



AMERICAN COUNCIL FOR CAPITAL FORMATION

Comments and Analysis on Department of Energy’s 2015 Report, “Macroeconomic Impacts of LNG Exports Studies”

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Introduction

On October 29, 2015, Oxford Economics, LTI, and Rice University’s Baker Institute for Public Policy’s Center for Energy Studies released a new report commissioned by the Department of Energy (DOE) entitled “The Macroeconomic Impact of Increasing U.S. LNG Exports.” This new independent study follows previously conducted macroeconomic studies in terms of its findings and points to the positive economic impacts of LNG exports for the U.S. economy. It is important to highlight the common basic theme of this new study and previous studies to educate and to remind policymakers and the public why exporting LNG is a win for the U.S. and how delays in the approval process for LNG exports could delay or even negate some of these benefits in today’s fast moving worldwide LNG markets.

Comparison of Key Findings of the new DOE Study to Previous Studies:

To date, a variety of groups (consulting firms, government agencies, and think tanks) have conducted macroeconomic analyses of LNG exports for the U.S. economy. Some of these studies and their key findings are:

- In January 2012, the U.S. Department of Energy’s Energy Information Administration (EIA) analyzed the impact of exporting 6 billion cubic feet per day (Bcf/d) and 12 Bcf/d under various scenarios.¹ This study reported the natural gas price impacts as well as how increased exports would be supplied, but did not consider the impact on other macroeconomic variables. Across all scenarios considered, the price change per Bcf/d is about 1.6 percent.² The study shows that 60 to 70 percent of exports would be supplied by increased domestic production.
- NERA Economic Consulting released its first macroeconomic study on LNG exports (commissioned by DOE) in December 2012³ and subsequently updated its numbers on March 2014 with a new report.⁴ The later study was consistent with their original estimates. Using different assumptions and multiple scenarios, the study found that the macroeconomic impacts of LNG exports are positively correlated with export levels. The studies looked at exports of 6 Bcf/d, 12 Bcf/d, and unrestricted export levels. Due to higher natural gas supply estimates released by EIA, as well as projections of more rapid growth in domestic natural gas demand, the revised study showed greater LNG export potential at lower prices than previously estimated. In terms of GDP impacts, in one of the scenarios which considers high oil and gas resource cases, GDP could increase between \$2.5 billion and \$20 billion in 2018 and as much as \$86 billion in 2038 (all in 2012 dollars).⁵

¹ [“Effect of Increased Natural Gas Exports on Domestic Energy Markets,”](#) U.S. Energy Information Administration. January 2012.

² Hufbauer, Gary Clyde. Bagnall, Allie. Muir, Julia. [“Liquefied Natural Gas Exports: An Opportunity for America,”](#) Peterson Institute for International Economics. February 2013. Table 3. Pg 13.

³ [“Macroeconomic Impacts of LNG Exports from the United States,”](#) NERA Economic Consulting. December 2012.

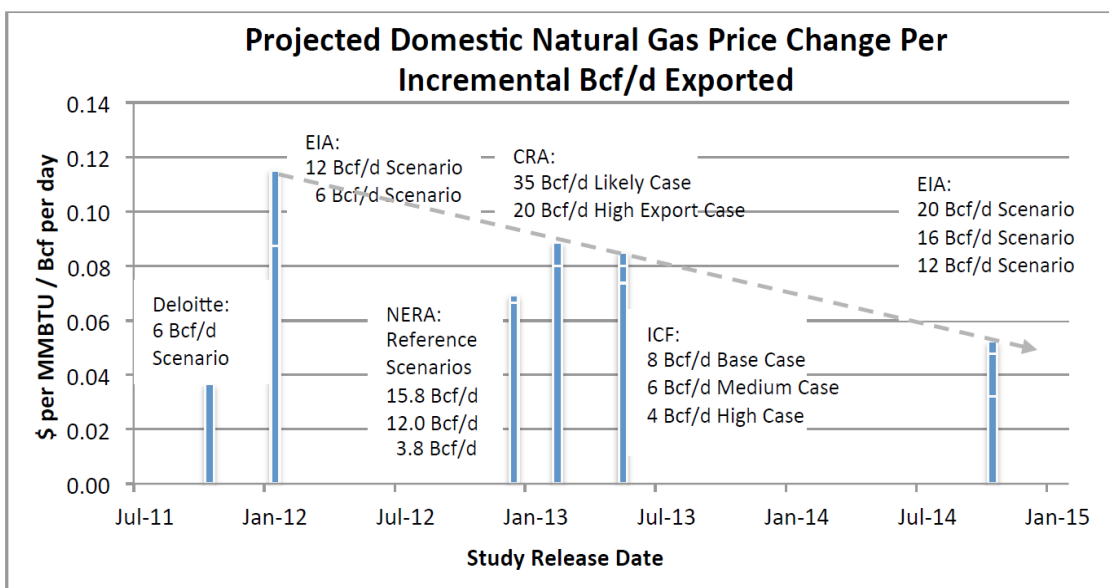
⁴ [“Updated Macroeconomic Impacts of LNG Exports from the United States,”](#) NERA Economic Consulting. March 2014

⁵ Ibid. See page 94 of the report for other scenario impacts.

- A May 2013 study by ICF International showed that for different LNG export levels ranging from up to 4 Bcf/d to up to 16 Bcf/d, the net positive effect on U.S. GDP could be between \$15.6 and \$73.6 billion annually (in 2010 dollars) between 2016 and 2035.⁶ This translates into potential average net job growth of 73,100 to 452,300 between 2016 and 2035. LNG exports were found to have a moderate impact on U.S. domestic natural gas prices of about \$0.32 to \$1.02 per million British Thermal Units (MMBtu) on average between 2016 and 2035. The study predicts that the majority of LNG exports would be supplied by production increases.
- In October 2014, EIA updated its 2012 report at the request of DOE.⁷ This time, EIA analyzed the impact of exporting higher levels of LNG at 12, 16 and 20 Bcf/d. Like the previous report, increased LNG exports were mainly supplied by increased natural gas production. In line with other studies, increased LNG exports resulted in higher levels of economic output: with positive GDP impacts ranging between 0.05% to 0.2% over the 2015 to 2040 period.

Figure 1, which was prepared by America’s Natural Gas Alliance (ANGA), presents an apples to apples price impact comparison for some of these studies as well as other studies at different export levels.⁸ As the U.S. shale gas revolution became more apparent, the price impacts in different studies tended to decline. For example, in the EIA’s second study, price impacts per incremental Bcf/d were just a quarter of EIA’s 2012 estimates.

Figure 1. Projected Natural Gas Price Change per Incremental Bcf/d Exported



Source: “[Carpe Diem: LNG Exports Are Americas Once in a Generation Opportunity](#),” ANGA, April 2015

The Oxford/LTI/Rice study (prepared for DOE) is the latest to show the net economic benefits of U.S. LNG exports. Even though this study is different than previous studies in the sense that it concentrates on the economic benefits of U.S. LNG exports increasing from 12 Bcf/d to 20 Bcf/d, rather than from current export levels (close to zero) to assumed levels, the overall macroeconomic impacts of higher LNG exports are still positive. These results are robust to alternative assumptions about the U.S. natural gas market. To reiterate,

⁶ “[U.S. LNG Exports: Impacts on Energy Markets and the Economy](#),” ICF International. May 15, 2013.

⁷ “[Effect of Increased Levels of Liquefied Natural Gas Exports on U.S. Energy Markets](#),” U.S. Energy Information Administration. October 2014.

⁸ “[Carpe Diem: LNG Exports Are Americas Once in a Generation Opportunity](#),” America’s Natural Gas Alliance. April 2015.

the differences in the magnitude of results between this study and previous studies can be attributed primarily to two factors:

- The Oxford/LTI/Rice study has the latest model and thus the latest input values for economy-wide indicators as well as energy prices.
- The Oxford/LTI/Rice study assumes that the international demand will be sufficient enough to pull U.S. LNG exports above 12 Bcf/d after the mid-2020s, after working through large sources of available international LNG supply mainly in Australia and already approved U.S. LNG projects.

Despite these differences, the main results of the study still validate the previous findings of different analyses:

- Like previous studies, the rising LNG exports are supported mainly by rising domestic natural gas investment and production.
- The price impact of increased LNG exports are shared by domestic and international consumers, decreasing the spread between domestic and international prices. In other words, there is some increase in domestic prices and some decrease in international prices. However, the majority of the price movement in absolute terms occurs in Asia.
- The 8 Bcf/d increase in LNG exports in the U.S. translates into a 0.03 and 0.07% increase in GDP over the period of 2026-2040 or \$7-\$20 billion USD annually at today's prices.
- Negative impacts in certain energy intensive industries are offset by the gains in other parts of the economy, such as the resulting positive impact in GDP.

What are the Key Points to Take Away from the Study?

Macroeconomic studies conducted by various groups disprove the fear that increased LNG exports will be supported primarily by displaced U.S. consumption. Both government reports and studies by economic consulting firms show that increased natural gas production will be the major source of supply for LNG exports. As mentioned before, the latest estimates by U.S. EIA show that with technically recoverable natural gas resources over 2,200 trillion cubic feet, the U.S. has enough natural gas to last about 84 years.⁹ This fact is also reflected in the downward trend in price impacts of LNG exports, as shown in Figure 1.

The DOE's Oxford/LTI/Rice study also highlights another important factor to consider: the issue of U.S. LNG exports in the context of global competition. Fueled by high global natural gas prices, many countries have been working on LNG export facilities. A 2013 ACCF paper notes that "..., uncertainty regarding world economic growth, government policies toward LNG imports and pricing, greenhouse gas (GHG) mitigation goals, subsidization policies for renewables, and development of the world's unconventional natural gas resources make LNG trade forecasting difficult. Given the uncertainties listed above, delay in the approval process for U.S. LNG export projects makes them all the more risky and costly. As a consequence, benefits to the U.S. in terms of jobs and economic growth will be smaller than if permits were approved without delay."¹⁰ The ACCF paper also stated that there are "at least 63 international LNG export projects planned or under construction, with combined LNG export capacity of 50.5 Bcf/d."¹¹

A 2016 update on global on-stream, under construction, planned, and proposed LNG liquefaction plants is shown in Table 2.

⁹ "[How much natural gas does the United States have, and how long will it last?](#)" U.S. Energy Information Administration. November 18, 2015.

¹⁰ Thorning, Margo. "[LIQUEFIED NATURAL GAS: Why Rapid Approval of the Backlog of Export Applications is Important for U.S. Prosperity](#)," American Council for Capital Formation. November 7, 2013. Pg 7

¹¹ Ibid. Pg. 7

Table 2. World's LNG Liquefaction Plants

<i>On-Stream</i>	<i>Under Construction</i>	<i>Planned</i>	<i>Proposed/Under Study</i>
Adgas LNG Plant (UAE)	Australia Pacific LNG Plant (Australia)	Abadi Floating LNG Plant (Indonesia)	Annova LNG Project (USA)
Algeria LNG Plants (Algeria)	Cameron LNG Plant (USA)	Alaska South Central LNG (SCLNG) Plan (USA)	Aurora LNG Project (Canada)
Angola LNG Plant (Angola)	Caribbean FLRSU (Columbia)	Arrow LNG Plan (Australia) – Cancelled	Bear Head LNG project (Canada)
Arun LNG Plant (Indonesia) - Offline	Corpus Christi LNG Plant (USA)	Baltic LNG Plant (Russia)	Cambridge Energy (CE) FLNG Project (USA)
Atlantic LNG Plant (Trinidad & Tobago)	Cove Point LNG Plant (USA)	Bonaparte LNG Plant (Australia)	Cameroon LNG Project (Cameroon)
Bontang LNG Plants (Indonesia)	Freeport LNG Plant (USA)	Brass LNG Plant (Nigeria)	Canaport LNG project (Canada)
Brunei LNG Plant (Brunei)	Gorgon LNG Plant (Australia)	Browse Floating LNG Plant (Australia)	Coral South Development FLNG Project (Mozambique)
Damietta LNG Plant (Egypt)	Ichthys LNG Plant (Australia)	Delta Caribe LNG Plant (Venezuela) – Suspended	Downeast LNG (USA)
Darwin LNG Plant (Australia)	Iran (NIOC) LNG Plant (Iran) Suspended!	Douglas Channel LNG Barge Plant (Canada)	Elba Island LNG Project (USA)
Donggi-Senoro LNG Plant (Indonesia)	Petronas Floating LNG-1 Plant (Malaysia)	Fisherman's Landing LNG Plant (Australia)	Far East LNG Project (Russia)
EG LNG Plant (Equatorial Guinea)	Petronas Floating LNG-2 Plant (Malaysia)	Gulf LNG Plant (Papua New Guinea) – Cancelled	Goldboro LNG Project (Canada)
Egyptian LNG Plant (Egypt)	Prelude Floating LNG Plant (Australia)	Jordan Cove LNG Plant (USA)	G2 LNG Project (USA)
Gladstone LNG Plant (Australia)	Sabine Pass LNG Plant (USA)	Kitimat LNG Plant (Canada)	Gulf LNG Project (USA)
Kenai LNG Plant (Alaska, USA)	Wheatstone LNG Plant (Australia)	Lake Charles LNG Plant (Canada)	Lavaca Bay FLNG (USA) – Cancelled
Marsa El Grega LNG Plant (Libya)	Yamal LNG Plant (Russia)	LNG Canada Plant (Canada)	Vie Oake LNG Project (USA)
MLNG Satu Plant (Malaysia)		Olokola LNG Plant (Nigeria)	Louisiana LNG Project (USA)
MLNG Dua Plant (Malaysia)		Oregon LNG Plant (USA)	Mamba Development FLNG project (Mozambique)
MLNG Tiga Plant (Malaysia)		Pacific Northwest LNG Plant (Canada)	Mozambique LNG Project (Mozambique)
Nigerian LNG Plant (Nigeria)		Papua LNG Plant (Papua New Guinea)	Nigeria LNG Project – T7 (Nigeria)
Nordic (Skangass) LNG Plant (Norway)		Pars LNG Plant (Iran) – Suspended	Pechora LNG Project (Russia)
North West Shelf LNG Plant (Australia)		Persian LNG Plant (Iran) – Suspended	Port Author LNG Project (USA)
Oman & Qalhat LNG Plant (Oman)		Shtokman LNG Plant (Russia)	Prince Rupert LNG Project (Canada)
Peru LNG Plant (Peru)		Sunrise LNG plant (Australia)	Rio Grande LNG Project (USA)
Pluto LNG Plant (Australia)		Vladivostok LNG Plant (Russia)	Sakhalin LNG II expansion Project (Russia)
PNG LNG Plant (Papa New Guinea)			Scarborough FLNG Project (Australia)
Qatargas I LNG Plant (Qatar)			Tanzania (BG) LNG Project (Tanzania)
Qatargas II LNG Plant (Qatar)			Tassie Shoal LNG Project (Australia)
Qatargas III, IV LNG Plant (Qatar)			Texas LNG Project (USA)
Queensland Curtis LNG Plant (Australia)			WCC LNG Project (Canada)
RasGas I LNG Plant (Qatar)			Woodfire LNG Project (Canada)
RasGas II LNG Plant (Qatar)			
RasGas III LNG Plant (Qatar)			
Sakhalin LNG Plant (Russia)			
Snohvit LNG Plant (Norway)			
Tagguh LNG Plant (Indonesia)			
Yemen LNG Plant (Yemen)			

Source: Global LNG Info, “[World's LNG liquefaction Plants and Regasification Terminals, As of January 2016](#)”

Impact of Global Competition and Slowing Demand for LNG

Countries that have moved quickly to build LNG export facilities have experienced positive economic impacts. For example, Australia has moved fast to break into the global LNG market. With three major facilities already in operation and seven more prepared to go online in the next couple of years, Australia is poised to exceed Qatar as the world's largest LNG exporter in terms of export volumes, according to a recent Brookings analysis.¹²

Changing market conditions are likely to present a challenging environment for U.S. LNG exports. The Brookings report concludes that U.S. LNG projects that are currently under construction, totaling close to 10 Bcf/d in capacity, will make it to the market by 2020, but additional projects are uncertain.¹³ This is because there are alternative suppliers of LNG about to enter the market, as well as competition from existing suppliers, such as Qatar, and pipeline supplies from Russia, Norway, and Algeria, and perhaps by mid-2020's, Iran. The study goes on to note that demand in Asia will be affected by the success or failure of additional intercontinental pipeline projects. In addition, Russia continues to expand to new markets in Asia, particularly in China, the Koreas, and Japan.

Also, Central Asian countries continue to add new production and pipelines to the Asian power and industrial markets. In addition, demand will also be affected by the likelihood of at least some countries tapping into their own unconventional gas reserves in the coming years. Our neighbor to the north, Canada, is also hoping to develop LNG export facilities as demand for their natural gas in the U.S. declines. In response to this Canadian "existential" gas market crisis and the perception that the United States is a "low cost" gas producer, the Canadian gas industry has embarked on ambitious schemes. According to the Brookings report, there are no fewer than 19 proposed LNG projects along the coast of British Columbia.

Geopolitical Impact of U.S. Exports of LNG

Several analyses in recent years have made the case that exporting LNG from the U.S. would not only boost the U.S. economy but it would also have a positive impact on international relations. As a new report by the Atlantic Council (AC) notes, LNG exports will strengthen U.S. economic and political relationships with trading.¹⁴ The AC report goes on to observe that "U.S. LNG export projects complement European Union (EU) gas policy and energy security strategy, which entail building infrastructure to further integrate European gas markets, especially in Central and Eastern Europe and the Baltic region. The EU also seeks to further diversify gas supplies to promote market competition and to improve security by protecting against supply cutoffs from Russia." In addition, according to the AC report, U.S. LNG exports will help to integrate the three major regional gas markets: North America, Europe, and Asia. This integration has already reduced the difference in gas prices between Asia and Europe; as recently as early 2014 gas prices were several dollars higher in Asia. Prices in North America are unlikely to be substantially impacted by LNG exports, at least over the next five to ten years, because an overwhelming share of gas supplies will be produced domestically.

Conclusions

The recent Oxford/LTI/Rice analysis reinforces the findings of previous government, think tank and consulting firms studies that LNG exports will have a positive impact on the U.S. economy. Investment, employment and GDP will increase and economic and diplomatic ties with our trading partners will be strengthened. The permitting process should be streamlined without delay, either through legislation or executive order.

¹² Boersma, Tim. Ebinger, Charles. Greenley, Heather. "[An Assessment of U.S. Natural Gas Exports](#)," Brookings Institution. July 2015. Pg. 10

¹³ Ibid. Pg. 9

¹⁴ Coote, Bud. "[Surging Liquefied Natural Gas Trade: How US Exports Will Benefit European and Global Gas Supply Diversity, Competition, and Security](#)," Atlantic Council. January 2016. Pg.1,2