

U.S. Liquefied Natural Gas Exports: America's Opportunity and Advantage

What is LNG?

- LNG is clean, odorless, noncorrosive, nontoxic liquid
- LNG is formed when natural gas is cooled to -260 F
- In liquid state, the volume shrinks by about 600 times, making it easy to store and transport via vessel
- LNG has been safely handled for decades
- LNG is not stored under pressure and is not flammable in its liquid state
- LNG vessels have made more than 135,000 voyages without major accidents or safety problems
- LNG is highly regulated: FERC, DOT, USCG, DHS...

What is the issue?

Various applications to export LNG are pending before DOE

Order to Be Processed	Company	DOE/FE Docket No.	Date DOE Application Filed	FERC Pre-Filing Docket No.	Date Applicant Received FERC Approval to Begin Pre-Filing Process
1	Freeport LNG Expansion, L.P. and FLNG Liquefaction, LLC	10-161-LNG	12/17/2010	PF11-2	1/5/2011
2	Lake Charles Exports, LLC	11-59-LNG	5/6/2011	PF12-8	4/6/2012
3	Dominion Cove Point LNG, LP	11-128-LNG	10/3/2011	PF12-16	6/26/2012
4	Freeport LNG Expansion, L.P. and FLNG Liquefaction, LLC	11-161-LNG	12/19/2011	PF11-2	1/5/2011
5	Cameron LNG, LLC	11-162-LNG	12/21/2011	PF12-13	5/9/2012
6	Jordan Cove Energy Project, L.P.	12-32-LNG	3/23/2012	PF12-7	3/6/2012
7	LNG Development Company, LLC (d/b/a Oregon LNG)	12-77-LNG	7/16/2011	PF12-18	7/16/2012
8	Cheniere Marketing, LLC	12-97-LNG	8/31/2012	PF12-3	12/22/2011
9	Excelerate Liquefaction Solutions I, LLC	12-146-LNG	10/5/2012	PF13-1	11/20/2012
10	Carib Energy (USA) LLC	11-141-LNG	10/20/2011		
11	Gulf Coast LNG Export, LLC	12-05-LNG	1/10/2012		
12	Southern LNG Company, L.L.C.	12-100-LNG	8/31/2012	PF13-3	Not yet approved
13	Gulf LNG Liquefaction Company, LLC	12-101-LNG	8/31/2012	PF13-4	Not yet approved
14	CE FLNG, LLC	12-123-LNG	9/21/2012		
15	Golden Pass Products LLC	12-156-LNG	10/26/2012		
16	Pangea LNG (North America) Holdings, LLC	12-184-LNG	12/19/2012		

What is the solution?

DOE should confirm that LNG exports are in the public interest and expeditiously approve pending LNG export applications

In 1938, Congress passed the Natural Gas Act, which established a rebuttable presumption that all natural gas exports, including LNG, are in the public interest and shall be permitted. In the Energy Policy Act of 2005, Congress revisited the issue of LNG imports and exports – and confirmed that LNG exports are presumed to be in the public interest.

LNG exports to countries with which the United States has signed a Free Trade Agreement are automatically deemed to be in the public interest and applications “shall be granted without modification or delay.”

Exports will:

- Create and support thousands of jobs
- Generate billions of dollars in government revenues
- Reduce our trade deficit
- Help the industry operate efficiently by maintaining production levels, thereby enhancing energy security
- Increase domestic production of associated natural gas liquids (NGLs), putting downward pressure on prices of chemical manufacturing feedstocks

DOE should expeditiously move forward with the approval of LNG export applications to ensure the above benefits are realized, and to ensure domestic projects are competitive with international projects.

NERA Study: *Macroeconomic Impacts of LNG from the United States* (December 2012)

“Across all scenarios, the U.S. [is] projected to gain net economic benefits from allowing LNG exports. Moreover, for every one of the market scenarios examined, net economic benefits increase[] as the level of LNG exports increase[s]. In particular, scenarios with unlimited exports always ha[ve] higher net economic benefits than corresponding cases with limited exports.” (page 1)

NERA Study: *Macroeconomic Impacts of LNG from the United States* (December 2012)

“Natural gas price changes attributable to LNG exports remain in a relatively narrow range across the entire range of scenarios.” (page 2)

NERA Study is Available for Public Comment (77 Federal Register 238, December 11, 2012)

- DOE Initial Comment Period: January 24, 2013
- DOE Reply Comment Period: February 25, 2013
- Comments are intended to help inform DOE in its public interest determinations

Exporting the American Renaissance: Global impacts of LNG exports from the United States (Deloitte, January 2013)

“The impact of U.S. LNG exports on U.S. citygate prices is projected to be minimal, only an average \$0.15/MMBtu from 2016 through 2030. Abundant North American gas resources mitigate the impact of demand changes, including exports. Vast shale gas resources, that are now economically viable due to technological advancements in recent years, have effectively caused the aggregate U.S. supply curve to flatten, representing greater supply elasticity.” (page 12)

LNG Exports Will Drive Additional Production and Support Thousands of Additional Jobs

Each Additional Bcf (billion cubic feet) of shale gas production supports 32,000 total jobs throughout the economy. (*The Economic and Employment Contributions of Unconventional Gas Development in State Economies*, IHS Global Insight, June 2012.)

LNG Exports Will Advance the Administration's National Export Initiative

“The [National Export Initiative] will help meet my Administration’s goal of doubling exports over the next 5 years by working to remove trade barriers abroad, by helping firms – especially small business – overcome the hurdles to entering new export markets, by assisting with financing, and in general by pursuing a Government-wide approach to export advocacy abroad.” (Executive Order 13534, March 11, 2010)

Increased demand for domestically produced natural gas would help to sustain small business employment:

- Roughly 359,000 people are employed by small businesses within the upstream oil and natural gas industry and upstream support industries.
 - Nearly 45% of all employment in the upstream oil and natural gas industry and upstream support industries is provided by small businesses.
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Experts and Editorial Boards Agree: LNG Exports Are Good for the Country

Daniel Yergin, CERA

John Deutch, MIT

Robert Samuelson, Economic Columnist

Richard Lugar, Former Chairman Senate CFR

William O'Keefe, Marshall Institute

Bill Richardson, former Energy Secretary

Spencer Abraham, former Energy Secretary

Charles Ebinger, Brookings Institute

Michael Levi, Council on Foreign Relations

Raymond Keating, Small Business and Entrepreneurship Council

Margo Thorning, American Council for Capital Formation

Experts and Editorial Boards Agree: LNG Exports Are Good for the Country

Washington Post, Editorial Board:

Natural Gas Exports: A Boon to the Economy, Dec. 7, 2012

A U.S. Energy Renaissance, Nov. 16, 2012

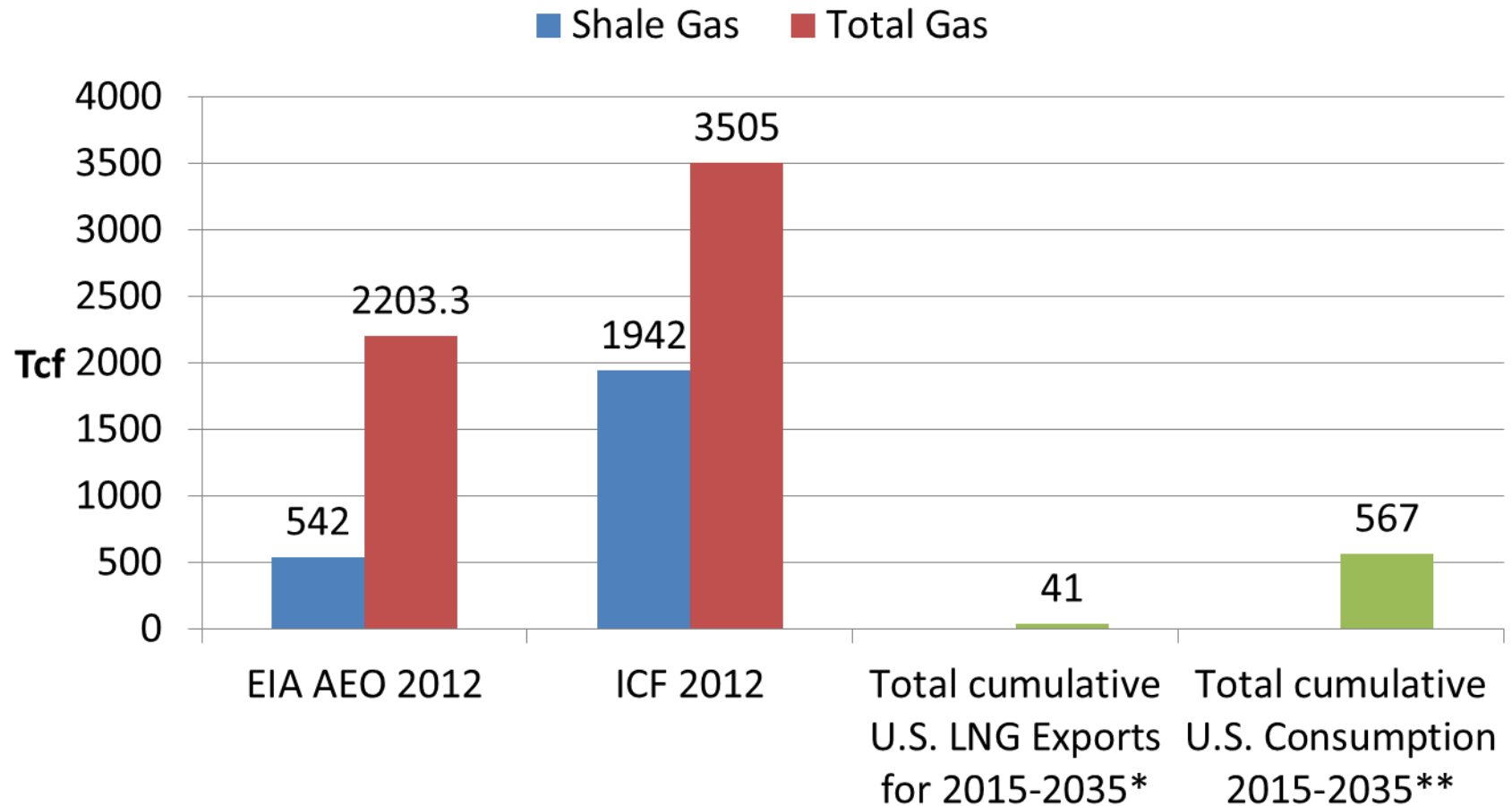
New York Times, Editorial Board:

Sending Natural Gas Abroad, Dec. 15, 2012

Bloomberg, Editorial Board:

U.S. Natural Gas Doesn't Need Protectionism, Dec. 28, 2012

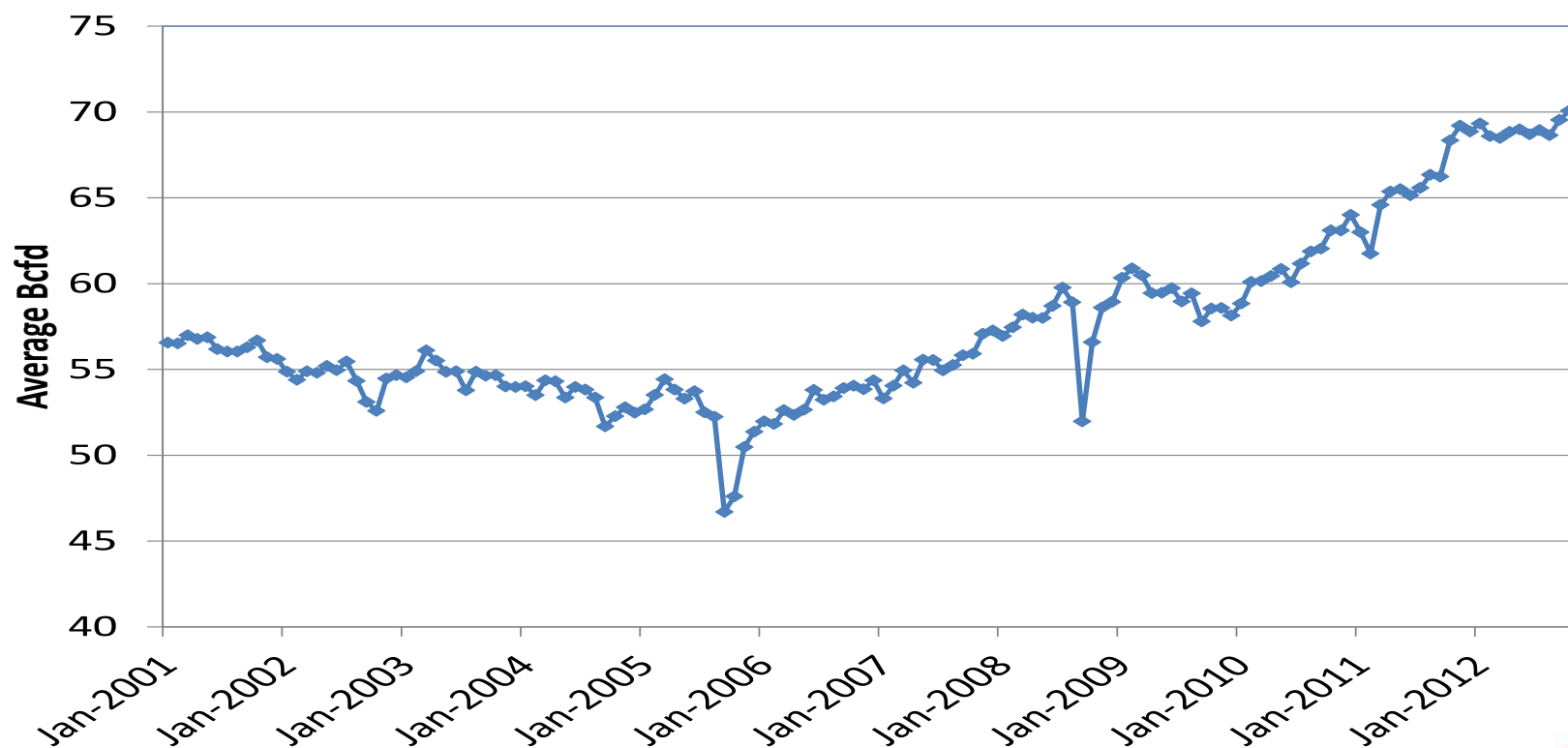
Estimates of U.S. Total Natural Gas Resource Base vs Total U.S. LNG Exports and Consumption



*20 years of 6 bcf/d of LNG exports phased in between 2015 and 2020 reaching 6 bcf/d in 2020 and thereafter.

**Source: EIA AEO 2013ER

U.S. Natural Gas Marketed Production



Natural Gas Exploratory and Development Wells - 2011 vs. 2012

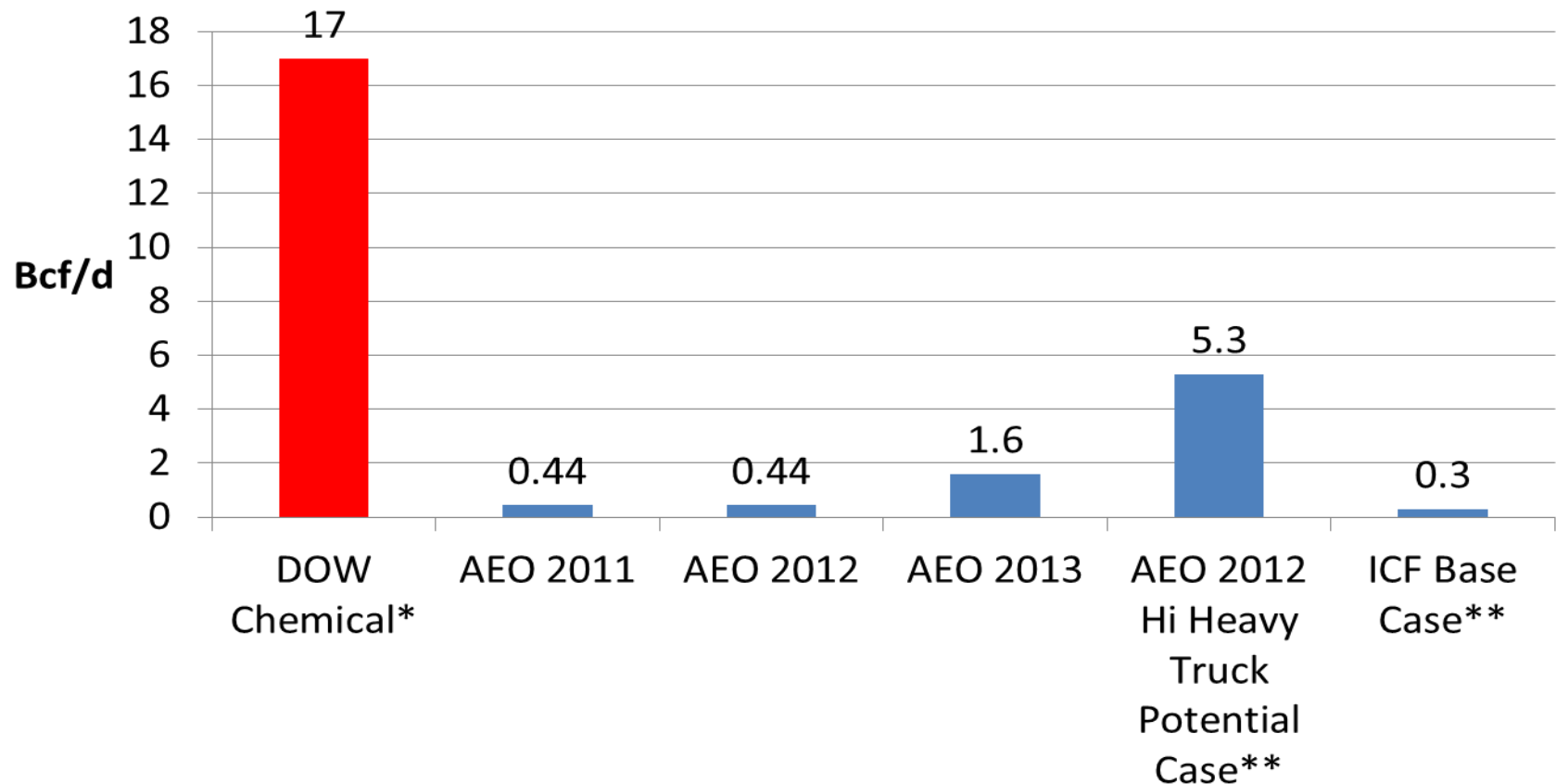
U.S. Total	2011	2012	Delta	Percent
Exploratory Wells	658	793	+135	+21%
Development Wells	3,154	1,912	(1,242)	(39%)

Source: API Quarterly Completion Report

In 2012, the number of exploratory natural gas wells increased even while development wells decreased due to market conditions.

The industry is ready to expand future natural gas production with development drilling.

2035 Projected Natural Gas Demand in the Transportation Sector

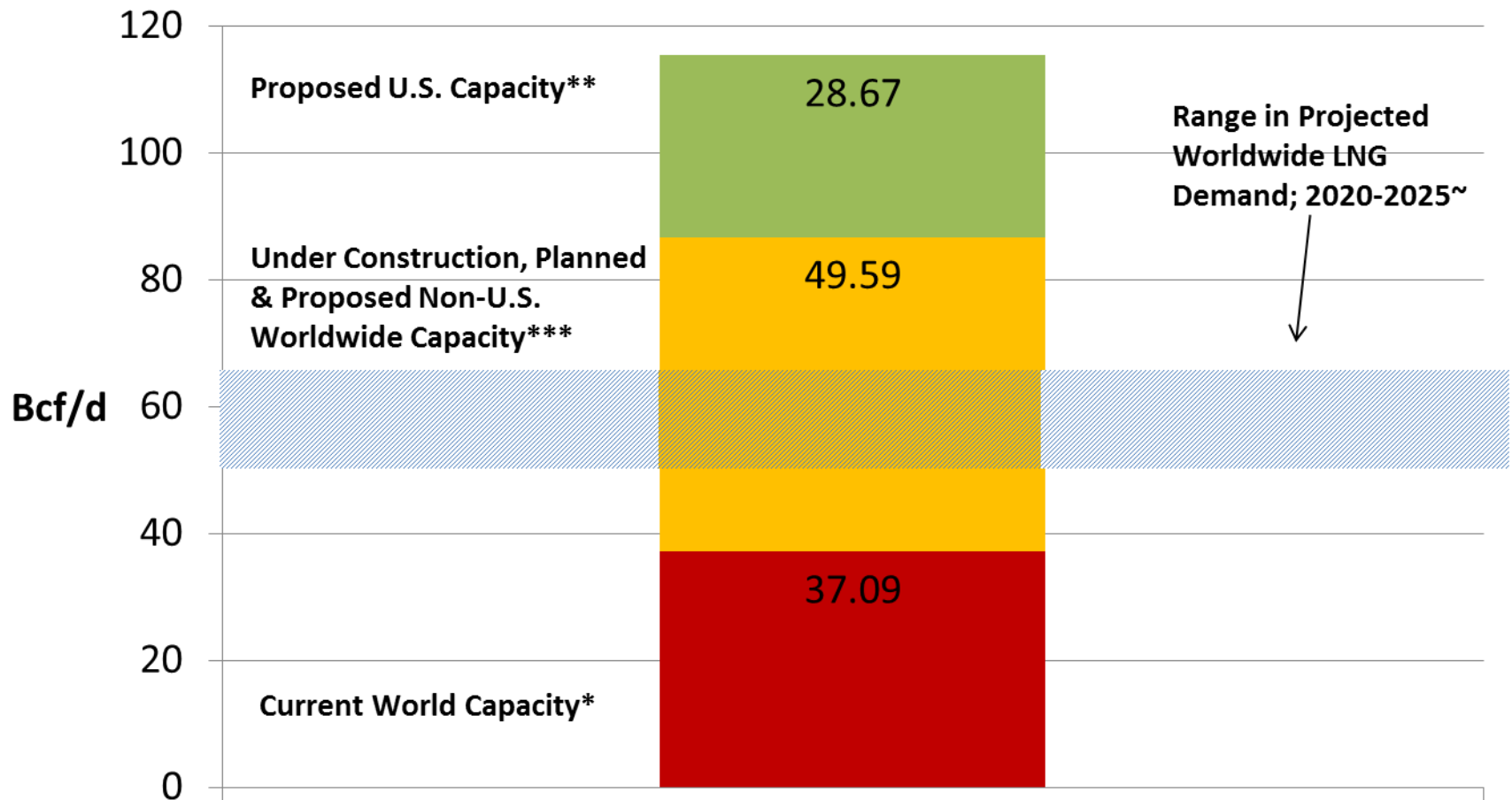


*DOW PowerPoint slide, October 25, 2012.

**26,000 HD vehicles in the reference case vs 275,000 HD vehicle sales in the high potential case.

***ICF Base Case Projection 4Q 2012.

Competition for Worldwide LNG Demand will be Steep



* ICF estimate for year end 2011.

**FTA Applications to DOE as of Nov. 29, 2012.

***Dec 2012 ICF estimate based on current worldwide project list.

~Poten, BG Group, Credit Suisse, Facts Global

Recent Criticism of NERA's LNG Export Study Is Unfounded

Main criticism of NERA Study:

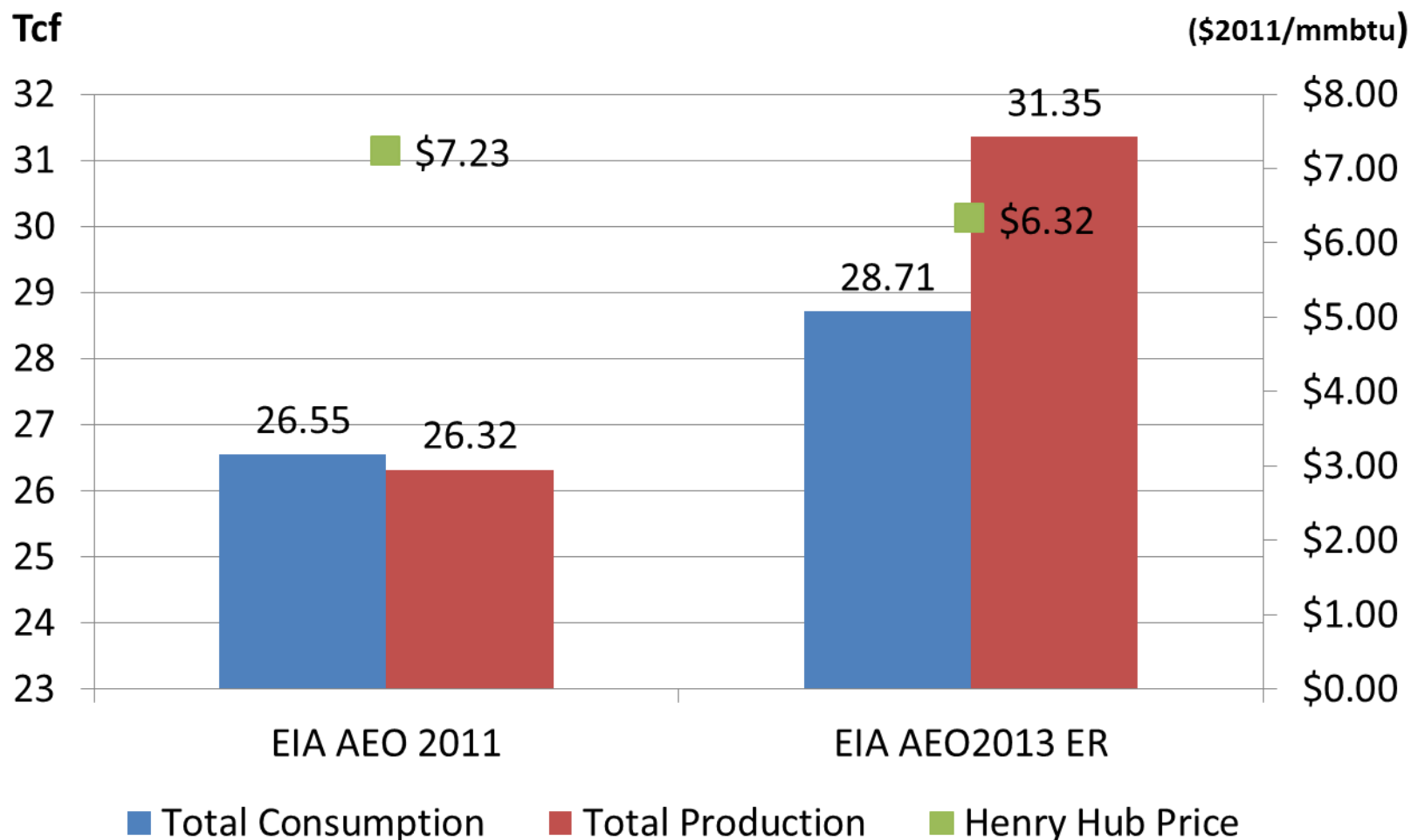
- Two year old AEO 2011 forecast used is not valid, natural gas consumption projections are higher in AEO 2013.

Response:

- AEO 2013 projects even greater natural gas supply for **both** domestic consumption and LNG exports at lower prices.
- BY 2035, U.S. production up 19%, prices down over 20%

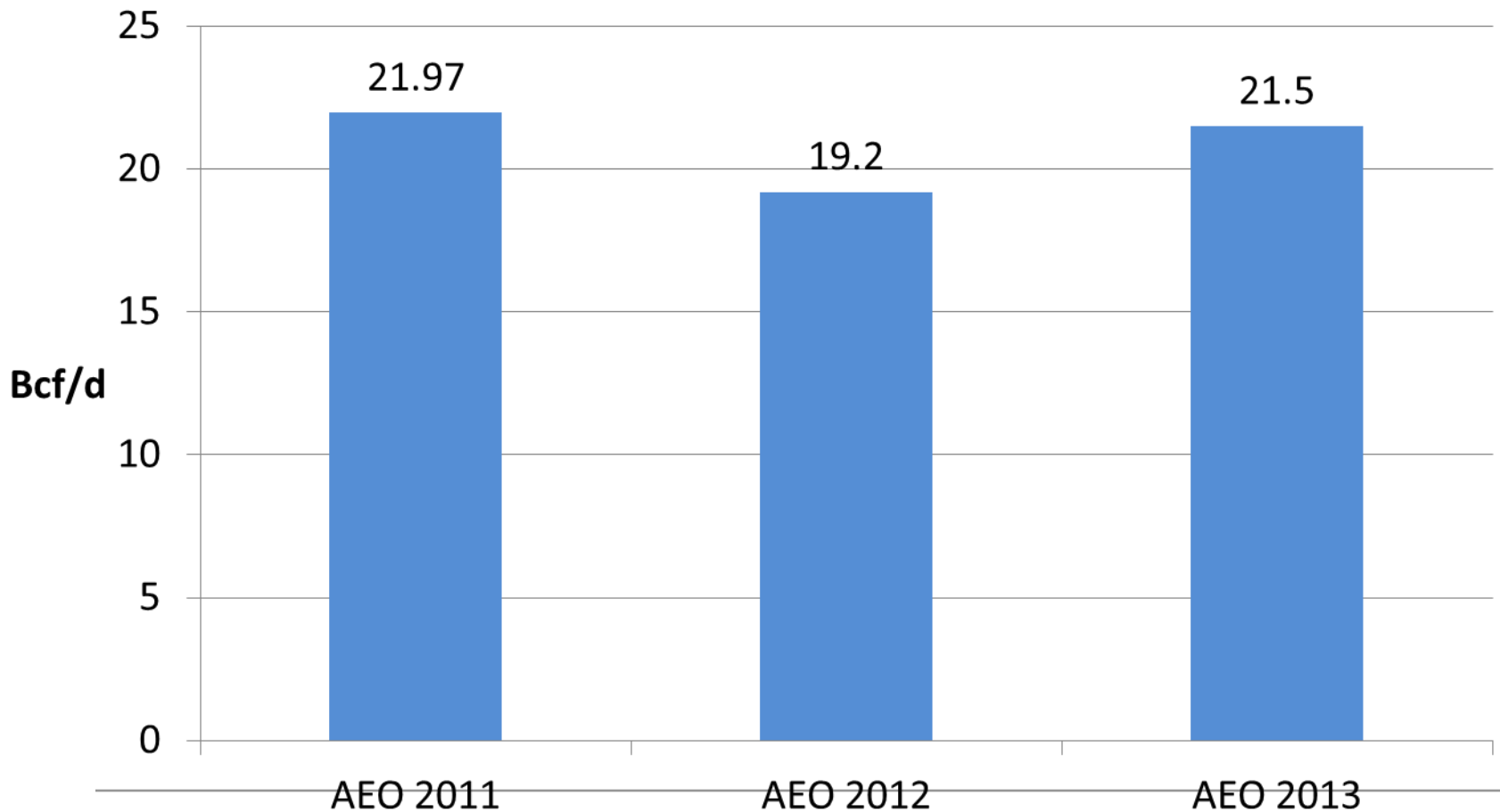
If the NERA study was conducted using the AEO 2013, price impacts would most likely be smaller.

A Comparison of EIA's AEO 2011 with AEO 2013 Early Release; Natural Gas Consumption, Production and Prices, 2035



Source: <http://www.eia.gov/oiaf/aeo/tablebrowser/>
The AEO 2011 price in \$2009 was converted to \$2011.
Total production is dry gas production.

2035 Projected Natural Gas Demand in the Industrial Sector



The Impact of Higher LNG Exports on Natural Gas and Electricity Bills for Residential, Commercial and Industrial Customers are Small

Natural Gas Bills

- ““from 2015 to 2035, natural gas bills paid by end-use consumers in the residential, commercial and industrial sectors combined increase 3 to 9 percent over a comparable baseline case with no exports.”(p. 6)

Electricity Bills

- “...while increases in electricity bills paid by end-use customers range from 1 to 3 percent.” (p. 6)

The Department of Energy (“DOE”) is the agency responsible for authorizing exports of LNG

- The authorization process for the export of the LNG commodity to countries with which the U.S. has a free trade agreement (“FTA countries”), is predictable and less burdensome than the authorization process for exports to countries with which the U.S. does not have a free trade agreement (“non-FTA countries”)
- By law, applications to export LNG to FTA countries are deemed to be in the public interest and must be granted without delay or modification (Natural Gas Act Section 3)
- Approximate time: 2-3 months for agency authorization

FTA v. Non-FTA Applications

DOE authorization process is different for exports to FTA countries than for non-FTA countries

	FTA Countries	Non-FTA Countries
Application	Relatively short	Longer
Public Notice/ Comment	Not required	<ul style="list-style-type: none"> - Notice of application must be published in the Federal Register - Interested parties must be given the opportunity to comment on the application
Public Interest	Deemed to be in the public interest	Rebuttable presumption that application is in the public interest
DOE Status	Ongoing	Temporarily on hold pending macroeconomic study

FTA v. Non-FTA Applications

By law, applications to export LNG to FTA countries are **deemed** to be in the public interest

- Applications to export LNG to FTA countries do not need to be noticed in the Federal Register (public notice)
- By law, these applications must be granted without modification or delay
- The current average of DOE's issuance for an FTA export license is between 45 and 90 days

FTA v. Non-FTA Applications

By contrast, applications to export LNG to non-FTA countries are **presumed** to be in the public interest, but the applicant must file a substantial application

- Notice of the application must be filed in the Federal Register, which enables interested parties to file comments and protests

Standard of Review

- Section 3 of the Natural Gas Act establishes a **rebuttable presumption that imports and exports are in the public interest**
- Any party seeking to challenge the import or export authorization must overcome this presumption with substantial evidence

The Federal Energy Regulatory Commission (“FERC”) is the agency responsible for authorizing the siting, construction, and operation of LNG export facilities

- The authorization process for LNG export facilities requires extensive environmental review and can be contentious
- Multiple permits must be obtained from federal and state environmental agencies as part of the FERC process
- Approximate time: minimum 18 months, with an estimated average of 24-30 months, depending on the terminal site, and sometimes longer

FERC Application Approval Process

Under the Natural Gas Act, FERC possesses regulatory authority over construction, interconnection and operation of pipelines and facilities used to transport natural gas in interstate commerce

- This authority includes onshore LNG facilities and LNG facilities in state waters

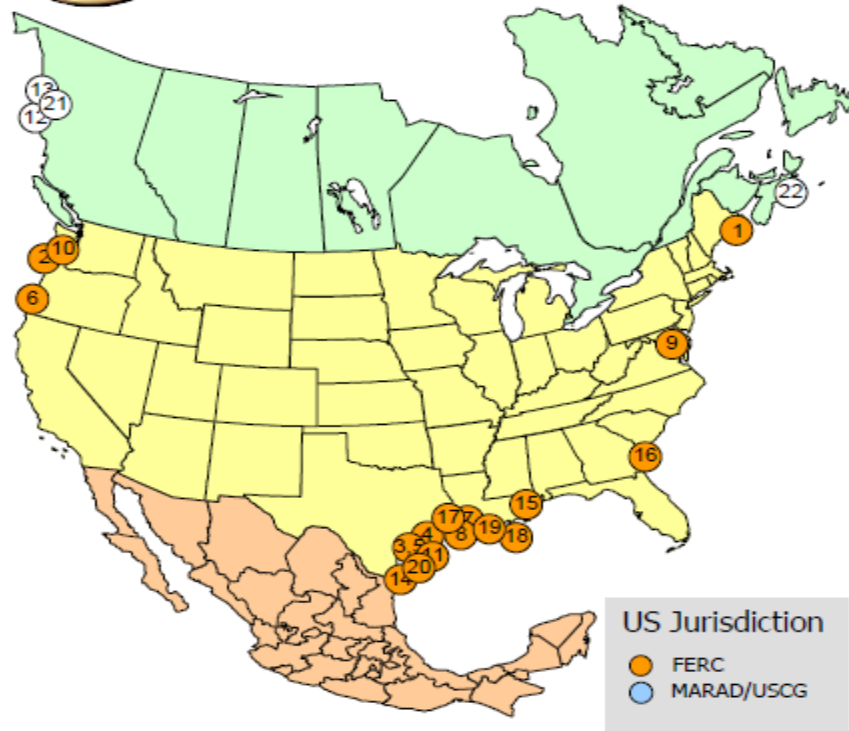
FERC approval process is elaborate and public

Detailed filings required, including engineering and design information, maps and diagrams, an environmental report, pro forma tariffs and initial rate services, as well as financial and operational information

Even an uncontested application can take between 8-12 months for FERC to review and issue decision



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



Import Terminal

PROPOSED TO FERC

1. **Robbinston, ME:** 0.5 Bcfd (Kestrel Energy - Downeast LNG)
2. **Astoria, OR:** 1.5 Bcfd (Oregon LNG)
3. **Corpus Christi, TX:** 0.4 Bcfd (Cheniere - Corpus Christi LNG)

Export Terminal

PROPOSED TO FERC

4. **Freeport, TX:** 1.8 Bcfd (Freeport LNG Dev/Freeport LNG Expansion/FLNG Liquefaction)
5. **Corpus Christi, TX:** 2.1 Bcfd (Cheniere - Corpus Christi LNG)
6. **Coos Bay, OR:** 0.9 Bcfd (Jordan Cove Energy Project)
7. **Lake Charles, LA:** 2.4 Bcfd (Southern Union - Trunkline LNG)
8. **Hackberry, LA:** 1.7 Bcfd (Semptra - Cameron LNG)
9. **Cove Point, MD:** 0.75 Bcfd (Dominion - Cove Point LNG)
10. **Astoria, OR:** 1.30 Bcfd (Oregon LNG)
11. **Lavaca Bay, TX:** 1.38 Bcfd (Excellerate Liquefaction)

PROPOSED CANADIAN SITES IDENTIFIED BY PROJECT

SPONSORS

12. **Kitimat, BC:** 0.7 Bcfd (Apache Canada Ltd.)
13. **Douglas Island, BC:** 0.25 Bcfd (BC LNG Export Cooperative)

POTENTIAL U.S. SITES IDENTIFIED BY PROJECT SPONSORS

14. **Brownsville, TX:** 2.8 Bcfd (Gulf Coast LNG Export)
15. **Pascagoula, MS:** 1.5 Bcfd (Gulf LNG Liquefaction)
16. **Elba Island, GA:** 0.5 Bcfd (Southern LNG Company)
17. **Sabine Pass, TX:** 2.6 Bcfd (ExxonMobil - Golden Pass)
18. **Plaquemines Parish, LA:** 1.07 Bcfd (CE FLNG)
19. **Cameron Parish, LA:** 0.16 Bcfd (Waller LNG Services)
20. **Ingleside, TX:** 1.09 Bcfd (Pangea LNG (North America))

POTENTIAL CANADIAN SITES IDENTIFIED BY PROJECT

SPONSORS

21. **Prince Rupert Island, BC:** 1.0 Bcfd (Shell Canada)
22. **Goldboro, NS:** 0.67 Bcfd (Pieridae Energy Canada)

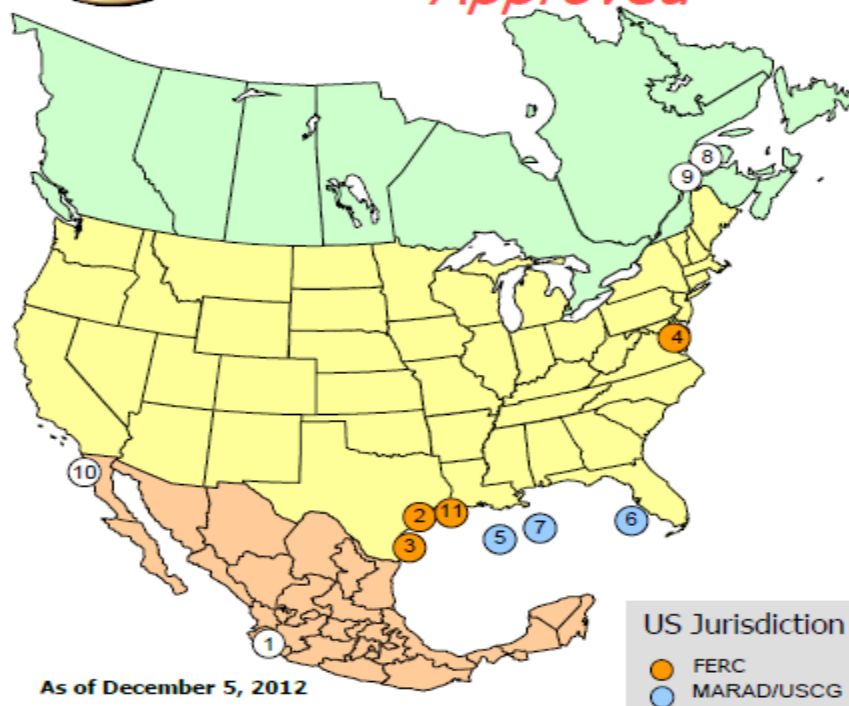
As of December 5, 2012

Office of Energy Projects



North American LNG Import /Export Terminals

Approved



As of December 5, 2012

* Expansion of an existing facility

Import Terminal

APPROVED - UNDER CONSTRUCTION

Mexico

1. Manzanillo, MX: 0.5 Bcfd (KMS GNL de Manzanillo)

APPROVED - NOT UNDER CONSTRUCTION

U.S. - FERC

2. Freeport, TX: 2.5 Bcfd (Cheniere/Freeport LNG Dev. - Expansion)*
3. Port Lavaca, TX: 1.0 Bcfd (Gulf Coast LNG Partners - Calhoun LNG)
4. Baltimore, MD: 1.5 Bcfd (AES Corporation - AES Sparrows Point)

U.S. - MARAD/Coast Guard

5. Gulf of Mexico: 1.0 Bcfd (Main Pass McMoran Exp.)
6. Offshore Florida: 1.2 Bcfd (Hoegh LNG - Port Dolphin Energy)
7. Gulf of Mexico: 1.4 Bcfd (TORP Technology-Bienville LNG)

Canada

8. Rivière-du- Loup, QC: 0.5 Bcfd (Cacouna Energy - TransCanada/PetroCanada)
9. Quebec City, QC: 0.5 Bcfd (Project Rabaska - Enbridge/Gaz Met/Gaz de France)

Mexico

10. Baja California, MX: 1.5 Bcfd (Sempra - Energia Costa Azul - Expansion)

Export Terminal

APPROVED - UNDER CONSTRUCTION

U.S. - FERC

11. Sabine, LA: 2.6 Bcfd (Cheniere/Sabine Pass LNG)

Office of Energy Projects

Background Slides

History of DOE and FERC Regulation

Department of Energy Organization Act (1977)

- Simultaneously abolished the FPC, created DOE, and vested DOE with the sole authority over imports and exports of natural gas
- Also created FERC and provided that DOE may specifically assign some of its authority over imports and exports of natural gas to FERC
 - But any authority FERC had over imports and exports of natural gas must be specifically assigned to it

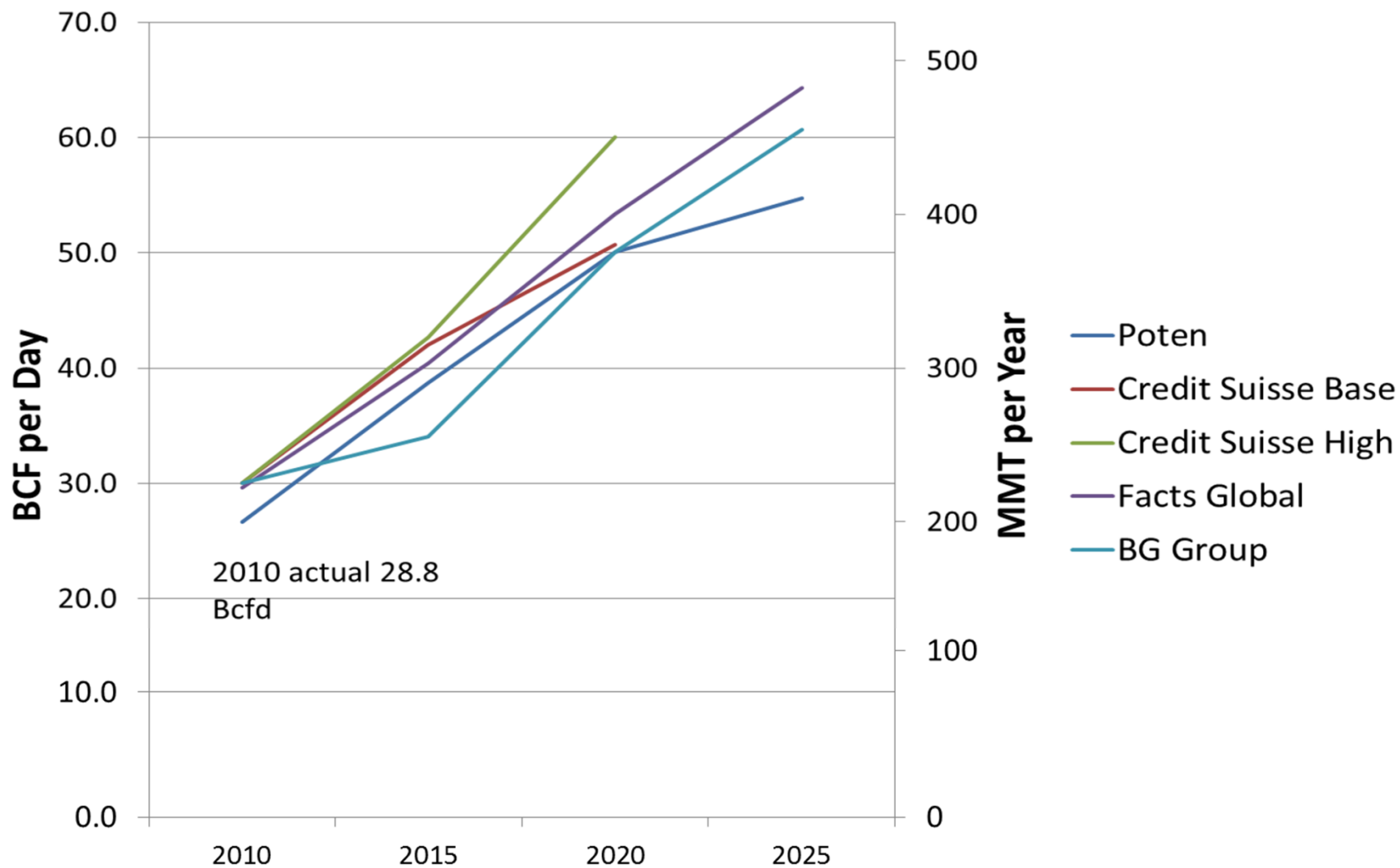
Over time, DOE specifically assigned to FERC authority over the siting, construction, operation, and modification of LNG terminals Authority to approve or deny applications to import or export the LNG commodity eventually was vested in DOE's Office of Fossil Energy ("OFE")

History of DOE and FERC Regulation

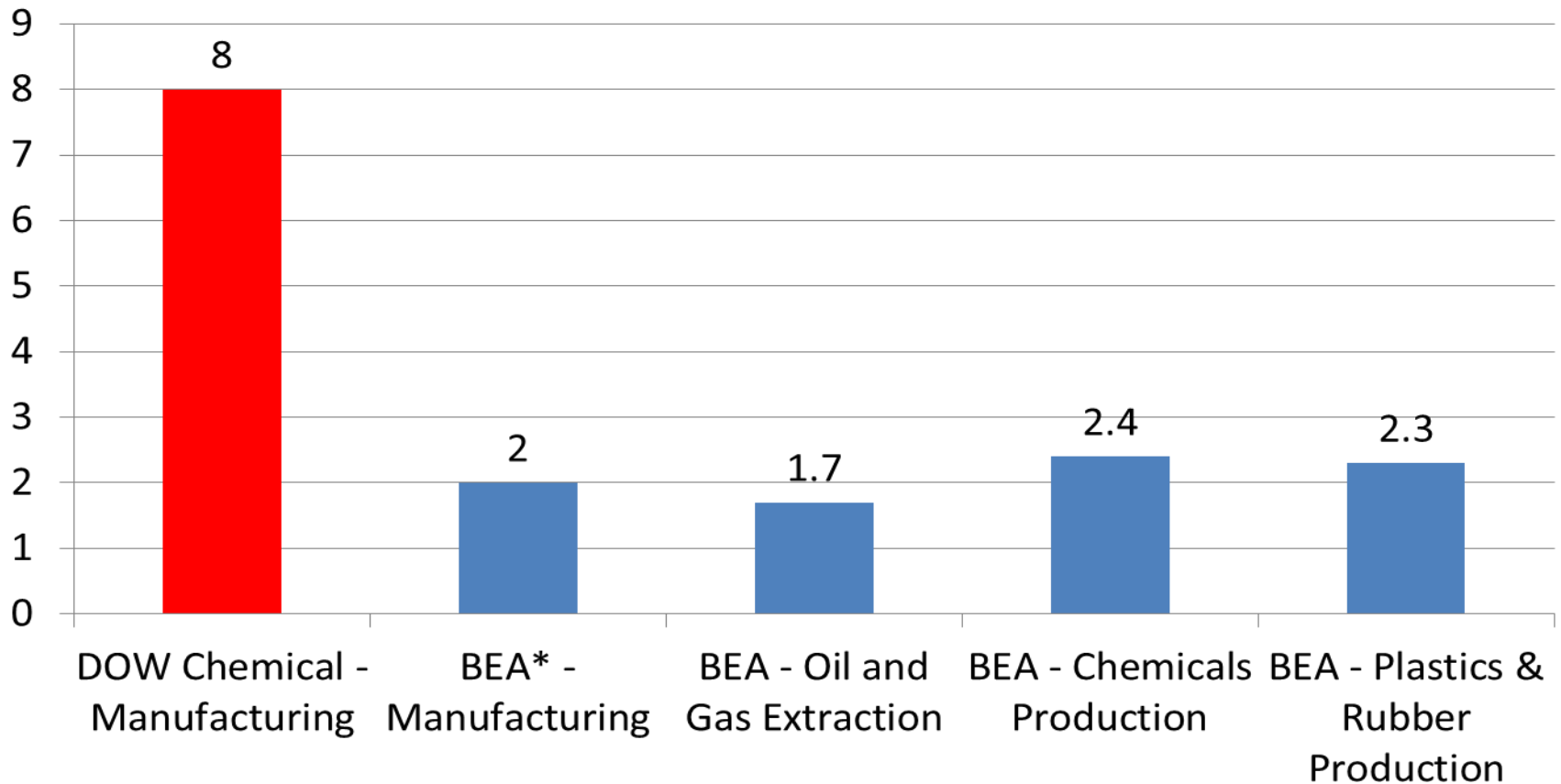
Energy Policy Act of 2005

- Enacted in response to surge in number of proposals to construct regasification/import terminals in the U.S.
- Reaffirmed rebuttable presumption that LNG exports are in the public interest, and that exports to FTA countries are automatically deemed to be in the public interest
- Granted FERC the exclusive authority to approve or deny any application for the siting, construction, expansion, or operation of an LNG terminal
- Restricted FERC's ability to require open access at new LNG terminals and to impose rates or terms and conditions of service – fully private, commercial arrangements allowed

Comparison of Recent World LNG Demand Forecasts



GDP Multiplier Estimates



*U.S. Bureau of Economic Analysis; a multiplier of 2 means that for every \$ increase in the output of the manufacturing industry, GDP increases by \$2

Small Business Employment in the Upstream Oil and Natural Gas and Support Industries

NAICS Code	Industry Sector	Number of Small Businesses	Small Business Employment	Percentage of Total Sector Employment
211111	Crude petroleum and natural gas extraction	6,334	46,329	46.6%
211112	Natural gas liquid extraction	92	1,507	15.5%
213111	Drilling oil and gas wells	1,921	32,177	42.3%
213112	Support activities for oil and gas operations*	7,057	44,855	23.8%
23712	Oil and gas pipeline and related structures construction*	1,559	36,535	28.8%
23891	Site preparation contractors*	34,210	184,405	71.2%
333132	Oil and gas field machinery and equipment mfg.	512	13,587	35.5%
54136	Geological surveying and mapping services*	833	4,385	40.6%
Total		52,519	359,395	44.4%

Notes: Small businesses are categorized as defined by the Small Business Administration, <http://www.sba.gov/content/small-business-size-standards>. Where Small Business is defined by employment size, 2010 census data was applied. Where Small Business is defined by annual receipts, 2007 data was applied (sectors marked with an asterisk). All data is the most recent data publicly available.

Source: U.S. Census Bureau, Statistics of U.S. Businesses, 2010 Annual Employment data and 2007 Annual Receipts data. <http://www.census.gov/econ/susb/>

- Roughly 359,000 people are employed by small businesses within the upstream oil and natural gas industry and upstream support industries.
- Nearly 45% of all employment in the upstream oil and natural gas industry and upstream support industries is provided by small businesses.
- Increased demand for domestically produced natural gas, such as through LNG exports, would help to sustain this small business employment.