Accelerating adoption of LNG fuelling infrastructure

Ujjwal Kumar
General Manager
Turbomachinery Unconventional Solutions
LNG-fueled transportation today

**Opportunities**

<table>
<thead>
<tr>
<th>LNG vs Diesel Prices$^1,^2,^3</th>
<th>$4</th>
<th>$2</th>
<th>$-</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNG (DGE)</td>
<td>NG/Crude Price</td>
<td>Processing + Distribution + Taxes</td>
<td></td>
</tr>
</tbody>
</table>

**NG vs Diesel Emissions Reduction**

<table>
<thead>
<tr>
<th>CO</th>
<th>CO2</th>
<th>NOX</th>
<th>VOG</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>-25%</td>
<td>-50%</td>
<td>-75%</td>
</tr>
<tr>
<td>-100%</td>
<td>-50%</td>
<td>-25%</td>
<td>0%</td>
</tr>
</tbody>
</table>

**Adoption challenges**

**For vehicle owners**
- High conversion costs
- Nascent LNG fueling network

**For LNG station operators**
- High CapEx/OpEx
- Location based adoption risk
- Logistics cost & complexity

Sources: $^1$IHS CERA – Apr ’12, $^2$Credit Suisse: The Shale Revolution – Dec ’12, $^3$EIA.gov data – Feb ’13, data, $^4$NGVA –’13
GE solutions for natural gas fueling infrastructure
Transforming LNG fueling infrastructure model

Traditional Large LNG

- Up to 72 months
- Custom, project-based
- Capital intensive
- High logistics complexity & cost

LNG for Transportation

- 6-24 months
- Modular & standard, product-based
- Reduced CapEx & OpEx
- Simplified logistics, on-site production

Breaking down traditional, complex LNG plants into modular, rapidly deployable solutions
GE Differentiation = Simplification + Execution

- Repeatable + scale => ↓ cost
- Modularized = Faster installation
- Project: Product financing

Simpler & Modular LNG fueling solutions ... to facilitate LNG adoption
LNG In A Box™ system

Ideally suited for:
- Heavy-duty truck fueling stations
- Virtual pipeline
- Distributed power generation

Performance:
- 10,000-50,000 gallons per day LNG production
- Inlet gas: Pipeline
- Gas recovery: 80-82%
- Specific power 1.4 kWh/gal (1.3MJ/liter)

Features:
- Modular, rapidly (re)deployable design
- Simple methane cycle
- Minimal pad prep & quick installation
- 6-12 month lead time
- Highly automated operation
- Gas engine option available
- Equipment financing available
Micro LNG system

Ideally suited for:
- HD truck fueling hub
- Rail
- Marine
- Peaking plants

Performance:
- 100,000-300,000 gallons per day LNG production
- Inlet gas: Pipeline

Features:
- Methane based system with boil off recovery
- 8% improved power efficiency
- 40% reduced wasted methane
- Scalable design w/ multiple standard packages for rapid deployment
- Factory tested skids
- Plug & play, light civil work
- Targeting 12-15 month lead time
SUMMARY

Breaking down traditional, complex LNG plants into modular, rapidly deployable solutions

Providing equipment & vehicle financing to accelerate natural gas adoption

Broad GE LNG fueling portfolio for on-road, off-road, marine to rail
Accelerating mass-market natural gas fueling infrastructure ... through simpler, modular solutions