LNG Trade, Competition, Economics

EIA 2018 Workshop
27 Sept. 2018
LNG Allies – Mission

To expedite and maximize LNG exports to create U.S. jobs and economic growth, enhance the energy security of America’s allies, and improve economic and environmental conditions worldwide.
U.S. LNG Export Industry

- Eight major brownfield (import) terminals adding/planning liquefaction capabilities
- Another 16+ greenfield projects proposed
- Ownership: midstream players and special purpose entities; IOCs mostly offtakers not project sponsors
U.S. LNG Export Industry (cont.)

- Capital expense ($500-$600/mtpa) means most projects rely on nonrecourse loans.
- Even companies with growing revenue from LNG sales not likely to finance new trains on balance sheet due to dividend pressure (may adjust debt/equity ratio).
Quick Background Review
U.S. Natural Gas Production, Consumption, Imports

trillion cubic feet per year

Source: EIA Annual Energy Outlook - 2018
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Monthly Henry Hub Spot Prices 2008-2018

Source: EIA Nat. Gas Weekly Update (Data through Dec. 2017)  ©LNG Allies, 2018
U.S. Natural Gas Production and Consumption

trillion cubic feet per year

- Dry Gas Production
- Domestic Consumption

Difference between production and consumption = volume available for export by LNG and pipeline.

Source: EIA Annual Energy Outlook 2018 (Reference Case) © LNG Allies, 2018
U.S. Natural Gas Production and Consumption

Source: EIA Annual Energy Outlook 2018 (High Oil & Gas Case)  ©LNG Allies, 2018
U.S. Natural Gas Consumption by Sector

trillion cubic feet per year (Tcf/y)

- Residential
- Pipeline Exports (Net)
- Commercial
- LNG Exports (Net)
- Industrial
- Transportation
- Electric Power

Source: EIA Annual Energy Outlook 2018 (High Oil & Gas Case) ©LNG Allies, 2018
U.S. LNG Exports
Top 15 Importers of U.S. LNG

billion cubic feet of natural gas (bcf) imported since Feb. 2016

Mexico
So. Korea
China
Japan
Chile
India
Jordan
Argentina
Brazil
Turkey
Spain
Kuwait
Portugal
Taiwan
Egypt

Source: DOE LNG Monthly, Sept. 2018 (July 2018 data) ©LNG Allies, 2018
U.S. LNG Destinations Last 12 Months

Source: DOE LNG Monthly, Sept. 2018 (July 2018 data)
U.S. LNG Exports Industry
## Permitting Status of U.S. LNG Export Projects

<table>
<thead>
<tr>
<th>Project Stage</th>
<th>Projects</th>
<th>MTPA</th>
<th>Bcm/yr</th>
<th>Bcf/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating / Under Construction</td>
<td>6</td>
<td>75.4</td>
<td>103.9</td>
<td>10.0</td>
</tr>
<tr>
<td>Fully Permitted (Major Projects)</td>
<td>4</td>
<td>64.4</td>
<td>88.8</td>
<td>9.1</td>
</tr>
<tr>
<td>Fully Permitted (Small Projects)</td>
<td>N/A</td>
<td>9.0</td>
<td>12.4</td>
<td>1.3</td>
</tr>
<tr>
<td>Formal FERC Review</td>
<td>11</td>
<td>146.9</td>
<td>202.6</td>
<td>20.9</td>
</tr>
<tr>
<td>FERC Pre-Filing</td>
<td>2</td>
<td>24.0</td>
<td>33.1</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>23</strong></td>
<td><strong>310.7</strong></td>
<td><strong>428.5</strong></td>
<td><strong>43.4</strong></td>
</tr>
</tbody>
</table>

Notes: (1) Projects = individual projects. (2) Additional trains for existing projects not included in the project count, but in the MTPA, Bcm/year, and Bcf/day totals (Sabine Pass #5, Cameron #4 #5, Freeport #4).

Source: Federal Energy Regulatory Commission & LNG Allies (24 June 2018) ©LNG Allies, 2018
Wave 1
Operating & Under Construction
Wave 1: Operating

- Cheniere’s Sabine Pass (T1-T4)
- Dominion’s Cove Point (T1)
Wave 1: Under Construction

- Kinder Morgan’s Elba Island (Ph1-Ph2)
- Cheniere’s Sabine Pass (T5)
- Cheniere’s Corpus Christi (T1-T3)
- Sempra’s Cameron (T1-T3)
- Freeport (T1-T3)
Operating & Under Construction

- Six Projects, Five Companies, Four States
- Production: 75.4 mtpa
- Liquefaction: 10 Bcf/d
- Gas for Liquefaction: 1 Bcf/d
Wave 2A
Fully Permitted Awaiting FID
Wave 2A: Permitted / Pre-FID

- Cheniere’s Sabine Pass (T6)
- Sempra’s Cameron (T4-T5)
- Equity Transfer’s Lake Charles (T1-T3)
- LNG Ltd.’s Magnolia (T1-T2)
- QP/XOM’s Golden Pass (T1-T3)
- Delfin (Offshore, 4 FLNG)
Permitted / Pre-FID

- Six Projects, Six Companies, Two States
- Production: 64.4 mtpa
- Liquefaction: 9.1 Bcf/d
- Gas for Liquefaction: 0.9 Bcf/d
Wave 2B
Under FERC / DOE Review
Wave 2B: Still Under Review

- Venture Global’s Calcasieu Pass
- Freeport (T4)
- Tellurian’s Driftwood
- Sempra’s Port Arthur
- Cheniere’s Corpus Christi (Ph 3)
- Texas LNG Brownsville
Wave 2B: Still Under Review (cont.)

- Eagle LNG
- Kinder Morgan’s Gulf LNG
- Exelon’s Annova LNG
- NextDecade’s Rio Grande LNG
- Venture Global’s Plaquemines LNG
- Pembina’s Jordan Cove LNG
Wave 2B: Still Under Review (cont.)

- Alaska Gasline’s Alaska LNG
Still Under FERC & DOE Review

- 12 Projects, 11 Companies, Six States
- Production: 146.9 mtpa
- Liquefaction: 20.9 Bcf/d
- Gas for Liquefaction: 2 Bcf/d
Benefits of U.S. LNG Exports
ICF for LNG Allies – April 2018
U.S. LNG Export Terminal Capacity (Year End)

billion cubic feet of gas per day

High Oil Price Case
High Oil & Gas Resources
Reference Case

Source: ICF Estimates Based on AEO-2018 Selected Cases. ©LNG Allies, 2018
Value Added: LNG Terminals + Natural Gas Supply

$2017 Billions

Source: ICF Estimates Based on AEO-2018 Selected Cases. ©LNG Allies, 2018
Employment: LNG Terminals + Natural Gas Supply

Direct, Indirect, Induced Jobs

Source: ICF Estimates Based on AEO-2018 Selected Cases. ©LNG Allies, 2018
Annual Benefits of US LNG Exports*

**GDP**
- $47.22 Billion (low)
- $53.11 Billion (medium)
- $92.72 Billion (high)

**JOBS**
- 205,400 (low)
- 270,100 (medium)
- 432,900 (high)

*Average annual direct, indirect, and induced impacts from 2013-2050, calculated by ICF for LNG Allies, based on Feb. 2018 EIA scenarios.

www.lngallies.com/jobs.pdf
Peak Benefits of US LNG Exports*

**GDP**
- $59.8 Billion (low)
- $67.3 Billion (medium)
- $141.2 Billion (high)

**JOBS**
- 325,400 (low)
- 336,500 (medium)
- 637,350 (high)

Cumulative Benefits of US LNG Exports*

GDP
$1.66 Trillion (low)
$1.89 Trillion (medium)
$3.26 Trillion (high)

Job-Years
7.35 Million (low)
9.68 Million (medium)
15.46 Million (high)

*Cumulative direct, indirect, and induced impacts from 2013-2050, calculated by ICF for LNG Allies, based on Feb. 2018 EIA scenarios.

www.lngallies.com/jobs.pdf
Competition and Economics
(No Slides)