Economic Impacts From Energy Trust of Oregon 2007 Program Activities

Final Report

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1. INTRODUCTION AND SUMMARY

ECONorthwest was asked by Energy Trust of Oregon ("Energy Trust") to estimate the economic impacts of its energy efficiency and renewable energy programs in 2007 on the Oregon economy. These impacts include changes in output, wages, business income, and employment in Oregon that resulted from 2007 program spending and activities. Energy Trust programs generate energy efficiency gains (i.e., energy savings) that continue beyond each program year. As a result, ECONorthwest also analyzed the economic impacts from the current and previous program years that accumulate in the future.

For this analysis, all impacts were compared against a Base Case spending scenario, which assumes that funds that were paid to Energy Trust are returned and spent by Oregon ratepayers in the Oregon service territories of Portland General Electric (PGE), PacifiCorp, Northwest Natural, Cascade Natural Gas, and Avista. The difference in economic impacts between Energy Trust spending and the Base Case scenario is referred to as *net impacts*. [1] Unless otherwise stated, the results in this report reflect net impacts.

In 2007, Energy Trust spending totaled $56.5 million. Most of this spending went towards program implementation, with $44.1 million for energy efficiency and $9.9 million for renewable energy programs, and $2.5 in administrative and program support costs. In 2007, Energy Trust offered incentives through their renewable energy program that proved critical for the construction of two large wind farms. These impacts are analyzed and reported separately.

Energy efficient equipment and renewable energy installations—not including the wind farms—saved Oregonians 35.5 average megawatts (aMW) of electricity (308,641 MWh annually) and 2.3 million therms. The spending and energy savings associated with these programs had the following net economic impacts on the Oregon economy in 2007:

- An increase of $63.2 million in output
- An increase of $16.5 million in wages and $2.7 million in income to small business owners
- 390 new full- and part-time jobs

Energy Trust's renewable energy program included $7.125 million in incentives for two wind farms—the Biglow Canyon wind farm in Sherman County, Oregon ($6.0 million in incentives); and the Goodnoe Hills wind farm in Goldendale, Washington ($1.125 million in incentives).[2] The net economic impacts associated with these wind farm projects include:

- The Biglow Canyon wind farm went on line in December 2007. Construction and operation of the Biglow Canyon wind farm is associated with $56.3 million in output,

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[1] For example, if an impact of 5 new jobs is reported, this means that spending on Energy Trust programs resulted in 5 more jobs relative to what would have occurred had the money been returned and spent by Oregon ratepayers in the utility service territories.

[2] The incentives for Goodnoe Hills were committed in 2007, but will not be paid until 2008.

$18.3 million in wages, $4.7 million in business income, and 460 full- and part-time jobs for the Oregon economy in 2007.

- Scheduled to be on line in 2008, construction of the Goodnoe Hills wind farm generated an increase of $15.7 million in output, $5.9 million in wages, $1.3 million in business income, and 126 full- and part-time jobs for the Washington economy in 2007.

The remainder of this report documents the analysis that was completed to develop these economic impact estimates.

2. ENERGY TRUST 2007 PROGRAM ACTIVITIES

A. 2007 EXPENDITURES

For this analysis, budget information provided by Energy Trust was aggregated into several general categories to facilitate economic impact modeling for similar areas of spending. Table 1 shows the general areas of spending for Energy Trust and reflects actual expenditures for 2007. As shown at the bottom of the table, total spending by Energy Trust in 2007 was $56.5 million. This represents an 18 percent increase from the previous program year.

As a general rule, spending on program incentives goes directly to equipment purchases and labor for installation. Common measures that receive incentives include high efficiency lighting (compact fluorescents and T-8's), high efficiency HVAC systems, home weatherization, high efficiency industrial motors, and variable speed fan drives for commercial applications. In 2007, program expenditures[3] for energy efficiency measures totaled $44.1 million (a $0.9 million or 2.1 percent increase). Program expenditures for renewable resources totaled $9.9 million (a $7.5 million or 313 percent increase). It's important to note that most of this increase is attributed to $7.125 million in incentives for two utility wind farms. According to utility management and the Oregon Public Utilities Commission, these incentives were critical for the wind farm projects to proceed.

Table 1: 2007 Energy Trust Program Spending ($ millions)

Spending Category	Total Program Expenses	Total Support Costs	Total
Energy Efficiency Programs	$44.1		$44.1
Renewable Programs	$9.9		$9.9
Other Admin & Program Support		$2.5	$2.5
Total	**$54.0**	**$2.5**	**$56.5**

Source: Energy Trust of Oregon

[3] Program expenditures are based on incentives and allocated support costs.

B. 2007 ENERGY SAVINGS AND GENERATION

Table 2 shows the total energy saved by Energy Trust programs in 2007. A total of 35.5 average megawatts were saved as a direct result of Energy Trust program activities in 2007. This includes energy savings for both residential and commercial programs. It also includes energy generated by renewable energy installations that were completed or substantially initiated in 2007, with the exception of the Biglow Canyon and the Goodnoe Hills wind farms. (A separate, more detailed discussion of these wind farms follows Table 2.) Excluding the two wind farms, the amount of energy generated by the renewable energy program in 2007 was quite small. However, it is included in Table 2 because energy savings and renewable generation are essentially identical from a customer standpoint in terms of economic effects, i.e., they both reduce energy bills.

Table 2: 2007 Net Energy Savings

Program Sector	Annual kWh Saved	Average MW Saved (aMW)	Annual Therms Saved
Residential Sector Programs	113,311,147	12.9	1,108,175
Commercial/Industrial Sector Programs	197,578,291	22.6	1,140,053
Total Energy Saved	**310,889,438**	**35.5**	**2,248,228**

Source: Energy Trust of Oregon

Similar to previous program years, the commercial/industrial sector generated the most energy savings in 2007. In addition, there was a slight change in the mix of energy savings from the previous program year, with slightly more energy savings from the commercial/industrial sector (63.6 percent of total energy savings in 2007 vs. 62.0 percent in 2006) and less from the residential sector (36.4 percent in 2007 vs. 38.0 percent in 2006).

The efficiency gains shown in Table 2 result in a loss of revenue to Oregon utilities due to lost power sales, and this loss of revenue has been accounted for in this analysis.[4] If the utility sector had similar economic impact multipliers as other sectors in Oregon's economy, then the energy cost savings in other sectors would roughly cancel out the loss of revenue in the utility sector. For Oregon utilities, much of the spending impact flows outside the state, as PacifiCorp is owned by an out-of-state company, and both PacifiCorp and PGE have shareholders that are widely distributed throughout the country. Consequently, some of the revenue loss (and the resulting losses in employment and economic activity) is incurred outside of Oregon.

There is an additional long-term benefit from the efficiency gains, as they delay the need for building new power generation. Power generated from new sources will almost certainly be more expensive than existing power resources due to increased costs of capital and issues associated with siting new power plants. In this sense, efficiency gains can be viewed as a means for

[4] For this analysis, it was assumed that utilities did not sell saved power on the spot market, as estimates of the amount of power sold due to energy efficiency are generally unavailable. If utilities can sell conserved power on the market due to the efficiency programs, then there is an additional benefit in the form of increased revenues to the utility sector. As this was not included in this analysis, the results discussed here represent a lower bound for potential utility sector benefits.

prolonging the use of lower-cost resources and delaying the need for switching to higher cost power supplied by new generation. By enabling the efficient use of lower cost resources, these programs help the entire Oregon economy run more efficiently. This benefit was not explicitly modeled for this analysis because it is directly addressed in the Energy Trust's benefit/cost analysis. It is nevertheless an important issue and is one of the primary tenets underlying conservation and demand-side management programs.

The energy savings shown in Table 2 do not include the energy generated at the Biglow Canyon and Goodnoe Hills wind farms. In order to make the current study results consistent with previous studies and as transparent as possible, we have decided to report the energy savings (and economic impacts) associated with these wind farm projects separately. Our impact estimates for these two projects assumes that they would not have been built without Energy Trust incentives. The key project parameters include:

- **Biglow Canyon**. In a collaborative effort, Energy Trust committed $6.0 million to PGE's Biglow Canyon wind farm. Total project costs were $260 million. Phase I went on line in December 2007 and consists of 76 wind turbines with installed capacity of 125 MW. Energy Trust estimates that Biglow Canyon will generate approximately 409.7 million kWh annually. PGE acknowledges that this project would not have been undertaken without Energy Trust incentives. As such, the construction and operation of the wind farm will be attributed to Energy Trust program performance in 2007.
- **Goodnoe Hills.** Energy Trust's collaborative efforts to expand renewable energy resources extend beyond Oregon. In 2007, Energy Trust also committed $1.125 million in incentives to help fund Pacific Power's 94 MW Goodnoe Hills wind farm in Goldendale, Washington. As with Biglow, it is assumed here that this project would not have been built without Energy Trust incentives. Goodnoe Hills was under construction during the 2007 program year and is scheduled to come on line in 2008. Construction impacts will be attributed to Energy Trust program performance in 2007 and reported separately. Generation will be reported in the 2008 program year.

3. ANALYSIS METHODS

Estimating the economic impacts attributable to Energy Trust programs is a complex process, as spending by Energy Trust—and subsequent changes in spending by program participants—unfold over a lengthy period of time. From this perspective, therefore, the most appropriate analytical framework for estimating the economic impacts is to classify them into the following categories:

- *Short-term* economic impacts associated with changes in business activity as a direct result of changes in spending by Energy Trust programs and participants.
- *Long-term* economic impacts associated with the subsequent changes in factor costs and optimal use of resources.

This analysis estimates the short-term economic impacts of Energy Trust program activities during the 2007 program year. The short-term economic impacts are those attributed to additional dollars accruing to Oregon households and businesses as a result of these programs.

The economic modeling framework that best measures these short-term economic impacts is called input-output modeling. Input-output models provide an empirical representation of the economy and its inter-sectoral relationships, enabling the user to trace the effects (economic impacts) of a change in the demand for commodities (goods and services). Because input-output models generally are not available for state and regional economies, special data techniques have been developed to estimate the necessary empirical relationships from a combination of national technological relationships and county-level measures of economic activity. This modeling framework, called IMPLAN (for IMpact Analysis for PLANning), is the technique that ECONorthwest has applied to the estimation of impacts.[5]

Input-output analysis employs specific terminology to identify the different types of economic impacts that result from economic activities. Expenditures made through Energy Trust programs affect the Oregon economy *directly*, through the purchases of goods and services in this state, 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 consumption- and investment- driven stimulus. 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 or "imports."

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, and non-cash compensation.
- *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, doctors, accountants, lawyers, etc.
- *Job* impacts include both full and part time employment.

Within this modeling framework, the following terms are used to classify impacts:

- *Gross Impacts* reflect the economic impacts with no adjustment made for impacts that might have occurred in the Base Case scenario.

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[5] 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.

- *Net Impacts* are the effects of Energy Trust program expenditures that have been adjusted to reflect the Base Case scenario. That is, net impacts are those impacts over and above what would have occurred in the Base Case scenario.

The following types of activities form the basis of this impact analysis:

- *Program operations spending* as Energy Trust purchases labor and materials to carry out its energy efficiency and renewable energy programs.
- *Measure spending* by participants in Energy Trust programs.
- *Reductions in energy consumption* and the associated lower operating costs to businesses and increase in household disposable income.
- *Reductions in utility revenues* as households and businesses consume less electricity.

4. GROSS ECONOMIC IMPACTS

The gross economic impacts attributed to the 2007 Energy Trust programs are based on the program costs, including administration costs and incentives issued by Energy Trust, and the measure spending and energy savings of program participants. Measure spending by program participants consists of expenditures on energy efficiency equipment such as appliances and furnaces/boilers, heating, ventilation and air conditioning (HVAC) systems, lighting modifications, and also industrial processing equipment.

ECONorthwest received detailed measure spending data from Energy Trust, and this spending data was then mapped to over 20 different IMPLAN sectors. Energy Trust also supplied detailed energy savings estimates, broken out by fuel type (electricity, natural gas) for program participants. For residences, lower energy costs will increase Oregon households' disposable income. Therefore, the estimated energy cost savings were input into a consumption function representing the spending pattern of a middle-income household in Oregon, which mapped the spending to over 500 IMPLAN sectors.[6]

Energy savings for commercial/industrial participants were first mapped to industry sector using North American Industrial Classification System ("NAICS") codes, and then cross-referenced to 181 different business sectors in the IMPLAN model.[7] From an input-output perspective, energy savings will *indirectly* affect Oregon businesses by lowering their production costs. To estimate the economic impacts associated with these lower energy costs, ECONorthwest used an elasticity-based approach to measure the change in output. That is, this approach assumes that

[6] This consumption function was modified to exclude spending on electricity.

[7] In 2006, energy savings were allocated to 100 different industry sectors. The significant increase in the number of benefiting industry sectors (up over 80 percent) suggests that Energy Trust commercial/industrial sector involvement is expanding.

lower energy costs increase the competitiveness of Oregon businesses, allowing them to decrease price, and increase output.[8]

Lastly, the energy savings for households and businesses translate into lower revenues to utilities, refiners, and other providers of energy services. ECONorthwest used estimated energy savings, by fuel type, to reduce revenues to utilities, refiners and other providers of energy services.

A. Energy Trust Spending Impacts

The gross economic impacts of Energy Trust programs—excluding the Biglow Canyon and Goodnoe Hills wind farms—for 2007 are shown in Table 3. Spending related to Energy Trust programs increased economic output by $127.1 million in 2007, which includes an increase of $36.9 million in wages and $5.4 million in business income within Oregon. This activity also created 1,030 jobs in Oregon. Table 3 reports gross impacts that do not take into consideration alternative uses of Energy Trust and participant spending related to these programs. These net impacts are addressed in the next section.

Table 3: 2007 Energy Trust Gross Impacts

Impact Type	2007
Output	$127,054,800
Wages	$36,845,000
Business Income	$5,378,700
Jobs	1,030

Source: ECONorthwest.

ECONorthwest used project data provided by Energy Trust to model the economic impacts associated with the Biglow Canyon and Goodnoe Hills wind farms. Biglow Canyon went on line in December 2007, so the impacts for that Oregon wind farm are based on Oregon-based construction spending (estimated to be 10 percent of total project costs) and operations (adjusted using the 50 percent implementation adjustment). Goodnoe Hills was under construction during the 2007 program year, so only construction impacts are included for that Washington wind farm. Construction impacts are based on Washington-based construction spending (estimated to be 10 percent of total project costs.)

The gross economic impacts attributed to construction and operation of the Biglow Canyon wind farm, and construction of the Goodnoe Hills wind farm are shown in Table 4.

[8] Because we do not have price elasticity of demand coefficients for each of the 181 business sectors (and their commodities) that benefited from reduced energy costs, ECONorthwest assumed that the price elasticity of demand for each industry's output was -1.0, i.e., unitary elastic. A 1 percent decrease in costs would, therefore, translate into a 1 percent decrease in price and a 1 percent increase in output.

Table 4: Biglow Canyon and Goodnoe Hills Gross Economic Impacts in 2007

Impact Type	Biglow Canyon (Oregon)	Goodnoe Hills (Washington)
Output	$63,107,200	$15,725,900
Wages	$20,469,000	$5,915,400
Business Income	$5,012,500	$1,261,800
Jobs	530	139

Source: ECONorthwest.

5. NET ECONOMIC IMPACTS

All of the economic impacts reported in this section of the report are *net impacts* and reflect economic benefits over and above what would have occurred had Energy Trust programs not existed. To calculate net impacts, the economic impacts of the Base Case scenario are estimated first, which assumes that the money that is currently spent on Energy Trust programs is instead allocated to utility ratepayers. The economic impacts resulting from the Base Case scenario are then subtracted from the gross impacts discussed in the previous section to determine net impacts.

Table 5 shows the net economic impacts attributed to Energy Trust programs in 2007. The net economic impacts are positive and (by design) are significantly less than the gross economic impacts reported previously. The gross economic impacts include the assumption that revenues to utilities and other providers of energy services decline as a result of the energy savings by households and businesses. To this, we have now included the Base Case spending scenario that assumes that all Energy Trust funds are instead spent by ratepayers of the utilities according to the spending patterns of a typical Oregon household.

For 2007, Energy Trust programs—again, excluding Biglow Canyon and Goodnoe Hills—had a net effect of increasing Oregon's economic output by $63.2 million relative to the Base Case scenario. This includes an increase of $16.5 million in wages and $2.7 million in business income within Oregon. Energy Trust programs also had a positive net impact on employment in Oregon, with 390 jobs created in 2007. This reflects jobs over and above what would have been created in the Base Case scenario.

Table 5: 2007 Net Economic Impacts

Impact Type	2007 Impacts
Output	$63,170,200
Wages	$16,469,400
Business Income	$2,721,700
Jobs	390

Source: ECONorthwest.

The net economic impacts attributed to construction and operation of the Biglow Canyon wind farm, and construction of the Goodnoe Hills wind farm are shown in Table 6. Energy Trust provided $6.0 and $1.125 million in incentives, respectively, for Biglow Canyon and Goodnoe Hills. These incentives were critical for both projects to proceed, and leveraged significant spending on the part of utilities. (On a net basis, it is assumed that these incentives would have been returned to ratepayers.) As a result, the difference between net and gross impacts for the wind power projects is relatively smaller than for Energy Trust programs as a whole.

Table 6: Biglow Canyon and Goodnoe Hills Net Economic Impacts in 2007

Impact Type	Biglow Canyon (Oregon)	Goodnoe Hills (Washington)
Output	$56,336,400	$15,725,900
Wages	$18,308,400	$5,915,400
Business Income	$4,731,100	$1,261,800
Jobs	460	126

Source: ECONorthwest.

6. Energy Savings-Related Economic Impacts Over Time

For many projects, the installations occur in the same year that the equipment and program costs are incurred. The energy savings from these measures, however, extend into future years as most measures have expected useful lives of eight to 16 years (or more). The cost savings from these measures for homes and businesses also extend into future years (with some degradation as equipment ages) after the initial purchase. These cost savings continue to benefit the economy, as households spend less on electricity and more on other consumer products and businesses are able to produce goods and services more efficiently. As a consequence, the net effects from the first year when the equipment and program spending occur only capture a fraction of the overall benefit of these programs.

A. 2007 Program Year

Table 7 shows the annualized gross economic impacts due to energy cost savings from energy efficiency measures installed in 2007 (i.e., they do not account for new generation from renewable sources). These estimates were calculated using the input-output model to estimate the

economic impacts of reduced energy costs while setting all other costs (i.e., equipment purchases and program implementation costs) equal to zero. To truly isolate the impact of the energy cost savings, we also assumed that there were no lost utility revenues resulting from the measures installed and that utilities would be able to sell the unused power to other customers. This provides an estimate of energy efficiency benefits based solely on the reduced energy costs to the economy and excludes any additional benefits due to the spending on these programs and measures.

To be consistent with previous impact reports, the energy savings impacts shown in Table 7 are reported on an annualized basis, i.e., they describe the economic impacts from energy savings for measures that were installed in 2007 and operated for an entire year. In the first program year, energy savings develop as energy efficiency measures are installed, and installation occurs over the course of the year. ECONorthwest does not have data on when each individual installation was completed. Thus, we have assumed that installations occur evenly throughout the year and have used a 50 percent implementation adjustment factor for energy savings in the first program year. (The economic impacts shown earlier in this report are based on energy savings that have been adjusted using this implementation adjustment factor.)

As shown in Table 7, on an annualized basis, 35.5 aMW of energy savings from energy efficiency will increase economic output by $30.9 million, which includes an increase of $9.2 million in wages and $1.2 million in business income. This increase in economic activity will generate 255 jobs.

Table 7: Annualized Economic Impacts Due to 2007 Energy Savings Alone

Economic Impact Measure	Impact Due to 2007 Savings Only
Output	$30,882,110
Wages	$9,223,602
Business Income	$1,240,688
Jobs	255

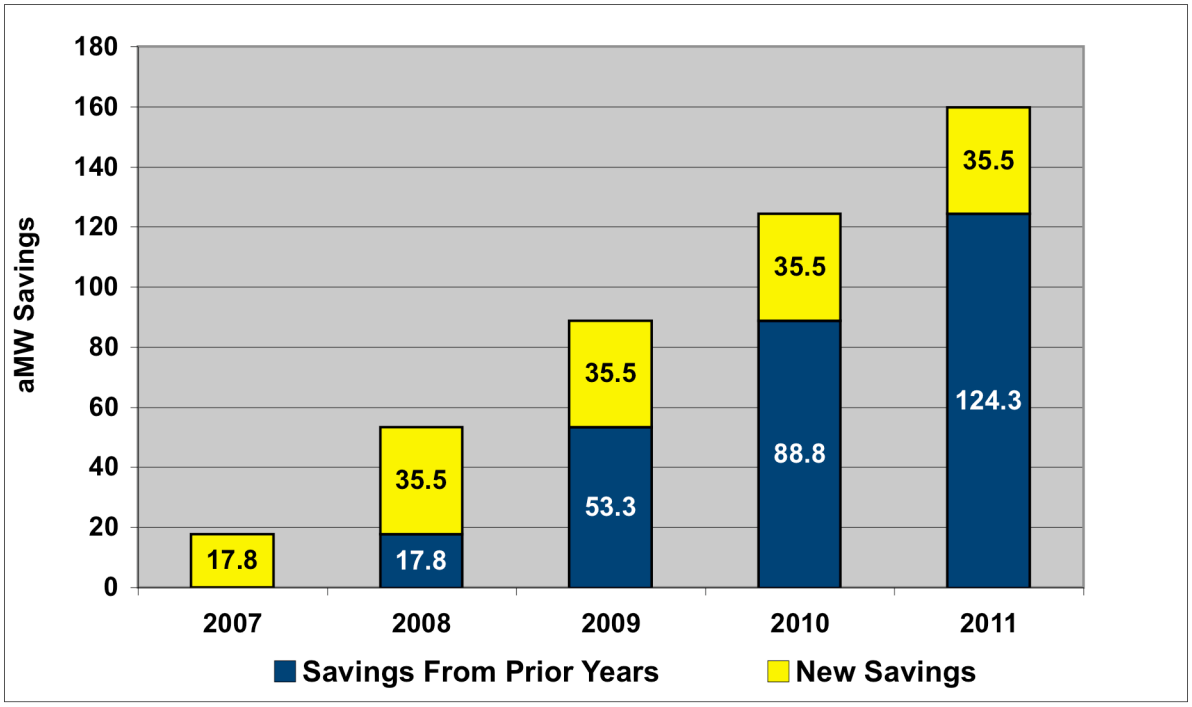
Source: ECONorthwest

The following figures illustrate how the effects of energy efficiency accumulate in the future, assuming that energy cost savings in future years continue at the annualized level observed in 2007. These figures highlight the fact that the incremental benefit of any single year is only a fraction of the cumulative effect of efficiency gains achieved in prior years. It should also be noted that 2007 does not include impacts from renewable energy projects. When the effects of the larger renewable energy projects are included, the cumulative impacts will be significantly greater than what is shown here using only the energy savings generated by Energy Trust efficiency program activities.

Figure 1 shows the cumulative energy savings resulting from Energy Trust energy efficiency program activities in 2007. This exhibit assumes that the 35.5 aMW in annual energy savings achieved in 2007 is achieved in future years. Given that the average measure life for equipment

covered by Energy Trust programs is over 10 years, the potential for sustained cumulative energy savings benefits is quite large.

Figure 1: Cumulative Energy Savings Over Time



In 2007, Energy Trust's program activities included installation of energy efficiency measures that would yield an estimated 35.5 million aMW of energy savings annually. As shown in Figure 1, these energy savings have been adjusted in the first program year and then cumulate each year thereafter. By 2011, Energy Trust's 2007 energy efficiency program will have generated approximately 160 aMW of energy savings over the five year time period.

Figure 2 illustrates a similar cumulative effect for the economic output impacts that result from energy cost savings. In 2007, economic output in Oregon increased an additional $15.4 million based on the energy cost savings achieved in 2007. If these energy cost impacts are annualized and this trend continues in subsequent years, the cumulative benefits expand over time. By the end of 2011, Oregon's economic output will have increased by $139.0 million due solely to efficiency gains made over the past five years.

Figure 2: Cumulative Output Effects Based on 2007 Energy Savings

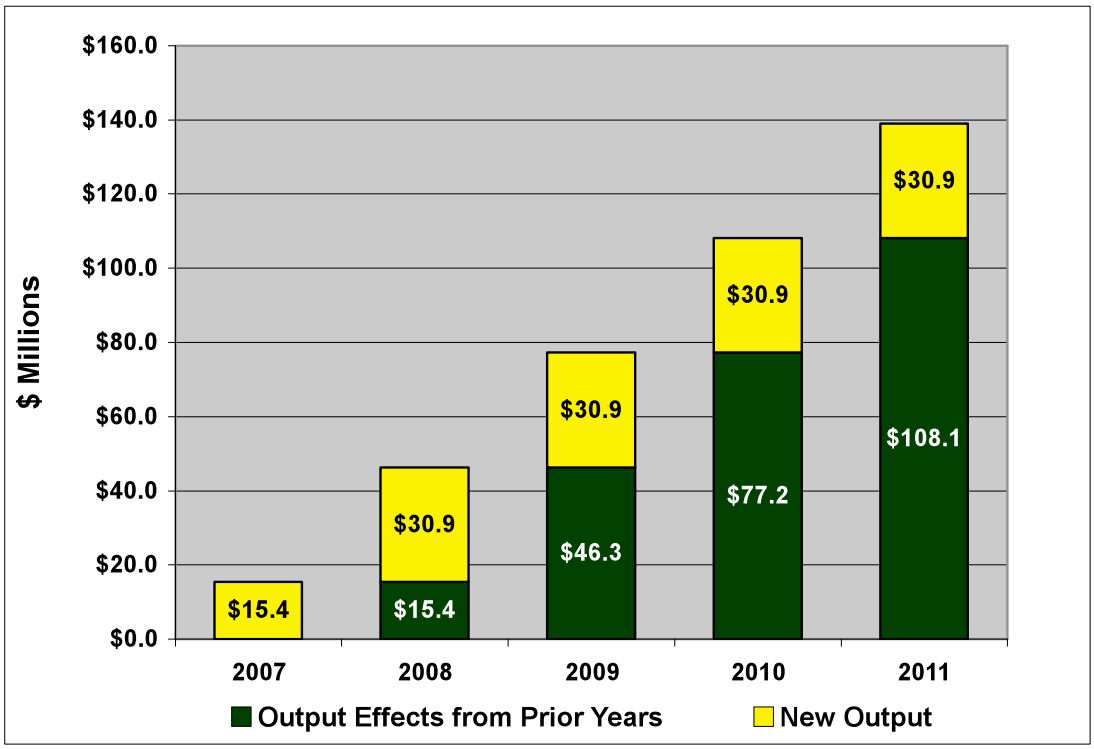
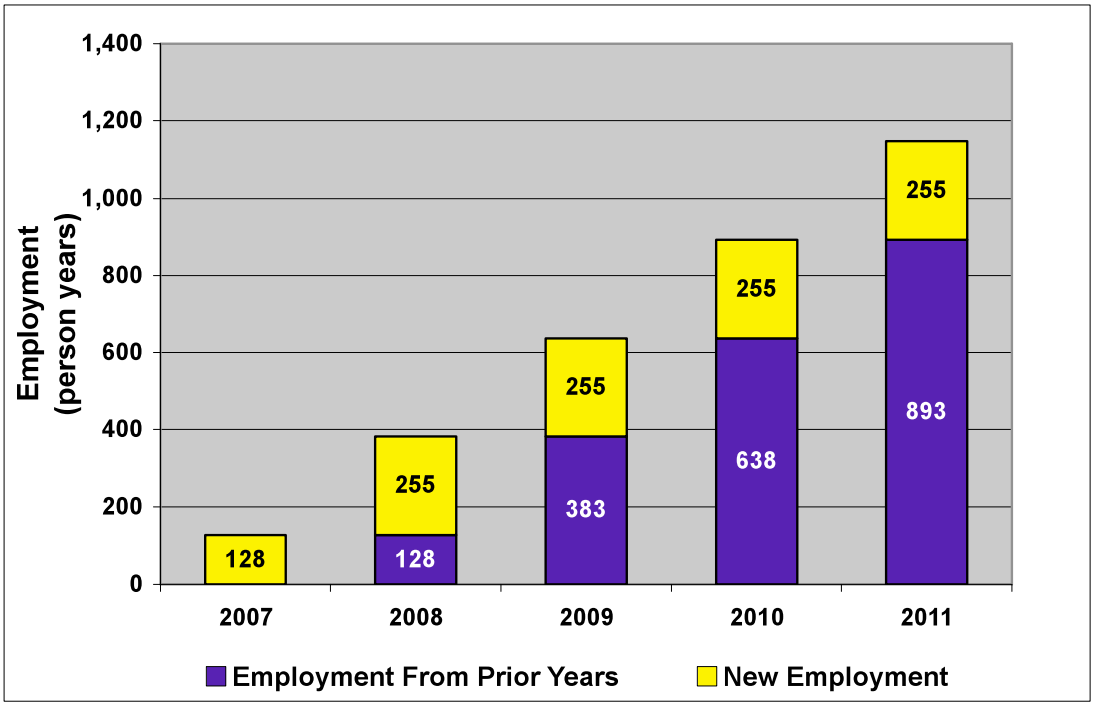


Figure 3 illustrates the potential cumulative impact of energy cost savings on employment in Oregon. When energy cost savings persist over time, businesses are able to direct spending away from energy costs to other factors of production. By lowering their costs, businesses are able to increase output. Similarly, less residential spending on energy also contributes to increased employment as spending shifts to other goods and services in sectors that have a greater impact on the Oregon economy.

As shown in Table 7 and Figure 3, on an annualized basis, Oregon employment increased by 255 jobs based on the energy cost savings achieved in the 2007 program year. If these energy cost savings can be sustained over time, then the employment impacts should persist as well, at least in the short term. By the end of 2011, the costs savings attributed to Energy Trust's energy efficiency program in 2007 will have generated 1,148 person-years of employment in Oregon over the five-year period.

Figure 3: Cumulative Employment Impacts Based on 2007 Energy Savings



B. Across All Program Years, 2002 Through 2007

As just shown, the cost savings and economic impacts from the 2007 program year will persist and cumulate over time. In similar fashion, the energy savings and economic impacts across program years will also persist and grow over time. ECONorthwest calculated the cumulative net impacts across Energy Trust's six program years, from 2002 through 2007. These results are shown in Table 8.

Table 8: Cumulative Impacts From Energy Savings Across Program Years, 2002 Through 2007

Year	Output	Wages	Business Income	Jobs
2002	$14,063,800	$4,316,000	$793,700	140
2003	$59,355,500	$18,215,500	$3,349,700	590
2004	$96,344,000	$29,573,300	$5,340,900	950
2005	$109,355,600	$33,580,900	$5,857,800	1,090
2006	$126,383,600	$39,326,900	$6,533,700	1,260
2007	$151,601,800	$47,451,300	$7,541,800	1,490

Source: ECONorthwest.

The methodology employed here is similar to that for the 2007 program year. We assume that installation occurs evenly and that 50 percent of the total "annualized" energy savings are

realized in the initial program year; subsequent years include the full amount of energy savings attributed to the initial program year. For example, ECONorthwest previously estimated that Energy Trust's 2002 and 2003 energy efficiency programs would generate, on an annualized basis, 280 and 620 jobs, respectively. As shown in Figure 4, one-half of the 280 annualized job impacts are reported for the 2002 program year. In 2003, the cumulative job impacts (590 jobs) are based on the annualized job impacts from 2002 (280 jobs, of which 140 occurred in the prior year) plus one-half of the annualized job impacts in 2003 (310 jobs). Following this approach, ECONorthwest estimates that the energy savings associated with Energy Trust's energy efficiency programs have sustained approximately 1,490 jobs in Oregon over the 2002 through 2007 time period.

Figure 4: Cumulative Job Impacts From Energy Savings Across Program Years, 2002 Through 2007

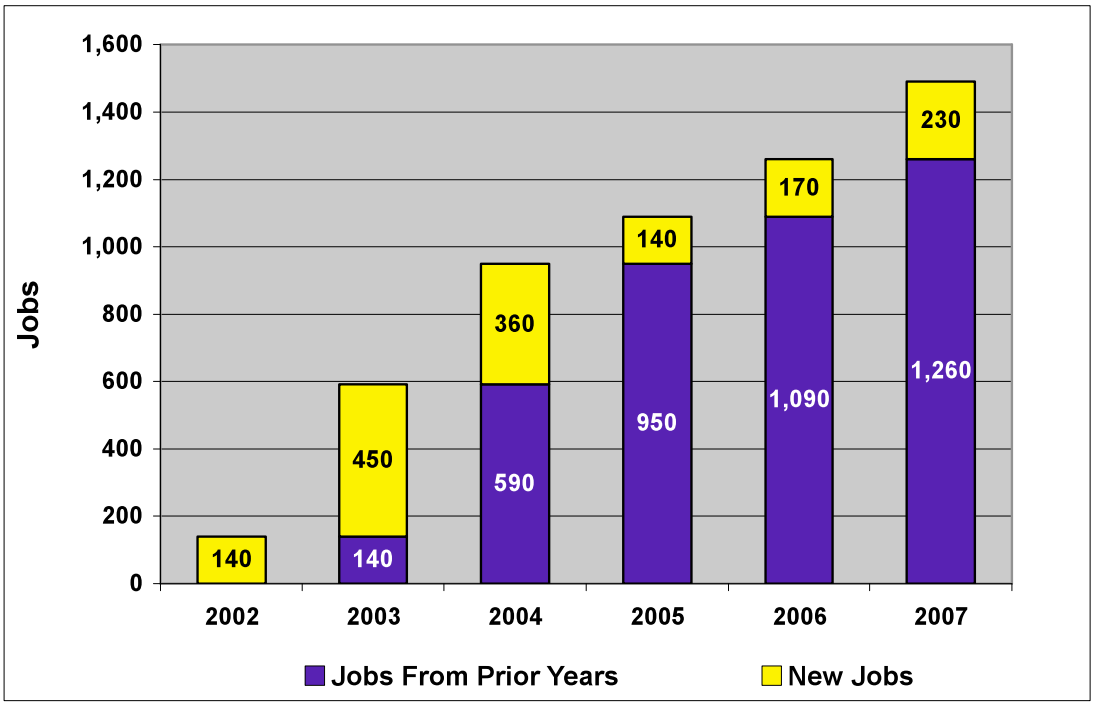
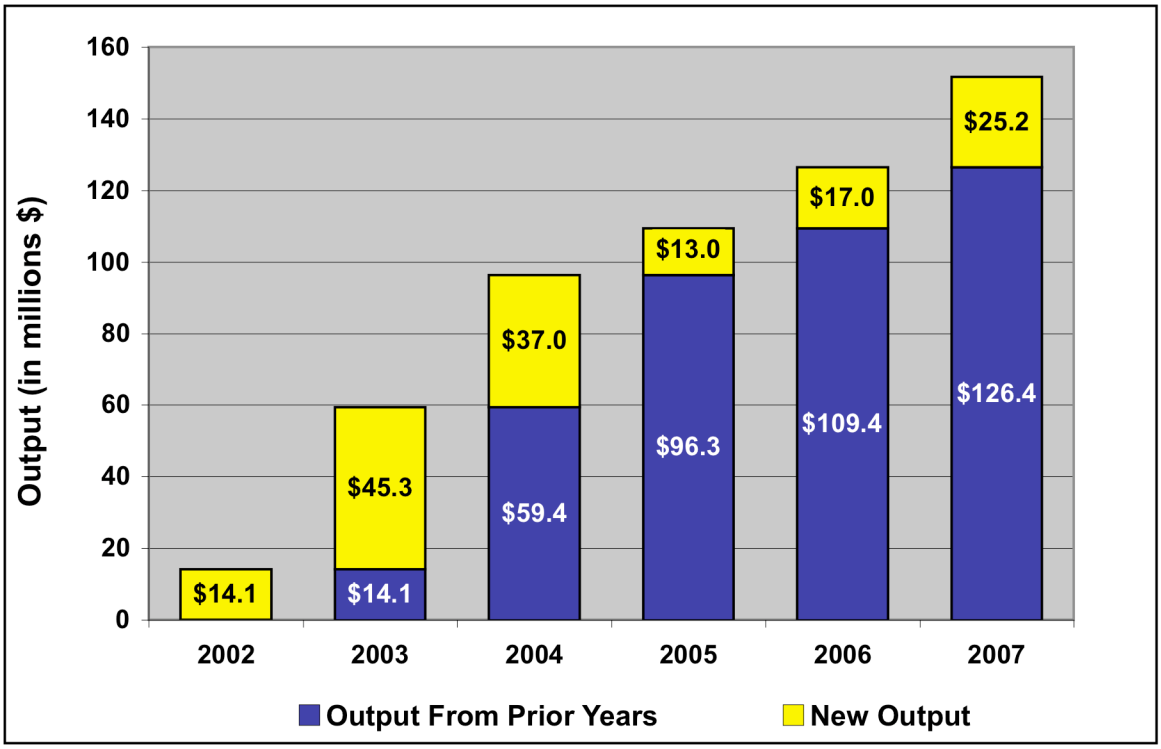


Figure 5 reports the cumulative output impacts from Energy Trust program activities from 2002 through 2007.

Figure 5: Cumulative Output Impacts From Energy Savings Across Program Years, 2002 Through 2007 (dollars in millions)



Although the methodology used to calculate cost savings and economic impacts across program years is similar to that used for any given program year, the results are not directly comparable and should be interpreted carefully. For a given program year, the cumulative impacts are the impacts that have occurred over time, i.e., the energy savings and economic impacts generated in a program year will continue in years to come. The cumulative impacts across program years are the total impacts occurring at that time, i.e., the energy savings and economic impacts generated in subsequent program years are added to the energy savings and economic impacts generated in previous years.

In addition, there are other economic factors that could cause the economic impacts to decline over time in which case the economic impacts reported above would be overstated.

Given the static nature of input-output modeling, in general, and the IMPLAN model used in this analysis, cumulative impacts do not take into account changes in production and business processes that Oregon businesses make in anticipation of future higher energy prices and/or increased market pressure from international competition to increase production efficiency. To the extent that Oregon businesses are already adjusting in anticipation of higher costs and/or tougher competition, then cumulative impacts presented here are overstated as the overall market would become more efficient due to factors outside Energy Trust influence.

The cumulative numbers also rely on the critical assumption that each dollar saved will translate into a dollar of increased economic output for those businesses adopting conservation measures. This assumption is a simplifying assumption made in absence of better information specific to

Oregon's economy. This assumption is reasonable in the short run, but in the long run it is likely that a dollar of energy savings will translate to less than a dollar of increased economic output (as reflected in the current economic variables for Oregon used in IMPLAN) as the overall market adopts more efficient production practices in anticipation of increased competition and higher energy costs. Consequently, the cumulative impacts shown here represent an upper bound. Despite these caveats, the ongoing and cumulative effect of conservation due to Energy Trust activities is nevertheless a significant net benefit to Oregon's economy.