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The True Cost of Jordan Cove LNG Exports

Comments on: Jordan Cove Energy Project, L.P.; Amendment of Application for Long-Term, Authorization To Export Liquefied Natural Gas to Non-Free Trade Agreement Nations

Nowhere in the analysis of the proposed Pacific Connector pipeline and Jordan Cove LNG Terminal did FERC assess the true cost of the project. Although operating under the requirements of NEPA (National Environmental Policy Act) which demands an analysis of cumulative impacts of projects – meaning the impact of past, present and reasonably foreseeable future actions associated with the project, FERC did not do it. Indeed, although a Veresen application for certification indicated the proposal required an expansion of natural gas extraction, FERC declared it had no basis for inferring the project would lead to increased extraction.

Furthermore, when considering the potential impact of methane emissions from the project, FERC employed out of date data regarding the Global Warming Potential of the gas and ignored the reality of fugitive emissions (i.e. leakage) of the gas from the shale fracked source to the combustion sink. We now know that these emissions are vastly greater than previously thought. It appears that the industry and EPA have both consistently been underestimating the emissions and thus their impact.

Since natural gas is some 90% methane, it is the Global Warming Potential (GWP) of this gas that must be considered. Because it is much shorter-lived in the atmosphere than carbon dioxide, the GWP of methane is reported in both 20 year and 100 year bases. However, the most recent (2013/2014) IPCC report summarizing current research, identifies the GWP of methane as 86 times carbon dioxide on a 20 year basis and 34 times worse on a 100 year basis. Thus the carbon dioxide equivalent (CO_2e) of methane emissions is 86 (20 yr basis) or 34 (100 yr basis) (https://www.ipcc.ch/pdf/assessment-report/ar5/syr/SYR_AR5_FINAL_full.pdf and http://ecometrica.com/assets/Understanding-the-Changes-to-GWPs.pdf).

Because less carbon dioxide is emitted per unit of energy generated when natural gas is combusted as opposed to coal and oil, it has mistakenly been called 'the clean fossil fuel'. But the high GWP of methane means not much leakage has to occur to negate this combustion benefit completely. Analyses tell us the leakage rate at which natural gas starts to exceed coal as a warming agent is just 2.8%. Meanwhile, recent analysis indicates that the range of fugitive emissions for shale fracked natural gas is from 3.6% – 7.9% with a mean of 5.8% where all values are above the 2.8% cut-off at which natural gas becomes worse than coal as a global warming fuel

(http://www.eeb.cornell.edu/howarth/publications/Howarth_2014_ESE_methane_emissions.pdf).

While it is clear that the fugitive emissions value to be used in this assessment should be based on the recent studies of shale fracking emissions, there are no data available on what the rate of emissions would be for this project. I shall, therefore, offer the average from the above range (i.e. 5.8%) recognizing that the number could be at the low end of the range (*i.e.* 0.62 of the reported value) but lower and could be higher (*i.e*. 1.36 of the reported value).

It would have been impossible to determine how much these emissions actually cost society before 2007 when the economic cost of greenhouse gas emissions was first assessed. Thanks to those efforts, we now have an estimate of what the social cost of greenhouse gas emissions are economically. These emissions are measured in terms of their carbon dioxide equivalent global warming potential. While assessments undertaken to downplay the impact of these emissions focus on the 100 year GWP of methane, there is no justification for such a basis other than the desire to underestimate the apparent consequences. We now know that the rate at which anthropogenic global warming is occurring, and is projected to continue if we follow the business as usual scenario of ever increasing fossil fuel use and greenhouse gas emissions is such that the 100 yr basis for comparison is totally inadequate. Projects such as the proposed Jordan Cove LNG Export terminal promise should be evaluated using the 20 yr GWP equivalence. In this analysis, I will offer both estimates.

On the other hand, it is also difficult to determine exactly on what natural gas volume basis emissions should be calculated since the rate of flow of natural gas through the pipeline has been variously proposed as 0.9 billion, 1.07 billion, and 1.55 billion cubic feet per day. Furthermore, a recent Veresen application to the Department of Energy has identified 0.96 billion cubic feet per day (based on the stated rate of 350 billion cubic ft per year) (http://www.fossil.energy.gov/programs/gasregulation/authorizations/2012_applications/2015-10-05_JCEP_Amendment_of_NFTA__Appli.pdf) as the target for pipeline transmission to the terminal for export as LNG. This value, therefore, might be considered the most reasonable basis upon which to estimate emissions volumes and costs though that remains unclear and could represent only 0.619 of the total transmission permissible (at 1.55 billion cubic ft per day as Veresen reported).

In these calculations, I assume that the rate of emissions subtracts from the reported pipeline capacity. This represents an underestimate because by the time the natural gas reaches Coos Bay, most of the leakage would have already occurred. Calculation of the social cost of the emissions depend on the discount rate employed (https://www3.epa.gov/climatechange/Downloads/EPAactivities/social-cost-carbon.pdf). The range is from $12.58 to $120.8 adjusted from the reported 2007 dollars to 2016 dollars (http://www.usinflationcalculator.com/).

The question, then, is: what will the overall emission of greenhouse gases from the proposed project actually cost us? Employing the above assumptions, I calculate the total impact from an assessment of the cumulative actions associated with the project below.

Table 1. The greenhouse gas emissions (CO_2e equivalent), in Millions of Metric tons (MMT) and as a percentage of total Oregon GHG emissions for 2010 in parentheses.

Cu ft per day	20 yr basis MMT	% Oregon 2010 total	100 yr basis MMT	% Oregon Total
0.9	45.210	72.422	28.397	44.86
0.9589	48.168	76.096	30.255	47.797
1.07	53.749	64.912	33.760	53.334
1.55	77.860	123.002	48.904	77.259

Table 2. The **annual** social cost of these emissions.

Cu ft per day	20 yr basis @ $12.58 per ton	20 yr basis @ $120.8 per ton	100 yr basis @ $12.58 per ton	100 yr basis @ $120.8 per ton
0.9	$568,744763	$5,715,167,412	$357,236,126	$3,684,146,477
0.9589	$605,964,160	$6,072,568,302	$380,613,458	$3,908,628,330
1.07	$676,169,169	$6,746,714,971	$424,708,901	$4,332,056,749
1.55	$934,326,048	$9,659,319,844	$586,855,579	$6,161,450,457

The evidence is clear. Whatever value is used as the annual export volume of natural gas, the resultant emissions will be consequential. Although not occurring within the boundary of our state, these emissions would represent a substantial proportion of the total emissions of greenhouse gases from Oregon, compromising the effectiveness of any effort on the part of our state to reduce emissions. The social cost of these emissions is also substantial, regardless of the basis upon which such costs are calculated. Compared to these costs, the local economic benefits of the proposed projects pale into insignificance.

SUMMARY

Of great immediate significance is the cost of these greenhouse gas emissions. Even if the lower volume of 0.9 billion cu ft per day and the 100 year basis is employed, the **annual** cost of the projects range from over $357 million to three and a half billion dollars. At the higher volume of 1.55 billion cu ft per day suggested by Veresen the range climbs to $586 million to over $6 billion annually. Of course, if the more reasonable 20 year basis and higher discount rates for the social cost of emissions are employed, the annual cost skyrockets to comparable values to those for 1.55 billion cu ft per day values: even at 0.9 billion cu ft per day, the range is from $568 million to $5.715 billion annually. Again, these costs would not be borne entirely by the state of Oregon, but the annual cost estimates raise the question of whether it is

justifiable to generate relatively small local economic benefit, as predicted by the Veresen/Williams project proposals when the global costs will be so vast. Purely on an economic basis, the Jordan Cove, Pacific Connector proposals make no sense.

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