

# **Unanswered Questions About the Economic Impact of Shale Gas Exports: Don't Jump to Conclusions**

Comments on NERA Study

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NERA Economic Consulting was hired by the U.S. Department of Energy (DOE) to assess the macroeconomic impacts that may result from the export of liquid natural gas (LNG). The report, "Macroeconomic Impacts of LNG Exports from the United States," contains the results of NERA's research.

My comments below focus on some of the inadequacies of the NERA study. Others have commented on NERA's close ties to the natural gas industry. Any potential bias on the part of NERA's study team is a serious concern since our leaders are using NERA's conclusions to help them decide on national policy that may negatively affect many Americans.

It appears that NERA's proprietary energy-economy model, NewERA, was released in the spring of 2012, hardly sufficient time to develop a track record. No tests of forecasting accuracy have been provided. Even NERA's longer established general equilibrium model is proprietary, and tests of accuracy have not been provided with the study results.

Having developed and worked with economic models for over 35 years, I am fully aware that they are often not accurate, but some are more accurate than others. When I deliver economic modeling results to a client, I include details of model structure and tests of accuracy. NERA has done neither.

The Energy Information Administration (EIA) regularly reports on the accuracy of its forecasts, and its track record confirms how difficult it is to make accurate forecasts in the energy sector. In the case of national policy regarding shale gas exploration, development, and exportation, our leaders should endeavor to obtain economic forecasts that are as accurate and comprehensive as possible. The downside risks are grave.

## Regional Impacts

Macroeconomic models do not capture regional, state or local impacts. It is possible that the combined losses at these less aggregate levels will be greater than the macroeconomic gains claimed by NERA. Peer reviewed research and other research not funded by the natural gas industry reach conclusions that show only modest employment gains to regions with shale gas development. [1] Research also shows that economic impacts concluded by industry-sponsored economic impact studies

are likely overstated [2] and that regions with shale gas development end up worse off in the long run, with higher levels of unemployment and long-term poverty. [3, 4] A survey of municipalities in twelve Marcellus counties in Pennsylvania found that while 26% of the municipalities experienced increased expenditures due to Marcellus shale development, 75% said that Marcellus shale development had not affected their tax or non tax revenue, indicating that costs to communities are increasing without any offsetting increase in revenue from shale development. [5]

Community costs from shale development are multifold. There are costs to communities due to increased demand for police, fire, first responders, and hospitals. There are costs to states, counties and local communities associated with road damage due to heavy truck traffic. There are costs associated with water and air contamination, and public health costs. For accurate conclusions to be drawn in a comprehensive study of economic impacts, all costs must be aggregated and accounted for across all the effected communities.

NERA mentions shifting of labor between different industries, but there is no mention of the actual regions of shale development where small businesses will be crowded out, where industries not compatible with an industrial landscape will decline or disappear entirely and where the threat of water and air contamination will depress industries dependent on the existence and perception of clean land, water and air. Equally omitted are the negative economic consequences of the regional long-term bust frequently characterizing gas development and other extractive industries.

If exports of natural gas are encouraged, states, regions, and communities are likely to suffer financially while other countries benefit from U.S. shale gas.

The preponderance of independent research findings, such as those mentioned above, indicates that the impact of shale gas exports on regional, state and local economies must be studied in depth along with national macroeconomic impacts. NERA has failed to conduct any such analysis.

### Investment Income

NERA states, “through retirement savings an increasingly large number of workers share in the benefits of higher income to natural resource companies whose shares they own.”

The Gallup poll found that only 54% of Americans own stock of any kind, retirement savings or otherwise. Clearly, not all of the 54% own natural gas stock. Most Americans who do own natural gas stock likely hold tiny numbers of shares in mutual funds. It is disingenuous for the authors of the NERA study to imply that investment income to Americans owning stock in energy companies will more than make up for losses in wage income. Prior to making such a claim, the income distribution of shareholders should have been analyzed. It is likely that ownership

of natural gas stock by wealthy Americans greatly outweighs that of low and middle income Americans, thus concentrating any income gains in a narrow sector of the population. Multiplier impacts resulting from investment income to wealthy Americans tend to be lower than multiplier impacts associated with income to low and middle income Americans. Also, if foreign individuals or corporations own American natural gas stock, the income will likely go overseas. NERA has not mentioned this.

NERA addresses foreign investment in American shale gas on Page 5 by stating one of the study assumptions: “financing of investment was assumed to originate from U.S. Sources.” This is clearly an incorrect assumption, as we know that foreign corporations already hold significant shale assets in the United States. In fact, it was very recently reported that Norse Energy, a Norwegian company that has invested in American shale gas, declared bankruptcy. Reports abound of additional foreign investment in U.S. shale gas. For example, another Norwegian firm, Statoil, paid over \$4 billion to invest in shale gas in the United States. BHP Billiton, an Australian firm, has invested billions of dollars in US shale gas assets. China National Offshore Oil Company, Cnooc Ltd, paid several billion dollars for a stake in Chesapeake Energy’s Eagle Ford shale play. Total SA, a French company, paid several billion dollars to develop U.S. shale gas reserves in Ohio. There may be more, as this list is merely anecdotal. NERA’s inaccurate assumption that all financing originates from U.S. sources clearly results in overstated U.S. macroeconomic impacts.

### Manufacturing Industries

NERA claims that there would be very little impact on manufacturing industries in the U.S. if the price of natural gas were to increase due to exports. This contradicts other findings. Industry should not be allowed to “have it both ways.” Without exports, it is projected that there has been and will continue to be “greater investment in US manufacturing facilities, stemming from more affordable natural gas feedstock; and increased demand from the domestic energy end-market,” as stated in a report by PwC. [7] PwC has estimated cost savings for US manufacturers of approximately \$11 billion annually. The U.S. Department of Commerce credits low domestic natural gas prices with an increase in domestic manufacturing. [8] Does the NERA study fairly account for the increased exports of products manufactured here due to the low price of natural gas? If domestic natural gas prices increase, it may stop the trend toward manufacturing companies returning to the U.S. and also the recent trend toward “insourcing” labor.

Further, it is not clear that NERA accounts for the potential loss of exports of products manufactured here while gas prices are low. It also appears that NERA has omitted the impacts on several important industries.

The first two sentences of the naturalgas.org website states, “Natural gas has a multitude of industrial uses, including providing the base ingredients for such varied products as plastic, fertilizer, anti-freeze, and fabrics. In fact, industry is the

largest consumer of natural gas, accounting for 43 percent of natural gas use across all sectors. Natural gas is the second most used energy source in industry, trailing only electricity.” However, on Page 64 of the report, NERA lists only the following five energy using subsectors that were analyzed in their assessment.

Paper and Pulp manufacturing (NAICS 322)\*  
Chemical manufacturing (NAICS 326)  
Glass manufacturing (NAICS 3272)  
Cement manufacturing (NAICS 3273)  
Primary metal manufacturing (NAICS 331).

It appears that NERA omitted NAICS 325, another Chemical manufacturing classification that includes paint and fertilizer, both of which use natural gas and natural gas byproducts. NERA also omitted all of NAICS 313 and 314 when naturalgas.org clearly states that natural gas is used in the production of fabrics. Obvious omissions such as these call into question the thoroughness of the NERA work and raise the possibility of other, even more significant omissions.

Further, on Page 67, in the section “Harm is Likely to be Confined to Very Narrow Segments of Industry,” it is stated that NERA relied on a study done in 2007 by an Interagency Task Force using data from the 2007 Economic Census.

In light of the recent “renaissance in manufacturing”, it is inappropriate and likely inaccurate to base this analysis on such old data. The reality is that due to the low price of natural gas, some manufacturers are returning to the U.S. and reportedly have planned large investments in the U.S. The NERA Study does not account for the potential loss of these improvements in the economy.

And on Page 70, it is stated, “Some examples of industries that did fit the criteria for EITE (Energy-Intensive, trade-exposed) were 311251 (nitrogenous fertilizer) within the 31 (2-digit chemicals) industry and 331111 (iron and steel mills) within the 3311 (4-digit iron and steel) industry. Analysis in this report strongly suggests that competitive impacts of higher natural gas prices attributable to LNG exports will be very narrow, but **it was not possible to model impacts on each of the potentially affected sectors.**” Why was it not possible? The stakes are too high for the American people. Nor is any explanation provided for the impossibility. Our decision makers must not accept a less than comprehensive economic assessment.

#### Additional Concerns

There are at least several additional areas of concern that are not addressed in the NERA report.

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\* North American Industry Classification System (NAICS)

The study does not and cannot account for changes in energy policies of foreign governments relating to natural gas and other competing forms of energy. NERA assumes a perfectly competitive world and states, "First, additional income comes in the form of higher export revenues and wealth transfers from incremental LNG exports at higher prices paid by overseas purchasers. Second, U.S. households also benefit from higher natural gas resource income or rents....This is exactly the outcome that economic theory describes when barriers to trade are removed." Economic theory rarely describes reality, and there is a major problem with NERA's conclusion. If the U.S. export barrier is removed, will that mean that the world will be a truly competitive market in natural gas with no other trade barriers or market anomalies introduced by foreign countries? Are barriers to trade truly removed? What is happening in the other competing countries? It is unrealistic to assume, as NERA has, that other countries that export gas will behave as perfect competitors, based solely on price. It is equally unrealistic to assume that a major exporting country, such as Qatar, would keep its "decisions about exports fixed no matter what the level of U.S. exports." (Page 5) We know that Argentina is not behaving as a perfectly competitive gas producer. It has recently been reported that Argentina is subsidizing natural gas development by artificially increasing price threefold. In a rapidly changing world market for natural gas, both on the supply and demand side, the data used in the NERA study are already outdated.

Natural gas has a history of price volatility and it appears that NERA did not include this issue in the report. The President of American Electric Power commented on the concern of volatility in the price of natural gas. He said, "Whether that volatility has changed permanently remains to be seen." He said that natural gas prices could spike if major environmental issues emerge with fracking, and that natural gas prices are vulnerable to volatile weather conditions. He also said they could increase as export facilities for LNG are constructed. [6]

Was the increased demand for natural gas in the US properly accounted for? There are major efforts to convert large buildings to natural gas for heating. T. Boone Pickens is making great efforts to increase the use of natural gas in transportation. There are recent efforts to incentivize energy producers to use natural gas instead of coal or nuclear in power plants. These efforts may result in significant upward pressure on natural gas price, and the extent of such pressure should be analyzed.

Were adverse health impacts and their costs properly accounted for? If a hypothetical new product that would be very popular in foreign markets were to be developed and produced in the United States such that, if exported in large quantities, it would dramatically increase exports and improve the trade balance, it sounds like this would be a positive development. But, what if the production of this product would kill thousands of Americans? Should it be considered a net economic gain? Should national policy encourage the production and exportation of this product? The NERA study has ignored this possibility. In fact, NERA makes no mention of some of the greatest potential negative economic impacts associated with the production of shale gas for export.

Economic/environmental justice issues continue to be a major concern in the development of shale gas. It is possible that some of those Americans who rely solely on wage income (as they do not hold a stock portfolio) are the same Americans whose families may experience the negative health impacts associated with natural gas development. They may even be the same Americans who lose jobs in industries in shale regions that are not compatible with shale gas development, such as tourism, agriculture, organic farming, wine making, hunting and fishing and other outdoor recreation.

NERA states that “NewEra does not address questions of how rapidly the economy will recover from the recession and generally assumes that aggregate unemployment rates remain the same in all cases.” The fact is that there appears to be a slow improvement in the US economy and a scenario with stronger growth should be presented as an alternative. Stronger growth would translate into greater domestic demand for natural gas and exert further upward pressure on natural gas price.

Our decision makers should not consider allowing exports of U.S. shale gas unless and until shale gas development can be done in such a way as to protect our environment, our public health and our state and local economies.

There is great uncertainty regarding the available resources in the U.S. If the lowest estimates are correct, and the U.S succeeds in significantly increasing demand through gas fired power generation, increased use of gas for heating and transportation, and increased domestic manufacturing, multiple economic sectors in the U.S. may suffer serious financial consequences when gas prices further increase due to exports.

On Page 3 of the EIA Study, it is stated, “EIA recognizes that projections of energy markets over a 25-year period are highly uncertain and subject to many events that cannot be foreseen, such as supply disruptions, policy changes, and technological breakthroughs.” [9] This is particularly true in projecting the effects of exporting significant natural gas volumes from the United States.

NERA does not offer similar caveats. Instead, NERA cavalierly claims in the Executive Summary, “the U.S. was projected to gain net economic benefits from allowing LNG exports. Moreover, for every one of the market scenarios examined, net economic benefits increased as the level of LNG exports increased.”

The NERA report sets forth strident conclusions that make their results seem far more reliable than is warranted by a study that is wrought with inaccuracies, omissions, uncertainties and flaws.

## REFERENCES:

- [1] J.G. Weber, "The Effects of a Natural Gas Boom on Employment and Income in Colorado, Texas, and Wyoming," *Energy Economics* 34 (2012) 1580-1588.
- [2] T. Kinnaman, "The Economic Impact of Shale Gas Extraction: A Review of Existing Studies," *Ecological Economics* 70 (2011):1243-1249.
- [3] W.R. Freudenburg and L.J. Wilson, "Mining the Data: Analyzing the Economic Implications of Mining for Nonmetropolitan Regions," *Sociological Inquiry* 72(4) (2002): 549-575.
- [4] Headwaters Economics, "Fossil Fuel Extraction as a County Economic Development Strategy: Are Energy-focusing Counties Benefiting?" *Energy and the West Series*, Bozeman, MT (Sept 2008 –revised 7/11/09).
- [5] T.W. Kelsey, M.W. Ward, "Natural Gas Drilling Effects on Municipal Governments Throughout Pennsylvania's Marcellus Shale Region, 2010," Penn State Cooperative Extension).
- [6] The Hill.com E2 Wire, "Utility President warns of natural gas price volatility." April 26, 2012.
- [7] Price Waterhouse Coopers, "Shale Gas: A Renaissance in US Manufacturing?" December 2011, Page 12.
- [8] U.S. Department of Commerce, "Investing in America: Building an Economy that Lasts," January 2012.
- [9] U.S. Energy Information Administration, "Effect of Increased Natural Gas Exports on Domestic Energy Markets," January 2012.