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January 24, 2013

The Honorable Steven Chu  
Secretary of Energy  
U.S. Department of Energy  
1000 Independence Ave, NW  
Washington, D.C. 20585

Dear Mr. Secretary:

The Energy Policy Research Foundation is a non-profit organization that has published extensive research on developments in U.S. and world energy markets since 1944. We have been called on to testify at every session of Congress in the last decade and routinely provide briefings on our research for industry, non-profit organizations, federal, state, and local agencies and Congressional staff. EPRINC has been a source of expertise for numerous government studies and its chairman and president have served on virtually every National Petroleum Council study of oil and gas issues. We welcome the opportunity to comment on the report prepared by National Economic Research Associates (NERA) for the U.S. DOE on the benefits of U.S. LNG exports. NERA concluded that for a wide range of scenarios,

***..... 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. In particular, scenarios with unlimited exports always had higher net economic benefits than corresponding cases with limited exports.***

The NERA conclusions are consistent with our own research on the economic benefits of a wide range of project opportunities now emerging as a direct result of the surge in natural gas production. The opportunities from the technological breakthroughs of hydraulic fracturing of petroleum source rock are not only expanding domestic natural gas production, but will likely see the U.S. become world's largest natural gas producer by 2015 and the top oil producer by 2020.

Where does this high net economic value come from when natural gas is exported? Whenever domestic resources used to produce natural gas can be sold for prices above their cost of production (including any additional processing costs) to foreigners, the national economy benefits. The economic gain occurs because the U.S. can produce a product that will make a claim on foreign resources considerably above its cost of production resulting in wealth transfers from other countries to the U.S. The surplus value from these transactions shows up in higher

returns to construction of plant and equipment, additional investment in human capital, employment growth and new revenues for federal, state, and local governments. As export markets grow, opportunities emerge to expand investment to meet foreign demand. Foreign purchasers also benefit as additional supplies of natural gas on world markets provide opportunities to substitute away from more costly energy and/or meet higher environmental standards. There is also a net economic gain for sales to domestic customers in the U.S., but here the value to the U.S. is largely through improved productivity for the domestic economy and lower costs for consumers.

Many opponents of natural gas exports have raised concerns that, if permitted without controls, North America would return to an era of price and supply volatility. Note that from 2008 to 2012, the price of natural gas at Henry Hub fell from over \$10 per million cubic feet (mcf) to less than \$4/mcf, providing large scale savings to consumers and new opportunities for value added processing. In approximately the same time frame, U.S. net natural gas imports fell from 10 billion cubic feet per day (bcf/d) to 4 bcf/d, a net loss of 6 bcf/d to the domestic economy. This reduction in imports was driven by the sustained growth in output from domestic production from the technological breakthroughs associated with hydraulic fracturing. This rapid expansion in shale gas production occurred because it was largely free from highly restrictive government policies. The expansion of shale gas production took place almost entirely on private land and was not subject to extensive access restrictions and other federal regulations common on federal lands or on projects in which federal reviews are extensive.

Concerns have been raised by certain manufacturing enterprises that natural gas should not be exported, or the volumes of natural gas at least should be constrained at some level, and these gas supplies should instead be “saved” for domestic manufacturers who could then export a more valuable product. Here the claim is that the national economy would be better off in terms employment and the net gain to the economy would be higher if natural gas exports were limited. These conclusions are not supported by economic analysis.

There are two important claims made on restricting exports. The first is that the U.S. could generate more jobs by allocating natural gas to domestic manufacturers rather than let it be exported. The problem with this argument is that capital cannot, and unless mandated by the government, will not be allocated on the basis of the number of jobs it creates, but instead its ability to generate value, i.e., a positive rate of return.

It is investment in high return projects that provides the foundation for economic expansion and job growth. Allocating investment strictly on its capacity to provide a short term increase in employment is likely to fail. For example, we could mandate a return of our agricultural sector to 17<sup>th</sup> century practices and create full employment, but our standard of living would drop substantially. None of this is to say that exports do not contribute to employment growth. Professor Slaughter of the Tuck School of Business has pointed out that exporting companies are on average more profitable, highly productive, and pay about 10-14 percent more in salaries than companies that just sell in the domestic market.

Another issue raised by some U.S. manufacturers is that diverting natural gas exports to domestic use not only provides for more employment, but actually delivers higher added value to the national economy through constraints on U.S. LNG exports. A claim is made that natural gas used in manufacturing raises the economic benefit 8 times above the value of the natural gas used as exports (see <http://www.americasenergyadvantage.org/info/growing-the-economy>). However, official U.S. data do not support this view. The U.S. Department of Commerce Bureau of Economic Analysis (BEA) estimates that the average GDP growth multiplier for all manufacturing is approximately 2. This means that a \$1 increase in manufactured goods production results in a \$2 benefit to the overall U.S. economy.

The BEA estimates the GDP multipliers for oil and gas extraction, chemicals production, and plastics and rubber production are 1.7, 2.4, and 2.3, respectively. Some petrochemical manufacturers have claimed that the GDP multiplier is only 1 for LNG exports. This neglects the benefits of GDP growth from the LNG export industry which would include additional jobs, tax revenues, and likely increased domestic gas production. The increased gas production would have potential benefits to the chemicals industry through the increased NGLs (e.g., ethane) production, a common byproduct of natural gas production in many U.S. petroleum plays.

There is concern among some petrochemical and heavy manufacturing companies that the growing demand for natural gas in transportation, power production, and exports, will provide little opportunity for expansion of domestic manufacturing. For example, one petrochemical company has presented an analysis that concludes that between 2012 and 2035, U.S. demand for natural gas will grow by 55 bcf/d resulting from the replacement of one-third of remaining U.S. coal fleet, one-fourth of daily oil imports through natural gas vehicles, and the installation of 14 LNG export terminals. Note that this estimate of 2035 natural gas demand is 50 percent higher than forecasts provided by EIA in their 2012 Annual Energy Outlook (AEO 2012).

These concerns over “excessive demand growth” in natural gas are driven from a view that all announced projects will reach a final investment decision (FID). However, it is common for companies to announce a large number of projects, particularly as a hedging strategy when permits to construct and operate facilities are difficult to obtain, but many of these projects will never reach FID. It is worth noting the components of this expansionary view (+55 bcf/d by 2035) of U.S. natural gas demand growth. For example, for the transportation sector, the expectation is that natural gas demand will grow by 15 bcf/d reaching 17 bcf/d in 2035. However, EIA’s 2012 AEO forecasts 2035 natural gas demand less than 2 bcf/d for the transportation sector. In addition the robust view of natural gas use in transportation is not supported by trend -- the growth rate for natural gas use in vehicles was steepest over the last two years (2009-2011), and applying this growth rate (9.8 percent per year) out to 2035 would yield an increase of only 2 bcf/d, not 15 bcf/d.

Another concern often raised is that if the U.S. permits large scale natural gas exports, prices will escalate dramatically and natural gas supplies will be severely limited. However, the potential volume of U.S. natural gas resources is substantial and subject to expansion from technological

advances. Because source rock is so prolific in the U.S., technology is likely to be the main driver in the expansion of natural gas production. The U.S. is not reserve limited.

Given today's technology and prices, EIA estimates U.S. recoverable natural gas to be 2203 TCF compared to the 2005 estimate of 1600 TCF, representing a 38 percent increase. Estimates of recoverable resource by IHS and in the NPC's 2011 study exceed 3000 TCF. Concerns over U.S. gas supply do not recognize that significant additional U.S. natural gas resources could still be found in areas that have not been explored. This includes areas of the Arctic and extensive offshore areas under federal control, where exploration has not been allowed. Note that the Lower-48 offshore areas that have been off-limits are estimated – even without exploration – to have 77 TCF of recoverable natural gas, according to API. This expansionary view of the U.S. reserve base is supported by recent natural gas modeling efforts by Deloitte (*Economic impact of LNG exports from the United States*, **Deloitte Center for Energy Solutions**). The results show that the North American gas market is dynamic. If exports can be anticipated, then producers, midstream players, and consumers can act to mitigate the price impact. There is growing realization that the U.S. natural gas production can be supported at sustained higher levels with relatively modest price increases, i.e., the supply curve for natural gas is relatively flat.

We do not have a fixed amount of natural gas and we should not ignore the potential for substantial supply expansions, particularly if appropriate government policies are put into place. One of the central lessons of the shale gas revolution is the benefit of open systems where ideas and technology could move quickly from one to another petroleum province. Here the effective strategy to address concerns on U.S. natural gas supply is to address the vast federal lands not open to exploration and development of new supplies and the regulatory structure at all levels of government that have constrained not only the growth in new petroleum supplies but the entire range of industrial facilities that can productively use the gas.

It is EPRINC's view that the low growth rate in the national economy over the last ten years, an average annual growth rate of less than 2%, represents a national crisis and that all the components of petroleum; natural gas, natural gas liquids, and crude oil can play a critical role in expanding the domestic economy. Rather than adding another regulatory constraint to economic expansion through restriction on natural gas exports, a higher yield to the national economy is likely through extensive regulatory relief that would permit projects to proceed. We only need to look at the extensive regulatory constraints now in place on the construction of LNG export facilities. A short list includes: FERC approval (based on an Environmental Impact Statement which includes an Endangered Species Act review, and cultural resources assessment); Department of Energy approval of the export licenses; EPA and state approval of air permits for potential traditional air pollutants and greenhouse gas emissions; US Army Corps of Engineers approval of possible wetlands permits; and EPA and States approval of water quality permits. Even the US Coast Guard plays a role with a water suitability assessment.

The North American petroleum renaissance is a remarkable achievement of American technology and innovation. Capital flows and project planning essential for expanding the

economy require expectations that government policies will be supportive of economic growth, and not create further impediments. Government policy should send strong signals to both producers and the entire range of value added manufacturers that our economy will remain open and that investment in new natural gas production will have access to the entire range of domestic and foreign markets. The benefits of an open market strategy will lift employment, bolster the national economy, and even enhance our strategic outlook.

Sincerely,

A handwritten signature in black ink, appearing to read 'Lucian Pugliaresi', with a horizontal line underneath.

Lucian Pugliaresi  
President  
Energy Policy Research Foundation, Inc.