

CALL FOR REJECTION OF APPLICATION TO CONSTRUCT JORDAN COVE

1.0 INTRODUCTION

“Engineers for a Sustainable Future” (“ESF”) is an organization of engineers located in Oregon. We have studied and concluded that the permit to construct the 230-mile Pacific Connector Natural Gas Pipeline in Oregon from Malin to Coos Bay and the Jordan Cove Liquid Natural Gas (LNG) energy project in Coos Bay should not be approved. (Hereafter we will refer to the total project as the Jordan Cove project.) The Jordan Cove installation will have negative impact on Oregon policy and environment as well as a significant negative impact on the efforts to reduce global pollution.

As engineers, we believe that when an activity raises threats of harm to the environment or human health, precautionary measures should be taken. Precaution calls for applying adequate safety factors when developing laws and regulations and granting permits on major projects to ensure a livable world for future generations.⁽¹⁾ We join with other environmental groups, affected landowners and concerned Oregonians in urging rejection of the application.

Our state is now faced with the decision as to whether or not to grant a permit on a very major project - Jordan Cove \$10 billion project. The third application⁽²⁾ for this project has been submitted by a Canadian firm - Pembina Pipeline⁽³⁾. The LNG plant would be used to export 7.8 Million Metric tons (Mmt) of liquified gas per year from Oregon to Japan and/or Asia. The company expects to complete the application process during the second half of 2018. This paper presents four major reasons for rejection of this permit application.

2.0 SUMMARY

The following discussion presents four areas that we wish to address. There are other important environmental issues that are associated with this project that are not addressed in this paper. The major concerns that we present in this paper are:

- **Infrastructure Development (See also Section 3).** We have reached a time where major new greenhouse gas producing projects should be halted and the investment funds should go to development of renewables and energy conservation. A project such as Jordan Cove with an expected 40-year life will at some point become a stranded investment if Oregon is to reach its greenhouse emission reduction goals. There will be intense pressures brought to bear by project owners on Oregon to allow this project to continue for 40 years.

We agree with the Portland City Council’s adoption of zoning code changes to ban the construction of new major fossil fuel terminals and the expansion of existing ones.

- **Global Emissions Associated with Jordan Cove Operation (See also Section 4).**

While we are concerned with emissions within our state, we recognize that we are also citizens of the world and we do not want to **enable** significant emission additions elsewhere. The range of anticipated emissions estimated by Oil Change International ⁽⁴⁾ is 36.8 – 52 million metric tonnes per year (Mmt/yr) of Carbon Dioxide equivalent (CO₂e) ⁽⁵⁾. (A metric ton is 2,204.6 pounds.) As a point of reference, the total emissions enabled by this project will be on the same order as Oregon’s entire annual emissions – about 63 million metric tons of CO₂e per year (Mmt/yr).

We must do our part by refusing to add major fossil fuel infrastructure projects in our state. We realize that in the absence of Jordan Cove, Japan and Asian countries will meet their energy needs by other means. At one end of the spectrum, they may realize more pressure to use renewable resources. Or they may get LNG or coal from some other supply point. Possibly without Jordan Cove, the cost of the fossil fuel solution will be somewhat more expensive.

- **Emissions in Oregon (See also Section 5).** Emissions within Oregon from the Jordan Cove project are predicted to be 2.2 Mmt/yr of CO₂e. These emissions will come close to matching the annual greenhouse gas emissions from Portland General Electric’s (PGE’s) Boardman Coal fired plant. Boardman will be shut down in 2020 as a result of negotiations between Oregon and PGE. Jordan Cove will make it more difficult for Oregon to reach emission reductions committed to by the state’s own goals and by the Paris Climate agreement. Approval of Jordan Cove will **cancel** the savings in climate emissions realized by shutting down Boardman.

- **Social Cost of Jordan Cove greenhouse Gas Emissions (See also Section 6).** Climate change is leading to negative consequences to existing and future generations. Social costs of carbon have been estimated and the median estimate is about \$40 per metric tonne of CO₂e ⁽⁶⁾. Using this estimate, we calculate that the global cost will be \$1.47 billion per year based on the Oil Change International reference case and \$2.08 billion per year based on the OCI high estimate. The cost for the emissions within Oregon borders will be \$88 Million per year. These costs of emissions will be paid for by existing and future generations unless those responsible are assessed fees and the revenue is used to mitigate climate change.

Oregon should not allow construction of a project that will have significant negative impacts to people and the environment. We need to do our share to ensure that the Jordan Cove application is rejected and thereby avoid these large social costs.

3.0 INFRASTRUCTURE DEVELOPMENT

Major energy related expenditures should be for development of renewable energy and conservation, rather than expanding fossil fuel infrastructure. It is estimated that the Jordan Cove project will require an investment of \$10 billion. Early shutdown of the project will lead to

significant financial losses for Pembina. With an investment of this magnitude, there will be intense pressure by project owners to allow the project to remain in operation for at least the designed life of the project – estimated to be 40 years.

We need to phase out our use of fossil fuels. Approving major construction projects like Jordan Cove runs counter to that goal. **Imagine what we could do in Oregon if we had \$10 billion to invest in energy conservation and renewable energy.**

4.0 GLOBAL EMISSIONS ASSOCIATED WITH JORDAN COVE OPERATION

While the production and burning of the gas associated with the Jordan Cove gas project will be outside Oregon, approval of the project will **enable** emissions of CO₂e of the same order of magnitude as the current emissions from the entire state of Oregon.

Developing an emission estimate for the Jordan Cove project is not easy as there are many different methane leakage emission rates in publications. Leakage emissions estimates range from 1.5% to 10% of delivered product.

To estimate the emissions associated with the Jordan Cove project, we refer to the Oil Change International (OCI) paper entitled “*Jordan Cove LNG and Pacific Connector Pipeline Greenhouse Gas Emissions Briefing*”. This paper presents estimates of the lifecycle, annual global greenhouse emissions of the Jordan Cove project.

OCI presents two cases – a reference case and a high case. The reference case and high case emissions were respectively 36.8 and 52.0 million metric tons of CO₂e per year. Total emissions of CO₂e within Oregon was estimated to be 63 Mmt in 2016.

The difference between the reference case and the high case estimates is in the gas production stage. The gas production estimates are based on peer-reviewed studies published in *Environmental Science & Technology* in July 2017. The report was titled “*Variation in Methane Emission Rates from Well Pads in Four Oil and Gas Basins with Contrasting Production Volumes and Compositions*”. The studies were conducted by researchers from University of Wyoming and Colorado State University. The estimates are based on the Rocky Mountain region – one of the two possible sources for the Jordan Cove Project. (There is no peer-reviewed data for the possible British Columbia source.) The emissions were based on randomly chosen days in 2014 and 2015. Reference case emissions were based on mean averages and the high case emissions were based on the higher observed rates.

Based on the leakage observations, OCI developed the two scenarios for methane leakage estimates - 1.77 % for the reference case and 4.08 % for the high case.

OCI points out in its paper that the reference case life cycle annual emissions of 36.8 Mmt CO₂e/Year are equivalent to 15.4 times the 2016 emissions of the Boardman Coal fired plant. Boardman will close in 2020 because of climate and air pollution concerns.

The following table presents a breakdown of the emissions as determined by Oil Change International.

Item Number	Lifecycle Stage	Reference Case Mmt CO2e / Year	High Case Mmt CO2e / Year
1	Gas Production	10.9	26.0
2	Gas Processing	0.51	0.52
3	Transmission to Jordan Cove (2)	0.78	0.78
4	LNG Liquefaction	1.8	1.8
5	Transportation and use in Japan and/or Asia	2.57	2.57
6	Combustion	20.2	20.2
7	Total	36.8	52.0

We note that the OCI reference case emission level of 36.8 Mmt CO2e may be on the conservative side. Methane leakage rate estimates that are published by the EPA and industry are often criticized by third party investigators as being significantly lower than actual measurements. In a July 2015 study published in “*Environmental Science and Technology*”, methane emissions were thought to be 50 % higher than estimates derived from the EPA. As such, the gas processing, transmission to Jordan Cove and transmission and use in Asia and/or Japan categories (Items 2, 3 and 5 in the previous table) could be too low.

5.0 EMISSIONS WITHIN THE STATE OF OREGON

Emissions within the State of Oregon from the Jordan Cove project are predicted to be 2.2 Mmt of CO2e. These emissions are the total of the CO2e emissions associated with the liquefaction process at Jordan Cove (1.8 Mmt of CO2e) and the emissions associated with the supply pipeline and pipeline gas compressor stations in Oregon (0.4 Mmt of CO2e).

The Oregon State Legislature set goals for greenhouse emissions in 2007. The goals were:

- In 2020 – 51 Mmt CO2e. 10% below 1990 levels of 55.8 Mmt of CO2e. However, the latest projection is that we will actually produce 61 Mmt in 2020.
- In 2035 – 32 Mmt CO2e.
- In 2050 – 14 Mmt CO2e. 75% below 1990 levels of 55.8 Mmt of CO2e.

Governor Kate Brown has committed Oregon to achieving the Paris Climate goals. For the 2 deg C scenario, Oregon’s emissions will have to be zero by 2065. For the 1.5 deg C scenario, emissions will have to be zero by 2050. The Jordan Cove project will directly and indirectly seriously compromise the state’s goals of reducing greenhouse gases during the coming decades. Oregon spent years negotiating with PGE to reach an agreement to close the Boardman coal plant. Approval of Jordan Cove will **cancel** the savings in climate emissions realized by shutting down Boardman.

6.0 SOCIAL COST OF JORDAN COVE GREENHOUSE GAS EMISSIONS

Operation of the Jordan Cove project will result in a significant cost to the public by the continued production of greenhouse gases which will lead to negative consequences on human health, migration and economic productivity. To compare the cost of limiting greenhouse gas emissions to the cost of climate change, estimates of the social cost of carbon pollution have been developed. It is based on modelling of climate change and its impact on health, wellbeing and quality of life.

The Obama administration and the Intergovernmental Panel on Climate Change (IPCC) determined that the social cost of carbon to be about \$40 per metric ton. The \$40 estimate is considered by many to be a central estimate and **we use it to estimate the cost of CO₂e**. Using \$40 per metric tonne, we calculate the following:

- For the world community, the social cost will be \$1.47 billion per year if emissions are 36.8 Mmt/yr and \$2.08 billion per year if the high-end emissions are produced.
- For Oregon, the social cost will be \$88 million per year based on anticipated project emissions within the state.

Those responsible for emissions are now operating under a “cost-free” approach. Existing and future generations will pay, not those responsible for the emissions.

7.0 CONCLUSION

Engineers for a Sustainable Future calls for rejection of the Jordan Cove Application for the following reasons:

- **Infrastructure Development.** Investment in major new greenhouse gas producing projects should be halted and funds should instead go to development of renewables and energy conservation. If Oregon is to reach its greenhouse reduction goals, the project must at some point be shut down before the end of its useful life. There will be intense pressures brought to bear by project owners who have invested an estimated \$10 billion in this project on Oregon to allow this project to continue for 40 years and thereby prohibit Oregon from reaching its greenhouse goals.

- **Increase in Global Greenhouse Gas Emissions.** The range of anticipated emissions associated with the operation of the Jordan Cove project will be on the same order as Oregon's entire annual emissions. We must not **enable** this substantial increase in greenhouse gas emissions to occur. In the absence of Jordan Cove, Japan and Asian countries will meet their energy needs by other means. At one end of the spectrum, they may realize more pressure to use renewable resources. Or they may get LNG or coal from some other supply point. Possibly without Jordan Cove, the cost of the fossil fuel solution will be somewhat more expensive. In any case, we must not participate.
- **Increase in Emissions within the State of Oregon.** The annual emissions within Oregon from operation of the Jordan Cove Emissions are predicted to closely match the annual greenhouse gas emissions from Portland General Electric's (PGE's) Boardman Coal fired plant. Boardman will be shut down in 2020 as a result of years of negotiations between Oregon and PGE. Approval of Jordan Cove will be a step backwards in Oregon's effort to meet greenhouse gas reduction goals.
- **Social cost of Emissions Associated with the Jordan Cove Project.** The social cost to the world community to address the damage caused by Jordan Cove project is estimated to be \$1.47 billion per year if emissions are 36.8 Mmt/yr and \$2.08 billion per year if the high-end emissions are produced. For Oregon, the social cost will be \$88 million per year based on anticipated project emissions within the state. Renewable energy projects should replace Jordan Cove project.

NOTES

- (1) Engineers reduce risk by applying science-based and fact-based conclusions to our designs. We hold paramount the health, safety and wellbeing of communities. As such, our designs include safety factors to ensure that a project will withstand unanticipated stresses. We must apply this precautionary approach when dealing with climate change as we will no doubt experience unanticipated tipping points if we delay action. We believe that it is the right of future generations to expect us to keep their needs in mind.
- (2) In 2016, **FERC** denied the project stating: “because the record does not support a finding that the public benefits of the Pacific Connector Pipeline outweigh the adverse effects on landowners, we deny Pacific Connector’s request for certificate authority to construct and operate its project”. However, FERC operation under the Trump administration is expected to look more favorably on the proposed project and as such, another application for the project is being undertaken.
- (3) Pembina Pipeline obtained 100 percent ownership of the Jordan Cove project in 2017 following the acquisition from Veresen. Pembina officially filed the Jordan Cove application in September 2017 with the Federal Energy Regulatory Commission. The company expects a final investment decision in 2019 and it expects to begin service in 2024.
- (4) Oil Change International (OCI) describes themselves as “a research, communication and advocacy organization focused on exposing the true cost of fossil fuels and facilitating the coming transition towards clean energy.”
- (5) CO₂e or carbon dioxide equivalent is a standard unit for measuring carbon footprints. It expresses the impact of greenhouse gasses in terms of the amount of CO₂ that would create the same amount of warming.
- (6) There are many estimates of the social cost of CO₂. The cost depends on estimates of the sensitivity of the climate to emissions and the economic damage resulting from the climate change. The social cost of carbon needs to be continually updated to reflect the latest available climate science. By applying social costs of greenhouse emissions as a component of cost-benefit analysis, government agencies can properly evaluate policies and projects that affect greenhouse emissions.

The social cost of CO₂ has been revised downward by the Trump administration. The administration has lowered the cost to somewhere between \$1 and \$6. They have done this by increasing the discount rate from 3% to 5% (higher discount rates give less importance to the future damage caused by emissions) and by considering only the domestic benefits of reducing greenhouse-gas emissions. (Of course, emissions in our country effect the entire world as do emissions from other countries.) With these changes, many of the environmental regulations that are based on greenhouse gas emissions are wiped away.