Forecast of the Net Economic Benefits of a Proposed LNG Terminal in Coos County, Oregon

An Economic Impact Analysis Prepared for the South Coast Development Council

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ECONorthwest
ECONOMICS • FINANCE • PLANNING

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Section I

Introduction

The South Coast Development Council ("SCDC") engaged ECONorthwest to forecast the net economic benefits, which would arise in a typical year from the operations of a proposed liquefied natural gas ("LNG") terminal in Coos County and its associated Pacific Connector Gas Pipeline.

The question this white paper answers is: What would be the effect on the local economy if an LNG terminal were built in Coos County rather than in Northern California? This report addresses three key issues in answering that question:

1. Research on LNG terminals and property values is discussed beginning on page 5.

2. On page 9 is the start of a section on the economic impacts of the LNG terminal project in 2016—chosen for the analysis because it would be a typical future operating year.

3. Because an LNG terminal would change the competitiveness of Coos County, this report concludes with a review of the longer-term effects a terminal would have of the local economy (page 16).

Major Findings of This Analysis

This analysis measures the economic impacts arising from the delivery, storage, and regasification of LNG into natural gas at Coos Bay, the shipping of the natural gas through a connector pipeline, and the cost savings to Oregonians due to having the LNG terminal in Coos County instead of Northern California. Furthermore, the analysis includes research into the other effects the presence of an LNG terminal might have. The principal findings of this analysis are:

- There is no evidence that LNG facilities hurt nearby property values or deter economic development. This finding is based on reviews of academic literature and county assessors' data for two existing LNG operations in Oregon.

- The proposed LNG facility for Coos County, during 2016 (a typical operating year), will supply 292 billion cubic feet of natural gas into the market. Natural gas prices on the western side of Oregon would be less than if LNG were to be brought into a port in California. However, prices elsewhere in Oregon and on the California border are not expected to be markedly less.

- Overall, Oregonians would save $17.0 million in 2016 on their energy bills if the terminal were built in Coos County instead of California. Local businesses in the State would save $31.5 million. Savings of this magnitude will occur each year the terminal operates.

- Because of lower natural gas prices, Oregonians, especially those living in southwestern Oregon, will be better off economically and will spend much of the money they would save on utility bills on other goods and services in the local economy.

- The combination of lower utility prices and better supply stability would make businesses in Oregon more competitive. They would increase both their output and employment.

- Since natural gas is the primary source of industrial hydrogen, the availability of LNG at Coos Bay could stimulate the development of a hydrogen industry. Hydrogen is a non-polluting fuel.

- Access to LNG would make power plants fueled by natural gas more feasible and potentially stimulate the decommissioning of dams to enhance salmon habitat.

- Overall, by placing the LNG terminal in Coos County instead of California, the County's economy would be able to support 400 additional jobs with above-average wages.

- Statewide, the terminal would raise annual employment by 1,173 and, in the year 2016, total economic output would be $488 million greater.

Section II

Background

LNG Project Description

The Jordan Cove Energy Project, L. P. ("JCEP") is planning to build and operate an LNG import terminal on 170 acres of industrial land on the North Spit of Coos Bay. The land area would be sufficiently large to accommodate the terminal facility and a required exclusion zone (buffer area) around it.

The terminal would have two large containment storage tanks and a regasification facility. Regasification is the process of taking LNG and warming it up to normal outside temperatures, thus, converting it into the conventional form of natural gas familiar to homeowners. The gas would then be shipped out by pipeline to consumers in Oregon, Washington, northern California, and Nevada. A 37-megawatt ("MW") plant at the terminal would capture waste heat from the regasification and use it to make electricity.

LNG terminals are designed to supply natural gas on an uninterrupted basis to power plants, factories, and homeowners via local utilities. To do so, they must receive LNG at a competitive price, which is only possible if shipped in large quantities. Modern, efficient LNG carriers (ships) do this and each holds about 160,000 cubic meters of LNG.

The size of terminals is dictated by the size of the carriers. Storage tanks onshore must be able to hold one shipload of LNG. These tanks constitute up to half the total cost of construction of a terminal.[1] To ensure steady gas supplies and flexibility in deliveries, at least two storage tanks are typically built at import terminals.

The terminal in Coos Bay would be designed to sendout, or put into the pipeline system, one billion cubic feet ("BCF") of natural gas a day or 365 BCF a year. However, because energy demand fluctuates with the weather and seasons, it is assumed that in a normal year the terminal would average 292 BCF. To achieve that volume, the terminal would unload about 80 carriers a year.

The economies of scale of LNG tankers and import terminals are such that the proposed facility would sendout volumes that exceed local demand in Coos County. Therefore, a connector pipeline is necessary so that gas from the terminal can reach a critical mass of customers. By doing so, most of the costs of building and running the LNG project would be incurred by consumers outside the County. Without access to large end-use markets, an import terminal would be uneconomic.

[1] U.S. Department of Energy, Energy Information Administration website accessed on August 30, 2006 at http://www.eia.doe.gov/oiaf/analysispaper/global/lngindustry.html

To move 292 BCF of natural gas a year the terminal would need to be connected to the existing large natural gas pipelines that deliver Canadian gas down the west coast. For this reason, the Jordan Cove project also entails the construction of a 223-mile natural gas pipeline that would run through parts of Coos, Douglas, Jackson, and Klamath counties. It would connect to the Williams Pipeline near Myrtle Creek, which would then bring gas mostly to points north on the western half of Oregon, and to the Pacific Gas & Electric ("PG&E") Pipeline in Malin, Oregon, that moves gas south into California through the Tuscarora Pipeline into Nevada.

Natural gas consumption in Oregon has tripled from 79 BCF in 1984 to 235 BCF in 2004.[2] Besides the natural growth of the economy and expansion of gas distribution systems into more communities, natural gas use has also grown in Oregon over the last twenty years because it has been generally more economical than other forms of energy.

Natural gas has also benefited from its growing use in electric power generation. With few opportunities to expand hydroelectric power plant capacity and major gains in the efficiencies of gas-fired power plants, natural gas use in power plants has risen. Natural gas is also less polluting than other conventional fuels. Unlike coal and biomass, it is essentially free of sulfur and particulate matter[3] and has a high hydrogen-to-carbon ratio that minimizes CO_2 emissions.[4]

Industrial Displacement

This analysis considered the possibility that an LNG terminal might displace other industries. Presumably, if an LNG terminal would occupy 170-acres of industrial land on the North Spit, that property would not be able to be used by other industries and, thus, potentially cause a net loss or displacement in industrial employment.

Displacement can only happen if there is no alternative land supply. Oregon law ensures that there is. The State requires that every city have a 20-year supply of industrial lands for development. Cities may expand their urban growth boundaries or convert existing lands to industrial uses to meet that 20-year supply.

The development of an LNG terminal would not absorb all of the available industrial land in the Coos Bay area. Indeed, even after taking 170 acres for an LNG terminal, there would be 1,130 acres left on the North Spit and most could be used for new industrial developments. There are also available industrial parcels available in the nearby cities of North Bend and Coos Bay.

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[2] Energy Information Administration, U.S. Department of Energy website accessed on September 23, 2006 at http://www.eia.doe.gov/oil_gas/natural_gas/data_publications/historical_natural_gas_annual/hnga.html.

[3] Jensen, James, The Development of a Global LNG Market, 2004. Oxford Institute from Energy Studies.

[4] Todd Gabe, Jonathan Rubin, Charles Morris, and Lisa Bragg. Economic and Fiscal Impacts of a Proposed LNG Facility in Robbinston, Maine. Department of Resource Economics and Policy, University of Maine. November 2005. Page 7.

Since Oregon law would preclude any displacement of industrial development because of the LNG terminal, this analysis finds that there would not be any negative consequences to industrial employment because of the LNG terminal operations occupying 170 acres on the North Spit.

Impact on Neighboring Properties

Common in disputes over major commercial or industrial developments are claims by detractors that such projects would hurt local property values. They point to attributes they perceive as so undesirable that the market as a whole would factor them in causing real estate prices to fall—a process that economists call "capitalizing disamenities." Since the perceptions of individuals can differ from economic realities, this analysis sought good evidence whether an LNG facility would be a disamenity or not.

Published Research

There is one report by an anti-LNG group that postulates that an LNG terminal would be a disamenity and, as such, should adversely affect property values. However, the report did not offer any data in support of that belief, did not examine property values around existing LNG terminals, and indeed made only a loose comparison to earlier research on a coal-fired power plant in a residential neighborhood.[5]

Currently there are five LNG import terminals and almost 100 LNG storage facilities in the United States, so there is ample data for testing whether LNG is a disamenity.[6] However, most research on disamenities focuses on the more common sources for consideration such as toxic waste sites, landfills, airports, and social factors (poor schools, high crime rate areas, *etc.*).

Thus, a search of the economic literature for this analysis uncovered only one academic study, which sought to quantify potential disamenities associated with LNG facilities. It was a peer reviewed research paper published in the *Journal of Environmental Economics and Management* that analyzed residential property values near eleven LNG liquefied natural gas storage facilities throughout the United States.

The researchers found that there was no disamenity impact. Indeed, their analysis revealed that when adjusted for other factors, the presence of LNG storage facilities is "found to positively affect annual housing rents." They also found that the presence of LNG did not adversely affect wage rates.[7]

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[5] Yellow Wood Associates, Report on Potential Economic and Fiscal Impacts of LNG Terminals in the Whole Passamaquoddy Bay, Report for "Save Passamaquoddy Bay." June 20, 2006.

[6] Mike Hightower, *et al.*, Guidance on Risk Analysis and safety Implications of a Large Liquefied Natural Gas (LNG) Spill Over Water, Sandia National Laboratories. December 2004. Page 26.

[7] David E. Clark and Leslie A. Nieves, "An Interregional Hedonic Analysis of Noxious Facility Impacts on Local Wages and Property Values," Journal of Environmental Economics and Management. November 1994, p. 235-253.

The researchers were unsure why the data show a positive relationship between property values and proximity to LNG terminals. One possibility is that there are exclusion zones around LNG storage facilities and these open-space buffers eliminate any possible disamenity effect. The LNG storage tanks proposed for Coos Bay, for example, would occupy about three acres of a 170-acre site. The bulk of the land area would be open space.

LNG Storage in Oregon

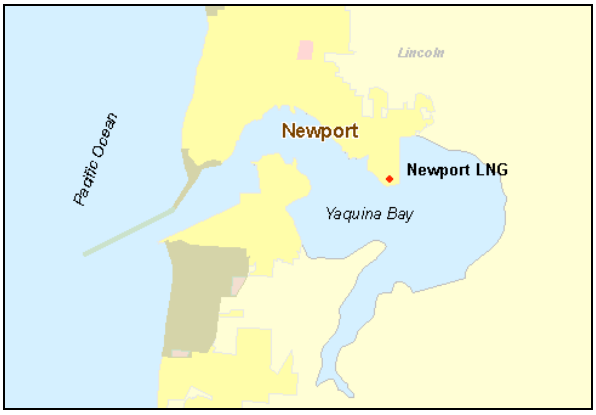
To explore whether LNG storage tanks hurt nearby property values or employment, this analysis collected data from county tax assessors on the two LNG storage facilities that have long operated in Oregon.

One is in Newport and the other is in Portland. Both are used for peak shaving—a way of storing a lot of gas for use in emergencies or when demand is extremely high. The LNG facilities in Oregon take natural gas off pipelines, liquefy it, and store it on-site. When demand surges, such as on a very cold winter night, the LNG is converted into a gaseous form and put back into the pipeline system. By doing so, utilities can assure customers of reliable supply. Although peak shaving is expensive, it is nonetheless cheaper for consumers than having to pay for setting aside pipeline capacity that would be needed only for brief peak demand periods.

Newport

The Newport LNG facility is located on a point of industrial land that juts out into Yaquina Bay. The Port of Newport owns and leases land in the area, which supports Newport's lumber, fishing, and tourism industries. The Port offers a variety of shipping terminal facilities including two berths with the capability of serving large ocean-going vessels, and over 500 berths for commercial and sport boats. The location of the LNG facility in Newport is shown on Figure 1.

Figure 1: LNG Facility in Newport Oregon



Source: ESRI US Base Map

The local utility, Northwest Natural, operates the LNG facility in Newport. It takes natural gas from a pipeline, liquefies it, and stores it in an above ground tank.

A review of data from the Lincoln County Assessor's Office indicates that property values near the LNG facility are not depressed. The area immediately around the LNG tank includes the normal exclusion zone. Nearby there are several industrial and commercial businesses. The largest is Trident Seafoods, which has a plant that processes Pacific whiting. The plant employs 120 workers seasonally.[8]

Overlooking the LNG facility and within a half mile of it are about 25 homes. They have above average market values according to the assessor's data. Consequently, the notion that the LNG facility serves as a disamenity to the surrounding residential community seems unlikely.

Portland

Northwest Natural operates an LNG facility, similar to the one in Newport, on a 40-acre site in Portland five miles from downtown. It is in the Portland Harbor industrial area, which is home to manufacturers, metalworking companies, and petroleum product facilities.

Within a half-mile radius of the site, there is a park and the Willamette River. According to data from the Multnomah County assessor,[9] there are many businesses in the area including five industrial properties on parcels exceeding six acres. They are shown in Table 1. Among them is Siltronic Corporation. It is the second largest industrial employer in Portland. Next door to the LNG facility, Siltronic manufactures silicon wafers for the semiconductor industry and employs about 970 workers.

Table 1: Five Industrial Properties Within a Half-Mile of the Portland LNG Facility

Owner	Business/Use
Siltronic Corporation	Semiconductor wafer manufacturing plant
U.S. Army Corps. Of Engineers	Willamette River dredging operations
City of Portland	Vehicle storage yard
Advanced American Construction	Marine construction company
Columbia Forge & Machining	Manufacturer of steel forgings

Source: Metro Data Resource Center. 2002a. RLIS Lite: Data for Mapping and Analysis (August 2006).

Advanced American Construction is a marine construction firm in close proximity to the LNG facility. They recently moved into the area. Columbia Forge & Machine Works is right across the river from the LNG facility, employs 17, has sales of about $1.6 million a year, and has been operating continuously at its present site since 1957.[10]

[8] Trident Seafoods website accessed October 9, 2006 at http://www.tridentseafoods.com

[9] Assessor data was accessed through: *Metro Data Resource Center. 2002a. RLIS Lite: Data for Mapping and Analysis (August 2006)*

[10] Dun & Bradstreet Market Identifiers. Accessed September 2006.

Conclusion

A search of academic literature uncovered only one paper that analyzed data on properties near LNG terminals and it found no negative consequences.

An examination of data on the two LNG storage facilities currently in Oregon found no evidence of a disamenity. In fact, there are a variety of industrial businesses located in close proximity to both. In Newport, there is very expensive housing within a half mile of the LNG storage tank. In Portland, the second largest industrial employer in the city is adjacent to an LNG storage tank property.

As a result, this analysis has no basis for considering disamenities in its assessment of the net economic impact of placing an LNG terminal in Coos County. Indeed, for some industries, the presence of an LNG terminal could be a positive amenity by supplying large and steady amounts of natural gas at very competitive prices. It may well attract more employment to the region. This dynamic impact is explored in a section beginning on page 16, although it was not included in the net impact analysis which follows.

Section III

Net Economic Impacts

The LNG project will cause increased economic activity in Coos County and much of the rest of Oregon through the spending by the project's operators and employees, but also because of lower natural gas prices if the LNG were brought into Coos Bay rather than to a port in California. To quantify these impacts an economic analysis was done, which predicts the effect of the LNG facility on economic activity in a particular year.

In this section, we first review what an economic impact analysis is and what it measures. This is followed by a discussion of the findings of the analysis.

What is a Net Impact Analysis

In simple terms, an economic impact analysis is a way of accounting for all the effects that a project, such as Jordan Cove, would have on an economy. A net impact analysis counts only the net increase in economic activity because of a project compared to what would happen if some other alternative project were built. In this report, the alternative would be to build an LNG terminal and pipeline in Northern California instead of Coos County.

There are several common measures of economic activity. The one that is important to most people is jobs. Impact studies can also measure the impacts of a project on employee compensation (wages and benefits), taxes, self-employed worker income, property income, and output, which is the value of services done and things produced in an economy. The impact analysis for this report tracked all of these.

Economic Impact Model

An impact analysis uses a computer model. It is a mathematical description of an economy, for example, the economy of Oregon, which follows how money in a given year is spent and made as it goes from the project being studied to other workers, households, and businesses in the State. It does this by taking information from the U. S. Census and other sources, and carries out the dollar flows to nearly every possible segment of the economy by tracing how money is spent and re-spent.

Impact models are specific to an economic area. Therefore, if a worker at the LNG terminal spends money on a vacation in Washington, an impact model of Oregon would not count any of that spending as affecting the Oregon economy even if some of those dollars could potentially come back to the State in some way.

Economies Measured in this Report

For this report, the economic impacts were measured for three economic areas.

Since the SCDC is most interested in Coos County, the first model used was one of Coos County.

However, the pipeline will extend through other parts of Southwestern Oregon, so a second model was developed to measure the project's impacts on a four county region of the State.

Finally, because there is interest in the project elsewhere in the state, a model that would measure the economic impacts of Jordan Cove on Oregon was also created and run.

Year Analyzed

Economic impacts are normally measured for a given year. This provides a good snapshot picture of how a project like Jordan Cove affects an economy. However, it is understood that those impacts would reoccur year after year, as the terminal continues to operate.

For this report, the impacts were measured for the year 2016. This would be about the fifth year of the terminal's operation. It is normal for large energy projects, particularly those in new markets, to take up to five years to reach a routine level of operations—a point where the rapid growth period ends and business stabilizes. That is why 2016 was chosen.

All the dollar values reported in the analysis include the effects of the inflation expected between this year, 2006, and 2016.

Types of Impacts

The analysis begins by estimating the direct impacts of a project. Direct impacts are the basic facts of a project such as the number of workers, total payroll and benefits, and output for a given year. The direct impacts are then run through the model of the economy.

The model calculates all the downstream impacts that are felt in the economy that arise from the jobs, output, and spending at the project. The results fall into one of three types of impacts, which are:

(1) Direct impacts are activities that occur primarily on-site at the location of the project. For this report, we also count the savings in natural gas prices and those direct impacts are going to be spread out throughout the region.

(2) Indirect impacts are the result of successive rounds of purchases of goods and services that start with the spending done by the project, but quickly disperse throughout the economy. The indirect impacts representing what the JCEP would spend money on, including payments to local governments and emergency service crews, were incorporated into the impact models.

(3) Induced impacts come from the increased spending of money made by workers, either directly or indirectly, because of a project.

For this analysis, only the changes in direct and some indirect impacts that would occur if the terminal were placed in Coos County instead of the alternative in California were put into the economic impact model.

Economics of the Alternative

The alternative is an LNG terminal in California. As with Jordan Cove, if an LNG terminal were built in Northern California, a new connecting pipeline would be needed to link it to the PG&E Pipeline. Because of this, the economics are similar.

Transmission costs to take gas from the Northern California coast to the PG&E Pipeline near the California-Oregon border at Malin would be about the same as the cost of getting gas to Malin from Coos Bay. Thus, this analysis assumes that only consumers in Coos, Douglas, and Jackson Counties, and other Oregon counties along the Williams Pipeline, which runs from Grants Pass north up through the Willamette Valley, would save money from having the LNG terminal in Coos Bay instead of Northern California.

Net Direct Impacts

For this analysis, the Jordan Cove project is viewed from the perspective of counting all of the activities associated with the direct handling of the LNG and resulting natural gas from the point at which the LNG tankers come into Coos Bay through to the points at which the natural gas goes onto the Williams and PG&E pipelines.

Therefore, the direct net impacts of the Jordan cove project in 2016 would be the sum of the following five sources:

1. The employment, payroll costs, and output of the LNG terminal all would count as net direct impacts because, if the project were built in California instead, none of these impacts would occur in Oregon.

2. Similarly, the employment and output of the Pacific Connector Gas Pipeline are all net direct impacts.

3. If built in Coos County instead of California, the terminal would result in lower natural gas prices in much of Oregon because Oregonians would be closer to the source of the gas. Gas utilities are regulated and pass-on such savings to residential customers. For people, lower gas bills would leave some extra money in their pockets. Some of it would be saved and some of it would probably be taxed, but much of it is going to be spent. The portion that would be spent locally is going to stimulate the economy and is counted here as a net direct impact.

4. The energy cost savings for businesses are going to make them more competitive, especially relative to companies in higher energy price states like California. As a result, Oregon businesses that see lower natural gas prices, because the terminal is in Coos County instead of further away in California, are going to be able to increase their output and, in doing so, employ more people. This is a direct impact.

5. The analysis includes the employment, payrolls, and output of vessel service activities done in Coos County for the purposes of delivering LNG to the terminal as net direct impacts. If the terminal were in California, none of this economic activity would benefit Oregon. Vessel services include pilots, dockworkers, stevedores, chandlers, and others that serve ships.

The five sources of direct impacts all feed into the impact models, which trace and sum all the indirect and induced impacts.

To illustrate the relative size of the five direct impacts, Table 2 shows the number of jobs for each in Coos County and statewide. It indicates that in Coos County, the direct employment at the terminal and for vessel service providers is particularly important, but in the rest of Oregon, the benefits of lower natural gas prices on direct jobs are more significant.

Table 2: Direct Employment Impact by Activity in Coos County and Oregon, 2016

Activity	Coos County	Oregon
Direct employment by LNG terminal company	57	68
Direct employment of those providing vessel services	26	26
Direct employment by the natural gas connector pipeline	1	4
Higher economic activity from lower gas prices for households	19	52
Higher economic activity from lower gas prices businesses	21	224
Net direct labor	124	374

Source: ECONorthwest Impact Analysis. October 2006.

In total, the direct employment impact of the JCEP in Coos County would be 124 jobs. Statewide, the net direct impact would amount to 374 additional jobs. For both, however, the indirect and induced impacts more than triple the benefits on employment.

Results of the Net Impact Analysis

Table 3 shows the net effects on jobs, output, and personal income that would arise in 2016 because of the direct, indirect, and induced impacts of the JCEP.

Table 3: Net Economic Impacts by Type, 2016

Study Area / Type of Impact	Output	Personal Income	Jobs
Coos County			
Direct	$202,143,900	$11,777,900	124
Indirect	16,711,400	11,060,200	180
Induced	8,708,700	3,450,600	96
Total	227,564,000	26,288,700	400
SW Oregon			
Direct	$375,225,000	$17,335,800	242
Indirect	28,543,900	18,138,700	298
Induced	20,223,700	7,756,400	195
Total	423,992,600	43,230,900	735
Oregon			
Direct	$395,816,200	$24,288,100	374
Indirect	53,164,200	32,113,700	475
Induced	38,915,500	15,056,000	324
Total	$487,895,900	$71,457,800	1,173

Source: ECONorthwest Impact Analysis. October 2006.

In total, Coos County would see a net increase of 400 jobs in 2016. Personal income would be about $26 million higher as a result—this includes pay, benefits, and proprietors' (self-employment) income. Output would be nearly $228 million higher in 2016 if the terminal were built in Coos County instead of California.

Southwest Oregon would capture many of the benefits from Jordan Cove because much of the savings on natural gas prices would accrue to people and businesses in that part of Oregon. Southwest Oregon would see a net gain of 735 jobs or about 63 percent of the total gain in Oregon. This region would also experience a $424 million increase in economic output in 2016.

Statewide, personal income would be over $71 million higher with the LNG terminal in Coos County instead of California. The net benefit would indirectly stimulate 475 jobs around Oregon and, through income induced means, another 324 jobs.

Net direct economic output would be $396 million. Indirect output would be $53 million higher in the State because of the project whereas the increase in economic activity induced by higher labor income would spark almost another $39 million in net output in 2016.

The direct impacts of the JCEP are high relative to the total impacts because LNG terminals and pipelines are very capital intensive—involving hundreds of millions of dollars in construction and equipment installations. Most of the spending on the project occurs during that construction phase, which causes a large burst of indirect and induced economic impacts in the economy. However, once up and running, spending on ongoing operations is comparatively lower, and the indirect and induced impacts are more modest.

Total Economic Impacts

Table 4 shows the total impacts. In Coos County, employee compensation would be almost $25 million higher in 2016 than if the LNG project were not built. Compensation includes wages, health insurance, and retirement benefits. That compensation averages $62,470 a year for the 400 workers affected by the JCEP in 2016. With inflation taken out, that would be the same as $44,878 a year in today's dollars—well above the current average wage in Coos County of $27,248.[11] One reason why the compensation would be so high is that many of the jobs connected with the LNG terminal are high skilled and high paying. Many are union jobs.

Table 4: Total Economic Impacts, 2016

Type of Impact	Coos County	SW Oregon	Rest of Oregon	Total Statewide
Output	$227,564,000	$423,992,600	$63,903,300	$487,895,900
Employee Compensation	24,988,000	39,782,100	25,709,800	65,491,900
Proprietors' Income	1,300,700	3,448,800	2,517,100	5,965,900
Other Income	3,649,600	7,160,600	9,080,900	16,241,500
Jobs	400	735	438	1,173

Source: ECONorthwest Impact Analysis. October 2006.

In the rest of Oregon, outside of the four counties, the net increase in economic output due to the terminal would be nearly $64 million in the year 2016. About $21 million of this would be attributable to the reduction in the cost of natural gas to homeowners, businesses, and local governments throughout western Oregon.

The analysis does not assume any savings in central or eastern Oregon, because getting gas to those markets from an LNG terminal in Northern California would cost as much as getting it from Coos Bay. Thus, there is no net benefit to gas utility customers. However, because of the indirect spending effects and the economic activity resulting from higher payrolls caused by the Coos Bay operation, there would be an additional $43 million in economic output statewide in 2016.

[11] Oregon Employment Department covered payroll per employee in Coos County for the first quarter of 2006 annualized.

Net Tax Impacts

The incremental taxes arising from the LNG project would exceed $43 million in 2016 alone. Much of it would come in the form of property taxes on the real estate and equipment of the terminal and pipeline. However, property taxes will also come about because the higher value of housing of workers benefiting from the induced impacts of the LNG project. So too would the properties of various industries that would increase their output because of the availability of lower cost energy in the State.

Table 5: Tax Impacts, 2016

Taxing Jurisdiction / Type of Tax	Coos County	SW Oregon	Oregon
Federal Government			
Business	$499,100	$1,141,700	$2,457,900
Personal	883,300	1,325,053	2,053,291
Social insurance taxes	3,199,300	5,864,300	9,260,900
Total Federal	$4,581,700	$8,331,053	$13,772,091
State and Local Government			
Business income, property & other	$8,674,600	$15,957,100	$26,069,800
Personal income, property & other	834,400	1,438,400	2,498,400
Social insurance taxes	540,400	1,668,000	779,700
Total State and Local	$10,049,400	$19,063,500	$29,347,900
Total All	$14,631,100	$27,394,553	$43,119,991

Source: ECONorthwest Impact Analysis. October 2006.

The boost in economic activity forecast here for 2016 would reoccur each year the terminal operates. In the long run, the economy would benefit in other ways. Most notably, having LNG would offer Coos County and Oregon an absolute competitive advantage over nearby states that lack such a stable and cost effective energy source.

Over time, the local economy will respond to this advantage and new industries will take hold. We may see not only traditional energy intensive industries expand, but alternative energy sources—most notably hydrogen manufacturing—may also become feasible. These dynamic impacts are discussed in the following section.

Section IV Long-Term Dynamic Impacts

Investments of the size and nature of the LNG terminal fundamentally alter the economic landscape allowing new employers to establish themselves that would otherwise have never considered Coos County. What had formerly been an isolated, high-energy cost county would become a better location for industries.

LNG would lower the cost of energy and assure consumers of a secure, ample supply of natural gas. The flow of ships would enhance the economic viability of the Port of Coos Bay and further improve the area's attractiveness as a business location. Together, these would expand the range of goods and services that could logically be produced in Coos County.

Economists call this effect an expansion of the production possibility frontier. Effectively, it means that the possibilities for how the economy can grow are fundamentally improved by the permanent advantage in energy costs that Coos County would enjoy because of the LNG terminal. This triggers a series of changes in the structure of the economy as new businesses emerge.

The dynamic process occurs over many years and their evolution can be carried out in innumerable directions. In this section, the dynamic impacts are discussed.

Dynamic Impacts

Dynamic impacts are the result of a stimulating business investment in an area that affects economic structural changes in that area's economy. Although often requiring years to "play out," the ultimate result is further industrial production and supportive infrastructure investments that would otherwise not have occurred.

The consequences include growth in investment, expansion of career and employment opportunities, and subsequent improvements in the standards of living. The dynamic impacts make it possible for participants to engage in an expanded range of productive wealth creating activities.

For purposes of this analysis, the proposed LNG terminal project at Coos Bay is the subject economic opportunity stimulus. That investment would include a marine docking facility for tankers, natural gas conditioning equipment, handling and storage facilities, a cogeneration power plant, and a gas pipeline for connecting the terminal to gas transmission facilities.

Topics of interest include the economic advantage offered the Coos Bay and Oregon South Coast areas by such a stimulus, and the nature and impacts of further investment and expansion that could be anticipated.

Elements of a Healthy Economy

A healthy economy has the ability and community support to foster growth. Most communities hope that they can have ample living wage jobs for their citizens and for their children to take on when they reach adulthood. Hope, however, is not enough. Certain elements in support of a healthy economy need to be in-place.

Historical Perspective

Coos Bay and the South Coast of Oregon need to look no further than the recent past to understudy the elements of a healthy economy. Until the early 1980's, the region experienced economic health through the auspices of a natural resources based economy. Logging, mill production, log exports, and healthy fisheries and agricultural industries provided for productivity, employment, and provision of public services.

Necessary elements included:

- General community support for economic growth
- Solid foundation for productive economic activity
- Diversity of activities
- Worker availability and employment participation
- Supportive education system
- Adequately funded social services

The area economy prevailed for years despite cycles of prosperity and recession. However, change was inevitable. New competitors emerged, natural resources dwindled, environmental rules intervened, and the character of the economy changed over time to reflect today's reality.

The evolving question for the past two decades has been, "how does the area re-establish its economic vitality." Tourism and retirement induced employment have been helpful albeit remain insufficient.

This is reflected in the payroll employment data that show a decline of 3,998 manufacturing jobs between 1976 and 2005. While total employment grew 5,165, much of it had been in lower paying sectors. Indeed, in 1976, the average fulltime job in Coos County paid $248 more a year than the average job paid in all of Oregon. In 2005, jobs in the County were paying an astounding $9,176 a year less than the average job in Oregon.[12]

[12] Data from the covered employment and payrolls reported by the Oregon Employment Department website as accessed on September 10, 2006 at http://www.qualityinfo.org/olmisj/CEP.

Furthermore, much of the relatively high-paying job growth was confined to the government sector. Indeed, 45 percent of the growth in Coos County between 1976 and 2005 came from government jobs—a ratio far higher than the norm (about 13 percent statewide) and unsustainable without significant private sector income growth.

Re-engaging the Economy

Coos County would benefit from a structural economic change that would facilitate high-wage job growth. The long-term answer may well be found by reestablishing in the area the key elements necessary for successful economic engagement.

Support in the community for industrial activity would have to be forthcoming. A broad-based desire to seek opportunities is fundamental. Resources, assets, and financing on which to establish new ventures are basic. A willingness to share in investment and risk is equally relevant.

The proposed LNG project at Jordon Cove offers a venture that can once again economically engage and invigorate the South Coast region.

Energy and Economies

The LNG terminal being proposed for the North Bay Marine Industrial Park at Coos Bay will set it apart from other major west coast ports. As the gateway of a natural gas based energy resource, the area will acquire the advantages and characteristics of an energy supplier region. The west coast of the U.S. is energy deficient. The LNG facility would place Coos County in a unique regional situation as the equivalent of an energy producer.

To be anticipated are investments in sectors in which energy is important. Of particular attraction are energy supplies that are both secure and offer pricing stability over the long term. The LNG facility will afford these attributes by virtue of long term contracting and capacity sizing. To operate at an efficient scale, the LNG terminal would have to handle more natural gas than the entire Oregon economy currently consumes. This would put businesses in the Coos Bay area in the enviable position of having access to more than ample supplies of natural gas at what are likely to be at or near the lowest prices on the coast.

The importance of energy cannot be understated. As a critical input of manufacturing and many other key economic sectors, having stable, low-priced natural gas would allow Coos County to become more competitive in the global market.

International & U.S. Situation With Natural Gas

Unlike petroleum, which has seen declining reserves, the global situation for natural gas is quite different. New reserves continue to be discovered and total proved reserves have more than doubled in the last 25 years.[13] World proven reserves now equal about 70 years of current consumption. Discoveries are adding to this faster than gas production is being consumed.

Proved reserves are known, measured deposits that can be brought to market using current technology and infrastructure at a competitive price. In addition to these there are less certain reserves and resources including between 3,000 to 4,500 trillion cubic feet of known gas that can be brought to the surface, but from wells that are too far from markets. When this gas is brought to the surface, it is considered "stranded," and, as such, it is either flared (burnt off on-site) or injected back into the ground.

Stranded gas is a problem in the remote locations of the more recent discoveries, the challenge being economical transport of the gas to markets. It is also an issue for many petroleum-producing counties. Throughout the Gulf Countries, natural gas is extracted as a necessary byproduct of oil production only to have to be burnt off in the atmosphere because there are no practical markets reachable by pipelines for it. The undisputed solution is use of the LNG option.

Several countries today rely on LNG for natural gas supplies. Examples include France – 32 percent, Spain – 59 percent, Taiwan – 80 percent and Japan – 96 percent. Japan has relied on LNG for natural gas supplies in excess of 35 years. LNG incorporates mature technology that continues to be improved.

Considering the energy situation in the U.S., proven natural gas reserves and production are little changed over the last 25 years. However, demand is up and imports are filling the gap. LNG currently supplies only about three percent of domestic demand. Because of the growing world reserves of natural gas, concerns over petroleum supplies, high natural gas prices domestically, and improved means of producing and transporting LNG, the situation is about to change. It is projected that by 2025, 14 percent of the U.S. natural gas needs will be supplied by LNG.

Local Situation

At the state level, Oregon has only 15 producing natural gas wells that fill just 0.2 percent of its annual consumption. Nearly all the state's natural gas comes from the Rocky Mountain Basin and Canada—places where the costs of producing natural gas have been on the rise. Indeed, natural gas prices in Oregon increased 168% between 1999 and 2004. Price swings have become more volatile, a situation destined to continue. It is apparent that actions, which bring security and stability of supply, and pricing stability, will be advantageous to the state economy. LNG could contribute a meaningful response.

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[13] From the U.S. Department of Energy report accessed on the Internet on September 10, 2006 at http://www.eia.doe.gov/oiaf/ieo/nat_gas.html.

In reviewing the energy situation in the Coos Bay area, the results of recruitment efforts over recent years attest to the importance of having available a secure, stable, and price competitive energy supply. Following is a list of industrial recruitments that had been lost by the Coos Bay area because natural gas was not available. This activity took place before its availability in January 2005. The firms are indicative of the types of manufacturers that LNG would attract:

- US Gypsum – 200 jobs – sheet rock manufacturing – went to the Port of St. Helens.
- Pohang Steel – 200 jobs – steel mill.
- BHP Steel – 200 jobs – coil mill – went to Kalama, Washington.
- Hokishen – 120 jobs – secondary wood products.
- Project Vision – 250 to 300 jobs – glass production.

These losses were significant and point to the importance of securing a viable energy future for the region.

South Coast Development

The economic opportunity presented to Coos Bay and the South Coast as an LNG host site is substantial. The availability of a secure and stable natural gas supply with pricing advantages would act as a catalyst for attracting downstream development and stimulating economic growth. The significance of such a response is not to be underestimated.

It is conceivable that the response would be immediate with companies locating near the LNG terminal. In addition to the gas resource, these players would be seeking to take advantage of the industrial land available on the North Spit and the other assets available including the deepwater port, fresh water resources, and land transportation infrastructure.

Downstream industrial and commerce development would necessitate a continuum of both private and public investments in industrial plant construction and infrastructure. Such activity could readily result in the establishment of a major west coast industrial park and the re-establishment of Coos Bay as a major seaport with modern facilities.

Indeed, with LNG tanker operations, potential ship transport of natural gas liquids products, the delivery of raw materials and shipments of manufactured product associated with sited industry, yearly shipping as a separate activity could become substantial. It is conceivable that operations could once again return to numbers approaching the 450 ships annually of years past as compared to today's 45 ships.

Some idea of the types of industry that would be attracted can be acquired by evaluating what industrial processes are reliant on natural gas, and what supportive industries might follow. The significance of supplier and secondary support enterprises can be equally important to targeted growth.

A goal of importance is the achievement of a critical mass of economic activity, fundamental to ensuring continued success. The lack of a sufficient critical mass is a significant contributor to economic initiative failure.

Industry accounts for 43 percent of domestic natural gas use including use as a feedstock for such important everyday products as fertilizers, plastics, and synthetic fabrics. As an energy resource for industry, a greater percentage entails provision of the basic requirements of heating, cooling and cooking as stages of industrial processing.

This application scenario is not unlike that of the commercial and residential sectors. In the residential sector, natural gas is applied to our fundamental needs of keeping homes warm, supplying hot water, drying clothes, and preparing foods.

From past experience, the types of industries that would be attracted to Coos Bay because of the LNG resource include wood products, metals, food processing, glass, ceramics, building products manufacturing, metal fabrication, paper, hydrogen production, and energy-intensive forms of recycling.

Many innovative options are utilized in other parts of the U.S. for both attracting new industrial investments and retaining successful operations. One example of a program that has been successfully applied in excess of ten years in the state of New York is the provision of subsidized electricity as practiced by the New York Power Authority.

The program was started in the 1990's, has been substantially effective over the period, and continues to the present time. Another example is a series of utility and transportation programs being utilized in Suffolk County, NY. Involved are gas and electric utility rate incentives for assisting business development initiatives.

Comparable programs could be derived for the South Coast using the natural gas supply as an economic incentive to encourage industrial development in the area. Such an initiative strategy would effectively turn the LNG natural gas energy resource into an economic development tool.

The net effect of a Jordan Cove LNG project and follow up industrial investment is that Coos Bay and the South Coast areas would once again have "at work" the elements of a healthy economy. Involvement, investment, and participation would prevail to the benefit of employers, employees, and area residents. A sound economic and social services foundation would be constructed for the benefit of the next generations.

The Environment and Alternative Fuels

With large surplus reserves of natural gas coming on the market and onshore at Coos Bay, opportunities to expand end-uses arise and none is as promising as alternative fuels. LNG is a source of nearly pure methane, which is a simple hydrogen rich compound that burns cleanly. As such, it is a low polluting alternative to gasoline and diesel, and is the most cost effective feedstock in commercial hydrogen production.

Air pollution is a concern locally, domestically, and at the international level. It is being driven by increasing levels of harmful pollutants in our immediate surroundings, and the accumulation of greenhouse gases in the upper atmosphere through the measured onset of global warming being made evident by the scientific community.

Vehicle Fuel

The single largest contribution to air pollution is forthcoming from transportation, principally vehicular traffic operating on gasoline and diesel fuels. It is estimated that vehicles on the road today in the U.S. account for 50 to 60 percent of carbon monoxide pollution, 30 percent of hydrocarbon pollutants that contribute to the greenhouse effect, and 31 percent of nitrogen oxide emissions, a major contributor to ozone formation.

The situation in Oregon is similar. Gasoline and diesel fuel use account for 40 percent of the state's total energy requirements. Gasoline consumption accounts for 60 percent of the total petroleum use in Oregon. The State's need to cut vehicular pollution emissions is great.

State and federal mandates call for more stringent emission standards. However, because neither gasoline- nor diesel-fueled vehicles as currently operated can meet those standards, options are being evaluated. One of the more promising alternatives is to fuel vehicles with natural gas. In fact, vehicles have been operated on a limited scale for years using both compressed natural gas ("CNG") and LNG as alternative fuels.

The reason for the interest in natural gas is overall reduced emissions. Natural gas vehicles produce, on average, 70 percent less carbon monoxide, and 80 percent fewer nitrogen oxides than traditional powered vehicles. Furthermore, since natural gas is hydrogen rich, water is its primary combustion product. Thus, natural gas vehicles generate less carbon dioxide than do gasoline or diesel ones. Additionally such harmful emissions as sulfur dioxide, volatile organic compounds, and particulate are substantially less. It is further noteworthy that natural gas operated vehicles are superior in performance to gasoline.

On an equally positive note, natural gas is cheaper. The energy content of a thousand cubic feet of natural gas equals that of about six gallons of gasoline. Thus, if natural gas were priced at $5, it would be the equivalent cost of 63 cents a gallon for gasoline. In most places the costs of compressing and delivering the natural gas plus motor fuel taxes raises the final cost to a CNG vehicle owner as much as four-fold. However, with LNG delivered into Coos Bay, the costs of delivering CNG to users would be much less.

The latest national price data, for June 2006, show that CNG cost $1.90 a gasoline gallon equivalent. Gasoline sold nationally for $2.84 then. Diesel, when adjusted for energy content (better road mileage because it contains more BTUs per gallon) cost the equivalent of $2.65. B99 biodiesel was being sold for an average energy equivalent price of $3.71. E85 ethanol was $3.43. Thus, natural gas was the least expensive.[14]

Fuel Cells

An emerging technology that would produce clean energy is the fuel cell. These devices are very energy efficient and produce electricity from hydrogen gas. They are sold commercially on a limited scale, but advances are being made to bring their costs down. Ultimately fuel cells could find widespread use in electric vehicles and in powering homes.

The key material needed in fuel cells is hydrogen gas. Hydrogen is produced commercially in a process called steam methane reforming, which uses methane from natural gas. Methane has the highest ratio of hydrogen to carbon of any hydrocarbon. Some fuel cells, such as the one operated by the City of Portland that runs off methane from a wastewater treatment plant, have small reformers that make hydrogen on-site. As with any chemical process, however, it is more efficient to produce hydrogen on a large scale. The benefits of using natural gas in large-scale plants to make hydrogen are low emissions, high energy efficiencies, and low costs.[15]

With a steady and substantial supply of low cost methane at the LNG terminal, Coos County would be a logical place to build a hydrogen plant. This would complement the State's interest. In July 2006, Governor Kulongoski expressed a strong support for moving Oregon toward a "hydrogen economy."[16]

[14] U.S. Department of Energy. Clean Cities Alternative Fuel Price Reports. June 2006.

[15] International Energy Agency—OECD, Hydrogen Production, and Storage, 2006. Page 8.

[16] State of Oregon Governor's Office. Press release. July 28, 2006.

Report Summary

Having an LNG terminal in Coos County would alleviate a major hindrance to economic growth. It would effectively create a means by which natural gas, a stranded natural resource in Asia, could be economically brought to the west coast of the United States and in doing so make Coos County the lowest cost location for LNG in the west. It could fundamentally change the County's competitiveness, especially in attracting industrial jobs.

An analysis done for the SCDC reveals that in a typical operating year (2016) the LNG terminal and its associated elements would, in net terms, stimulate an additional 1,173 jobs and $488 million in economic output for Oregon. Most of this would be felt in Coos, Douglas, Jackson, and Klamath Counties. Furthermore, these benefits would reoccur for many years into the future.

From an economic perspective, a review of economic literature and of actual property data for two LNG liquefaction facilities in Oregon, both show no negative consequences on employment or property values. Furthermore, because of the large supply of developable industrial lands in Coos County, the citing of an LNG terminal on 170-acres of the North Spit would not hinder industrial growth.

On the contrary, an LNG terminal would make the Coos Bay area a more desirable place for some industries because of its proximity of cost effective, reliable, and substantial supplies of natural gas. Such assuredness of competitive supply would set Coos County apart. The result would be long term economic benefits that would change the dynamics of the local economy and attract good paying jobs. Such dynamic impacts would be in addition to the net economic impacts forecast in this report for a typical operating year.

Finally, an LNG terminal would position Coos County as a center for alternative energy. LNG and compressed natural gas are recognized as practical, low-polluting alternative fuels under known and proven technologies. More importantly, methane, the main constituent of natural gas, is hydrogen-rich and the source from which hydrogen gas is most economically produced. If Oregon pursues a "hydrogen economy" plan, Coos County would be the most logical place to build a large-scale plant.