NorthernStar Natural Gas
Bradwood Landing

*May 27, 2008*

# Oregon Department of Energy Report Rebuttal

**Summary**

1. Oregon will need increased supplies of natural gas to meet the state's energy needs.
   **CORRECT**

2. Natural gas from the Rocky Mountains will be available to meet that increased demand via currently proposed pipelines.
   **INCORRECT**

3. The proposed pipelines in the Rocky Mountains are more likely to provide less expensive natural gas.
   **INCORRECT**

4. The proposed pipelines in the Rocky Mountains are more likely to produce significantly reduced carbon dioxide emissions than the three liquefied natural gas (LNG) facilities proposed in Oregon. **INCORRECT**

5. Other concerns regarding the ODOE report.

1. **Oregon will need increased supplies of natural gas to meet the state's energy needs. CORRECT**
    a. Numerous independent studies conclude that the demand for natural gas in the Pacific Northwest is forecast to increase. Meanwhile traditional gas supplies from Canada, which provide nearly two-thirds of Oregon's current gas needs, are projected to decline. At the same time, Oregon is facing increased competition from higher-priced eastern states for Rockies gas.

    b. There will always be gas. However, the question is, at what price? Without access to additional supplies, the price of natural gas will continue to increase. In fact, according to NW Natural, the wholesale price for natural gas in the Northwest has increased 300 percent since 2000.[1]

2. **Natural gas from the Rocky Mountains will be available to meet that increased demand via the proposed pipelines. INCORRECT**
    a. While there are several pipelines proposed to be constructed from the Rockies, most of these projects actually compete with one another, and most are designed to serve the California market. It is unlikely that all would be constructed. Regardless, much of the Rockies's gas will go east where suppliers can realize higher prices. The Rockies Express pipeline which now carries gas east to the Midwest (with a further expansion to New Jersey under construction) is evidence that Rocky Mountain suppliers will no longer let the West Coast (previously their only outlet for gas) determine their pricing.

    b. There is no guarantee that any domestic gas pipelines will be constructed in a time frame to meet the region's growing demand. To rely on that assumption places consumers at significant financial risk. As evidence of this uncertainty, new market developments since the release of the ODOE report have called into question the very viability of some projects. Consider:

        i. **Ruby Pipeline** – On May 6, PG&E Corporation withdrew as an equity participant in the Ruby pipeline, citing rapidly escalating construction cost estimates for the project. Intervenors at the California PUC proceeding have suggested that that the total pipeline costs have been underestimated by as much as $1 billion. Additionally, the price differential – or potential savings – between the gas trading hubs at Malin, Oregon and Opal, Wyoming have disappeared since the opening of phase one of the Rockies Express in January. On May 12, Natural Gas Intelligence's Daily Gas Price Index reported that project developer El Paso CEO Jim Yardley remained "'Optimistic" on the Ruby Pipeline but "Not Committed Yet."

        ii. **Bronco Pipeline** – A direct competitor to Ruby, this $3 billion pipeline is also proposed to transport 1billion cubic feet per day (Bcfd) to the California/Oregon border at Malin. The open season closed February 8. Since that time, there has been no public announcement whether the project's sponsors received enough interest to continue forward. In contrast, the Bradwood Landing LNG terminal would provide 1.3 Bcfd for $650 million and negligible pipeline transportation costs compared to Ruby, Bronco or Sunstone.

[1] *Until renewables develop, Oregon needs gas supplies*, Gregg Kantor, NW Natural, *The Oregonian*, April 27, 2008, pg. E2.

iii. **Sunstone Pipeline** – This project, an alternative outlet for Rockies producers to the Ruby or Bronco pipelines, could deliver 1.2 Bcfd of natural gas to Stansfield, Oregon, at which point it could provide gas to California through GTN/TransCanada's existing pipeline from Stansfield to Malin. However, it would provide no pipeline supply diversity for customers in Portland or Southwest Washington unless an additional pipeline is constructed running west along the Columbia River Gorge.

c. There are multiple competing projects to take gas away from the Rockies to higher priced eastern U.S. markets:

i. **Cheyenne Plains Gas Pipeline** – This pipeline, completed in 2005 transports up to 0.73 Bcfd of natural gas from the Rocky Mountains to Midwest markets.

ii. **Rockies Express Pipeline** – Beginning in 2009, this project will move 1.8 Bcfd from the Rockies to eastern U.S. markets. There are already plans announced to expand this capacity. Rockies Express (phase one) was commissioned in January and within 30 days of operation had reached 1 Bcfd – well above expectations. With this interest, Pathfinder, Rockies Alliance and Rockies Express expansion will be pushing their proposals forward. Assuming east coast markets are satisfied, then and only then, will a west bound line be economical.

iii. **Pathfinder Pipeline** – On May 12, a new pipeline was announced by TransCanada/GTN to move 1.2 Bcfd of natural gas from Colorado to the upper Midwest and east coast markets.

iv. **Other** – Numerous smaller projects have been proposed downstream to enhance distribution of new deliveries of Rockies gas in the Northeast U.S. For example, Spectra Energy has signed precedent agreements with shippers on its Northern Bridge project, a proposed expansion of its Texas Eastern Transmission system to deliver Rocky Mountain natural gas to Northeast markets in the Mid-Atlantic and New England states seeking new sources of supply.

d. The report suggests that the market will ultimately determine which of the domestic gas pipelines will be constructed, yet it offers no comparative analysis of market, price or cost data to support which, if any, should be constructed.

**3. The proposed pipelines in the Rocky Mountains are more likely to provide less expensive natural gas. INCORRECT**

a. The report's premise that gas from the Rockies would be less expensive is fundamentally flawed. The wholesale market for the price of natural gas is unregulated and set by the market. It is a function of supply and demand. It is not based on adding up the cost of production and transportation.

b. U.S. domestic gas producers are not interested in serving the Pacific Northwest gas market at a lower cost for a lower profit. Like all for-profit businesses, Rockies producers are primarily interested in access to the highest-priced markets to sell their product, and maximizing their net back, i.e., the selling price minus the total cost to deliver gas to market. Until recently, producers had limited ability to get to market due to pipeline constraints.

c. The report confuses the price at which gas is sold with the cost at which gas is produced. Although the price at which LNG is sold in other parts of the world may be higher, LNG is a "price-taker," meaning it only receives the prices established based on the supply and demand in the United States. No one will pay higher prices for imported LNG. The price in the local market is set in the local market. Whatever the cost of producing and shipping LNG the supplier will have to sell at local prices. For example, the cost to land LNG to the west coast is estimated at $4.50 per million British Thermal Units (MMBTUs), whereas the price of domestic gas today is nearly triple that at $11 per million BTUs. Additional supply options will help keep prices down.

d. LNG has been one of the fastest-growing energy markets in the United States. In 2001, 240 billion cubic feet (bcf) of LNG were imported. Six years later, in 2007, 240 bcf of LNG was imported in just the first four months of the year. During the winter of 2007/08 imports of LNG into the US dropped considerably due to competition from Asia and Europe. Market forces prevailed – the price offered by these competing countries was higher than US prices.

e. The recent decline in LNG imports in August 2007 coincided with a price surge of more than 93 percent in natural gas here in North America. The U.S. isn't dependent upon LNG imports for natural gas, but natural gas prices are related to the amount of LNG imports. Historically, LNG imports in the U.S. have filled the gap between available supply and demand, thereby reducing upward price pressure.

f. As stated previously, Rockies gas has historically bid into the market at a lower price because coal seam methane gas must be produced no matter what the demand. If the U.S. West Coast demand dropped, then "must flow" Rockies gas had to accept a lower price. In other words Rockies gas was trapped due to insufficient alternate pipeline takeaway capacity. With the opening of the first phase of the Rockies Express pipeline in 2008, 1 Bcfd is flowing east. In 2009 1.8 Bcfd will flow east to higher-priced eastern markets. As a result West Coast pricing will have to compete with eastern states pricing to attract Rockies gas.

g. With adequate liquefaction capacity, long term contracts for LNG have been negotiated for far less than domestic U.S. natural gas prices. For example:

    i. In 2002, China negotiated a long term contract for LNG from Australia. The contract was indexed to the price of oil. Even considering the contract's terms and today's price of oil, China is only paying the equivalent of $3.15/MMBtu for LNG.

    ii. Also in 2002, China negotiated a similar long term contract for LNG from Indonesia for which they pay today the equivalent of $3.65/MMBtu. This contract is also indexed to the price of oil.

h. In fact, global liquefaction capacity is forecasted to nearly double between 2007 and 2014. A significant percentage of the increase in world supply of LNG will come from the Pacific Rim and could be delivered to Bradwood Landing. At the end of 2007, there was 24.11 Bcfd of global LNG capacity. By the end of 2014, close to when the Bradwood terminal would be in operation, it is projected to be 43.00 Bcfd. Further supporting graphs and data are provided at the end of this document.

4. **The proposed pipelines in the Rocky Mountains are more likely to produce significantly reduced carbon dioxide emissions than the three LNG facilities proposed in Oregon. INCORRECT**
    a. The report correctly noted that lifecycle greenhouse gas emissions of LNG are slightly higher than domestic natural gas but still far below those of domestic coal using currently available technologies.

    b. As required by federal and state law, Bradwood has estimated the greenhouse gas emissions of its project for construction and operational phases including emissions from the terminal, LNG carrier vessels, tugs and security escorts. To put Bradwood's emissions in context:

        i. Bradwood Landing's total emissions from the combined annual operations of the terminal and related shipping are 355,460 tons per year.

        ii. The total greenhouse gas emissions of Multnomah County in 2004 (the latest year for which figures are readily available) were about 9.6 million tons, or about 26,300 tons per day.

        iii. The ODOE estimated that in 2004, the state emitted approximately 70 million metric tons of greenhouse gases.

        The ODOE report concludes that Oregon's ability to achieve its greenhouse gas reduction targets may be placed at risk by LNG terminals. This is not supported by the evidence. To put this in context, Bradwood's greenhouse gas emissions would be less than one half of one percent of the state's total greenhouse gas emissions. One third of the state's greenhouse gas emissions are from transportation and the biggest industrial source is PGE's coal-burning power plant in Boardman.

    c. Transporting Rocky Mountain natural gas to the region will result in CO2 emissions from the construction and operations of pipelines and compressors. It does not appear that ODOE accounts for the direct and indirect emissions associated with these pipelines. For example:

        The proposed Bradwood pipeline is 38 miles long. The Ruby pipeline as proposed, is expected to include approximately 680 miles of 42-inch natural gas transmission pipeline beginning at the Opal Hub in Wyoming and terminating at a Malin, Oregon interconnect, near California's northern border. The pipeline would cross a portion of four states: Wyoming, Utah, Nevada and Oregon. Two compressor stations are proposed for the project: one near the Opal Hub and one expected to be near the mid-point of the project. Based on market demand, additional compressor stations could be added.

    d. If the LNG originates from a developed country, the emissions associated with LNG production and transportation are part of the country's national greenhouse gas inventory under the UNFCCC (United Nations Framework Convention on Climate Change, 1992 aka Rio Accords). These countries either already are or in the future will be subject to a greenhouse gas emissions cap and reduction obligation.

e. Some LNG originates from developing countries that lack a ready domestic market for natural gas and which do not have an emissions cap or reduction obligation under the Kyoto Protocol. If the gas is not liquefied and transported to markets, it is flared and vented to the atmosphere as CO2. On the other hand, the gas could be captured, converted to LNG and exported. Under that scenario, some of that gas will be used to provide the energy for liquefaction and transport of LNG to destination markets. However, there will be an environmental benefit if useful energy is produced from gas for which the alternative use is flaring. That is because it will offset the use of another energy source and its environmental impacts. CO2 emissions are a global, not local concern.

f. The ODOE report makes several references to a discredited Carnegie Mellon University (CMU) study examining lifecycle greenhouse gas emissions. The CMU study has been widely criticized by experts for relying on yet-to-be developed carbon capture technologies that they say will not be feasible for 20 years. At the same time, the authors of the study conveniently did not consider existing advancements in LNG technologies that improve energy efficiency and reduce greenhouse gas emissions, such as modernized fuel efficient ships and more environmentally-friendly LNG liquefaction plant designs.

   The CMU study has been criticized for not following standard procedures regarding life-cycle assessments as well as its lack of transparency. The criticism to this CMU report has been unusually strong. On February 26, CRA International issued comprehensive rebuttal to CMU's study. Their rebuttal said:

   ***"The CMU report's authors display a complete lack of understanding of the environmental performance of gasification technologies. There appears to have been no attempt to gather current, credible information from industry sources, either through direct contact or available papers. The CMU Report is so seriously flawed that none of its findings or conclusions regarding gasification merit serious consideration in any public policy discourse on the topic.***

   *"The Gasification Technologies Council (GTC)[1] took serious objection to the findings concerning gasification technologies within the Carnegie Mellon University researchers' report entitled "Comparative Life-Cycle Air Emissions of Coal, Domestic Natural Gas, LNG, and SNG for Electricity Generation" (CMU Report) and retained CRA International, Inc. (CRA) to review the assumptions, data, and methods used. The GTC was concerned that the CMU researchers' use of outdated and averaged performance and emissions data and erroneous technology assumptions resulted in a misrepresentation of the emissions profiles of current gasification technologies. As a result, decision-makers relying on the CMU Report may be misled and might oppose or delay gasification projects that could otherwise lower energy prices, improve the environmental performance of coal-based energy, and help to improve the Nation's energy security. The GTC determined that a detailed analysis by CRA was necessary as the CMU Report already has been referenced by interest groups opposed to the siting of coal plants[2] and by environmental news journals.[3]*

*"CRA's analysis found that the CMU Report contained a number of serious methodological errors in its life cycle assessment (LCA) approach and incorrect assumptions with respect to gasification technologies. In particular, the CMU Report researchers failed to adequately represent life cycle emissions, used outdated technology assumptions and data, failed to consider other major pollutants, and did not provide adequate data needed to replicate their results. This Rebuttal Report describes theses errors and demonstrates how the CMU Report's findings would change when correct assumptions regarding gasification technologies are used. In light of these significant errors, the CMU Report is an invalid source for comparing life cycle environmental performance of gasification-based technologies."*

[1] The GTC is the leading gasification trade association, and its members represent the entire range of the gasification value chain – fuel production and processing, plant engineering, procurement, and construction, gasification technologies and services, and final customers/owners of gasification plants. This membership has extensive industrial experience on the latest gasification technologies.

[2] Toquop Energy, LLC. "Tuquop Energy's Comments on the Petition by Western Resource Advocates," Prepared for the Nevada State Environmental Commission. August 31, 2007

[3] "Battle Brews Over Lifecycle

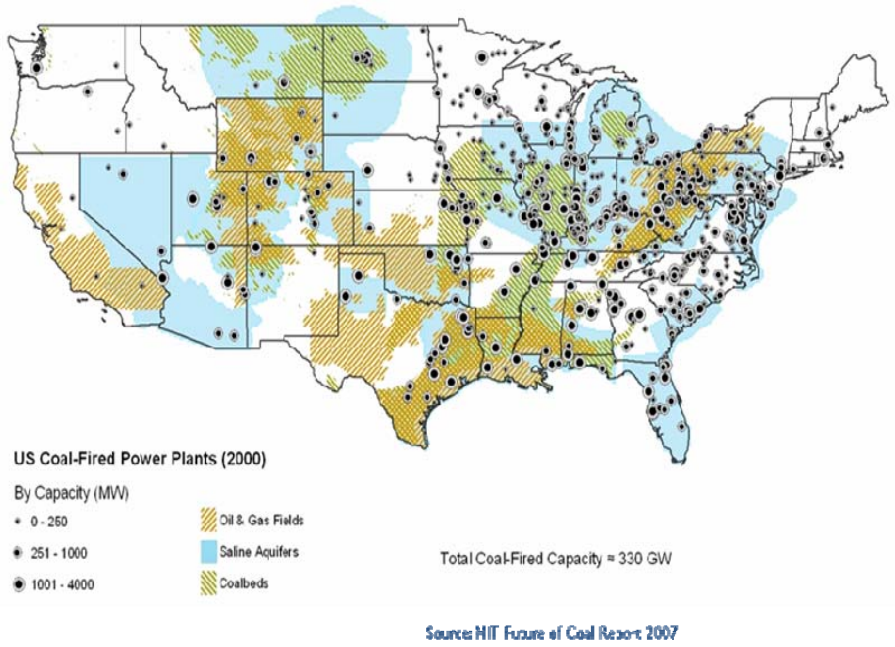
g. The ODOE report states that Carbon Capture and Sequestration (CCS) will be technologically and economically feasible in the next 20 years. There is insufficient data to support this conclusion:

   i. In May, Greenpeace issued a peer-reviewed report that calls into question both ODOE's conclusions regarding CCS technical feasibility and cost-effectiveness. The Greenpeace report, *False Hope: Why carbon capture and storage won't save the climate* (http://www.greenpeace.org/australia/admin/image-library2/false-hope-why-carbon-capture), was based on peer-reviewed independent scientific research and shows that the earliest possibility for deployment of CCS at utility scale is not expected before 2030 and the technology uses between 10 and 40 percent of the energy produced by a power station; therefore wide scale adoption of CCS is expected to erase the efficiency gains of the last 50 years, and increase resource consumption by one third.

   ii. The Electric Power Research Institute, the Coal Utilization Research Council, and the U.S. Dept. of Energy have all stated that they believe CCS will not be commercially available until the mid-to-late 2020s.

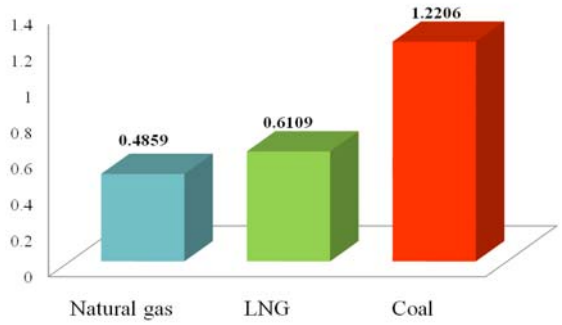
h. Further, if and when CCS is available as a technology option, the Pacific Northwest lacks access to CO2 storage sites (see map of U.S. sites at top of next page). The use of CCS in the region will require a pipeline system of hundreds to a thousand miles to transport the CO2 to suitable geologic storage sites. CO2 pipelines will require their own siting process and will generate CO2 emissions as a result of pipeline compressor operations. These pipelines will raise the same permitting, siting and landowner issues associated with any pipeline project.

## Map Comparing Location of Existing Coal-Fired Power Plants In the U.S. with Potential Sequestration Sites




i. For a more realistic comparison of the lifecycle greenhouse gas emissions of LNG vs. domestic natural gas vs. domestic coal, PACE Global Energy Services performed an analysis of these three options based on the following assumptions: LNG imported to Oregon, natural gas piped into Oregon from Wyoming, and coal mined in Montana and then shipped by rail to coal-burning power plants in Oregon, Wyoming and Montana that currently supply electricity to Oregon. This real world analysis showed that LNG has slightly more lifecycle greenhouse gas emissions than U.S. natural gas, but still less than half the emissions of domestic coal. Considering that Oregon receives 41 percent of its electricity from coal-burning power plants, a greater use of natural gas would immediately reduce greenhouse gas emissions. In addition, unlike coal, there are no mercury or sulfur emissions associated with burning natural gas.

**Total greenhouse gas emissions summary (CO2 per MegaWatt hour)**




*Source: Comparative Life-Cycle Analysis of GHG Emissions from Select Hyrdocarbon Fuels,* PACE Global Energy Services, May 2007.

## 5. Other concerns regarding the ODOE report

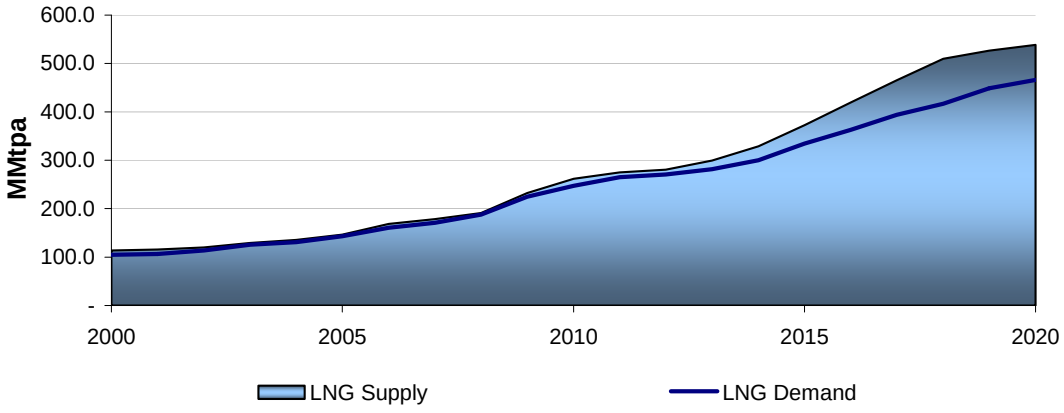
The ODOE report represents a snapshot in time and is not a forecast of future market conditions. Accordingly, there are limits to the types of conclusions that can be drawn from such an analysis. Consider:

- The report fails to quantify or qualify the magnitude of potential pipeline transportation savings from an LNG terminal in Oregon. In recent data modeling submitted as testimony to the Oregon Public Utility Commission, NW Natural concludes that access to an LNG terminal could provide up to hundreds of millions of dollars in present value savings to customers in the Pacific Northwest, providing rate relief to more than 60 percent of all Oregonians. The savings would occur because NW Natural would no longer be dependent upon only the Williams pipeline for gas supply from Canada and the Rockies. If a Columbia River LNG terminal is operational, NW Natural could access gas that would not include the transportation fee of bringing it hundreds of miles from Canada. This savings estimate did not consider any additional savings from a reduction in price that competition would bring to the market.

- The report does not acknowledge that global liquefaction capacity is forecasted to nearly double between 2007 and 2014 and that a significant percentage of the increase in world supply of LNG will come from the Pacific Rim and could be delivered to Bradwood Landing. At the end of 2007, there was 24.11 Bcfd of global LNG capacity. By the end of 2014, close to when the Bradwood terminal would be in operation, it is projected to be 43.00 Bcfd.

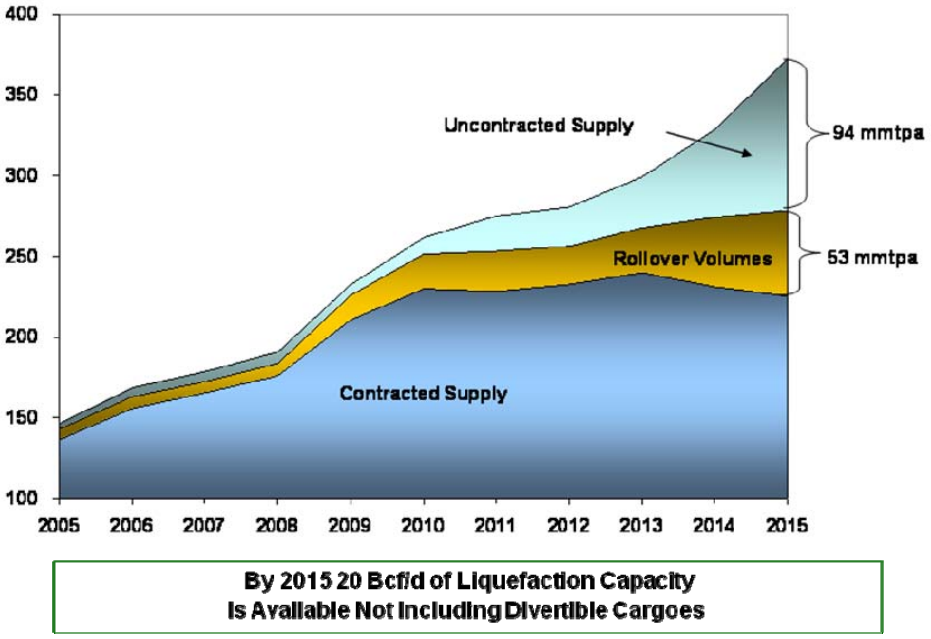
  The following graphs illustrate how global LNG supply and demand will soon exceed balance and result in excess supply.

***Global LNG Supply & Demand Balance***



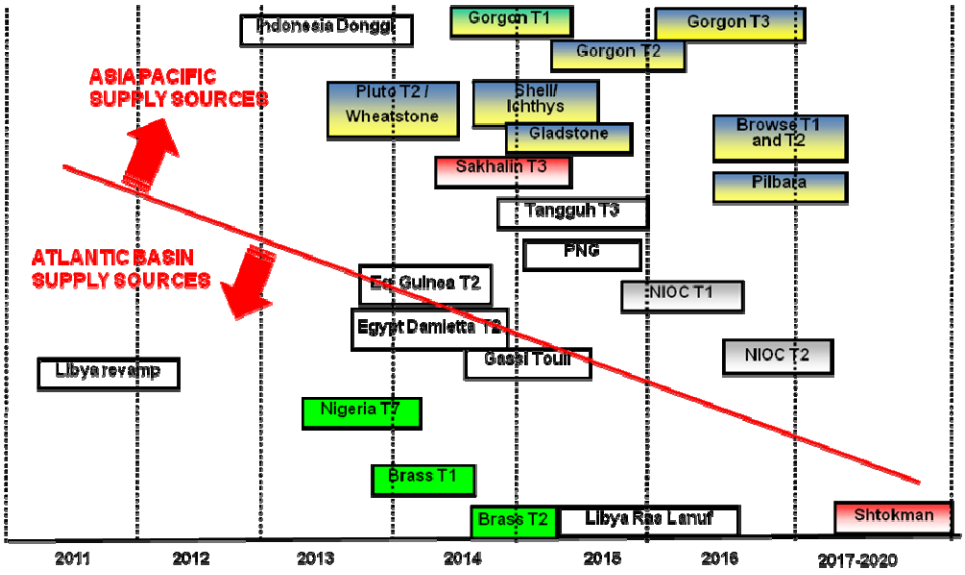

*Source: Wood Mackenzie 2008*

***There will be a significant amount of available ("uncontracted") supply***



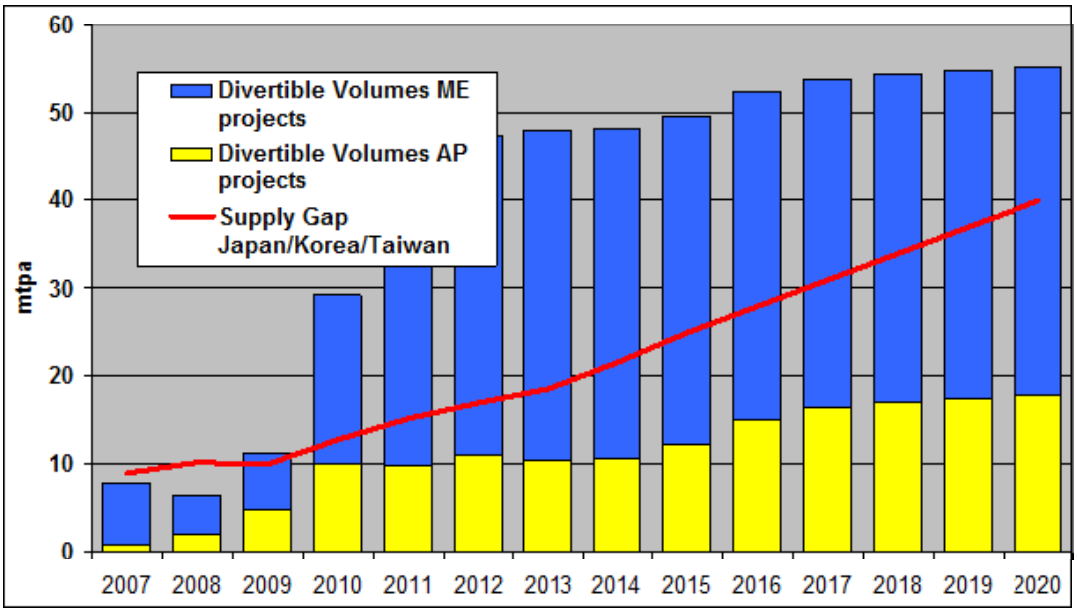

*Source: Wood Mackenzie 2008*

***There are many new liquefaction projects in development***




*Source: LNG Worldwide 2008*

***The Asian LNG demand gap is capable of being supplied by the LNG volumes in service or under construction from Asia Pacific and Middle East sources***




*Middle East supply is equidistant from the U.S. West Coast and the U.S. Gulf Coast and is considered both an Atlantic Basin and Pacific Basin supply source. It is the swing supply for both markets. The blue boxes only reflect Middle East supply under construction or in operation targeted to Atlantic Basin markets and capable of diversion to Asia. In the near term, prices in Asia exceed prices in the U.S., Europe China and India so they will secure the supply. As the graph above shows, existing divertible supply will more than exceed the expected demand/supply gap from 2010 forward, so prices in Asia will moderate and come in line with Europe and U.S. prices. As Asia's demand is met by existing and under construction Middle East and Asia supply, the new Asia supply coming on line will move to the U.S. to meet U.S. demand (as Asia's demand is largely satisfied). Without a terminal in Oregon, Oregon and the Pacific Northwest would not be able to take advantage of these new supplies of natural gas that will be available.*

- The report incorrectly concludes that the Northwest Pipeline Corporation (NWP) pipeline (sometimes referred to by the name of its parent company "Williams") was not capable of handling the gas from an LNG terminal such as Bradwood Landing and would instead require any terminal to be coupled to a new pipeline feeding into TransCanada's Northwest (GTN) pipeline. This conclusion fails to consider how natural gas markets and pipelines operate physically and financially, as well as the specifics of the Bradwood project pipeline design.

  Williams is an interstate natural gas company subject to the Natural Gas Act. Williams owns and operates an interstate natural gas transmission system to provide open-access transportation services for both on-system and off-system customers in the states of Washington, Oregon, Idaho, Nevada, Utah, Wyoming, Colorado and New Mexico.

  Under FERC rules, Williams is required to allow Bradwood Landing interconnection to and use of capacity on its interstate pipeline system, like any other customer according to Williams' published tariff. These requirements explain why in previous comments filed

with FERC, Williams has, in fact, stated its willingness to accommodate an interconnection with the proposed Bradwood Landing Pipeline.

Specifically, Williams' statement that their existing pipeline capacity is currently fully contracted on a long-term firm basis – while technically accurate – does NOT preclude shipment of gas by Bradwood. There are a number of reasons for this.

- It is well documented that there is excess capacity on the Williams pipeline to enable Bradwood's gas to flow (see: State of Washington report, *Review of Pipeline Utility Corridor Capacity and Distribution for Petroleum Fuels, Natural Gas and Biofuels in Southwest Washington*, November 16, 2007).
- The Northwest line is fed from the north, south and the middle. To say that a pipeline is fully subscribed ignores the many ways for gas consumers who own capacity on the pipeline to manage it to get the lowest price.
- Bradwood will install interconnects along its proposed 38 mile pipeline to directly serve NW Natural gas company, Portland General Electric and Georgia-Pacific, all existing customers currently served by Williams. These interconnects have been included in our application before Clatsop County and FERC.
- There is a secondary market for pipeline capacity. This means that even though Williams itself might not sell capacity Williams' current transportation customers can make their capacity available to Bradwood (through a process designed by FERC to encourage efficient use of capacity and discourage anticompetitive hoarding).

Bradwood's design capacity is 1.0 Bcfd. With regards to current actual physical capacity available to receive gas from the Bradwood Landing Pipeline, a total of 1.5 Bcfd can be delivered as follows:

- Williams Northwest Pipeline can receive a peak of 1.2 Bcfd at the proposed interconnect, with 0.65 Bcfd flowing North, and 0.55 Bcfd flowing south.
- Wauna Mill can receive about 10 million cubic feet per day,
- The Northwest Natural Gas system can receive 0.2 Bcfd at the proposed tap location in Oregon,
- The power plant at Port Westward can receive 0.1 Bcfd.

Bradwood provides competition to serve some of Williams existing customers at a lower cost – exactly the outcome FERC intended when it established open access rules. We are confident based on our discussions with gas users, together with the FERC rules governing open access, that sufficient demand exists to move forward with the Bradwood terminal and pipeline to deliver reliable, competitively priced gas supplies into the Pacific Northwest.

- The report incorrectly concludes there would be less CO2 emissions associated with LNG cargoes delivered to Costa Azul, Mexico than to Oregon due to shorter shipping distances. In fact, compared to Baja, Mexico, Oregon is located 500 nautical miles closer in distance from a liquefaction plant on the Northwest shelf of Australia and would be more than 400 nautical miles closer in distance from a liquefaction plant in Indonesia. The report's methodology to account for the direct and indirect emissions associated with the domestic pipelines is not defined clearly. Greenhouse gases are emitted by pipelines through the burning of gas in compressors necessary to move gas over long distances, such as from the Rockies to the west. Pipeline compressors will consume between 5 and 10 percent of the gas transported.

- The report incorrectly states that the emissions from an LNG terminal operation are not considered. In fact, under Oregon Law, they are required to be. NorthernStar Natural Gas has always explicitly stated that it will comply with the Oregon CO2 mitigation program, OAR 345-024-0620.

  The Bradwood facilities are expected to provide an average of 1.0 Bcfd of natural gas from LNG. However, the Bradwood Landing project will not generate the LNG, nor is it possible to establish a nexus between global LNG production and consumption and the project. Accordingly, emissions associated with the consumption of LNG are not attributable to the project.

- There are many LNG producing countries that are signatories to the Kyoto protocol and could supply the Pacific Northwest. All CO2 emissions associated with LNG liquefaction are already accounted for under those countries' emissions inventories. To assess a CO2 penalty for upstream activities already accounted for would be double-counting and unfairly burden Oregon consumers.

- Today, Oregon obtains 41 percent of its energy from coal-fired generation. Under the Western Climate Action Initiative, long term contracts for power produced from coal are intended to be eliminated. This in itself will make the further development of gas fired power imperative as alternate forms of power (wind, solar) will only be able to make up a portion of the loss of power from coal fired stations. CCS aims to reduce the climate impact of burning fossil fuels by capturing CO2 from power station smokestacks and disposing of it underground. Its future development has been widely promoted by the coal industry as a justification for the construction of new coal-fired power plants. However, the technology is largely unproven and will not be commercially viable for many years.

###