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December 31, 2006

SOUTHWEST OREGON ECONOMIC EXPANSION AND TRANSPORTATION TEAM
c/o Mr. Michael Baker, Planning Specialist
Region 3 Oregon Department of Transportation
3500 Stewart Parkway
Roseburg, OR 97470-1600

TRANSMITTAL OF FINAL REPORT
Transportation Investment Economic Impact Analysis

Dear Chair and Team Members:

REMI Northwest is pleased to submit this *Final Report of the Transportation Investment Economic Impact Analysis* to the Southwest Oregon Economic Expansion and Transportation Team. The purpose of this analysis is to provide the Team a tool to assess the economic performance of targeted transportation investments and private economic development projects. We believe this has been successfully accomplished through the efforts of the Team in association with REMI-Northwest.

Please feel free to contact either Jay Harland or Alec Miller at REMI Northwest should you have any questions regarding the technical results of the analysis or our office if we can provide further assistance.

Very truly yours,

REMI Northwest

Jay Harland
Consultant

JJH/cas

Final Report

Transportation Investment Economic Impact Analysis

Prepared for

Southwest Oregon Economic Expansion and Transportation Team

Prepared by

REMI Northwest

January 2007

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CONTENTS

FORWARD

Michael A. Montero, Montero Associates LLC
Co-Chair, Rogue Valley Area Commission on Transportation

In early 2006, a team was assembled by Oregon Senator JoAnne Verger and Representative Susan Morgan for the purpose of exploring conceptual investment strategies that would strategically target public transportation improvements as a means to stimulate economic activity. Early in this process, the Southwest Oregon Economic Expansion and Transportation Team recognized this effort would not reach its full potential without a process to measure the economic performance of public transportation investments.

A number of Team members familiar with economic analysis software developed by Regional Economic Models, Inc. (REMI) in Amherst, Massachusetts, suggested that REMI would provide the means to objectively measure economic performance. The Team determined that the REMI model was highly regarded nationally and internationally and elected to use it as its analysis tool. The Team also recognized that any comparative economic measurement would be most meaningful if it could be configured to integrate the expressed goals of the Team with representative transportation projects it identified.

Once the goals had been agreed upon, the Team set about to construct an economic measurement tool that would incorporate ODOT policies, already established transportation planning entities and protocols. To this end, project data would need to be identified and assembled to serve as inputs for the REMI forecast model. The purpose of the developed methodology and resulting REMI economic forecast is to provide decision makers with a clear view of the comparative economic advantages and disadvantages of targeted transportation investment decisions. While a comparative economic analysis is important, ***"the Team believes and has stressed throughout its work, that project specific decision making should not be based exclusively upon economic analysis; decisions must take into account the other goals of the state and balance these with the projected economic consequences."*** The establishment of project goals and the identification of the tools needed to assess economic consequences led the Team to a decision to proceed with this analysis.

To that end, a fundamental goal of the Task Force was the development of mode-specific transportation system lists of regional transportation projects anticipated to optimize transportation system performance within the five-county region (Coos, Curry, Douglas, Josephine and Jackson). Development of these transportation system project lists would ensure that while the REMI analysis would be applicable to individual projects identified on these lists, transportation investments made in individual projects would ultimately contribute to project components of a transportation system. The transportation modes identified as having regional significance in the study area are marine, aeronautic, rail and roadway.

These mode specific *lists* will function as foundation elements for all individual REMI based analysis. This protocol will serve to ensure that any individual transportation project investments will be an integral component of an identified transportation system designed to optimize that mode's performance within the region.

The transportation projects identified were, all ODOT roadway projects on major highway corridors, projects submitted by the Port of Coos Bay, projects submitted by Central Oregon and Pacific Railroad, and projects already identified in the adopted Rogue Valley-Medford International Airport Master Plan. In addition the economic return to the State from individual publicly financed transportation projects could be evaluated.

In recent years, the State has wisely concluded that economic stimulus can best be achieved when targeted public transportation investments are leveraged with public economic development investments. To this end, the Team requested that three private sector projects be identified and evaluated. The goal of this

component of this analysis is to provide "demonstration projects" as a practical means by which to "test", in advance of any public transportation investment, the economic impact of specific public transportation investments when combined with identified private sector economic development project investments. By means of an aggregated economic forecast, the State would position itself to evaluate, with reasonable confidence, the *total potential State return* on investments made to the State's public transportation systems.

The Team process has attracted the attention of federal policy makers, who believe that this prototypical investment evaluation tool may represent a tool useful to federal investment decisions as well.

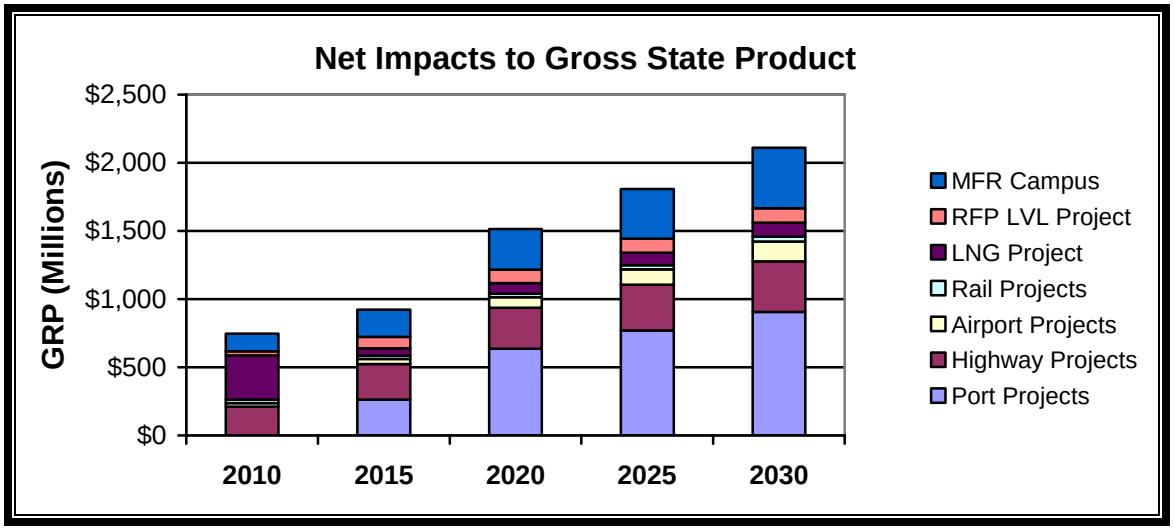
I. EXECUTIVE SUMMARY

This economic analysis project examines the potential economic benefits to Southwest Oregon specifically, and the State of Oregon generally, resulting from infrastructure investment strategies being developed by a Team of community leaders. Team members have expertise in various aspects of transportation investment and economic development. ODOT's Region 3 consists of five counties: Douglas, Curry, Josephine, Jackson, and Coos. The Team undertook this analysis to assess the extent to which the underutilization of pipeline, air, rail, and marine transportation modes and under-funded highway systems restrict economic expansion. Aggressive investments in transportation infrastructure are analyzed, including proposals contemplated at the Port of Coos Bay, the Oregon Gateway Project, the Jordan Cove Energy LNG Terminal Project with its corollary Pacific Connector Gas Pipeline Project, Major Corridor Highway Investments, Central Oregon and Pacific Rail Improvements and Rogue Valley-Medford International Airport improvements.

Table 1
Summary of Impacts in $ millions
Sources: REMI Northwest; ODOT, Port of Coos Bay, Williams, JCEP, Roseburg Forest Products, Airport Master Plan

Project Description	Exogenous Investments		Annual GRP Increase 2020		Annual State Revenue 2020	Employment Growth 2020	
	Govt	Private	5-County Region	Rest of Oregon	Oregon	5-County Region	Rest of Oregon
Jordan Cove LNG		$500	$40	$13	$3	224	104
Pacific Connector Gas Inter-Connector Pipeline		$755	$39	$8	$5	772	77
Port of Coos Bay/Oregon Gateway	$345	$325	$526	$109	$60	5,239	862
ODOT Highway Investments	$3,200		$255	$41	$33	3,399	266
Rogue Valley-Medford International Airport	$72		$79	$0	$13	1,049	-4
CORP Siskiyou Line	$65		$28	$1	$3	402	-2
Roseburg Forest Products LVL Plant	$50		$79	$6	$3	225	47
Medford Employment Campus	$156		$263	$24	$22	2,730	168
Total	**$3,888**	**$1,580**	**$1,309**	**$202**	**$144**	**14,039**	**1,517**

The analysis presented herein treats the substantial investments as exogenous to the system (additional dollars to the region's economy). For some of these investments, this is also represents the real-world fiscal reality, such as the Jordan Cove Energy Project. However, other investment categories, such as the Highway Investments, would likely involve changes in government spending and financing methods at the local and state levels. These changes would modify the results somewhat, but the scale of impacts would not be expected to change dramatically.

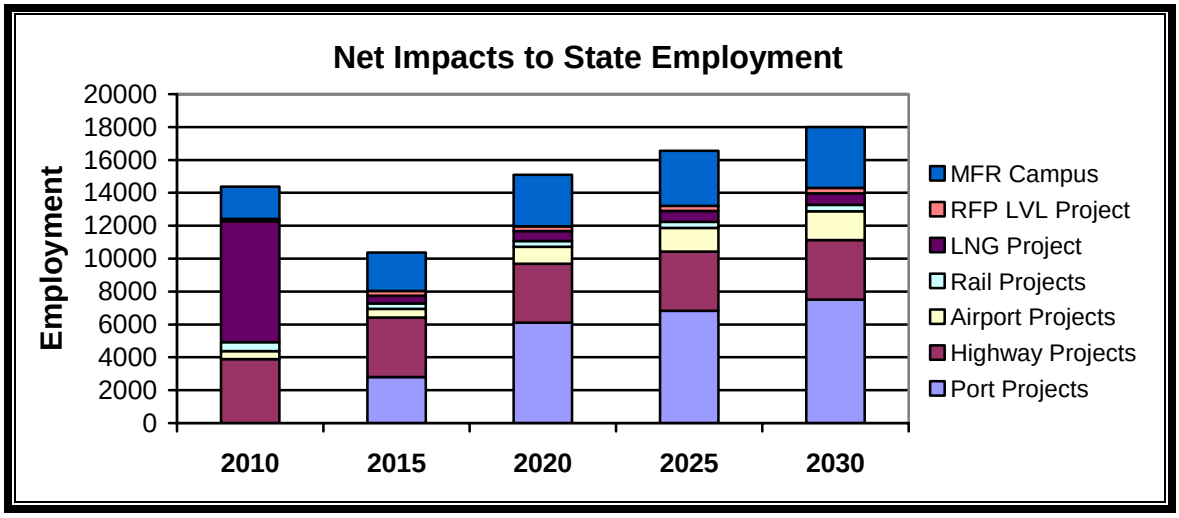


There are several interesting phenomena depicted in the above graph, such as:

- The LNG project's benefits are heavily loaded in the 2010 time period due to the nature of this project; the LNG project has substantial construction spending but ultimate benefits are distributed throughout the western united states so diminished benefits to SW Oregon are projected in the out years. However, it is this project that makes the Port Projects feasible and long-term benefits are derived from that project.

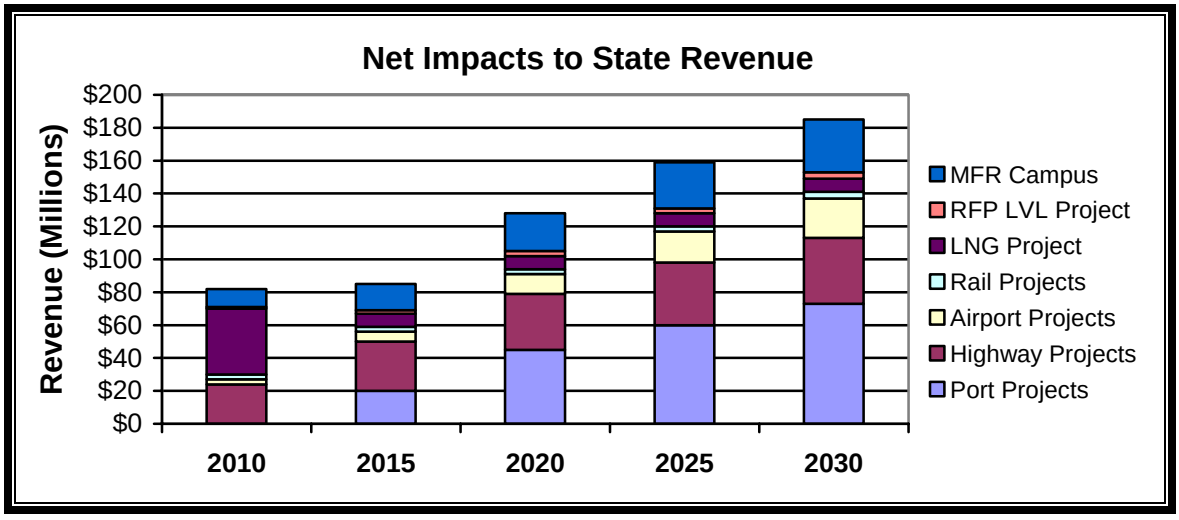
- The Port Projects, the Airport Projects, and the Medford Employment Campus depict continued economic benefits going forward. This occurs for a couple reasons. First, these projects are not directed at narrow sectors of the economy, but a wide variety of economic sectors have the potential to benefit significantly from these projects. Also, these projects are expandable; the projects ramp up and the potential for marginal growth supported by the initial investments is high for all three of these projects throughout the analysis period.

- Because the highway investments are evenly distributed over the time horizon, the impacts are relatively constant. In this analysis Highways are treated as the backbone of the transportation system and thus function as a foundation element in the economy. As such, highway investments can be conceptualized like *blue-chip stocks*; investments in highways will result in a fairly consistent return on investment, but in an analysis such as this, they are unlikely to support high ratios of economic growth to investment. This component of the analysis could be refined significantly with more detailed data that relates network efficiency to project costs.



The employment figures indicate the strong short-term impacts of the LNG terminal and transmission pipeline construction projects. Construction projects of this scale result in a large number of jobs being created over a short-term.

The employment figures also depict the efficiency of the LVL Plant, because the ratio of employment impacts to GRP impacts is very high (i.e. few employees relative to the GRP impacts).



State revenues depict similar patterns to GRP. The airport and Medford Employment Campus projects represent somewhat higher State Revenues relative to Gross Regional Product as one would expect in a State whose tax revenue sources are weighted toward income taxes.

II. INTRODUCTION

This economic analysis project examines the potential economic benefits to Southwest Oregon specifically, and the State of Oregon generally, resulting from infrastructure investment strategies being developed by a Team of community leaders with expertise in various aspects of transportation investment and economic development. The policy question in this analysis is to identify the regional economic and fiscal impacts projected to result from a policy choice to make aggressive transportation infrastructure investments in key Southwest Oregon facilities. Aggressive investment in transportation infrastructure has the potential to have far-reaching economic implications that are both direct and indirect. Obviously, the direct investment of transportation and private utility dollars will increase regional spending. The analysis presented here does not make any assumptions regarding changes in State and Local spending rates as financing mechanisms utilized to fund the investment decisions analyzed here. Direct spending increases will cause direct increases in Gross Regional Product, Output and Employment.

In addition to the direct growth that results from large scale projects, investments in transportation infrastructure and utilities has the potential to support significant economic expansion. This is especially true for projects that increase system efficiency because those types of projects reduce cost to business and consumers.

Increases in system efficiency and capacity have the effect of reducing effective distance. Reduced effective distance increases access. Increased access expands potential labor and consumer markets. Reduced effective distance can also change opportunity costs associated with the deployment of various factors of production such as energy and land. Increased comparative advantage can also support investment and generate capital.

While the potential benefits from economic expansion due to transportation investments are considerable in theory, the extent and timing of such benefits is important to policy makers considering such investments. The analysis in this document provides a broad overview of the timing and extent of expected benefits based upon a series of conceptual transportation infrastructure and utility investments and illustrative private sector investments all within ODOT's Region 3.

ODOT's Region 3 consists of five counties: Douglas, Curry, Josephine, Jackson, and Coos. The analysis identifies the following investment scenarios in these five counties:

1. **A multi-modal Port of Coos Bay project group includes the following components:**
   a. **Private construction of a liquefied natural gas import facility The Jordan Cove Energy Project (JCEP).**
   b. **Pacific Connector Gas pipeline project to construct a private pipeline connection for distribution onto the national natural gas transmission network.**
   c. **Additional Port improvements that would increase bulk shipment capacity and add container shipping facilities- The Oregon Gateway Project.**
   d. **Improvements to the CORP line which connects Coos Bay to the Class I railroads to improve freight mobility to the nation's Class I rail network.**
2. **Highway infrastructure improvements across Southern Oregon identified by ODOT.**
3. **Investments at the Rogue Valley-Medford International Airport**
4. **Improvements to the north-south Siskiyou Line of the Central Oregon and Pacific Railroad**

In addition to the above project scenarios, this modeling effort includes an illustrative analysis of two additional private sector projects as follows:

1. **Roseburg Forest Products' LVL Plant in Douglas County**
2. **Rogue Valley Employment Complex in Jackson County**[1]

The investment and benefit details of the above projects vary considerably. For example, many of the Highway projects identified by ODOT are in various stages of project development. The costs and benefits of the near-term highway projects are relatively well known, whereas, other Highway projects are at a very conceptual stage and cost figures and functionality of the improvements are not well known at this time.

Under these circumstances, best modeling practices utilize reasonably conservative assumptions associated with the benefits of reduced effective distance and direct investment. Conservative assumptions were utilized in this analysis sufficient that the input assumptions can be expected to reasonably represent real world relationships but should somewhat understate benefit potential that could be justified with more refined data collection and input data estimation techniques. The direct investment assumptions are addressed in Section III of this report which describes each project component in detail including direct investment estimates. Assumptions about the relationship between improved access/reduced transportation costs and economic benefits are covered in the detailed methodological discussion in Section IV.

One aspect of the analysis performed here is the unique ability of the REMI model to capture the marginal benefit of supply side response to demand stimuli. Total project benefits reported in this analysis include effects of investments as they ripple throughout the economy both in the years when investments are made and decades thereafter. Reported project benefits include a wider cross section of beneficiaries than some other models.

Despite the range of uncertainty for the various project components analyzed and the necessary assumptions to respond to data deficiencies, the analysis still captures the fundamental policy question because the relationship between the projects and the economy as a whole are intact and captured by REMI. As components of project concepts modeled here change during the actual project development phase, the relationship between relative project expenditures and relative benefits from improved accessibility and reduced transportation costs are likely to remain fairly stable.

The fundamental policy question of whether or not to aggressively invest in transportation system projects of the types contemplated by the Team can be captured quantitatively in this type of analysis. Realization of such benefits are ultimately dependent on the qualitative components of real world project selection, development and delivery to assure that assumed relationships between transportation improvements and economic benefits are actually born out.

[1] While ODOT selected Rogue Valley Employment Complex for illustrative scenario due to data availability, development firms associated with it are clients of Montero & Associates LLC.

III. PROJECT DESCRIPTIONS AND DIRECT INVESTMENTS

This section addresses the direct investments such as employment projections and capital spending for each of the projects analyzed by REMI. Capital spending did not capture changes in tax levels to support the various public expenditures that are integral to some of the investment policies in this analysis.

A. Port of Coos Bay Project Group

This project involves three interrelated components and each is discussed in detail below.

1. Jordan Cove Energy Project

This project involves construction of an import terminal to receive liquefied natural gas (LNG) at the Port of Coos Bay, regasification of the LNG and transmission via a new pipeline from Coos Bay to a connection with the national transmission network near Klamath Falls. Thus, most of this project, the terminal and transmission facility is located in the 5-county area which is the subject of this analysis. The Center for Liquefied Natural Gas provides background information on LNG facilities:

> LNG is simply natural gas in its liquid form – it is the same natural gas more than 64 million American homeowners use everyday.
>
> The ability to convert natural gas to LNG, which can be shipped on specially built ocean-going ships, provides U.S. consumers with access to vast natural gas resources worldwide. LNG is an energy source that is becoming increasingly important in the United States.
>
> U.S. demand for natural gas is outstripping domestic supply as well as available Canadian supply. Demand for natural gas is increasing because of its clean-burning characteristics, especially for producing electricity. According to the U.S. Department of Energy, by 2030, the gap between demand and supply is projected to reach 21%.
>
> Domestic natural gas supplies will continue to struggle to meet growing demand due to declining productivity in the country's existing natural gas producing areas and government policy that restricts access to new supplies in the United States. Even as the nation continues to use all of its natural gas supplies that are currently available and builds a pipeline to transport natural gas from the Alaska North Slope to the lower 48 states, we cannot meet the growing natural gas demand – at least not in a way that provides consumers with economically viable prices.
>
> At the same time, increasing our imports from Canada is not a viable solution to this supply issue. Canadian supplies are declining (similar to the United States) and Canada is using more and more of its own natural gas for extracting oil from oil sands in Western Alberta and to achieve lower emissions from its electric power plants.
>
> Although domestic and Canadian supplies are limited, vast supplies of natural gas exist overseas. Importing it in the form of LNG will expand supply options, which in turn will help moderate prices and thus deliver relief to both household and industrial users.
>
> As demand growth outstrips domestic production of natural gas, the United States will need to rely increasingly on natural gas brought in from overseas to meet rising demand. LNG alone cannot meet the growing demand, but it has a critical role to play in the mix of energy supplies needed to help the nation meet the pressing need for new energy.
>
> According to the U.S. Department of Energy (DOE), natural gas makes up 22% of total energy consumption in the United States. In 2005, LNG made up only 2.8% of the natural gas supply. The

> U.S. Department of Energy estimates that by 2030 LNG will need to make up 16% of the nation's natural gas supply in order to meet demand.
>
> According to the U.S. Department of Energy, LNG imports must increase more than 500% in order to meet U.S. natural gas demand in 2030. Today, there are only five U.S. facilities (and one facility in Puerto Rico) capable of importing LNG – not nearly enough to handle the amount needed.
>
> The United States needs to build more LNG import terminals.

Currently, the Jordan Cove Energy Project (JCEP) is going through the Draft EIS process with the Federal Energy Regulatory Commission (FERC) for approval of the LNG terminal facility at the Port of Coos Bay. JCEP is proposing a facility capable of transmitting one billion cubic feet of natural gas per day. Information utilized in this economic analysis on the LNG terminal itself is based upon information submitted to FERC, most of which is located in *Resource Report 5 – Socioeconomics*. The modeled direct inputs from the terminal include an estimated $500 million in construction dollars during the construction phase and an estimated 56 permanent jobs to operate the facility following construction. Estimated project completion is 2010.

2. Pacific Connector Gas Pipeline Project

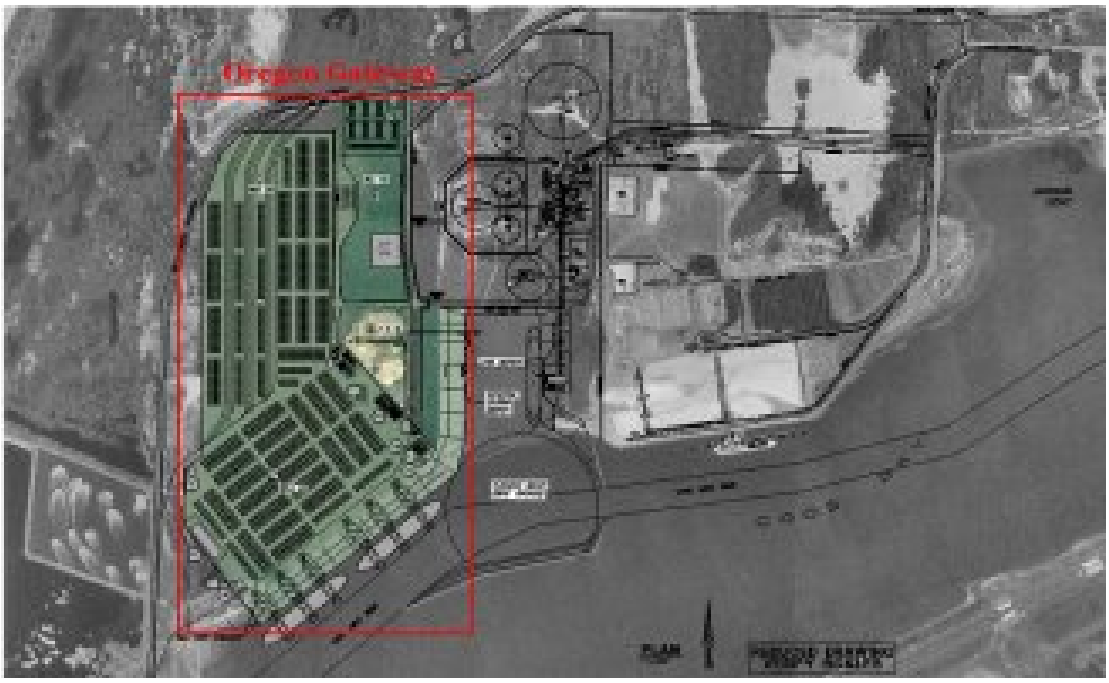
In addition to the LNG terminal itself, the analysis considers the pipeline construction project impacts as well. Pipelines tend to be very expensive to construct, but they are extremely efficient post-construction. As such, construction dollars are significant during the construction period, but long-term direct economic benefits are not large. The analysis assumes natural gas pipeline construction spending of $775 million. These figures were obtained by e-mail directly from Williams, managing partner of the pipeline project. Estimated project completion is 2010.

3. International Port of Coos Bay Oregon Gateway Project

A corollary benefit of the Jordan Cove Energy Project is that navigation system improvements are needed to support it. Many of these improvements can be leveraged into additional port improvements to benefit the expansion of general marine cargo activities. The JCEP project necessarily requires construction of a waterway from the current federal channel to the proposed LNG Terminal site on the North Spit of Coos Bay.

With this new opportunity, the Port of Coos Bay began planning to expand. This planning effort has identified the potential to improve bulk materials shipping facilities and to add a new North Spit intermodal containerized freight terminal. The planning work on this project is somewhat preliminary and details are appropriately being held confidential. However, because of the broad scale of this analysis and participation in the Team by the Port of Coos Bay, the analysis was provided some general information on construction figures and expanded Port facility concepts. Employment estimates for vessel operations and cargo handling was provided from Paul Sorensen of BST Associates who is working on an economic impacts analysis on behalf of the Port.[2] See below concept plan:

[2] The employment figures from Mr. Sorensen for inland transportation and *other* employment categories were not entered into REMI, as the REMI model treats these as *the supply* response to growth in the water transportation sector.



In round dollars, the Port estimates these facilities would involve a total of $670 million dollars in direct construction investments that would add an approximately 1214 jobs at the Port. The improvements would consist of $325 million for construction of the container terminal facility, $200 million in Port improvements, such as dredging the lower harbor next to the LNG Terminal, and $25 million in general cargo handling improvements. Project completion is projected by 2014.

The Central Oregon and Pacific Railroad (CORP) is a short line railroad operating between Coquille and Eugene/Springfield. This CORP facility provides the ability to transport intermodal freight and other commodities via rail from the Port of Coos Bay to the Class I rail yard connections in Eugene/Springfield. In order for the Oregon Gateway project to reach its full potential, convenient and efficient rail freight mobility from the Port to destinations throughout the US is important. As such, this project is included as an integral component of the Oregon Gateway project. The Port of Coos Bay estimates upgrades to this facility at $120 million dollars to improve this line to support the shipping potential of the Oregon Gateway improvements at the Port of Coos Bay. Project completion is projected by 2014.

The following table summarizes the direct investment and direct permanent employment components of the Port of Coos Bay project Group:

Table 2
Direct Investment; Direct Permanent Employment Components in $ millions
International Port of Coos Bay Project Group
Sources: Port of Coos Bay, Paul Sorensen, BST

International Port of Coos Bay Project	Construction Investments			2020 Permanent Employment
	Govt	Private	Total	
Port of Coos Bay	$225	$325	$550	1,214
CORP (Coos Bay Line)	$120		$120	
Total	**$375**	**$325**	**$670**	**1,214**

In terms of scale for this project and ultimate capacity of the facility, it is comparable to the Port of Oakland, as it currently exists. The Port of Oakland currently handles 1.3 million twenty-foot equivalency units in containerized cargo per year and the design capacity of this project is 2 million.

B. ODOT Highway Investments

The Oregon Department of Transportation provided a list of major highway projects from year 2006 to 2030 with preliminary construction cost estimates. Only those highway projects located on major highways are included in the project list; the subject Highways are OR 38, OR 42, OR 62, OR 138, US 199, US 101, and Interstate 5.

This analysis faced a challenge because the investment timelines provided by ODOT called for 93 percent of the total project expenditures in 2030. It is unlikely that $3 billion dollars would be spent in a single year. Moreover, because the fundamental purpose of this analysis is to assess potential economic benefits associated with a policy choice to aggressively invest in transportation infrastructure, it stands to reason that policy makers would not elect to postpone all the potential benefits to the very end of the policy period. For this reason, the analysis redistributed the project expenditures evenly from 2007 to 2030 and distributed the expenditures, by County, according to the percent of the total project values located in each county. The following table depicts the annualized direct construction spending by County in nominal dollars:

Table 3
Annualized Direct Construction Spending By County
Sources: REMI Northwest; ODOT Region 3

Year	Douglas	Coos	Josephine	Jackson
2006	$59,750,000	$11,379,167	$9,537,500	$52,083,333
2007	$61,017,065	$11,620,474	$9,739,753	$53,187,818
2008	$62,600,239	$11,921,984	$9,992,465	$54,567,851
2009	$64,247,476	$12,235,694	$10,255,402	$56,003,727
2010	$65,951,948	$12,560,305	$10,527,476	$57,489,494
2011	$67,716,807	$12,896,416	$10,809,189	$59,027,900
2012	$69,545,728	$13,244,727	$11,101,128	$60,622,147
2013	$71,401,954	$13,598,238	$11,397,425	$62,240,197
2014	$73,273,408	$13,954,650	$11,696,153	$63,871,520
2015	$75,180,043	$14,317,761	$12,000,496	$65,533,510
2016	$77,120,810	$14,687,373	$12,310,288	$67,225,253
2017	$79,094,133	$15,063,185	$12,625,277	$68,945,374
2018	$81,108,939	$15,446,898	$12,946,887	$70,701,656
2019	$83,171,530	$15,839,710	$13,276,125	$72,499,590
2020	$85,285,579	$16,242,323	$13,613,577	$74,342,381
2021	$87,455,815	$16,655,637	$13,959,997	$76,234,148
2022	$89,684,336	$17,080,050	$14,315,721	$78,176,723
2023	$91,975,345	$17,516,364	$14,681,420	$80,173,766
2024	$94,331,465	$17,965,079	$15,057,512	$82,227,567
2025	$96,755,849	$18,426,794	$15,444,501	$84,340,872
2026	$99,251,121	$18,902,009	$15,842,804	$86,515,970
2027	$101,819,381	$19,391,125	$16,252,759	$88,754,691
2028	$104,465,882	$19,895,141	$16,675,202	$91,061,612
2029	$107,195,873	$20,415,058	$17,110,973	$93,441,312
2030	$110,008,830	$20,950,775	$17,559,987	$95,893,332
Total	**$2,059,409,553**	**$392,206,938**	**$328,730,019**	**$1,795,161,745**

The above table depicts a substantial increase in highway spending over the analysis period on the region's major highways. The major projects in the above list include adding lanes to I-5 from Ashland to Grants Pass and through the Roseburg area, and the Highway 62 project which would construct an expressway from the North Medford Interchange through White City.

C. Rogue Valley-Medford International Airport

The Rogue Valley-Medford International Airport is the region's largest airport. The airport handles almost twenty thousand passengers on a typical month. The airport also handles air freight that is essential for many types of businesses that rely on reliable and efficient air freight service. The Airport has seen substantial direct investment over the years and that direct investment has translated into steadily increasing passenger volumes and freight movements. Currently, the Airport is constructing a new terminal to support

future operations and expansion. The below table depicts airport investments that are projected to occur over the next twenty years:

Table 4
Projected Airport Investments 2006-2030
Sources: REMI Northwest; Airport Master Plan

Time Frame	Project Description	Project Cost
2006-2010	Construct taxiway stub/Schultz Road (8,100 sq. yards)	$243,000
	Replace airport traffic control tower - $5,000,000	$5,000,000
	New Terminal (Landside and Airside)	$50,000,000
	Multi-Modal Improvements	$5,958,000
	Car rental maintenance facility	$2,000,000
	Expand GA apron (50,000 sq. yds)	$1,500,000
2010-2020	Expand air cargo apron (33,000 sq. yds)	$2,500,000
	Construct parallel runway (4,650 x 75)	$2,267,000
	Acquire property for development (100 ac)	$2,000,000
	Acquire local GPS equipment	$100,000
2006-2030	**Total**	**$71,568,000**

Of the 10 projects planned for the Airport, the new terminal is by far the largest. This project is underway now and is expected to further enhance this airport's regional role in aviation.

D. CORP Siskiyou Line Improvements

In addition to the $120 million dollars in improvements proposed for the CORP facilities on the Coos Bay line to support the Oregon Gateway project, CORP also operates and maintains a north-south line from Eugene-Springfield to Weed, California. This line has significant speed restrictions and the tunnel over the Siskiyou mountains is not large enough to allow double-stacked cars. The projects described in below Table 5 would add significant capacity and useful life to the Siskiyou Line facility:

Table 5
Projects Adding Significant Capacity and Life to the Siskiyou Line 2008-2010
Sources: REMI Northwest; CORP

Time Frame	Project Description	Project Cost
2008-2010	Siskiyou Line rail and tie replacements	$40,000,000
	Siding Extensions (south and middle of railroad)	$1,500,000
	2 Yard tracks in Eugene (total of 2 miles)	$600,000
	Total	**$42,100,000**

One important component of the REMI analysis is that baseline economic growth projections are maintained. In addition to the potential for additional economic activity as a result of the CORP Siskiyou Line improvements, there are many significant industries in the 5-County region that depend on the continued viability of the CORP system. If this system ceased to function, the baseline projections for Southwest Oregon would be severely reduced.

E. Illustrative Private Sector Projects

In addition to the major transportation projects above, the analysis also includes two illustrative private sector investment projects that are intended to demonstrate the kinds of economic growth and expansion that can occur as a result of private sector investment responding to targeted transportation infrastructure investments. The two private sector projects analyzed here are a proposed Jackson County Employment Campus and a Laminated Veneer Lumber (LVL) plant in Roseburg.

1. Roseburg Forest Products LVL Plant

This project is a concrete example of how targeted transportation investments can support private sector industrial investment. The CORP yard in Roseburg was at or near capacity and funds from Connect Oregon 1 added enough capacity to the CORP system to allow Roseburg Forest Products to move forward with plans to construct a Laminated Veneer Lumber Plant. The direct capital construction investment in this project is expected to be $70 million in $2006 dollars. The LVL Plant, at full build-out, is projected to create 110 jobs in a relatively high-wage sector. Also, this plant will have a high-value added component that will generate substantial capital appreciation which may be deployed elsewhere in the region's economy.

2. Jackson County Employment Campus

This is a conceptual project that is in the planning stages. The concept of this project is that Jackson County generally, and Medford specifically, has unique amenity characteristics that are attractive to certain technical industries. These industries, such as instruments, tend to demand Office Park/ R&D employment campus style development patterns. There is limited land available in Jackson County for this development pattern. The City of Medford has, through the Regional Problem Solving process, identified 150 acres of land as a potential site for this type of development project. The site is well situated near I-5 and the planned extension of a major arterial roadway (South Stage Road) across I-5. However, the conceptual planning of this project is sufficiently detailed to provide a preliminary REMI forecast based upon future employment on the site. This preliminary forecast uses a reasonably conservative employment density and assumes an absorption rate that is also reasonably conservative for the contemplated transportation infrastructure investments.

F. Direct Investment Summary

In summary, the above project descriptions and direct investment present a very different picture for the 5-county region than exists today. In combination, the above projects would represent a substantial increase in investment in Southern Oregon that would have far-reaching comparative economic advantages.

IV. METHODOLOGY AND MODELING ESTIMATES

This section of the report discusses the technical aspects of the REMI model. This section also discusses the assumptions that were utilized in developing model inputs to capture transportation and utility improvements that would reduce effective distance and stimulate economic activity through increased access and reduced transportation and energy costs.

A. REMI Policy Insight® Model

These are the distinguishing features of the REMI Policy Insight Model:

- The REMI model is a multi-year forecasting and simulation model, enabling users to evaluate policy simulations of "what if" scenarios to determine the economic impacts. The model has strong dynamic properties, which means that it forecasts not only what *will* happen but also *when* it will happen.

- REMI developed a custom multi-regional economic and demographic forecast for the 5-County Region of Coos, Curry, Douglas, Jackson and Josephine Counties as well as the rest of Oregon. This dynamic year-by-year forecast represents the baseline, or no-build scenario. The REMI forecast extends to the year 2030, although REMI is capable of forecasting to 2050.

- The Industrial Sectors in Policy Insight are based on the North American Industry Classification System (NAICS). NAICS replaced the old Standard Industrial Classification (SIC) System in 1997, and was developed jointly by the US, Canada, and Mexico to allow business statistics comparability across North America[3].

- Policy Insight's forecast was assembled at the county level using data from the Bureau of Economic Analysis (BEA), the Bureau of Labor Statistics (BLS), the Department of Energy, Department of Defense (DOD), the Bureau of Census, and other public sources.

- The REMI model generates estimates for the *DIRECT* and *INDIRECT* impacts. Direct Impacts in this case are discussed in above Section III and include construction demand and labor demand. Indirect impacts are those demands for goods and services that increase as a result increased direct demand and demand increases that result from induced impacts.

- REMI's dynamic model structure is also capable of capturing the supply increases that result from increased demand stimuli, sometimes called induced impacts.

- The model structure has been developed to include "new economic geography" assumptions. Economic geography theory explains regional and urban economies in terms of competing factors of dispersion and agglomeration. Producers and consumers are assumed to benefit from access to variety, which tends to concentrate production and the location of households.

Cost Matters:

- For businesses, the demand for labor, capital, and fuel depends on their relative costs. For example if there was an increase in the price of capital, businesses would likely have a preference shift away from capital toward labor and fuel.

[3] www.census.gov/epcd/www/naics.html

- The population responds to price changes. Economic migrants will respond to wages, employment opportunity, local prices, and other labor market conditions.

Figure 1 is a representation of REMI Policy Insight's structure and shows the linkages within the local economy. The Output block shows how a business will produce goods to sell to other firms, consumers, investors, governments, and purchasers outside the region. The Labor and Capital Demand block shows how labor and capital requirements depend both on total sales (output) and on relative costs. In the Demographic block, the Population and Labor Supply size contribute to consumer spending (demand) and influence wages. Supply and demand interact in the Wage, Price, and Profit block. Production costs determine market shares locally, for the rest of the US, and for the Rest of the World. Output depends on market shares and the components of demand.

Figure 1
REMI Model Structure and Linkages
Excluding Economic Geography Linkages
Source: REMI

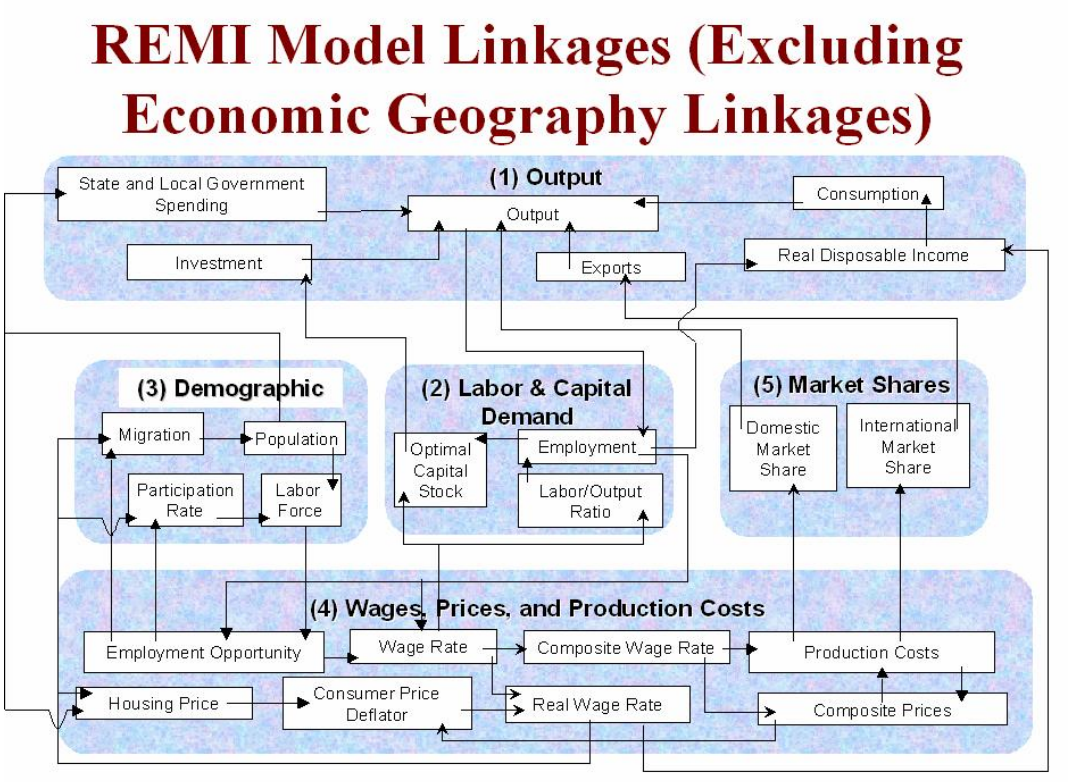
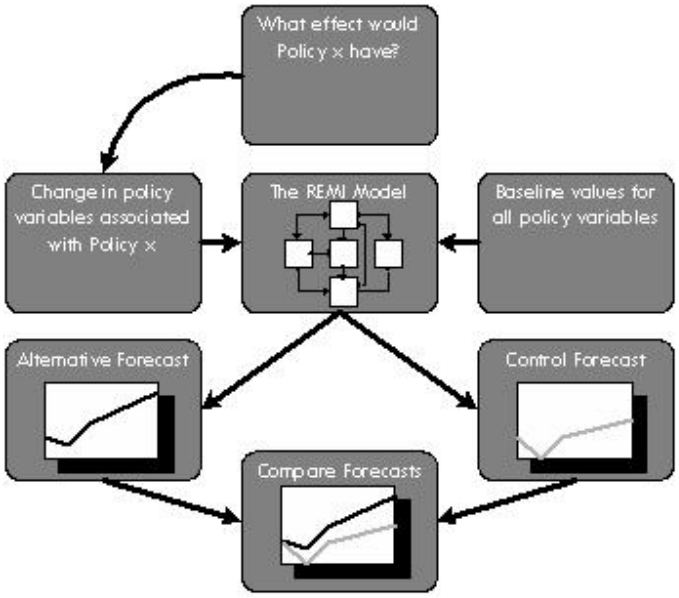


Figure 2 shows the policy simulation process for a scenario called "Policy X". To show the effects of this scenario, the user must select the appropriate policy variables to enter the values and assumptions that represent the direct effects of the scenario. The alternative forecast is then generated using these policy variable inputs. The impacts of a scenario are now determined by comparing the baseline REMI forecast with this new alternative forecast simulation "Policy X" to quantify the change to the economy.

Figure 2
REMI Model Policy Simulation Process
Source: REMI



B. REMI Transight® Model

Regional Economic Models, Inc. (REMI) developed a custom TranSight model for the Oregon State Department of Transportation that incorporates the Southwestern Oregon Region which consists of the Counties: Coos, Curry, Douglas, Jackson, Josephine, and the rest of Oregon State. This configuration allows REMI Consulting Inc. to estimate the economic impacts for counties individually and for the entire state. Once northwest travel data and project-specific data are entered into TranSight, the model translates the information into REMI Policy Variables and enters the data into REMI's Economic and Demographic Forecasting Simulation model for 70 Industrial Sectors (EDFS-70). EDFS-70 includes the REMI economic and demographic baseline forecast, or no-build scenario, and produces multi-year forecasts comparing them to the baseline forecast. REMI used the same baseline forecast, which included updated fiscal information, for the Highway and Port analysis.

The travel-model outputs enter TranSight and are then passed onto the transportation cost matrix, which includes individual matrices for transportation costs, accessibility costs, and commuter costs. The travel data enter each individual matrix as changes to "effective distance."[4] These changes are then passed onto the EDFS-70's five major blocks as changes to delivered costs, production costs, and commuter costs for the region.

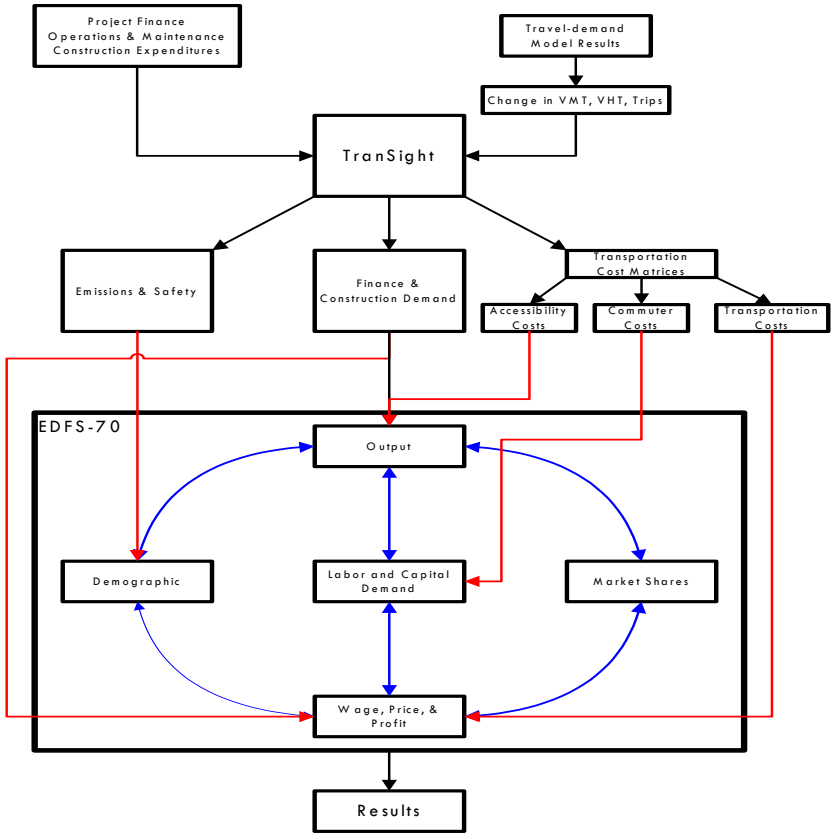
The change in truck movement (VHT, VMT, & Trips) enters the matrix as changes to transportation cost. The cost reduction or increase then enters the delivered-price equation and composite input-costs equation for each industry sector found in the Wage Price and Profit Block. The Accessibility Cost Matrix describes access to more diverse consumer goods and services by households, as well as access to a broader array of intermediate inputs by employers. Inputs to the accessibility cost matrix are calculated from the change in truck-trips per hour. The data from the accessibility cost matrix then enter into the output block as changes

[4] See Appendix: "Effective Distance: The Transportation Cost Matrices"

to the intermediate-input access index, which represents a price elasticity of demand[5] (price is sensitive to distance) and then feeds into the commodity access index giving both businesses and consumers more or less access to commodities.

The commuter cost savings over the average workday are entered into the model as savings in respect to auto movement (VHT, VMT, & Trips). These effective-distance changes enter the occupation labor access productivity equation found in the Labor and Capital Demand block in EDFS-70, which feeds into the industry labor-access productivity. Improvements in transportation would then mean an increase in labor access (i.e. workers willing to commute further), which would allow businesses to take advantage of a larger labor pool.

Figure 3
Model structure of REMI TranSight Model
Source: REMI



TranSight uses motor-vehicle emissions rates obtained from the PART5 and MOBILE6b models developed by the EPA to specify emissions rates per vehicle-mile for specified pollutants. These pollutants include carbon monoxide, nitrogen oxides, volatile organic compounds, sulfur oxides, and particulate matter. Default emissions costs are based on a study by McCubbin and Delucchi[6] who quantified the health effects of vehicle pollution per VMT in the average urban area and the nation as a whole. TranSight uses these

[5] Measures how the quantity demanded responds to a change in prices

[6] McCubbin, Donald, and Mark Delucchi, "The Social Cost of the Health Effects of Motor Vehicle Air Pollution." Report 11 from The Annualized Social Cost of Motor-Vehicle Use in the United States. Institute of Transportation Studies. University of California-Davis. 1996.

costs per gram for both motor-vehicle and public-transit modes. The change in emissions cost relative to baseline levels enters into the model as a non-pecuniary amenity, found in the Demographic block in EDFS-70, that accrues to workers and their dependents.[7]

TranSight includes annual mode-specific rates for three accident-consequence categories: fatalities, injuries, and Property Damage Only (PDO). Using national averages reported by the Federal Highway Administration, TranSight is configured with default highway accident rates. Although these accident rates were not updated for this analysis, the data can be updated to reflect accident rates for each individual county or all of Oregon State. TranSight also provides default cost-per-accident figures for each transportation mode, broken down by accident-consequence category. REMI bases these values on National Safety Council figures that incorporate wage and productivity losses, medical and administrative expenses, motor-vehicle damage, and a willingness to pay to reduce safety risks[8]. As with emissions costs, TranSight transfers these changes in safety costs into EDFS-70 as adjustments to the non-pecuniary amenities that affect individual welfare, which will induce a migration response in the demographic block of EDFS-70. Even for people not involved in accidents, the prevailing local accident rate, along with associated insurance and medical costs, can influence the relative attractiveness of living and/or working in a particular region, also influencing migration.

These costs then proceed to influence private decision-making by households in accordance with the tenets of the new economic geography, as articulated by Fujita et al.[9] and applied to regional macroeconomic modeling by Fan, Treyz, and Treyz.[10] This theory emphasizes the geographic location decisions of firms, demonstrating how improved access to intermediate inputs and a diversely skilled labor force can provide incentives for industries to cluster and agglomerate.

C. Effective Distance: The Transportation Cost Matrices

"Effective distance" is the mechanism through which the theory of economic geography enters the decision-making processes of economic agents in TranSight. It can be imagined as the geographic distance between two centers of economic activity, adjusted for the efficiency of multi-modal transportation between them. Hence, improvements in the transportation infrastructure reduce effective distance between two locations and, consequently, increase their interaction, in terms of the flows of labor, intermediate inputs, and end-use commodities. In general, as effective distance increases, the costs that deter economic activity rise through an exponential process called "distance decay." The rate of change by economic sector of the distance decay curve (known as the distance decay parameter, β) captures both the increased deterrence and the variable impact on flows by sector.

For businesses involved in transporting goods, shorter travel times for their delivery vehicles translate into savings on fuel, wages, and perhaps vehicle and inventory costs. Furthermore, traveling sales personnel can potentially reach more clients during business hours. Although these savings can stem directly from additional roads, which provide quicker alternative routes between popular destinations, they can also result from widened roads, public transit networks, or enhanced traffic control systems, which can diminish congestion and lower accident rates.

[7] Lieu, Sue and G. I. Treyz, "Estimating the Economic and Demographic Effects of an Air Quality Management Plan: The Case of Southern California." Environment and Planning 24 (1992): 1799-1811

[8] National Safety Council, Estimating the Cost of Unintentional Injuries.

[9] Fujita, Masahisa, Paul Krugman, and Anthony J. Venables, The Spatial Economy: Cities, Regions, and International Trade. Cambridge, MA: MIT Press, 1999.

[10] Fan, Wei, Frederick Treyz, and George Treyz "An Evolutionary New Economic Geography Model." Journal of Regional Science 4 (2000): 671-695.

The theory of economic geography (which is integrated into the EDFS-70 model) assumes that both firms and households obtain benefits from policies that expand their access to variety in labor, intermediate inputs, and end-use goods. Regarding labor markets, transportation upgrades improve compatibility between employers and employees through two complementary channels: firms can access a broader and more diverse labor pool, while workers can reach additional jobs that may be better suited to their preferences. Even in the absence of job switching, shorter commutes to existing jobs produce time - savings valuable to both workers and employers. The commuter-related benefits accruing to firms are captured through the commuter cost matrix, while the gains to suppliers of labor are described in the "Value of Time" section.

Economic geography also assumes that markets are characterized by monopolistic competition, meaning that goods and services are non-homogeneous. Therefore, all economic agents derive incremental utility from the ability to choose from a wider array of alternatives. By facilitating interactions among a more diverse set of buyers and sellers, transportation upgrades can broaden the scope for market transactions. Businesses can find better matches for their needs in the intermediate input markets, while households can purchase more varied goods and services.

Within the TranSight framework, effective distance implicitly enters the calculation in three distinct forms: commuter costs, transportation costs and accessibility costs. The transportation cost matrix displays time savings for on-the-clock business travel and transport of goods. Transportation costs can vary among regions as well as across forecast years. Thus, a new or expanded highway connecting two regions may have substantial impacts on transport costs between them, but also smaller secondary effects on costs between other regions as traffic patterns shift in response to the new alternative. The intertemporal differences can capture the cumulative impact of business development that occurs along the new highway or near a new public transit station, which may steadily increase congestion and thereby increase average travel times.

Savings are grounded in the difference between the alternative and baseline scenarios in the ratio of VMT to VHT. This approach captures the offset between shorter travel times and additional miles traveled, both of which are likely consequences of an upgraded transportation infrastructure. TranSight computes the transportation cost savings parameters as follows. Because the baseline values are in the numerator, a cost change parameter greater than 1 implies a cost increase relative to the baseline case, whereas ΔTC_{ij} less than 1 suggests cost savings to the commercial and industrial sectors due to the transportation project. Thus, the value of 1 would indicate that the transportation improvement has a neutral impact on transportation costs, with the degree of deviation from 1 being associated with the magnitude of the cost effect.

$$\Delta TC_{ij} = \frac{(VMT_{ij}^{\ base} / VHT_{ij}^{\ base})}{(VMT_{ij}^{\ alt} / VHT_{ij}^{\ alt})}$$

where

$VMT_{ij}^{\ base}$ = Vehicle miles traveled between i and j: base scenario

$VHT_{ij}^{\ base}$ = Vehicle hours traveled between i and j: base scenario

$VMT_{ij}^{\ alt}$ = Vehicle miles traveled between i and j: alternative scenario

$VHT_{ij}^{\ alt}$ = Vehicle hours traveled between i and j: alternative scenario

The final cost matrix bridges business and consumer interests by reflecting the value of increased accessibility to intermediate inputs and consumer goods afforded by the upgraded transportation system. While widened roads may only marginally improve accessibility, other infrastructure upgrades such as new bus routes, highways, or commuter rail lines may yield notable decreases in accessibility costs. As with the preceding two cost matrices, accessibility costs are entered for each pair of modeled regions in each forecast year. TranSight measures the change in these costs by comparing the ratio of VMT to VHT between the alternative and baseline scenarios, through an equation comparable to the transportation cost formula above.

Increasing labor productivity will create a comparative advantage for firms in the region. Assuming wage rates remain constant, firms now increase their output with the same number of workers, essentially reducing production costs. This reduction leads to an economic snowball effect. Because the firms now have cheaper production costs, they can charge less money for their goods. Because they charge less for the goods, they will increase their share of foreign and domestic markets, thus increasing the demand for goods and services from those firms. To meet this higher output demand, a firm will have to purchase more capital and hire more workers. To attract more workers, the firm will have to increase wage rates. People from outside the region will see higher wages and increased employment opportunity and will start moving into the area.

Commuting costs describe how difficult it is for workers to travel within and between regions. One of the most significant deterrents for commuters is congestion (Weisbrod, Vary, Treyz). Decreasing an area's congestion increases commuters' ability to get to work. Workers who live farther away from the work place will be willing to commute into the region, and firms now have access to a larger pool of workers than before. This change in transportation infrastructure becomes an economic shock. Because firms have access to a larger number of workers, they have the ability to "specialize" their workers, which means that they can find workers that are more suitable to the position in the firm that needs to be filled.

TranSight passes them directly into EDFS-70, where they impact economic and demographic trends through different channels. Decreases in transportation costs lower the delivered prices of products, which are computed as the sum of the commodity's cost at its origin and the distance-related cost of transferring the commodity to its destination. These price changes translate into lower input costs for producers and into benefits for consumers. Improved accessibility costs influence the location decisions of households via the economic migration module, and also indirectly diminish production costs due to improved access to well-suited factor inputs.

As a consequence of affecting commodity and labor access indices, transportation projects can have secondary effects on regional wages, employment, delivered prices, and market shares, among other variables. More importantly, an improvement in a region's transportation infrastructure can yield localized benefits in costs and productivity, which can increase its competitive position in relation to surrounding regions. However, at the same time, the project can create spillover effects in those neighboring regions, particularly on labor and capital inputs that are drawn from those areas.

The costs to move intermediate inputs, final goods, and labor directly affect a firm's production costs; as a firm's transportation costs rise, so do a firm's production costs. The three main transportation factors in production costs are a firm's access to intermediate inputs, access to laborers, and the firm's ability to deliver their goods and services to consumers. Dollar figures for these factors are difficult to estimate. To more easily quantify transportation costs, economic geography theorists use the concept of effective distance.

D. Port Of Coos Bay Project Group

1. Jordan Cove Energy Project

This project was modeled strictly on the basis of construction spending and permanent employment. It is important to note that this methodology differs materially from the *Forecast of Net Economic Benefits of the Proposed LNG Terminal in Coos County, Oregon* performed by EcoNorthwest and dated October 2006. The EcoNorthwest analysis assumed benefits to the Regional and State economies as a result of this project due in large part to reduced gas prices for households and businesses. The REMI analysis does not assume reduced gas prices for households because households are regulated customers whose price changes at the direction of the Public Utility Commission (PUC). The extensive planning for LNG terminals throughout the Country, including additional facilities in the State of Oregon, is likely to slow the rate of increase for energy prices, but this would only affect the baseline forecast and does not represent a significant comparative advantage to Oregon. Because this analysis is focused on marginal impacts, changes to baseline forecasts are those that will occur provided adequate total LNG facilities are constructed to serve the aggregate demand nationally. The REMI analysis assumes only industrial businesses that have the ability to capitalize on proximity to a transmission facility and the sophistication to purchase natural gas on the energy markets would realize substantive comparative advantage. It is assumed for this analysis that industrial customers would see a cost advantage because they would be able to take advantage of previously unavailable wholesale markets. This methodology is discussed in this analysis as the Pacific Connector Gas Pipeline project.

2. Pacific Connector Gas Pipeline Project.

The Pacific Connector Gas Pipeline Project, also known as the Jordan Cove Inter-connector Pipeline was modeled as a $755 million dollar construction project that would also make the wholesale natural gas markets available to industrial customers in Southwest Oregon. While imported LNG is expected to lower or slow the rate of increase in natural gas prices during the coming years, this is expected to happen nationally. Lower natural gas prices due to increased national supplies were not assumed to give Southwest Oregon a comparative advantage over any other region.

Southwest Oregon was assumed to benefit from access to natural gas markets that it has not previously had access to, via the Pacific Connector Gas Pipeline. It was assumed that industrial users of natural gas will be able to achieve 50% reductions in natural gas costs. Participation in both real time and derivative markets will allow for not only cheaper gas but also hedging and planning strategies that can substantially reduce costs.

3. International Port of Coos Bay Oregon Gateway Project

The Oregon Gateway Project is still in the planning stages but may well be an important part of Coos County's economic future. The project is intended to take advantage of a new channel dredging from the Federal navigation channel in Coos Bay to the proposed site of the Jordan Cove LNG import facility. The Oregon Gateway will include $120 million in additional improvement to the Coos Bay short-line rail facility, $550 million for a multi-modal container facility and associated improvements.

The project is assumed to yield efficiency improvements to the state as a whole and to Coos Bay specifically. Transportation costs of all goods to and from Coos Bay were assumed to decrease by

25% for the economy of Coos Bay during the four years after completion of the project in 2014. Statewide, transportation costs of goods for export that travel by surface transportation only were assumed to decline by 5% over the ten years following completion of the project. Statewide efficiencies derive from savings associated with having a new facility without capacity constraints in closer proximity to exporters and importers than the Ports of Tacoma and Oakland. Closer to the Pacific Ocean, a container facility at Coos Bay was assumed to be a competitive option to the Port of Portland.

E. ODOT Highway Investments

Unfortunately, ODOT is between development periods in its transportation modeling efforts and were not able to provide network efficiency benefits associated with the proposed Highway projects in time for this analysis. This unforeseen circumstance prevented the analysis from taking full advantage of the TranSight functionality discussed above.

As a result, the analysis was required to utilize an assume 2.5 percent improvements to network efficiency and increased accessibility. It is important to keep in mind that this efficiency increase is treated in relative terms. For example, the baseline growth forecast projects 38,600 more jobs in the 5-County area in 2020 than there are currently and additional $5.9 billion in Gross Regional Product. Current infrastructure spending and investment is not likely to keep pace with this growth so system efficiency will diminish over time under the baseline forecast. It is assumed that the contemplated $3.2 billion in additional highway investments will slow, or perhaps in some instances reverse, the rate at which system efficiency is diminished. Thus, the assumed 2.5 percent increase in network efficiency may not reflect an actual 2.5 percent increase in the efficiency of the network that presently exists, but actually reflects network efficiency improvements compared to the negative conditions that would otherwise occur in those future years. Reliance on this assumption is also dependent on reasonably efficient project delivery directed at locations where network efficiencies are most acute; historically, the STIP process has done at least a fair job in this area and is considered adequate for purposes of this analysis.

The economic benefit of this assumed 2.5 percent network efficiency was then shared out to those economic sectors that rely directly on the road system for their core industry activity.

F. Rogue Valley-Medford International Airport

Effective distance was modeled for the airport as a share-out. The share-out relates the portion of the economy that is related to air transportation in the I/O table that is an export component of the Jackson and Josephine County economies. This share-out then assumed access benefits for this portion of the economy as it relates directly to forecast growth rates in air transportation; this forecast growth was determined independently from the Airport Master Plan.

G. CORP Siskiyou Line Improvements

Effective distance was modeled for the CORP Siskiyou line as a share-out. The share-out relates the portion of the economy that is related to rail transportation in the I/O table that is an export component of the Douglas, Jackson and Josephine County economies. This share-out then assumed access benefits for this portion of the economy. The assumed rate of access improvement was ten percent. The CORP did not provide a forecast estimate of operational efficiency over the analysis period should the contemplated improvements not occur. However, given the condition of the CORP Siskiyou Line it appears reasonable that at least a 10 percent reduction in system efficiency would occur without these improvements. Arguably, the real-world coefficient relationship is the inverse of the modeled relationship (negative 10 percent coefficient for the no-build and zero for the build), but conceptually the additive or positive

coefficient is more easily understood and really only has implications for detailed fiscal planning that is beyond the scope of this exploratory analysis.

H. Illustrative Private Sector Projects

In addition to the major transportation projects above, the analysis also includes two illustrative private sector investment projects that are intended to demonstrate the kinds of economic growth and expansion that can occur as a result of private sector investment responding to targeted transportation infrastructure investments. The two private sector projects analyzed here are a proposed Jackson County Employment Campus and a Laminated Veneer Lumber (LVL) plant in Roseburg.

1. Roseburg Forest Products LVL Plant

The essential transportation project to support the Roseburg Forest Products LVL Plant was the CORP Winchester rail yard improvements funded through Connect Oregon 1. For this reason, this project is a private sector response to targeted transportation investments that have reduced effective distance for Roseburg Forest Products, but this project itself has no impact on effective distance. Therefore, this project was modeled strictly on the basis of direct construction investment and additional employment.

2. Jackson County Employment Campus

This project involves one transportation improvement at South Stage Road and I-5. This transportation project will be regionally significant within Jackson County and will result in network efficiency improvements. However, this site is located within the MPO Boundary and therefore more detailed transportation information is available from TPAU through the RVMPO Regional Travel Demand Model. Unfortunately, this data was not available at the time of the modeling effort for this project. For this reason, the modeling project contained in this report did not assume any efficiency improvements in the transportation system. The modeling effort was solely based upon forecast employment levels at an assumed absorption rate and project construction figures.

I. Effective Distance Assumptions Summary

In summary, the above project descriptions of assumptions due to reduced effective distance were intended to be reasonably conservative, but were not intended to leave substantial portions of access benefit unaccounted. There are numerous ways in which improved data collection and access benefit forecasts could improve both the accuracy and precision of the assumed benefits. These improvements would also improve the accuracy and precision of the economic forecasts presented here.

V. RESULTS

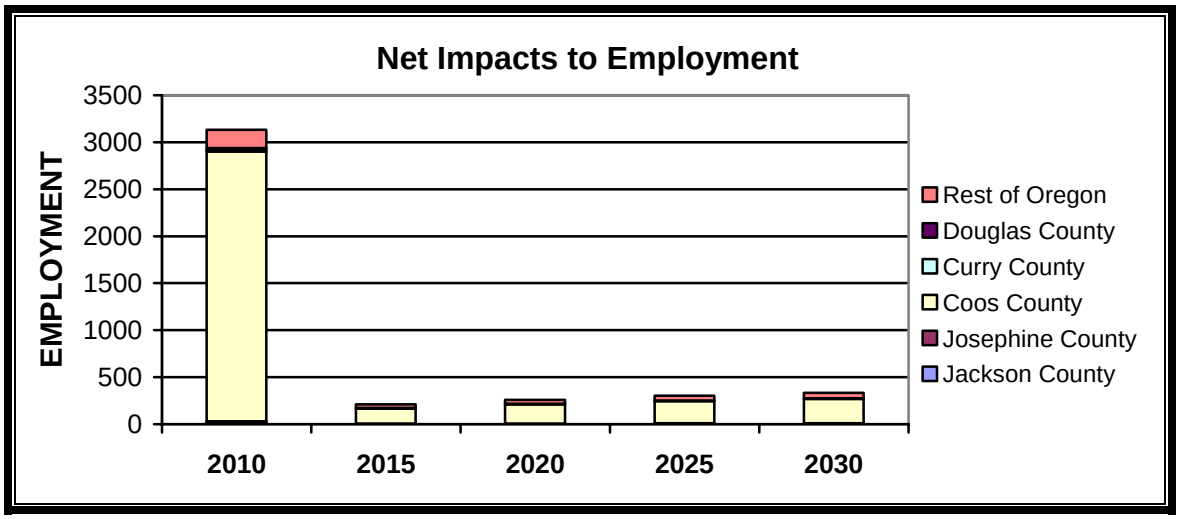
The results presented here focus on the marginal benefits associated with the projects modeled and these are reported in 2006 fixed dollars. Employment is presented in number of actual jobs. Only the most salient result categories are presented here and are discussed below:

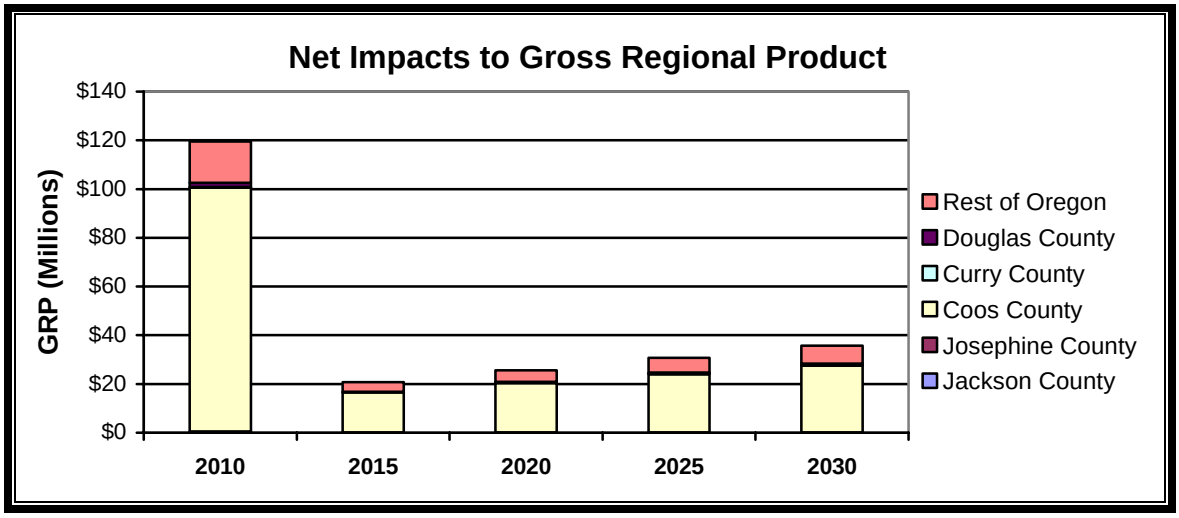
- *Net Impacts to Employment*: This results category presents the total aggregate employment change as a result of the project in each County and the Rest of Oregon.
- *Gross Regional Product*: This results category presents the aggregate total final goods and services production. Intermediate output is excluded from these results.
- *Net Impacts to Per Capita Real Personal Disposable Income*: This results category is a measure of impacts of projects on the financial situation of individuals; conceptually this result describes how *well-off* the population is over time as a result of the project. This result is important because it reflects demographic changes predicted by the model. Demand-side economic stimuli support population growth from increased berths and in-migration which off-sets the economic expansion to varying degrees depending on the nature of economic stimuli.
- *State Revenue*: These results report the aggregate annual state revenue that can be expected from the project.

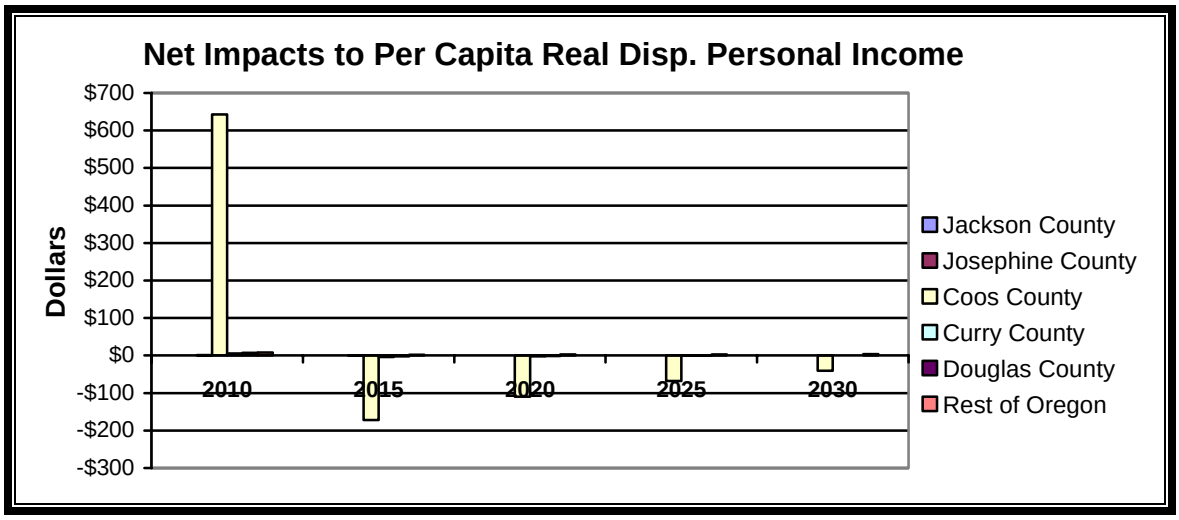
A. Port of Coos Bay Project Group

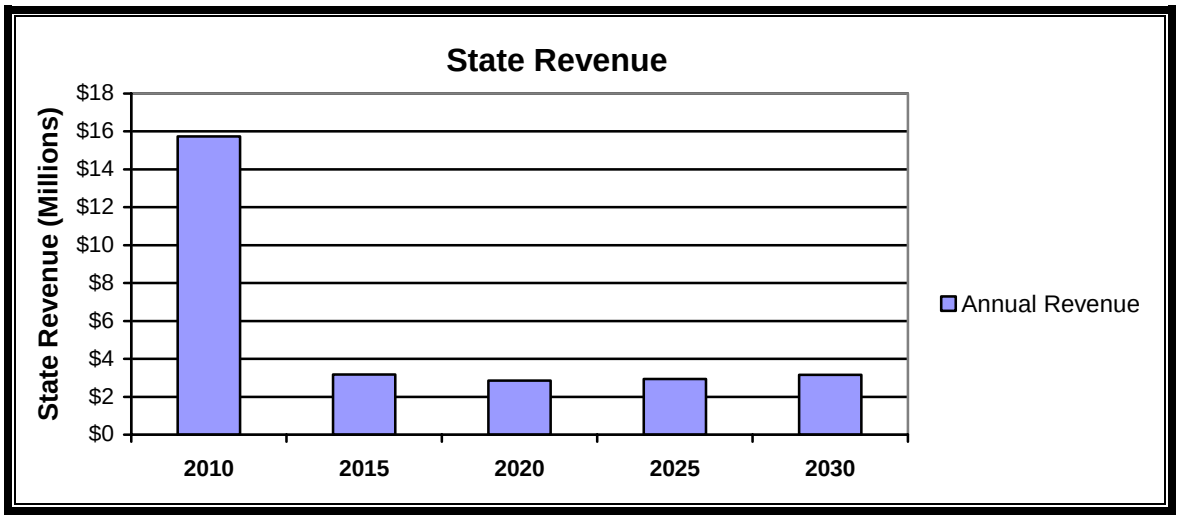
1. Jordan Cove Energy Project

The below graphs report the economic impacts of the LNG Terminal construction and ongoing operations.




Net Impacts to Gross Regional Product
GRP (Millions)
$140
$120
$100
$80
$60
$40
$20
$0
2010
2015
2020
2025
2030
Rest of Oregon
Douglas County
Curry County
Coos County
Josephine County
Jackson County


Net Impacts to Per Capita Real Disp. Personal Income
Dollars
$700
$600
$500
$400
$300
$200
$100
$0
-$100
-$200
-$300
2010
2015
2020
2025
2030
Jackson County
Josephine County
Coos County
Curry County
Douglas County
Rest of Oregon

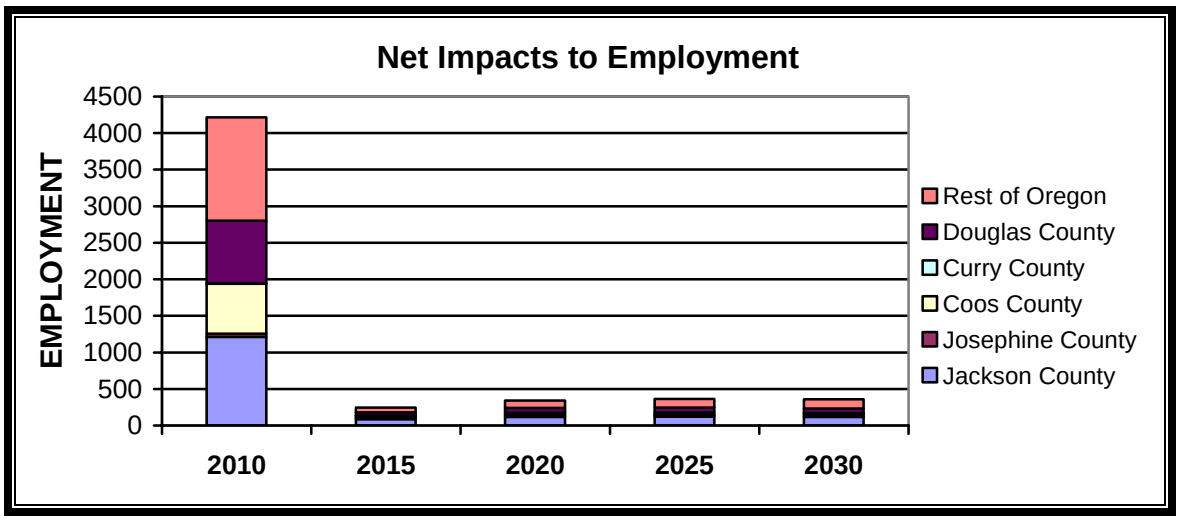

State Revenue
State Revenue (Millions)
$18
$16
$14
$12
$10
$8
$6
$4
$2
$0
2010
2015
2020
2025
2030
Annual Revenue

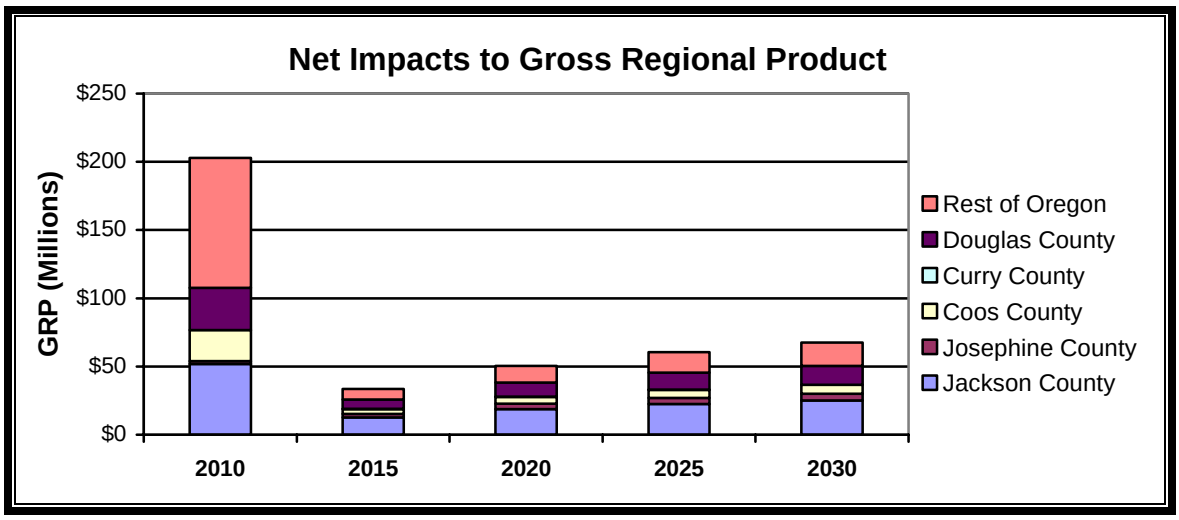
As one would expect, the economic impacts of the Liquefied Natural Gas Terminal are concentrated in Coos County. The economic impacts are also heavily weighted toward the beginning of the forecast period in 2010, when the construction dollars are surging into the project.

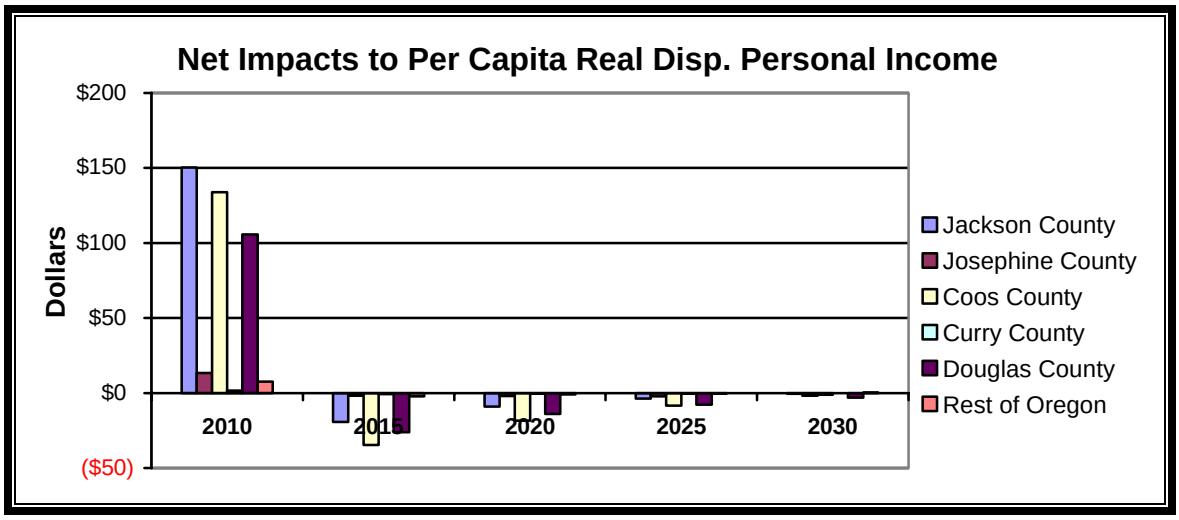
Also, this project represents an opportunity to compare the reasonableness of the REMI results to other economic forecasts. For example, Resource Report 5 of the Jordan Cove filing with FERC estimates the peak direct workforce for the project will be near 1000 employees. REMI forecasts total employment within the economy as a result of the project at approximately 3,200 jobs during the peak of the construction period. This appears to be a reasonable estimate; each on-site job is supporting approximately 2 off-site jobs elsewhere in the Oregon economy, after consideration of indirect demand response and the unique REMI supply response analysis.

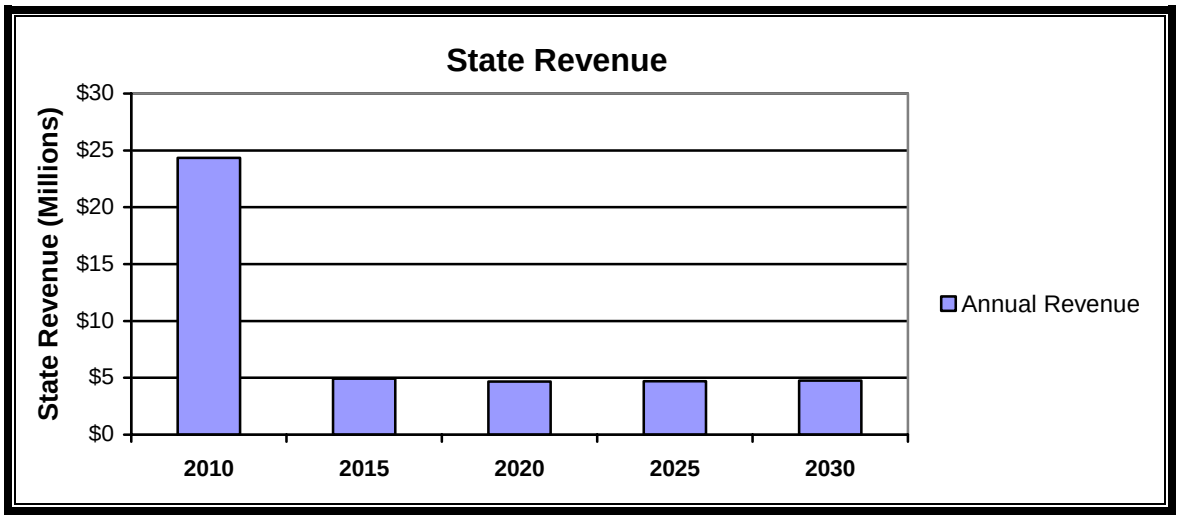
2. Pacific Connector Gas Pipeline Project

The below graphs represent the net economic impacts of the Pacific Connector Gas Pipeline project and on-going operations. This analysis also assumes that industries which utilize large amounts of natural gas will realize a comparative advantage by purchasing natural gas on the wholesale markets.




Net Impacts to Gross Regional Product
GRP (Millions)
$250
$200
$150
$100
$50
$0
2010
2015
2020
2025
2030
Rest of Oregon
Douglas County
Curry County
Coos County
Josephine County
Jackson County


Net Impacts to Per Capita Real Disp. Personal Income
Dollars
$200
$150
$100
$50
$0
($50)
2010
2015
2020
2025
2030
Jackson County
Josephine County
Coos County
Curry County
Douglas County
Rest of Oregon

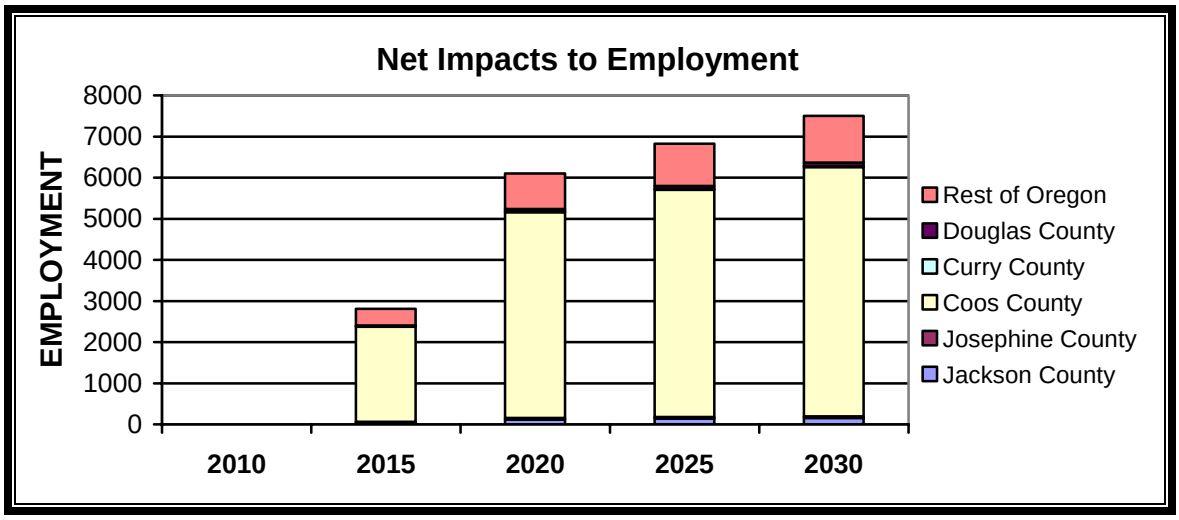

State Revenue
State Revenue (Millions)
$30
$25
$20
$15
$10
$5
$0
2010
2015
2020
2025
2030
Annual Revenue

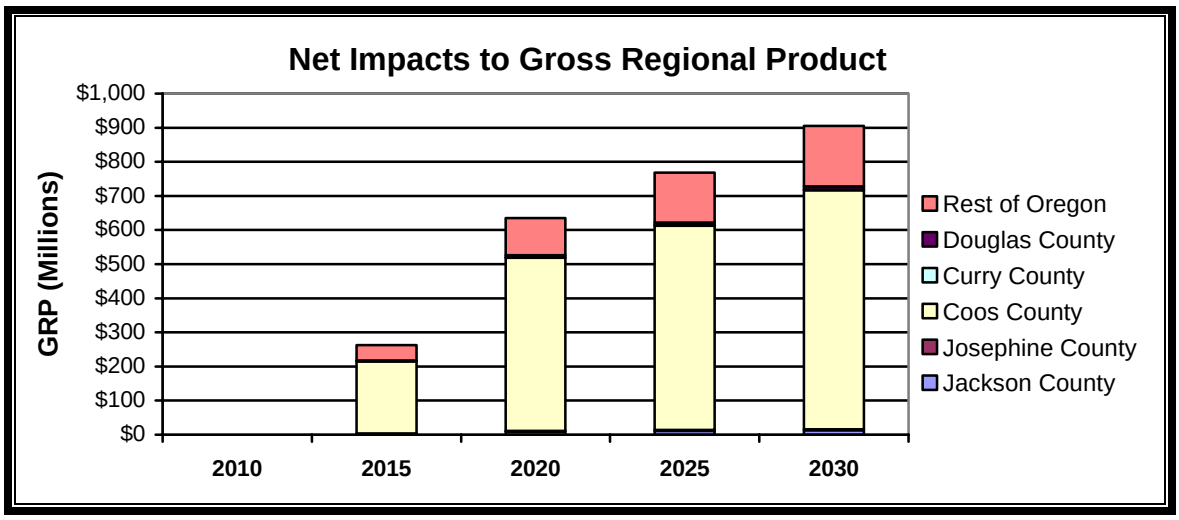
As one would expect, the vast majority of impacts appear during the construction cycle for such a large project. Dramatic employment increases are projected during the construction cycle, which is not surprising as part of a $775 million pipeline project. For both the Jordan Cove Energy Project and the Pacific Connector Gas Pipeline project there is a hang-over effect from the construction cycle from the standpoint of Real Personal Per Capita Disposable Income. The model projects about 300 net migrants to the Coos Bay area as a result of the pipeline project from 2008 to 2010, but less than 100 of these are forecast to leave after the construction cycle is over.

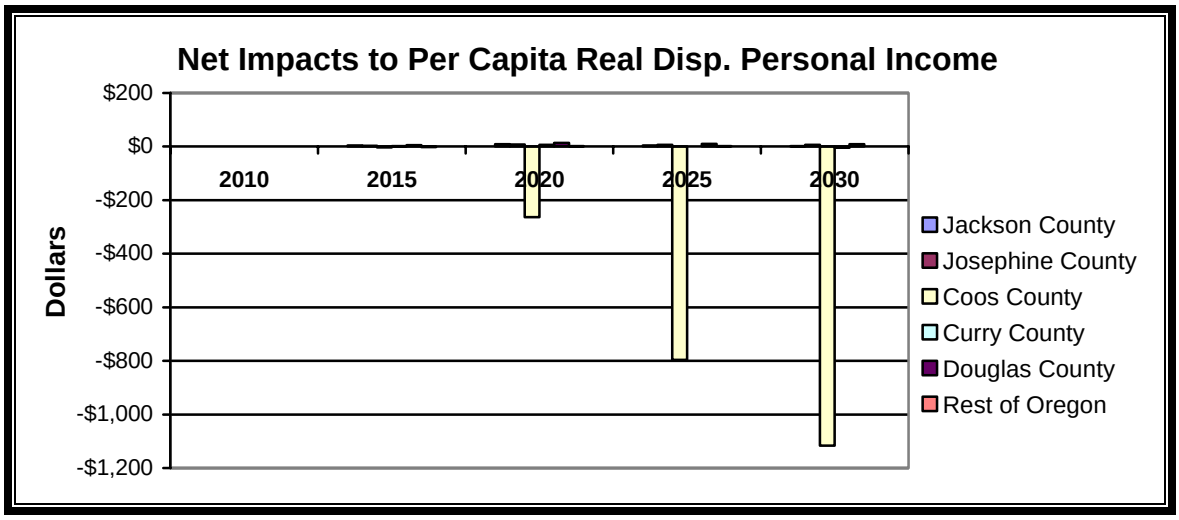
While the concentration of economic impacts surround the construction cycle, the model does estimate that around 400 hundred jobs and close to $50 million in Gross Regional Product would result from the pipeline project by 2020.

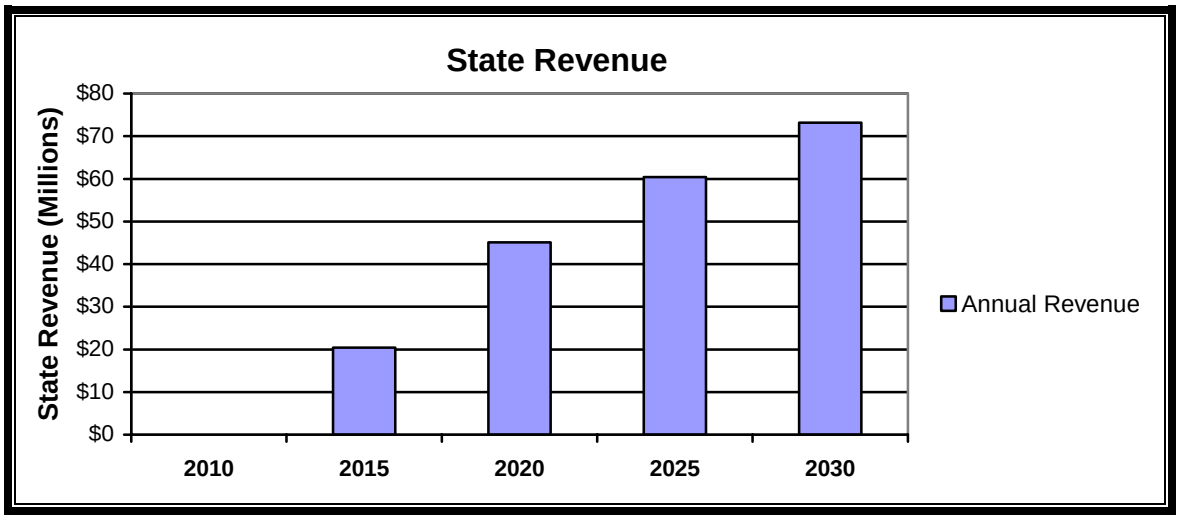
3. Oregon Gateway Project & CORP *Coos Bay Line* Improvements

The below graphics depict the net economic benefits associated with the proposed Oregon Gateway project. The improvements to the Port and the CORP Coos Bay line are modeled together. Upgrades to both of these facilities are interdependent in this project scenario.




Net Impacts to Gross Regional Product
GRP (Millions)
$1,000
$900
$800
$700
$600
$500
$400
$300
$200
$100
$0
2010
2015
2020
2025
2030
Rest of Oregon
Douglas County
Curry County
Coos County
Josephine County
Jackson County


Net Impacts to Per Capita Real Disp. Personal Income
Dollars
$200
$0
-$200
-$400
-$600
-$800
-$1,000
-$1,200
2010
2015
2020
2025
2030
Jackson County
Josephine County
Coos County
Curry County
Douglas County
Rest of Oregon

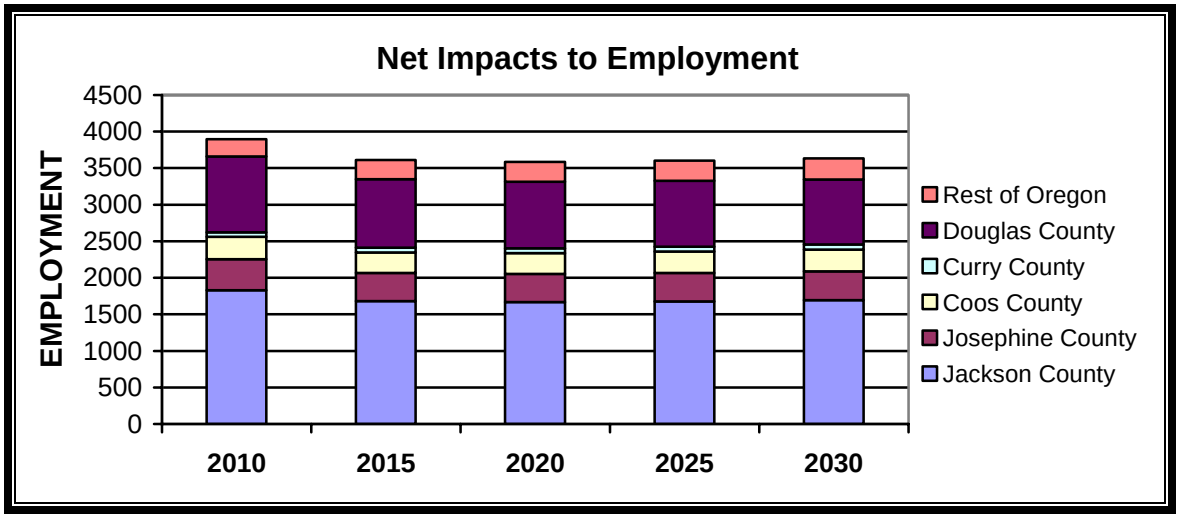

State Revenue
State Revenue (Millions)
$80
$70
$60
$50
$40
$30
$20
$10
$0
2010
2015
2020
2025
2030
Annual Revenue

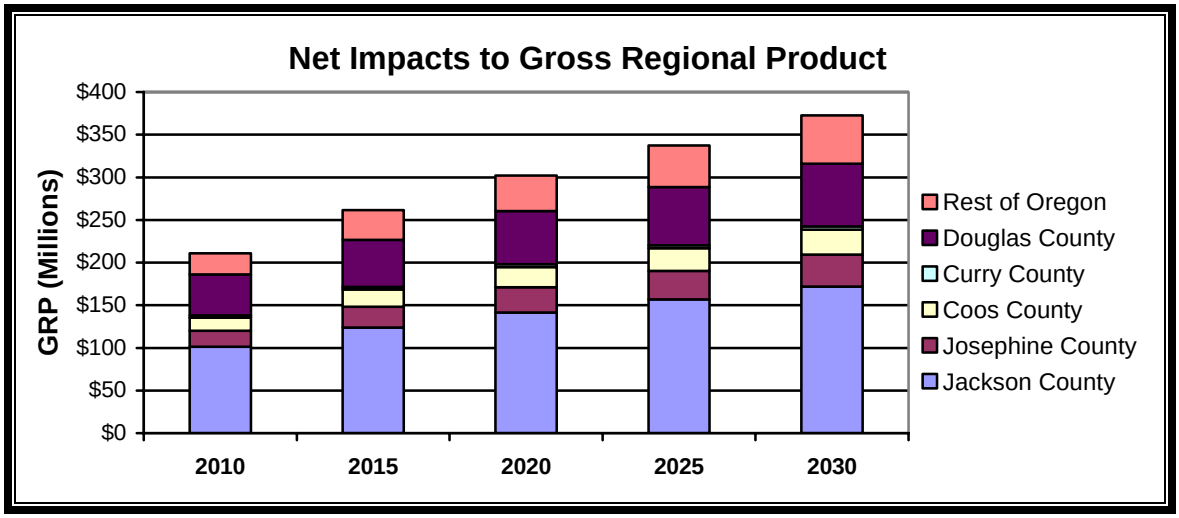
The Oregon Gateway project indicates strong economic growth in absolute terms. The analysis indicates this project has important impacts on the State's economy outside the 5-County area. This is indicated by the fact that almost one fifth of the GRP growth is in the rest of the state.

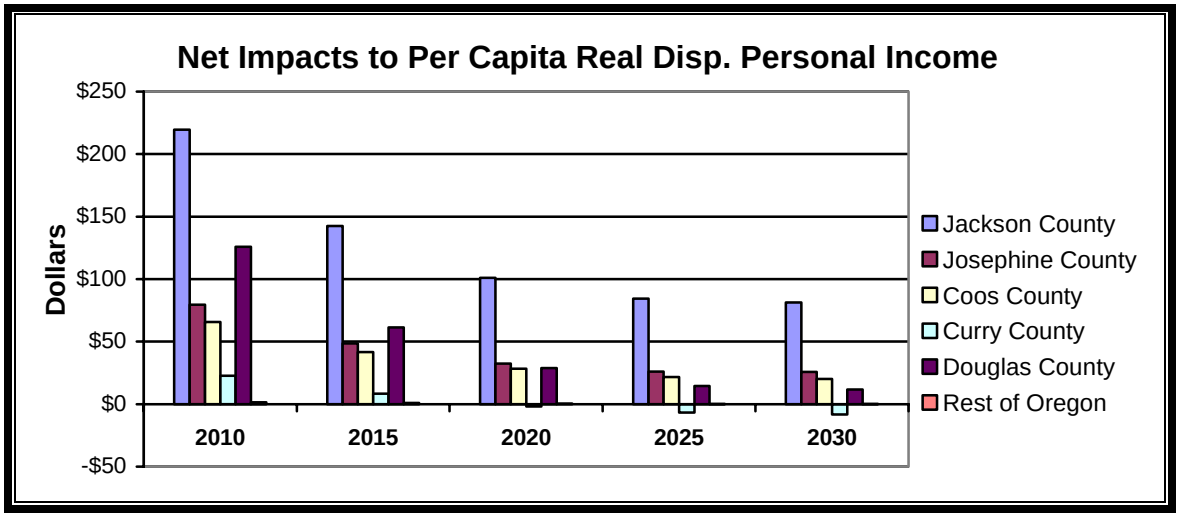
The strong negative impacts on net real per capita disposable income from the Gateway project have the potential to compound similar conditions as a result of the LNG projects. The REMI model predicts in-migration that responds to this employment demand stimulus. This in-migration increases the costs to households, such as housing prices and household operations prices, in response to the demand stimulus. Increases in prices to households also results in the model projecting out-migration of retired persons, who tend to have high per capita real disposable personal income.

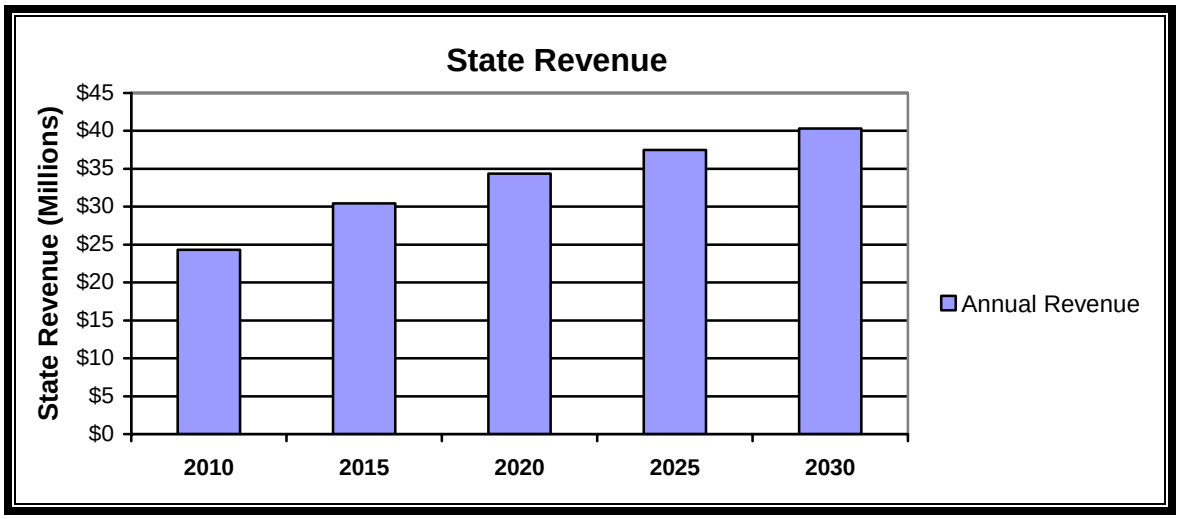
B. ODOT Highway Investments

The below graphs depict forecast benefits from the proposed highway projects. The modeling assumes a 2.5 percent increase in network efficiency and corresponding benefits captured by TranSight. The model incorporates all construction spending from the contemplated highway projects.







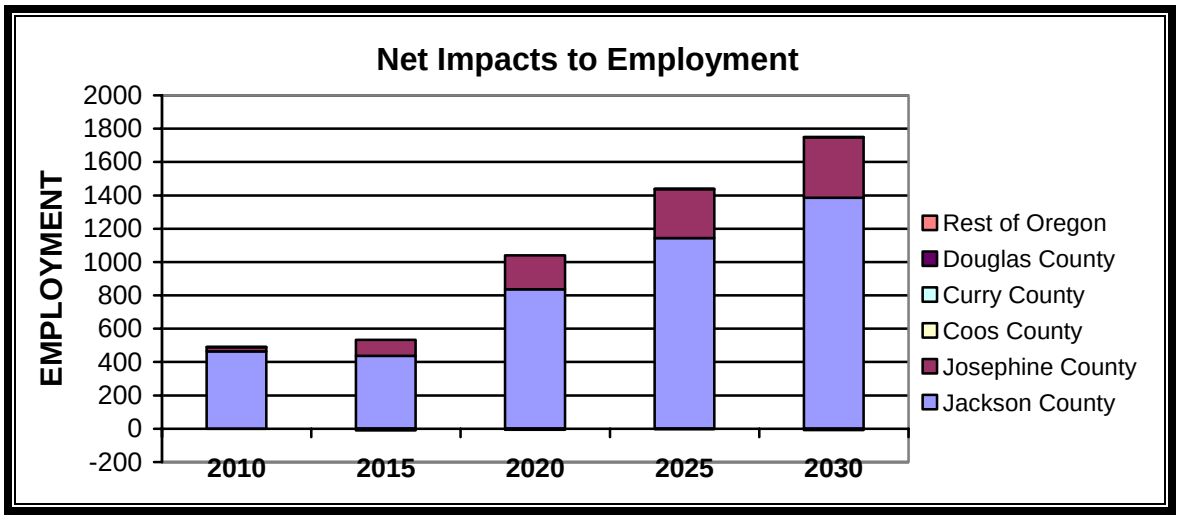


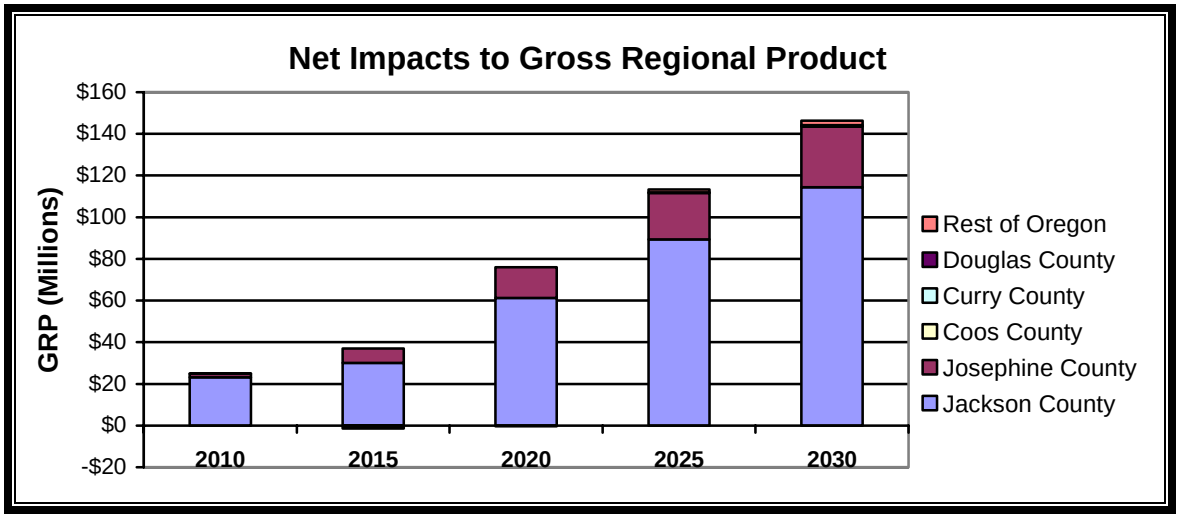
The Highway Investment results depict dramatic economic expansion from the contemplated $3.2 billion in Highway investments. If these investments can reach benchmark network efficiency increases of 2.5 percent, then this investment strategy would result in substantial economic expansion. Detailed traffic modeling work by ODOT's Transportation Planning and Analysis Unit (TPAU) is theoretically capable of refining the 2.5 percent benchmark assumption. By increasing access in the 5-County region, the TranSight model predicts increases in all reported categories of economic activity.

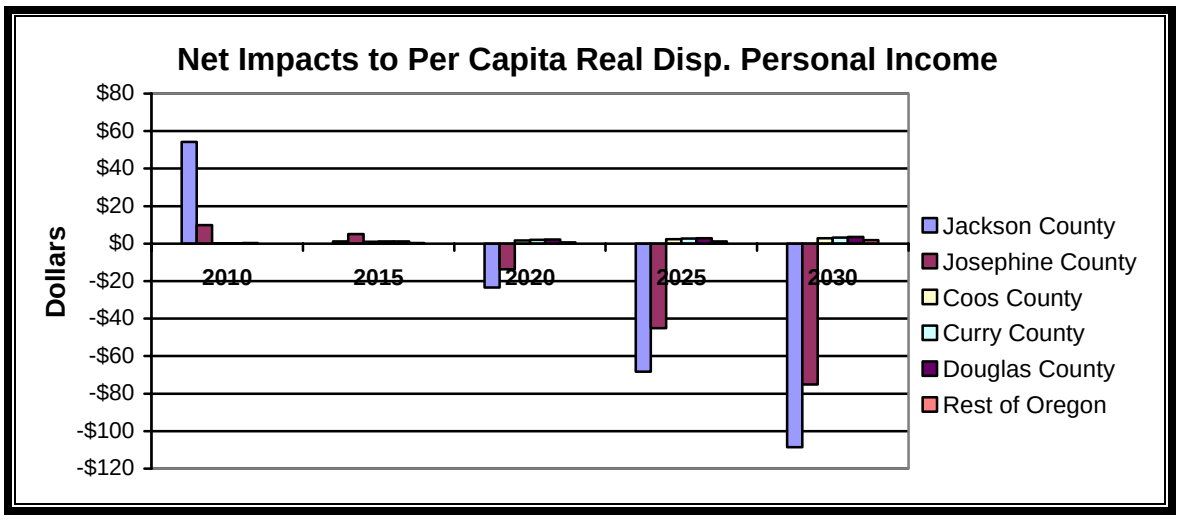
In relative terms, the aggressive transportation investments analyzed here would increase employment in the 5-County region by about 8.5 percent.

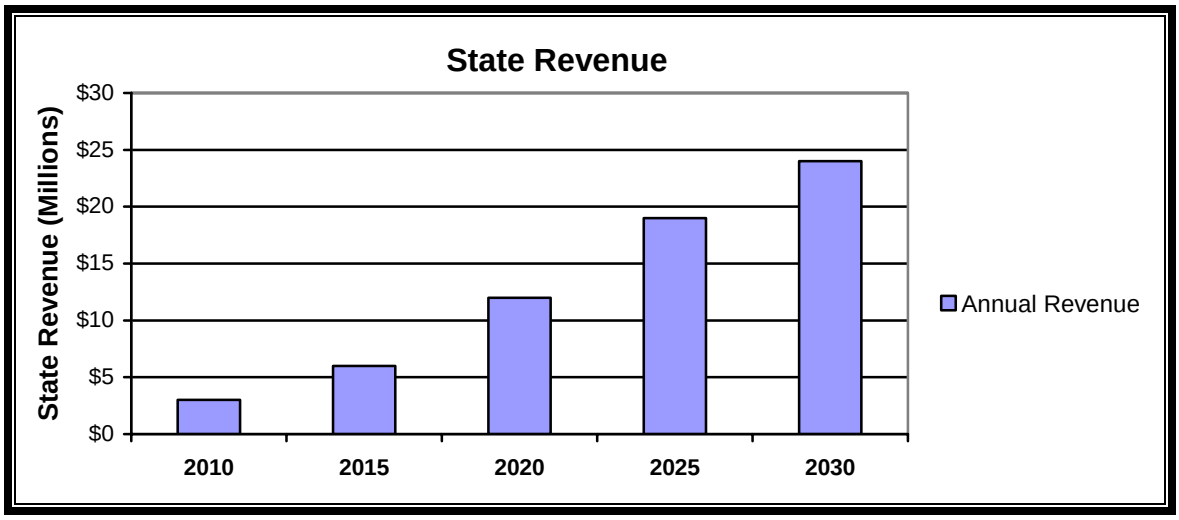
C. Rogue Valley-Medford International Airport

The Rogue Valley-Medford International Airport is the region's primary airport and there are a number of businesses that rely on it. The below results describe the economic benefit of the airport based upon the essential relationship it has with business that are sensitive to air transportation costs.





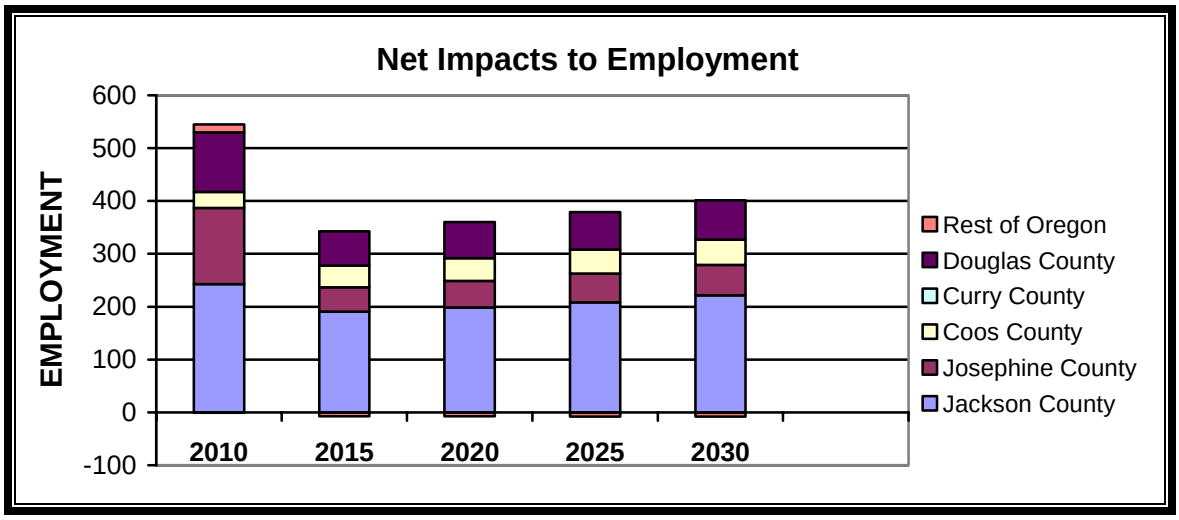


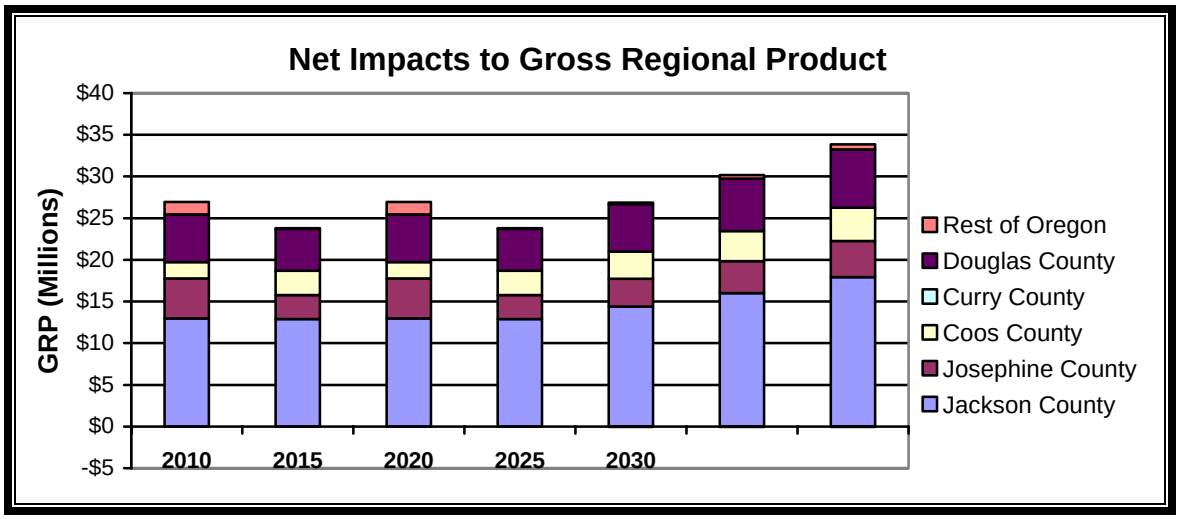


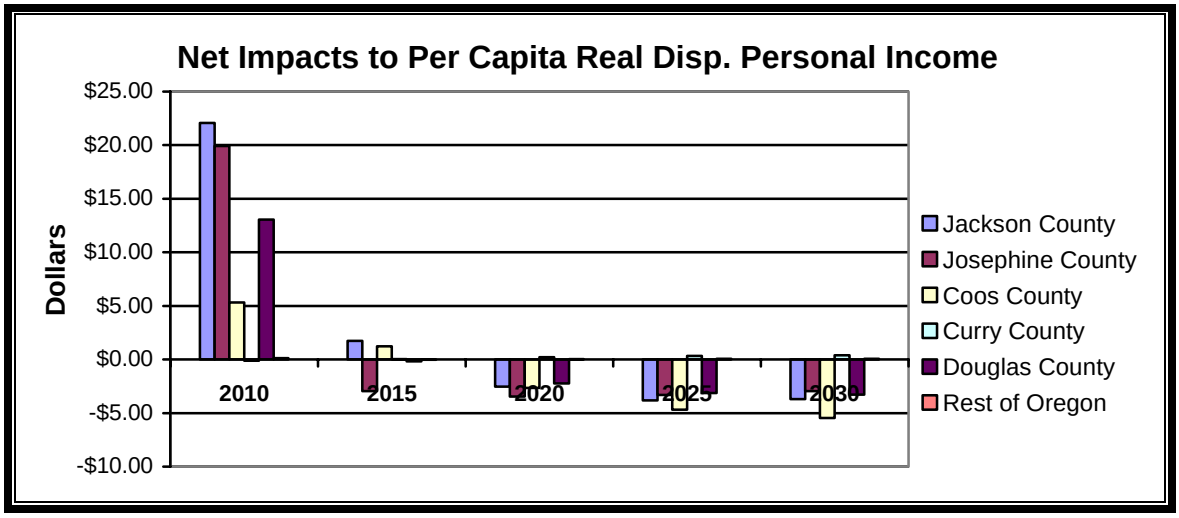
The most significant capacity improvements at the airport are the new terminal, new tower and parallel runway project. The Airport Master Plan indicates that the parallel runway, in particular, will add substantial capacity. The Airport Master Plan also indicates that this capacity will be needed to serve forecast travel demands. As such, if the 10 to 20 percent growth in air travel is dependent on these improvements this represents an essential investment for the long-term health of the Jackson County and Josephine County economies that will support considerable economic growth and expansion.

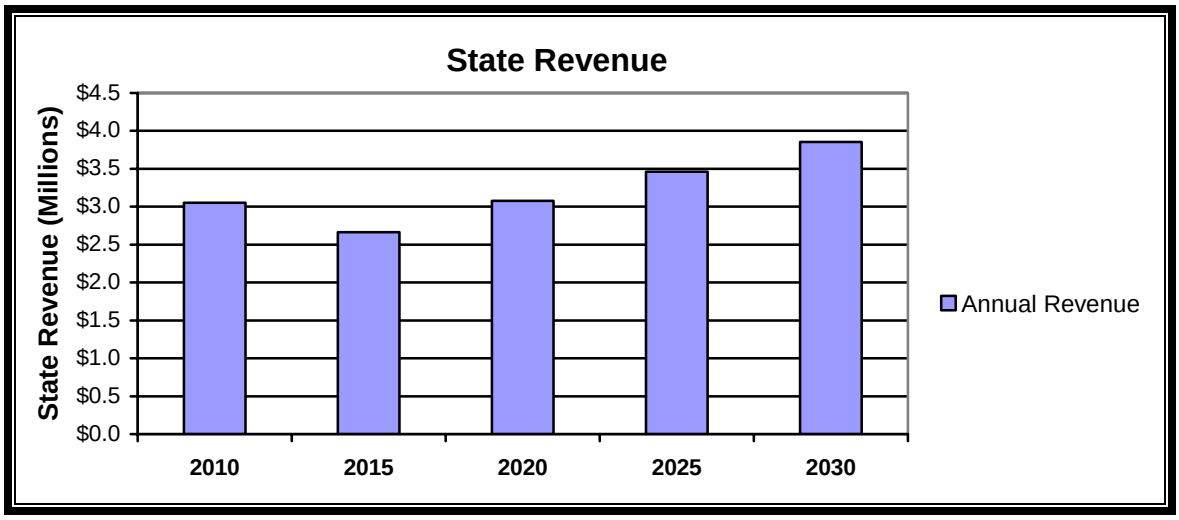
D. CORP Siskiyou Line Improvements

The below graphs depict the benefits forecast from the proposed CORP investment in its Siskiyou Line from Eugene to Weed.









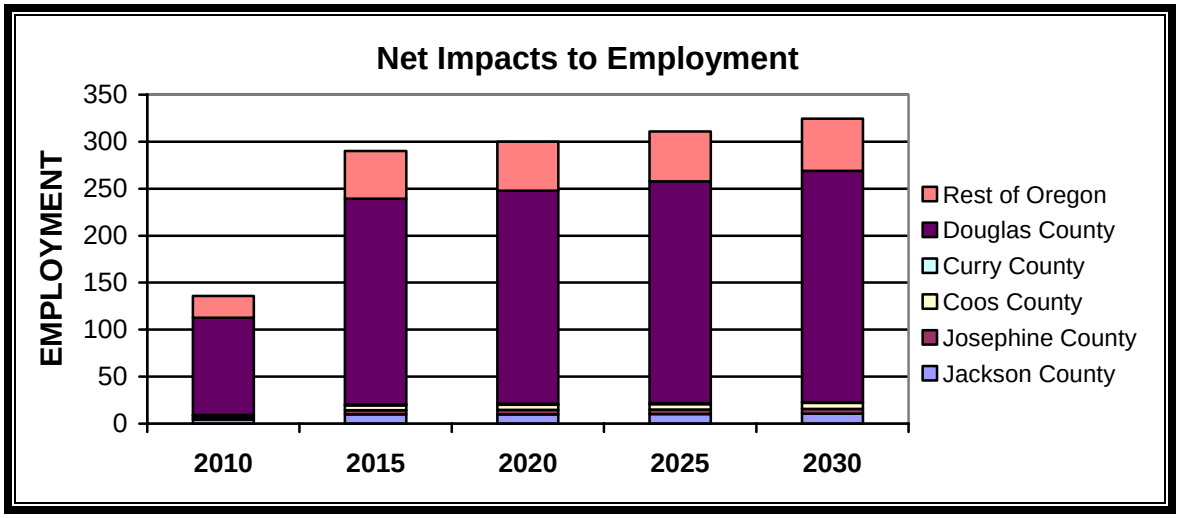
The above results indicate the importance of the CORP line in the 5-County regional economy. While the system investments in this project are maintenance related, again the access improvements are relative in nature. The CORP Siskiyou Line would benefit from repair. Most rail facilities are experiencing challenges because the direct return on investment for the managing company from facility upgrades are not covered by additional revenues. As such, the modeled improvements are really an example of the lost economic expansion potential that could reasonably be expected if system efficiency is decreased by 10 percent over the analysis timeframe if the system is not maintained in a reasonably efficient state of operations.

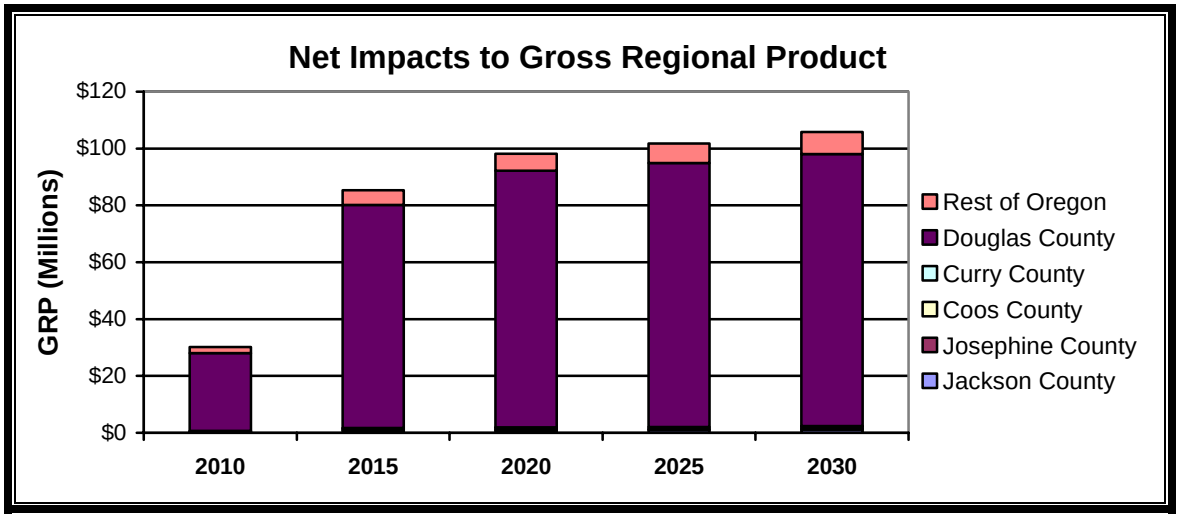
E. Illustrative Private Sector Projects

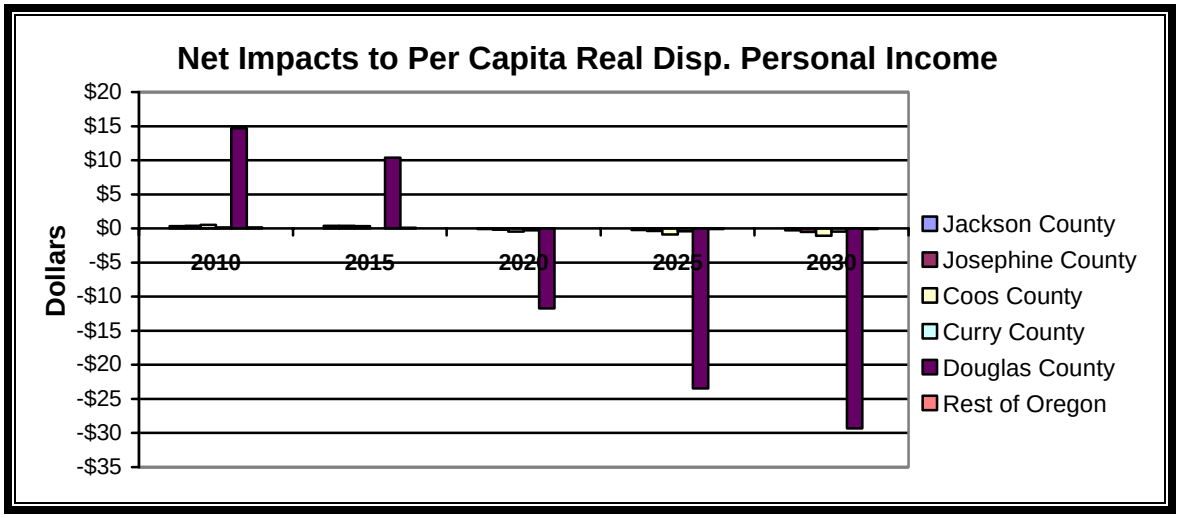
In addition to the major transportation and natural gas utility projects above, the analysis also includes two illustrative private sector investment projects that are intended to demonstrate the kinds of economic growth and expansion that can occur as a result of private sector investment responding to targeted transportation infrastructure investments. The two private sector projects analyzed here are a proposed Jackson County Employment Campus and a Laminated Veneer Lumber (LVL) plant in Douglas County.

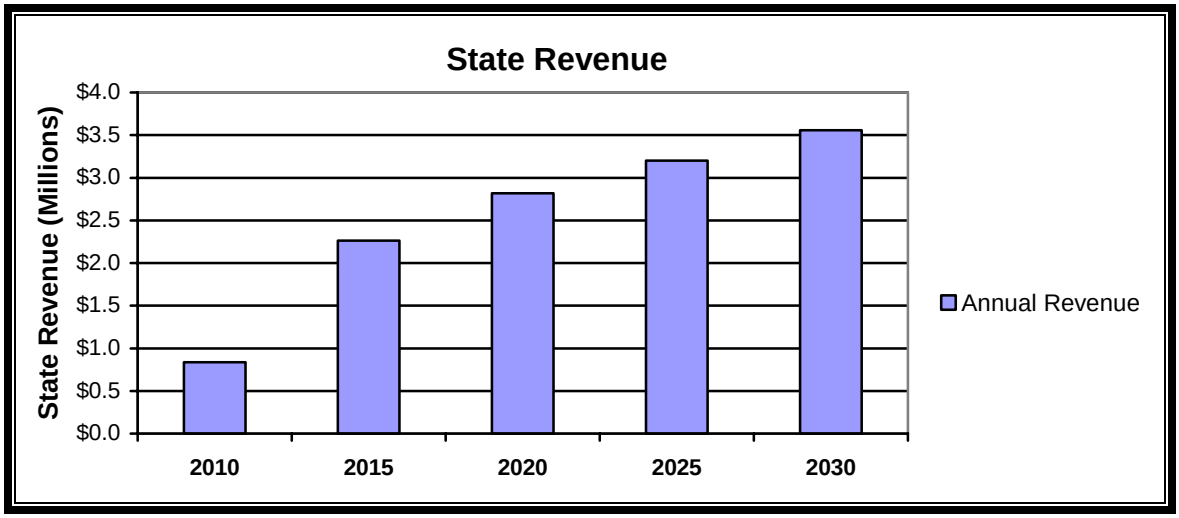
1. Roseburg Forest Products LVL Plant

This project is a concrete example of how targeted transportation investments can support private sector industrial investment. The CORP yard in Roseburg was capacity constrained. Funds from Connect Oregon 1 added enough capacity to the CORP system to allow Roseburg Forest Products to move forward with plans to expand a Laminated Veneer Lumber Plant. The projected economic impacts from this project are provided below:







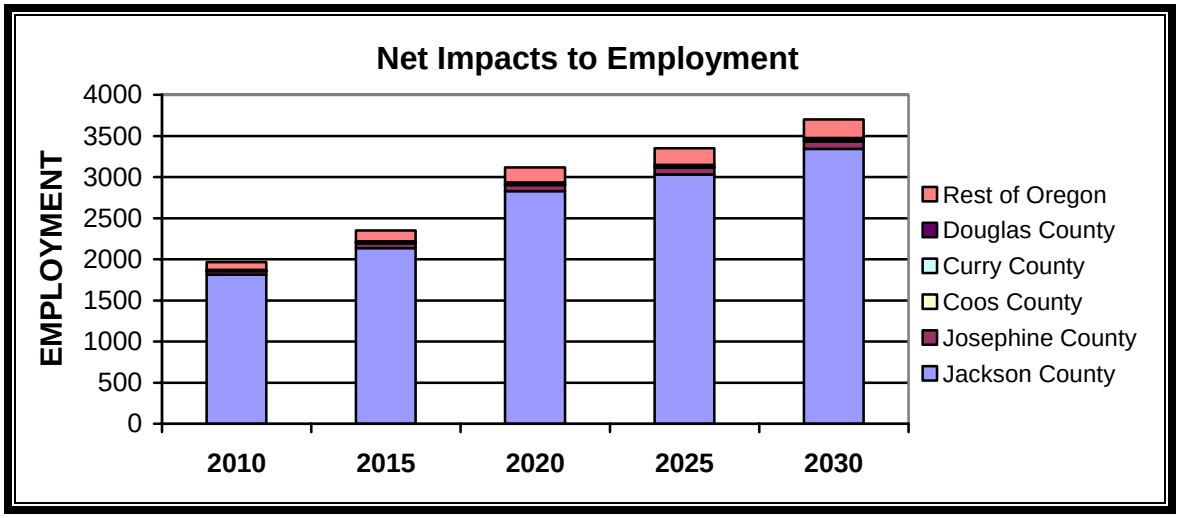


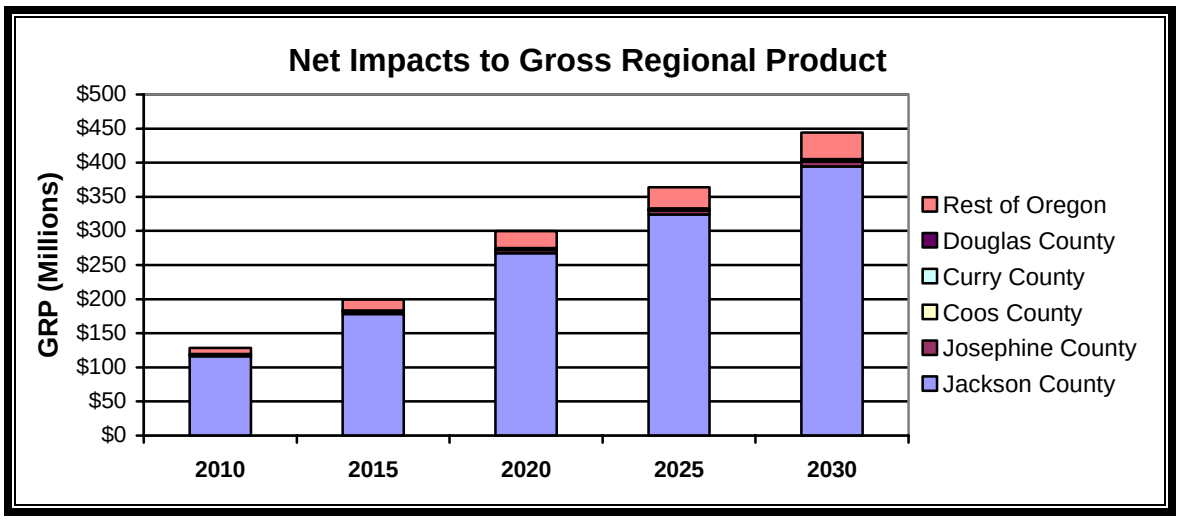
The LVL Plant results are a good example of how a high value-added production facility impacts Gross Regional Product. For an investment of less than $100 million the plant is projected to generate close to $100 million in total GRP within the State by 2020.

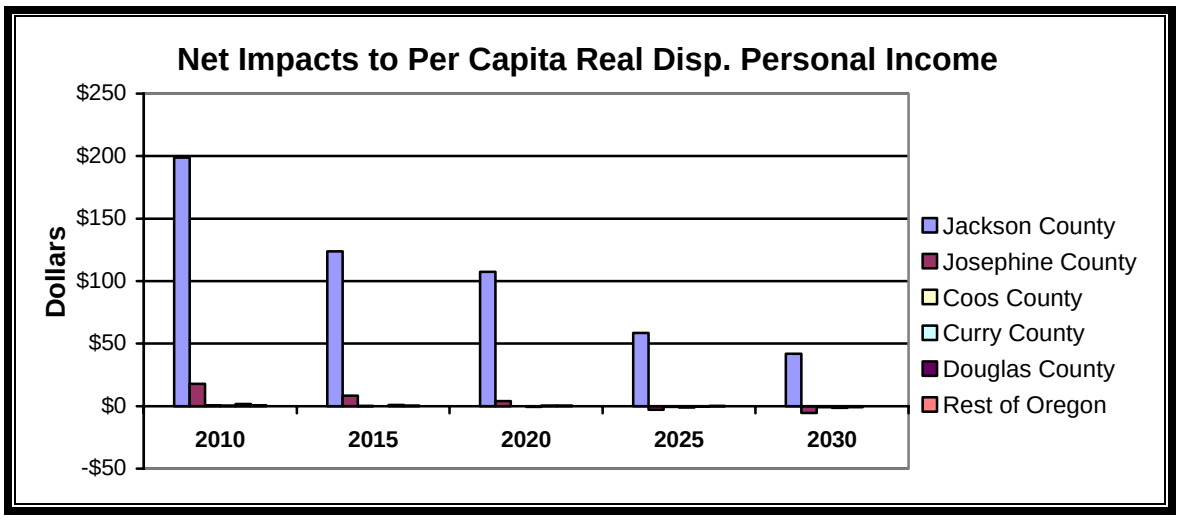
2. Jackson County Employment Campus

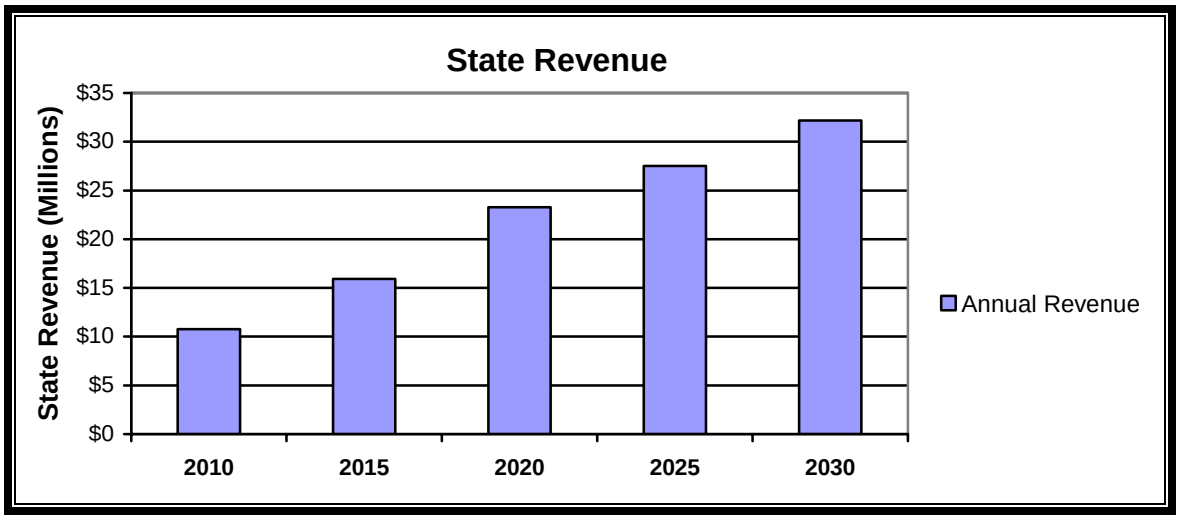
This is a conceptual project that is in the initial planning stages. The concept behind this project is that Jackson County generally, and Medford specifically, has unique amenity characteristics that are attractive to certain technical industries. These industries, such as instruments, tend to demand Office Park/R&D Employment Campus style development patterns. There is limited land available in Jackson County for this development pattern. The City of Medford has, through the Regional Problem Solving process, identified 150 acres of land as a potential site for this type of development project. The site is well situated near I-5 and the planned extension of a major arterial roadway (South Stage Road) across I-5. The below graphs depict the economic impacts of

build-out of this project based upon assumed absorption rates, employment densities and employment mix described in the methodology in Section IV.







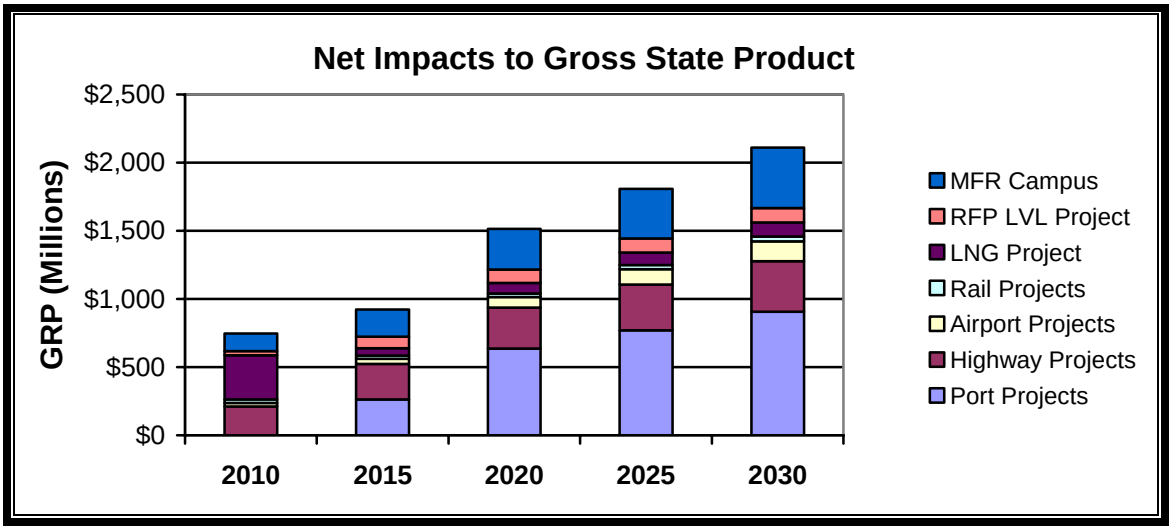


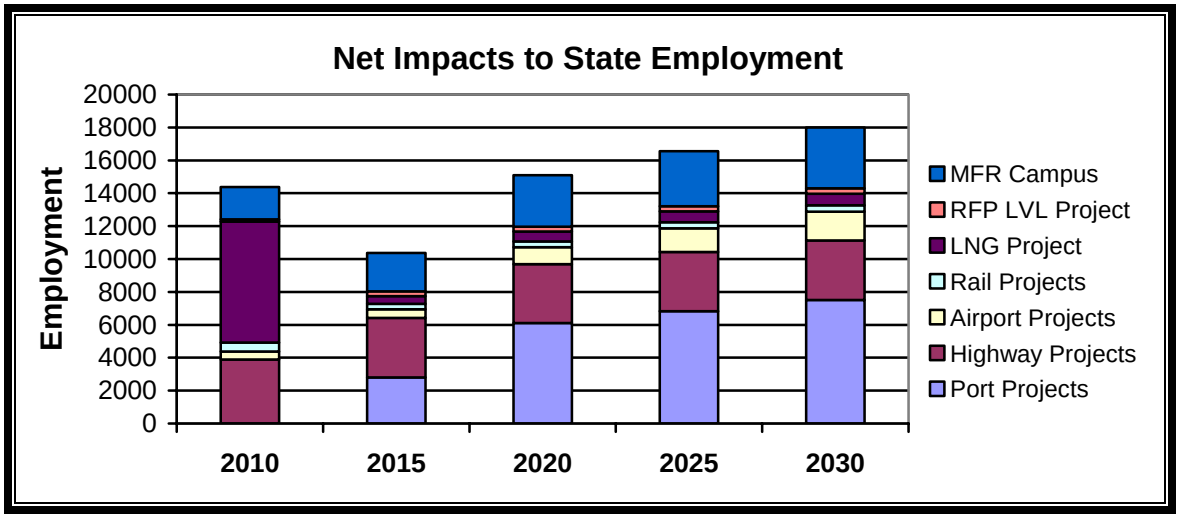
While the above analysis is only one of an array of potential absorption and employment mix scenarios for this project, the results depict the power of an economy that diversifies and attracts a mix of high-value added activities with relatively high payroll. This is clearly depicted by substantial growth in Gross Regional Product and employment growth near 3,500 by 2030 in Jackson County alone.

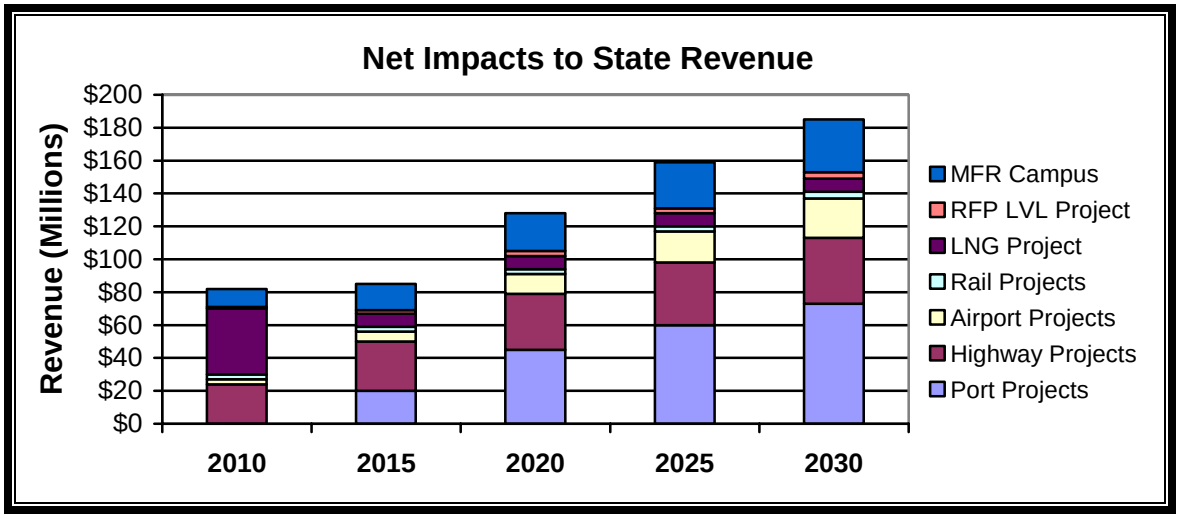
The Employment Campus project is one of the projects analyzed where real personal disposable per capita income is projected to outstrip the eroding effects of inflation and population growth. Ultimately, the ability for this project to meet these projections will depend on marketing, successful competition with alternative sites in the western U.S., and continued growth in key employment sectors in Jackson County.

F. Combined Results

The combined results are a recitation of those provided in the Executive Summary.


Net Impacts to Gross State Product
GRP (Millions)
$2,500
$2,000
$1,500
$1,000
$500
$0
2010
2015
2020
2025
2030
MFR Campus
RFP LVL Project
LNG Project
Rail Projects
Airport Projects
Highway Projects
Port Projects


Net Impacts to State Employment
Employment
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
2010
2015
2020
2025
2030
MFR Campus
RFP LVL Project
LNG Project
Rail Projects
Airport Projects
Highway Projects
Port Projects


Net Impacts to State Revenue
Revenue (Millions)
$200
$180
$160
$140
$120
$100
$80
$60
$40
$20
$0
2010
2015
2020
2025
2030
MFR Campus
RFP LVL Project
LNG Project
Rail Projects
Airport Projects
Highway Projects
Port Projects

VI. CONCLUSIONS AND RECOMMENDATIONS

The analysis contained in this report is intended to provide decision makers an unbiased assessment of each of the projects analyzed. Economic impacts is only one of many potentially important factors in the decision making process for major transportation projects.

What are the economic consequences of aggressive investment in Southwest Oregon's transportation and natural gas utility infrastructure?

- Significant economic expansion is forecast to result from each of the projects analyzed here, but some projects have greater potential than others. The projects with the greatest potential are those that reduce effective distance to support a diverse set of competitive industries in the region specifically and the State generally. These projects include the Port of Coos Bay Project Group and the Airport Project.

- The projects that involve large capital expenditures over a short-period present long-term economic challenges on a per capita basis. This is because the in-migration response to economic opportunities is not directly equivalent to the out-migration response as economic opportunities diminish following construction. These in-migration activities are also accompanied by increases in prices to households. This in-turn causes out-migration of retired age people who avoid such price pressures. This problem is compounded in economies that are less diversified and more rural, such as Coos County.

- The Highway Project analysis indicates substantial benefits, but is likely too conservative from a cost-benefit standpoint. This analysis would benefit from refined data inputs. For example, if detailed data were available that forecast network efficiency improvements within the region (changes in VMT and VHT) for each dollar spent on modernization projects, then the REMI modeling work would likely show higher levels of economic benefit and expansion for each dollar spent on the Region's highway network. Essentially, the analysis would be able to assume higher levels of access benefits for each dollar spent on construction projects and lower total construction demand would improve the real personal per capital disposable income results.

- The private sector projects analyzed demonstrate significant potential value associated with key transportation projects. If key transportation investments can facilitate or entice private sector investment, that investment has the potential to result in significant economic and revenue benefits. In the case of the LVL Plant, that project has the potential to provide almost as much revenue to the State annually as the Connect Oregon grant necessary to facilitate the expansion.

- The analysis presented here is relatively conservative in one important aspect. Economic expansion in this analysis is almost universally derived from benefits to existing industries. With the type and scale of investments analyzed here, there are a myriad of potential opportunities for these investments to attract or create competitive industries that do not currently exist. Even a handful of such successes have the potential to dramatically improve the forecast results presented here.

This exploratory analysis does not tell the whole story. There are a number of recommendations that would further inform the policy question analyzed here, such as:

1. Improved data collection and forecasting of efficiency benefits could substantially increase the accuracy and precision of the analysis presented. The methodology of the economic analysis presented here would not change substantively, but empirically derived numbers could replace many of the assumptions and the statistical significance of those numbers could then be reported. Efficiency data sets are important data set categories that are largely ignored by most State and Federal agencies. Oregon may have an opportunity to become more competitive in various

Federal processes just by developing and becoming a leader in this type of data development and management. Moreover, this type of data would lend itself well to more detailed fiscal forecasting and analysis to project return on investment for project evaluation and comparison.

2. The total state revenue picture is only one part of the equation from the perspective of sound State of Oregon fiscal decision-making. The financing mechanisms necessary to support the contemplated investments will not in fact be exogenous from the State budget. Detailed fiscal calibration of the model combined with detailed construction financing scenarios would allow for relatively precise cost-benefit analysis to the various State funds that might be used to support the investments analyzed here.

3. The negative real personal per capita disposable income impacts associated with the large construction projects analyzed here need not function as a deterrent to any of the projects contemplated. The State has time to respond to the real income effects through strategic decision making that would couple these projects with end-user private investments wishing to take advantage of the opportunities created by the projects, including:

   a. A willing and available labor force that will be seeking work.

   b. New capacity in marine, highway, and natural gas utility infrastructure

   c. The inherent natural resources and high amenity values already present in the region.

   In addition to economic development responses to absorb latent labor supplies, there are supply-side policy options as well, such as:

   a. Changes to local tax structures that will exert downward price pressures on the key household consumption component- housing itself. These taxes could then be leveraged to deliver lower costs for other components of household consumption, such as attracting additional financial and insurance services to the area and increasing consumer goods opportunities.

   b. Increase land supplies for housing and develop programs to lower the delivered price of housing.

   c. Identify and target deficiencies in the supply of medical services, as medical services have the potential to cause leakage in an expanding economy and can consume a significant portion of households income.

4. This analysis does not make any assumptions that the relative quality of infrastructure investments in Oregon will improve. The Connect Oregon program in an excellent example of how quality investment decisions can support substantial economic expansion with relatively low levels of investment. Many of the projects required generalized benefit assumptions. If the relative quality of infrastructure products could be improved then this analysis could be repeated with assumed improvements to access for each dollar invested.