



# Northwest Fossil Fuel Exports

Planned expansions would eclipse region's clean energy aspirations.

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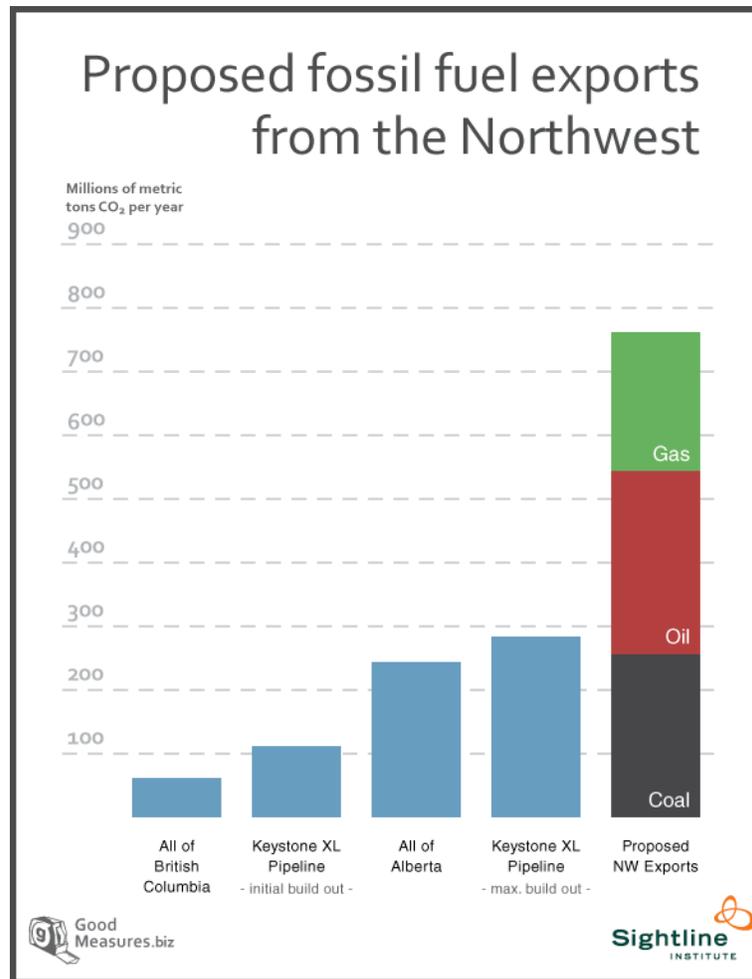
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## Section 1. Summary

North America's interior is laden with large deposits of coal, oil, and natural gas, such as oil sands in Alberta and subbituminous coal in the Powder River Basin of Wyoming and Montana. Many of these deposits are remote from consumers, and face serious obstacles to domestic use. For the firms that stand to profit from selling these fuels, the growing economies in Asia seem to provide a ray of hope. In order to reach markets in Asia, fossil fuel interests are planning to build a range of large infrastructure projects in the Pacific Northwest.

Now, across British Columbia, Oregon, and Washington there are active proposals for five new coal terminals, two expansions of existing terminals, three new oil pipelines, and six new natural gas pipelines. The projects are distinct, but they can be denominated in a common currency: the tons of carbon dioxide emitted if the fossil fuels were burned. Taken together, these projects would be capable of delivering enough fuel to release an additional 761 million metric tons of carbon dioxide into the atmosphere each year, which is equivalent to:

- ◆ 12 times all the climate-warming gases emitted in British Columbia
- ◆ Nearly seven Keystone XL pipelines at initial build out
- ◆ Three times all the carbon emitted annually in Alberta
- ◆ 157 million American cars
- ◆ 76 coal-fired power plants



The projects under consideration include:

- ◆ Seven new or expanded **coal export terminals** capable of moving an additional 128 million metric tons of coal annually, enough to emit 256 million metric tons of carbon dioxide per year.
- ◆ Three new or expanded **oil pipelines** capable of carrying more than 1.5 million barrels per day, enough to emit 288 million metric tons of carbon dioxide annually.
- ◆ At least six new natural **gas pipelines** capable of carrying 11.2 billion cubic feet per day, enough to emit 217 million metric tons of carbon dioxide annually.

British Columbia, Oregon, and Washington each enjoy a reputation for leadership in clean energy and environmental policy. Among other achievements, the region is home to a path-breaking carbon tax, cities pledging to steep reductions in carbon emissions, and abundant renewable energy. Yet the new fossil fuel infrastructure planned for the region would eclipse the region's green reputation, transforming the Northwest from an aspiring climate leader into a carbon export hub of global consequence.

## Section 2. New Fossil Fuel Export Proposals

Coal Export Terminals			
C02 emissions (million metric tons per year when the coal is burned)	Proposed new coal handling capacity (million metric tons per year)	Principal operator	Project
16	8	Ambre Energy	Morrow Pacific (Boardman, OR)
88	44	Ambre Energy	Millennium Bulk Terminals (Longview, WA)
96	48	SSA Marine	Gateway Pacific Terminal (Ferndale, WA)
17	8	Port Metro Vancouver	Fraser Docks (Surrey, BC)
12	6	Port Metro Vancouver	Neptune expansion (North Vancouver, BC)
2	1	Compliance Energy	Raven Underground Coal (Port Alberni, BC)
27	13	Prince Rupert Port Authority	Ridley Terminals expansion (Prince Rupert, BC)
<b>256</b>	<b>128</b>	<b>Total</b>	

Oil Pipelines			
C02 emissions (million metric tons per year when the oil is burned)	Proposed new oil capacity (barrels per day)	Principal operator	Project
100	525,000	Enbridge	Northern Gateway (Bruderheim, AB to Kitimat, BC)
112	590,000	Kinder Morgan	Trans Mountain Expansion (Edmonton, AB to Burnaby, BC)
76	400,000	Kinder Morgan	Northern Leg (Edmonton, AB to Kitimat, BC)
<b>288</b>	<b>1,515,000</b>	<b>Total</b>	

<b>Natural Gas Pipelines</b>			
<b>CO2 emissions</b> (million metric tons per year when the gas is burned)	<b>Proposed new gas capacity</b> (billion cubic feet per day)	<b>Principal operator</b>	<b>Project</b>
33	1.7	TransCanada	Coastal GasLink (Dawson Creek, BC to Kitimat, BC)
19	1.0	Apache / Chevron	Pacific Trail Pipeline (Summit Lake, BC to Kitimat, BC)
58	2.0	Progress Energy / Petronas	Prince Rupert Gas Transmission Line (Montney Gas Field to Prince Rupert, BC)
81	4.2	Spectra Energy / BG Group	Spectra Natural Gas Pipeline (Cypress, BC to Prince Rupert, BC)
25	1.3	Oregon LNG	Oregon LNG Export (Sumas, WA to Warrenton, OR)
19	1.0	Williams / Veresen US Power	Pacific Connector Pipeline (Malin, OR to Coos Bay, OR)
<b>217</b>	<b>11.2</b>	<b>Total</b>	

### Section 3. Calculations, Methods, and Other Notes

All figures in this memo are given in metric units; some may not sum due to rounding. In this report, the Northwest refers to British Columbia, Oregon, and Washington.

Although the total potential carbon capacity of these projects is enormous by any standard, the estimates in this memo both overstate and understate the actual risk of the fossil fuel infrastructure under consideration for the Northwest. Notably, some of the projects are in competition with one another and may be mutually exclusive. Or they face physical constraints, such as vessel traffic limitations in the Salish Sea or rail capacity for coal transport in the US. Yet on the other hand, this analysis excludes major dimension of fossil fuel export plans. For example, it does not count new fueling infrastructure planned for Vancouver, BC's airport or shipping oil in rail cars, now underway or planned at several locations in Oregon and Washington. Moreover, Sightline's figures do not include any of the sizeable "upstream" emissions associated with the fuels. If one were to tally the emissions from extracting, mining, refining, processing, handling, or transporting the fuels, the carbon footprint of the projects analyzed here would be far larger.

British Columbia emitted 62 million metric tons of CO<sub>2</sub>-equivalent in 2010, the most recent data available, [http://www.env.gov.bc.ca/cas/mitigation/ghg\\_inventory/](http://www.env.gov.bc.ca/cas/mitigation/ghg_inventory/). Alberta emitted 244 million metric tons of CO<sub>2</sub>-equivalent in 2008, the most recent data available. See page 86, Table A14-10 in

Environment Canada, National Inventory Report: Part, 3, [http://unfccc.int/national\\_reports/annex\\_i\\_ghg\\_inventories/national\\_inventories\\_submissions/items/5270.php](http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/5270.php). The Keystone XL pipeline would have an initial capacity of 591,000 bpd and a maximum build out capacity of 1.5 million bpd, <http://keystonepipeline-xl.state.gov/documents/organization/182421.pdf>. These volumes would be equivalent to an annual carbon dioxide capacity of 112 mmt and 285 mmt, respectively.

## Coal

Sightline estimates that each ton of coal shipped from terminal expansions would produce 2 tons of CO<sub>2</sub>, on average, a figure that is consistent with data published by the US Energy Information Administration (EIA) and by Environment Canada. EIA reports that subbituminous coal produces 97.2 kilograms of CO<sub>2</sub> per million BTUs, [http://www.eia.gov/environment/emissions/co2\\_vol\\_mass.cfm](http://www.eia.gov/environment/emissions/co2_vol_mass.cfm). Assuming that export-grade US coal contains 9,300 BTUs per pound, each metric ton would produce 1.99 tons of CO<sub>2</sub>, on average. Environment Canada reports carbon intensities for western Canadian subbituminous coal, western Canadian bituminous coal, and Canadian anthracite, <http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=AC2B7641-1>. This simple average of these figures is 2.1 tons of CO<sub>2</sub> per ton of coal.

Sightline's estimates do not include any emissions associated with coal mining, processing, transporting, or handling. In estimating expansions of coal export capacity, Sightline excludes Westshore Terminal's recently completed expansion to 33 million tons per year, as well as the small amounts of coal shipped from Texada Island and Port Moody. Sightline also excludes the Project Mainstay coal export plan at Coos Bay, Oregon and Kinder Morgan's Port Westward proposal at the Port of St. Helens, Oregon. Although the Port of Coos Bay has indicated it is still interested in pursuing the plan, all of the project's investors have backed out, <http://earthfix.opb.org/energy/article/metro-ports-bails-out-on-coos-bay-coal-export-plan/>. Kinder Morgan has said publicly that it is still planning to export coal from the Northwest, but the firm has officially abandoned its Port Westward plans and has declined to name an alternative site, [http://www.oregonlive.com/environment/index.ssf/2013/05/another\\_northwest\\_coal\\_export.html](http://www.oregonlive.com/environment/index.ssf/2013/05/another_northwest_coal_export.html).

## Oil

Proposed Canadian oil pipelines would mostly transport bitumen derived from oil sands. When burned, each barrel of bitumen releases an average of 0.521 metric tons of CO<sub>2</sub>; see Table 1 of the report, "The Carbon Contained in Global Oils," by Deborah Gordon of the Carnegie Endowment for International Peace, <http://carnegieendowment.org/2012/12/18/carbon-contained-in-global-oils/euzi>. Note, however, that the proposed oil pipelines may transport fuels produced from a range of different sites, and that the carbon content of different bitumen products may vary. Also note that estimates of carbon intensity of bitumen fuels vary; see, for example, Table 1 of the NRDC report, "GHG Emission Factors for High Carbon Intensity Crude Oils," [http://docs.nrdc.org/energy/files/ene\\_10070101a.pdf](http://docs.nrdc.org/energy/files/ene_10070101a.pdf).

Sightline's estimates do not account for diluents, which are hydrocarbons that are processed and/or transported before being blended with pure bitumen for pipeline transport. The US State Department concludes that diluted bitumen is only 6 percent less carbon intense than pure bitumen on a "well-

to-wheels” basis; see Appendix W of its official assessment of the Keystone XL pipeline, at <http://keystonepipeline-xl.state.gov/documents/organization/205563.pdf>.

These estimates also do not account for emissions associated with bitumen extraction, upgrading, processing, transporting, handling, or refining. Nor do they include the emissions from coal-fired power plants’ combustion of low-price petroleum coke, which is derived from bitumen refining and upgrading; see OilChange International’s report, “Petroleum Coke: The Coal Hiding in the Tar Sands,” <http://priceofoil.org/wp-content/uploads/2013/01/OCI.Petcoke.FINALSCREEN.pdf>.

## Natural Gas

According to the US Energy Information Administration, burning 1,000 cubic feet of natural gas produces 53.1 kilograms of CO<sub>2</sub>; see [http://www.eia.gov/environment/emissions/co2\\_vol\\_mass.cfm](http://www.eia.gov/environment/emissions/co2_vol_mass.cfm). Sightline’s estimates do not include emissions from extraction, transporting, processing, storing, and handling, nor from venting or other fugitive emissions. In conducting this analysis, Sightline applied an additional level of scrutiny to natural gas transport projects, counting only those that are in active development. For example, Sightline has excluded the Douglas Channel processing and export facility near Kitimat and the Kitimat LNG facility, neither of which transport fuel, as well as more speculative new gas pipeline proposals and pipeline expansion proposals.

## Section 4. Sources

### Coal

Coal export volumes are reported in million tons per year (mta) or million metric tons per year (mmta). Sightline converts all US coal export capacity figures into metric units.

- ◆ Ambre’s Morrow Pacific project would have a capacity of 8.8 mta (8 mmta) according to Oregon Department of Environmental Quality’s permit review documents, [http://www.deq.state.or.us/news/publicnotices/uploaded/121128\\_3345\\_PNupdateCoalInfoMeet.pdf](http://www.deq.state.or.us/news/publicnotices/uploaded/121128_3345_PNupdateCoalInfoMeet.pdf).
- ◆ Ambre’s Millennium Bulk Terminals at Longview would have a capacity of 44 mmta according to the project website, <http://www.ambreenergy.com/millennium-bulk-terminal-submits-permits-to-r>.
- ◆ The Gateway Pacific Terminal at Ferndale would have a capacity of 48 mmta according to the project sponsor’s official documents; see page 4-49, <http://gatewaypacificterminal.com/wp-content/uploads/2011/09/GPT%20PID%20DOCUMENT.pdf>. Note that the terminal’s design includes an additional 6 mmta in capacity for unspecified dry bulk commodities.
- ◆ Port Metro Vancouver’s Fraser Docks would have a capacity of 8 mmta, according to the project’s website, <http://www.fsd.bc.ca/company/community.htm#details>.
- ◆ The Neptune Terminal expansion would increase the site’s capacity by 6 mmta according to the terminal’s website, <http://www.neptuneterminals.com/explore-our-terminal/terminal->

[improvements/faq/](#).

- ◆ Compliance Coal's Raven Underground Coal Project is estimated to have an export capacity of up to 1.1 mmta according to the project's website, <http://www.theravenproject.ca/qa/>.
- ◆ The Ridley Terminal expansion would increase the site's capacity by 13 mmta according to the terminal's 2011 Annual Report, [http://www.rti.ca/sites/default/files/annualreport/Ridley\\_2011AR\\_English\\_V4.pdf](http://www.rti.ca/sites/default/files/annualreport/Ridley_2011AR_English_V4.pdf).

## Oil

Oil pipeline volumes are commonly reported in barrels per day (bpd).

- ◆ Enbridge's Northern Gateway pipeline would have an initial capacity of 525,000 bpd according to the project website: <http://www.northerngateway.ca/project-details/project-at-a-glance>. Sightline excludes Enbridge's condensate pipeline, which would be built parallel to the oil pipeline and would be capable of moving 193,000 bpd east to provide diluent material for the west-bound bitumen. Note that the US State Department says the Northern Gateway oil pipeline is "easily expandable" to 800,000 barrels per day, but that expansion does not appear to be part of the current official proposal; see page 18: <http://keystonepipeline-xl.state.gov/documents/organization/182421.pdf>.
- ◆ Kinder Morgan's expanded Trans Mountain Pipeline would be capable of moving 590,000 bpd in addition to the existing Trans Mountain Pipeline's rated capacity of 300,000 bpd, according to Kinder Morgan's project documents; see p. 10: <http://www.transmountain.com/uploads/papers/1362702106-13-01-22-information-guide.pdf>.
- ◆ Kinder Morgan's Northern Leg Pipeline would, technically, be considered a further expansion of the Trans Mountain Pipeline system; it would have a capacity of 400,000 bpd according to the US State Department, <http://keystonepipeline-xl.state.gov/documents/organization/182421.pdf>. Analysts consider the Northern Leg pipeline a longer term project, but it is not exclusive with the main Trans Mountain expansion and Kinder Morgan markets the project to investors as an addition, [http://www.kindermorgan.com/investor/presentations/2010\\_Analysts\\_Conf\\_05\\_KM\\_Canada.pdf](http://www.kindermorgan.com/investor/presentations/2010_Analysts_Conf_05_KM_Canada.pdf).

## Natural Gas

Natural gas volumes are commonly reported either in billion cubic feet per day (bcfd) of natural gas or, for liquefied natural gas, in million tons per year. For consistency, Sightline converted the latter measure to bcfd using a standard conversion formula; see <http://www.bp.com/conversionfactors.jsp>.

- ◆ TransCanada's Coastal GasLink pipeline would have a capacity of 1.7 bcfd, and may expand in the future; see <http://www.coastalgaslink.com/category/about/the-project/>. The Vancouver Sun has said the pipeline's capacity has the "potential to double in size," <http://www.vancouversun.com/business/resources/major+energy+export+projects/7906825/story.html>.

- ◆ The Apache/Chevron Pacific Trail Pipeline would carry 1.0 bcf/d; see [http://www.kitimatlngfacility.com/Supply/pacific\\_trail\\_pipelines.asp](http://www.kitimatlngfacility.com/Supply/pacific_trail_pipelines.asp). Note that the Vancouver Sun has reported that the pipeline will have a capacity of 1.4 bcf/d; see <http://www.vancouversun.com/business/resources/major+energy+export+projects/7906825/story.html>.
- ◆ The Progress Energy/Petronas natural gas pipeline would have an initial capacity of 2.0 bcf/d according to the project website, <http://www.progressenergy.com/transcanada-selected-to-develop-6-billion-in-natural-gas-infrastructure-to-prince-rupert-british-columbia>. Note that the project proponents say they can expand the pipeline to 3.6 bcf/d, which is the figure used in some news accounts; see, e.g., <http://www.bloomberg.com/news/2013-01-09/transcanada-to-develop-5-1-billion-pipeline-to-lng-terminal.html>.
- ◆ Spectra Natural Gas pipeline would have a capacity of 4.2 bcf/d; see <http://www.spectraenergy.com/Newsroom/News-Archive/Spectra-Energy-Corp-Announces-Project-Development-Agreement-with-BG-Group-for-New-Natural-Gas-Transp>.
- ◆ Oregon LNG export proposal would be capable of moving 1.3 bcf/d according to the US Department of Energy's official NEPA review documents, <http://energy.gov/nepa/downloads/eis-0492-notice-intent-prepare-environmental-impact-statement>. The pipeline portion of this project involves both an expansion of the existing natural gas pipeline between Sumas, Washington and Woodland, Washington, as well as a new pipeline from Woodland to Warrenton, Oregon, where the natural gas would be received at a liquefied natural gas terminal.
- ◆ The Pacific Connector Pipeline proposed by Williams/Veresen US Power would have a capacity of 1.0 bcf/d; see <http://www.pacificconnectorgp.com/overview.php>.

## Section 5. Acknowledgements

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**Sightline Institute** is a not-for-profit research and communications center—a think tank—based in Seattle. Sightline's mission is to make the Northwest a global model of sustainability—strong communities, a green economy, and a healthy environment.

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