Freeport LNG Liquefaction Project
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Introducción

- Terminal de Regasificación LNG de Freeport
  - Condado de Brazoria, Texas, USA
  - Capacidad de send-out: 2.0 Bcf/día
- Terminal de liquefacción proyectado
  - Será el 2° terminal de exportación LNG en los "48 estados centrales"
  - Capacidad de exportación hasta 1.9 Bcf/día
  - Approximadamente 1% del déficit comercial de EE.UU.
Freeport LNG Regasification Terminal development initiated in the early 2000’s
  - US gas supplies were dwindling
  - Large quantities of LNG imports expected by the late 2000’s
Freeport engaged a joint venture of Technip, Zachry, and Saipem
  - Construction began in 2005 and was completed in 2008
  - Commissioning cargo was received and the performance test was performed
  - Since then, Freeport’s customers have only used the facility for storage and re-export
- Surplus of U.S. natural gas reserves because of Shale accessibility
  - The US now has more than 100 years of natural gas supply.
  - Lower gas prices long term make exporting natural gas economically attractive.
  - Significant difference between lower US gas prices and higher international crude oil-linked gas prices expected to remain long into the future.
  - LNG buyers interested in diversifying supply and linking price to Henry Hub.
- Freeport LNG proximity to:
  - Eagle Ford, Barnett, Haynesville-Bossier deposits
  - Houston ship channel and Katy trading Hubs
Freeport LNG is committed to HSE as a Core Value

- Zero injuries since start up of the facility in 2008
- Ongoing training to identify and mitigate hazards

CB&I and Zachry are also committed to HSE as a Core Value

- People and the Environment are our most valuable asset!
## Environmental Challenges

<table>
<thead>
<tr>
<th>Concern</th>
<th>Mitigation</th>
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</thead>
<tbody>
<tr>
<td>Erosion from ship traffic</td>
<td>Recycle usable vegetation and replant along waterway to decrease erosion</td>
</tr>
<tr>
<td>Destruction of plants in construction path</td>
<td>Work only during limited time frames to minimize impact. Bussing employees to the island</td>
</tr>
<tr>
<td>Increased construction traffic</td>
<td>Work only during limited time frames to minimize impact. Bussing employees to the island</td>
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<td>Waterway contamination from equipment spills</td>
<td>Diligent equipment maintenance and spill prevention procedures</td>
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<tr>
<td>Plant Noise</td>
<td>Detailed Sound studies to reduce impact of louder equipment</td>
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Existing Terminal

- Two full containment 160,000 m$^3$ (1 million barrels) LNG storage tanks
- Seven vaporizer trains capable of delivering 2.0+ Bcf/d of gas to intrastate pipeline connections
- Unique ambient air heating system to substitute fired heaters during warm weather periods
- State-of-the-art marine dock facility to accommodate largest LNG tankers built
- Nine miles of 42-inch pipeline to transport gas to pipeline connections at Stratton Ridge
- Underground gas storage cavern at Stratton Ridge (4.5 Bcf of working gas)
Freeport LNG is well suited to develop a liquefaction project.

- A financially strong company with proven, experienced operating and management organizations.
- Utilization of FLNG’s existing infrastructure represents an advantage of lower capital and operating costs compared to a grass roots facility.
- The FLNG terminal will be able to react to domestic and global gas market fluctuations to import/vaporize or liquefy/export.
Facilities for Expansion

- Gas Pretreatment
- Liquefaction
- Additional LNG Storage

- 2nd LNG Loading berth
- Additional Boil Off Gas Handling
Pre-Treatment Facility

Feed Gas from Pipeline

Metering → Inlet Reception and Mercury Removal → Compression → Acid Gas Removal

Dehydration → NGL Removal → Compression

Treated Gas to Liquefaction

NGL Product to Pipeline
APCI C3MR Liquefaction Process

Three propane pre-cooled mixed refrigerant trains

4.4 mtpa per Train = 13.2 mtpa in aggregate ≈ 1.9 Bcf/d of natural gas.
- Liquefaction technology: AP-C3MR (Air Products – Propane and Pre-cooled Mixed Refrigerant)
  - Air Cooled, Electric Motor Drive Refrigerant Compressors
- Vessel Traffic: 200 Ships per year
- About 700MW of power
Challenges – Land Acquisition

- Leased 170 acres adjacent to the current plot
- Purchase of land adjacent to the existing pipeline for the pre-treatment facility
Challenges – Engineering Design

- Soil Conditions on Liquefaction Site
  - Dredge Material Placement Area
  - Extensive geotechnical studies performed
  - All foundations will require piles

- Potential Storms
  - All facilities designed to withstand a category 5 hurricane event
  - All facilities grade levels set above potential storm surge

- Electrical System Design
  - Working with Center Point for robust supply
  - 75 MW motors
  - Variable speed drives
<table>
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<tr>
<th>Regulatory Agency</th>
<th>Review Basis</th>
<th>Submission</th>
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<tbody>
<tr>
<td>Federal Energy Regulatory Commission (FERC)</td>
<td>Environmental impact – required for construction</td>
<td>✓</td>
</tr>
<tr>
<td>Department of Energy (DOE)</td>
<td>Trade to non-FTA countries</td>
<td>✓</td>
</tr>
<tr>
<td>U.S. Department of Transportation (DOT)</td>
<td>Safety, location, traffic</td>
<td>✓</td>
</tr>
<tr>
<td>Other Federal, State and Local agencies</td>
<td>Varies</td>
<td>✓</td>
</tr>
</tbody>
</table>

**North American LNG Import/Export Terminals Proposed/Potential**

Source: FERC, Office of Energy Projects 2/21/2013
Freeport LNG developed a good relationship with the local community during the construction of the existing terminal.

Freeport LNG has held several open house meetings to inform the public of its future plans and regularly keeps in touch with the local community elected officials.
Liquefaction tolling agreements for Train 1 volumes with Osaka Gas and Chubu Electric executed in July 2012

Liquefaction tolling agreements for Train 2 volumes with BP executed in February 2013

Negotiating with potential customers for Train 3 volumes

Completing FEED

EPC Execution Plans near completion

Arranging financing for the first two Trains

Responding to data requests from FERC