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Economic Impacts of Oregon Energy Tax Credit Programs in 2006 (BETC/RETC)

Final Report

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1. INTRODUCTION AND SUMMARY

The Oregon Department of Energy asked ECONorthwest to estimate the economic effects of the Business Energy Tax Credit (BETC) and Residential Energy Tax Credit (RETC) programs. These effects include impacts on employment, output, and wages as well as tax revenue in Oregon that resulted from 2006 tax credits and the subsequent spending on measures and labor that these credits create. ECONorthwest also isolated the economic impacts of energy efficiency improvements (i.e., energy savings) that were realized in 2006 in order to estimate the benefits to the economy that accumulate in future years.

For this analysis, ECONorthwest compared all impacts against a Base Case scenario in which the BETC and RETC programs do not exist and the tax credit funds are assumed to be spent on other Oregon government programs following historical spending patterns.[1] The difference in economic impacts between the tax credit program spending and the Base Case scenario is referred to as the *net impact* of the tax credit programs. For example, if an impact of five new jobs is reported, this means that BETC and RETC programs resulted in five more jobs than would have occurred had the money been spent on other government programs and activities.

The combined spending on the BETC and RETC programs for 2006 totaled $73.8 million for tax credits and program administration. That is, $73.8 million in tax credits and program administration costs were obligated for projects completed in 2006. The effect of these tax credits combined with spending by businesses and residences taking advantage of these tax credits had the following net impacts on the Oregon economy in 2006:

- Output in Oregon's economy increased by $142.7 million
- 1,240 new jobs were created in Oregon
- Oregon wages increased by $18.6 million
- Tax revenues for state and local government increased by $10 million
- Oregon commercial and residential energy costs decreased by $48 million

Again, these net impacts reflect the benefits *over and above* what might have been achieved if the RETC and BETC did not exist and the tax credit dollars were used to fund other government activities.

In addition to the first year spending impacts, the energy savings achieved by the measures covered by these tax credits will continue in subsequent years after the tax credit is paid out. This substantially increases the benefits of these purchases as most of the measures covered by these programs have an expected useful equipment life of 15 years or more. As the energy cost savings is achieved each year, businesses are able to produce at lower costs and increase output and

[1] For Oregon, state government spending is split about evenly between education and non-education programs.

households have more money available to spend on other goods and services due to lower energy bills.

Based on annual energy savings of $46 million achieved from the BETC program activity in 2006, the continued energy savings in future years due to the expected equipment life of 15 years or more has the following annual economic impacts:

- Increase in Oregon's economic output by $93 million
- Continued net impact of 889 new jobs
- Additional state and local tax revenues of $10 million

The remainder of this report documents the analysis methods used to estimate these impacts. The first part of the report provides a brief overview of both the RETC and BETC programs. The following section provides background information on the analysis methods and data used to estimate the economic impacts. The gross economic impacts in 2006 for both programs are presented in the next section, followed by a section on net impacts. The final section contains a brief discussion that isolates the economic impacts associated with the improvements in energy efficiency in Oregon's economy.

2. BETC AND RETC PROGRAM OVERVIEW

RETC OVERVIEW

The Oregon Department of Energy (ODOE) offers Oregon residents who invest in energy conservation and efficiency improvements a personal income tax credit. Residents can obtain a maximum credit of $1,000 (per year) for efficient appliance purchases and a maximum credit of $1,500 (per year) for installation of renewable energy equipment and $1,500 (per year) for the purchase of an alternative fuel or hybrid vehicle. To obtain their credit, residents must submit an application to ODOE by April 1 of the year following their purchase of an eligible measure. (After April 1, residents can still receive credits but must amend their tax filings.)

ODOE lists the following products and technologies as eligible for the RETC:

- **Appliances**: Clothes washers, dishwashers, and refrigerators
- **Heating and Air Conditioning Systems**: Includes various heat pump systems, heat/energy recovery ventilation systems, furnaces and boilers, air ducts, and combination space and water heating systems.
- **Solar**: Includes solar water and space heaters and solar electric (photovoltaic) systems
- **Water Heaters**: Includes combination space and water heaters and wastewater heat recovery systems
- **Vehicles**: Hybrid and alternative fuel.
- **Wind Systems**
- **Fuel Cells**
- **Geothermal Systems**
- **Hydroelectric Systems**

RETC PROGRAM ACTIVITIES

Table 1 and Figure 1 show the types of projects receiving a RETC in 2006. An average net-to-gross ratio of 80 percent was used to adjust annual energy savings to remove the effect of "free riders" that would have purchased the equipment even if the RETC were unavailable.[2] As shown in the following table and chart, appliances comprised the majority of RETC projects, accounting for 79 percent of the RETC recipients, 43 percent of the tax credits, and 37 percent of the energy cost savings achieved through the program.

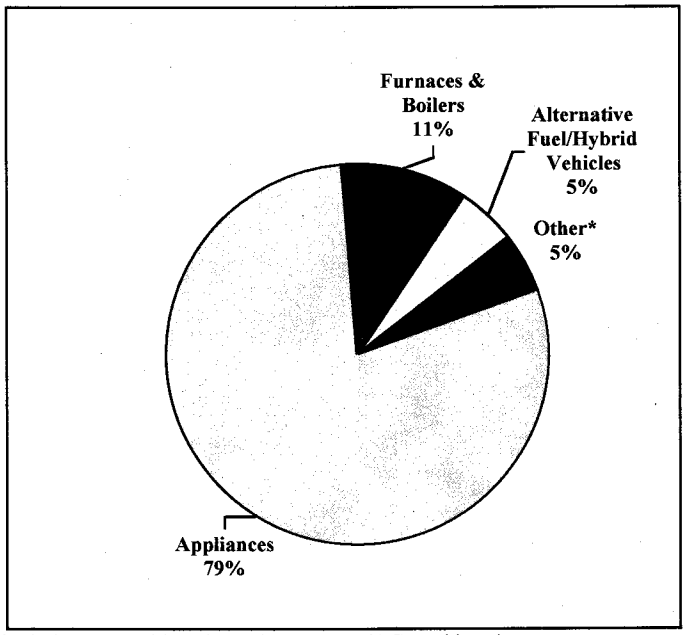
[2] Based on net-to-gross ratios in the California PUC *Energy Efficiency Policy* Manual (October 2001).

Table 1: RETC Program Summary (2006)

Product/System	Number of Installations	Total Tax Credits	Annual Energy Savings*
Renewables	489	$1,017,830	$80,049
Appliances	34,023	$4,696,088	$871,248
Ducts	993	$222,564	$78,063
Furnaces & Boilers	4,627	$1,620,371	$294,003
Heat Pumps/AC	672	$244,021	$35,907
Heat/Energy Recovery Ventilators	28	$8,450	$3,008
Alternative Fuels/Hybrid Vehicles	2,129	$3,178,000	$796,615
Total	**42,961**	**$10,987,323**	**$2,158,893**

* Includes savings values for electricity, natural gas, and automobile gasoline.

Figure 1: Share of RETC Installations by Product Type (2006)



*Other includes renewables, ducts, heat pumps/AC, and heat/energy recovery ventilators.

BETC Program Overview

The Oregon Business Energy Tax Credit (BETC) is offered as an incentive to encourage commercial investments in energy conservation, renewable energy resources, and sustainable resource use. The tax credit amount is 35 percent of eligible energy project costs deducted from Oregon income tax liability and is available to all business, trade, or rental property owners within Oregon. A business itself, its partners, or its shareholders can use the credit, but the credit applicant must own the project or purchase its contract, and the project equipment can only be used or leased for use in Oregon. For all but the smallest projects, the 35 percent credit is taken

over five years (10 percent the first and second years and 5 percent each year thereafter), and any unused portion can be carried forward for a maximum of eight years. Tax credits for small projects (eligible costs of $20,000 or less) can be fully redeemed in one year.

The tax credit value is calculated based on the eligible project costs, which are the incremental costs associated with moving from a standard efficiency to a more energy efficient option. Specific eligible project costs include direct expenses associated with equipment, materials and supplies, fees paid for engineering and design, loan and permit costs, and installation costs that relate to installing more energy efficient equipment. Costs associated with equipment maintenance, equipment replacement at the end of its useful life, or equipment required to meet established code are not eligible for the BETC program.

ODOE classifies BETC-eligible projects into the following six categories:

- **Retrofit Projects**. In general, project equipment must be at least 10 percent more efficient than existing equipment. For lighting projects, retrofit equipment must increase efficiency by at least 25 percent and the project owner must present a plan for recycling the existing fixtures or systems. Most retrofit projects must have a simple payback of one to 15 years with rental property weatherization projects required to have a simple payback of one to 30 years

- **New Construction Projects.** Measures installed in new facilities must reduce energy usage by at least 10 percent relative to a similar building that meets minimum code. New construction projects must have a simple payback of one to 15 years.

- **Co-generation Projects**. Projects must use the heat byproduct of electricity generation and must improve efficiency by 10 percent. Co-generation projects must have a simple payback of one to 15 years.

- **Renewable Resource Projects**. Projects must generate or reclaim energy from wind, water, sun, geothermal sources, or biomass. Energy from projects can be used onsite or sold and must replace at least 10 percent of the electricity or fossil fuels used.

- **Recycled Material Projects**. Projects must develop new markets for recyclable materials or recycle materials not mandated by law. New or replacement equipment used to sort or transport materials that are already covered by existing recycling laws are ineligible for the BETC.

- **Transportation Projects**. Projects must reduce work-related travel by at least 25 percent and/or make investments in alternative fuels.

Businesses must apply for the BETC before they begin a project and can start the project once they receive preliminary certification from ODOE. Once the project is complete, businesses must apply for final certification to actually receive their tax credit, and project modifications occurring between the preliminary and final certifications must be submitted in writing. Businesses also must spread the tax credit for larger projects over five years. For the purposes of

this analysis, however, the BETC is modeled as being taken in one year as it simplifies the analysis and this assumption does not change the estimates of net economic impacts.

Businesses, non-profit organizations, schools, tribes and public entities with no income tax liability (or businesses with liability that choose not to use their credit) can use the BETC pass-through option. The business can transfer its tax credit eligibility to a tax-liable third party in exchange for a lump sum cash payment. The pass-through rate for five-year credits is currently set at 25.5 percent and the rate for one-year credits is 30.5 percent.

BETC Program Activities

Table 2 and Figure 2 shows how the BETC was distributed across industries for 2006. Projects in the Construction and Manufacturing sector received one-third of the tax credit dollars during 2006 and also achieved one-third of the energy cost savings estimated for the BETC program. Projects in the Wholesale and Retail Trade sector received 28 percent of the tax credit dollars but accounted for almost half of the savings (46 percent). Projects in the Public Administration sector accounted for an additional 10 percent of energy cost savings.

Note that the energy cost savings reflect *net savings* and account for the fact that some measures would have been purchased even if the BETC program had not existed. The savings values were adjusted using net-to-gross adjustment factors, with net-to-gross ratios used averaging about 80 percent across all technologies.[3] That is, on average 80 percent of the projects would not have been completed without the BETC available as an incentive. The net-to-gross calculation avoids crediting the program with "free rider" installations, as these would have occurred even if the BETC program had not existed. In this case, with a net-to-gross ratio of 0.80, 20 percent of the projects are assumed to be free riders that would have done the project even if the BETC had not been available.

[3] The net savings adjustment factors are taken from the California PUC *Energy Efficiency Policy Manual* (October 2001), with a default value of 80 percent applied to those measures not specifically covered in the manual.

Table 2: BETC Summary by Industry (2006)

SIC Industry Category	Number of Projects	Total Value of Tax Credits	[illegible]
Natural Resources	60	$729,346	$329,133
Construction and Manufacturing	147	$20,470,940	$17,335,199
Transportation, Communication, and Utilities	125	$4,964,084	$1,984,312
Wholesale and Retail Trade	240	$16,788,232	$24,166,292
Finance, Insurance and Real Estate	786	$3,343,727	$895,561
Services	401	$9,963,126	$2,476,537
Public Administration	102	$4,601,277	$5,096,749
Total	1,861	$60,860,732	$52,283,784

Figure 2: BETC Tax Credit Dollars by Sector (2006)

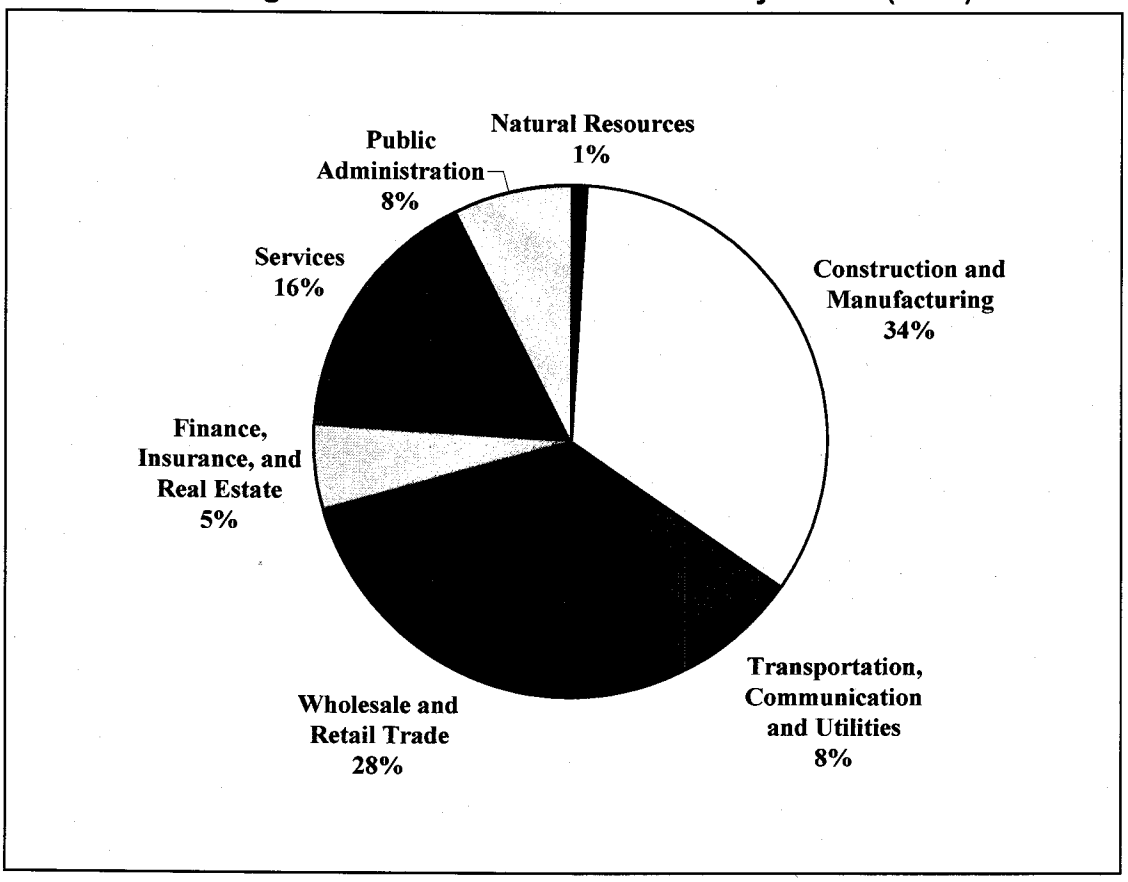
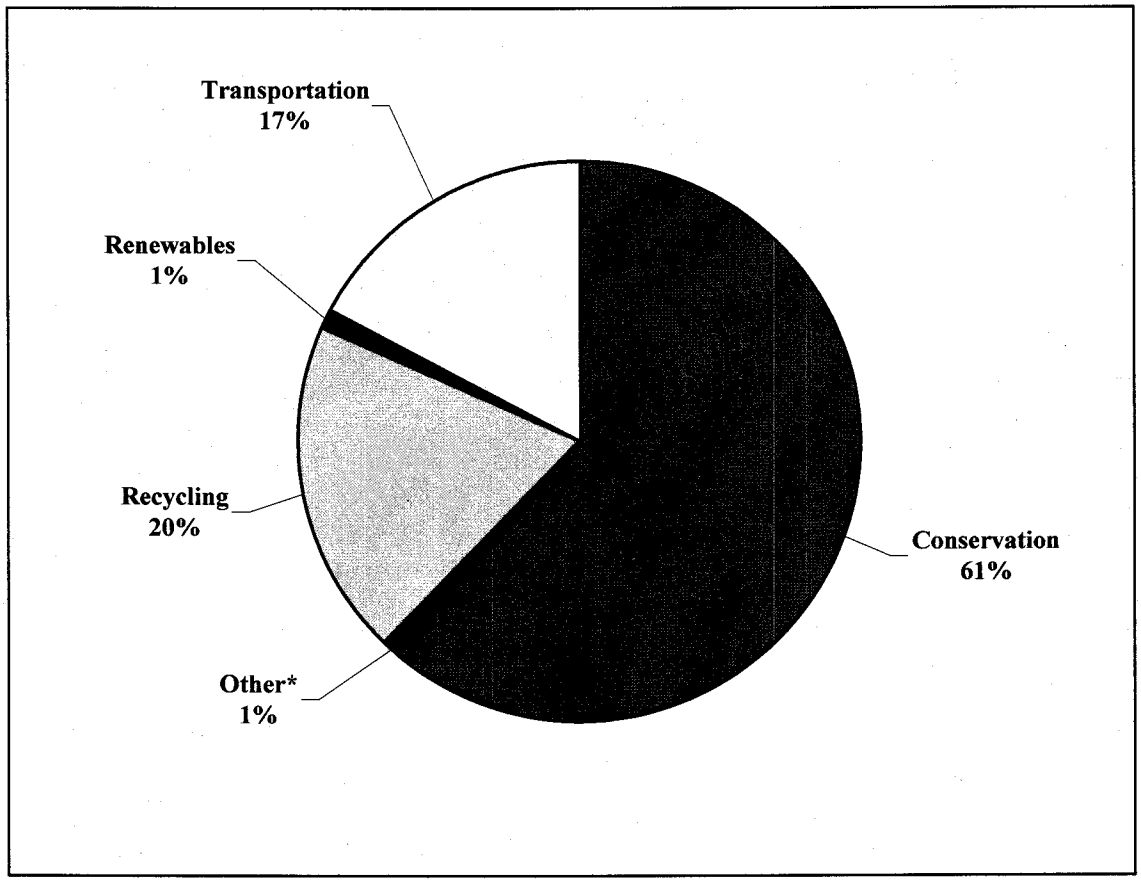


Figure 3 reports shares of BETC tax credit dollars received by the type of project completed. Conservation projects accounted for over half (61 percent) of the total credits received, and recycling and transportation projects accounted for the second and third largest shares, respectively. These three project categories combined accounted for 98 percent of all projects receiving a BETC in 2006.

Figure 3: Share of Total BETC Credits by Project Type (2006)



*Other includes research and development, sustainable building, and waste heat recovery.

3. ANALYSIS METHODS

Estimating the economic impacts attributed to the Oregon Department of Energy's BETC and RETC programs is a complicated process as spending by ODOE—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 the Oregon Department of Energy or program 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 ODOE's program activities during the 2006 program year. The short-term economic impacts are those attributed to the dollars coming to Oregon households and businesses as a result of the RETC and BETC programs. The economic modeling framework that best measures the 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 out 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.[4]

Input-output analysis employs specific terminology to identify the different types of economic impacts resulting from economic activities. Expenditures made through ODOE 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."

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[4] 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. ECONorthwest has applied the model to a variety of public and private sector projects including an analysis of the economic impacts of the Energy Trust of Oregon's energy efficiency and renewable energy programs.

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.
- *Tax revenues* for various state and local taxing jurisdictions.

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.
- *Net Impacts* are the effects of ODOE 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.

For this study, the economic impacts are estimated relative to a Base Case scenario that reflects the economy had the RETC and BETC programs not existed and assumes that the funds used for both tax credits would have been reallocated and spent on all other state and local government programs within Oregon. Specifically, the Base Case scenario explicitly allows us to examine the opportunity costs of the BETC and RETC programs by accounting for that fact that the funds dedicated for these tax credits cannot be allocated to other government programs. In some cases, certain sectors in the economy might show a negative net impact as employment or economic output decreases relative to the Base Case. This reflects a shift of output or employment from one sector to another as we move from the Base Case to a scenario containing the RETC and BETC programs.

The following types of impacts form the basis of this analysis:

- *Program operations spending* as the Oregon Department of Energy purchases labor and materials to carry out their energy efficiency programs.
- *Measure spending* by participants in the RETC and BETC 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.

- *Changes in government spending* attributed to expenditures by ODOE (program operations and tax credits for BETC and RETC participants) and other state government programs.

ECONorthwest's impact analysis relies on program data compiled and reported by the Oregon Department of Energy. These data are summarized in Table 3 and discussed in more detail in later sections of this report. The Tax Credits and Program Expenditure data reported in Table 3 are actual amounts provided by ODOE. The Tax Credits are the incentives paid to RETC and BETC participants who install energy efficient equipment. The Program Expenditures represent the program operating expenditures by ODOE necessary to conduct the RETC and BETC programs.

The Net Measure Spending and Net Energy Savings data reported in Table 3 are derived from the gross measure spending and energy savings data provided by ODOE. As discussed in the previous section, ECONorthwest adjust all measure cost and energy savings numbers to reflect net values. That is, some program participants would have installed energy efficiency equipment even in the absence of the program ("free riders"). The spending and energy savings attributed to these free-rider participants, therefore, should not be included in overall impacts of the programs. ECONorthwest removed these free-rider participants by using net-to-gross ratios on a measure-by-measure basis.

Table 3: RETC and BETC Program Data (2006)

RETC	
Net Measure Spending	$102,022,000
Net Energy Cost Savings	$2,159,000
Tax Credits	$10,987,000
Program Expenditures	$506,000
BETC	
Net Measure Spending	$135,998,000
Net Energy Cost Savings	$45,929,000
Tax Credits	$60,861,000
Program Expenditures	$1,516,000

Source: Oregon Department of Energy. Net values calculated by ECONorthwest.

The following sections present the gross and net impacts of both the BETC and RETC programs for 2006 using the methods and input data discussed in this section.

4. GROSS ECONOMIC IMPACTS

The gross economic impacts attributed to the RETC and BETC programs are based on the program costs and tax credits issued by ODOE, and the measure spending and energy savings of program participants. Although tax credits are not entered separately in the input-output model, they are included in the model as part of the total equipment cost. Program costs and tax credits are the key component of the Base Case scenario, as these funds are assumed spent on other government programs.

Measure spending by program participants consists of expenditures on energy efficiency measures, such as appliances and furnaces/boilers for RETC participants, and heating, ventilation and air conditioning (HVAC) systems, lighting modifications, and industrial process modifications for BETC participants. ECONorthwest received detailed measure spending data from ODOE and, in total, mapped the spending on the various types of energy measures to over 20 different IMPLAN sectors. ODOE also supplied detailed energy savings estimates, broken out by fuel type (electricity, natural gas, petroleum, wood products, and other) for program participants. For residences, lower energy costs will increase Oregon households' disposable income. As such, the estimated energy cost savings were fed into a consumption function representing the spending pattern of a middle-income household in Oregon.[5]

Energy savings for commercial/industrial participants were identified by Standard Industrial Classification (SIC) code. ECONorthwest used this detailed energy savings information to allocate energy savings to approximately 100 different business sectors in the IMPLAN model. 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 likely change in output. That is, this approach assumes that lower energy costs increase the competitiveness of Oregon businesses, allowing them to decrease price, and increase output.[6]

Finally, 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.

RETC IMPACTS

The gross economic impacts of the RETC program for 2006 are shown in Table 4. Spending related to the RETC program increased economic output by $89.7 million in 2006, which includes an increase of $29.9 million in wage income and $3.6 million in business income within

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

[6] Because we do not have price elasticity of demand coefficients for each of the 100 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.

Oregon. This activity also created 830 jobs and resulted in additional tax revenues of $6.8 million to state and local governments. It is important to reiterate that these are gross impacts and therefore do not take into consideration alternative uses of ODOE funds dedicated to these programs, which are addressed in the next section.

Table 4: RETC Gross Impacts (2006)

[illegible]	[illegible]
Output	$89,731,000
Wages	$29,916,000
Business Income	$3,615,000
Jobs	830
Taxes	$6,806,000

Source: ECONorthwest.

BETC Impacts

The gross economic impacts for the BETC program are shown in Table 5. As shown earlier in Table 3, the 2006 BETC program generated $135.9 million in measure spending which led to $45.9 million in energy savings for businesses. The gross impacts attributed to BETC activity in 2006, as a result, included $178 million in additional economic output, almost $70 million in wages, and over 2,000 new jobs for workers in Oregon.

Table 5: BETC Gross Economic Impacts (2006)

[illegible]	[illegible]
Output	$178,137,000
Wages	$69,915,000
Business Income	$9,356,000
Jobs	2,090
Taxes	$10,808,000

Source: ECONorthwest.

Combined Impacts

The combined gross impacts for the RETC and BETC programs for 2006 are reported in Table 6. In total, on a gross basis, both programs combined to produce almost $268 million in output, $100 million in wages, 3,000 jobs, and an increase of $17.6 million in tax revenues for 2006.

Table 6: Combined BETC and RETC Gross Economic Impacts (2006)

Impact Type	2006
Output	$267,868,000
Wages	$99,831,000
Business Income	$12,971,000
Jobs	2,920
Taxes	$17,614,000

Source: ECONorthwest.

Table 7 reports the combined, gross impacts for the RETC and BETC programs in 2006 by major industry sector. It is evident from Table 7 that the economic impacts are widespread among all major industry sectors. This is attributed primarily to the energy savings benefits from both programs. For instance, energy efficiency equipment installed under the RETC program saves households money. As a result, households spend less on energy and more on other goods and services. Similarly, the BETC program reaches a wide variety of businesses and every sector of Oregon's economy benefits from lower energy costs.

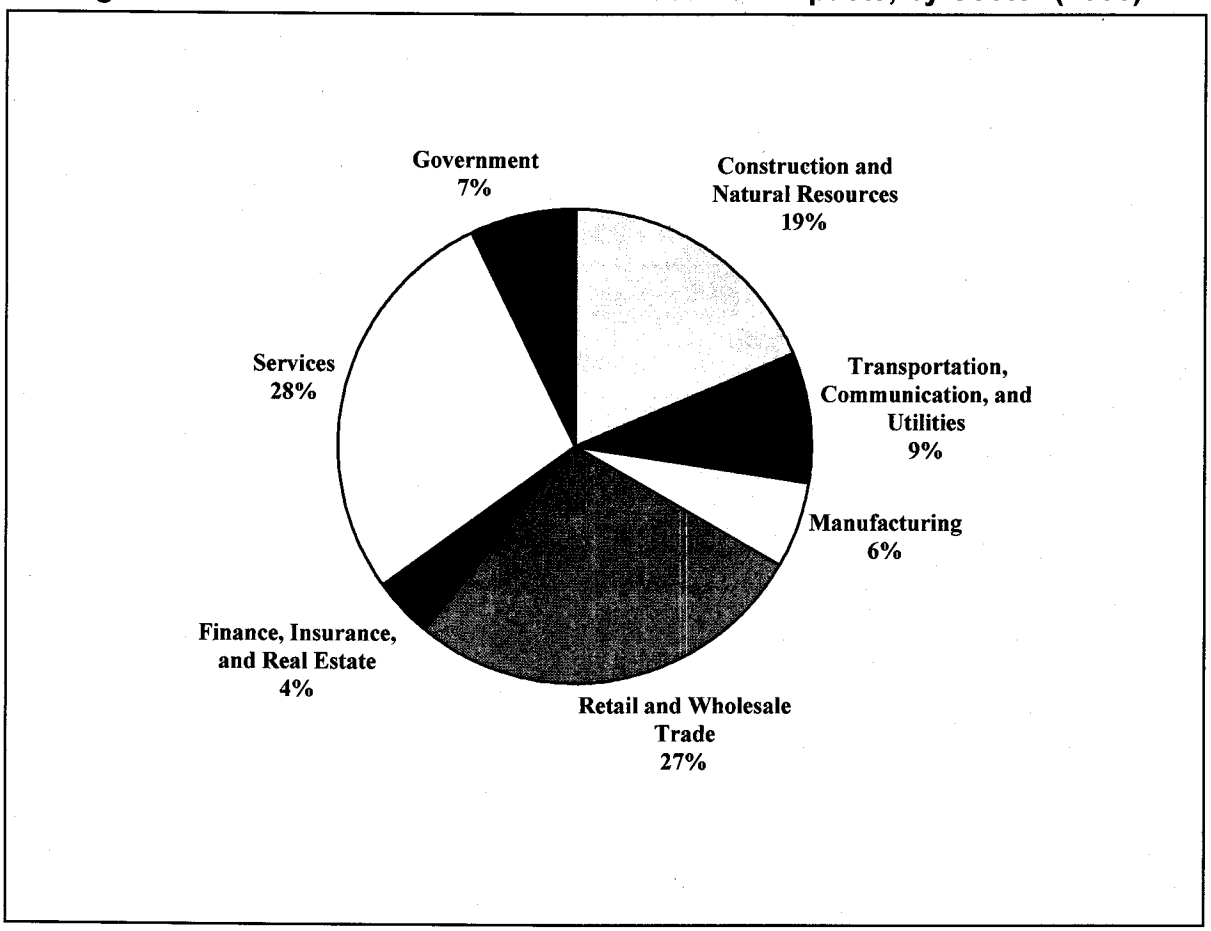
Table 7: Combined BETC and RETC Gross Economic Impacts, by Sector (2006)

Industry Sector	Output	Wages	Business Income	Jobs
Construction and Natural Resources	$60,042,000	$18,477,000	$5,298,000	540
Transportation, Communication & Utilities	-7,873,000	4,530,000	-745,000	260
Manufacturing	48,229,000	9,572,000	603,000	170
Retail and Wholesale Trade	70,790,000	26,139,000	1,920,000	800
Finance, Insurance, Real Estate	17,479,000	3,291,000	1,027,000	120
Services	61,700,000	23,695,000	4,868,000	810
Government	17,501,000	14,126,000	0	210
Total	**267,868,000**	**$99,831,000**	**$12,971,000**	**2,920**

Source: ECONorthwest.

Figure 4 shows the distribution of gross job impacts among major industry sectors. The largest impacts include the service and trade sectors due to increases in spending from several related areas. Households that take advantage of the RETC are spending less on energy and more on other goods and services, which has a positive impact on the service and trade sectors. Similarly, the manufacturing and transportation sectors are enjoying reduced energy costs due to the BETC and this ultimately has a positive impact on the supporting trade and service industries. Finally, the construction sector also has a significant share of gross employment impacts, which is due to the local labor and specialized trade contractors (i.e., HVAC contractors) needed for installing many of the measures covered in the BETC and RETC programs.

Figure 4: Combined BETC and RETC Gross Job Impacts, by Sector (2006)



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 the BETC and RETC programs not existed. To calculate net impacts, the economic impacts of the Base Case scenario are estimated assuming that the money that is currently spent on the BETC and RETC programs is allocated to other state government programs.[7] 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.[8]

RETC IMPACTS

Table 8 shows the net economic impacts attributed to the RETC program in 2006. The net economic impacts are still significant but are less than the gross economic impacts reported previously. The gross economic impacts included the assumption that revenues to utilities, refiners 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 funds used to finance the RETC program (administrative and operating costs, and tax credits for program participants) are now available for other state government programs.

For 2006, the RETC program has had a net effect of increasing Oregon's economic output by $70.2 million relative to the Base Case scenario. Similarly, the program has increased business income by $3.2 million and wage income by $17.2 million relative to the case where the RETC program does not exist. This increase in economic activity due to the RETC program also increased tax revenues by $5.6 million and Oregon employment by 570 jobs. Again, this reflects jobs over and above what would have been created in the Base Case scenario.

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[7] This Base Case spending scenario does not focus on any one state government program in particular. Rather, it assumes that the RETC and BETC funds would be redistributed equally among all government programs and activities based on historical spending patterns observed for Oregon.

[8] As an alternative Base Case scenario, it could be assumed that the tax credit dollars are returned to Oregon businesses and residents and then spent based on historical spending patterns. This scenario would have lower economic impacts than the Base Case used in this analysis, as government spending tends to be more labor intensive and therefore creates greater local economic impacts within the state than does private spending. Since the current Base Case scenario (assuming that the tax credits are spent on other government programs) has *greater* economic impacts, the *net* impacts are lower relative to the case where the alternative Base Case scenario is assumed. As a consequence, the net impacts presented in this report are the more conservative of the two Base Case scenarios.

Table 8: RETC Net Economic Impacts (2006)

Impact Type	2006
Output	$70,268,000
Wages	$17,292,000
Business Income	$3,269,000
Jobs	570
Taxes	$5,620,000

Source: ECONorthwest.

BETC IMPACTS

Table 9 reports the net economic impacts attributable to the BETC program in 2006. As with the RETC program, Table 9 shows the net economic impacts are positive but less than the gross economic impacts described earlier for the BETC program. For 2006, the BETC program resulted in a net increase in economic output within Oregon by $72.5 million, which includes an increase of $1.3 million in wage income and $7.4 million in business income. This also results in a net increase in tax revenues of $4.3 million. The BETC program also resulted in a net addition of 670 jobs relative to the case where the BETC program did not exist.

Table 9: BETC Net Economic Impacts (2006)

Impact Type	2006
Output	$72,505,000
Wages	$1,397,000
Business Income	$7,478,000
Jobs	670
Taxes	$4,373,000

Source: ECONorthwest.

COMBINED IMPACTS

Table 10 provides a comparison of the gross and net impacts and illustrates the importance of analyzing net impacts rather than only considering gross effects. Except for business income, the net impacts are significantly lower than the gross impacts.[9] The net impacts are all positive, however, which indicates that the BETC and RETC programs have a positive effect on the economy relative to the Base Case scenario.

[9] Whereas foregone government spending causes government output, wages, and jobs to decrease significantly, it has very little effect on business income.

Table 10: Combined BETC and RETC Gross and Net Impacts (2006)

Impact Type	Gross	Net	Net/Gross
Output	$267,868,000	$142,773,000	53%
Wages	$99,831,000	$18,689,000	19%
Business Income	$12,971,000	$10,747,000	83%
Jobs	2,920	1,240	42%
Taxes	$17,614,000	$9,993,000	57%

Source: ECONorthwest. Combined numbers may vary from earlier tables due to rounding.

Table 11 and Figure 5 shows how the combined net impacts for 2006 are distributed across the different economic sectors. Overall, the combined effect of the BETC and RETC programs is an increase in economic output of $142.7 million in Oregon economy for 2006. This includes an increase of $18.6 million in wages and a net increase of 1,240 jobs. The areas with the largest increase in output and jobs were the construction, manufacturing, and retail and wholesale trade sectors, due both to the purchase and installation of measures through the programs and through the benefits of lower energy costs on operations for businesses within these sectors. The effect of shifting funds to the BETC and RETC and away from other spending on all other government programs is clearly reflected in the negative economic impacts for the government sector. Since the overall net effect on employment is positive, spending on the BETC and RETC programs results in more private-sector job creation and less public-sector employment relative to the case where these programs do not exist.

Note from Table 12 that the net tax impact is an increase of almost $10 million in state and local tax revenues over the Base Case scenario. This indicates that these tax credits are being applied to the economy in such a way that they increase economic activity (and subsequently tax revenues) relative to the case where the tax credit funds are spent on other government programs following historical spending patterns. The increase in tax revenues also helps defray the cost of the tax credits, as the $10 million in new tax revenues is about 14 percent of the $71.8 million spent on BETC and RETC tax credits for 2006.[10]

[10] Some of these tax revenues are local taxes and therefore will not directly offset the cost to the state for the energy tax credit programs. However, the increase in local tax revenues may help offset the program costs if these new revenues allow the state to reduce its payments to local jurisdictions.

Table 11: Combined BETC and RETC Net Impacts, by Sector (2006)

Industry Sector	Output	Wages	Business Income	Jobs
Construction and Natural Resources	$59,047,000	$18,289,000	$5,219,000	540
Transportation, Communication & Utilities	-11,748,000	3,556,000	-881,000	250
Manufacturing	44,394,000	8,969,000	546,000	170
Retail and Wholesale Trade	61,172,000	22,678,000	1,629,000	680
Finance, Insurance, and Real Estate (FIRE)	10,328,000	1,864,000	648,000	70
Services	40,546,000	15,299,000	3,586,000	550
Government	-60,966,000	-51,966,000	0	-1,030
Total	**$142,773,000**	**$18,689,000**	**$10,747,000**	**1,240**

Source: ECONorthwest. Combined numbers may vary from earlier tables due to rounding.

Figure 5: Combined BETC and RETC Net Job Impacts, by Sector (2006)

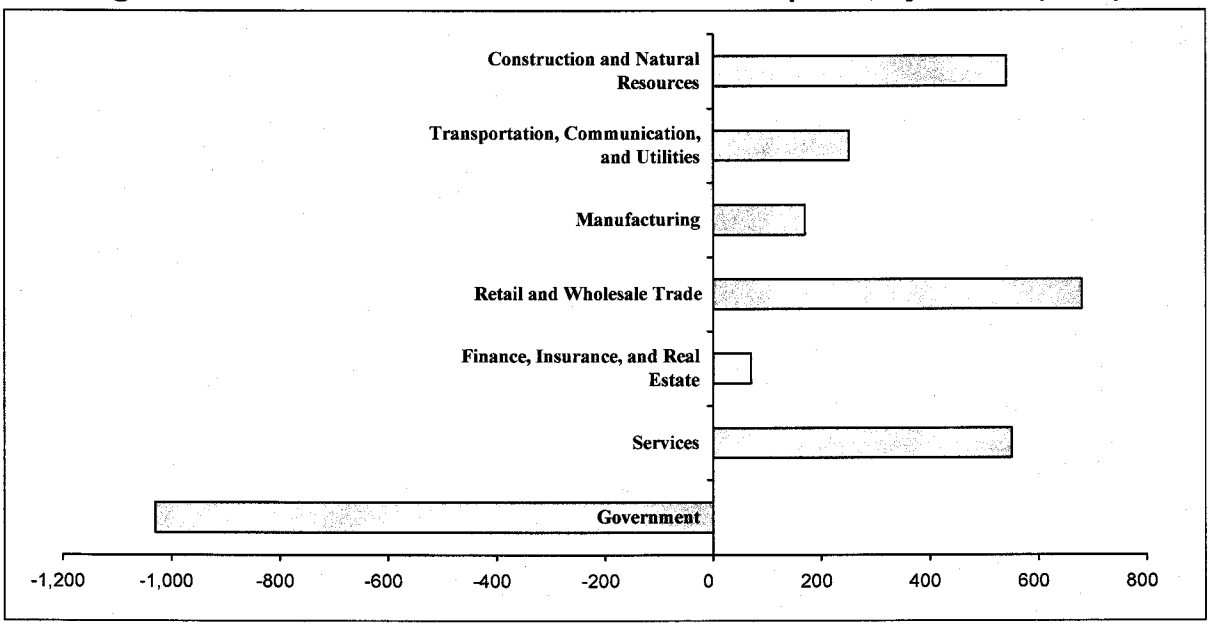


Table 12: Combined Increases in Net Tax Revenue (2006)

[illegible]	[illegible]
Business Taxes	
Corporate Profits Tax	$918,500
Property Taxes	$5,234,000
Other Taxes	$1,180,400
Fines and Fees	$788,300
Vehicle Licensing and Fees	$273,800
Total Business	**$8,395,000**
Personal Taxes	
Income Taxes	$1,215,400
Property Taxes	$16,300
Other Taxes	$35,200
Fines and Fees	$72,300
Vehicle Licensing and Fees	$79,700
Total Personal	**$1,418,900**
Social Insurance Taxes	**$179,600**
Grand Total	**$9,993,500**

Source: ECONorthwest.

6. Energy Savings Impacts Over Time

For many projects, installation of BETC and RETC projects occurs 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 costs and tax credit costs have ended. 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.

Table 13 shows the economic benefits per $1 million in energy cost savings for both the BETC and RETC based on 2006 spending patterns and distribution of measure purchased. Note that there are slight differences in the economic impacts between the BETC and RETC due to the different spending patterns between the residential and non-residential sectors. 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 purchase 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.

As shown in Table 13, $1 million in energy cost savings results in a $1.1 million increase in economic output for Oregon through the RETC program, while the same $1 million in energy savings results in an increase of $2 million in output from the BETC program. The higher BETC value reflects the ability of businesses to produce goods at a lower cost due to their investments in energy efficiency through the program. Similarly, $1 million in savings through the RETC program will increase Oregon wages by $366,000 and create 10 jobs. With the BETC program, this same amount of savings increases wages by $725,400 and creates 19 jobs (with higher salaries on average). The increase in economic activity due to $1 million in energy cost savings will also increase taxes by $93,800 with the RETC and $161,600 for the BETC for each year that the energy cost savings continues.

Table 13: Impacts per $1 Million in Energy Cost Savings

Impact Type	RETC	BETC
Output	$1,128,600	$2,033,500
Wages	$366,000	$725,400
Business Income	$47,700	$65,600
Jobs	10	19
Taxes	$93,800	$161,600

Source: ECONorthwest.

The following figures show the cumulative effects of continued improvements in efficiency and assume that annual efficiency improvements in future years will continue at the level observed in 2006. 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. The results are shown here for the BETC only, but the results for using the RETC impacts would be similar although on a somewhat smaller scale given the lower energy cost savings resulting from that program.

Figure 6 shows the cumulative energy cost savings resulting from the BETC assuming that 2006 participation levels are continued in the near term.[11] In 2006, the BETC resulted in an estimated $46 million in energy cost savings. In 2007, an additional $46 million could be achieved (assuming constant participation), which is in addition to the $46 million still being saved due to the program participants in 2006. Given that the measure life for equipment covered by the BETC averages about 15 years and that the program has existed for over 20 years, the potential for sustained cumulative savings with this program is quite large.

[11] This only accounts for savings beginning in 2006, as this was the period covered in our analysis. Since both the BETC and RETC programs began in the 1980s, actual cumulative savings is much higher than what is shown in Figure 6.

Figure 6: Cumulative BETC Energy Cost Savings

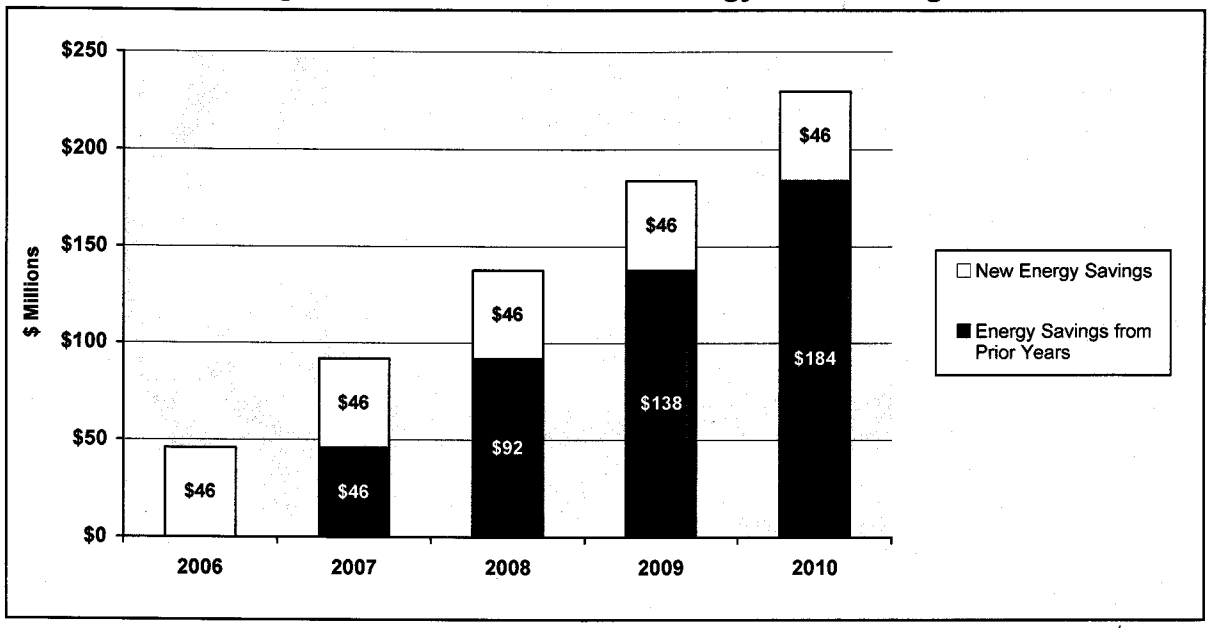


Figure 7 shows a similar effect using the economic output impacts over time resulting from energy cost savings. As before, energy cost savings are assumed to continue at the 2006 levels observed for the BETC program. In 2006, economic output in Oregon is increased an additional $93 million based on the energy cost savings achieved in 2006. In 2007, Oregon's economic output also increases by $93 million, in addition to the $93 million achieved in the prior year. This trend continues each year that the programs exist and consequently the cumulative benefits expand over time. By 2010 (assuming energy savings levels continue at 2006 rates), economic output increases by $374 million in that year due solely to efficiency gains made in prior program years.

As discussed above, the increase after the first year in economic output relative to the gross and net impacts is due to the fact that the impacts in subsequent years do not include the Base Case scenario or the installation cost of the equipment. Since the Base Case and equipment cost effects are all incorporated in the first year, the annual impact for later years will be higher than the first-year output effects shown in either Table 5 or Table 9.

Figure 7: Cumulative Economic Output Effect from BETC Energy Cost Savings

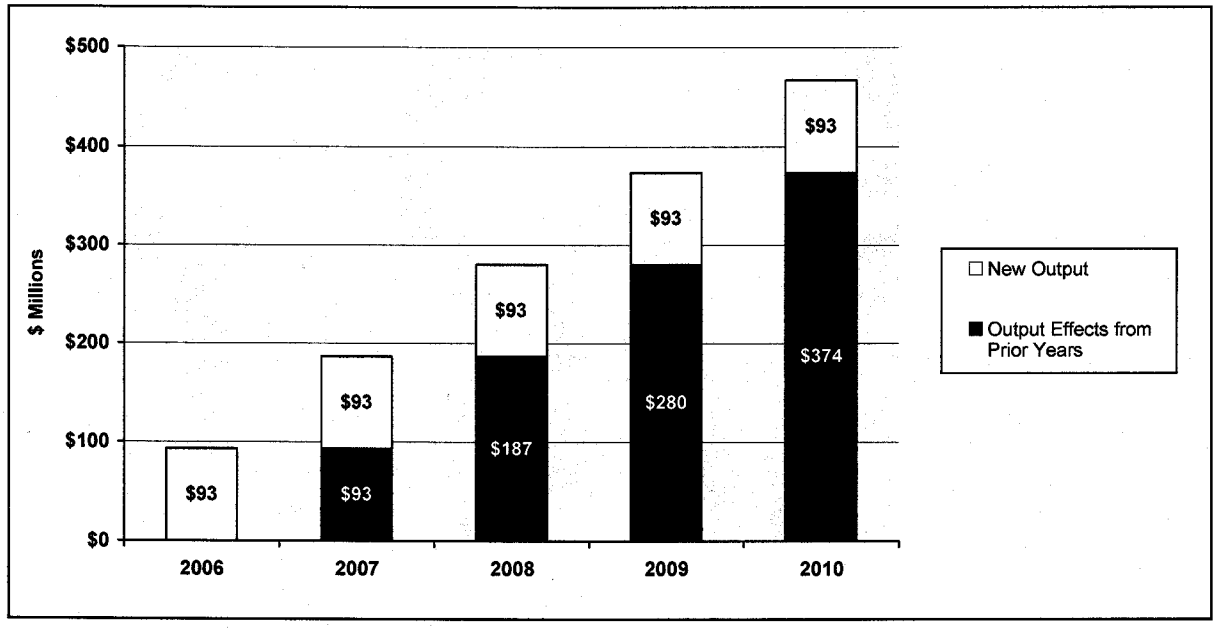


Figure 8 shows the cumulative impact of energy cost savings through the BETC program on employment in Oregon. When cost savings gains persist, businesses are able to direct spending away from energy costs to other factors of production. And by lowering their costs, they are able to increase output. Similarly, residents spending less on energy also contribute to increased employment as spending shifts to other goods and services that have a greater impact on the Oregon economy. The analysis presented earlier shows that the combined shift in spending translates to about 19 Oregon jobs for each $1 million in energy cost savings. If these savings persist over time, then the employment impacts should persist as well, at least in the short term.[12] The effect of energy savings for 2006 is an increase of 889 new jobs, with an additional 889 new jobs added each subsequent year. If current trends continue, the cumulative net effect on employment by the end of 2010 will be 4,444 new jobs for Oregon.

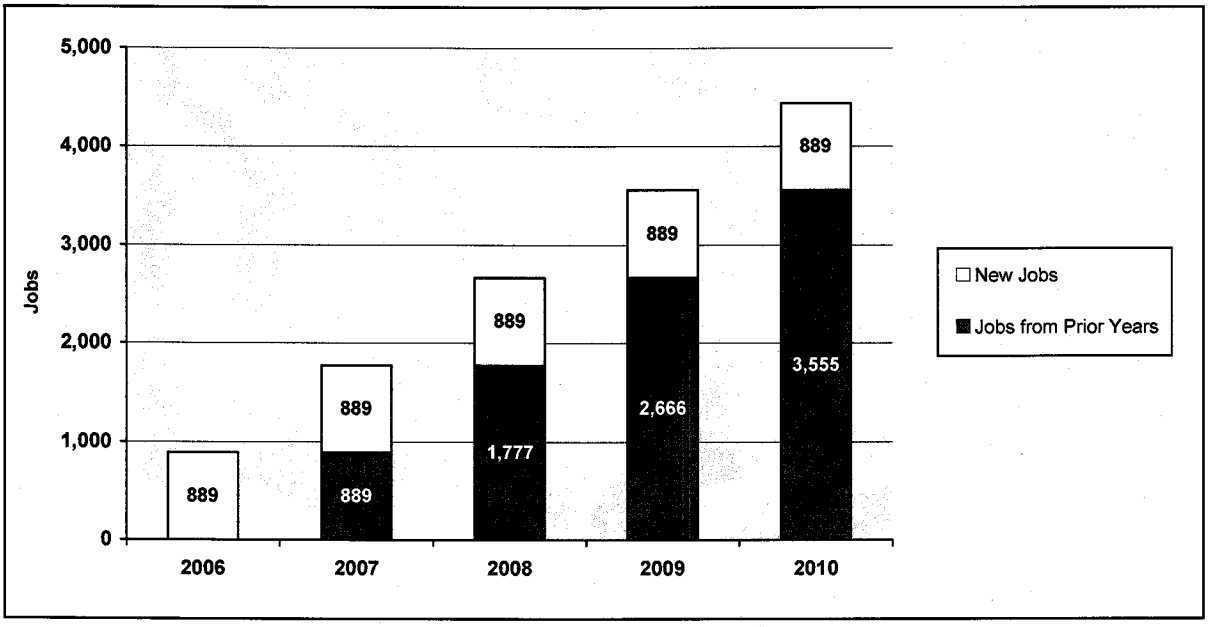
Note that the annual job effects are higher than the gross and net effects reported earlier in Table 5 and Table 9. This is due to the fact that after the first year, there is essentially no cost associated with achieving these energy savings, either in terms of equipment costs or the alternative Base Case scenario.[13] Consequently, there is no Base Case scenario needed for

[12] The extrapolation from 2006 impacts is presented here as an approximation of the potential employment impacts in the short term. Over the long term, shifts in the Oregon economy and changes in efficiency in other regions will alter the employment impacts. Estimating the long-term impacts taking into account *regional* changes in energy efficiency and the subsequent impact on economic output requires a much more extensive dynamic modeling exercise that is beyond the scope of this project.

[13] For larger projects, costs will likely be spread out over several years and as noted earlier the BETC can also be distributed across multiple years. The assumption that all costs are incurred in the first year is a simplifying assumption made for this analysis and the fact that in practice these costs may be spread out over multiple years does not materially affect our analysis or the conclusions drawn in this report.

comparison in these later years, as all the equipment and program costs have been included in the first year.

Figure 8: Cumulative New Job Creation From BETC Energy Cost Savings



Highlights of Oregon Study

Product/System	Number of Installations	Total Tax Credits	Annual Energy Savings
Renewables	489	$1,017,830	$80,049
Appliances	34,023	$4,696,088	$871,248
Ducts	993	$222,564	$78,063
Furnaces and Boilers	4,627	$1,620,371	$294,003
Heat pumps/AC	672	$244,021	$35,907
Heat/Energy Recovery Ventilators	28	$8,450	$3,008
Alternative Fuels/Hybrid Vehicles	2,129	$3,178,000	$796,615
Total	**42,691**	**$10,987,323**	**$2,158,893**

RETC Net Economic Impacts	
Impact Type	2006
Output	$70,268,000
Wages	$17,292,000
Business Income	$ 3,269,000
Jobs	570
Taxes	$5,620,000