Economic Impacts of Energy Efficiency Within a Cap-and-Trade System

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ABSTRACT

ECONorthwest conducted an economic impact analysis of a carbon cap-and-trade policy in the state of Oregon using the policy design as proposed by the Western Climate Initiative. Data from ICF International's ENERGY 2020 modeling were the basis of this study and were used to run annual models on economic impacts for the years 2008 through 2020. Alternative high and low-cost scenarios were developed to test the sensitivity of the results to changes in elasticities across sectors. Results were consistent across all three scenarios and showed an increase in both economic output and employment.

By 2020, cumulative impacts of a cap-and-trade policy in Oregon would result in an increase in economic output of $4.6 billion and an increase in nearly 38,000 jobs for the state compared to the reference case. This represents an increase of 2 percent from total Oregon employment in 2007. In the high and low-cost scenarios, cumulative economic output in 2020 increased by $3.2 billion and $6.1 billion respectively, while jobs increased by 27,260 and 48,710 respectively.

Introduction

Oregon Governor Ted Kulongoski has announced that one of his priorities for the 2009 legislative session is to pass climate legislation, specifically a cap-and-trade program. At the Governor's behest, Oregon is collaborating in the Western Climate Initiative (WCI) to develop regional strategies to reduce greenhouse gas emissions. In September 2008, WCI released a report that provided design recommendations for a market-based cap-and-trade system to help achieve the greenhouse gas reduction goal.[1]

A coalition of organizations was formed for the purpose of analyzing the potential economic impacts to Oregon of the proposed WCI cap-and-trade system as described in the September 2008 report. As part of the process of developing the WCI design recommendations, ICF International (ICF) used the ENERGY 2020 model to forecast changes in energy prices and energy demand that would result from the cap-and-trade and complementary policies. The Business Committee contracted with ECONorthwest to estimate the potential economic impacts to Oregon of the proposed WCI cap-and-trade system. The economic impact analysis was begun in 2008 and builds on the WCI modeling conducted by ICF using the ENERGY 2020 model results.

Note that this paper has been produced independently of the earlier project and utilizes a slightly different analysis method. The results presented here are solely the responsibility of the authors—they have not been reviewed or endorsed by the original Business Committee that sponsored ECONorthwest's earlier WCI economic impact analysis for Oregon.

[1] Design Recommendations for the WCI Regional Cap-and-Trade Program (September 23, 2008), which is available on the WCI website www.westernclimateinitiative.org.

Background

The Western Climate Initiative is a partnership of seven Western states (Arizona, California, Montana, New Mexico, Oregon, Utah, and Washington) and four Canadian provinces (British Columbia, Manitoba, Ontario, and Quebec) with numerous other US states, Canadian provinces and Mexican states participating as observers.[2] The WCI scenario modeling was conducted by ICF International in 2008 using the ENERGY 2020 model. Details on the ENERGY 2020 model have been documented by ICF in two separate volumes that present the initial modeling assumptions and modeling results for the recommended policy design.[3] Given the large number of assumptions and the existing documentation, the details of the ENERGY 2020 model will not be replicated here except for a few key assumptions.

The WCI modeling included several different scenarios involving various combinations of complementary policies, offsets, and other design considerations. For the Oregon economic impact analysis, we took the Oregon-specific results from one of the final WCI policy options for use in the IMPLAN model discussed below. This scenario will be referred to as the WCI Policy scenario throughout this report.[4]

The WCI analysis includes several characteristics that are referred to as the "Broad Scope" for the Energy 2020 modeling. Under the Broad Scope, the following areas are assumed covered under cap-and-trade[5]:

- Electricity generation, including emissions from electricity imported into WCI jurisdictions from non-WCI jurisdictions.
- Combustion at industrial and commercial facilities.
- Industrial process emission sources, including oil and gas process emissions.
- Residential, commercial, and industrial fuel combustion at facilities with emissions below the WCI thresholds.

Additional assumptions for the WCI scenario examined for Oregon include the following:

- Banking of allowances for use in future years is allowed.
- Offsets are allowed up to 5 percent of the annual compliance obligation, valued at $20/ton.
- The WCI ENERGY 2020 modeling assumes that the transportation sector is included beginning in 2012, however, the transportation sector was not addressed in the analysis presented in this paper.
- All of the allowances are assumed to be auctioned, as opposed to having some or all of the allowances allocated at no cost.

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[2] Additional information on the WCI is available on the website www.westernclimateinitiative.org.
[3] The two documents are Economic Analysis and Modeling Support to the Western Climate Initiative ENERGY 2020 Model Inputs and Assumptions (July 15, 2008) and Design Recommendations for the WCI Regional Cap-and-Trade Program (September 23, 2008). Both of these documents are available on the WCI website www.westernclimateinitiative.org.
[4] This corresponds to the scenario described as "Broad Scope, with complementary policies and with offsets" on page 17 of the report Design Recommendations for the WCI Regional Cap-and-Trade Program Appendix B: Economic Modeling Results. It is also referred to as "Case G" in the detailed data spreadsheets provided by ICF for this analysis.
[5] Page 17, Design Recommendations for the WCI Regional Cap-and-Trade Programs.

The recommended WCI design assumes that Oregon enacts complementary policies in addition to the cap-and-trade framework. These complementary policies include[6]:

- Energy efficiency programs that are able to reduce the annual rate of energy consumption growth by 1 percent are included in the WCI scenario. These programs are expected to reduce carbon emissions by about 74 million metric tons in 2020 relative to the WCI Reference case.

- Clean Car Standards (equivalent to California's Pavley I and Pavley II polices) are assumed in the WCI scenario. These standards reduce emissions by about 30 million metric tons in 2020 relative to the Reference case.

- Programs that reduce vehicle miles traveled (VMT) by 2 percent in 2020 relative to the WCI Reference case. These programs are expected to reduce carbon emissions by 4 million metric tons in 2020 (in addition to the Clean Car Standards reductions).

All of the modeling completed by ICF was evaluated relative to a WCI Reference case, which estimates market conditions in absence of any type of new carbon reduction policy such as cap-and-trade.[7] This will be referred to as the Reference case throughout the remainder of this paper.[8]

The WCI Policy scenario is modeled for Oregon using the characteristics described above. The ENERGY 2020 outputs are included in the WCI Design Recommendations report and include the following:

- Changes in spending on energy efficient equipment

- Changes in fuel prices

- Changes in spending on fuel

- Carbon allowance prices

- Changes in carbon emissions

A subset of the ENERGY 2020 model outputs specific to Oregon were provided to ECONorthwest by ICF for use in this analysis, as described below.

Analysis Methods

ECONorthwest utilized a specific input-output model called IMPLAN (for IMpact Analysis for PLANning) to develop the economic impact estimates presented in this report.[9] The changes in fuel costs

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[6] Complementary policies and associated emissions reductions are taken from page 17 of Design Recommendations for the WCI Regional Cap-and-Trade Program Appendix B: Economic Modeling Results.

[7] Existing policies such as Oregon's Renewable Energy Standard are included in the WCI Reference Case.

[8] Additional detail on the assumptions included with the WCI Reference Case are included in the document Economic Analysis and Modeling Support to the Western Climate Initiative ENERGY 2020 Model Inputs and Assumptions available on the WCI website www.westernclimateinitiative.org.

[9] IMPLAN was developed by the Forest Service of the US Department of Agriculture in cooperation with the Federal Emergency Management Agency and the Bureau of Land Management of the US Department of the Interior to assist federal agencies in their land and resource management planning. Applications of IMPLAN by the US Government, public agencies and private firms span a wide range of projects, from broad, resource management strategies to individual projects, such as proposals for developing ski areas, coal mines, and transportation facilities, and harvesting timber or other resources.

and energy efficient equipment spending predicted by ENERGY 2020 will affect Oregon's economy through several different channels. Spending in these areas impacts the economy *directly*, through the purchases of goods and services locally, and *indirectly*, as those purchases, in turn, generate purchases of intermediate goods and services from other, related sectors of the economy. In addition, the direct and indirect increases in employment and income enhance overall economy purchasing power, thereby *inducing* further spending on goods and services. This cycle continues until the spending eventually leaks out of the local economy as a result of taxes, savings, or purchases of non-locally produced goods and services. The IMPLAN model captures each of these effects.

The IMPLAN model uses multiplier factors based on historical spending patterns within Oregon to develop the state-level impacts. In addition to estimating impacts on households, IMPLAN contains information on 506 different industry sectors within Oregon and provides very detailed information on the distribution of spending impacts across various industries.

The IMPLAN model reports the following economic impacts:

- *Total Industrial Output (Output)* is the value of production by industries for a specified period of time. Output can be also thought of as the value of sales including reductions or increases in business inventories.

- *Employee compensation (Wages)* includes workers' wages and salaries, as well as other benefits such as health and life insurance, and retirement payments.

- *Proprietary income (Business Income)* represents the payments received by small business owners or self-employed workers. Business income would include, for example, income received by private business owners, accountants, lawyers, etc.

- *Employment (Jobs)* impacts include both full-time and part-time employment.

- *Indirect business taxes* are taxes paid by businesses to local, state, and federal taxing jurisdiction. In Oregon, indirect business taxes consist primarily of property taxes. Further, in Oregon, approximately 85 percent of the indirect business taxes paid accrue to state and local taxing jurisdictions; the remainder goes to the federal government.

ECONorthwest calculated spending in each sector using energy savings data from ENERGY 2020 specific to Oregon and savings acquisition costs from the Northwest Power and Conservation Council (NPCC) for each year from 2008 through 2020 and ran the IMPLAN model separately for each year. Note that only investments in building energy efficiency were considered; our economic impact analysis did not address changes in the transportation sector. The effects of energy savings impacts from prior years are carried over for the commercial and industrial sectors, as the increased efficiency of production due to the energy efficiency investments will have a sustained positive impact on the economy over time.

The IMPLAN model is a static model that provides a snapshot of Oregon's economy at a particular point in time. While we have made some adjustments to make the model more dynamic (such as the use of the elasticity factors discussed below), more complex market relationships (such as the entry of new businesses and exit of existing businesses) are not accounted for in this analysis. As a consequence, the makeup of Oregon's economy in 2020 is assumed to be the same as 2008 in terms of the types and sizes of industries operating within the state.[10] Despite its static nature, running the IMPLAN model annually does provide useful information on the general trends that are likely to occur if the WCI policy were enacted.

Additional information was provided by WCI on the types of equipment spending that was expected to occur based on the ENERGY 2020 results. Upon reviewing the WCI estimates, however, we determined that there was better information available from other sources regarding the market areas with the most likely potential for energy efficiency.[11] For the Oregon economic impact analysis, we used information from Energy Trust of Oregon and the NPCC on energy efficiency potential in the region to allocate the energy efficiency equipment spending.[12] Costs of efficiency investments were available by sector from the NPCC and ranged from 1.7 to 2.6 cents per kWh.

The energy efficiency potential distributions are shown in Table 1. The energy efficiency spending amounts from the NPCC were distributed across these categories and then input into the IMPLAN model as an increase in spending (benefit) for the various sectors that are likely to provide these types of equipment (e.g., contractors, retail sales, construction sectors). The costs of these investments were also subtracted from the money available for household spending on other goods and services. For the commercial and industrial sectors, spending on new equipment is added to the overall costs of production.

Table 1. Energy Efficiency Equipment Spending Categories by Market Sector

End Use	Residential Sector Potential	Commercial Sector Potential	Industrial Sector Potential
Lighting	55%	48%	14%
Appliances	12%	20%	--
Other equipment	4%	9%	--
Water heating	6%	12%	--
Shell	16%	3%	--
HVAC	7%	2%	6%
Controls, O&M	--	6%	--
Hydraulics	--	--	<1%
Wastewater	--	--	13%
Fresh water	--	--	4%
Refrigeration	--	--	5%
Motors	--	--	2%
Compressed Air	--	--	19%
Process pumping	--	--	14%
Process modification	--	--	16%
Process fans	--	--	<1%
Pneumatic Conveyance	--	--	7%
Total	100%	100%	100%

Source: Energy Trust of Oregon, Northwest Power and Conservation Council

An important parameter in the Oregon economic modeling was determining an appropriate elasticity factor relating the costs of energy and device spending to economic productivity. As costs for energy and equipment increase, production will decrease (all other factors held constant). The sensitivity of this

[10] The ENERGY 2020 model runs were also completed prior to the economic crisis that occurred late in 2008. Consequently, the Reference Case and WCI Policy case do not reflect the current recession conditions.

[11] The WCI results, for example, had approximately zero percent of the equipment spending going to lighting, while Energy Trust of Oregon estimates that 55 percent of the efficiency potential in the residential sector and 48 percent of the efficiency potential in the commercial sector comes from lighting.

[12] Energy potential numbers for the residential and commercial sectors are from Energy Trust of Oregon's Energy Efficiency and Measure Resource Assessment, May 2006, available at http://www.energytrust.org/library/reports/db/report_list.php. Efficiency potential numbers for the industrial sector are from Northwest Power and Conservation Council's The Fifth Northwest Electric Power and Conservation Plan, May 2005, available at http://www.nwcouncil.org/energy/powerplan/5/Default.htm.

relationship is referred to in economics as an elasticity. In the short term, the sensitivity is likely to be relatively low as there are limited options other than to simply reduce energy consumption.

In the longer term, once firms and households have time to react to the change in costs, then the sensitivity will be greater as firms adapt to the higher prices with more substantial changes in behavior and possibly by purchasing new energy efficient equipment.[13] Over time, these changes may result in an *increase* in economic productivity associated with that particular input. For example, nationally, real energy prices for industrial use increased by 6.3 percent annually between 1998 and 2006. Over this same period, real economic output grew by 1.5 percent annually, while energy consumption actually declined by 1.0 percent annually. In Oregon, the average annual changes were even greater. The real value of industrial output grew 9.1 percent per year while industrial energy consumption actually decreased by 2.6 percent annually. Some of the changes nationally and for Oregon are explained by changes in the mix of industrial output, as the US economy continually adjusts to new national and global changes in demand and economic opportunities.

Another important benefit of investments in energy efficient equipment is that energy cost savings will occur annually throughout the expected life of the new equipment. For example, if in the industrial sector an investment is made that will decrease energy costs by 10 percent, then with the elasticity factor of -0.95 the economic productivity will increase by 9.5 percent (10 percent x 0.95). If the equipment installed is expected to last 15 years, then the 9.5 percent increase in productivity will continue each year for 15 years, assuming no other changes to the system.[14] This has a cumulative effect over time, as each year has a new round of investments in energy efficient equipment.

The elasticity values used in this analysis are shown in Table 2. Note that elasticity values are likely to vary within and across industry sectors based on a wide range of factors including (but not limited to) capital intensity, availability of lower cost capital and labor substitutes, competition from other firms, and access to capital. We have used a single elasticity factor for the industrial sector for this analysis, as developing industry-specific elasticity values is beyond the scope of this project. The overall sensitivity of the economic impact estimates to the elasticity assumptions is tested in the High Cost and Low Cost scenarios discussed later in this paper.

[13] A recent example with high gasoline prices helps illustrate this point. When gas was over $4 a gallon, consumers cut back on driving by carpooling, taking public transit, eliminating trips, etc. As the high gas prices persisted, consumers were more likely to invest in newer, more fuel efficient cars.

[14] If at the end of 15 years the old equipment is replaced again with new energy efficient equipment, then the productivity gains will continue over the expected life of the new equipment.

Table 2. Elasticity Factors Used in Oregon Economic Impact Scenarios[15]

WCI Sector	WCI Policy Scenario	Low Cost Scenario	High Cost Scenario
Commercial	-1.04	-0.52	-1.56
Energy Intensive Industry	-0.81	-0.41	-1.22
Paper	-0.81	-0.41	-1.22
Chemicals	-0.81	-0.41	-1.22
Petroleum	-0.81	-0.41	-1.22
Nonmetallic Minerals	-0.81	-0.41	-1.22
Primary Metals	-0.81	-0.41	-1.22
Mining Except Oil and Gas	-0.81	-0.41	-1.22
Oil and Gas Extraction	-0.81	-0.41	-1.22
Other Industry	-0.81	-0.41	-1.22
Passenger Transportation	0.00	0.00	0.00
Freight Transportation	-1.04	-0.52	-1.56
Agriculture	-0.81	-0.41	-1.22
Power Sector	-0.81	-0.41	-1.22
Waste & Wastewater	-0.81	-0.41	-1.22

Analysis Results

The following tables show the economic impact estimates to Oregon for the WCI Policy scenario for selected years based on the Oregon IMPLAN model results.

Table 3 shows the economic impacts estimated for 2010. Column 2 shows the impacts associated with spending on energy efficient equipment, while column 3 shows the effects of energy cost savings that result from reducing energy use. For 2010, spending on energy efficiency equipment is expected to reduce economic output by $6 million and decrease employment by 44 jobs. At the same time, the benefit of lower energy cost is expected to increase economic output by $13 million and add 102 jobs to the economy. The net result of these two impacts is shown in column 4, with a net gain of $7 million in economic output and an increase of 58 jobs in the very early years of the policy.

Column 5 of Table 3 shows the benefits of energy cost savings from spending on energy efficiency equipment in prior years. Given that the policies are just beginning in 2010, there are no cumulative effects carried over from previous years.

[15] The average commercial sector elasticity was derived by ECONorthwest based on elasticity estimates from Bernstein and Griffin (2005), Dahl (1993), and Jorgensen (2000). The industrial elasticity values were estimated by ECONorthwest based on a simple regression analysis of economic productivity ($ output / energy consumption) and energy prices. This model was estimated using natural logs of both variables, with state-level industrial sector data on energy prices, energy consumption, and gross state product from 1998 to 2006. (Appendix showing model results will be added to final report).

Table 3. 2010 Oregon Economic Impact Estimates

Type of Impact (1)	Energy Efficiency Equipment Spending Impacts (2)	Energy Cost Savings Impacts (3)	Total Impacts 2010 (4)	Cumulative Energy Cost Savings Impacts From Prior Years (5)
Output (Million $)	-6	13	7	0
Total Value Added (Million $)	-3	6	4	0
• Wages	-2	4	2	0
• Business Income	0	1	0	0
• Other Income	-1	2	1	0
• Indirect Business Taxes	0	0	0	0
Jobs	-44	102	58	0

Table 4 shows the economic impacts for investments made in 2015, as well as showing the cumulative impacts from prior years. The combined effect of equipment spending and energy cost savings in 2015 alone will increase economic output by $321 million and increase employment by 2,523 jobs relative to the Reference case.

As shown in column 5, the cumulative impacts from prior years begin to add substantially to the overall economic impacts.[16] As shown in column 5, the benefits from energy savings from prior years is adding $1.3 billion of output to Oregon's economy in 2015 relative to the Reference case. These earlier investments are also sustaining 10,423 additional jobs in 2015. This represents an increase in employment of approximately 0.6 percent of total Oregon employment in 2007.[17] Again, these increases are all relative to the WCI Reference Case.

Table 4. 2015 Oregon Economic Impact Estimates – WCI Policy Scenario

Type of Impact (1)	Energy Efficiency Equipment Spending Impacts (2)	Energy Cost Savings Impacts (3)	Total Impacts 2015 (4)	Cumulative Energy Cost Savings Impacts From Prior Years (5)
Output (Million $)	-210	530	321	1,271
Total Value Added (Million $)	-108	267	159	641
• Wages	-63	159	96	381
• Business Income	-9	23	13	54
• Other Income	-27	65	38	156
• Indirect Business Taxes	-9	21	12	50
Jobs	-1,813	4,336	2,523	10,423

[16] Note that the cumulative impacts from prior years are limited only to those resulting from energy cost savings, which are sustained over the life of the new equipment. In contrast, impacts related to spending on energy efficient equipment (rather than energy cost or bill savings) last only for the year in which the spending occurs and are not carried over into subsequent years. For those years where equipment spending impacts are negative, the negative impacts are counted against the positive economic impacts of energy cost savings. In this case, only the energy cost savings over and above any losses from equipment spending are carried forward into future years. This is done to provide a more conservative estimate of the magnitude of impacts that can be sustained over time.

[17] Based on total non-farm employment for Oregon of 1,731,600 in 2007. Source: Oregon OLMIS, http://www.qualityinfo.org/olmisj/CES?areacode=01000000&action=summary&submit=Continue

Table 5 shows the results for 2020, the last year covered in the ENERGY 2020 model. For energy efficiency equipment spending (column 2), the WCI policy is estimated to reduce economic output by $427 million and also decrease employment by 3,643 jobs relative to the Reference case.

As shown in column 4, the combined effect of the energy efficient equipment and energy cost savings is an increase to Oregon's economy of $330 million in output and increase wage income for Oregon workers of $98 million. An additional 2,434 jobs will result due to spending in 2020.

From the ongoing energy cost savings from previous years (column 5), Oregon's economy will add $4.6 billion in new economic output and an additional 37,985 jobs as a result of investments needed to meet the WCI emission reduction goals. Combined with the impacts from 2020, Oregon employment is expected to increase by 40,419 and economic output is expected to increase by nearly $5 billion relative to the Reference case. This represents an increase of over 2 percent in Oregon employment over 2007 levels.

Table 5. 2020 Oregon Economic Impact Estimates – WCI Policy Scenario

Type of Impact (1)	Energy Efficiency Equipment Spending Impacts (2)	Energy Cost Savings Impacts (3)	Total Impacts 2020 (4)	Cumulative Energy Cost Savings Impacts From Prior Years (5)
Output (Million $)	-427	757	330	4,643
Total Value Added (Million $)	-219	378	159	2,340
• Wages	-127	225	98	1,392
• Business Income	-19	34	15	200
• Other Income	-55	91	36	567
• Indirect Business Taxes	-18	28	10	180
Jobs	-3,643	6,077	2,434	37,985

The graphs below show the same trends graphically using the combined effects of energy savings and device cost spending in each year, plus the cumulative effects from energy savings from investments made in previous years. Figure 1 shows the annual and cumulative effects for jobs while Figure 2 shows the trend for economic output for the WCI Policy scenario.

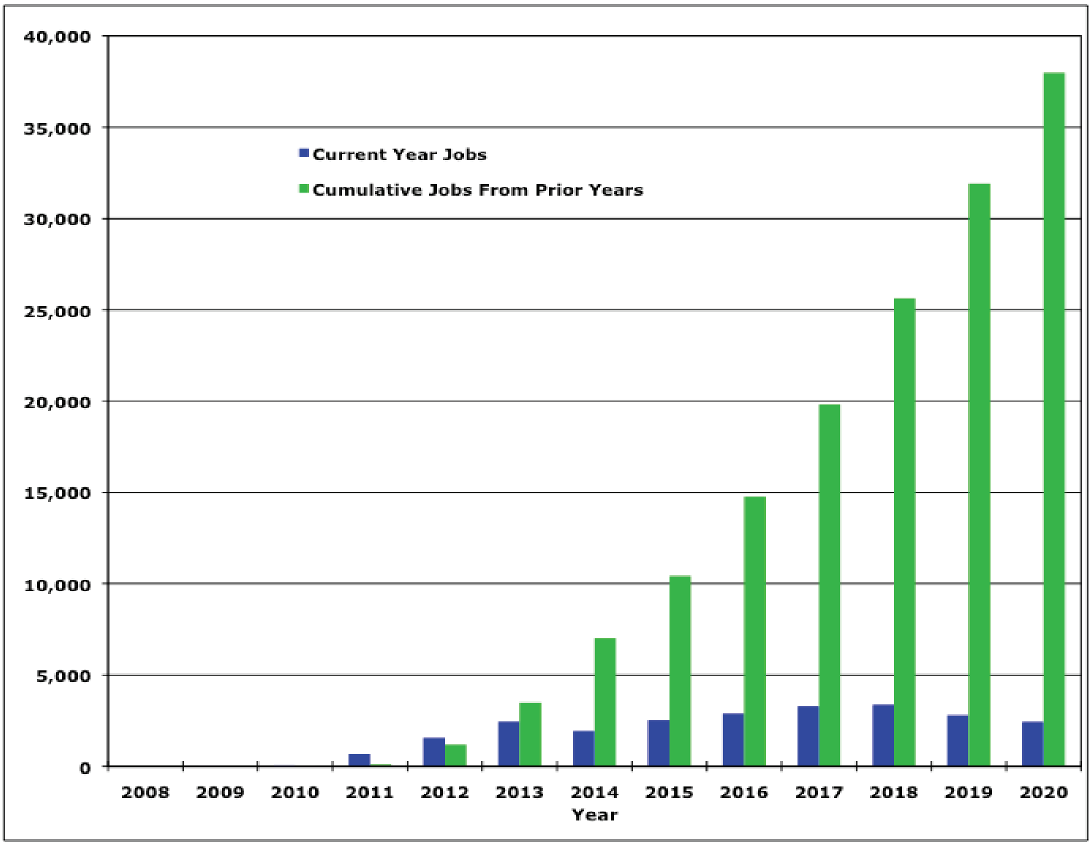

Figure 1. WCI Policy Scenario Annual and Cumulative Job Impact

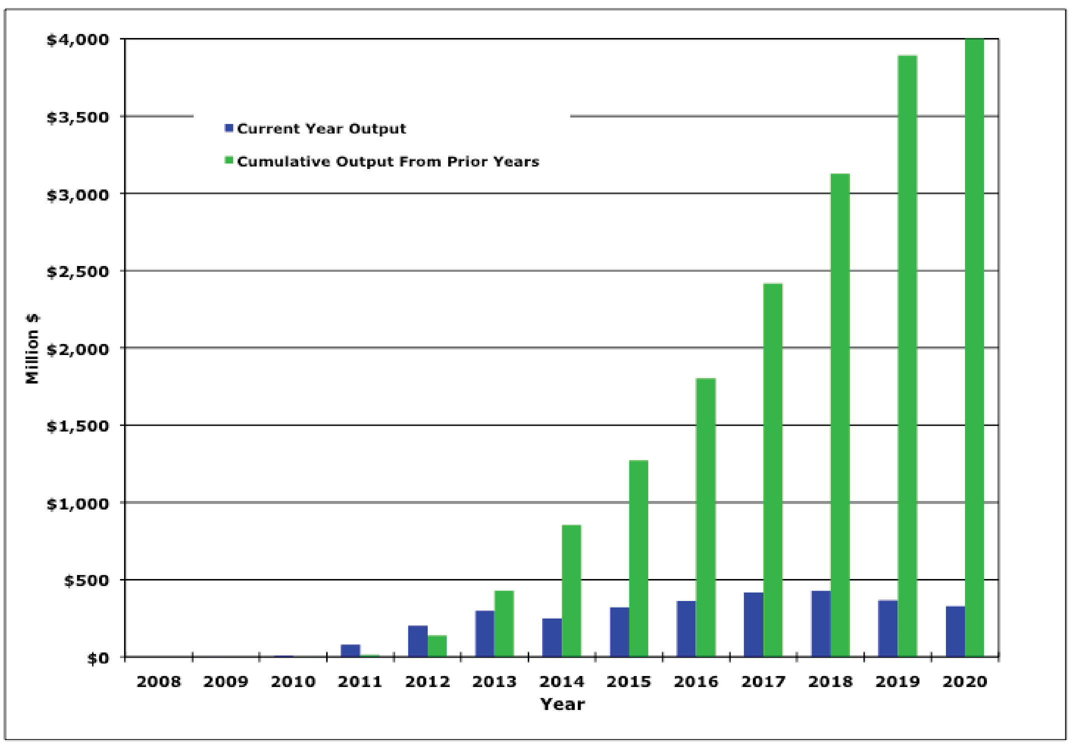

Figure 2: WCI Policy Scenario Annual and Cumulative Output Impacts

High Cost Scenario Results

In addition to the WCI Policy scenario, a separate High Cost scenario was also developed based on the IMPLAN model results for Oregon. The High Cost scenario uses more conservative assumptions for model input parameters. The specific change made for the High Cost scenario was a 50 percent decrease in the elasticity values assigned to commercial and industrial sectors.[18]

The 50 percent reduction in elasticity assumptions (shown in Table 2) has the effect of reducing the overall sensitivity of economic productivity to energy and equipment costs. As a consequence, this change in elasticity limits the impact on production in the commercial and industrial sectors from energy cost savings accruing over time.

The results of the High Cost scenario for 2020 are shown in Table 6. The impacts related to equipment spending are negative in this year. However, the benefits from energy cost savings are enough to erase the job losses and the decrease in economic output relative to the Reference case, as shown in columns 3 and 4.

Table 6. High Cost Oregon Economic Impact Scenario (2020 Only)

Type of Impact (1)	Energy Efficiency Equipment Spending Impacts (2)	Energy Cost Savings Impacts (3)	Total Impacts 2020 (4)	Cumulative Impacts From Prior Years (5)
Output (Million $)	-427	545	118	3,228
Total Value Added (Million $)	-219	276	57	1,647
• Wages	-127	165	38	987
• Business Income	-19	25	6	145
• Other Income	-55	64	9	388
• Indirect Business Taxes	-18	20	2	126
Jobs	-3,643	4,504	861	27,260

Low Cost Scenario Results

A separate Low Cost scenario was run that simulates conditions where the emissions reductions are achieved at a lower cost than that predicted in the ENERGY 2020 results. Since the WCI Policy scenario already results in a net positive impact on the economy, the Low Cost scenario was used to test the assumptions made regarding elasticities. The only change made in the Low Cost scenario is that the elasticity assumptions are increased by 50 percent (shown in Table 2) relative to the WCI Policy scenario. The other parameters for energy costs and spending on energy efficient equipment remain the same as the WCI Policy and are taken directly from the ENERGY 2020 model results. Note that the previous caveats regarding the ENERGY 2020 results and the estimates of negative equipment spending still apply.

The results of the Low Cost scenario for 2020 are shown in Table 7. Note that the energy equipment spending impacts (column 2) are unchanged from the WCI Policy case shown in Table 5. The energy cost

[18] We had originally planned to include energy price increases as part of the High Cost scenario. However, the ENERGY 2020 output data do not include sufficient detail on energy prices by fuel type and energy consumption by fuel type and market sector to allow for price changes to be incorporated into the Oregon scenario analysis.

impacts (column 3) have increased relative to the WCI Policy scenario as businesses are assumed to receive a greater benefit to their production capabilities due to the investments made in energy efficiency. The 50 percent increase in the elasticity factor resulted in approximately a 30 percent increase in cumulative job and output impacts from the WCI Policy scenario results shown in Table 5.

Table 7. Low Cost Oregon Economic Impact Scenario (2020 Only)

Type of Impact (1)	Energy Efficiency Equipment Spending Impacts (2)	Energy Cost Savings Impacts (3)	Total Impacts 2020 (4)	Cumulative Energy Cost Savings Impacts From Prior Years (5)
Output (Million $)	-427	969	541	6,057
Total Value Added (Million $)	-219	481	262	3,032
• Wages	-127	285	158	1,797
• Business Income	-19	42	23	255
• Other Income	-55	118	63	746
• Indirect Business Taxes	-18	36	18	234
Jobs	-3,643	7,649	4,006	48,710

Summary and Conclusions

The results of the Oregon economic impact analysis of the WCI recommended cap-and-trade policies include the following:

- For the WCI Policy scenario, the cap-and-trade system combined with the complementary policies is expected to add 2,434 jobs to Oregon's economy in 2020 relative to the Reference Case. The cumulative benefit from energy cost savings from years prior to 2020 will result in an additional 37,985 jobs in Oregon. The combined increase of 40,419 jobs by 2020 represents a 2 percent increase in Oregon employment from 2007 levels. These jobs will be sustained beyond 2020 as energy cost savings are anticipated to last throughout the expected life of the energy efficiency equipment.

- In a more conservative scenario (High Cost scenario), there is still a net gain in employment of 861 jobs in 2020 relative to the Reference case, and net job gains from prior years total 27,260. The overall effect on economic output is positive as well, with an increase of $118 million in economic output estimated for 2020 relative to the Reference case and a cumulative impact on economic output of $3.2 billion.

In general, the Oregon economic impact analysis shows a consistent trend in the type and magnitude of job impacts that result from the WCI policy. Investments made in energy efficient equipment result in positive impacts for Oregon employment through energy cost savings, and the cumulative effect of these benefits increases over time. By 2020, the combined effect of energy efficiency investments from prior years result in an overall increase in economic output and employment for Oregon's economy relative to the Reference case and is consistent in all three scenarios examined in this study.