How LNG Exports Will Hurt U.S. Manufacturing

Forging Industry Association
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President
Industrial Energy Consumers of America
Presentation

- How much natural gas do we really have – and at what price?
- LNG exports – long-term potential to drive U.S. prices to international levels just like crude oil.
One Key Question – One Key Point!

- **Key Question:** Low-cost natural gas has given us this once-in-a-lifetime opportunity to rejuvenate the manufacturing sector, create GDP, and jobs – will we squander it?

- **Key Point:** Era of cheap natural gas and electricity is behind us – rapidly rising costs from here.
Industrial Energy Consumers of America

- Represent exclusively industrial energy consumers on energy and environmental issues.
- Legislative/regulatory issues.
- Focused on: Congress, EPA, FERC, DOE, DOI, CFTC, White House.
- Member companies have $1.0 trillion in annual sales, 1.4 million employees.
Relationship of Energy to the Manufacturing Sector
The U.S. Has a Choice: Use Natural Gas to Create U.S. Jobs or Export It

- Manufacturing: 1 X to 8 X
- Fuel: 1 X to 1 X
- Exports: 1 X to 1 X
Optimizing U.S. Economic Growth

Comparative Economic Impacts, 5 Bcf/d

Direct Value Added (Annual): $4.9 Billion

Total Ongoing Employment (Annual): 180,000 Jobs

Direct Construction Employment (Total): 104,000 Person-Years

Manufacturing

LNG Exports

Source: CRA Analysis
Manufactured Products Trade Deficit Offers Huge Economic Growth & Jobs Opportunity

In 2013, China represented 75.5 percent of the trade deficit.

Source: Department of Commerce

2013 Deficit: $457 Billion
Manufacturing is Important to U.S. Economy

- Contributed $2.0 trillion to the economy, up from $1.73 trillion.
- 11.9 percent of GDP.
- Supports 17.2 million jobs, one in six private sector jobs (12 million direct or 9 percent).
- Average pay: $77,505.
- GDP contribution equal to 10th largest economy in world.
Manufacturing’s Multiplier Effect
Indirect Economic Activity Generated by $1 of Sector GDP

Source: Bureau of Economic Analysis, 2010 Annual Input-Output Tables
Industrial Energy Consumption has been Relatively Flat for 30 Years / 32% of U.S. Energy (1970–2012)

Source: EIA, 2013
Industrial Energy Consumption to Increase by 21.8%
Industrial Natural Gas Demand to Increase 36.4% from 2009 to 2025

Source: EIA, AEO 2014
Industrial Electricity Demand to Increase 36.6% from 2009 to 2025

Source: EIA, AEO 2014
EIA: Exports to Exceed Residential Demand
(From 2010 to 2025, 402.7% Increase in Exports)

Source: EIA, AEO 2014
Manufacturing Use of Energy

- 25.9% of total electricity
- 28.7% of total natural gas
- 4.7% of total coal

Energy-intensive industries consume 81.6% of the energy of the entire manufacturing sector.

Source: EIA
## Energy-Intensive Industries Use 82% of All Energy from Industrial Sector
*(Small Energy Price Increases Have Large Competitive Impacts)*

<table>
<thead>
<tr>
<th>Sector</th>
<th>% of Operating Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td>30-35%</td>
</tr>
<tr>
<td>Recycled Steel</td>
<td>25%</td>
</tr>
<tr>
<td>Integrated Steel</td>
<td>85% (energy and raw materials)</td>
</tr>
<tr>
<td>Plastics</td>
<td>80% (feedstock)</td>
</tr>
<tr>
<td>Chemicals</td>
<td>Varies greatly 15-20% (fuel only)</td>
</tr>
<tr>
<td>Paper</td>
<td>10-20%</td>
</tr>
<tr>
<td>Glass</td>
<td>20-25%</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>80% (feedstock)</td>
</tr>
<tr>
<td>Food Processing</td>
<td>30%</td>
</tr>
<tr>
<td>Cement</td>
<td>25-35%</td>
</tr>
<tr>
<td>Refining</td>
<td>15-20% (fuel only)</td>
</tr>
</tbody>
</table>
Energy Price Sensitive Products are Essential for Economic Growth

<table>
<thead>
<tr>
<th>Building Block Industries</th>
<th>Convert to</th>
<th>Commercial &amp; Consumer Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Chemicals</td>
<td></td>
<td>- Food Production</td>
</tr>
<tr>
<td>- Plastics</td>
<td></td>
<td>- Automobiles</td>
</tr>
<tr>
<td>- Fertilizer</td>
<td></td>
<td>- Consumer goods</td>
</tr>
<tr>
<td>- Glass / ceramics</td>
<td></td>
<td>- Construction</td>
</tr>
<tr>
<td>- Steel</td>
<td></td>
<td>- Medical Supplies</td>
</tr>
<tr>
<td>- Aluminum</td>
<td></td>
<td>- Energy Production</td>
</tr>
<tr>
<td>- Pulp and Paper</td>
<td></td>
<td>- Appliances</td>
</tr>
<tr>
<td>- Cement</td>
<td></td>
<td>- Household products</td>
</tr>
<tr>
<td>- Food Processing</td>
<td></td>
<td>- Defense industries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Telecommunication</td>
</tr>
</tbody>
</table>
The Relationship of Natural Gas Prices and Manufacturing Jobs
Lessons Learned…

When energy prices go up, competitiveness decreases along with jobs – this is what happened from 1999 to 2008.
“A Direct Relationship Between Energy Costs and Mfg’ing Jobs”

Natural Gas Prices Increased 209% from 1999 to 2008, or 23% a year

Source: EIA, Bureau of Labor Statistics
Natural Gas Prices Significantly Contributed to the Loss of 5.3 Million Manufacturing Jobs (-31%)

- 54,905 Facilities Lost (Since 2001)
- An Average Loss of 441,667 per Year:
  - (Jobs created in 2010-2013 – 466,000)

Source: Bureau of Labor Statistics
Loss of Manufacturing Competitiveness Resulted in About 8.5 Million Job Losses

Source: NAM, based on 2009 data
EIA: Industrial Natural Gas Prices to Increase 105% by 2025

• In 2008, natural gas prices rose to $9.65, they are forecasted to rise again by 2025 to $7.96 per dollars per thousand cubic feet.

Source: EIA, AEO 2014
U.S. Natural Gas Resources
-100 Year Supply-
Natural Gas Resources are More Uncertain Than Believed
“Technically recoverable” resources does not mean that it is “economically” recoverable.
Potential Gas Committee Assessment 2013 (“technically recoverable”)

<table>
<thead>
<tr>
<th>Classification</th>
<th>Tcf</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probable (existing fields)</td>
<td>708.5</td>
</tr>
<tr>
<td>Possible (“new fields”)</td>
<td>952.3</td>
</tr>
<tr>
<td>Speculative (“frontier fields”)</td>
<td>558.7</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2,225.6</td>
</tr>
<tr>
<td>Alaska</td>
<td>-193.8</td>
</tr>
<tr>
<td>Available to Lower 48</td>
<td>2,031.8</td>
</tr>
</tbody>
</table>

Key Point: 74% of potential supply in lower 48 is from “uncertain” resource estimates.

Source: Potential Gas Committee
EIA: Technically Recoverable U.S. Natural Gas Resources

Total 2,266

• 2013 U.S. Demand: 26.0 Tcf
• Lower 48 resources are 76.3 years of supply

Lower 48
1,985

Alaska
281

EIA AEO 2014

• 2025 LNG Export Demand: 5.4 Tcf + 2025 U.S. Natural Gas Demand 28.4 Tcf = 33.8 Tcf
• Lower 48 resources are 58.7 years of supply

Source: EIA, AEO 2014
### EIA: Technically Recoverable U.S. Natural Gas Resources (Tcf)

<table>
<thead>
<tr>
<th></th>
<th>Proved Reserves</th>
<th>Unproved Reserves</th>
<th>Total Technically Recoverable Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower 48 (Onshore)</td>
<td>311</td>
<td>1,352</td>
<td>1,663</td>
</tr>
<tr>
<td>Lower 48 (Offshore)</td>
<td>13</td>
<td>309</td>
<td>322</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>324</strong></td>
<td><strong>1,661</strong></td>
<td><strong>1,985</strong></td>
</tr>
<tr>
<td><strong>By 2025, years of supply:</strong></td>
<td><strong>9.6</strong></td>
<td><strong>49.1</strong></td>
<td><strong>58.7</strong></td>
</tr>
</tbody>
</table>

Source: EIA, AEO 2014
Can Production Meet and Sustain New Demand?

- More demand to be added between 2016 and 2020 than in the past 20 years combined!
- Must replace declining “conventional” well production of 19 Bcf/d.
- Production base decline from horizontal wells is 30% equal to 10 Bcf/d.

This means replacing almost four times the production of the Barnett Shale each year!
Natural Gas Cost Curve Slopes Upward

Average Cost of Production (2010$/MM Btu)

Source: CRA
LNG Exports
IECA’s Position on LNG Exports

- A important national public policy issue because of domestic consumer dependency for heating, cooling, economic growth, and jobs. There is no substitute!
- LNG is not a “free market” and should not be treated the same as other products/markets.
- Export only to the extent that exports do not impact domestic consumers.
- Not allow U.S. natural gas market prices to be manipulated by OPEC, and to rise to international LNG prices.
LNG Exports – A Controversial Public Policy

- LNG is not a “free market” – OPEC crude-linked LNG price. Artificially high prices.
- Asian “government entities” will buy YOUR gas away from YOU. (Price insensitive.)
- U.S. market is a free market!
- DOE: Has failed to do an appropriate “public interest” determination.
- DOE approvals are for 20-30 years. Caution is warranted because a lot can happened to domestic demand or supply that cannot be foresee today.
Applications to export LNG to non-free trade countries must be approved by both DOE and FERC.

**Department of Energy (DOE):**
- Already approved 8 (11.2 Bcf/day, 15.8% of U.S. demand) – Equal to largest LNG exporter, Qatar.
- 24 pending applications (27 Bcf/day, 37.9% of U.S. demand)
- For approval, shipments *must be in the “public interest.”*

**Federal Energy Regulatory Commission (FERC):**
- Already approved 4 (6.7 Bcf/day, 9.4% of U.S. demand)
- 13 pending applications (16.1 Bcf/day, 22.6% of U.S. demand)

The report concluded that:
- DOE has never defined “public interest.”
- DOE is using 1984 guidelines it developed for “imports” to make decisions for “exports.”
FERC – Four Approved LNG Export Projects

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Capacity (Bcf/d)</th>
<th>Coming Online</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sabine Pass LNG Terminal</td>
<td>2.20</td>
<td>2015</td>
</tr>
<tr>
<td>Freeport LNG, LLC</td>
<td>1.80</td>
<td>2018</td>
</tr>
<tr>
<td>Cameron LNG LLC (Sempra)</td>
<td>1.70</td>
<td>2019</td>
</tr>
<tr>
<td>Dominion Cove Point, LP</td>
<td>1.00</td>
<td>2017</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6.70</strong></td>
<td></td>
</tr>
</tbody>
</table>

9.4% of 2013 U.S. Natural Gas Demand

### FERC - Thirteen Pending Lower 48 LNG Export Projects

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Capacity (Bcf/d)</th>
<th>Coming Online</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cheniere Marketing, LLC</td>
<td>2.10</td>
<td>2018</td>
</tr>
<tr>
<td>Jordan Cove Energy Project</td>
<td>0.90</td>
<td>2017</td>
</tr>
<tr>
<td>Lake Charles Exports, LLC</td>
<td>2.20</td>
<td>2019</td>
</tr>
<tr>
<td>LNG Development Company</td>
<td>1.25</td>
<td>2019</td>
</tr>
<tr>
<td>Excelerate Liquefaction</td>
<td>1.38</td>
<td>2019</td>
</tr>
<tr>
<td>Southern LNG Company</td>
<td>0.35</td>
<td>2017-2018</td>
</tr>
<tr>
<td>Sabine Pass LNG Terminal</td>
<td>1.40</td>
<td>2016-2017</td>
</tr>
<tr>
<td>Magnolia LNG, LLC</td>
<td>1.07</td>
<td>2017</td>
</tr>
<tr>
<td>CE FLNG, LLC</td>
<td>1.07</td>
<td>2018</td>
</tr>
<tr>
<td>Golden Pass Products, LLC</td>
<td>2.10</td>
<td>2019</td>
</tr>
</tbody>
</table>

**FERC - Thirteen Pending Lower 48 LNG Export Projects Cont’d.**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Capacity (Bcf/d)</th>
<th>Coming Online</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gulf LNG Liquefaction</td>
<td>1.50</td>
<td>2019</td>
</tr>
<tr>
<td>Louisiana LNG Energy LLC</td>
<td>0.30</td>
<td>2017</td>
</tr>
<tr>
<td>Kestrel Energy - Downeast LNG</td>
<td>0.45</td>
<td>2020</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16.07</strong></td>
<td></td>
</tr>
</tbody>
</table>

22.6% of 2013 U.S. Natural Gas Demand

North American LNG Export Terminals

Potential

Export Terminal

POTENTIAL U.S. SITES IDENTIFIED BY PROJECT SPONSORS
1. Brownsville, TX: 2.8 Bcf/d (Gulf Coast LNG Export)
2. Cameron Parish, LA: 0.16 Bcf/d (Waller LNG Services)
3. Ingleside, TX: 1.09 Bcf/d (Pangea LNG (North America))
4. Cameron Parish, LA: 0.20 Bcf/d (Gasfin Development)
5. Cameron Parish, LA: 0.67 Bcf/d (Venture Global)
6. Brownsville, TX: 3.2 Bcf/d (Eos LNG & Barca LNG)
7. Gulf of Mexico: 3.22 Bcf/d (Main Pass - Freeport-McMoRan)
8. Brownsville, TX: 0.94 Bcf/d (Anova LNG)
9. Gulf of Mexico: 1.8 Bcf/d (Delfin LNG)
10. Brownsville, TX: 0.27 Bcf/d (Texas LNG)
11. Cameron Parish, LA: 0.54 Bcf/d (SCT&E LNG)
12. Port Arthur, TX: 0.2 Bcf/d (WesPac/Gulfgate Terminal)
13. Robbinston, ME: 0.27 Bcf/d (Kestrel Energy - Downeast LNG)

POTENTIAL CANADIAN SITES IDENTIFIED BY PROJECT SPONSORS
14. Goldboro, NS: 1.4 Bcf/d (Pieridae Energy Canada)
15. Prince Rupert Island, BC: 2.91 Bcf/d (BG Group)
16. Melford, NS: 1.8 Bcf/d (H-Energy)
17. Prince Rupert Island, BC: 2.74 Bcf/d (Pacific Northwest LNG)
18. Prince Rupert Island, BC: 4.0 Bcf/d (ExxonMobil – Imperial)
19. Squamish, BC: 0.29 Bcf/d (Woodfibre LNG Export)
20. Kitimat/Prince Rupert, BC: 0.32 Bcf/d (Triton LNG)
22. Kitsault, BC: 2.7 Bcf/d (Kitsault Energy)
23. Stewart, BC: 4.1 Bcf/d (Canada Stewart Energy Group)
24. Delta, BC: 0.4 Bcf/d (WesPac Midstream Vancouver)
25. Vancouver Island, BC: 0.11 Bcf/d (Steelhead LNG)

As of July 18, 2014
LNG Demand - Eight DOE Approved Export Applications
(In 2025, 27.0% Increase from EIA Forecast)

Source: EIA, AEO 2014
LNG Demand - Thirteen FERC Lower 48 Export Applications
(In 2025, 34.0% Increase from EIA Forecast)

Source: EIA, AEO 2014
World LNG Imports Forecast by Major Importers from 2013 to 2030

Source: *LNG Markets Study*. PFC Energy, June 2012; CRA analysis and industry research
Australia: A Cautionary Tale

- Third largest natural gas producer in world.
- Significant gas reserves and are producing at record levels.
- LNG exports have tripled domestic prices. $9 going to $11/12 in 2015 (netback pricing).
- Producers locked up long-term contracts to sell LNG and there is not enough for domestic market. 20-30 year contracts.
- Driven by OPEC cartel crude oil-linked LNG prices.
Take Action to Protect Your Competitiveness

- Sign onto IECA letter to President Obama to take a measured approach to further LNG export approvals.
- Participate in IECA organized fly-in.
- Join IECA and get involved!!!!!
Thank You!

Industrial Energy Consumers of America

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