



Methanol Refining and Export on the Columbia: What You Need to Know

Columbia Riverkeeper White Paper
July, 2016

Northwest Innovation Works LLC, a new company backed by the Chinese government, wants to build the world's largest natural gas-to-methanol refinery at the Port of Kalama, Washington.

What's Proposed at the Port of Kalama?

The Kalama Methanol Refinery and Export Terminal:

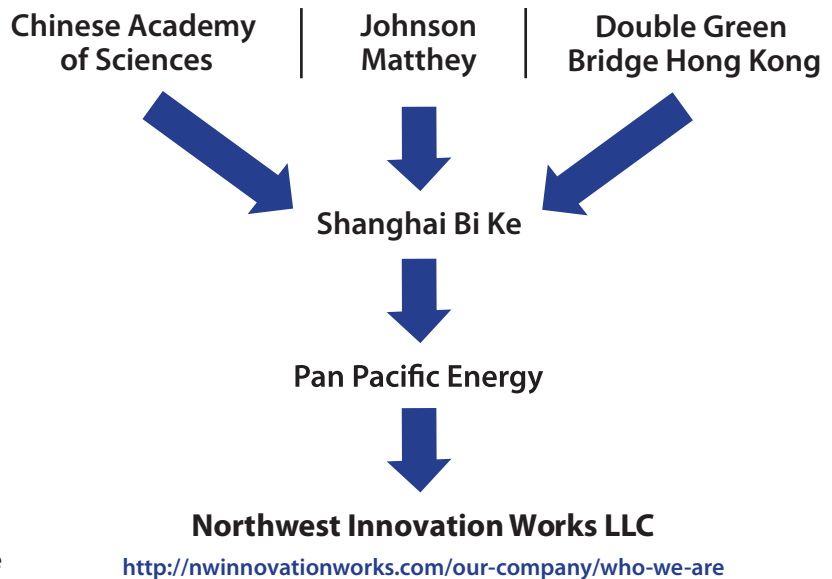
The methanol refinery would convert fracked natural gas into liquid methanol, store the liquid methanol onsite, and export the methanol to China in large tanker ships. In China, the methanol could be used to manufacture plastics or burned as fuel. But it takes more than a refinery to pull off this project:

- **Northwest Pipeline LLC**, a subsidiary of Williams Pipeline, proposes the "Kalama Lateral" natural gas pipeline to bring gas to the methanol refinery.
- The **Port of Kalama** proposes a new deep-draft dock and marine terminal facility to load liquid methanol onto oceangoing tanker ships. The Port of Kalama also leased property to Northwest Innovation Works for the refinery.
- **Cowlitz County Public Utility District No. 1** must upgrade electrical service to provide power to the refinery.

Who Owns the Kalama Methanol Refinery?

Foreign corporations and the Chinese government control Northwest Innovation Works LLC and the methanol refinery proposed at the Port of Kalama. Their plan is to take advantage of Washington's cheap natural gas, water and electricity to produce methanol for export to China.

Backers of the Kalama Methanol Refinery pitch the project as an environmentally responsible investment that would reduce global warming pollution. But the promised carbon reductions rely on a very big assumption: that the Kalama Methanol Refinery would replace coal-based forms of production. No one has supplied any evidence showing that this is true. So the Kalama refinery may simply add to global supplies of petrochemicals—and global greenhouse gas pollution—without actually replacing dirtier methanol production methods.



A Methanol Refinery at the Public's Expense.

Property rights threatened by eminent domain

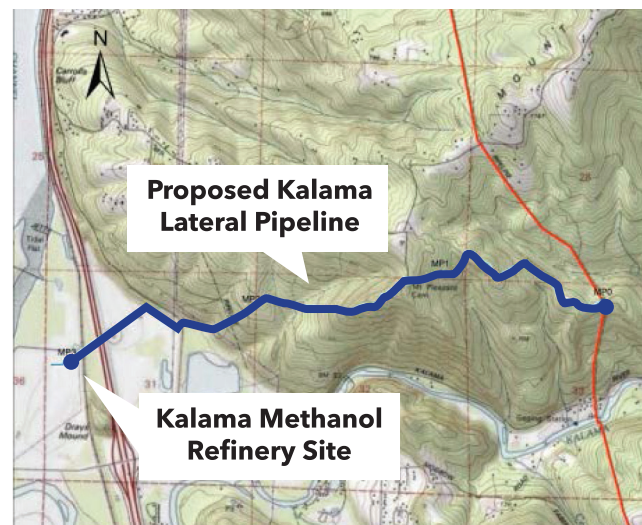
The Federal Energy Regulatory Commission ("FERC") gave Northwest Pipeline LLC, a subsidiary of Williams Pipeline, the legal right to take private and public property to build a 3.1-mile natural gas pipeline to the methanol refinery. The Cemetery District, whose property would be impacted by the pipeline, is challenging the FERC's decision.

A 24-inch natural gas pipeline poses an economic risk to property owners along the proposed pipeline route. In addition to establishing a permanent scar on their properties, landowners would be prevented from building on the 50-foot-wide pipeline easement, which could lower property values or make it more difficult for potential buyers to get certain types of loans.

Northwest Innovation Works is considering a new technology for methanol production that the company calls “Ultra Low Emissions” or “ULE.” The ULE technology was developed more than two decades ago at a small refinery in Australia—but no large-scale U.S. methanol refinery has adopted this process.¹ The major difference between ULE and conventional technology is ULE’s increased dependence on electricity from the Cowlitz County grid.

Thousands of taxpayers impacted by the proposed Kalama Lateral Pipeline

The taxpayers of Cowlitz County Cemetery District No. 6 stand to lose taxpayer-funded cemetery property to the Kalama Lateral Pipeline. The proposed pipeline cuts through Mt. Pleasant Cemetery property—a Cowlitz County pioneer cemetery with graves dating back to the 1800s. Williams would use eminent domain to take land that the cemetery district purchased to build a mausoleum. If Williams succeeds, the 3,628 cemetery district taxpayers will lose out on their investment.



Public subsidies for Northwest Innovation Works

While publicly touting all the money that Northwest Innovation Works would invest in Washington, project proponents were courting the Governor, the Port of Kalama, and the Washington legislature. One reason: public subsidies. Here’s what we know:

- The Port of Kalama is asking for at least \$11 million in federal money to build Northwest Innovation Works’ dock.²
- The Port of Kalama asked the federal government for a \$15 million low-interest loan to build the groundwater well for the methanol refinery.³
- Northwest Innovation Works executive Vee Godly asked Washington legislators for hundreds of millions in tax breaks. According to a fiscal analysis prepared for the legislature, an existing tax loophole will allow Northwest Innovation Works to avoid paying \$143 million in state and local sales tax through 2021.⁴ Northwest Innovation Works lobbied against recent efforts to close that loophole.

What are the risks of methanol refining at the Port of Kalama?

Earthquake risks

The refinery site is currently used for dredge spoil disposal. This sandy soil is at “moderate to high” risk of liquefying in an earthquake⁵, and experts estimate a 42% likelihood of a severe earthquake in the Pacific Northwest within the next 50 years.⁶ The ground under the refinery could settle more than two feet in an earthquake.⁷ Knowing this, the Port of Kalama should not allow Northwest Innovation Works to make and store toxic and explosive methanol in such a risky location.

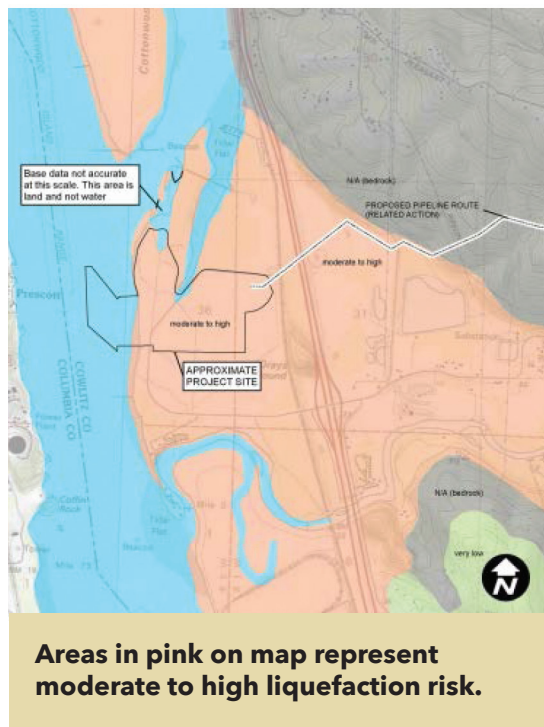
Air pollution

The methanol refinery and export terminal would result in harmful levels of small particulate matter, including diesel particulate matter, in the air near the facility.⁸ According to the American Heart Association, there is no completely safe level of exposure to diesel particulate matter. Physicians for Social Responsibility reports that inhaling small particulate matter (sometimes referred to as “PM2.5”) increases the risk of illnesses including cancer, heart and lung disorders, stroke, immune system anomalies in children, asthma, and neurodevelopmental disorders.

With the addition of the Kalama Methanol Refinery’s air pollution, levels of small particulate matter in the air near the refinery would be close to the maximum short-term exposure levels recommended by the World Health Organization.⁹ Washington also established recommended lifetime exposure levels—called Acceptable Source Impact Levels—for diesel particulate matter. Emissions from the Kalama Methanol Refinery and export terminal would be five times greater than Washington’s Acceptable Source Impact Level for diesel particulate matter.¹⁰

In addition to particulate matter, the refinery would generate the following toxic air pollutants:

Acenaphthene, Ethylbenzene, Acenaphthylene, Fluoranthene, Acetaldehyde, Fluorene, Acrolein, Formaldehyde, Ammonia, Hexane, Anthracene, Indeno(1,2,3-cd)pyrene, Arsenic, Lead, Barium, Manganese, Benz(a)anthracene, Mercury, Benzene, Methane, Benzo(a)anthracene, Methanol, Benzo(a)pyrene, 3-Methylchloranthrene, Benzo(b)fluoranthene, 2-Methylnaphthalene, Benzo(g,h,i)perylene, Molybdenum, Benzo(k)fluoranthene, Naphthalene, Beryllium, Nickel, 1,3-Butadiene, PAH, Butane, Pentane, Cadmium, Phenanthrene, Chromium, Propane, Hexavalent Chromium, Propylene, Chrysene, Propylene Oxide, Cobalt, Pyrene, Copper, Selenium, Dibenzo(a,h)anthracene, Sulfuric Acid, Dibenzo(a,h)anthracene, Toluene, Dichlorobenzene, Vanadium, Xylenes, 7,12-Dimethylbenz(a)anthracene, Zinc, Ethane.¹¹



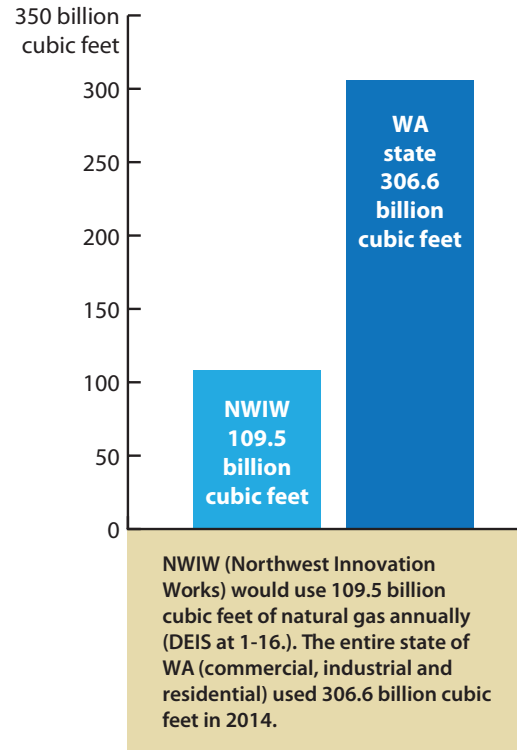
Natural gas extraction risks

The Kalama Methanol Refinery would consume North American gas extracted by fracking. Extracting gas, especially by fracking, can cause local air pollution,¹² groundwater contamination,¹³ and localized earthquakes.¹⁴ Fracking can also release significant amounts of methane—a potent greenhouse gas—into the atmosphere.¹⁵

The Kalama Methanol Refinery would use a third of the gas consumed in Washington and more electricity than all the homes in Cowlitz County. The refinery would use fracked gas from North America and water from Kalama's aquifer to increase global fossil fuel consumption. Northwest Innovation Works would ship the methanol through the Columbia River estuary to China, where it could be made into plastic or burned as fuel.

Risks of a methanol spill in the Columbia River

Large methanol spills can “deplete the surface water of oxygen required to sustain aquatic life.”¹⁶ Large spills of ethanol—which also deplete oxygen—have resulted in significant fish kills in two rivers.¹⁷ The Draft EIS assumes that a “worst case scenario” is a 300,000-gallon spill into the Columbia, but the methanol tanker ships would actually hold 14 million gallons of methanol.¹⁸ Riverkeeper called on the Port to revise the draft EIS and explain the impacts of a 14 million-gallon methanol spill in the Columbia.



<http://www.eia.gov/state/data.cfm?sid=WA#ConsumptionExpenditures>

Facts about methanol:

- Methanol is flammable and considered a hazardous substance.¹⁹
- Methanol spills and releases present inhalation risks in enclosed areas, explosion and fire risks, and potential toxicity to plants and animals near the release.²⁰
- The flash point for methanol is low: 52 to 54 °F. The flash point is lowest temperature at which a flammable liquid will give off enough flammable vapor to ignite from a spark or other ignition source. The lower the flash point, the more volatile the substance.
- Methanol burns clear. The result: fires can go undetected until someone sees heat waves or feels the extreme temperatures.²¹
- The International Code Council and the National Fire Protection Agency give methanol the same explosion classification as ethanol and hydrocarbon fuels, like gasoline and kerosene.
- Methanol has a low boiling point; at 149 °F, liquid methanol boils and turns into gas.
- Methanol vapor can ignite under a wide range of conditions. Ignition can occur if there is between 6.7–37% methanol in a mixture with oxygen. Methane, a primary compound in natural gas, has a range of just 5–15%.

Risks of a methanol explosion

The risk of an explosion at the proposed Kalama Methanol Refinery is significant. Yet Northwest Innovation Works' analysis does not come close to evaluating the complete range of risks associated with producing and storing methanol. The refinery's eight massive storage tanks would be approximately 105 feet tall and 145 feet in diameter, each with nearly one million gallons of capacity. Still, the "worst case scenario" analyzed by Northwest Innovation Works assumes a methanol release lasting just 30 minutes. The Draft EIS overlooked security risks at the methanol refinery and methanol vessels.²²

The document did not analyze the risk of a methanol vapor cloud explosion. An independent analysis conducted by the Northwest Citizen Science Initiative found that the worst-case accident at the Kalama Methanol Refinery would be a detonated vapor cloud explosion.²³ A methanol vapor cloud could result from an accident—like a plane crashing into the eight closely spaced methanol tanks—that converts liquid methanol into vapor. If such a vapor cloud ignited, the detonation could shatter glass up to six miles away. Even if a vapor cloud did not ignite, prevailing winds could carry toxic methanol vapors for dozens of miles.

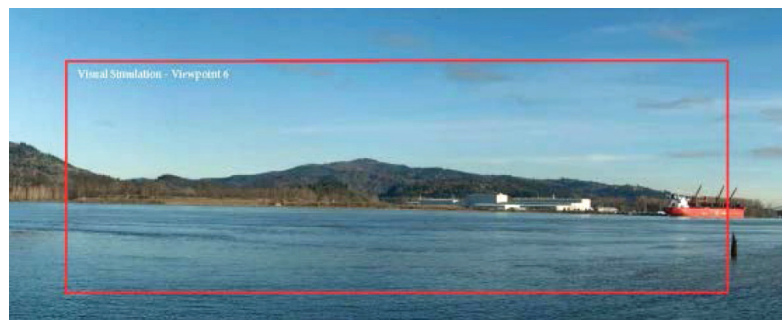
According to calculations by the Northwest Citizen Science Initiative, a Boiling Liquid Expanding Vapor Explosion ("BLEVE") could occur if seven of the eight methanol storage tanks ruptured in a magnitude 9 earthquake and the over-pressure valve of the eight tank failed. If the eighth tank was just 11.8% full, the BLEVE explosion could result in second degree burns as far away as 1.2 miles.

Visual impacts of a methanol refinery

Kalama's waterfront maintains a balance of recreation and industry. The methanol refinery threatens this balance. The refinery and terminal would dominate views of the North Port site, substantially changing the visual character of this area. For instance, the 245-foot flare stack required to dispose of flammable gases would be one of the tallest structures in the entire county, looming 100 feet taller than Kalama's iconic totem pole.

These pictures²⁴ show the visual impact of the Kalama Methanol Refinery from the Columbia:

BEFORE



AFTER



In addition to buildings and smokestacks, vapor plumes from the refinery's cooling towers could extend thousands of meters into the air.²⁵ Vapor plumes are an eyesore, and they can cause fogging and icing in nearby areas.²⁶ Depending on the technology selected, the vapor plume could at times be over 13,000 feet high and up to 2,600 feet wide.

Excessive water use

The Kalama Methanol Refinery would draw roughly 4.8 million gallons of groundwater each day from a new Ranney well near the Columbia River shoreline.²⁷ The well draw from an aquifer that is "hydrologically connected directly to the Columbia River."²⁸ The methanol refinery would consume nearly a third of the Port of Kalama's water rights.²⁹

Approximately 85% of the water used would be lost to evaporation³⁰—another 288,000 gallons per day would be discharged into the Columbia River at a temperature of 68° Fahrenheit.³¹ Salmon and steelhead do not survive well in water at or above 68° Fahrenheit, and the Washington Department of Ecology has already determined that this area of the Columbia River is too warm for native fish.

Risks of another Williams pipeline in Cowlitz County:

Williams Pipeline—the company ultimately in charge of the Kalama Lateral pipeline—has a track record of worker safety problems, environmental violations, and pipeline failures and leaks.³² In the past decade alone, Williams and its subsidiary companies have been responsible for dozens of leaks, explosions, and safety violations.³³

Cowlitz County residents are familiar with Williams' failures. The main gas line for the entire Pacific Northwest runs through Cowlitz County and is operated by Williams. The Williams Northwest pipeline exploded in Castle Rock in 1995 and again in 1997 in Kalama. Another Williams pipeline exploded two years later in the town of North Bonneville.³⁴

Williams expanded its dangerous legacy in 2014. An explosion at Williams' liquefied natural gas facility in Plymouth, Washington, injured five workers and forced hundreds of people to evacuate.³⁵

One year before the Plymouth, Washington explosion, two workers were killed and 80 injured by an explosion at a Williams plant in Louisiana. Williams was cited for six process safety violations, including one willful or knowing violation, by the U.S. Department of Labor's Occupational Safety and Health Administration.³⁶

The adage "it's not if but when" applies to accidents caused by Williams and its subsidiaries. Residents of Kelso and Kalama, especially those whose properties are threatened by eminent domain, deserve protection from Williams' dangerous pipelines.

You can protect public safety and private property

Community opposition forced Northwest Innovation Works to withdraw a methanol refinery proposal in Tacoma. Committed Tacoma residents attended port and city council meetings, wrote letters to the editors and to elected officials, and rallied to block the Tacoma methanol refinery. Southwest Washington can do the same.

How we can win:

1. Convince the Port of Kalama to withdraw its support for the methanol refinery and end the lease. In 2014, Northwest Innovation Works leased approximately 90 acres of land from the Port of Kalama to build the methanol refinery. The Port of Kalama may terminate the lease if the required permits are not issued by the end of the lease's "contingency period." The contingency period expires on October 9, 2016, but Northwest Innovation Works can extend the contingency period until October 9, 2017.

2. Convince local, state, and federal agencies to deny permits for the refinery and pipeline!

If you live near Kalama, we encourage you to attend Port of Kalama meetings. Members of the public are allowed two minutes of public testimony at the beginning of each port. Port meetings are the second and fourth Wednesday of each month at 5:30 PM at the Port of Kalama at 110 West Marine Drive. Check the Port's website (www.portofkalama.com) or call (360) 673-2325 for schedule changes. To find your other elected officials, visit www.commoncause.org/take-action/find-elected-officials/

3. Contact Jasmine@ColumbiaRiverkeeper.org or 503-929-5950 for information about upcoming meetings and community events related to methanol export.

For more information about Northwest Innovation Works and methanol refining, visit www.ColumbiaRiverkeeper.org.

Sources

- 1 <http://nwinnovationworks.com/environment>
- 2 See Cowlitz County Board of Commissioners, *Letter to Secretary Foxx in Support of Port of Kalama's TIGER 2016 Grant Application* (April 25, 2016).
- 3 See Port of Kalama, *Regular meeting minutes* (Aug. 27, 2014); see also Port of Kalama, *Special meeting minutes* (June 26, 2014).
- 4 <http://www.thenewtribune.com/news/politics-government/article62347452.html#storylink=cpy>
- 5 DEIS Figure 3-3
- 6 By the year 2060, within the lifetime of the proposed facility, the southern portion of the Cascade Subduction Zone will have exceeded 85% of recurrence intervals if no major earthquake has yet occurred. Goldfinger, Christopher et al., *Turbidite Event History—Methods and Implications for Holocene Paleoseismicity of the Cascadia Subduction Zone*, U.S. Geological Survey Professional Paper 1661-F, <http://pubs.usgs.gov/pp/pp1661f/>, (2014)
- 7 Draft EIS, p 3-8
- 8 Draft EIS, Appendix D, Table 2.
- 9 According to the DEIS, the ambient 24-hour background level of PM_{2.5} for the area is 18 ug/m³. (Appendix D, Table 2). Operations for the ULE alternative would add 5 ug/m³, bringing the total to 23 ug/m³. The EPA's standard is 35 ug/m³. (Appendix D Table 11). The World Health Organization's guideline is 25 ug/m³. <http://www.who.int/mediacentre/factsheets/fs313/en/#>
- 10 Draft EIS, Appendix D, p. 12 and Table 13.
- 11 Draft EIS, Appendix D, Table 12.
- 12 <https://www.nrdc.org/sites/default/files/fracking-air-pollution-IB.pdf>
- 13 U.S. Environmental Protection Agency, *Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources* (External Review Draft) (2015) (https://www.epa.gov/sites/production/files/2015-06/documents/hf_es_erd_jun2015.pdf).
- 14 <http://www.cbc.ca/news/canada/british-columbia/more-than-90-of-larger-earthquakes-in-western-canada-triggered-by-fracking-1.3510812>
- 15 <https://www.nrdc.org/sites/default/files/fracking-air-pollution-IB.pdf>
- 16 Draft EIS, Appendix G2, p. 8.
- 17 Massachusetts Department of Environmental Protection, *Large Volume Ethanol Spills—Environmental Impacts and Response Options*, p. 4-9 (2011).
- 18 Draft EIS, p. 8-14.
- 19 [www.methanol.org/getattachment/b327897d.../NorthAm_SDS_English-\(1\).pdf.aspx](http://www.methanol.org/getattachment/b327897d.../NorthAm_SDS_English-(1).pdf.aspx)
- 20 Draft EIS, p. 8-9.
- 21 https://en.wikipedia.org/wiki/1981_Indianapolis_500
- 22 Draft EIS, Appendix G, p. 3.
- 23 Northwest Citizen Science Initiative, *Comments on Kalama Manufacturing Facility Draft Environmental Impact Statement*.
- 24 Draft EIS, p. 10-49, Figure 10-14A.
- 25 Draft EIS, Appendix D, pp. 52-53.
- 26 Draft EIS, p. 4-14.
- 27 *Draft EIS*, pp. 2-23, 5-20.
- 28 *Draft EIS*, p. 5-8.
- 29 *Draft EIS*, p. 5-8.
- 30 Draft EIS, p. 5-20.
- 31 Draft EIS, pp. 5-20, 5-21.
- 32 <http://klamathriver.org/wp-content/uploads/2016/05/NO-LNG-KLAMATH-story.pdf>
- 33 <http://klamathriver.org/wp-content/uploads/2016/05/NO-LNG-KLAMATH-story.pdf>
- 34 <http://www.columbian.com/news/2014/mar/31/natural-gas-explosion-reported-in-benton-county/>
- 35 <http://www.sightline.org/2016/02/08/how-industry-and-regulators-kept-public-in-the-dark-after-2014-lng-explosion-in-washington/>
- 36 https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=NEWS_RELEASES&p_id=25230