Prepared Testimony of Kenneth H. Ditzel

Before the Subcommittee on Energy and Power
Committee on Energy and Commerce
United States House of Representatives

March 25, 2014

Mr. Chairman and Members of the Subcommittee:

Thank you for your invitation to present testimony before the Subcommittee on Energy and Power; I appreciate the opportunity to discuss my analysis on the impacts of LNG exports on domestic gas prices and the U.S. economy. I am a Principal in the energy practice at Charles River Associates (CRA), and I have authored three reports since February 2013 regarding LNG exports. The client for all three reports has been the Dow Chemical Company. The views I express today are mine and do not necessarily reflect the views of CRA or others.

The major points I will cover in my testimony include the following:

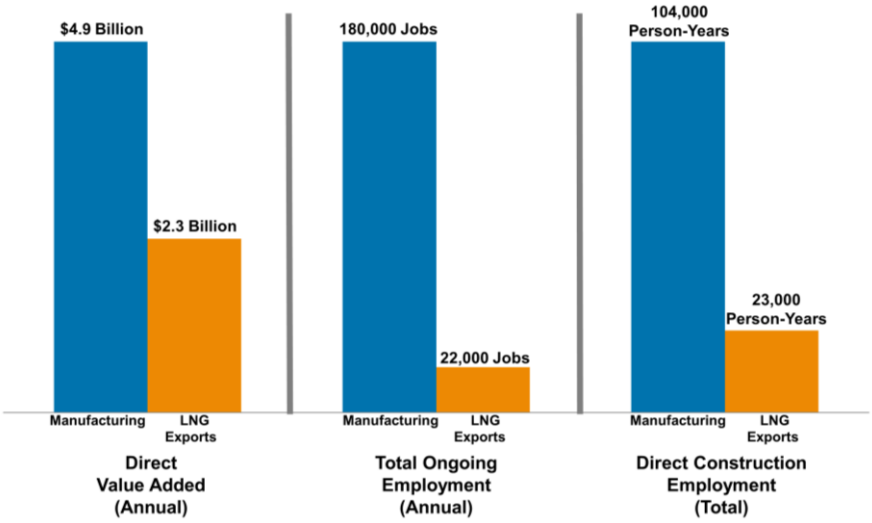
- LNG exports do create GDP growth and jobs, but manufacturing contributes more GDP, jobs, and trade benefit, assuming the same level of gas consumption
- The trade-off in benefits between LNG exports and manufacturing (along with power generation and natural gas vehicles) will occur if prices rise above ~$8/MMBtu on average
- LNG exports will introduce netback pricing to the U.S. and move us off of domestic supply curve pricing, which means we will be importing international LNG prices netted for value chain costs
- Because the LNG market is not a competitive market due to oil linked prices induced by OPEC and because the LNG market is expected to remain tight through the end of the decade, Asian LNG prices will remain high. I therefore expect the netback to the U.S. to be above $8/MMBtu
- These findings were missed by NERA due to its flawed assumptions and modeling approach
- Many of the concerns that I address today have been submitted to the DOE, yet the DOE public interest determination process continues in a manner that is opaque for both sides of this issue

My written testimony is divided into three areas: (1) A summary of the findings from my three reports, (2) Fundamental concerns with relying on the December 201 NERA Report for public interest determination, and (3) Recommendations for addressing the public interest determination going forward.

Summary of the CRA Reports' Findings

First, it is important to state that LNG exports could be beneficial to the U.S. economy. As shown in Figure 1Figure 1, LNG exports, assuming they do not cause significant gas price increases, would add to U.S. GDP (direct value added) and create jobs.

Figure 1: Economic Contributions of Manufacturing Compared to LNG Exports, 5 Bcf/d Equivalent[1]



The figure also shows that gas-intensive manufacturing creates twice (2x) as much GDP and almost five times (5x) the permanent jobs and eight times (8x) the construction jobs as LNG exports consuming a commensurate level of natural gas. Given the benefits from both LNG exports and manufacturing, the three key questions that need to be addressed are the following:

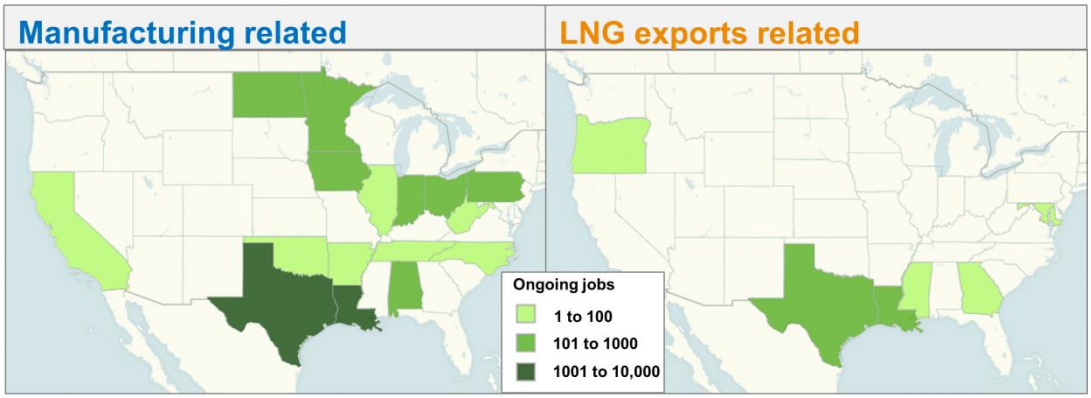
- Does U.S. manufacturing clearly deliver more economic benefits to the economy?
- Will U.S. manufacturing by at risk if domestic gas prices rise?
- Could U.S. LNG exports raise prices to a level that impacts manufacturing?

[1] The benefits shown in Figures 1 to 3 are based on the economic contributions of 5 Bcf/d of natural gas use in the manufacturing sector to the economic contributions of 5 Bcf/d of LNG exports. This level of gas consumption was chosen after analyzing a subset of announced investments in new manufacturing capacity in the United States.

The economic benefits of manufacturing relative to LNG exports

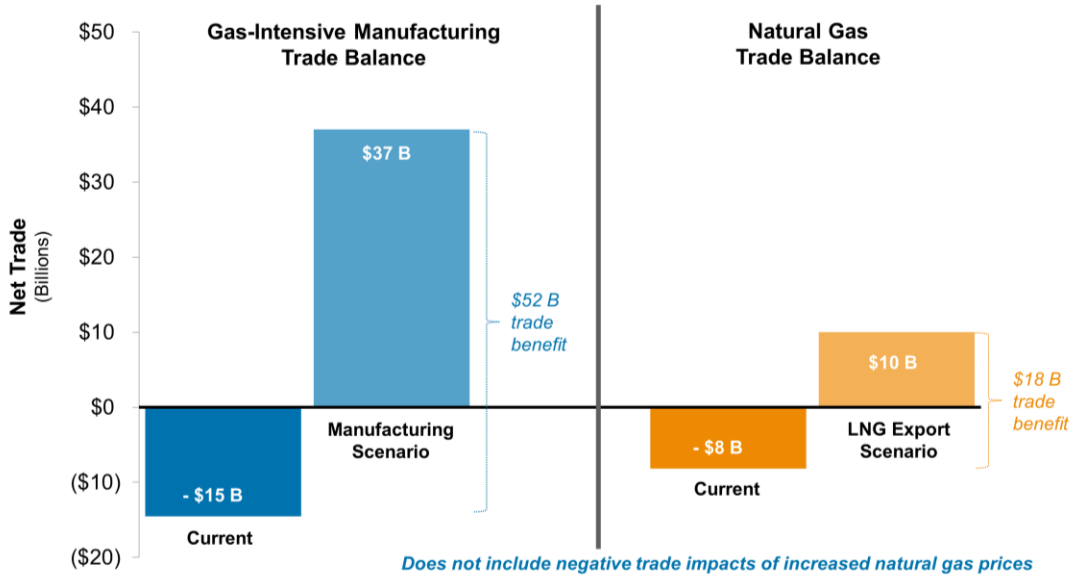
As highlighted in Figure 1, manufacturing has a bigger impact on overall GDP and job creation than LNG exports. Additionally, manufacturing distributes these benefits across more states as illustrated in Figure 2. Similar geographic dispersion occurs for construction employment. Note that a significant share of the jobs associated with manufacturing occurs in the Midwest; this is not the case for LNG exports, which benefit a small number of coastal states.

Figure 2: Geographic Distribution of Ongoing Employment, 5 Bcf/d Equivalent



Manufacturing also has a larger trade balance impact relative to LNG exports. As shown in Figure 3, manufacturing would create a $52 billion trade benefit while LNG exports (assuming a doubling in February 2013 prices) would create an $18 billion trade benefit.

Figure 3: Trade Impacts of 5 Bcf/d of Economic Activity in Manufacturing and LNG Exports

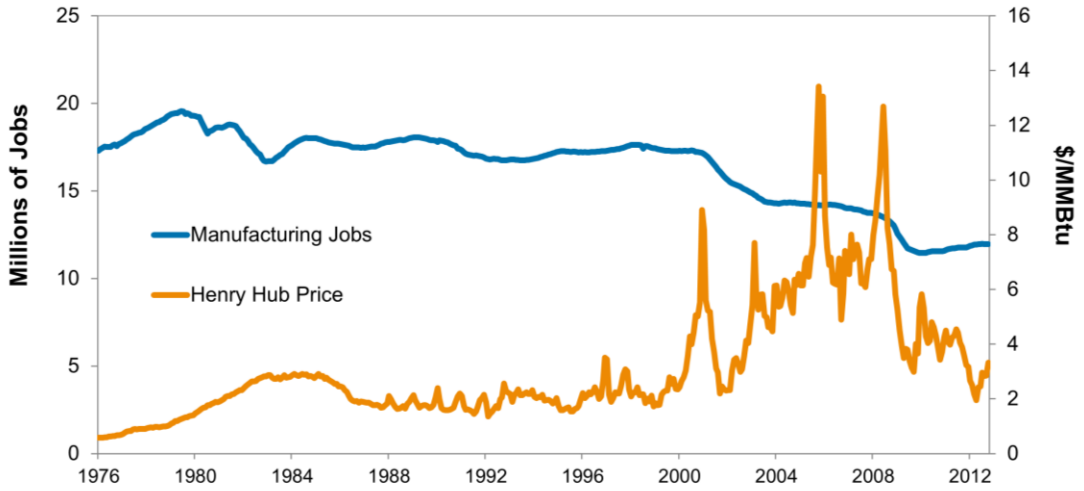


The reason why manufacturing would deliver a bigger benefit is that it generates more value added products than LNG exports. Given the larger economic contributions from manufacturing relative to LNG exports, the next question to answer is the following: at what price levels are these benefits at risk?

Price levels that will place the manufacturing renaissance at risk

From 2000 through the end of 2007, the United States experienced a 21% decline in manufacturing jobs, losing 3.6 million jobs in total. During the same period, as shown in Figure 4, Henry Hub natural gas prices increased significantly.

Figure 4: Manufacturing Jobs and Henry Hub Price Trend[2]



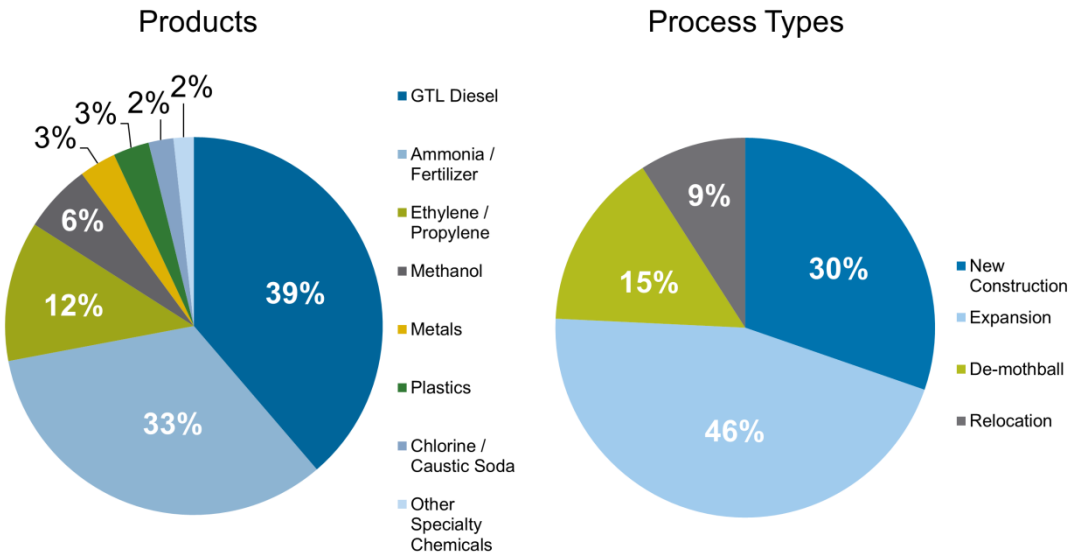
The average Henry Hub nominal natural gas price from 2000 through the end of 2007 was $5.7/MMBtu, and the annual average from 2005 through the end of 2008 was almost $8/MMBtu. These price levels are significantly higher than the eight-year period leading up to 2000 when the average Henry Hub price was $2.1/MMBtu. While correlation in Henry Hub prices and manufacturing is not necessarily evidence for causation, the anecdotal evidence from 2000 to 2007 indicate that increasing natural gas prices were a major driver of decisions to idle and shut down manufacturing plants.

The return of low natural gas prices in recent years has enabled the U.S. manufacturing industry to become more competitive internationally, which in turn has sparked the hopes of a manufacturing renaissance. The expectation of continued, favorable natural gas prices has led to announcements of more than 95 capital investments in the gas-intensive manufacturing sector, representing more than $90

[2] EIA, Bureau of Labor Statistics.

billion in new investments and thousands of new jobs. These investments will be varied across the manufacturing industry, and will be a combination of new builds, expansions, de-mothballs (re-commissioning of idled plants), and transfers of plants from overseas to the United States (relocation). Figure 5 shows the variation in products and plant type by incremental gas demand.

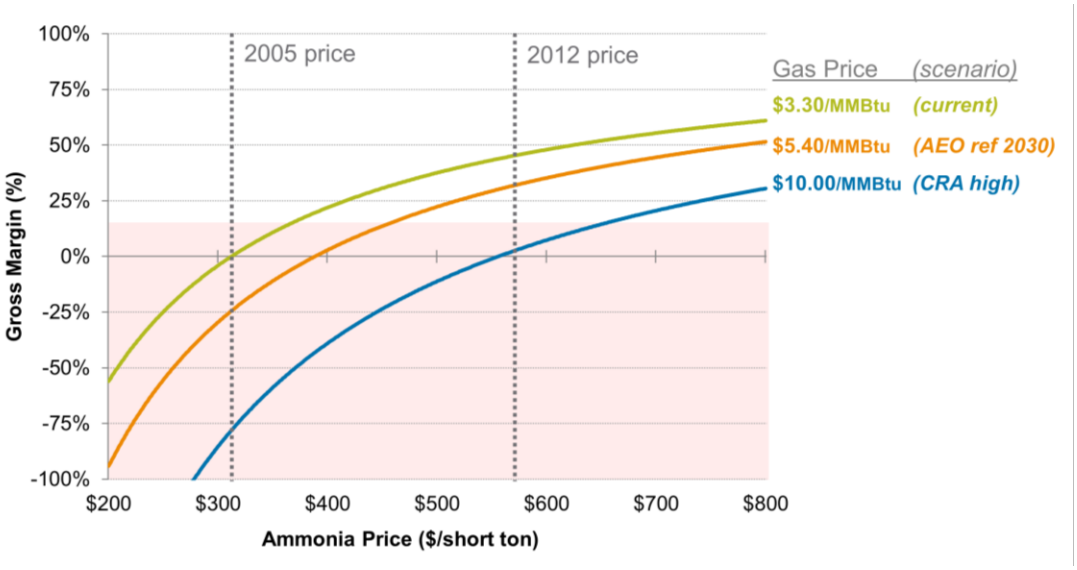
Figure 5: Plant Products Announced and Plant Types Announced, 4.8 Bcf/d[3]



I have found that the announced manufacturing investments are at risk if domestic gas prices rise above ~$8/MMBtu, similar to historical precedence. This was illustrated via a case study in the first CRA report, which showed that a typical ammonia facility would experience zero gross margins (revenues less costs of goods sold) at prices above $8/MMBtu even if ammonia prices maintained recent levels of $500-$600/ton (see Figure 6). Note that a zero gross margin results in negative profit margins after other fixed costs are considered.

[3] CRA analysis of public announcements in the gas-intensive portion of the manufacturing sector

Figure 6: Ammonia Producer Margins under Varying Ammonia Prices[4]



The ammonia case study is just one example of the impact of high gas prices on domestic manufacturing profits and sustainability. Similar impacts would be felt by other gas-intensive manufacturing if prices were to rise above $8/MMBtu.

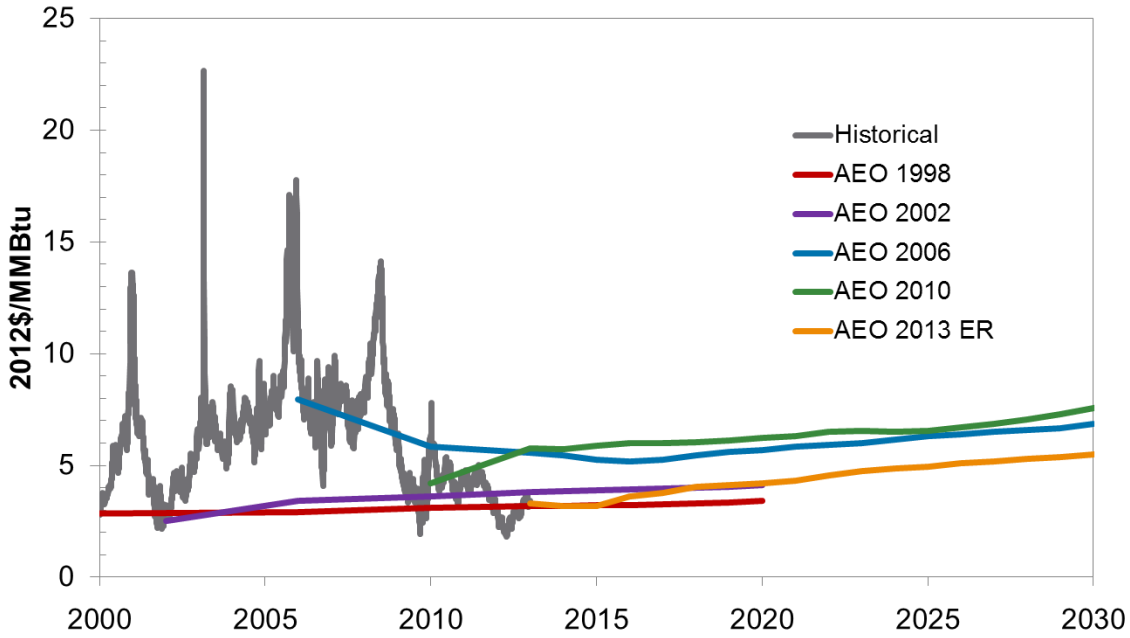
LNG exports' impact on domestic natural gas prices

The best outcome for LNG exporters and manufacturers would be for gas prices to remain low for the foreseeable future. This has appeared to be the potential promise as a result of the oil and gas sector's ingenuity and technology development that has led to the shale boom. Many forecasters, including the Energy Information Administration (EIA), forecast gas prices to remain low through 2030 even with LNG exports. In the case of EIA, the 2014 Annual Energy Outlook (AEO) Early Release (ER) forecasts gas prices to remain below $6.0/MMBtu in 2012 dollars through 2030 even though the EIA forecasts demand to increase by 23 Bcf/d (33%) in 2030 relative to its AEO 2011 forecast. The 23 Bcf/d increase includes ~9 Bcf/d of LNG exports from the U.S.

This co-existence of LNG exports and the manufacturing renaissance at low gas prices is an attractive proposition because it means that everyone wins. The problem is that this story contains two fundamental concerns. The first is that forecasters have many times said that "this time is different", but historical evidence has shown otherwise and has been challenging even for the EIA (see Figure 7).

[4] CRA Analysis; The Fertilizer Institute

Figure 7: The Accuracy of EIA Reference Case Projections versus Actual Henry Hub Spot Prices

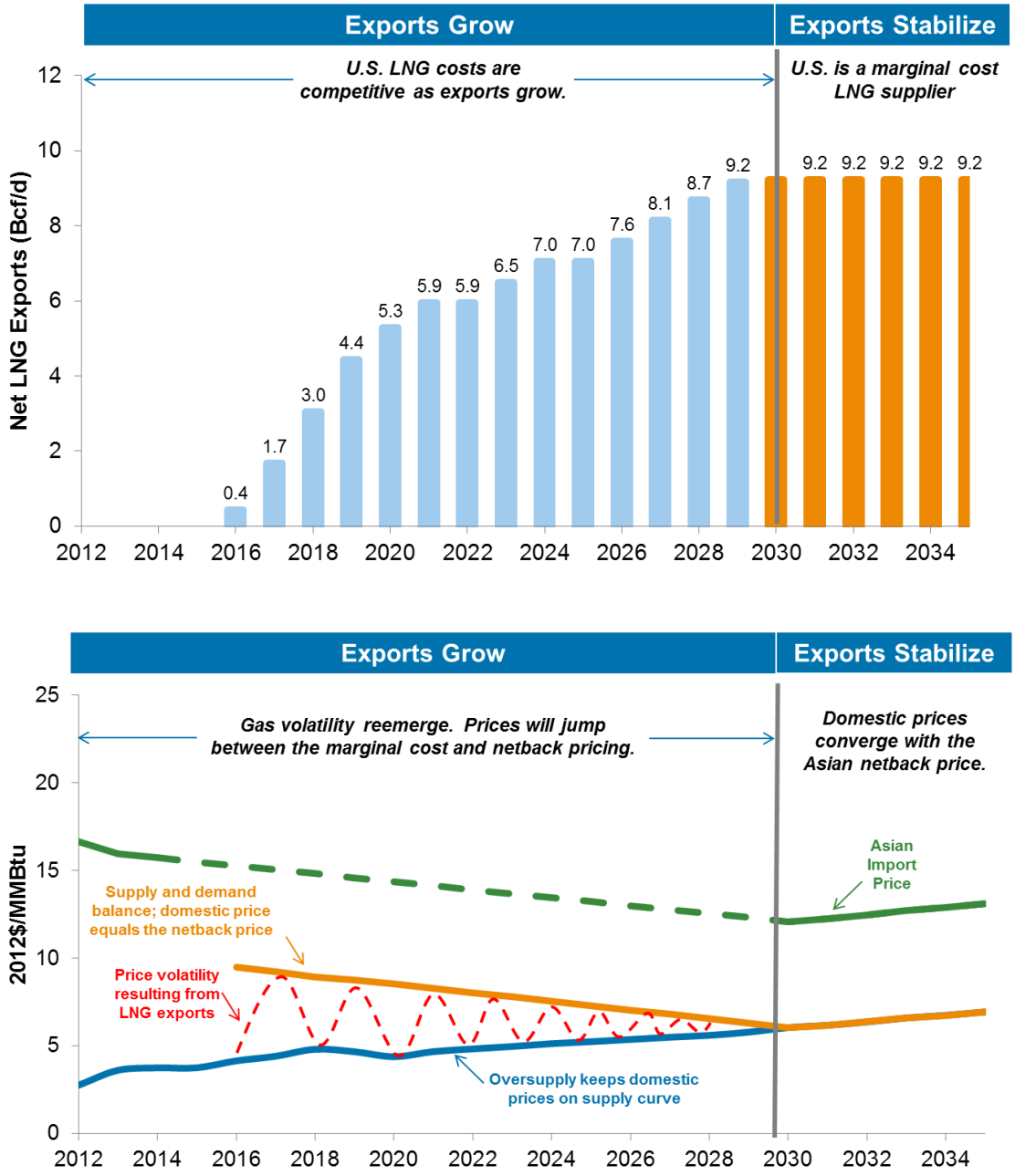


The second issue with the story is that many forecasters are using the wrong tools to project gas prices. The EIA and many others rely on the domestic supply curve to estimate the incremental price impact that exports will have on domestic gas prices. This is an invalid approach because connecting to the global natural gas market fundamentally changes how gas is priced. That is, we move away from the domestic supply and demand curves and jump onto the global gas supply and demand curves, and thus enter a new era of netback pricing. Netback pricing simply is the international price of gas less the transportation costs for getting it there, and it reflects the opportunity cost of selling gas into the global markets. Netback pricing explains what has occurred in Eastern Australia where the development of LNG export facilities has increased prices from ~$4/MMBtu to $8-9/MMBtu.

In its AEO 2014 ER release, the EIA does not address the netback pricing that would occur with the U.S. connecting with the global gas market. Instead, the EIA assumes that domestic prices will be driven by the domestic supply and demand balance inclusive of incremental demand by LNG exports. I believe EIA has missed an important factor in their natural gas price forecasting, as evinced by the Australian natural gas markets and every other globally traded commodity market. Figure 8 shows the EIA's forecasted

Henry Hub price. It also shows the AEO 2014 ER Henry Hub and LNG export forecast along with the implied Asian LNG import price and the U.S. netback price that I have derived separately.

Figure 8: AEO 2014 ER LNG Exports, Henry Hub Prices, and Implied Netback Prices



To understand this figure, one must first focus on the EIA forecasts for U.S. LNG export volumes in the top portion. The AEO 2014 ER forecast shows exports stabilizing after 2030 at 9.2 Bcf/d. For this to

occur, the forecasted Henry Hub gas price of $6.0/MMBtu in 2030 *must* converge with the netback price as this will no longer make LNG export terminal expansions economic.

When applying the approximate $6/MMBtu netback cost to the Henry Hub price, one can arrive at the 2030 Asian LNG import price implied by the AEO 2014 ER forecast, which is $12/MMBtu. Interpolating between today's price and the $12/MMBtu in 2030 yields the dotted green line in Figure 8. Subtracting the netback costs to the green color line generates the orange color line, which is the implied netback price to the U.S. The domestic gas price will reflect netback pricing when the U.S. market is balanced and will shift back to domestic supply curve pricing (i.e., the AEO 2014 ER Henry Hub forecast) during times of excess supply, which is represented by the solid blue line. The dotted red line shows the gas price volatility that will ensure when connecting our gas market with the global market. It is for illustrative purposes only.

Why would international LNG import prices decline from their current levels? The EIA does not provide much discussion on international LNG import prices in its Early Release. I have, however, developed a list of drivers that, in part or full combination, would support such a scenario. These include the following:

- Soft global GDP growth
- A global shale gas boom
- The LNG market becoming competitive and moving away from oil-linkage
- Japan restarts the majority of its nuclear facilities
- Germany abandons plans to retire its nuclear facilities

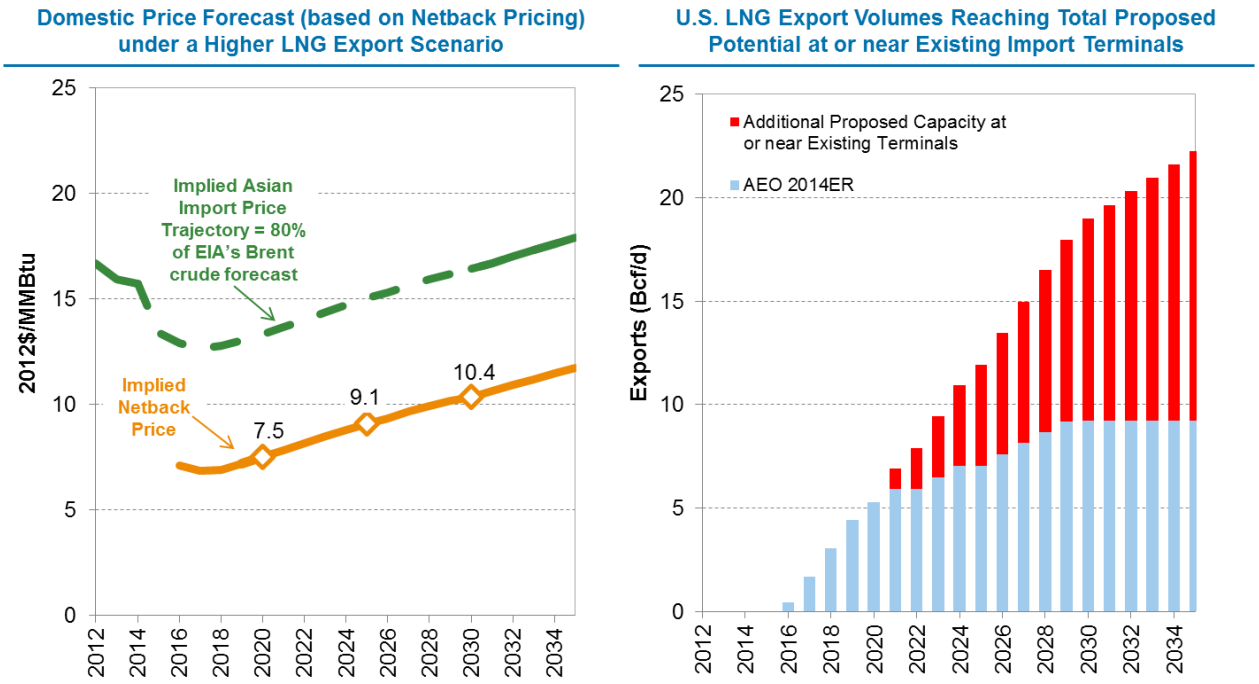
While this is a possible scenario, an equally plausible and more likely scenario is one where Asian LNG import prices remain closely linked to international oil prices, which would further drive demand for U.S. LNG exports. As I detail later in my testimony, U.S. LNG export developers, such as the BG Group, forecast market tightness until the end of the decade at least. I agree with this assessment. The drivers that would support such a scenario include those listed in Table 1.

Table 1: Summary of Drivers for International LNG Import Prices Remaining High

Driver	Rationale
Robust global GDP growth	Forecast by the World Bank and OECD indicate that global growth prospects are moving upwards over the past year as the legacy of the global financial crisis is being overcome.
The cost of developing international shale gas remains high	The geology, mineral rights, regulations, public acceptance and infrastructure may preclude shale-rich countries from becoming major producers of shale gas. High profile exits from Poland and China well costs triple those in the U.S. are indications that international shale gas may be slow to develop.
Europe backtracks on its renewable goals	Rising electricity prices in Europe due to heavy adoption of renewables have decreased the competitiveness of its industry. Easing of renewable goals would increase reliance on gas.
LNG export facilities require oil-linkage to support investment	Given their high costs, many proposed LNG export facilities will require oil-linked pricing to support the investment. Australia is an example of exports requiring oil-linkage. Mozambique is another example with no current infrastructure to support LNG exports.
Continued environmental pressures encourage coal to gas switching	Developed countries continue to emphasize de-carbonization of fuels. For example, the U.S. EPA has a number of proposals that would reduce the size of the U.S. coal fleet significantly over the next decade, switching reliance from coal to gas power most of the electric sector's generating fleet.
Natural gas vehicle market penetration	Fuel cost arbitrage enables significant switching of medium and heavy duty fleet vehicles from gasoline and diesel to natural gas over the next decade. Also, emissions control and pricing drives maritime consumption growth for near port transit because the alternatives are distillates

Under these drivers, the Asian LNG import price would maintain its relationship with international oil prices. I project that this, in turn, would result in 18+ Bcf/d of U.S. LNG exports and Henry Hub prices reaching $7.5 – $10/MMBtu between 2020 and 2030, assuming LNG exports are left unconstrained (see Figure 9).

Figure 9: Domestic Prices and LNG Export Volumes in a High LNG Export Scenario



In this scenario, the ramifications to the U.S. economy would be tremendous. The manufacturing renaissance would vanish at these price levels. In addition, economic benefits due to low-cost gas would impact other gas-intensive sectors of the economy. These include the electric sector and the transportation sector via natural gas vehicles (NGV) deployment. These impacts are described below:

- **Electric sector:** coal–to–gas switching is being led by two drivers: low natural gas prices competing with coal prices and coal plant retirements due to impending regulations. The implementation of multiple environmental regulations over the next 10 years will have a significant impact on the U.S. electric sector. Recent proposed and finalized rules from the U.S. Environmental Protection Agency (EPA) target the regulation of air quality, water quality, solid waste disposal, and greenhouse gas (GHG) emissions associated with electric power generation. Under a high export scenario, utilities will migrate to non-gas generation technologies, such as wind and nuclear, but only at higher relative costs. This will raise prices for the full spectrum of consumers.

- **NGVs:** heavy duty (freight) NGVs can be competitive with current diesel prices at $14/MMBtu delivered. While this is well above our Henry Hub natural gas price forecast in 2030, the costs of pipeline transportation and compression and liquefaction services will raise the delivered price. CRA estimates that these costs could be $3–4/MMBtu, which would put the heavy duty NGV breakeven at the $10-11/MMBtu range, making NGVs marginal under a high export scenario.

Altogether, I have found that the economy will lose at the expense of unconstrained LNG exports. In particular, the impacts will be:

- **Lower than expected GDP.** We showed that the manufacturing sector has at least double the direct value added, or GDP contribution, for a given level of natural gas use than LNG exports.

- **Less employment added.** Our analysis also showed that the investment in manufacturing for a given level of natural gas demand is significantly higher than the investment required to export the same level of natural gas. This leads to over four times the construction employment. The labor intensity of production and deep domestic supply chain for manufacturers lead to eight times the total (direct and indirect) employment of LNG exports during operations.

- **Higher trade deficit.** The announced natural gas-intensive projects have the potential to reduce the trade deficit by over $50 billion annually, compared to $18 billion for exporting the same level of natural gas as LNG. This discrepancy is important for a country focused on improving its negative trade balance.

The CRA analysis of the NERA Reports reveals that they did not properly reflect these impacts. The reason is that NERA made a number of fundamental flaws in its assumptions and its approach, which I detail in the next section of my testimony.

Fundamental Issues with the NERA Reports' Assumptions, Process, and Findings

First NERA Report

NERA has produced two reports on the economic impacts of LNG exports to the U.S. economy – the December 2012 report ("1st NERA Report"), which was conducted for the Department of Energy (DOE), and the March 2014 report ("2nd NERA Report"), which was conducted for Cheniere Energy, Inc

(Cheniere). The 1st NERA Report and the 2012 Energy Information Study ("EIA Study") are commonly referenced by the DOE as studies that support its public interest determination for non-FTA exports.

Given DOE's reliance on the 1st NERA Report, it is surprising that the DOE never had the report peer-reviewed before accepting it. A review by energy experts would have uncovered some of the same flaws in assumptions, process, and results that are detailed in the February 2013 CRA report. These include the following:

- **No exports in the reference scenarios:** NERA concluded that there would be no exports in its reference scenarios, effectively stating that it is not economically rational to export LNG even though 30+ Bcf/d of applications have been submitted to the DOE.
- **A lack of transparency:** the 1st NERA Report (and the 2nd NERA Report) provides a minimal amount of results by which one can stress test the findings. Key information that is missing, but likely would part of NERA's model, include:

  (1) Underlying assumptions that impact domestic gas demand by sector such as the degree to which proposed EPA regulations are adopted,

  (2) Projected gas demand by scenario for the U.S. power generation sector, natural gas vehicles, residential & commercial, and industrial sectors,

  (3) Gas production and consumption by year and by region by scenario,

  (4) LNG production and consumption by year and by region by scenario,

  (5) Net pipeline imports/exports by country/region and year by scenario, and

  (6) International LNG import prices by region and year by scenario
- **Resource owners win while the rest of the economy loses:** Figures 3 and 4 of the 1st NERA report show NERA's results for income, GDP, and total wage income by industry (which for all but oil and gas is reduced). As NERA states "[h]ouseholds with income solely from wages or transfers, in particular, will not participate in these [LNG export] benefits."[5]
- **Applying additional shipping cost adders:** these adders doubled the transportation cost between the U.S. and Korea/Japan, likely shutting down exports to this region in NERA's model.

[5] 1st NERA Report, page 8.

- **Lack of disaggregation of impacted manufacturing sectors:** NERA grouped gas-intensive manufacturing with a much larger subset of manufacturing. This grouping produced a weighted average representation that muted the impact of sectors highly sensitive to changes in gas prices.
- **High price elasticity of demand for Asian importers:** NERA assumed that non-U.S. countries would have the same price elasticity of demand. This does not comport with reality as evidenced by Japan and Korea, who have consistently increased demand regardless of the price.
- **No examination of domestic demand scenarios:** NERA examined high and low resource scenarios on the supply side, but it did not examine the fundamental drivers that would change domestic demand for gas outside of price, such as proposed EPA regulations that would encourage more coal to gas switching.
- **Assumption that the LNG market is competitive:** the LNG market is not a competitive market like the U.S. domestic gas market. The majority of LNG is locked up in long-term contracts that are indexed to oil. Oil prices are heavily impacted by OPEC. As a result, OPEC indirectly impacts the global LNG market. Understanding this makes it clear that the U.S. is not on a level playing field when it comes to trade in energy markets, and thus modeling it otherwise is inappropriate in a reference scenario.
- **No evaluation of whether LNG exports will increase price volatility:** NERA does not discuss whether increased volatility would result from the U.S. connecting with the global LNG market, which is one that is closely linked with oil prices.

Second NERA Report

Fifteen months after its first report, NERA released its second report on March 6, 2014. The findings on the economic impacts due to LNG exports generally were similar to the ones in the 1st NERA Report; however, the level of LNG export volumes was starkly different. For example, NERA projected zero LNG exports in its first report's Reference scenarios and 4.74 Bcf/d of U.S. LNG exports by the end of the modeling horizon in its second report's Reference scenarios. Below I focus on the flaws I have found in

the 2nd NERA Report's computations for LNG exports as well as the reasonableness of its export levels and international import prices.[6]

Flawed Computations in the 2nd NERA Report's LNG Export Decision

Both the 1st and 2nd NERA Reports provide limited input and output data from its model that can be used for auditing the precision of their results. I was, however, able to extract enough information from the Reference case results in the 2nd NERA Report to perform a basic audit. My audit showed that NERA's model should not have forecasted LNG exports in 2018 in its Reference scenarios, yet NERA shows that 0.36 Tcf or 0.99 Bcf/d of LNG is exported. My reasoning is that the "Maximum Wellhead Price for Export" that I derived from NERA's results is lower than forecasted NERA Wellhead price of $3.44/Mcf. As such, LNG exports should be uneconomic in the NERA model (see Table 2). The steps I took for this analysis were the following: (1) Begin with the NERA's "City Gate Price" forecast, (2) Subtract "Total LNG Transportation Cost", (3) Subtract "Additional LNG Shipping Cost Adders" to arrive at the "Maximum Wellhead Price for Export", and (4) Subtract the "Wellhead Price" in the "No Constraint" scenario to arrive at the Differential. A negative differential means that it is uneconomic to export LNG.

Table 2: Audit of 2nd NERA Report's Reference Scenarios with LNG Exports

	A	B	C	D=A–B–C	E	F=D– E
	City Gate Price	**Total LNG Transport Cost**	**Additional LNG Shipping Cost Adders**	**Maximum Wellhead Price for Export**	**Wellhead Price in No Constraint Scenario**	**Differential**
Africa	$2.99	N/A	N/A	N/A	N/A	N/A
Canada	$4.70	N/A	N/A	N/A	N/A	N/A
C & S America	$4.80	N/A	N/A	N/A	N/A	N/A
China/India	$9.89	$7.79	$0.00	$2.10	$3.44	($1.34)
Europe	$12.79	$6.33	$3.07	$3.39	$3.44	($0.05)
FSU	$5.95	N/A	N/A	N/A	N/A	N/A
Korea/Japan	$12.10	$6.65	$2.06	$3.39	$3.44	($0.05)
Mexico	$8.47	N/A	N/A	N/A	N/A	N/A
Middle East	$4.28	N/A	N/A	N/A	N/A	N/A
Oceania	$6.08	N/A	N/A	N/A	N/A	N/A
Sakhalin	$3.89	N/A	N/A	N/A	N/A	N/A
Southeast Asia	$3.27	N/A	N/A	N/A	N/A	N/A
U.S.	$4.46	N/A	N/A	N/A	N/A	N/A

[6] I define the NERA "Reference" scenarios as those that are the U.S. Reference scenario and the International Reference scenarios.

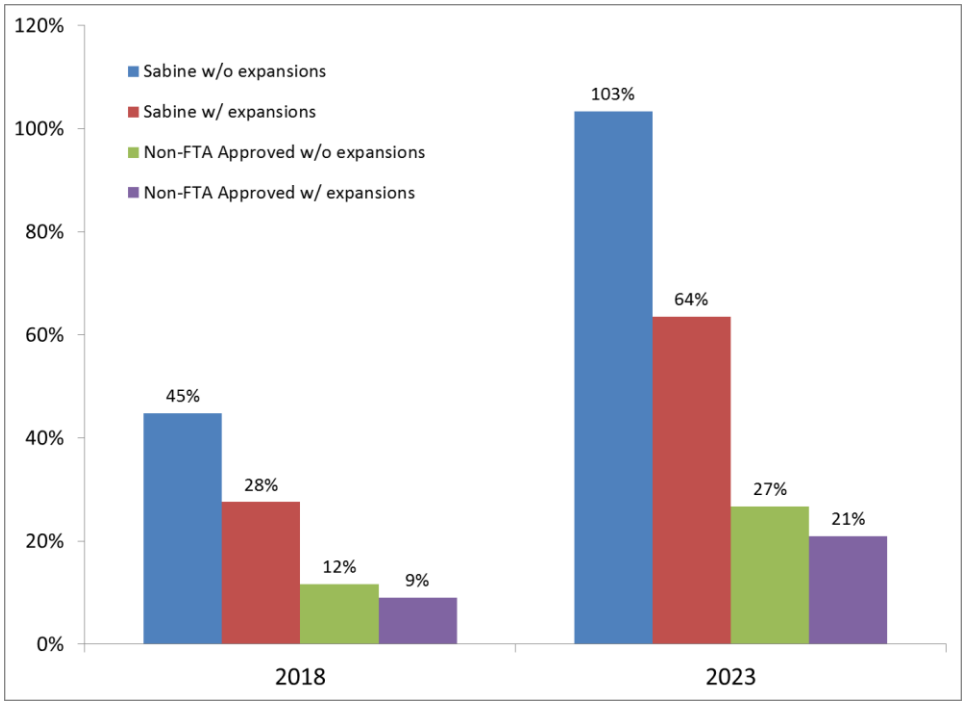
The conclusion from Table 2 above is that the NERA projected LNG exports do not align with the economic data from their results tables.

Reasonableness of LNG Export Volumes in the 2nd NERA Report

In addition to the computation flaw detailed above, the level of exports that the 2nd NERA report forecasts in 2018 and 2023 is perplexing. The reason is that NERA's projected export levels are well below U.S. export capacity that is presently under construction and financed.

Currently, there is only one U.S. LNG export terminal under construction – Sabine Pass. This facility is owned by Cheniere. In its Reference scenarios, NERA forecasts LNG exports to be 0.36 Tcf (0.99 Bcf/d) by 2018. A sanity check on the modeling results shows that NERA projects the Sabine Pass facility to be massively underutilized. For example, the Sabine Pass facility has been approved for 2.2 Bcf/d of Non-FTA exports and is waiting for an approval of 1.38 Bcf/d of additional non-FTA exports. This would be a total of 3.58 Bcf/d of non-FTA capacity. The NERA results imply that the Sabine Pass utilization rates will be 28% and 45% in the 2.2 Bcf/d and 3.58 Bcf/d Sabine Pass capacity scenarios, respectively, in 2018.

Figure 10: Implied Utilization of Under Construction and Non-FTA Approved



In addition to the Sabine Pass facility's 3.58 Bcf/d of exports, there are another 6.27 Bcf/d of LNG export facilities that are Non-FTA approved and have financial arrangements in place. These facilities – Freeport LNG, Lake Charles, Dominion Cove, and Cameron – currently plan to enter commercial operation by 2020. This 6.27 Bcf/d of additional exports does not include the 1.00 Bcf/d of expansion capacity planned at Freeport LNG. Figure 10 shows what the implied capacity utilizations of these facilities are in the NERA Reference case scenario. Because the NERA report only showed export volumes in its reports and not capacity, we do not know how NERA accounts for capacity. Nonetheless, comparing the NERA export volumes to the capacity under construction and financed with Non-FTA approval provides a way to sanity check the results. The finding is that 2nd NERA Report results do not comport with reality, which is one where LNG export owners are trying to receive approvals, permits, and enter construction as quickly as possible.

NERA's Forecasted International LNG Import Prices

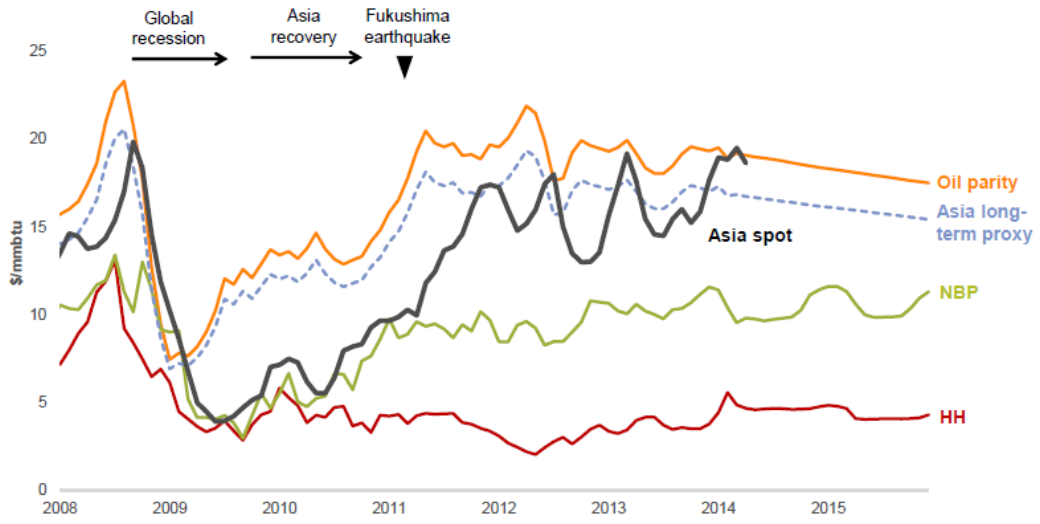
The 1st and 2nd NERA reports do not specifically provide its modeled international LNG import prices, but they do provide enough information to derive these prices for one set of scenarios – the Reference scenario. In this scenario, the 2nd NERA Report projects that Korea/Japan import prices will drop significantly from the ~$15-18.5/Mcf (in 2012 dollars) over the last few years to $10.7/Mcf (in 2012 dollars) by 2018 as shown in Table 3. The steps for arriving at the International LNG Import Prices in Table 3 were the following: (1) Begin with the NERA's "City Gate Price" forecast, (2) Subtract the "Regasification to City Gate Pipeline Cost", and (3) Subtract the "Regasification Cost" ("C") to arrive at the "2018 International LNG Import Price".

Table 3: Projected 2018 LNG Import Price for Major Markets – 2nd NERA Report ($/Mcf)

	A	B	C	D=A–B–C
	City Gate Price	Regasification to City Gate Pipeline Cost	Regasification Cost	2018 International LNG Import Price
Africa	$2.99	N/A	N/A	N/A
Canada	$4.70	N/A	N/A	N/A
C & S America	$4.80	N/A	N/A	N/A
China/India	$9.89	$1.53	$0.83	**$7.53**
Europe	$12.79	$1.02	$0.87	**$10.90**
FSU	$5.95	N/A	N/A	N/A
Korea/Japan	$12.10	$0.51	$0.86	**$10.73**
Mexico	$8.47	N/A	N/A	N/A
Middle East	$4.28	N/A	N/A	N/A
Oceania	$6.08	N/A	N/A	N/A
Sakhalin	$3.89	N/A	N/A	N/A
Southeast Asia	$3.27	N/A	N/A	N/A
U.S.	$4.46	N/A	N/A	N/A

The NERA projections for LNG import prices are starkly different from that of a recent report and presentation by the BG Group – a major LNG player. BG Group forecasts the Asia long-term LNG proxy to remain above $15.5/Mcf in 2012 dollars over the next few years as shown in Figure 11.

Figure 11: BG Group LNG Price Forecast[7]



Source: Platts, Heren, Petroleum Association of Japan and Bloomberg (as of Mar 6, 2014)

Note: Asia long-term proxy = 14.85% JCC + 0.50
Oil parity = JCC = Japanese average crude price

[7] "Global LNG Market Overview", Andrew Walker of the BG Group, March 18, 2014, pg. 10.

The justifications given by BG Group include the following:

> *"LNG demand will grow at 5% to 2025, twice as fast as for gas overall."*[8]
>
> *"LNG industry likely to be tight through the end of the decade"*[9]
>
> *"New supply will take longer than many envisage."*[10]
>
> *"LNG market will remain tighter, for longer than many assume"*[11]

Other notable findings from the 2nd NERA report shown in Table 3 include the following:

- 2018 LNG import prices in Europe will be slightly higher than prices in Asia
- 2018 LNG import prices for China/India will be $3.20/Mcf lower than Korea/Japan.

It also is worth noting that an incomplete set of input assumptions and model results by NERA prevented me from analyzing other markets and other models years. For example, Table 3 could not be completed for the other markets shown because NERA did not provide the pipeline and regasification costs assumptions for these markets in either report. I also was unable to construct this table for model years past 2018 because the LNG transportation costs provided by NERA were only for 2018.

Recommendations

I believe the question surrounding the value of LNG exports still needs to be decided due to the process employed and the modeling results relied upon. There are actions that can be taken quickly that will help end the uncertainty and put U.S. businesses on a path where they can make clear decisions on whether and when they want to invest in the natural gas value chain. Below are my recommendations for moving the discussion forward:

- Make transparent the public interest determination process for the American public. Are the economic benefits modeled properly? How are the national security aspects considered? How are the environmental impacts weighted? Making the process more transparent will help clarify the direction of natural gas prices, which in turn will help businesses make better decisions regarding multi-billion dollar investments that affect GDP, jobs, and trade balance.

[8] "Global trade summary for 2013: LNG supply hiatus in full effect", BG Group, March 2014.
[9] "Global LNG Market Overview", Andrew Walker of the BG Group, March 18, 2014, pg. 14.
[10] "Global LNG Market Overview", Andrew Walker of the BG Group, March 18, 2014, pg. 15.
[11] Ibid.

- If LNG exports are determined to be in the public interest via a transparent process, consider actions to mitigate the impact of significantly higher natural gas prices and gas price volatility induced by LNG exports. An example might be to negotiate free trade agreements with non-FTA countries wanting access to our natural gas if it is deemed in the best interest of the two countries. Consumers likely will benefit from access to lower-cost goods, and U.S. businesses may become more competitive as a result. Another action might be to lower taxes for consumers as LNG-induced prices and volatility will act as a tax, which reduces consumption, a major component of GDP.
- Given the fundamental flaws in the 1st NERA report, I recommend that DOE reconsider using it as a primary reference to justify the public interest of non-FTA LNG exports. The second NERA report is equally as flawed as I have enumerated in my testimony and should not be used in the public interest determination process either.
- If the decision is to continue to assess the public interest determination on a cumulative, case-by-case basis, the DOE should consider an annual re-evaluation of the merits of LNG exports. The EIA's Annual energy Outlook currently is insufficient for this purpose since it does not consider the impacts of netback back pricing and the increased volatility that would ensue with being connected to the global gas market.

I have attached the following reports for further reference:

- The February 2014 CRA Briefing on the AEO 2014 ER
- The July 2013 CRA Briefing on the API Report
- The February 2013 CRA Report