



CADMUS

THE ECONOMIC IMPACTS
OF ENERGY EFFICIENCY
INVESTMENTS IN OHIO

OCTOBER 2016



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ECONOMIC IMPACTS OF ENERGY EFFICIENCY

OHIO

Multi-Year Impacts of 2014 Programs

14,002
JOBS CREATED



\$1.211 BILLION
BOOST TO
STATEWIDE
INCOME

16,212 GWh
ELECTRICITY SAVED

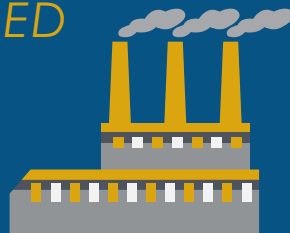


EMISSIONS AVOIDED

13,029,988 TONS CO₂

62,886 TONS SO₂

13,863 TONS NO_x



ENERGY EFFICIENCY INVESTMENTS ARE CREATING JOBS AND INCREASING INCOMES IN OHIO.

Analysis conducted by Cadmus concludes that 2014 energy efficiency investments in Ohio have yielded, and will continue to generate, net benefits for the Ohio state economy. In 2014 alone, these benefits included nearly **3,000 new jobs**, more than **\$175 million in increased statewide income**, about **\$270 million in total net economic value**, and over **\$500 million in net sales**.

The analysis also concludes that the economic impacts of energy efficiency investments endure, providing positive returns for Ohio residents and businesses long after the utilities' initial investments. Over the entire 25-year study period, the 2014 energy efficiency programs are estimated to **create over 14,000 jobs**, **increase net statewide income by more than \$1.2 billion**, **add almost \$1.9 billion of total value to the state's economy**, and **generate nearly \$3.3 billion in net sales**.

In 2014, the Ohio state legislature imposed a two-year freeze on the state energy efficiency resource standard mandate. Since early 2016, the Ohio state legislature has been engaged in a statewide debate on the future of energy policy.

Formal energy efficiency standards support a targeted investment that leads to larger energy savings and economic benefits. Energy efficiency programs provide direct investment into the state's economy, creating real jobs and having a lasting impact.



INTRODUCTION

This report describes the net statewide economic benefits of Ohio energy efficiency programs. As requested by MEEA, Cadmus determined the net economic impacts of 2014 program portfolio spending and savings.

Cadmus modeled annual statewide employment, personal income, value added, and sales benefits over a 25-year study period. Table 1 summarizes the net study period impacts on each of these economic indicators.

As Figure 1 illustrates, energy efficiency investments affect the flow of money through the state and regional economies in three ways. **Direct economic effects** represent impacts on industries directly involved with utility programs, such as firms that manufacture energy technologies or provide project services. **Indirect economic effects** account for impacts

on industries in the energy efficiency supply chain, such as firms that supply raw manufacturing inputs to the directly affected industries. **Induced economic effects** lead to additional impacts on other industries as utility program participants and employees of directly and indirectly affected industries spend money in the economy.

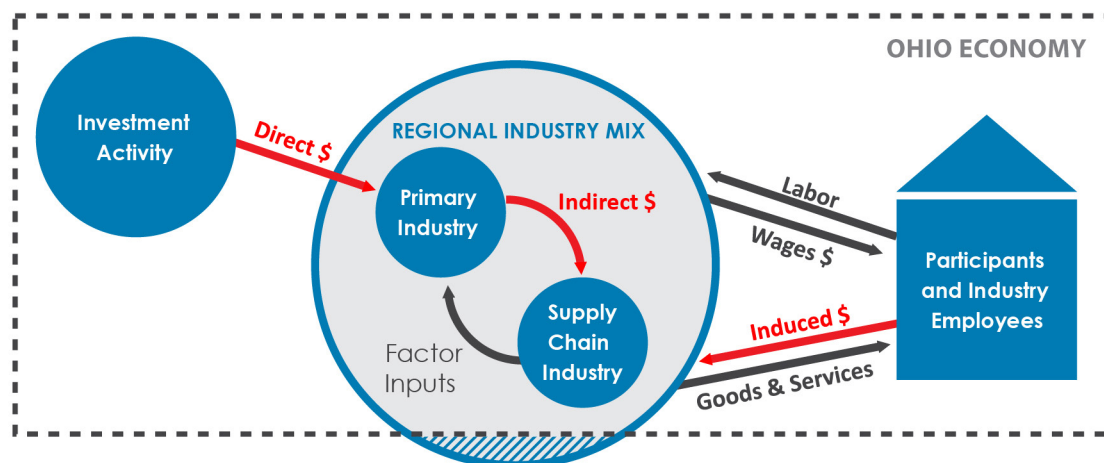
Ohio investments in energy efficiency create jobs, generate new income, and increase in-state spending.

The 2014 programs alone are estimated to create more than 14,000 jobs, increase statewide income by over \$1.2 billion, add nearly \$1.9 billion of economic value, and generate almost \$3.3 billion in sales between 2014 and 2038.

Table 1. Summary Findings

Economic Indicator	Net Study Period Impacts
	2014 Actual
Employment (jobs)	14,002
Personal Income (millions of 2015 dollars)	\$1,211
Value Added (millions of 2015 dollars)	\$1,891
Sales (millions of 2015 dollars)	\$3,277

Figure 1. How Energy Efficiency Investments Affect the Flow of Money Through the Economy



Although the modeling analysis assumes total statewide spending is the same with or without programs, net impacts are positive because the *nature* of spending within the Ohio economy changes as a result of direct, indirect, and induced program effects. In the example shown in Figure 1, efficiency investments result in positive net statewide economic impacts because funds that are directed to mainly local industries would otherwise have been spent primarily (but not exclusively) on energy resources, some of which are imported into Ohio.

In addition to the effects from program year expenditures, efficiency investments continue to generate positive net economic benefits for as long as energy savings continue. Ongoing energy savings allow participants to spend less money on energy and more on other products and services, many of which have relatively localized supply chains. Furthermore, Ohio utilities benefit from reduced fuel and power purchases, transmission and distribution costs, emission allowance costs, and supply capacity requirements. However, customers purchase less energy after participating in energy efficiency programs; therefore, utilities also forego revenues equal to sales reductions.¹

ANALYSIS FINDINGS

Cadmus estimated the net impacts on the Ohio economy of actual 2014 program spending and

energy savings. The following sections describe detailed findings from our analysis.

2014 PROGRAM PORTFOLIO SPENDING AND SAVINGS

As shown in Table 2, Ohio utilities invested nearly \$211 million (2015 dollars) in their 2014 energy efficiency program portfolios. They spent about 49% of that amount on residential programs, 48% on nonresidential programs, and 3% on cross-cutting initiatives such as customer education or program evaluation. The statewide program portfolio achieved over 16,000 GWh of lifetime electric savings (Ohio utilities do not report gas savings), saving over 13 million tons of CO₂, nearly 63,000 tons of SO₂, and almost 14,000 tons of NO_x. Of the total energy savings achieved, residential programs saved nearly 43%, nonresidential programs saved more than 55%, and cross-cutting initiatives saved about 2%.

2014 PROGRAM PORTFOLIO ECONOMIC IMPACTS

The economic impacts of any energy efficiency portfolio depend partly on the total level of investment and energy savings, and partly on the mix of programs. A program's net effect on the statewide economy depends on which industries are directly affected, as well as on the participant customer segment, the type of efficiency measure(s) promoted, and the incentive(s) offered. Then, the magnitude of those impacts

Table 2. 2014 Utility Spending and Savings, by Program Customer Segment

Program Customer Segment	Spending (Millions of \$2015)	GWh Savings	therm Savings	Avoided CO ₂ (tons)	Avoided SO ₂ (tons)	Avoided NO _x (tons)
2014 Actual						
Residential	\$104.1	4,576	NR	3,677,844	17,750	3,913
Nonresidential	\$101.2	11,597	NR	9,328,850	44,985	9,917
Cross-Cutting	\$5.5	39	NR	31,294	151	33
Total Portfolio	\$210.9	16,212	NR	13,029,988	62,886	13,863

* Ohio utilities do not report gas savings; therefore, no gas savings are included in the analysis.

¹ The dollar value of these reductions represents a cost to the utilities, which we also considered in our analysis.

depends on the levels of investment and energy savings. As shown in Table 3, the Ohio utilities' 2014 programs should result in positive net economic impacts in both the near- and long-term.

Details of the net statewide employment, personal income, value added, and sales impacts of the 2014 program portfolio are outlined in the following sections.

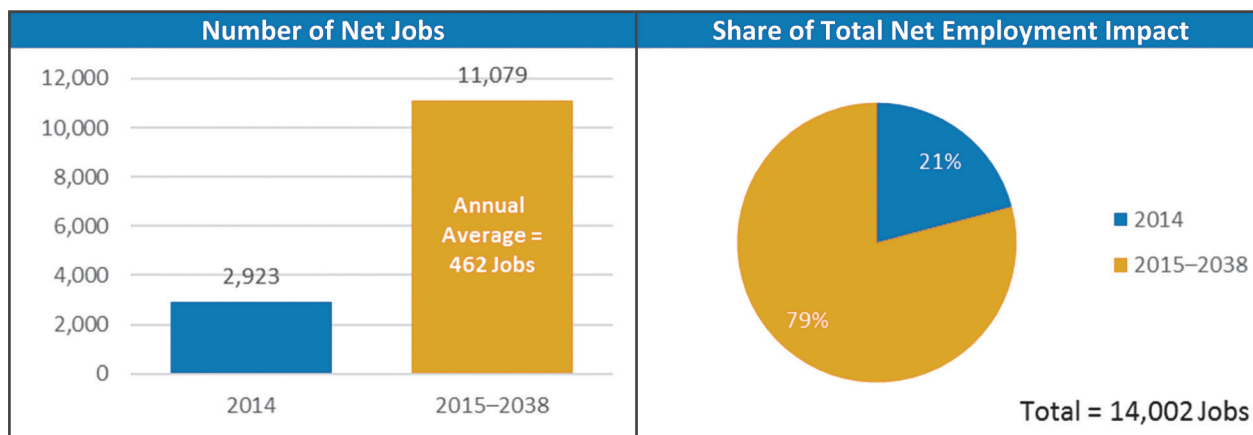
EMPLOYMENT

Program spending and energy savings generate positive net effects on statewide employment in the near term and over time. Figure 2 shows the net first-year and future-year job impacts. Analysis findings suggest that the 2014 programs created nearly 3,000 net jobs in the first year, or approximately 21% of the study period total (over 14,000 jobs). Modeling also shows that ongoing energy savings will help create another 11,079 net jobs—an average of 462 per year—through the end of the study period.

Table 3. Net Program-Year and Future-Year Economic Impacts from 2014 Programs

Economic Indicator	Net Impact
Program Year Employment (jobs)	2,923
Future Year Employment (jobs)	11,079
Total Study Period Employment (jobs)	14,002
Program Year Personal Income (\$2015 Millions)	\$176
Future Year Personal Income (\$2015 Millions)	\$1,035
Total Study Period Personal Income (\$2015 Millions)	\$1,211
Program Year Value Added (\$2015 Millions)	\$270
Future Year Value Added (\$2015 Millions)	\$1,621
Total Study Period Value Added (\$2015 Millions)	\$1,891
Program Year Sales (\$2015 Millions)	\$506
Future Year Sales (\$2015 Millions)	\$2,771
Total Study Period Sales (\$2015 Millions)	\$3,277

Figure 2. First-Year and Future-Year Employment Impacts



PERSONAL INCOME

As a result of increased statewide employment and ongoing energy cost savings, Ohio efficiency programs also yield positive near-term and long-term personal income effects. Figure 3 shows the net first-year and future-year statewide income impacts. The modeling analysis shows that the 2014 programs generated about \$176 million of net income the first year, or about 15% of the study period total (over \$1.2 billion). Ongoing energy savings benefits will continue generating an average of \$43 million of net personal income per year—a total of more than \$1 billion—from 2015 to 2038.

VALUE ADDED

Ohio efficiency investments and energy savings generate new demand for products and services that are produced by relatively local industries, which adds net value to the statewide economy. Figure 4 illustrates the net first-year and future-year value added impacts. The analysis suggests that the 2014 programs added about \$270 million of net economic value the first year, or approximately 14% of the study period total (nearly \$1.9 billion). Benefits from ongoing energy savings will generate an average of \$68 million of net economic value per year—a total of more than \$1.6 billion—from 2015 to 2038.

Figure 3. First-Year and Future-Year Personal Income Impacts

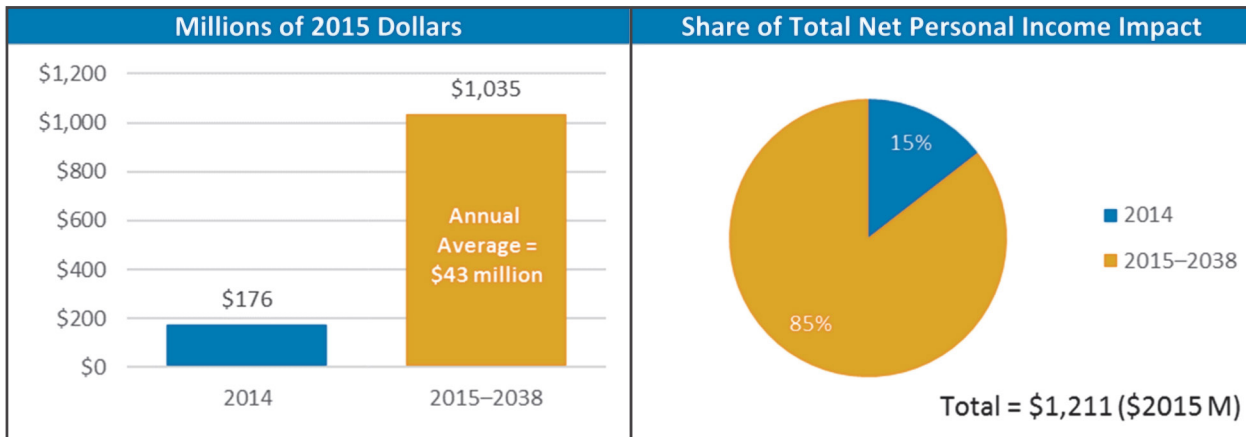


Figure 4. First-Year and Future-Year Value Added Impacts

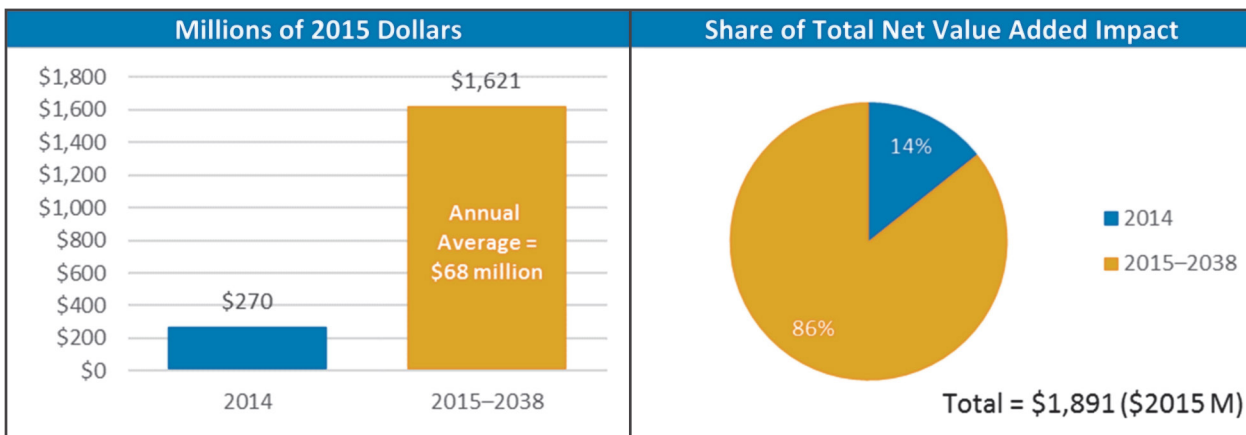
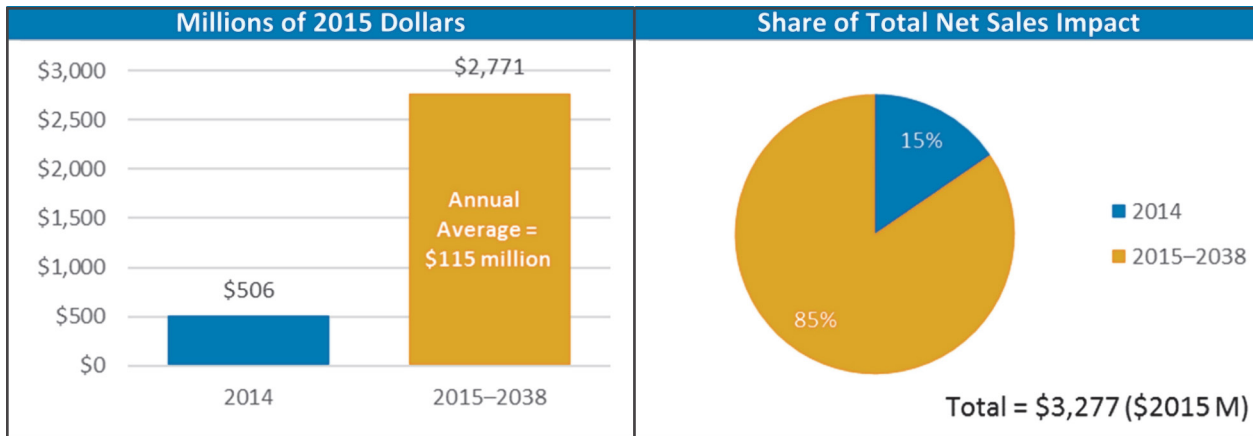


Figure 5. First-Year and Future-Year Sales Impacts



SALES

Efficiency program activities and resulting energy savings lead to positive net sales impacts in Ohio. Figure 5 shows the net first-year and future-year sales impacts by program year. Model findings suggest that the 2014 programs generated about \$506 million of net sales the first year, or around 15% of the study period total (almost \$3.3 billion). Spending of new income and energy cost savings will lead to an average of \$115 million of net sales per year—a total of nearly \$2.8 billion—from 2015 to 2038.

ANALYSIS METHOD

Six Ohio utilities were included in this analysis: American Electric Power Ohio, Dayton Power and Light, Duke Energy, First Energy Illuminating Company, First Energy Ohio Edison, and First Energy Toledo Edison. Cadmus estimated the net economic impacts of annual program spending and resulting energy savings for each utility using the Regional Economic Models, Inc. Policy Insight+ (REMI PI+) model, a dynamic economic forecasting tool.²

We determined net first-year and future-year impacts on four key economic indicators across a 25-year study period: (1) employment; (2) personal income; (3) value added; and (4) sales. To isolate the net statewide effects on these variables, Cadmus modeled six cash flows against the REMI PI+ model's built-in forecast of the baseline economy: (1) program payments; (2) program spending; (3) incentives; (4) participant payments; (5) bill reductions; and (6) avoided utility costs.³

CONCLUSION

Ohio utilities' energy efficiency programs affect the flow of money through the state economy, creating local jobs, boosting statewide income, and increasing in-state spending. The 2014 programs alone are estimated to create more than 14,000 jobs, increase statewide income by over \$1.2 billion, add nearly \$1.9 billion of economic value, and generate almost \$3.3 billion in sales between 2014 and 2038.

² <http://www.remi.com/>

³ A separate section of this report, "The Economic Impacts of Energy Efficiency Investments in the Midwest," includes a detailed description of each economic indicator and modeled cash flow analyzed in this study.

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