

UNITED STATES OF AMERICA  
DEPARTMENT OF ENERGY

IN THE MATTER OF )  
 )  
Jordan Cove Energy Project, L.P. ) FE Docket No. 12–32–LNG  
Amendment Application )  
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**Evans Schaaf Family LLC, Deborah Evans and Ron Schaaf’s  
Motion to Intervene, Comment and Protest**

The Evans Schaaf Family LLC, Deborah Evans and Ron Schaaf (collectively “Intervenors”) move to intervene, protest and comment on the above-captioned matter pursuant to 10 C.F.R. § 590.303 and § 590.304 and other relevant authorities. In support of this motion, comments and protest Intervenors submit the comments included at Exhibits A, B, C and D.

**Basis for intervention**

Intervenors move to intervene pursuant to 10 C.F.R. § 590.303(b) based on their strong interests in both the Jordan Cove Energy Project and the related Pacific Connector Pipeline.

On May 21, 2013, Jordan Cove Energy Project, L.P. filed in FERC Docket No. CP13-483-000 an application under section 3 of the Natural Gas Act (NGA) and Parts 153 and 380 of the Commission’s regulations, seeking authorization to site, construct and operate a natural gas liquefaction and liquefied natural gas (LNG) export facility in Coos Bay, Oregon. The LNG Terminal is intended to receive natural gas through the Pacific Connector Gas Pipeline, which filed an application under CP13-492-000 with FERC to construct and operate the a new 231-mile, 36-inch diameter interstate natural gas pipeline transmission system and related facilities.

The Pacific Connector Pipeline (“Pipeline”) would cross 0.45 miles of the Evans Schaaf Family LLC’s 157-acre forested property. The Evans Schaaf Family LLC is owned by Proposed Intervenors Deborah Evans and Ron Schaaf and would be subject to eminent domain should FERC grant the requested certificate. DOE’s consideration of Jordan Cove’s request to export 350 Bcf/yr (0.8 Bcf/day) from its proposed terminal to nations with which the United States does not have a Free Trade Agreement (FTA) is directly related to and affects the viability and operation of both the Jordan Cove LNG terminal and the related Pipeline and therefore proposed Intervenors’ interests.

The Pipeline would result in approximately a 100-foot swath of forest being clear-cut

from proposed Intervenor's property. 50 feet of that area would be permanently removed from timber production on what was purchased as timberland and for recreation.

A hydrostatic testing site would also impact Intervenor's property. The pipeline would result in substantial long-term management impacts due to restrictions on tree planting within the pipeline right of way, limitations on heavy equipment movement over the right of way, and disturbance from right of way management activities such as herbicide spraying and vegetation clearing. The presence of the pipeline will also result in a long-term management burden given the need to inform and coordinate with contractors involved with work on the property regarding necessary operational and safety considerations and limitations related to the pipeline.

Importantly, because of safety concerns related to the Class I pipeline, if the pipeline is built the owners will not proceed with planned improvements to the property, including a residential structure, which was an important reason for their purchase of the property.

### **Jordan Cove's request is contrary to the public interest and should be denied**

DOE/FE cannot legally authorize the requested exports absent a finding and evidence that such exports would be in the public interest. 15 U.C.C. § 717b. As is supported by FERC's recent denial of the applications for the Jordan Cove export terminal and Pacific Connector Pipeline, there is not a factual basis to support these projects are in the public interest. This is further detailed in Intervenor's attached comments to FERC which highlight both the lack of proven demand and the gross failure of the project's backers to take reasonable actions that would mitigate the impacts of eminent domain on the Intervenor and hundreds of other landowners along the proposed Pacific Connector route.

The project applicants' failure to demonstrate demand for its project in the face of radical LNG market changes is not cured by Veresen's March 22, 2016 announcement it had reached a non-binding "preliminary agreement" with JERA Inc. While Veresen no doubt has a strong incentive to trump up any evidence of demand for its project, a "preliminary agreement" for a minor portion of the LNG output from the project is no substitute for the type of evidence for demand that would show the project would be in the public interest despite the significant impacts on landowners along the Pacific Connector route. As an LNG buyer JERA is only benefitted by taking superficial steps, such as the preliminary agreement, that may even for a short period of time keep alive the potential for an over-supply of LNG in the Pacific market. Such preliminary agreements, however, cannot replace credible evidence of demand.

Communications concerning this proceeding should be served upon as follows:

Evans Schaaf Family LLC  
Deborah Evans  
Ron Schaaf  
9687 Highway 66  
Ashland, OR 97520  
debron3@gmail.com  
541-601-4748

Thank for considering this motion, protest and comments.

Respectfully submitted,

/s/

Brent Foster  
Attorney at Law  
1767 12<sup>th</sup> Street # 248  
Hood River, OR 97031  
(541) 380-1334  
[foster.brent@ymail.com](mailto:foster.brent@ymail.com)

Dated: March 23, 2016

## CERTIFICATE OF SERVICE

I certify that on this 23rd day of March, 2016, I served copies of the document above filed electronically with the DOE/FE on the designated representatives of all of the parties to this proceeding, in accordance with 10 C.F.R. § 590.107.

Dated: March 23, 2016

/s/ Deb Evans

### SERVICE LIST - FE DOCKET NO: 12-32-LNG

Applicant(s):

1 Jordan Cove Energy Project, L.P.

Elliott L. Trepper  
President  
Jordan Cove Energy Project, L.P.  
125 Central Avenue  
Suite 380  
Coos Bay OR 97420  
(541) 266-7510  
[eltrepper@attglobal.net](mailto:eltrepper@attglobal.net)

Joan M. Darby  
Attorney  
Jordan Cove Energy Project, L.P.  
1825 Eye Street NW  
Washington DC 20006  
(202) 420-2200  
[darbyj@dicksteinshapiro.com](mailto:darbyj@dicksteinshapiro.com)

Intervenor(s):

2 Landowners United

Clarence Adams  
Landowners United  
2039 Ireland Road  
Winston OR 97496  
(541) 679-7385  
[adams@mcsi.net](mailto:adams@mcsi.net)

3 The American Public Gas Association

David Schryver  
Executive Vice President  
The American Public Gas  
Association  
Suite C-4  
201 Massachusetts Avenue, NE  
Washington DC 20002  
[dschryver@apga.org](mailto:dschryver@apga.org)

William T. Miller  
Attorney  
Miller, Balis & O'Neil, P.C.  
Twelfth Floor  
1015 Fifteenth Street, N.W.  
Washington DC 20005

4 Citizens Against LNG

(202) 296-2960  
[wmiller@mbolaw.com](mailto:wmiller@mbolaw.com)

Jody McCaffree  
Executive Director  
Citizens Against LNG  
P.O. Box 1113  
North Bend OR 97459  
(541) 756-0759  
mccaffrees@frontier.com

Curt Clay  
President  
Citizens Against LNG  
P.O. Box 1113  
North Bend OR 97459  
(541) 294-1156  
[curtclay@gmail.com](mailto:curtclay@gmail.com)

5 Klamath-Siskiyou Wildlands Center

Lesley Adams  
Program Director  
Rogue Riverkeeper  
P.O. Box 102  
(541) 488-9831  
Lesley@rogueriverkeeper.org  
Ashland OR 97520

Joseph Vaile  
Program Director  
Klamath-Siskiyou Wildlands  
Center  
P.O. Box  
Ashland OR 97520  
(541) 488-5789  
[joseph@kswild.org](mailto:joseph@kswild.org)

6 Sierra Club Environmental Law Program

Nathan Matthews  
Sierra Club Environmental Law  
Program  
Sierra Club  
85 Second Street, 2nd Floor  
San Francisco CA 94105  
(415) 977-5695  
nathan.Matthews@sierraclub.org

Kathleen Krust  
Paralegal, Sierra Club  
Environmental Law Program  
Sierra Club  
85 Second Street, 2nd Floor  
San Francisco CA 94105  
(415) 977-5696  
kathleen.krust@sierraclub.org

**Deb Evans and Ron Schaaf  
Evans Schaaf Family, LLC  
9687 Highway 66, Ashland Oregon 97520**

**Exhibit B - Comments RE: FE Docket No. 12-32-LNG - 2016-04733  
Jordan Cove's request to amend Non-FTA LNG export**

**Larine Moore or Benjamin Nussdorf**

U.S. Department of Energy (FE-34),  
Office of Regulation and International Engagement,  
Office of Fossil Energy, Forrestal Building, Room 3E-042,  
1000 Independence Avenue SW., Washington, DC 20585,  
(202) 586-9478; (202) 586-7991.

**Cassandra Bernstein**

U.S. Department of Energy (GC-76),  
Office of the Assistant General Counsel for Electricity and Fossil Energy,  
Forrestal Building, 1000  
Independence Avenue SW., Washington, DC 20585  
(202) 586-9793.

March 23, 2016

Ms. Moore, Mr. Nussdorf and Ms. Bernstein,

We are writing to ask that the Department of Energy **NOT** grant Jordan Cove's request for the additional 58 bcf/yr of natural gas to be shipped as LNG to Non-FTA countries.

Per your summary:

The Amendment seeks to increase the volume of LNG for which Jordan Cove requests export authorization from the equivalent of 292 Bcf/yr to the equivalent of 350 Bcf/yr of natural gas (0.96 Bcf/day). On March 24, 2014, the Department of Energy issued DOE/FE Order No. 3413, conditionally granting Jordan Cove's Application. DOE/FE has not yet issued a final order on the pending Application.

In its Amendment, Jordan Cove states that it is increasing its requested volume by 58 Bcf/yr in order to reflect the maximum production capacity of the Facility of 6.8 million metric tons per annum (mtpa) of LNG. According to Jordan Cove, the 6.8 million mtpa of LNG equates to 350 Bcf/yr of natural gas, which may be available for export. Jordan Cove asserts that the Amendment to increase the volume of its requested authorization does not alter the findings in the conditional export authorization in DOE/FE Order No. 3413 that the proposed exports have not been shown to be inconsistent with the public interest. Nor, Jordan Cove submits, will the increase in authorized export volumes entail environmental consequences.

With FERC's recent order denying the application of Jordan Cove and Pacific Connector on March 11, 2016, **Jordan Cove's request for all LNG exports should now be moot.** The order reflected that the public benefit does

not outweigh the adverse effects of landowners and communities along the pipeline. And without the pipeline, there is no gas to supply the terminal and export LNG.

If the ruling of FERC does not lead to this conclusion, then we submit for the record these further comments on why we believe that the Department of Energy should deny the request of Jordan Cove to increase the amount of LNG they can export.

As you are well aware, the LNG world and market has been turned upside down since the Department of Energy issued DOE/FE Order No. 3413, conditionally granting Jordan Cove's application for the original .8 bcf/d of natural gas or 6 million tons of LNG export amounts on March 24, 2014. Ever since that date Jordan Cove has been working to find buyers for the LNG they would ship and trying to sign easements with landowners. On November 4<sup>th</sup> 2015 in a data request reply from Pacific Connector to FERC, the company stated they had NO CONTRACTS and less than 5% of the Right of Way and Construction Easements they needed. On Dec 9<sup>th</sup> we, along with 4 other landowners, submitted a letter to FERC (exhibit A) through one of our attorneys, Thane Tienson, extensively laying out why we felt that Jordan Cove would continue to struggle to get firm contracts given the oversupply of LNG and the fierce competition from other locations and companies for the limited slots remaining. We are attaching that letter and accompanying exhibits for the record as we think they strongly illustrate many reasons why we believe that Jordan Cove should be denied this application as well as FERC's denial.

In addition, we have written extensive comments for the recent request from your office on the 2014 and 2015 LNG export studies, respectively. I am attaching those comments as well (exhibits C and D). These comments go into detail on why we adamantly believe that DOE should STOP issuing LNG Export approvals starting NOW. To summarize, climate change and associated social costs of CO2 and methane already are impacting the United States and they promise to create a worsening impact in the future should we continue. By continuing to promote the use of LNG we are escalating greenhouse gas pollution by both burned natural gas and fugitive emissions which are significant if measured throughout the full life cycle of this project including: fracking, transporting, liquefaction, shipping, regasification and burning natural gas at its final destination. Not allowing these impacts to be included in the FEIS poses a serious breach and should instantly reverse the determination of LNG being in the "public interest".

Other factors that increasingly render the exporting of LNG as a risky proposition to not only those of us in the path of the projects, but to the investors and the buyers as well, is the rapid lowering cost of renewable energy sources and the growing number of countries, states and provinces that are beginning to price greenhouse gas pollution. These two factors, which we go into in depth in our attached Exhibit C and D comments, along with the gross over supply of LNG predicted to last until 2026, are causing tremendous uncertainty over what will actually be the go-to energy source of the future. Climate impacts and these rapidly changing market factors are quickly making renewables and energy efficient technologies the most beneficial choice. This is a very different picture than what the fossil fuel industry would like. But we would maintain that DOE/FE should be recalculating whether approving the shipping of anymore LNG from the US will serve anyone's interest in these changing times.

In determining whether to approve more LNG exports, you should also look closely at current demand. One indicator of demand should be for your office to look at and release data on what percentage of the seven currently approved LNG terminals in the Gulf Coast and Cove Point are actually contracted.<sup>1</sup> With liquefaction

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<sup>1</sup> <https://www.ferc.gov/industries/gas/indus-act/lng/lng-approved.pdf>

plants coming on line over the next 5 years, can you really justify okaying more terminals, especially when you weigh in the very real costs of climate impacts on health and increased number of extreme weather events. There is an increasing amount of data showing that methane released, both intentional and unintentional, are far greater than originally thought. By perpetuating and increasing the amount of fracking, this is only worsening. We can personally attest to just how slippery natural gas is. Almost 40 years ago, my family put in two non-commercial natural gas wells in Tennessee. Until last year, we had no idea that blowing the wells off periodically to clear the water out releases methane, a gas that has 85 times the global warming effect in a 20 year time frame and 35 times the warming effect in a 100 year time frame than CO<sub>2</sub>. We can assure you that no one is monitoring this and if you multiply the standard practice times how many wells there are in the continental U.S., it is no wonder we are fast moving up the 'hockey stick' curve of an overheated planet.

If we want remedies to the climate impacts we are increasingly seeing, then the path forward needs to include keeping much of these fossil fuel resources in the ground. Already, the pollution circling the planet is wreaking havoc and it will not be going away anytime soon. But to continue to pollute at ever increasing levels and adding to the atmospheric mess, will soon push the life support systems of clean air, water and soil that we rely on, beyond repair. This is beyond comprehension and we implore your office to see how issuing permits and approving exports exacerbates that and jeopardizes everything we have ever hoped for our children. '

Another consideration specifically for Jordan Cove is that despite the fact that it is closer to Asian Markets the cost of shipping per unit of LNG according to the *Life Cycle Greenhouse Gas Emissions from U.S. Liquefied Natural Gas Exports*<sup>2</sup> is very nearly the same as from the Gulf Coast. This is due to Coos Bay being restricted to smaller 148,000 m<sup>3</sup> tankers after proposed dredging while the deeper water ports in the Gulf Coast can ship via 260,000 m<sup>3</sup> tankers which are ½ the cost per unit than the smaller tankers taking away any location or shipping edge Jordan Cove might have had.

One of the studies that DOE/FE has been using to determine whether LNG is a good replacement for Russian natural gas or coal has been the 2014 *Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas From the United States*.<sup>3</sup> More recently, data gathered have refuted that the fugitive emissions fraught throughout the life cycle analysis of the natural gas supply chain may be far higher than previously thought. The Guardian ran a story on March 2, 2016 which reported:

Day in and day out, small leaks in oil and gas producing regions like the Bakken Shale are emitting methane in quantities that collectively rival or even exceed Aliso Canyon. New figures released by the Environmental Protection Agency (EPA) last month indicate the potent greenhouse gas is being emitted from leaks across the US in quantities "much larger" than previously thought.

The results have been striking. Researchers from the National Oceanic and Atmospheric Administration (NOAA) and the University of Colorado Boulder found methane escaping from Utah's oil and gas producing Uintah Basin at 55 metric tons per hour. The same researchers found oil and gas related

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<sup>2</sup> Life Cycle Greenhouse Gas Emissions from U.S. Liquefied Natural Gas Exports - Feb 4 2015 - <http://pubs.acs.org/doi/pdfplus/10.1021/es505617p>

<sup>3</sup>The Life Cycle Greenhouse Gas Report is available at: <http://energy.gov/fe/life-cycle-greenhouse-gas-perspective-exporting-liquefied-natural-gas-united-states>



methane in Colorado’s Denver-Julesburg Basin leaking at 19.5 metric tons per hour. In the Barnett Shale area of North Texas, methane emissions were sampled at 60 metric tons per hour.<sup>4</sup>

When fugitive emissions exceed 3.4% along the entire supply chain, LNG no longer can claim to be less polluting where greenhouse gases are concerned. This is one of the reasons that many groups are now recognizing that keeping fossil fuels in the ground and moving toward primarily renewable energy resources is the only future that keeps us from pushing the planet beyond an irreversible tipping point. The following chart shows what % of leakage would have to occur to no longer give Natural gas a greenhouse gas advantage over coal using both a 20 year and 100 year outlook.<sup>5</sup> New reports are showing that, in places, we are exceeding these leakage rates.

**Table 6-1: Coal and Natural Gas Breakeven for U.S. LNG and Russian NG Scenarios**

Scenario	Modeled Leakage	Breakeven Leakage		X Times Higher Than Modeled Leakage	
		100-yr GWP	20-yr GWP	100-yr GWP	20-yr GWP
U.S. LNG to Rotterdam	1.6%	5.8%	1.9%	3.6	1.2
U.S. LNG to Shanghai	1.6%	4.6%	1.4%	2.8	0.9
Russia NG to Rotterdam	4.1%	8.9%	3.2%	2.2	0.8
Russia NG to Shanghai	5.0%	8.8%	3.1%	1.7	0.6

Last year, in Oregon, Governor Kate Brown signed the Under 2 MOU with state and province leaders from around the world. Her pledge was to lower greenhouse gas pollution to 2 tons per capita by 2050. The South Dunes Power Plant, liquefaction and compressor generated greenhouse gas pollution combined along with a modest amount of fugitive emissions associated along the supply chain for this portion of the Jordan Cove Energy Project emissions account for 1 ton per capita of our 2 ton target and yet this energy consumption supplies **no benefit to the people of Oregon**. These numbers are completely impossible to endure for the future we need to be heading for.

Thank you for providing an opportunity for us to comment on Jordan Cove’s request to amend the quantity of LNG they are hoping to ship. As FERC has already found, we believe that there is NO public interest in Jordan Cove’s request and for this, and the other reasons presented, they should be denied not only the increase request, but the entire project. It is far too costly to landowners and communities and threatens the American public with unaccounted for social costs.

Sincerely,

Deb Evans and Ron Schaaf  
 Evans Schaaf Family LLC  
 Ashland, Oregon

<sup>4</sup> Methane leaks across US pose a much greater threat than Aliso Canyon - March 2, 2016 - <http://www.theguardian.com/vital-signs/2016/mar/02/methane-leaks-aliso-canyon-ghg-epa-edf-environmen-climate-change-gas>

<sup>5</sup> The Life Cycle Greenhouse Gas Report is available at: <http://energy.gov/fe/life-cycle-greenhouse-gas-perspective-exporting-liquefied-natural-gas-united-states>

**EXHIBIT C**

**Deb Evans and Ron Schaaf  
Ashland, Oregon**

**Comments on Office of Fossil Energy of the US Department of Energy:  
Effects of Increased Levels of LNG Exports on U.S. Energy Markets, Oct. 2014  
(2014 EIA LNG Export Study)**

**Comments submitted online Feb 12, 2016**

Attention:

**Robert Smith**

US Department of Energy, Office of Fossil Energy  
Forrestal Building, Room 3E-042  
1000 Independence Ave. SW  
Washington, DC 20585  
202-586-7241

**Edward Myers or Cassandra Bernstein**

US Department of Energy (GC-76)  
Office of the Assistant General Counsel for Electricity and Fossil Energy  
Forrestal Building  
1000 Independence Ave. SW  
Washington, DC 20585  
202-586-3397 and 202-586-9793

Mr. Smith, Mr. Myers and Ms. Bernstein,

Thank you for this opportunity to comment on both the “Effects of Increased Levels of LNG Exports on U.S. Energy Markets” (2014 EIA LNG Export Study) and “The Macroeconomic Impact of increasing U.S. LNG Exports” (2015 LNG Export Study) each of which examine the cumulative impacts of liquefied natural gas (LNG) exports. Specifically, we will address our comments to the **2014 EIA LNG Export Study** in this letter and submit a second letter with comments on the 2015 LNG Export Study.

One of the difficulties as you are no doubt well aware is that modeling rarely is able to take on all the real life factors that can influence markets, policies and changing awareness. The 2014 EIA LNG Study was issued on October 2014 and falls short on several measures to accurately identify factors that have and will continue to influence LNG supply and projected demand.

Some of these shortcomings are acknowledged in the introduction:

EIA recognizes that the ramp-up specified by DOE/FE for the scenarios analyzed in this report, under which total Lower 48 states LNG exports reach 12 Bcf/d in 2020, is extremely aggressive, indeed almost impossible, and that the ultimate LNG exports

levels specified by DOE/FE are also very unlikely for some of the baselines. (2014 EIA LNG Export Study, page 5)

Like previous commenters, including our Oregon Senator Wyden, who objected to DOE/FE using the flawed 2012 Nera Study to determine “public interest” and guide DOE/FE’s approval of LNG Export terminals, we also vehemently object to using this study to simplistically state that all LNG terminals are “in the public interest”. With the approval of Lake Charles LNG in December 2015, FERC and DOE have now pushed an aggressive and what some would call foolish number of LNG terminals, totaling 12.82 bcf/d capacity.<sup>1</sup> Some of these still have not secured off-take contracts for their full capacity and all are affected by the oversupply of LNG combined with low oil and gas prices and lower than expected demand. At the same time signals by subsequent reports like the 2014 EIA LNG Export study are being used to make predictions and guidance for future LNG approvals when clearly they are based on extremely limited information and have led to past predictions that have not come true.

**1) The 2014 EIA LNG Export Study does not take into account many key factors that are critical to making intelligent long term capital-intensive decisions that affect the long term consequences of LNG and public health and safety.**

As a case in point, the 2014 EIA LNG Export report admits that the projections of the US LNG markets are very difficult to make:

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. This uncertainty is particularly true for projecting the effects of exporting significant LNG volumes from the United States because of the following factors:

- Nems is not a world energy model and does not address the interaction between the potential for additional U.S natural gas exports and developments in world natural gas markets.
- Global natural gas markets are not fully integrated, and their nature could change substantially in response to significant changes in natural gas trading patterns. Future opportunities to profitably export natural gas from the United States depend on the future of global natural gas markets, the inclusion of relevant terms in specific contracts to export natural gas, as well as on the assumptions in the various cases analyzed. (2014 EIA LNG Export Study, page 10)

In order to have any hope of predicting the benefits or risks of developing US LNG export, a careful analysis of world LNG resources and changing world dynamics must be factored in as the US LNG market doesn’t operate in a vacuum. Factors like China’s slowing economy<sup>2</sup>, rapid expansion of worldwide LNG

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<sup>1</sup> FERC Approved Export LNG Terminals PDF- <https://www.ferc.gov/industries/gas/indus-act/lng/lng-approved.pdf>

<sup>2</sup> China’s Slowing Demand Burns Gas Giants, Oct. 5, 2015, Wall Street Journal <http://www.wsj.com/articles/chinas-slowng-demand-burns-gas-giants-1444071604>

export terminals<sup>3</sup>, Japan's restarting of nuclear plants<sup>4</sup>, falling oil prices, Iran sanctions being lifted, renewable energy costs dropping, energy efficiency policies enacted, the growing world awareness of the high social costs of GHG pollution—all must get weighed along with new constantly changing dynamics to determine both LNG supply and demand and whether there is an overall “public benefit” or positive increase in GDP when these are factored into the modeling.

The following real changes pose a huge risk to LNG.

**Oversupply of LNG:** Responding to projected demand and previously high price points of world LNG markets, a whole bunch of countries decided to get into the LNG market. As many of these come online over the next 3-5 years the glut of oversupply is expected to continue.

Citi Research says that there will be 25 mtpa of oversupply by 2018. That supply overhang will balloon over the next decade if all proposed LNG export terminals actually get constructed. Citi Research says capacity could exceed demand by one-third by 2025. In an Oct. 5 article, The Wall Street Journal cites the Arrow Energy project in Australia, a joint venture between Royal Dutch Shell and PetroChina. The companies had to take a AUS\$700 million impairment charge on the project due to a souring “economic environment,” and the project lost AUS\$1.5 billion in 2014. The companies are scrapping the terminal.<sup>5</sup>

Significant changes in previously predicted LNG “supply” and “demand” with current overproduction and predictions of ongoing oversupply have made it impossible to secure the long term off-take contracts needed to justify building capital intensive LNG export facilities putting companies, financial backers and communities in the path of these projects, like Arrow Energy project in Australia, at great risk of failure and abandonment. LNG export projects creating this kind of risk in highly unpredictable markets most certainly are NOT in the “public interest”.

**Crashed world LNG Prices:** Two years ago the price differential between Henry Hub (\$4.90 mmBtu) and Japan Spot market (\$18.30 mmBtu)<sup>6</sup> was \$13.40. In January 2016 the Henry Hub price was \$2.28 and Japan landed spot market price for January was \$7.10, a \$4.82 difference. The gap has narrowed even before a drop of LNG has gone out of the United States making it all but impossible for companies who have not signed contracts to do so in this buyer's market. This further puts “public interest” claims as suspect.

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<sup>3</sup> World LNG Report - 2015 Edition [http://www.igu.org/sites/default/files/node-page-field\\_file/IGU-World%20LNG%20Report-2015%20Edition.pdf](http://www.igu.org/sites/default/files/node-page-field_file/IGU-World%20LNG%20Report-2015%20Edition.pdf)

<sup>4</sup> Japan Nuclear Update - Takahama 3 is Third Japanese Reactor to Restart - Feb. 4, 2016 <http://www.nei.org/News-Media/News/Japan-Nuclear-Update>

<sup>5</sup> Stafford, J. (2015, October 7). LNG Bust Could Last For Years. Retrieved from oilprice.com: <http://oilprice.com/Energy/Gas-Prices/LNG-Bust-Could-Last-For-Years.html>

<sup>6</sup> Japan Jan average LNG spot price falls to \$7.10/mmBtu. Feb 9, 2016. Reuter's Toyko. <http://www.reuters.com/article/lng-japan-spot-idUSL3N1500GX>

### **Slowing China Economy and Japan's restarting of nuclear power:**

Much capital has already been invested in LNG and a lot more is poised—all banking on continued growth in demand. China's recent economic slowdown and their starting to price GHG emissions country-wide in a cap and trade program in 2017 will continue to influence and somewhat dampen their need for LNG. Also, with the lifting of the Iran sanctions China has recently committed to a \$600 billion dollar trade deal<sup>7</sup> over the next 10 years with Iran who sits on the largest gas reserves in the world further raising questions over where is the demand for U.S. LNG export markets. Last month, Japan started up their 3<sup>rd</sup> nuclear reactor and a 4<sup>th</sup> is slated to start this month. These combined with the sharp decrease in cost of wind and solar are making it questionable to whether LNG will become the go to "bridge". The 2014 EIA study did not look at any of these world market influences, but simply concluded that if there is demand, it would benefit the US gas industry creating a slight positive increase in overall GDP. So far hindsight is 20/20 and the predictions of higher demand to absorb LNG coming online over the next 5 years have been wrong. This points out a fundamental flaw with using limited models to try and predict future supply, demand and benefits.

### **Climate Change, COP 21 agreement in Paris and world recognition of the need to LOWER GHG emissions and to stay under 1.5 Celsius:**

At the end of the talks in Paris in December 2015, 195 countries signed an agreement to try and hold global warming to 1.5 degrees Celsius. With states, provinces and select countries like Germany and China leading the way, it is predicted that ¼ of the world economy will put a price on greenhouse gas emissions by the end of 2016. This combined with the sharp decrease in cost of wind and solar, the extension of the wind and solar tax credits and the recent Supreme Court decision approving "demand response" are making it increasingly questionable whether natural gas and LNG will be by passed as a "bridge fuel" to a renewable energy future. Using energy efficient technology like "demand response" to eliminate peak energy, neutralizes much of the increase in electrical demand and when coupled with falling wind and solar costs and tax credit extension, renewables can begin taking the place of retiring coal and gas plants right away, bringing down emissions and transitioning the US to a clean energy economy.<sup>8 9 10</sup>

### **2) The finding that 20 bcf/d of LNG exports add more to GPD overall than the 12 bcf/d of LNG export projects already approved by FERC/DOE and made in the absence of social cost of fossil fuel pollution leads to a false conclusion.**

**Social Costs of Greenhouse Gas (GHG) Pollution:** In the Summary of Results section, the study states:

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<sup>7</sup> China, Iran Agree to Expand Trade to \$600 Billion in a Decade - January 23, 2016.

<http://www.bloomberg.com/news/articles/2016-01-23/china-iran-agree-to-expand-trade-to-600-billion-in-a-decade>

<sup>8</sup> LNG and Renewable Power: Risk and Opportunities in a Changing World, January 15, 2016, The Brattle Group.

[http://www.brattle.com/system/publications/pdfs/000/005/249/original/LNG\\_and\\_Renewable\\_Power\\_-\\_Risk\\_and\\_Opportunity\\_in\\_a\\_Changing\\_World.pdf?1452804455](http://www.brattle.com/system/publications/pdfs/000/005/249/original/LNG_and_Renewable_Power_-_Risk_and_Opportunity_in_a_Changing_World.pdf?1452804455)

<sup>9</sup> How Congress And The Supreme Court Blew Up The Natural Gas 'Bridge' To Renewables. BY JOE ROMM JAN 29, 2016. <http://thinkprogress.org/climate/2016/01/29/3743517/congress-natural-gas-renewables/>

<sup>10</sup> What Just Happened in Solar Is a Bigger Deal Than Oil Exports. Tom Randall, December 17, 2015.

<http://www.bloomberg.com/news/articles/2015-12-17/what-just-happened-to-solar-and-wind-is-a-really-big-deal>

**Increased LNG Exports result in higher total primary energy use and energy-related CO2 emission in the United States.** The 0.1% to 0.6% increase in total primary energy use and a -0.1% to 0.6% change in CO2 emissions relative to baseline over the 2015-40 period reflect both increased use of natural gas to fuel added liquefaction and fuel switching in the electric power sector that for some cases increases both fuel use and emissions intensity. (2014 EIA LNG Export Study, page 12)

The report refers to the Reference baseline CO2 emissions as being 143,353 million metric tons. According to the EPA’s Chart on Social Costs of CO2 emissions (Table 1), the average social costs from 2015 to 2040 would be a low of \$2.2 billion to a high of \$21.8 billion per year (in 2007 dollars). An increase of .6% would be an additional \$1.3 million to \$13.1 million dollars more. **The Social Cost of CO2 emissions should be included in the study.**

**TABLE 1 - Social Cost of CO2, 2015-2050 a (in 2007 Dollars per metric ton CO2)**  
 Source: [Technical Support Document](#) (PDF, 21 pp, 1 MB): Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866 (May 2013, Revised July 2015)<sup>11</sup>

Year	Discount Rate and Statistic			
	5%	Average 3%	Average 2.5%	Average 3% 95th percentile
2015	\$11	\$36	\$56	\$105
2020	\$12	\$42	\$62	\$123
2025	\$14	\$46	\$68	\$138
2030	\$16	\$50	\$73	\$152
2035	\$18	\$55	\$78	\$168
2040	\$21	\$60	\$84	\$183
2045	\$23	\$64	\$89	\$197
2050	\$26	\$69	\$95	\$212

a The SC-CO2 values are dollar-year and emissions-year specific.

**The study also needs to include Life Cycle Analysis of methane fugitive emissions when determining the true GHG (CH4) emissions and attribute the full social cost of methane in the report.** It is unclear from the report whether any fugitive methane emission, which can range widely but are reported in Science as 5.4% of total life cycle production,<sup>12</sup> are included in the analysis. Since Methane traps heat 36 times more effectively than CO2 over 100 years and 86 times more over 20 year span, fugitive emission,

<sup>11</sup> EPA Social Cost of Carbon, July 2015 - <https://www.google.com/webhp?sourceid=chrome-instant&ion=1&espv=2&ie=UTF-8#q=epa%20social%20cost%20of%20carbon>

<sup>12</sup> Methane Leakage from North American Natural Gas Systems: <http://www.sciencemag.org/content/343/6172/733.summary>

if included in this study, would add significantly to the social cost—increasing the above emissions and costs by another 4.6 times over 20 years and 1.9 times the GHG pollution and associated social costs over 100 years.

More recently, in EPA’s *Regulatory Impact Analysis for Oil and Natural Gas Proposed NSPS*, published in August 2015, a chart for the social cost of Methane (See Table 4.3)<sup>13</sup> was included. Using those values, it is clear the social cost of fugitive methane in the full life cycle production of natural gas comes with a high social cost.

**Table 4-3 Social Cost of Methane (SC-CH<sub>4</sub>), 2012 – 2050<sup>a</sup> [in 2012\$ per metric ton]**  
(Source: Marten *et al.*, 2014<sup>b</sup>)

Year	SC-CH <sub>4</sub>			
	5 Percent Average	3 Percent Average	2.5 Percent Average	3 Percent 95th percentile
2012	\$430	\$1,000	\$1,400	\$2,800
2015	\$490	\$1,100	\$1,500	\$3,000
2020	\$580	\$1,300	\$1,700	\$3,500
2025	\$700	\$1,500	\$1,900	\$4,000
2030	\$820	\$1,700	\$2,200	\$4,500
2035	\$970	\$1,900	\$2,500	\$5,300
2040	\$1,100	\$2,200	\$2,800	\$5,900
2045	\$1,300	\$2,500	\$3,000	\$6,600
2050	\$1,400	\$2,700	\$3,300	\$7,200

<sup>a</sup> The values are emissions-year specific and are defined in real terms, i.e., adjusted for inflation using the GDP implicit price deflator.

<sup>b</sup> The estimates in this table have been adjusted to reflect the minor technical corrections to the SC-CO<sub>2</sub> estimates described above. See Corrigendum to Marten *et al.* (2014) for more details  
<http://www.tandfonline.com/doi/abs/10.1080/14693062.2015.1070550>.

Social Costs associated with CO<sub>2</sub> and CH<sub>4</sub> (methane) carry significant implications in determining the viability of LNG in today’s world and should be included in this and future studies.

Some examples of these externalities that are NOT mentioned in this study but are the result of human caused fossil fuel pollution are the increasing number of extreme weather events<sup>14 15</sup> that include drought, floods, fires and wind events. Storms like Sandy which cost the government \$60 billion in emergency funds, the tropical storm that hit Northern California and Southern Oregon on Feb 6<sup>th</sup>, 2015 that dumped 3 inches of rain in 24 hours, toppled thousands of trees across a 100 mile swath and created landslides that closed Highway 66 where we live in Oregon are costly and life threatening. Fires

<sup>13</sup> Regulatory Impact Analysis for Oil and Natural Gas Proposed NSPS, page 4-14.

[http://www3.epa.gov/airquality/oilandgas/pdfs/og\\_prop\\_ria\\_081815.pdf](http://www3.epa.gov/airquality/oilandgas/pdfs/og_prop_ria_081815.pdf)

<sup>14</sup> The Unsustainable Trend of Natural Hazard Losses in the United States, November 14, 2011.

<http://www.mdpi.com/2071-1050/3/11/2157>

<sup>15</sup> U.S. Billion-dollar Weather and Climate Disasters: Data Sources, Trends, Accuracy and Biases. Smith, Adam B.

Katz., Richard. *Natural Hazards*. June 2013, Volume 67, Issue 2, pp 387-410,

<http://link.springer.com/article/10.1007%2Fs11069-013-0566-5>

have been raging in the wake of our hotter, longer summers in the West and drought threatens drinking water, agriculture and fisheries.

In this study, that narrowly focuses on the natural gas/LNG industry with its 10%+ loss incurred in the energy intensive process to liquefy the natural gas, it seems completely catastrophic to NOT be putting the real social costs on our continuing to use of fossil fuels. We are over 400ppm of CO2 equivalent already causing a 1 degree Celsius global temperature increase and science says we have to return to 350 ppm. We fail to see how we can reach these goals if the path Department of Energy has been advocating for over the past 10 years is increased use of natural gas.

**3) The study fails to address the vast difference in costs between greenfield and brownfield LNG projects and the risk to capital given the many uncertainties that face pushing LNG as the next energy currency.**

One concern that faces the LNG future and goes counter to the simplified look at GPD this study makes, is the risk taken when investing large sums of capital into an industry that may soon get passed up with a move toward renewable energy. The authors of the Brattle Group's *LNG and Renewable Power: Risk and Opportunity in a Changing World* analyzed the current and projected cost of gas-fired generation using LNG from North America versus the current projected cost of renewable power in markets outside of North America and deduced that in some places wind and solar are already competitive with LNG for electric generation.

The increasing competition between renewable power and gas-fired generation using LNG should be considered carefully by participants in the global LNG markets. This competition increases the uncertainty in global gas demand and the future LNG requirements in markets now being targeted by North American LNG export developers," the report notes. "Both investors in LNG infrastructure and buyers of LNG under long-term contracts will want to consider these risks before making large and long-term commitments to buy or sell LNG."<sup>16</sup>

The variation of costs between projects must also be considered. In the Study, the Mid-Atlantic and South Atlantic regions were each assumed to host 1 Bcf/d of LNG export capacity, the Pacific region was assumed to host 2 Bcf/d, with all of the remaining Lower 48 states' export capacity hosted along the Gulf Coast in the West South Central Census division. It's not clear in the study what cost parameters were used for which location. In the 2015 World LNG Report there was a considerable range between capital cost of greenfield and brownfield with greenfield costs increasing at a much faster rate.

Cost has been the main challenge facing LNG projects worldwide. Liquefaction projects have faced considerable cost escalation since 2000 – several projects reported cost overruns in the range of 30-50% after construction began. Unit costs for liquefaction plants (in real 2014 dollars) increased from an average \$321/tonne from 2000-2006 to

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<sup>16</sup> LNG and Renewable Power: Risk and Opportunities in a Changing World, January 15, 2016, The Brattle Group. [http://www.brattle.com/system/publications/pdfs/000/005/249/original/LNG\\_and\\_Renewable\\_Power\\_-\\_Risk\\_and\\_Opportunity\\_in\\_a\\_Changing\\_World.pdf?1452804455](http://www.brattle.com/system/publications/pdfs/000/005/249/original/LNG_and_Renewable_Power_-_Risk_and_Opportunity_in_a_Changing_World.pdf?1452804455)



\$851/tonne from 2007-2014. Greenfield projects have increased from \$326/tonne to \$1,185/tonne, while brownfield projects have only increased to \$516/tonne, up from \$315/tonne.<sup>17</sup>

Recent U.S. Congress decision to extend wind and tax credits and the Supreme Court decision to allow “demand response” will continue to push renewable energy costs lower and have shortened the time in which renewable energy will surpass conventional fossil fuel energy.

The numbers are really stunning. According to a recent report by the investment firm Lazard, the cost of electricity generation using wind power fell 61 percent from 2009 to 2015, while the cost of solar power fell 82 percent. These numbers — which are in line with other estimates — show progress at rates we normally only expect to see for information technology. And they put the cost of renewable energy into a range where it’s competitive with fossil fuels.<sup>18</sup>

Another contributing factor that will help renewables grow and more quickly supplant natural gas as a “bridge fuel” to a clean energy economy is the recent Supreme Court decision.

In a long-awaited decision sure to benefit our wallets and the planet, the U.S. Supreme Court today upheld the Federal Energy Regulatory Commission's (FERC) authority to design rules and incentives for electricity customers to get paid for reducing consumption during periods of high electricity demand. Known as "demand response," it's most often used when energy is expensive and the grid's limits are tested.<sup>19</sup>

The reason this is significant is that through the use of smart technology we will be able to flatten peak electrical energy costs and rather than replace retiring coal or gas-fired plants with new gas-fired plants as a “bridge” it is predicted that renewable power will compete directly with natural gas. The Brattle Group study shows solar, wind and hydro already is the least expensive option in some parts of the world. With increased production these costs will continue to decline, making renewables the least expensive energy option. Already in early 2016 roughly one quarter of the world’s emissions now fall under some form of carbon pricing system.<sup>20</sup> With China introducing Cap and Trade country-wide in 2017, this number will only increase.<sup>21</sup> All of this shift in the world markets combined with the current oversupply in LNG, and current LNG export terminals in the US struggling to get long term contracts for 100% of their capacity suggest that a shift is already starting to occur. This raises serious questions around what happens if LNG markets dwindle instead of grow.

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<sup>17</sup> World LNG Report 2015, page 26. [http://www.igu.org/sites/default/files/node-page-field\\_file/IGU-World%20LNG%20Report-2015%20Edition.pdf](http://www.igu.org/sites/default/files/node-page-field_file/IGU-World%20LNG%20Report-2015%20Edition.pdf)

<sup>18</sup> Wind, Sun and Fire, Paul Krugman, FEB. 1, 2016. New York Times. <http://www.nytimes.com/2016/02/01/opinion/wind-sun-and-fire.html?emc=eta1>

<sup>19</sup> U.S. Supreme Court Decision: Demand Response Forces Awaken, Allison Clements’s Blog, January 25, 2016. [http://switchboard.nrdc.org/blogs/aclements/us\\_supreme\\_court\\_decision\\_dema.html](http://switchboard.nrdc.org/blogs/aclements/us_supreme_court_decision_dema.html)

<sup>20</sup> A 2016 Carbon Market Forecast. Kasey Krifka, The Climate Trust. <https://www.climatetrust.org/a-2016-carbon-market-forecast/>

<sup>21</sup> China to launch national cap-and-trade plan in 2017, US announces, Suzanne Goldenberg, Sept 24, 2015. The Guardian. <http://www.theguardian.com/world/2015/sep/24/china-national-cap-and-trade-deal>

Some, like The Solutions Project, have come up with plans to get to 100% renewable by 2050. They project that the plan for the United States would save a whopping \$587 billion (1.5% GDP) in avoided mortality and illness costs. The Plan pays for itself in as little as 1.5 years from air pollution and climate cost savings alone. If this were even remotely possible, it seems that the studies we should be conducting are ones that look at how we can attract capital to renewable energy and leave hydrofracturing and fossil fuels, with their high social cost, in the ground.

**4) What criteria should DOE/FE/FERC use in determining approval of additional export terminals when comparing the 29 contenders?**

One of the reasons for conducting this study and asking for comments was to determine who of the 29 pending applicants should get a shot at a very narrow LNG export market. Our response, for all the reasons stated above, emphatically is NO ONE ELSE! The risk and uncertainty created by significant and ongoing changes in energy markets, our cascading toward increasing climate chaos and the failure to incorporate real costs of GHG pollution caused by continued use of fossil fuel energy clearly shows that the narrow positive GDP margin currently shown in the study would be negated and that LNG Exports are most certainly NOT in the “public interest.”

Should the DOE/FE decide against prevailing wisdom to curtail our finite and harmful fossil fuels resources and move to approve an additional 8 bcf/d of LNG capacity, taking us from the current 12 bcf/d still not fully contracted terminals to 20 bcf/d, it should be first and foremost based on demand. And only then, if there are willing buyers contracted for 100% of the capacity.

By doing this, you establish two things: that there is actual demand for US LNG and that it must be delivered through long term contracts at prices a company can build infrastructure and sell LNG for thus guaranteeing that the jobs and the economic benefit that this study suggests, would actually exist. Without contracts, as in the case of Jordan Cove/Pacific Connector where we live in Oregon, there is absolutely zero public benefit in granting approval.<sup>22</sup> These LNG terminals and their associated pipelines are far too damaging, dangerous, polluting and a financial risk putting valued natural resources, private property, health and safety and risk of abandoned and stranded assets in jeopardy. Instead money could be put into other more beneficial renewable energy sources for a real and direct “public benefit” right here at home. Terrain and earthquake, tsunami and rain induced risk to public safety and environmental destruction should also be taken into consideration if future LNG terminals are approved.

If, as is suggested, the world demand exists for LNG, then only those plants that secure 100% longer term contracts and can show financial strength and a good track record of following all state and federal permit/certificate orders should be considered. Another factor that should be taken into consideration both in determining whether a project or applicant meets the increased U.S. GDP benefits is whether the stakeholder company(s) is/are from the United States. If profits over the course of the project do not bring dollars into the United States economy, but rather are taken elsewhere, this limits the trade

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<sup>22</sup> Landowner letter filed with FERC, Dec 9, 2015.

[http://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=20151210-5000](http://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20151210-5000)

balance perceived to partially make these projects in the “public interest”. When GDP dollars were determined in the study, was any profit to companies projected to account for any portion of the overall GDP or trade balance?

On this note, we believe that DOE/FE has far out step its bounds in determining that “LNG exports” are in the “public interest” and that private companies should be granted eminent domain for private corporate gain when LNG exports as in the case of Jordan Cove and the gas being exported are most certainly NOT for “public use” as eminent domain is designed to serve. This shift from “public use” to “public interest” all based on modeling that has so far not predicted the correct climate change ravaged world and flies in the face of our 5<sup>th</sup> amendment constitutional rights.

If the true social costs and the full life cycle analysis were done on US LNG export, the 2014 EIA study would have shown additional cost which arguably would have produced a negative GDP rating. The flood gates should NOT have been, nor should they continue to be, opened allowing more cost-intensive and harmful climate chaos causing pollution. It is time we recognize that for the sake of future generations we cannot keep fowling our atmospheric nest. Only when we remove the existing fossil fuel subsidies and we charge the real social costs of fossil fuel pollution both burned and fugitive will we find that renewable energy is the obvious choice. The sooner we get to that realization and start building the new energy economy the better. Our recommendation is that DOE/FERC stop approving more LNG terminals starting now.

Thank you for this opportunity to comment on the study.

Sincerely,

Deb Evans and Ron Schaaf,  
(as individuals)  
and  
Hair on Fire Oregon

Deb Evans and Ron Schaaf  
Ashland, Oregon

**EXHIBIT D**

**Comments on Office of Fossil Energy of the US Department of Energy  
The Macroeconomic Impact of increasing U.S. LNG Exports, Oct 29, 2015  
(2015 LNG Export Study)**

**Comments submitted online Feb 12, 2016**

Attention:

**Robert Smith**

US Department of Energy, Office of Fossil Energy  
Forrestal Building, Room 3E-042  
1000 Independence Ave. SW  
Washington, DC 20585  
202-586-7241

**Edward Myers or Cassandra Bernstein**

US Department of Energy (GC-76)  
Office of the Assistant General Counsel for Electricity and Fossil Energy  
Forrestal Building  
1000 Independence Ave. SW  
Washington, DC 20585  
202-586-3397 and 202-586-9793

Mr. Smith, Mr. Myers and Ms. Bernstein,

Thank you for this opportunity to comment on both the “Effects of Increased Levels of LNG Exports on U.S. Energy Markets” (2014 EIA LNG Export Study) and “The Macroeconomic Impact of increasing U.S. LNG Exports” (2015 LNG Export Study) each of which examine the cumulative impacts of liquefied natural gas (LNG) exports. Specifically, we will address our comments to the **2015 LNG Export Study** in this letter and submit a second letter with comments on the 2014 EIA Export Study.

One of the difficulties as you are no doubt well aware is that modeling rarely is able to take on all the real life factors that can influence markets, policies and changing awareness. The 2015 LNG Study was issued on October 29, 2015 and while significantly more comprehensive than the 2014 EIA LNG Export Study, it also falls short in several key places to accurately identify factors that have and will continue to influence LNG supply, projected demand and most importantly the bottom line of U.S. GDP.

Key Findings in the initial pages of the report included:

- The overall macroeconomic impacts of higher LNG exports are marginally positive, a result that is robust to alternative assumptions for the U.S. natural gas market. With external demand for U.S. LNG exports at 20 billion cubic feet per day (Bcf/d), the impact of increasing exports from 12 Bcf/d is between 0.03 and

0.07 percent of gross domestic product (GDP) over the period of 2026–2040, or \$7–\$20 billion USD annually in today’s prices. *(2015 LNG Export Study, page 8)*

- As exports increase, the spread between U.S. domestic prices and international benchmarks narrows. In every case, greater LNG exports raise domestic prices and lower prices internationally. The majority of the price movement (in absolute terms) occurs in Asia. *(2015 LNG Export Study, page 8)*

While selling natural gas at higher prices on the world market would increase profits for U.S. gas producers, the narrowing of the price gap between the United States and the rest of the world would erode some of the benefits that have accrued to U.S. consumers and manufacturers. Considering these potential tradeoffs, this paper examines whether it is ultimately economically advantageous for the United States to export LNG between 12 and 20 Bcf/d. *(2015 LNG Export Study, page 9)*

Of note, is the acknowledgement in this report that years 2016-2025 are virtually flat lined due to the glut of LNG currently on the market. Around 2026 the report predicts that the supply and demand of LNG will be more in line, but even so, a relatively small positive GPD of \$7 to \$20 billion annually is predicted. Additionally, to make these determinations, key assumptions were made:

Note that the scenarios are constructed so that there is sufficient international demand to support commercially viable LNG export flows from the United States in accordance with the volumes indicated in each case. Thus, various assumptions are made about the international natural gas market so as to stimulate investment in the U.S. upstream sector and the commensurate development of LNG export infrastructure. *(2015 LNG Export Study, page 26)*

Some of these assumptions were:

“Chinese gas demand rises in response to policies to limit coal use; Japanese nukes remain offline; Only the United States has expansion capability beyond 2020; No future expansions capabilities in selected locations; No future expansions of Central Asian pipelines to China; Russia-China pipeline supply agreements dissolve.” *(2015 LNG Export Study, page 29)*

Significant ongoing changes, even in the last four months, have undermined and call into question many of these assumptions further pointing out the danger of relying on results from any study to accurately predict demand that would warrant increasing U.S. LNG Exports to 20 cfb/d.

Like previous commenters, including our Oregon Senator Wyden, who objected to DOE/FE using the flawed 2012 Nera Study to determine “public interest” and guide DOE/FE’s approval of LNG Export terminals, we also vehemently object to using this study to simplistically state that all LNG terminals are “in the public interest”.

The DOE/FE’s rush to approve terminals from 2005-2015, calling them in the “public interest” when viewed now in light of current oversupply, points out the significant dangers in relying on models to

predict the future of rapidly changing markets. Approved LNG terminals, finding themselves not able to secure long term contracts for their full capacity, has put those large capital investments at risk. It continues to raise, Senator Wyden's questions and ours, of whether a handful of subjective studies should be determining "public interest".

With the approval of Lake Charles LNG in December 2015, FERC and DOE now have LNG terminals totaling 12.82 bcf/d capacity.<sup>1</sup> Looking at the 2015 LNG Export studies prediction that as supply grows, the margin between the US Henry Hub price and foreign markets such as Japan shrinks. This is indeed true. But of note this has happened without even a single shipment of U.S. LNG sailing from port. The poor calculations of the past failed to take into account that a slew of countries would all be eyeing high Asian prices.

Two years ago the price differential between Henry Hub (\$4.90 mmBtu) and Japan Spot market (\$18.30 mmBtu)<sup>2</sup> was \$13.40. In January 2016 the Henry Hub price was \$2.28 and Japan landed spot market price for January was \$7.10, a \$4.82 difference. The gap has indeed narrowed, so much so that it is all but impossible for companies who have not signed contracts to do so in this buyer's market.

The report goes on to state:

In the scenarios where international demand pull is sufficient to support 20 Bcf/d of U.S. LNG exports, the export volume growth occurs primarily after the mid-2020s....while international demand continues to increase, it must first work through a large amount of available LNG supply before turning to U.S.-sourced LNG to balance the global market. *(2015 LNG Export Study, page 12-13)*

This poses an interesting quandary in determining how to respond to the 29 applicants still pending and wanting in to the LNG market. But it also raises more questions which are missing from this study.

**1) The 2015 LNG Export Study does not take into account some key factors that are critical to making intelligent long term capital-intensive decisions that affect the long term consequences of LNG and public health and safety.**

Trying to accurately put in every condition for any model would be impossible and, while this study comes way closer than the last studies to predict supply and demand, it still isn't able to predict human and country behavior. The following explain some of the constraints, many having shifted significantly since this study was published.

In sum, the Ref\_Ref case captures geopolitical, contractual, and regulatory constraints that currently exist in the global gas market and are not already known to be different into the future. This includes:

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<sup>1</sup> FERC Approved Export LNG Terminals PDF- <https://www.ferc.gov/industries/gas/indus-act/lng/lng-approved.pdf>

<sup>2</sup> Japan Jan average LNG spot price falls to \$7.10/mmBtu.Feb 9, 2016. Reuter's Toyko.  
<http://www.reuters.com/article/lng-japan-spot-idUSL3N1500GX>

- Current pricing policies and export/import policies across countries remain as they are today throughout the model time horizon, unless there is already concerted action being undertaken to change the internal market.
- Current assumptions regarding the availability and competitiveness of emerging energy technologies are held fixed.
- Current environmental policies are assumed to remain in place throughout the model time horizon. So, for example, it is assumed that the European Union (EU) will maintain an active CO2 trading market but the United States will, collectively, not. (2015 LNG Export Study, page 31-32)

Factors like China's slowing economy<sup>3</sup>, rapid expansion of worldwide LNG export terminals<sup>4</sup>, Japan's restarting of nuclear plants<sup>5</sup>, falling oil prices, Iran sanctions being lifted, renewable energy costs dropping, energy efficiency policies enacted, the COP21 agreement and high social costs of climate change caused by GHG pollution, extension of wind and solar tax credits—most are changes that took place after the October 2015 release of this study and all must now get weighed to better determine both LNG supply and demand and whether there is an overall “Public Benefit” or positive increase in GDP when these are input into the modeling. The following real changes must be considered when making a determination to increase U.S. LNG Exports.

**Oversupply of LNG:** As indicated above, the study agrees that LNG supply has outpaced demand. As this article reports, this can have some very unpleasant consequences for businesses. Risk of an unpredictable market demand is currently having serious consequences for companies without deep pockets to ride out the low oil and gas glut.

Citi Research says that there will be 25 mtpa of oversupply by 2018. That supply overhang will balloon over the next decade if all proposed LNG export terminals actually get constructed. Citi Research says capacity could exceed demand by one-third by 2025. In an Oct. 5 article, The Wall Street Journal cites the Arrow Energy project in Australia, a joint venture between Royal Dutch Shell and PetroChina. The companies had to take a AUS\$700 million impairment charge on the project due to a souring “economic environment,” and the project lost AUS\$1.5 billion in 2014. The companies are scrapping the terminal.<sup>6</sup>

#### **Slowing China Economy and Japan's restarting of nuclear power:**

Much capital has already been invested in LNG and a lot more is poised--banking all on continued growth in demand. China's recent economic slowdown and their starting to price GHG emissions country-wide in a cap and trade program in 2017 will continue to influence and somewhat dampen their

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<sup>3</sup> China's Slowing Demand Burns Gas Giants, Oct. 5, 2015, Wall Street Journal <http://www.wsj.com/articles/chinas-slowng-demand-burns-gas-giants-1444071604>

<sup>4</sup> World LNG Report - 2015 Edition [http://www.igu.org/sites/default/files/node-page-field\\_file/IGU-World%20LNG%20Report-2015%20Edition.pdf](http://www.igu.org/sites/default/files/node-page-field_file/IGU-World%20LNG%20Report-2015%20Edition.pdf)

<sup>5</sup> Japan Nuclear Update - Takahama 3 is Third Japanese Reactor to Restart - Feb. 4, 2016 <http://www.nei.org/News-Media/News/Japan-Nuclear-Update>

<sup>6</sup> Stafford, J. (2015, October 7). LNG Bust Could Last For Years. Retrieved from oilprice.com: <http://oilprice.com/Energy/Gas-Prices/LNG-Bust-Could-Last-For-Years.html>

need for LNG. Also, with the lifting of the Iran sanctions China has recently committed to a \$600 billion dollar trade deal over the next 10 years<sup>7</sup> with Iran who sits on the largest gas reserves in the world. Last month, Japan started up their 3<sup>rd</sup> nuclear reactor and a 4<sup>th</sup> is slated to start this month. These combined with the sharp decrease in cost of wind and solar are making it questionable to whether LNG will become the go to “bridge”.

### **Climate Change, COP 21 agreement in Paris and world recognition of the need to LOWER GHG**

**emissions and stay under 1.5 Celsius:** At the end of the talks in Paris in December 2015, 195 countries signed an agreement to try and hold global warming to 1.5 degrees Celsius. With states, provinces and select countries like California, Germany and China leading the way, we now have around ¼ of the world’s economy putting a price on greenhouse gas emissions.<sup>8</sup> This combined with the sharp decrease in cost of wind and solar, the extension of the wind and solar tax credits and the recent Supreme Court decision approving “demand response” are making it increasingly questionable whether natural gas and LNG will be by-passed as a “bridge fuel” and we go straight to a renewable energy future. Using energy efficient technology like “demand response” to eliminate peak energy, neutralizes much of the increase in electrical demand and when coupled with falling wind and solar costs and tax credit extension, renewables can begin taking the place of retiring coal and gas plants right away, bringing down emissions and transitioning the US to a clean energy economy.<sup>9 10 11</sup>

**2) The study failed to include social costs of carbon and methane and full life cycle analysis to determine impacts to climate and public health and safety. These call into question the slight positive benefit that increasing from 12 Bcf/d LNG exports to 20 bcf/d of LNG exports would produce on U.S. GDP and associated macroeconomic impacts of exporting LNG.**

### **Social Costs of Greenhouse Gas (GHG) Pollution:**

We were unable to find a calculation for the total carbon emissions. The real cost impacts of LNG and Natural gas full life cycle emissions should be calculated. Using data from the 2014 EIA LNG Export study, the Reference baseline CO<sub>2</sub> emissions is 143,353 million metric tons. If we apply the EPA’s Chart on Social Costs of CO<sub>2</sub> emissions (Table 1), the average social costs from 2015 to 2040 would be a low of \$2.2 billion to a high of \$21.8 billion per year (in 2007 dollars). An increase of .6% would be an additional \$1.3 million to \$13.1 million dollars more. **The Social Cost of CO<sub>2</sub> emissions should be included in the 2015 LNG Export study using a range of costs from the chart below.**

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<sup>7</sup> China, Iran Agree to Expand Trade to \$600 Billion in a Decade - January 23, 2016.

<http://www.bloomberg.com/news/articles/2016-01-23/china-iran-agree-to-expand-trade-to-600-billion-in-a-decade>

<sup>8</sup> A 2016 Carbon Market Forecast. Kasey Krifka, The Climate Trust. <https://www.climatetrust.org/a-2016-carbon-market-forecast/>

<sup>9</sup> LNG and Renewable Power: Risk and Opportunities in a Changing World, January 15, 2016, The Brattle Group. [http://www.brattle.com/system/publications/pdfs/000/005/249/original/LNG\\_and\\_Renewable\\_Power\\_-\\_Risk\\_and\\_Opportunity\\_in\\_a\\_Changing\\_World.pdf?1452804455](http://www.brattle.com/system/publications/pdfs/000/005/249/original/LNG_and_Renewable_Power_-_Risk_and_Opportunity_in_a_Changing_World.pdf?1452804455)

<sup>10</sup> How Congress And The Supreme Court Blew Up The Natural Gas ‘Bridge’ To Renewables. BY JOE ROMM JAN 29, 2016. <http://thinkprogress.org/climate/2016/01/29/3743517/congress-natural-gas-renewables/>

<sup>11</sup> What Just Happened in Solar Is a Bigger Deal Than Oil Exports. Tom Randall, December 17, 2015.

<http://www.bloomberg.com/news/articles/2015-12-17/what-just-happened-to-solar-and-wind-is-a-really-big-deal>



**TABLE 1 - Social Cost of CO<sub>2</sub>, 2015-2050 a (in 2007 Dollars per metric ton CO<sub>2</sub>)**

Source: [Technical Support Document](#) (PDF, 21 pp, 1 MB): Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866 (May 2013, Revised July 2015)<sup>12</sup>

Year	Discount Rate and Statistic			
	5%	Average 3%	Average 2.5%	Average 3% 95th percentile
2015	\$11	\$36	\$56	\$105
2020	\$12	\$42	\$62	\$123
2025	\$14	\$46	\$68	\$138
2030	\$16	\$50	\$73	\$152
2035	\$18	\$55	\$78	\$168
2040	\$21	\$60	\$84	\$183
2045	\$23	\$64	\$89	\$197
2050	\$26	\$69	\$95	\$212

a The SC-CO<sub>2</sub> values are dollar-year and emissions-year specific.

**The study also needs to include Life Cycle Analysis of methane fugitive emissions when determining the true GHG (CH<sub>4</sub>) emissions and attribute the full social cost of methane in the report.** It is unclear from the report whether any fugitive methane emission, which can range widely but are reported in Science as 5.4% of total life cycle production,<sup>13</sup> are included in the analysis. Since Methane traps heat 36 times more effectively than CO<sub>2</sub> over 100 years and 86 times more over 20 year span, fugitive emissions, would add significantly to the social cost—increasing the above emissions and costs by another 4.6 times over 20 years and 1.9 times the GHG pollution and associated social costs over 100 years.

More recently, in EPA's *Regulatory Impact Analysis for Oil and Natural Gas Proposed NSPS*, published in August 2015, a chart for the social cost of Methane (See Table 4.3)<sup>14</sup> was included. Using those values, it is clear that fugitive methane emissions in the full life cycle production of natural gas comes with a high social cost.

<sup>12</sup> EPA Social Cost of Carbon, July 2015 - <https://www.google.com/webhp?sourceid=chrome-instant&ion=1&espv=2&ie=UTF-8#q=epa%20social%20cost%20of%20carbon>

<sup>13</sup> Methane Leakage from North American Natural Gas Systems:  
<http://www.sciencemag.org/content/343/6172/733.summary>

<sup>14</sup> Regulatory Impact Analysis for Oil and Natural Gas Proposed NSPS, page 4-14.  
[http://www3.epa.gov/airquality/oilandgas/pdfs/og\\_prop\\_ria\\_081815.pdf](http://www3.epa.gov/airquality/oilandgas/pdfs/og_prop_ria_081815.pdf)

**Table 4-3 Social Cost of Methane (SC-CH<sub>4</sub>), 2012 – 2050<sup>a</sup> [in 2012\$ per metric ton]  
(Source: Marten *et al.*, 2014<sup>b</sup>)**

Year	SC-CH <sub>4</sub>			
	5 Percent Average	3 Percent Average	2.5 Percent Average	3 Percent 95th percentile
2012	\$430	\$1,000	\$1,400	\$2,800
2015	\$490	\$1,100	\$1,500	\$3,000
2020	\$580	\$1,300	\$1,700	\$3,500
2025	\$700	\$1,500	\$1,900	\$4,000
2030	\$820	\$1,700	\$2,200	\$4,500
2035	\$970	\$1,900	\$2,500	\$5,300
2040	\$1,100	\$2,200	\$2,800	\$5,900
2045	\$1,300	\$2,500	\$3,000	\$6,600
2050	\$1,400	\$2,700	\$3,300	\$7,200

<sup>a</sup> The values are emissions-year specific and are defined in real terms, i.e., adjusted for inflation using the GDP implicit price deflator.

<sup>b</sup> The estimates in this table have been adjusted to reflect the minor technical corrections to the SC-CO<sub>2</sub> estimates described above. See Corrigendum to Marten *et al.* (2014) for more details <http://www.tandfonline.com/doi/abs/10.1080/14693062.2015.1070550>.

Social Costs associated with CO<sub>2</sub> and CH<sub>4</sub> (methane) carry significant implications in determining the viability of LNG in today's world and should be included in this and future studies.

Some examples of these externalities that are NOT mentioned in this study but are the result of human caused fossil fuel pollution are the increasing number of extreme weather events<sup>15 16</sup> that include drought, floods, fires and wind events. Storms like Sandy which cost the government \$60 billion in emergency funds, the tropical storm that hit Northern California and Southern Oregon on Feb 6<sup>th</sup>, 2015 that dumped 3 inches of rain in 24 hours, toppled thousands of trees across a 100 mile swath and created landslides that closed Highway 66 where we live in Oregon are costly and life threatening. Fires have been raging in the wake of our hotter, longer summers in the West and drought threatens drinking water, agriculture and fisheries.

In the reality of climate change the natural gas/LNG industry with its 10%+ loss incurred in the energy intensive process to liquefy the natural gas, it is an unconscionable oversight with catastrophic results, to NOT be putting the real social costs on our continuing to use of fossil fuels. We are over 400ppm of CO<sub>2</sub> equivalent already causing a 1 degree Celsius global temperature increase and science says we have to return to 350 ppm. We fail to see how we can reach these goals if the path Department of Energy has been advocating for over the past 10 years is increased use of natural gas.

<sup>15</sup> The Unsustainable Trend of Natural Hazard Losses in the United States, November 14, 2011.

<http://www.mdpi.com/2071-1050/3/11/2157>

<sup>16</sup> U.S. Billion-dollar Weather and Climate Disasters: Data Sources, Trends, Accuracy and Biases. Smith, Adam B. Katz., Richard. Natural Hazards. June 2013, Volume 67, Issue 2, pp 387-410, <http://link.springer.com/article/10.1007%2Fs11069-013-0566-5>

**3) The study fails to address the vast difference in costs between greenfield and brownfield LNG projects and the risk to capital given the many uncertainties that face pushing LNG as the next energy currency.**

One concern that faces the LNG future is the risk taken when investing large sums of capital into an industry that may soon get passed up with a move toward renewable energy.

U.S. natural gas will be an attractive source of supply to foreign consumers as long the cost to deliver is competitive with other sources of supply. Moreover, the commensurate investments in production, liquefaction, and shipping must remain attractive to investors. *(2015 LNG Export Study, page 20)*

The authors of the Brattle Group's "LNG and Renewable Power: Risk and Opportunity in a Changing World", analyzed the current and projected cost of gas-fired generation using LNG from North America versus the current projected cost of renewable power in markets outside of North America and deduced that in some places wind and solar are already competitive with LNG for electric generation.

The increasing competition between renewable power and gas-fired generation using LNG should be considered carefully by participants in the global LNG markets. This competition increases the uncertainty in global gas demand and the future LNG requirements in markets now being targeted by North American LNG export developers," the report notes. "Both investors in LNG infrastructure and buyers of LNG under long-term contracts will want to consider these risks before making large and long-term commitments to buy or sell LNG."<sup>17</sup>

The variation of costs between US LNG projects must also be considered. It's not clear in the study what cost parameters, if any, were used for different geographical parts of the country. In the 2015 World LNG Report there was a considerable range between capital cost of greenfield and brownfield with greenfield costs increasing at a much faster rate.

Cost has been the main challenge facing LNG projects worldwide. Liquefaction projects have faced considerable cost escalation since 2000 – several projects reported cost overruns in the range of 30-50% after construction began. Unit costs for liquefaction plants (in real 2014 dollars) increased from an average \$321/tonne from 2000-2006 to \$851/tonne from 2007-2014. Greenfield projects have increased from \$326/tonne to \$1,185/tonne, while brownfield projects have only increased to \$516/tonne, up from \$315/tonne.<sup>18</sup>

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<sup>17</sup> LNG and Renewable Power: Risk and Opportunities in a Changing World, January 15, 2016, The Brattle Group. [http://www.brattle.com/system/publications/pdfs/000/005/249/original/LNG\\_and\\_Renewable\\_Power\\_-\\_Risk\\_and\\_Opportunity\\_in\\_a\\_Changing\\_World.pdf?1452804455](http://www.brattle.com/system/publications/pdfs/000/005/249/original/LNG_and_Renewable_Power_-_Risk_and_Opportunity_in_a_Changing_World.pdf?1452804455)

<sup>18</sup> World LNG Report 2015, page 26. [http://www.igu.org/sites/default/files/node-page-field\\_file/IGU-World%20LNG%20Report-2015%20Edition.pdf](http://www.igu.org/sites/default/files/node-page-field_file/IGU-World%20LNG%20Report-2015%20Edition.pdf)

The recent U.S. Congress decision to extend wind and tax credits and the Supreme Court decision to allow “demand response” will continue to push renewable energy costs lower and have shortened the time in which renewable energy will surpass conventional fossil fuel energy.

The numbers are really stunning. According to a recent report by the investment firm Lazard, the cost of electricity generation using wind power fell 61 percent from 2009 to 2015, while the cost of solar power fell 82 percent. These numbers — which are in line with other estimates — show progress at rates we normally only expect to see for information technology. And they put the cost of renewable energy into a range where it’s competitive with fossil fuels.<sup>19</sup>

Another contributing factor that will help renewables grow, and more quickly supplant natural gas as a “bridge fuel” to a clean energy economy, is the recent Supreme Court decision.

In a long-awaited decision sure to benefit our wallets and the planet, the U.S. Supreme Court today upheld the Federal Energy Regulatory Commission's (FERC) authority to design rules and incentives for electricity customers to get paid for reducing consumption during periods of high electricity demand. Known as "demand response," it's most often used when energy is expensive and the grid's limits are tested.<sup>20</sup>

The reason this is significant is that through the use of smart technology we will be able to flatten peak electrical energy costs and, rather than replace retiring coal or gas-fired plants with new gas-fired plants as a “bridge”, it is predicted that renewable power will compete directly with natural gas. The Brattle Group study shows solar, wind and hydro already is the least expensive option in some parts of the world. With increased production these costs will continue to decline, making renewables the least expensive energy option. Already in early 2016 roughly one quarter of the world’s emissions now fall under some form of carbon pricing system.<sup>21</sup> With China introducing Cap and Trade country-wide in 2017, this number will only increase.<sup>22</sup> All of this shift in the world markets, combined with the current oversupply in LNG and current LNG export terminals in the US struggling to get long term contracts for 100% of their capacity, suggest that a shift is already starting to occur. This raises serious questions around what happens if LNG markets dwindle instead of grow due to the growth of wind and solar sectors competing with LNG?

Some, like The Solutions Project, have come up with plans to get to 100% renewable by 2050. They project that the plan for the United States would save a whopping \$587 billion (1.5% GDP) in avoided mortality and illness costs. The plan pays for itself in as little as 1.5 years from air pollution and climate cost savings alone. If this were even remotely possible, it seems that the studies we should be

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<sup>19</sup> Wind, Sun and Fire, Paul Krugman, FEB. 1, 2016. New York Times.

<http://www.nytimes.com/2016/02/01/opinion/wind-sun-and-fire.html?emc=eta1>

<sup>20</sup> U.S. Supreme Court Decision: Demand Response Forces Awaken, Allison Clements’s Blog, January 25, 2016.

[http://switchboard.nrdc.org/blogs/aclements/us\\_supreme\\_court\\_decision\\_dema.html](http://switchboard.nrdc.org/blogs/aclements/us_supreme_court_decision_dema.html)

<sup>21</sup> A 2016 Carbon Market Forecast. Kasey Krifka, The Climate Trust. <https://www.climatetrust.org/a-2016-carbon-market-forecast/>

<sup>22</sup> China to launch national cap-and-trade plan in 2017, US announces, Suzanne Goldenberg, Sept 24, 2015. The Guardian. <http://www.theguardian.com/world/2015/sep/24/china-national-cap-and-trade-deal>

conducting are ones that look at how we can attract capital to renewable energy and leave hydrofracturing and fossil fuels, with their high social cost, in the ground.

**4) What criteria should DOE/FE/FERC use in determining approval of additional export terminals when comparing the 29 pending applications?**

One of the reasons for conducting this study and asking for comments was to determine who of the 29 pending applicants should get a shot at a very narrow LNG export market. Our emphatic response, for all the reasons stated above, is NO ONE ELSE! The risk and uncertainty created by significant and ongoing changes in energy markets, our cascading toward increasing climate chaos and the failure to incorporate real costs of GHG pollution caused by continued use of fossil fuel energy, clearly show that the narrow positive GDP margin currently shown in the 2015 LNG Export study would be negated and that LNG Exports are most certainly NOT in the “public interest.”

Should the DOE decide against prevailing wisdom to curtail our finite and harmful fossil fuels resources and move to approve an additional 8 bcf/d of LNG capacity, taking us from the current 12 bcf/d still not fully contracted terminals to 20 bcf/d, it should be first and foremost based on demand carefully weighed against harm. And only then, if there are willing buyers contracted for 100% of the capacity.

By doing this, you establish two things: that there is actual demand for U.S. LNG and that it must be delivered through long term contracts at prices a company can build infrastructure and sell LNG for thus guaranteeing that the jobs and the economic benefit that this study suggests, would actually exist. Without contracts, as in the case of Jordan Cove/Pacific Connector where we live in Oregon, there is absolutely zero public benefit in granting approval.<sup>23</sup> These LNG terminals and their associated pipelines are far too damaging, dangerous, polluting and a financial risk putting valued natural resources, private property, health and safety and risk of abandoned and stranded assets in jeopardy. Instead money could be put into other more beneficial renewable energy sources for a real and direct “public benefit” right here at home.

Terrain and earthquake, tsunami and rain induced risk to public safety and environmental destruction should also be taken into consideration if future LNG terminals are approved.

If, as is suggested, the world demand exists for LNG, then only those applicants that secure 100% longer term contracts and can show financial strength and a good track record of following all state and federal permit/certificate orders should be considered. Another factor that should be taken into consideration both in determining whether a project or applicant meets the increased U.S. GDP benefits is whether the stakeholder company(s) is/are from the United States. If profits over the course of the project do not bring dollars into the United States economy, but rather are taken elsewhere, this limits the trade balance perceived to partially make these projects in the “public interest”. When GDP dollars were determined in the study, was any profit to companies projected to account for any portion of the overall GDP or trade balance?

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<sup>23</sup> Landowner letter filed with FERC, Dec 9, 2015.

[http://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=20151210-5000](http://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20151210-5000)

On this note, we believe that DOE/FE has far out step its bounds in determining that “LNG exports” are in the “public interest” and that private companies should be granted eminent domain for private corporate gain when LNG exports as in the case of Jordan Cove and the gas being exported are most certainly NOT for “public use” as eminent domain is designed to serve. This shift from “public use” to “public interest”--all based on modeling that has so far not predicted the correct climate change ravaged world and flies in the face of our 5<sup>th</sup> amendment constitutional rights--is both unconstitutional and absolutely wrong.

If the true social costs and the full life cycle analysis were included in the 2015 LNG Export study, additional costs would have produced a negative U.S. GDP result. The flood gates should NOT have been, nor should they continue to be, opened allowing more cost-intensive and harmful climate chaos causing pollution. It is time we recognize that for the sake of future generations we cannot keep fowling our atmospheric nest. Only when we remove the existing fossil fuel subsidies and we charge the real social costs of fossil fuel pollution both burned and fugitive will we find that renewable energy is the obvious choice. The sooner we get to that realization and start building the new energy economy the better. Our recommendation is that DOE/FERC stop approving more LNG terminals starting now.

Thank you for this opportunity to comment on the study.

Sincerely,

Deb Evans and Ron Schaaf,  
(as individuals)  
and  
Hair on Fire Oregon