The Economic Impacts and Macroeconomic Benefits of Energy Efficiency Programs in Washington

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EXECUTIVE SUMMARY

This report, sponsored by member companies of the Northwest Energy Efficiency Council (NEEC) and written by ECONorthwest, describes the economic effects of energy conservation work done in Washington. NEEC members provide products and services that improve energy efficiency.

Traditionally, economic impact reports on energy efficiency programs have narrow focuses. They all consider the impacts of spending on energy efficiency products and services. Those are impacts limited to one year and within one state.

Some reports go further. Since utility customers enjoy lower utility bills in the years following in the implementation of energy efficiency measures and practices, they have more money to spend each year and this causes economic impacts.

Rarely addressed, however, are the long-run macroeconomic effects arising from productivity growth. Our economy produces goods and services by using "factor inputs." These inputs include labor, capital, raw materials, and energy. Becoming more productive means society produces more output with the same amount of factor inputs. Making our state more energy efficient increases productivity growth.

Productivity growth is the cornerstone of long-run economic health. It also affects our competitive position. The more productive Washington is, the better it competes in national and world markets. In short, productivity growth is the source of a higher standard of living.

This report addresses the macroeconomic effects qualitatively, as there is no credible

macroeconomic model of Washington that reliably predicts how improving energy efficiency over the long run would play out. The direction and types of benefits are clear, but accurately quantifying beyond broad estimates of magnitude would be an exercise in unprovable speculation. Therefore, ECONorthwest begins with a logical, albeit largely qualitative discussion of the macroeconomic benefits of improving energy efficiency in Washington.

The report then turns to the standard view that other states consider when looking at the impacts of energy efficiency investments. We use an economic impact analysis, which tells us what effects an average year of investment in Washington on energy efficiency products and services has on the state's economy.

It then looks at the useful, though less common perspective, of how one year of investment saves consumers money on their utility bills. Specifically, how they spend those savings and what the economic impacts of that spending are.

Our analysis reports values in 2012 dollars, which is also the base year for the economic impact model and its data. NEEC asked that the analysis consider an average year and provided data for

2008 through 2012.[1] That is five years of spending by utilities and utility customers on energy efficiency products and services. ECONorthwest adjusted that data for inflation, converting values to 2012 dollars. We refer to this as the "average year" of investment spending.

Macroeconomic Effects

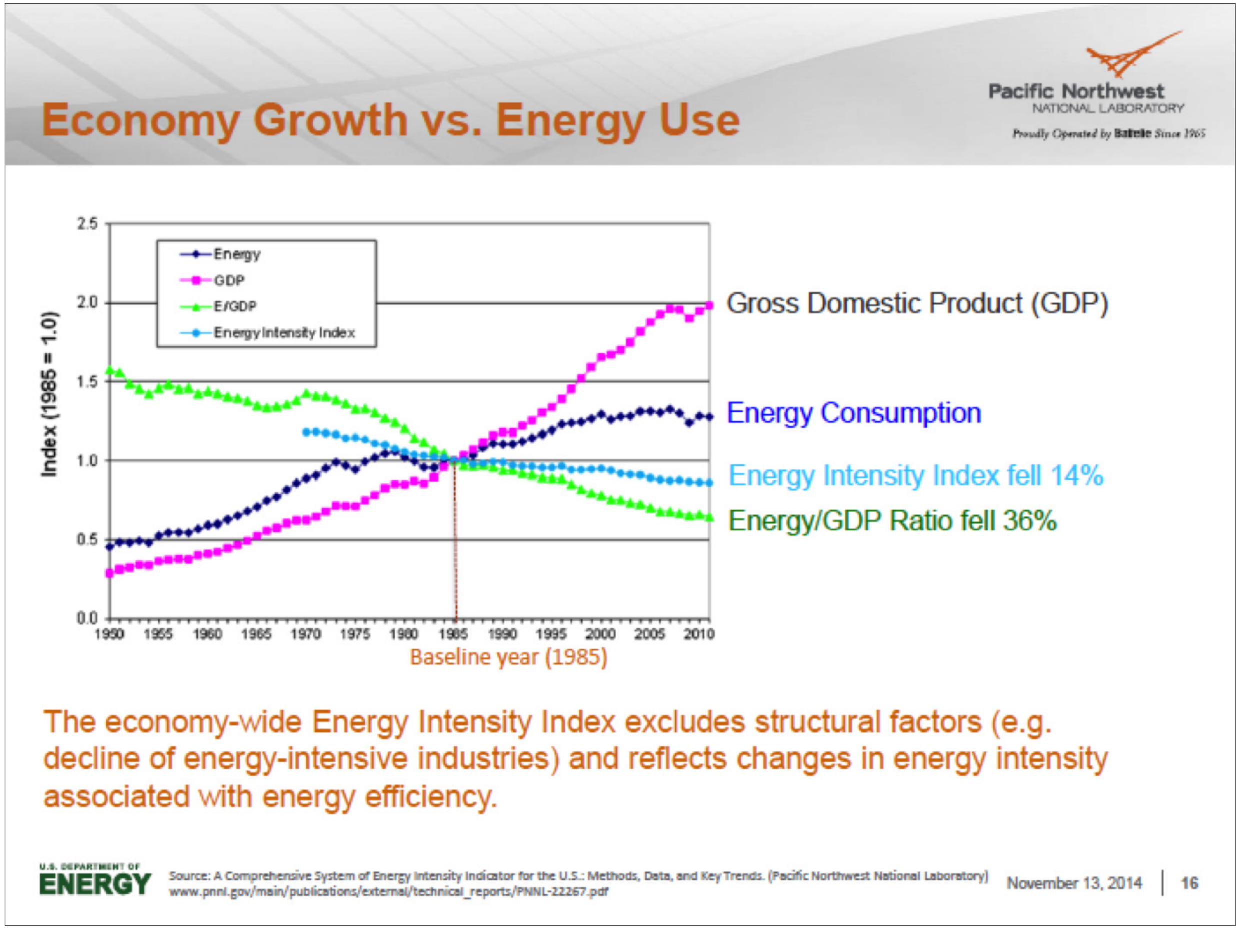
Making businesses and households more energy efficient causes macroeconomic effects. Unlike economic impacts, which focus on spending passed along the supply chain, macroeconomic effects are more broadly felt and are the third effect analyzed by ECONorthwest.

Better efficiency means that Washington's economy can produce more goods and services with less energy and at lower costs. Over time, the cumulative investments in energy efficiency can raise the overall productivity of the economy. This improves economic welfare and elevates the standard of living of Washington residents. Higher incomes, more jobs, and better quality of life are among the potential results.

Historically, energy use has kept pace with the economy. A recent analysis by the U.S. Department of Energy, illustrated in Figure 1, shows the tight connection between the nation's gross domestic product ("GDP") and energy consumption. The GDP is the value of the domestic production of goods and services. That relationship between energy use and GDP was close from 1950 to the mid 1970s. Then, sharply higher oil prices drove conservation and energy use and GDP began to diverge. But since then, the adoption of improved energy efficiency technologies, leading to productivity gains, have caused macroeconomic effects leading to higher GDP growth. The divergence widened considerably after 2000, as GDP grew while energy consumption did not. Predicting the degree of future macroeconomic improvements is a matter of great uncertainty. As with any long-term forecast, the range of possible outcomes is too wide. Therefore, rather than placing numbers on it that are purely speculative, ECONorthwest discusses macroeconomic effects in a qualitative manner, although a review of the U.S. experience in the 1970s and 1980s suggests that increased energy efficiency leads to increased productivity growth and a significant rise in economic well-being.

The macroeconomic effects of energy efficiency and energy production are discussed beginning on page 7.

Figure 1.



[1]Total installation spending statewide in 2012 was within one percent of the 2008 – 2012 average. However, spending on specific subsectors of the economy fluctuate, so that taking a multi-year average produces a more reliable assessment of normal conditions.

Economic Impacts of Energy Efficiency Investments

In the average year, almost half a billion dollars is invested in energy efficiency products and services within Washington State. The gross impact of that spending reverberates throughout the economy, affecting jobs, income, and output. About $594.4 million of Washington's gross regional product ("GRP") is linked to energy efficiency investments.[2] Importantly, so too were 7,577 jobs in the state. Those jobs generated $455.5 million in labor income.

But how much extra GRP and how many more jobs were there in Washington because of the investments? For that, the analysis subtracts the alternative case. That is what would have happened had people and businesses not spent the half billion dollars on energy efficiency. Had no money been spent on efficiency measures, some of that money would have been spent elsewhere in Washington on other goods and services, and that spending would have had economic impacts.

Subtracting the alternative from the gross impacts gives us net impacts. That is the net difference energy efficiency spending had on Washington in the average year.

Figure 2 illustrates the calculation of net economic impacts. In the average recent year, there were on net 3,807 more jobs in Washington because of energy efficiency investments. They had a net impact of $266.2 million in additional labor income throughout Washington. The state's GRP was $216 million higher as a result. All of these are summarized further on page 13 and the first of several detailed tables of installation impacts appear on page 18.

Figure 2.

In the baseline scenario, $499.8 million was spent in Washington on energy-efficiency improvements.

What were the gross, alternative, and net impacts?

	Gross Impacts		Minus the Alternative*		Equals the Net Impact:
JOBS	7,577	-	3,770	=	3,807
LABOR INCOME	$455.5MN	-	$189.3MN	=	$266.2MN
GRP	$594.4MN	-	$378.4MN	=	$216MN

*The "Alternative" refers to what happens if the money that went toward energy efficiency was spent elsewhere.

The net impacts of installation are positive and substantial for good reasons. Essentially, nearly all installation spending occurs inside Washington and is local labor-intensive. The subsequent rounds of spending and employment stay mostly within Washington. Therefore, the gross impacts are large. In comparison, general spending, especially by businesses, is more likely to involve out-of-state purchases. There is more leakage. The local impacts are less, so the spending impacts of

[2] GRP is the aggregate value of all the domestic production of goods and services done within a region or a state. GDP is the national equivalent for this measure.

installation work are a net positive. In addition to the analysis of actual installation spending data, NEEC asked ECONorthwest what the impacts would be if 50 percent more was spent on energy efficiency products and services in the baseline year? We also calculated the impacts and they appear on page 17.

Energy Bill Savings

The second impact effect that ECONorthwest measured arises from the savings on utility bills in the years after 2012. Utility bills are lower when homes, farms, and businesses are more energy efficient. In turn, this frees up money, which utility customers then spend elsewhere. They do most of that spending in Washington, so it triggers new economic impacts. ECONorthwest calculated these annual effects, which are reported on page 15.

Figure 3 illustrates the gross, alternative, and net impacts of reduced utility bills and the increased spending by utility consumers. When utility consumers spend the money they save on their bills, that spending supports 1,104 jobs a year with $56.3 million in annual labor income in Washington. The GRP tied to that spending, including its effects on business, is $112 million. But those are gross impacts, because alternatively, if no installations had been put in place in 2012, future utility bills would have been higher. Therefore, utility providers would have higher output, employ more people, and buy more supplies and services, all of which cause economic impacts.

Subtracting the alternative from the gross impacts gives us the net impacts. And on a net basis, Washington would see 857 more jobs, $36 million more in labor income, and $7.4 million in additional GRP each year past 2012, until the energy efficiency measures reach the end of their useful lives.

Figure 3.

What were the gross, alternative, and net impacts of lowering annual utility bills by $115.9 million?

	Gross Impact of consumers spending their utility bill savings		Minus the Alternative*		Equals the Net Impact:
JOBS	1,104	-	247	=	857
LABOR INCOME	$56.3MN	-	$20.3MN	=	$36MN
GRP	$112MN	-	$104.5MN	=	$7.4MN

*Without energy-efficiency measures, consumers would pay higher utility bills.

In this effect, ECONorthwest finds that although general spending of savings has leakage, the alternative of paying higher utility bills instead has an even higher leakage rate because utilities spend primarily on capital equipment and fuel, both of which are mostly non-local. Thus, the net effect of future energy savings on the economy of Washington is positive. There is a greater impact on Washington's economy from general spending than from spending on electric and gas utilities.

BACKGROUND

The Northwest Energy Efficiency Council is an association of businesses that provide energy efficiency products and services to the residential, commercial, industrial, and agricultural sectors.

ECONorthwest is a large economic consulting firm established in the Pacific Northwest in 1974. The company's 40-plus professionals have worked on projects for power producers, consumers, and regulators in Oregon, Washington, California, and elsewhere.

Examples of the energy conservation measures that NEEC members provide include better insulation and windows for homes, the design of more efficient retail space, software that enhances office building operations, the installation of more efficient air conditioning, and the replacement old natural gas furnaces in businesses and factories with more effective and efficient ones. These conservation efforts are paid for by consumers, often with financial incentives from utilities.

Currently, the utility industry uses benefit-cost tests to assess energy efficiency potential and help establish the magnitude of their incentive payments. They are a way of ensuring that conservation efforts are cost-effective, reliable, and feasible. The total cost of installing energy efficiency measures (for the customer and the utility), including administrative and program expenses, must be generally less than what the utility would have had to pay to secure the alternative. That alternative is known as the avoided cost. It is the marginal cost of power generation and distribution of energy from conventional power plants and natural gas lines.

Effectively, a utility satisfies the needs of its customers by delivering energy to them. If the customer can get the same satisfaction installing efficiency measures instead, and do so at a total cost less than the avoided cost, then the utility benefits. The utilities assess measures and, in the case of investor-owned utilities, the public utility commissions ensure the cost-effectiveness of the programs. But traditional benefit-cost assessments are too narrowly focused. The overall economy also benefits.

Benefit-cost tests ignore macroeconomic benefits and, in most cases, also ignore the impacts of future energy savings on the greater economy. Thus, benefit-cost tests, by design, understate the contribution energy efficiency has on long-term economic growth and employment. This report, however, addresses these important economic benefits.

Descriptions of Economic Impact Analysis

An economic impact analysis measures the effects of spending from an initial source and traces that spending as it flows through the economy. For this report, ECONorthwest used IMPLAN, a widely-available modeling system.

ECONorthwest built a model of Washington State using IMPLAN. The NEEC provided average annual spending data on energy efficiency products and services put into place in Washington between 2008 and 2012. ECONorthwest used that, along with data from the U.S. Department of Energy and other government sources, for the Washington model.

IMPLAN is a useful tool because it takes into account the countless links between different industries and consumers, as well as the diminishing effects of savings, taxes, and import purchases. Thus, knowing how much was spent in Washington on energy efficiency, IMPLAN can tell us how many jobs that work employed, how many workers suppliers employed, and so on. It also follows household spending arising initially from the wages and benefits of the employees involved with energy efficiency work.

Energy efficiency was a major priority for these Seattle buildings.

Spending causes businesses to produce goods and services, also known as output. In addition, spending stimulates business income, self-employment income, and payroll earnings and benefits. IMPLAN measures these.

IMPLAN traces how spending in one part of the economy creates work and output in other parts. That work, in turn, puts money in the hands of workers and business owners who buy goods and services from others, causing additional output and employment elsewhere. INPLAN tracks these linkages between hundreds of industries and households.

Links measure the flows through the economy, but they do diminish because some spending and hiring goes out of state, some money is saved, not spent, and some is taxed rather than used for buying goods or services. So initial impacts multiply, but do not expand indefinitely. Further, since IMPLAN uses census data, the strength of linkages within a state and between households of various income levels are considered, making the model a fair estimator of what actually happens in the inner workings of local economies.

When run through their logical conclusion, input-output models measure the total effects, or impacts, in terms of the jobs, income, output,[3] and value added.[4]

IMPLAN analyzes impacts at three stages. The first is direct impacts. These are, for example, the initial spending and employment for buying energy efficient products and services in Washington.

Using the direct impacts, IMPLAN measures all subsequent spending triggered through the chain of goods and services suppliers. This second stage consists of indirect impacts.

Any workers (including proprietors) earning money along the supply chain because of the direct and indirect outputs will spend some of what they make. This causes induced impacts, which is the third stage.

The total impact of the initial spending is the sum of the three: direct, indirect, and induced impacts.

Limitations of Impact Analysis

IMPLAN models portray the structure of the economy as it actually was. For instance, the model used for this report uses 2012 Washington State economic data. But that limits its value as a predictive tool. Making your economy more

[3]Output is the gross value of production for an economic sector or industry.

[4]The value added of an industry to the national economy, also referred to as gross domestic product (GDP)-by-industry, is the contribution of a private industry or government sector to overall GDP. On the state level, it is the GRP or gross regional product. The components of value added consist of compensation of employees, taxes on production and imports less subsidies, and gross operating surplus. Value added equals the difference between an industry's gross output (consisting of sales or receipts and other operating income, commodity taxes, and inventory change) and the cost of its intermediate inputs (including energy, raw materials, semi-finished goods, and services that are purchased from all sources). From http://www.bea.gov/faq/index.cfm?faq_id=184

energy efficient affects future prices, costs, and what can be produced (called dynamic effects). IMPLAN and similar models cannot easily adjust to these.

Another limitation, one we address in this analysis, is that impacts are triggered by the size of initial spending. The more of it, the greater total impacts are. But higher spending is not always beneficial. For instance, overpaying for something causes higher economic impacts in total, but is not necessarily more beneficial.

Gross Versus Net Impacts

Energy efficiency investments involve hiring labor, buying materials and services, and paying for construction. We call the value of this work, and the jobs involved in it, gross direct impacts. They are direct because it is the direct installation work. They are gross impacts because it is the gross total of the work done.

There is an alternative. By spending money on energy efficiency, you have less money to spend elsewhere in the economy. The economic impact of spending money elsewhere is the alternative case. The gross impacts minus the alternative impacts equal the net economic impacts.

From an economics perspective, money does not disappear. There are alternatives. Had there been no energy efficiency spending triggering economic impacts, there would be impacts elsewhere, as money is spent on other goods and services. Thus, net impacts are less than gross impacts.

The American Council for an Energy-Efficient Economy published an overview of this concept.[5] It is an excellent example of measuring net impacts by deducting the alternative from gross impacts. ECONorthwest uses this methodology.

MACROECONOMICS OF ENERGY EFFICIENCY PROGRAMS

Besides causing economic impacts through investment spending and spending of utility bill savings by consumers, enhancing energy efficiency causes changes in the broader economy. For that we turn to macroeconomics. Our perspective becomes longer-term.

Macroeconomic effects include productivity improvements, reductions in production costs, lower prices, higher standards of living, capacity expansions, and competitive gains for the statewide economy.

Improving energy efficiency contributes to productivity. It is possible to spend so much more on capital to make yourself more energy efficient that total factor productivity falls rather than rises. However, we assume economic agents (businesses, farms, and households) on average only engage in energy efficiency measures if they do indeed yield net savings and therefore enhance their overall productivity.

The following section explains how and why these macroeconomic effects occur. [6]

Aggregate Measures of Long-Run Economic Performance

Policies encouraging energy efficiency affect the economy in the long run. They do so by causing changes in the behaviors of consumers and industry, causing price shifts, and altering the structure of the economy. Changes like these alter the economy in total, as measured in macroeconomic aggregates. This report focuses on three macroeconomic aggregates, which reflect both the health (or general functionality) of a region's economy and welfare (or general well-being) induced by this economic health.

First is real gross regional product (GRP), a broad gauge of economic activity in a region. Real GRP may also be identified with the total income generated within a region. This measure is adjusted for inflation, as indicated by the modifier "real," which will always imply "inflation-adjusted" in economic contexts.

Second is the median real wage rate for workers in a region. This measure refers to the amount of output the median worker in a region is able to produce in a set amount of time or given a fixed amount of inputs—the worker's productivity.

Third is the unemployment rate, which, together with the rate of job creation, provides a measure of the health of a region's labor market.

None of these measures are static over time. Indeed, because GRP and the median real wage rate grow over time, a long-run macroeconomic analysis is inherently concerned with the rates of growth, or trends, in these measures.

The Need for Abstraction

Analyzing the long-run effects of policy decisions on macroeconomic trends requires a well-developed general equilibrium (GE) model. Such a model is particularly important if policymakers want quantitative predictions. While analysts have used simple, stripped-down GE models to study

[5] "How does energy efficiency create jobs?" American Council for an Energy-Efficient Economy. Fact Sheet. Available on-line at aceee.org/files/pdf/fact-sheet/ee-job-creation.pdf
[6] Internal ECONorthwest document, Dr. Bruce McGough and Dr. Ed Whitelaw of the University of Oregon, with edits for clarity by Robert Whelan of ECONorthwest.

Macroeconomic effects include productivity improvements, reductions in production costs, lower prices, higher standards of living, capacity expansions, and competitive gains for the statewide economy.

energy sectors, no robust GE models exist for the long-run macroeconomic assessment of energy efficiency programs.

A qualitative assessment of energy efficiency programs and their long-run effects can be achieved by interpreting energy efficiency as a form of technological progress. This allows for the application of certain principles of the theory of economic growth.[7] We conduct such a qualitative analysis below.

The Theory of the Aggregate Measures and their Trends

A necessary prerequisite for our assessment of energy efficiency programs is an understanding of the relationships between the aggregate economic measures identified above.

GRP is an important metric, in that it represents the long-run growth rate of output per capita, or how the ratio of GRP to the population grows over time. This growth rate stems from the rate of technological progress in a region.[8] The rate of technological advance derives (in part) from innovation and the creation and application of new ideas.[9] Importantly, the link between the growth rates of GRP per capita and technological progress means that an increase in the rate of technological advance also increases the long-run growth rate of output per capita.

In the long run, labor productivity, or real wage, drives firms' demand for labor: firms will hire more workers until the real productivity of the most recent hire is equal to the real wage of laborers in the labor market. As with the case of per capita GRP, the rate of technological progress partially drives the growth rate of labor productivity.[10] Consequently, as technological advance increases labor demand, both real wages and employment levels also rise in the long run.[11]

The unemployment rate is best understood by Okun's law, which summarizes the complicated interaction between changes in aggregate production and the labor market.[12] It provides a statistical relationship between short-run changes in economic growth and short-run changes in the unemployment rate. This relationship can be concretely quantified. Current estimates of Okun's law indicate that a 1.0% increase in the growth rate of the national GDP corresponds to a 0.4% reduction in the unemployment rate.[13]

No matter how much GDP is increased, the unemployment rate will never reach zero. The long-run (natural) unemployment always present in an economy is determined by two key variables. One is the action of participants in the labor market. The other is the nature of the long-run costs of production faced by firms. To illustrate the relationship between these terms, consider the effect of a reduction in the average cost of production of one additional unit of a good. This will increase the supply of that good, thereby stimulating labor demand and driving down the long-run unemployment rate.[14]

[7] The neoclassical theory of growth, as developed by Robert Solow (1956) takes the growth rate of labor-augmenting technology as exogenous. Solow's salient point is that this growth rate determines the long-run growth rate of per-capita GDP. Because of the exogeneity assumption, Solow's growth theory provides no policy prescription: it is silent on the economic mechanisms underlying technological advance. Paul Romer (1990) filled this theoretical gap with the development of the "endogenous growth theory" based on innovation, or the production of "ideas." See Solow, R.M. 1956. "A Contribution to the Theory of Economic Growth." The Quarterly Journal of Economics. 70 (1): 65-94.; Romer, P. 1990. "Endogenous Technological Change." Journal of Political Economy. 98 (5): 71-102.

[8] Solow, R.M. 1956. "A Contribution to the Theory of Economic Growth".

[9] Romer, P. 1990. "Endogenous Technical Change".; & Romer, D. 2012. *Advanced Macroeconomics*. 4th ed. McGraw-Hill-Irwin: Boston, MA. Print.

[10] The productivity of a given worker involves not only the technology available to the worker, but also the worker's skill level, or "human capital," which measures the worker's ability to apply that technology to production.

[11] Romer, D. 2012. *Advanced Macroeconomics*.

[12] Okun, A.M. 1974. "Unemployment and Output in 1974". Brookings Papers on Economic Activity. 1974 (2): 495-504.

[13] Blanchard, O., & D. Johnson. 2012. Macroeconomics. 8th ed. Prentice Hall: Upper Saddle River, NJ.

[14] Blanchard, O., & D. Johnson. 2012. *Macroeconomics*.

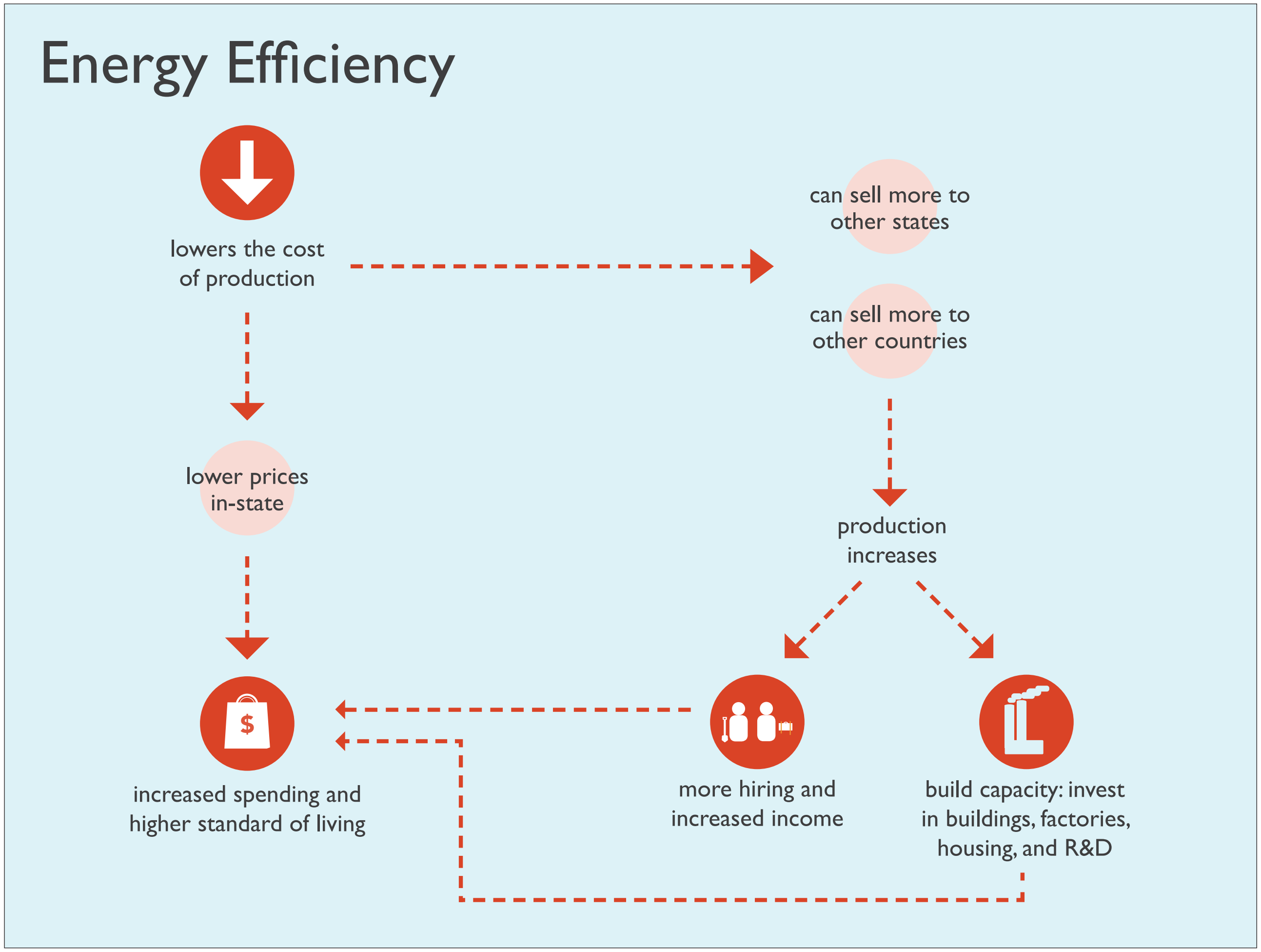
Energy Efficiency Programs as Technological Advance

Linking energy efficiency programs to technological progress—and thus to its corresponding impacts on long-run aggregate trends—requires connecting the adoption of energy efficiency technologies to the more general notion of technological advance.

The current state of an economy's technology captures that economy's productive capacity. This is the maximum total amount of goods and services an economy is theoretically capable of producing. This capacity is modeled by a production possibilities frontier, which identifies all possible combinations of outputs that can be produced given available inputs. An efficient economy is on the boundary of this frontier: production of any one output cannot be increased without reducing the production of one or more other outputs. An inefficient economy is inside the frontier: an increase in production of some (or possibly all) outputs is possible without reducing the production of any outputs.

Technological advance may involve the adoption of existing technology. For this reason, it can be viewed as the movement of an inefficient economy toward its production possibilities frontier. Technological advance may also involve the creation of new technology. In this case, it can be viewed as the movement of an efficient economy along an expanding frontier.

The incorporation of both new and existing technologies into the production process is beneficial for several reasons. The learning-by-doing inherent in technological adoption encourages further innovation and technological advance.[15] Moreover, the specialization and modification gains made by adopters further lower production costs and increase efficiency. Ultimately, these expand an economy's productive capacity.



If energy efficiency programs are considered technological advances, the implementation of these programs must also lead to the adoption of technologies that increase energy efficiency. Under this assumption, it follows that energy efficiency programs:

- Move the economy toward the frontier by lowering production costs and allowing for the production of more output using the same inputs, and;
- Expand the frontier through subsequent innovation and further technological advance.

Therefore, we can view energy efficiency programs as tangible representations, or animators, of technological progress.

[15]Romer, D. 2012. *Advanced Macroeconomics.*

Energy Efficiency Programs and the Aggregate Measures of Macroeconomic Performance

We have shown that energy efficiency programs increase the economy's productive capacity in two distinct dimensions: (1) by moving the economy toward the production possibilities frontier through direct efficiency gains; and (2) by expanding the production possibilities frontier through innovation. On Page 9, we detailed the mechanisms through which this increase in the economy's productive capacity—viewed broadly as raising the rate of technological advance—impacts the measures of long-run economic performance. From here, we can reach three primary conclusions regarding the relationship between energy efficiency programs and our aggregate measures of macroeconomic performance. These are:

- **Energy efficiency programs increase the long-run growth rate of GRP.** Energy efficiency programs, when implemented, lower production costs and increase input productivity, meaning they increase per capita income. Real GRP rises as energy efficiency technologies and programs are adopted within a state or region.
- **Energy efficiency programs increase median real wage in the long run.** Viewed as animating technological progress, energy efficiency programs improve long-run labor productivity. From an increase in labor productivity comes an increase in labor demand. And from an increase in labor demand comes higher equilibrium real wages.

Innovation involving energy production and use will be central to the future. The most successful regional economies will, by necessity, be at the frontier of energy innovation.

- **Energy efficiency programs create jobs and lower the unemployment rate.** The adoption of energy-efficient technologies moves the economy toward the production possibilities frontier. This means it creates short-run increases in the growth rate of GRP. These increases require more labor inputs, thus raising the employment level and lowering the short-run unemployment rate. The magnitude of the change in the unemployment rate is determined through Okun's law.[16]

  Furthermore, the adoption of energy efficient technologies (and the innovation they engender) lowers the long-run marginal cost of production. The result is increased labor demand and a lower long-run unemployment rate.

Other Impacts of Energy Efficiency Programs

There are other possible long-run macroeconomic impacts of energy-efficient technology that are not captured by our abstract analysis, such as:

- **Increased demand for high-skilled workers** Availability of energy-efficient residences, improved environmental conditions associated with reduced energy use, and the "warm glow" of living in an environmentally-conscious community attract skilled laborers and raise the satisfaction of workers living in a region. Subsequently, this region becomes more attractive to firms requiring highly skilled labor.
- **Relative price changes and reduced real income inequality**. The adoption of energy-efficient technology reduces the relative price of energy-intensive goods and services—most notably the cost of energy itself. Because less wealthy individuals spend a larger percentage of their income on necessities like energy,[17] this relative price change helps to mitigate real income inequality.
- **Induced innovation.** Precisely predicting the future path of technological advance is not possible; however, innovation involving energy production and use will be central to the future. The most successful regional economies will, by necessity, be at the frontier of energy innovation.
- **Resilience to exogenous energy price shocks**. Sharp rises in the real price of energy in the 1970s and since 2000 negatively affected real GRP growth and employment levels at the regional and national level. Reduced reliance on energy, both for production and consumption, will smooth the regional (and national) economy's response to future changes.

[16]Okun, A.M. 1974. "Unemployment and Output in 1974".

[17]See, for example: Soytas, U., & Sari, R. 2003. "Energy Consumption and GDP: Causality Relationship in G-7 Countries and Emerging Markets". Energy Economics. 25.1.; Eden, Y., & Jang, J. "Co-integration Tests of Energy Consumption, Income, and Employment". Resources and Energy. 14.3.

CONCLUSION: MACROECONOMIC EFFECTS OF ENERGY EFFICIENCY

The complexity of relationships, which change over time, the unpredictability of innovations and their effect on what we consume and how we produce, plus the paucity of historic data, which leaves us with estimates that have high standard error levels, make models that forecast the effects of energy efficiency (i.e., productivity) on the economy inherently unreliable. However, in the absence of useful tools, economists can look back and draw lessons from how economic welfare in the U.S. was affected by changes in energy productivity. The events of the 1970s prove informative.

Welfare and GRP growth

Economic welfare means the living standards, quality of life, and general well-being of people. There is no one measure of economic welfare, but real GRP per capita serves as a natural, if coarse, measure of average welfare.[18] Thus, economic welfare improves in a country when its real GDP per capita rises, or in a state when its real GRP per capita rises.

It is well known that while the average growth rate in real U.S. GDP per capita (over long time periods) is roughly constant, a significant decline was experienced in the 1970s and 1980s. Stanley Fischer estimates that the average annual growth rate of real U.S. GDP per capita from 1955 to 1973 was 2.0 percent, and that from 1973 to 1986, it was 1.3 percent.[19]

If this reduction in growth had been avoided, real GDP per capita would have been considerably higher in 1986. The average inflation-adjusted household income would have been more than 10 percent higher in 1986 under the hypothesized 2.0 percent growth rate, than it was under the realized 1.3 percent growth rate.

The average American would have enjoyed a higher standard of living in 1986 had per capita real GDP continued to grow at the historic rate. Improving economic welfare comes with growing per capita real GDP. But why did real GDP growth slow between 1973 and 1986?

Explaining the slow-down in U.S. GDP growth in the 1970s and 1980s

In the short run, many types of macroeconomic shocks affect real GDP growth; however, many economists, include Fischer, attribute the 1973 to 1986 slowdown to a reduction in productivity growth. While the cause of this reduction remains a matter of some debate, the sharp rise in real energy prices in the 1970s is thought to be a significant contributing factor.

Dale Jorgenson[20] observes that real energy prices rose by 23 percent from 1973 to 1975, and by 34 percent from 1978 to 1980. He then conducts a sector-level empirical investigation and finds that these rising prices resulted in lower productivity growth for 29 of the 35 industrial sectors he examined, which, he concludes, is more than sufficient to explain the decline in U.S. productivity growth.

The connection to energy efficiency

Increased energy efficiency allows for the production of goods and services at lower energy costs. The rise in real energy prices in the 1970s, then, may be interpreted as analogous to a decrease in energy efficiency.

To the extent that increases and decreases in energy efficiency have symmetric impacts on the economy, our examination of the US experience in the 1970s and 1980s has a simple lesson: increased energy efficiency leading to increased productivity growth will significantly raise average welfare.

[18]Lucas, R. 1987. Models of Business Cycles. Cambridge: Oxford University Press. 1-47.
[19]Fischer, S. 1988. "Symposium on the Slowdown in Productivity Growth." Journal of Economic Perspectives, 2(4): 3-7.
[20]Jorgenson, D. 1988. "Productivity and Postwar U.S. Economic Growth." Journal of Economic Perspectives, 2(4): 23-41.

ECONOMIC IMPACT ANALYSIS

ECONorthwest determined the gross and alternative economic impacts of electric and natural gas energy efficiency measures in Washington State. The difference between the two is the net economic impact.

ECONorthwest calculated impacts by industry and reported them as sector subtotals: commercial, industrial, and agriculture. We also calculated impacts of households, as utilities direct energy savings efforts towards owners of homes and multifamily housing. These are collectively reported as impacts on the residential sector.

Two Impacts

Our analysis measures two distinct impacts. They are the impacts of energy efficiency investments and future energy savings. They occur in different years, so are not summed. But they are nonetheless critical in understanding the overall importance and value to the state of improved energy efficiency.

Investment Impacts

The first effect comes during a typical year of investment spending. Utilities and utility customers buy energy efficiency goods and services in Washington, which triggers economic impacts. These are gross impacts. Calculating their net impact requires first estimating the alternative case.

The alternative case to making energy efficiency investments is what would have happened had people and businesses not spent their money on efficiency measures. Money would have been diverted to other uses including spending in Washington, but also savings and spending outside the state. The in-state spending would cause economic impacts in Washington.

The net impacts are the gross minus the alternative case. In other words, the change in total jobs, output, and incomes in Washington caused by having spending go towards energy efficiency efforts, opposed to other uses.

Savings Impacts

In the years following the installation of energy efficiency measures, utility customers save money. Reduced utility bills free up customer money, some of which they spend on other goods and services in Washington. The ECONorthwest model estimates how much customer will spend by type of industry or customer, income level, and energy use. It also determines how much of the savings will be spent within Washington, spent outside the state, or saved. The gross impacts come from the increased spending on goods and services in Washington.

The alternative case is straightforward. Had energy efficiency not been put in place, utility customers would have had higher utility bills. The alternative is the impact of higher utility production.

The net impact of savings is the gross minus the alternative. Those net impacts are reported for a single year, as IMPLAN models one year at a time, but do reoccur for the life of the energy efficiency measure. That of course varies depending on what measure was installed, but generally such efforts average in the 12 to 15 year range.

Spending and Savings Data

ECONorthwest used data on the total resource costs of energy efficiency measures from 2008 to 2012 that NEEC assembled from Washington energy providers. We estimated the portions paid by utilities and their customers. ECONorthwest estimated the annual cost savings, in 2012 dollars, that consumers would achieve from being able to reduce waste in their consumption of electricity and natural gas.

Table 1 lists efficiency measure spending by sector for the average year, as well as the annual savings customers are expected to see. The impacts of energy efficiency efforts are based on these figures. They show $499.8 million spent on such measures, including program costs, throughout Washington per year. Of this, $438.9 million went to conservation measures for electric usage and $60.9 million for natural gas. Because of these measures, the annual savings on utility bills, at 2012 prices, will be $115.9 million, split between electricity ($109.6 million a year) and natural gas ($6.3 million a year).

ECONorthwest ran IMPLAN using the investment spending and annual energy savings data. We modeled sectors by their components (individual industries and for residential, their in-state spending by industry). Furthermore, ECONorthwest ran the IMPLAN models separately for both utility types (electric and natural gas).

A summary of our findings follows; detailed results appear in tables beginning on Page 18. In all of these tables, values are expressed in millions of 2012 dollars and jobs are reported as full-year equivalents. Only the impacts occurring inside the State of Washington are counted in these tables.

Table 1: Annual Washington Energy Efficiency Measure Spending and Future Annual Energy Cost Savings, in 2012 Dollars by Sector

Sources of Direct Gross Impacts by Utility Type, Millions, Values in 2012 $	Residential Sector	Commercial Sector	Industrial Sector	Agricultural Sector	Total of All Sectors
Electricity					
Total Resource Cost of Installation:					
Paid by Utilities	$83.0	$78.9	$37.4	$8.3	$207.6
Paid by Utility Customers	93.2	87.1	41.7	9.3	231.3
Spending on Energy Efficiency	$176.3	$166.0	$79.1	$17.6	$438.9
Annual Customer Savings (M. $)	$50.0	$43.7	$13.1	$2.9	$109.6
Natural Gas					
Total Resource Cost of Installation:					
Paid by Utilities	$10.9	$10.3	$4.9	$1.1	$27.2
Paid by Utility Customers	13.6	12.7	6.1	1.4	33.7
Spending on Energy Efficiency	$24.5	$23.0	$11.0	$2.4	$60.9
Annual Customer Savings	$2.9	$2.3	$0.9	$0.2	$6.3
Combined Electric & Natural Gas					
Total Resource Cost of Installation:					
Paid by Utilities	$93.9	$89.2	$42.3	$9.4	$234.8
Paid by Utility Customers	106.8	99.8	47.8	10.6	265.0
Spending on Energy Efficiency	$200.7	$189.1	$90.0	$20.0	$499.8
Annual Customer Savings	$52.8	$46.0	$14.0	$3.1	$115.9

Sources: The NEEC collected data from utilities and the BPA. ECONorthwest calculated annual customer savings by multiplying units of energy saved by the average price by sector as reported by the Energy Information Administration, U.S. Department of Energy.

Impacts from Investment Spending

Investor-owned electric and natural gas utilities, utility customers, and public energy providers such as the BPA and local utility districts, all share in the costs of energy efficiency projects. On average, between 2008 and 2012, about 90 percent of all the spending went directly towards installation and design work. The remainder went to program administration.

All investments, by definition, occurred in Washington. Thus, the gross direct output in Washington, as shown on Table 2, is the same $499.8 million shown under total spending for all sectors on Table 1.

In Washington, the $499.8 million in direct output rippled through the state economy, causing indirect and induced impacts. The sum of these, or total economic output from energy efficiency work, is $902.3 million. This supported the equivalent of 7,577 full-year jobs with a total compensation of $455.5 million. That is more than $60,100 per job in wages and benefits. The total value added or state GRP attributable to this investment activity was $594.4 million. Those were the combined gross economic impacts from electric and natural gas energy efficiency program spending.

The alternative case answers the "what if" question. Had there been no such investment spending during the year, where would those dollars have gone and how much would have been spent in Washington? ECONorthwest determined this by utility, industries within sectors, and spending/savings patterns of households in the state.

Using the spending functions of IMPLAN, which are based on data collected in Washington, we find that approximately 67¢ of every dollar not spent on installation efforts would have been spent on

Table 2: Gross, Alternative, and Net Economic Impacts of Energy Efficiency Investment Spending in Washington

Total Energy Efficiency Investment Spending Impacts by Type, Values in 2012 $	Gross Impacts of Energy Efficiency Spending	Minus the Opportunity Cost (In-State Spending Alternative)	Net Impact of Energy Efficiency Installation
Direct Impacts:			
Output (millions)	$499.8	($334.6)	$165.3
Value-Added or GDP (millions)	$375.7	($241.5)	$134.2
Labor Income (millions)	$294.0	($114.1)	$180.0
Jobs (full year equivalents)	4,405	(2,348)	2,057
Indirect Impacts:			
Output (millions)	$126.8	($99.6)	$27.2
Value-Added or GDP (millions)	$107.7	($61.4)	$46.3
Labor Income (millions)	$66.6	($34.7)	$31.8
Jobs (full year equivalents)	1,254	(624)	631
Induced Impacts:			
Output (millions)	$275.7	($116.0)	$159.7
Value-Added or GDP (millions)	$111.0	($75.4)	$35.6
Labor Income (millions)	$94.9	($40.6)	$54.4
Jobs (full year equivalents)	1,918	(798)	1,119
Total Impacts:			
Output (millions)	$902.3	($550.2)	$352.1
Value-Added or GDP (millions)	$594.4	($378.4)	$216.0
Labor Income (millions)	$455.5	($189.3)	$266.2
Jobs (full year equivalents)	7,577	(3,770)	3,807

Sources: ECONorthwest IMPLAN analysis of data from the NEEC and others.

buying goods or services within Washington. That spending would have caused economic impacts. The other 33¢ would have been spent outside of Washington, saved, or used to pay off debt.

In other words, had the $499.8 million spent on energy efficiency not been used for that purpose, households, businesses, and farms would have spent most of the money elsewhere. About $334.6 million would have generated economic output inside Washington and triggered indirect and induced impacts. Total output arising from this spending would have been $550.2 million. So, the net impact of energy efficiency investment spending on total output is $352.1 million (gross output of $902.3 million minus the alternative case of $550.2).

Overall, the net economic impacts are substantial. The GRP is $216 million higher. There would be $266.2 million more in labor income and a net increase of 3,807 full-year equivalent positions. A reason why the net impacts are positive is because energy efficiency spending occurs in the state and installation work is local labor-intensive. IMPLAN does account for equipment and materials that installers import from out of state, and this does mute the gross indirect impacts, but not to the degree that total indirect impacts fall below zero.

Impacts from Energy Savings

Each year after putting in energy efficient measures, utility customers enjoy lower utility bills totaling $115.9 million (shown on Table 1). We account as a gross impact from this the spending of that savings in Washington.

Utility bill savings disproportionately affect residential customers; incomes of employees of businesses positively affected by energy cost savings; and commercial businesses that serve households, such as restaurants, medical offices, and stores.

Table 3: Annual Gross, Alternative, and Net Economic Impacts from In-State Spending by Utility Customers of Utility Cost Savings

Utility Customer Savings Impacts by Type, Values in 2012 $	Gross Impacts of Spending Savings on Utility Bills	Minus the Opportunity Cost (Lower Utility Output)	Annual Net Impact of Reduced Electricity Costs
Direct Impacts:			
Output (millions)	$99.9	($115.9)	($16.0)
Value-Added or GDP (millions)	$70.9	($89.4)	($18.5)
Labor Income (millions)	$33.6	($11.7)	$21.9
Jobs (full year equivalents)	679	(86)	592
Indirect Impacts:			
Output (millions)	$30.7	($13.2)	$17.5
Value-Added or GDP (millions)	$18.7	($7.1)	$11.6
Labor Income (millions)	$10.7	($4.4)	$6.3
Jobs (full year equivalents)	189	(72)	117
Induced Impacts:			
Output (millions)	$34.3	($12.5)	$21.8
Value-Added or GDP (millions)	$22.4	($8.0)	$14.3
Labor Income (millions)	$12.0	($4.3)	$7.8
Jobs (full year equivalents)	236	(89)	147
Total Impacts:			
Output (millions)	$165.0	($141.7)	$23.3
Value-Added or GDP (millions)	$112.0	($104.5)	$7.4
Labor Income (millions)	$56.3	($20.3)	$36.0
Jobs (full year equivalents)	1,104	(247)	857

Sources: ECONorthwest IMPLAN analysis of data from the NEEC and others.

The IMPLAN model accounts for the correct mix by utility type. The data show a strong local spending tendency of those affected by lower utility bills. As such, and as shown as the direct gross output on Table 3, the spending of those savings contribute about $99.9 million to annual economic output in the state.

Given the types of goods and services utility customers spend their money on, direct output triggers indirect and induced impacts of $30.7 million and $34.3 million, respectively. This includes the effects of higher labor earnings. It brings the gross impact, in total, to $165 million.

The alternative case tells us what would have happened differently during the year had the energy efficiency measures not been in place. The answer is $115.9 million in higher utility bills. In this analysis, we subtract the alternative from the gross impacts.

For direct output, the alternative is a negative $115.9 million. IMPLAN estimates the total impacts of the reduced utility sales to be $141.7 million in statewide economic output, $104.5 million in GRP, $20.3 million in lower labor income, and 247 jobs. But the increased spending by utility customers of their utility bill savings on other goods and services more than makes up for these losses.

The gross impacts of higher non-utility spending exceed deductions for the alternative case. That is because the utility industry is capital intensive, relies heavily on imported (from other states) equipment and materials, and employs relatively few workers. Spending of utility bill savings tends to go towards in-state businesses and activities, which affect more workers and more business owners. Thus, the net impacts are positive.

Table 4: Gross, Alternative, and Net Economic Impacts of Energy Efficiency Investment Spending in Washington to Achieve a 150 percent Reduction in Energy Use from the 2008-12 Annual Average

Total Energy Efficiency Investment Spending Impacts by Type Assuming 50% More Installed Energy Savings, Values in 2012 $	Gross Impacts of Energy Efficiency Spending	Minus the Opportunity Cost (In-State Spending Alternative)	Net Impact of Energy Efficiency Installation
Direct Impacts:			
Output (millions)	$774.8	($518.6)	$256.1
Value-Added or GDP (millions)	$582.3	($374.4)	$207.9
Labor Income (millions)	$455.8	($176.8)	$279.0
Jobs (full year equivalents)	6,828	(3,639)	3,189
Indirect Impacts:			
Output (millions)	$196.5	($154.4)	$42.1
Value-Added or GDP (millions)	$166.9	($95.2)	$71.8
Labor Income (millions)	$103.2	($53.8)	$49.3
Jobs (full year equivalents)	1,944	(967)	978
Induced Impacts:			
Output (millions)	$427.3	($179.8)	$247.5
Value-Added or GDP (millions)	$172.1	($116.9)	$55.1
Labor Income (millions)	$147.2	($62.9)	$84.3
Jobs (full year equivalents)	2,972	(1,237)	1,735
Total Impacts:			
Output (millions)	$1,398.5	($852.8)	$545.8
Value-Added or GDP (millions)	$921.3	($586.5)	$334.8
Labor Income (millions)	$706.1	($293.5)	$412.6
Jobs (full year equivalents)	11,745	(5,843)	5,902

Sources: ECONorthwest IMPLAN analysis of data from the NEEC and others.

On net, in each year following the year of installation, efficiency measures have positive economic impacts. The State of Washington would have $23.3 million in higher output, $7.4 million in higher GRP, $36 million in higher labor income, and 857 more jobs each year after the one year's worth of energy efficiency measures put in place last.

Impacts from Greater Energy Efficiency Spending

The NEEC asked ECONorthwest for the economic impacts that would have occurred if energy efficiency investment efforts were 50 percent greater than calculated for Table 2—that is, enough investment spending to reduce electric and natural gas consumption by an additional 50 percent above what the spending in the average year between 2008 and 2012 would have achieved.

For this scenario, the NEEC asked ECONorthwest to assume the incremental cost of energy efficiency measures be ten percent higher than they were. Thus, total installation spending would be 155 percent of the 2008–2012 actual (the original 100 percent plus 50 percent incremental energy efficiency costing 10 percent more to install).

Although incremental spending is less productive (that is, it costs more per unit of energy saved), it does result in more spending in Washington. Higher spending, as noted, results in greater economic impacts regardless of it being somewhat less productive.

As shown in Table 4, had 50 percent more energy efficiency capacity been installed, the net impact on employment in Washington would have been 5,902 jobs with a GRP impact of $334.8 million.

Photos courtesy of Diana Rothery

Appendix: Detailed Economic Impact Tables

ECONorthwest's economic impact research involved 32 IMPLAN models, along with several supporting models. The IMPLAN models for commercial, agricultural, and industrial sectors were broken out into about 400 individual industries. The following sets of tables show the research results.

Detailed Impacts from Energy Efficiency Investments

The first set summarizes impacts from energy efficiency installations. That is, the gross impact of energy efficiency projects during an average year, minus the alternative case of how much of that money would have been spent on other goods and services in Washington had it not been put towards energy efficiency.

Impacts of Investment in Measures to Conserve Electricity

Most of the energy efficiency measures go towards conserving electricity. The following five tables report the gross and net impacts of such measures on the residential, commercial, industrial, and agricultural sectors.

Table 5: Gross, Alternative, and Net Economic Impacts of Residential Electric Energy Efficiency Investment Spending in Washington

Residential Electricity Energy Efficiency Investment Spending Impacts by Type, Values in 2012 $	Gross Impacts of Energy Efficiency Spending	Minus the Opportunity Cost (In-State Spending Alternative)	Net Impact of Energy Efficiency Installation
Direct Impacts:			
Output (millions)	$176.3	($125.5)	$50.8
Value-Added or GDP (millions)	$148.0	($81.6)	$66.4
Labor Income (millions)	$117.6	($41.7)	$75.9
Jobs (full year equivalents)	1,719	(892)	827
Indirect Impacts:			
Output (millions)	$33.3	($37.0)	($3.7)
Value-Added or GDP (millions)	$36.0	($22.5)	$13.5
Labor Income (millions)	$20.6	($12.9)	$7.7
Jobs (full year equivalents)	427	(232)	195
Induced Impacts:			
Output (millions)	$105.5	($42.7)	$62.8
Value-Added or GDP (millions)	$41.2	($27.4)	$13.9
Labor Income (millions)	$36.4	($14.5)	$21.9
Jobs (full year equivalents)	731	(303)	428
Total Impacts:			
Output (millions)	$315.1	($205.2)	$109.9
Value-Added or GDP (millions)	$225.3	($131.5)	$93.7
Labor Income (millions)	$174.5	($69.1)	$105.5
Jobs (full year equivalents)	2,877	(1,426)	1,450

Sources: ECONorthwest IMPLAN analysis of data from the NEEC and others.

Table 6: Gross, Alternative, and Net Economic Impacts of Commercial Electric Energy Efficiency Investment Spending in Washington

Commercial Electricity Energy Efficiency Investment Spending Impacts by Type, Values in 2012 $	Gross Impacts of Energy Efficiency Spending	Minus the Opportunity Cost (In-State Spending Alternative)	Net Impact of Energy Efficiency Installation
Direct Impacts:			
Output (millions)	$166.0	($136.5)	$29.5
Value-Added or GDP (millions)	$119.9	($117.7)	$2.2
Labor Income (millions)	$95.2	($52.0)	$43.3
Jobs (full year equivalents)	1,392	(1,065)	327
Indirect Impacts:			
Output (millions)	$48.8	($37.6)	$11.1
Value-Added or GDP (millions)	$36.9	($24.7)	$12.3
Labor Income (millions)	$23.9	($13.8)	$10.1
Jobs (full year equivalents)	415	(250)	165
Induced Impacts:			
Output (millions)	$91.1	($50.5)	$40.6
Value-Added or GDP (millions)	$37.0	($33.2)	$3.8
Labor Income (millions)	$31.4	($18.1)	$13.3
Jobs (full year equivalents)	632	(340)	292
Total Impacts:			
Output (millions)	$305.9	($224.7)	$81.2
Value-Added or GDP (millions)	$193.8	($175.5)	$18.3
Labor Income (millions)	$150.5	($83.8)	$66.7
Jobs (full year equivalents)	2,439	(1,655)	784

Sources: ECONorthwest IMPLAN analysis of data from the NEEC and others.

Table 7: Gross, Alternative, and Net Economic Impacts of Industrial Electric Energy Efficiency Investment Spending in Washington

Industrial Electricity Energy Efficiency Investment Spending Impacts by Type, Values in 2012 $	Gross Impacts of Energy Efficiency Spending	Minus the Opportunity Cost (In-State Spending Alternative)	Net Impact of Energy Efficiency Installation
Direct Impacts:			
Output (millions)	$79.1	($25.0)	$54.1
Value-Added or GDP (millions)	$47.4	($9.1)	$38.3
Labor Income (millions)	$37.7	($4.0)	$33.7
Jobs (full year equivalents)	551	(45)	505
Indirect Impacts:			
Output (millions)	$23.2	($10.7)	$12.5
Value-Added or GDP (millions)	$17.6	($5.6)	$12.0
Labor Income (millions)	$11.4	($3.3)	$8.0
Jobs (full year equivalents)	198	(53)	144
Induced Impacts:			
Output (millions)	$37.5	($5.7)	$31.9
Value-Added or GDP (millions)	$15.6	($3.7)	$11.9
Labor Income (millions)	$12.9	($2.0)	$10.9
Jobs (full year equivalents)	261	(38)	222
Total Impacts:			
Output (millions)	$139.8	($41.4)	$98.4
Value-Added or GDP (millions)	$80.6	($18.5)	$62.1
Labor Income (millions)	$61.9	($9.4)	$52.6
Jobs (full year equivalents)	1,009	(137)	872

Sources: ECONorthwest IMPLAN analysis of data from the NEEC and others.

Table 8: Gross, Alternative, and Net Economic Impacts of Agricultural Electric Energy Efficiency Investment Spending in Washington

Agricultural Electricity Energy Efficiency Investment Spending Impacts by Type, Values in 2012 $	Gross Impacts of Energy Efficiency Spending	Minus the Opportunity Cost (In-State Spending Alternative)	Net Impact of Energy Efficiency Installation
Direct Impacts:			
Output (millions)	$17.6	($6.8)	$10.8
Value-Added or GDP (millions)	$13.6	($3.7)	$10.0
Labor Income (millions)	$10.8	($3.2)	$7.7
Jobs (full year equivalents)	147	(59)	88
Indirect Impacts:			
Output (millions)	$5.2	($2.1)	$3.1
Value-Added or GDP (millions)	$3.9	($1.1)	$2.8
Labor Income (millions)	$2.5	($0.7)	$1.8
Jobs (full year equivalents)	44	(13)	31
Induced Impacts:			
Output (millions)	$10.2	($3.0)	$7.2
Value-Added or GDP (millions)	$4.1	($1.9)	$2.2
Labor Income (millions)	$3.5	($1.1)	$2.5
Jobs (full year equivalents)	71	(20)	51
Total Impacts:			
Output (millions)	$32.9	($11.9)	$21.1
Value-Added or GDP (millions)	$21.6	($6.7)	$14.9
Labor Income (millions)	$16.9	($5.0)	$11.9
Jobs (full year equivalents)	262	(92)	170

Sources: ECONorthwest IMPLAN analysis of data from the NEEC and others.

Table 9: Gross, Alternative, and Net Economic Impacts of All Electric Energy Efficiency Investment Spending in Washington

Total Electricity Energy Efficiency Investment Spending Impacts by Type, Values in 2012 $	Gross Impacts of Energy Efficiency Spending	Minus the Opportunity Cost (In-State Spending Alternative)	Net Impact of Energy Efficiency Installation
Direct Impacts:			
Output (millions)	$438.9	($293.8)	$145.1
Value-Added or GDP (millions)	$328.9	($212.1)	$116.8
Labor Income (millions)	$261.3	($100.8)	$160.5
Jobs (full year equivalents)	3,809	(2,062)	1,747
Indirect Impacts:			
Output (millions)	$110.4	($87.5)	$23.0
Value-Added or GDP (millions)	$94.4	($53.9)	$40.5
Labor Income (millions)	$58.4	($30.7)	$27.6
Jobs (full year equivalents)	1,084	(548)	536
Induced Impacts:			
Output (millions)	$244.4	($101.9)	$142.5
Value-Added or GDP (millions)	$98.0	($66.2)	$31.7
Labor Income (millions)	$84.2	($35.6)	$48.6
Jobs (full year equivalents)	1,694	(701)	993
Total Impacts:			
Output (millions)	$793.7	($483.1)	$310.6
Value-Added or GDP (millions)	$521.3	($332.3)	$189.0
Labor Income (millions)	$403.8	($167.2)	$236.6
Jobs (full year equivalents)	6,587	(3,310)	3,277

Sources: ECONorthwest IMPLAN analysis of data from the NEEC and others.

Impacts of Investment in Measures to Conserve Natural Gas

Measures that reduce unnecessary use of natural gas have economic impacts. The alternative of not investing, but spending money on other goods and services, would also have impacts. The differences between the two are net economic impacts.

Table 10: Gross, Alternative, and Net Economic Impacts of Commercial Natural Gas Efficiency Investment Spending in Washington

Residential Natural Gas Energy Efficiency Investment Spending Impacts by Type, Values in 2012 $	Gross Impacts of Energy Efficiency Spending	Minus the Opportunity Cost (In-State Spending Alternative)	Net Impact of Energy Efficiency Installation
Direct Impacts:			
Output (millions)	$24.5	($17.4)	$7.0
Value-Added or GDP (millions)	$23.1	($11.3)	$11.7
Labor Income (millions)	$13.9	($5.0)	$8.9
Jobs (full year equivalents)	269	(124)	145
Indirect Impacts:			
Output (millions)	$4.9	($5.1)	($0.3)
Value-Added or GDP (millions)	$4.6	($3.1)	$1.5
Labor Income (millions)	$2.6	($1.5)	$1.1
Jobs (full year equivalents)	69	(32)	36
Induced Impacts:			
Output (millions)	$12.6	($5.9)	$6.7
Value-Added or GDP (millions)	$5.0	($3.8)	$1.2
Labor Income (millions)	$4.4	($2.0)	$2.3
Jobs (full year equivalents)	94	(42)	52
Total Impacts:			
Output (millions)	$42.0	($28.5)	$13.5
Value-Added or GDP (millions)	$32.7	($18.3)	$14.4
Labor Income (millions)	$20.9	($8.5)	$12.3
Jobs (full year equivalents)	431	(198)	233

Sources: ECONorthwest IMPLAN analysis of data from the NEEC and others.

Table 11: Gross, Alternative, and Net Economic Impacts of Industrial Natural Gas Efficiency Investment Spending in Washington

Commercial Natural Gas Energy Efficiency Investment Spending Impacts by Type, Values in 2012 $	Gross Impacts of Energy Efficiency Spending	Minus the Opportunity Cost (In-State Spending Alternative)	Net Impact of Energy Efficiency Installation
Direct Impacts:			
Output (millions)	$23.0	($18.9)	$4.1
Value-Added or GDP (millions)	$13.7	($16.3)	($2.6)
Labor Income (millions)	$10.9	($7.2)	$3.7
Jobs (full year equivalents)	218	(148)	70
Indirect Impacts:			
Output (millions)	$7.2	($5.2)	$2.0
Value-Added or GDP (millions)	$5.5	($3.4)	$2.1
Labor Income (millions)	$3.5	($1.9)	$1.6
Jobs (full year equivalents)	65	(35)	30
Induced Impacts:			
Output (millions)	$11.0	($7.0)	$4.0
Value-Added or GDP (millions)	$5.3	($4.6)	$0.6
Labor Income (millions)	$3.8	($2.5)	$1.3
Jobs (full year equivalents)	77	(47)	29
Total Impacts:			
Output (millions)	$41.3	($31.2)	$10.1
Value-Added or GDP (millions)	$24.4	($24.4)	$0.1
Labor Income (millions)	$18.2	($11.6)	$6.6
Jobs (full year equivalents)	359	(230)	129

Sources: ECONorthwest IMPLAN analysis of data from the NEEC and others.

Table 12: Gross, Alternative, and Net Economic Impacts of Industrial Natural Gas Efficiency Investment Spending in Washington

Industrial Natural Gas Energy Efficiency Investment Spending Impacts by Type, Values in 2012 $	Gross Impacts of Energy Efficiency Spending	Minus the Opportunity Cost (In-State Spending Alternative)	Net Impact of Energy Efficiency Installation
Direct Impacts:			
Output (millions)	$11.0	($3.5)	$7.5
Value-Added or GDP (millions)	$7.9	($1.3)	$6.6
Labor Income (millions)	$6.2	($0.6)	$5.7
Jobs (full year equivalents)	86	(6)	80
Indirect Impacts:			
Output (millions)	$3.4	($1.5)	$2.0
Value-Added or GDP (millions)	$2.6	($0.8)	$1.8
Labor Income (millions)	$1.7	($0.5)	$1.2
Jobs (full year equivalents)	31	(7)	23
Induced Impacts:			
Output (millions)	$6.1	($0.8)	$5.3
Value-Added or GDP (millions)	$2.2	($0.5)	$1.7
Labor Income (millions)	$2.1	($0.3)	$1.8
Jobs (full year equivalents)	42	(5)	37
Total Impacts:			
Output (millions)	$20.5	($5.7)	$14.7
Value-Added or GDP (millions)	$12.7	($2.6)	$10.1
Labor Income (millions)	$10.0	($1.3)	$8.7
Jobs (full year equivalents)	159	(19)	140

Sources: ECONorthwest IMPLAN analysis of data from the NEEC and others.

Table 13: Gross, Alternative, and Net Economic Impacts of Agricultural Natural Gas Efficiency Investment Spending in Washington

Agricultural Natural Gas Energy Efficiency Investment Spending Impacts by Type, Values in 2012 $	Gross Impacts of Energy Efficiency Spending	Minus the Opportunity Cost (In-State Spending Alternative)	Net Impact of Energy Efficiency Installation
Direct Impacts:			
Output (millions)	$2.4	($0.9)	$1.5
Value-Added or GDP (millions)	$2.1	($0.5)	$1.6
Labor Income (millions)	$1.7	($0.4)	$1.3
Jobs (full year equivalents)	23	(8)	15
Indirect Impacts:			
Output (millions)	$0.8	($0.3)	$0.5
Value-Added or GDP (millions)	$0.6	($0.2)	$0.4
Labor Income (millions)	$0.4	($0.1)	$0.3
Jobs (full year equivalents)	7	(2)	5
Induced Impacts:			
Output (millions)	$1.6	($0.4)	$1.2
Value-Added or GDP (millions)	$0.6	($0.3)	$0.3
Labor Income (millions)	$0.5	($0.1)	$0.4
Jobs (full year equivalents)	11	(3)	8
Total Impacts:			
Output (millions)	$4.8	($1.6)	$3.1
Value-Added or GDP (millions)	$3.3	($0.9)	$2.4
Labor Income (millions)	$2.6	($0.7)	$1.9
Jobs (full year equivalents)	41	(13)	28

Sources: ECONorthwest IMPLAN analysis of data from the NEEC and others.

Table 14: Gross, Alternative, and Net Economic Impacts of All Natural Gas Efficiency Investment Spending in Washington

Total Natural Gas Energy Efficiency Investment Spending Impacts by Type, Values in 2012 $	Gross Impacts of Energy Efficiency Spending	Minus the Opportunity Cost	Net Impact of Energy Efficiency Installation
Direct Impacts:			
Output (millions)	$60.9	($40.8)	$20.1
Value-Added or GDP (millions)	$46.8	($29.4)	$17.3
Labor Income (millions)	$32.7	($13.2)	$19.5
Jobs (full year equivalents)	596	(286)	310
Indirect Impacts:			
Output (millions)	$16.3	($12.1)	$4.2
Value-Added or GDP (millions)	$13.3	($7.5)	$5.8
Labor Income (millions)	$8.2	($4.0)	$4.2
Jobs (full year equivalents)	171	(76)	95
Induced Impacts:			
Output (millions)	$31.3	($14.1)	$17.2
Value-Added or GDP (millions)	$13.0	($9.2)	$3.8
Labor Income (millions)	$10.8	($4.9)	$5.8
Jobs (full year equivalents)	223	(97)	126
Total Impacts:			
Output (millions)	$108.6	($67.1)	$41.5
Value-Added or GDP (millions)	$73.1	($46.1)	$27.0
Labor Income (millions)	$51.7	($22.2)	$29.6
Jobs (full year equivalents)	991	(460)	531

Sources: ECONorthwest IMPLAN analysis of data from the NEEC and others.

Detailed Impacts from Energy Savings

In the years following investments in energy efficient products and services, utility customers see smaller electric and natural gas bills. They will redeploy most of the savings by making purchases in Washington on other products and services, causing economic impacts. These are gross impacts.

But lower utility bills equal less spending. With less spending on utilities, there are negative economic impacts on the Washington economy. That is the alternative case. The difference between these is the net economic impact. In most cases, the net impacts are positive, as shown in the detailed tables that follow.

Impacts of Customers Spending a Portion of Their Annual Electric Bill Savings in Washington

For electric utility customers, the gross economic impacts on the labor markets from spending their utility bill savings outweighs the negative effects caused by the loss of the alternative case—that of less electric utility output. The net impacts on GRP and output are slightly negative.

Table 15: Annual Gross, Alternative, and Net Economic Impacts of Residential Customer Spending of Electric Utility Cost Savings in Future Years

Residential Electric Utility Customer Savings Impacts by Type, Values in 2012 $	Gross Impacts of Spending Savings on Electricity Bills	Minus the Opportunity Cost (Lower Utility Output)	Annual Net Impact of Reduced Electricity Costs
Direct Impacts:			
Output (millions)	$35.6	($50.0)	($14.4)
Value-Added or GDP (millions)	$23.2	($39.5)	($16.3)
Labor Income (millions)	$11.8	($5.0)	$6.8
Jobs (full year equivalents)	253	(37)	216
Indirect Impacts:			
Output (millions)	$10.5	($5.8)	$4.7
Value-Added or GDP (millions)	$6.4	($3.1)	$3.3
Labor Income (millions)	$3.7	($1.9)	$1.7
Jobs (full year equivalents)	66	(32)	34
Induced Impacts:			
Output (millions)	$12.1	($5.5)	$6.7
Value-Added or GDP (millions)	$7.8	($3.5)	$4.3
Labor Income (millions)	$4.1	($1.8)	$2.3
Jobs (full year equivalents)	86	(39)	47
Total Impacts:			
Output (millions)	$58.2	($61.2)	($3.0)
Value-Added or GDP (millions)	$37.3	($46.1)	($8.8)
Labor Income (millions)	$19.6	($8.8)	$10.8
Jobs (full year equivalents)	405	(107)	297

Sources: ECONorthwest IMPLAN analysis of data from the NEEC and others.

Table 16: Annual Gross, Alternative, and Net Economic Impacts of Commercial Customer Spending of Electric Utility Cost Savings in Future Years

Commercial Electric Utility Customer Savings Impacts by Type, Values in 2012 $	Gross Impacts of Spending Savings on Electricity Bills	Minus the Opportunity Cost (Lower Utility Output)	Annual Net Impact of Reduced Electricity Costs
Direct Impacts:			
Output (millions)	$43.7	($43.7)	$0.0
Value-Added or GDP (millions)	$37.6	($34.5)	$3.2
Labor Income (millions)	$16.6	($4.4)	$12.2
Jobs (full year equivalents)	341	(32)	308
Indirect Impacts:			
Output (millions)	$12.0	($5.1)	$7.0
Value-Added or GDP (millions)	$7.9	($2.7)	$5.2
Labor Income (millions)	$4.4	($1.7)	$2.7
Jobs (full year equivalents)	80	(28)	52
Induced Impacts:			
Output (millions)	$16.2	($4.8)	$11.4
Value-Added or GDP (millions)	$10.6	($3.1)	$7.6
Labor Income (millions)	$5.8	($1.6)	$4.2
Jobs (full year equivalents)	109	(34)	75
Total Impacts:			
Output (millions)	$71.9	($53.5)	$18.4
Value-Added or GDP (millions)	$56.1	($40.2)	$15.9
Labor Income (millions)	$26.8	($7.7)	$19.1
Jobs (full year equivalents)	529	(94)	436

Sources: ECONorthwest IMPLAN analysis of data from the NEEC and others.

Table 17: Annual Gross, Alternative, and Net Economic Impacts of Industrial Customer Spending of Electric Utility Cost Savings in Future Years

Industrial Electric Utility Customer Savings Impacts by Type, Values in 2012 $	Gross Impacts of Spending Savings on Electricity Bills	Minus the Opportunity Cost (Lower Utility Output)	Annual Net Impact of Reduced Electricity Costs
Direct Impacts:			
Output (millions)	$13.1	($13.1)	$0.0
Value-Added or GDP (millions)	$4.8	($10.3)	($5.5)
Labor Income (millions)	$2.1	($1.3)	$0.8
Jobs (full year equivalents)	24	(10)	14
Indirect Impacts:			
Output (millions)	$5.6	($1.5)	$4.1
Value-Added or GDP (millions)	$2.9	($0.8)	$2.1
Labor Income (millions)	$1.7	($0.5)	$1.2
Jobs (full year equivalents)	28	(8)	20
Induced Impacts:			
Output (millions)	$3.0	($1.4)	$1.5
Value-Added or GDP (millions)	$1.9	($0.9)	$1.0
Labor Income (millions)	$1.1	($0.5)	$0.6
Jobs (full year equivalents)	20	(10)	10
Total Impacts:			
Output (millions)	$21.6	($16.0)	$5.6
Value-Added or GDP (millions)	$9.6	($12.0)	($2.4)
Labor Income (millions)	$4.9	($2.3)	$2.6
Jobs (full year equivalents)	71	(28)	43

Sources: ECONorthwest IMPLAN analysis of data from the NEEC and others.

Table 18: Annual Gross, Alternative, and Net Economic Impacts of Agricultural Customer Spending of Electric Utility Cost Savings in Future Years

Agricultural Electric Utility Customer Savings Impacts by Type, Values in 2012 $	Gross Impacts of Spending Savings on Electricity Bills	Minus the Opportunity Cost (Lower Utility Output)	Annual Net Impact of Reduced Electricity Costs
Direct Impacts:			
Output (millions)	$2.9	($2.9)	$0.0
Value-Added or GDP (millions)	$1.6	($2.3)	($0.7)
Labor Income (millions)	$1.4	($0.3)	$1.1
Jobs (full year equivalents)	25	(2)	23
Indirect Impacts:			
Output (millions)	$0.9	($0.3)	$0.6
Value-Added or GDP (millions)	$0.5	($0.2)	$0.3
Labor Income (millions)	$0.3	($0.1)	$0.2
Jobs (full year equivalents)	6	(2)	4
Induced Impacts:			
Output (millions)	$1.3	($0.3)	$1.0
Value-Added or GDP (millions)	$0.8	($0.2)	$0.6
Labor Income (millions)	$0.5	($0.1)	$0.3
Jobs (full year equivalents)	9	(2)	6
Total Impacts:			
Output (millions)	$5.1	($3.6)	$1.5
Value-Added or GDP (millions)	$2.9	($2.7)	$0.2
Labor Income (millions)	$2.1	($0.5)	$1.6
Jobs (full year equivalents)	39	(6)	33

Sources: ECONorthwest IMPLAN analysis of data from the NEEC and others.

Table 19: Total Annual Gross, Alternative, and Net Economic Impacts of Customer Spending of Electric Utility Cost Savings in Future Years

Total Electric Utility Customer Savings Impacts by Type, Values in 2012 $	Gross Impacts of Spending Savings on Electricity Bills	Minus the Opportunity Cost (Lower Utility Output)	Annual Net Impact of Reduced Electricity Costs
Direct Impacts:			
Output (millions)	$95.2	($109.6)	($14.4)
Value-Added or GDP (millions)	$67.1	($86.5)	($19.4)
Labor Income (millions)	$31.9	($11.1)	$20.8
Jobs (full year equivalents)	643	(81)	561
Indirect Impacts:			
Output (millions)	$29.0	($12.7)	$16.3
Value-Added or GDP (millions)	$17.7	($6.8)	$10.8
Labor Income (millions)	$10.1	($4.2)	$5.9
Jobs (full year equivalents)	179	(69)	110
Induced Impacts:			
Output (millions)	$32.5	($12.0)	$20.5
Value-Added or GDP (millions)	$21.2	($7.7)	$13.5
Labor Income (millions)	$11.4	($4.1)	$7.3
Jobs (full year equivalents)	223	(85)	138
Total Impacts:			
Output (millions)	$156.8	($134.3)	$22.5
Value-Added or GDP (millions)	$106.0	($101.0)	$4.9
Labor Income (millions)	$53.4	($19.3)	$34.1
Jobs (full year equivalents)	1,045	(236)	809

Sources: ECONorthwest IMPLAN analysis of data from the NEEC and others.

Impacts of Customers Spending a Portion of Their Annual Natural Gas Bill Savings in Washington

Detailed tables, covering the net economic impacts from gas utility customer spending, show modest local effects. This is because the magnitude of savings statewide on natural gas use is, compared to electricity, low.

Table 20: Annual Gross, Alternative, and Net Economic Impacts of Residential Customer Spending of Natural Gas Utility Cost Savings in Future Years

Residential Natural Gas Utility Customer Savings Impacts by Type, Values in 2012 $	Gross Impacts of Spending Savings on Natural Gas Bills	Minus the Opportunity Cost (Lower Utility Output)	Annual Net Impact of Reduced Natural Gas Costs
Direct Impacts:			
Output (millions)	$1.2	($2.9)	($1.6)
Value-Added (millions)	$1.3	($1.3)	$0.0
Labor Income (millions)	$0.6	($0.3)	$0.3
Jobs (full year equivalents)	14	(2)	12
Indirect Impacts:			
Output (millions)	$0.6	($0.2)	$0.4
Value-Added (millions)	$0.4	($0.1)	$0.2
Labor Income (millions)	$0.2	($0.1)	$0.1
Jobs (full year equivalents)	4	(1)	3
Induced Impacts:			
Output (millions)	$0.7	($0.3)	$0.4
Value-Added (millions)	$0.4	($0.2)	$0.3
Labor Income (millions)	$0.2	($0.1)	$0.1
Jobs (full year equivalents)	5	(2)	3
Total Impacts:			
Output (millions)	$2.5	($3.4)	($0.8)
Value-Added (millions)	$2.1	($1.6)	$0.6
Labor Income (millions)	$1.0	($0.4)	$0.6
Jobs (full year equivalents)	23	(5)	18

Sources: ECONorthwest IMPLAN analysis of data from the NEEC and others.

Table 21: Annual Gross, Alternative, and Net Economic Impacts of Commercial Customer Spending of Natural Gas Utility Cost Savings in Future Years

Commercial Natural Gas Utility Customer Savings Impacts by Type, Values in 2012 $	Gross Impacts of Spending Savings on Natural Gas Bills	Minus the Opportunity Cost (Lower Utility Output)	Annual Net Impact of Reduced Natural Gas Costs
Direct Impacts:			
Output (millions)	$2.3	($2.3)	$0.0
Value-Added (millions)	$2.0	($1.0)	$0.9
Labor Income (millions)	$0.9	($0.2)	$0.7
Jobs (full year equivalents)	18	(2)	16
Indirect Impacts:			
Output (millions)	$0.6	($0.2)	$0.4
Value-Added (millions)	$0.4	($0.1)	$0.3
Labor Income (millions)	$0.2	($0.1)	$0.2
Jobs (full year equivalents)	4	(1)	3
Induced Impacts:			
Output (millions)	$0.9	($0.2)	$0.6
Value-Added (millions)	$0.6	($0.1)	$0.4
Labor Income (millions)	$0.3	($0.1)	$0.2
Jobs (full year equivalents)	6	(2)	4
Total Impacts:			
Output (millions)	$3.8	($2.7)	$1.1
Value-Added (millions)	$3.0	($1.3)	$1.7
Labor Income (millions)	$1.4	($0.3)	$1.1
Jobs (full year equivalents)	28	(4)	24

Sources: ECONorthwest IMPLAN analysis of data from the NEEC and others.

Table 22: Annual Gross, Alternative, and Net Economic Impacts of Industrial Customer Spending of Natural Gas Utility Cost Savings in Future Years

Industrial Natural Gas Utility Customer Savings Impacts by Type, Values in 2012 $	Gross Impacts of Spending Savings on Natural Gas Bills	Minus the Opportunity Cost (Lower Utility Output)	Annual Net Impact of Reduced Natural Gas Costs
Direct Impacts:			
Output (millions)	$0.9	($0.9)	$0.0
Value-Added (millions)	$0.3	($0.4)	($0.1)
Labor Income (millions)	$0.1	($0.1)	$0.1
Jobs (full year equivalents)	2	(1)	1
Indirect Impacts:			
Output (millions)	$0.4	($0.1)	$0.3
Value-Added (millions)	$0.2	($0.0)	$0.2
Labor Income (millions)	$0.1	($0.0)	$0.1
Jobs (full year equivalents)	2	(0)	2
Induced Impacts:			
Output (millions)	$0.2	($0.1)	$0.1
Value-Added (millions)	$0.1	($0.1)	$0.1
Labor Income (millions)	$0.1	($0.0)	$0.0
Jobs (full year equivalents)	1	(1)	1
Total Impacts:			
Output (millions)	$1.5	($1.1)	$0.4
Value-Added (millions)	$0.7	($0.5)	$0.2
Labor Income (millions)	$0.3	($0.1)	$0.2
Jobs (full year equivalents)	5	(2)	3

Sources: ECONorthwest IMPLAN analysis of data from the NEEC and others.

Table 23: Annual Gross, Alternative, and Net Economic Impacts of Agricultural Customer Spending of Natural Gas Utility Cost Savings in Future Years, Value in 2012 $

Agricultural Natural Gas Utility Customer Savings Impacts by Type, Values in 2012 $	Gross Impacts of Spending Savings on Natural Gas Bills	Minus the Opportunity Cost (Lower Utility Output)	Annual Net Impact of Reduced Natural Gas Costs
Direct Impacts:			
Output (millions)	$0.2	($0.2)	$0.0
Value-Added (millions)	$0.1	($0.1)	$0.0
Labor Income (millions)	$0.1	($0.0)	$0.1
Jobs (full year equivalents)	2	(0)	2
Indirect Impacts:			
Output (millions)	$0.1	($0.0)	$0.0
Value-Added (millions)	$0.0	($0.0)	$0.0
Labor Income (millions)	$0.0	($0.0)	$0.0
Jobs (full year equivalents)	0	(0)	0
Induced Impacts:			
Output (millions)	$0.1	($0.0)	$0.1
Value-Added (millions)	$0.1	($0.0)	$0.0
Labor Income (millions)	$0.0	($0.0)	$0.0
Jobs (full year equivalents)	1	(0)	0
Total Impacts:			
Output (millions)	$0.4	($0.2)	$0.1
Value-Added (millions)	$0.2	($0.1)	$0.1
Labor Income (millions)	$0.1	($0.0)	$0.1
Jobs (full year equivalents)	3	(0)	2

Sources: ECONorthwest IMPLAN analysis of data from the NEEC and others.

Table 24: Total Annual Gross, Alternative, and Net Economic Impacts of Customer Spending of Natural Gas Utility Cost Savings in Future Years

Total Natural Gas Utility Customer Savings Impacts by Type, Values in 2012 $	Gross Impacts of Spending Savings on Natural Gas Bills	Minus the Impacts of Lower Natural Gas Utility Output	Annual Net Impact of Reduced Natural Gas Costs
Direct Impacts:			
Output (millions)	$4.7	($6.3)	($1.6)
Value-Added (millions)	$3.7	($2.8)	$0.9
Labor Income (millions)	$1.7	($0.6)	$1.1
Jobs (full year equivalents)	36	(5)	31
Indirect Impacts:			
Output (millions)	$1.7	($0.5)	$1.2
Value-Added (millions)	$1.0	($0.3)	$0.8
Labor Income (millions)	$0.6	($0.1)	$0.4
Jobs (full year equivalents)	10	(3)	8
Induced Impacts:			
Output (millions)	$1.8	($0.6)	$1.3
Value-Added (millions)	$1.2	($0.4)	$0.8
Labor Income (millions)	$0.6	($0.2)	$0.4
Jobs (full year equivalents)	13	(4)	9
Total Impacts:			
Output (millions)	$8.2	($7.4)	$0.8
Value-Added (millions)	$6.0	($3.5)	$2.5
Labor Income (millions)	$2.9	($0.9)	$2.0
Jobs (full year equivalents)	59	(11)	47

Sources: ECONorthwest IMPLAN analysis of data from the NEEC and others.