13.2</td>
<td>15</td>
</tr>
<tr>
<td>Length OA (m)</td>
<td>137</td>
<td>137</td>
<td>160</td>
<td>160</td>
<td>180</td>
<td>201</td>
<td>201</td>
<td>234</td>
<td>257</td>
<td>278</td>
</tr>
<tr>
<td>Breadth (m)</td>
<td>23.5</td>
<td>23.5</td>
<td>23.5</td>
<td>28.5</td>
<td>28.5</td>
<td>29.5</td>
<td>31.0</td>
<td>46.0</td>
<td>46.0</td>
<td>48.0</td>
</tr>
<tr>
<td>Loaded Draft (m)</td>
<td>7.3</td>
<td>7.5</td>
<td>8.0</td>
<td>7.9</td>
<td>8.2</td>
<td>8.3</td>
<td>8.8</td>
<td>8.7</td>
<td>10.5</td>
<td>10.5</td>
</tr>
</tbody>
</table>

* Net Capacity is net of heel gas and assumes lean gas at 27 °C
Flexible Options

• Sea NG Alliance
  • Established to finance, build, own, and operate fleet for customers
  • Daily charter or volume tariff rate
  • Potential participation in ownership of ships

• Technology licensing and technical services agreement
  • Customer can own Sea NG ships directly
  • Coselle™ system through licensing agreement
Island Example
**Tariff Estimator: sea-ng.com**

### PROJECT DETAILS:

- **Volume for continuous delivery:** 50 mm/scld/d
- **Distance to delivery point:** 800 nautical miles
- **Cost of capital (%):** 12

### SUGGESTED FLEET CONFIGURATION AND TARIFF

**Ship C20**
- Number of Coselles: 4 x 5 = 20
- Capacity: 80 mmscf
- Width: 23.5 m
- Draft: 8 m

**Configuration**
- Shuttle Operation: 4 x C20 Ships

### ESTIMATED PROJECT TARIFF

- **Shipping Tariff:** $3.95 / mbtu
- **Facilities Tariff:** $0.6 / mbtu
- **Combined Tariff:** $4.55 / mbtu
Indicative Economics

- Volume: **50 MMSCF/D**
- Distance: **800 km**
- Loading at jetty, discharge at jetty
- All-in cost of transport: **US$4.55/mmbtu**
- Estimated cost of gas: **US$5.50/mmbtu**

**TOTAL COST OF GAS DELIVERED:**

~**US$10.05/mmbtu**
Challenges of CNG

- Although numerous projects under development, none yet in service
- Stage-gate development of majors
- Implementation lag of any new technology
- Recession of 2009-2010 froze spending
- Usual delays in development and execution of any new infrastructure project
- **Shortage of gas for export until recently**
Conclusion

• Simple, safe and reliable solution for moderate gas volumes within 2000km

• Enables fuel switching from HFO and diesel

• Enable producers to commercialize reserves

• Small project footprint with no exclusion zone

• Fast implementation of project – 28 months

• Sea NG Alliance has strong financial and operational capability - Ready to contract
Lyndon Ward
Marketing Director

+1.403.444.7446
lward@sea-ng.com