Optimal ENERGY *Integrated Energy Resources*

Economic Impacts of PA 295 Energy Optimization Investments in Michigan

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EXECUTIVE SUMMARY

Michigan's electric and natural gas Energy Optimization (EO) programs operate by collecting money from ratepayers and using those funds to provide services and incentives that promote investment in energy efficient equipment. While the goals of the EO programs have not been directly related to economic development and job creation, program expenditures have unquestionably driven economic activity and created jobs in Michigan. The purpose of this report is to estimate the net impacts of Michigan's EO programs on the State's overall economy.

The economic impacts of the EO programs result from:

- additional spending by participating households and businesses for efficient equipment and services,
- increased demand for equipment and installations from local businesses,
- increased spending within the economy due to utility bill savings from reduced energy consumption, and
- increased production from participating businesses.

This report quantifies these economic impacts by modeling the effects of EO program spending for program year 2010 in comparison to having no EO program spending that year.[1] It presents *net new economic activity* generated by the EO investment: the difference between the increased amount of economic activity associated with the programs' stimulation of related commercial services and industries in Michigan, and the reduced amount of economic activity associated with the costs of the EO programs. Some durable efficiency measures continue to produce energy savings for 20 years or longer, so the economic impacts occur over that time period. Over the course of those 20 years, residents and businesses participating in the EO programs are estimated to save over $1.09 billion in energy-related spending.

The study results are presented in the table below:

[1] The Energy Optimization programs began in 2009. Because program startup dates varied by utility, and because startup efforts include many one-time costs, such as office or IT equipment purchases, the 2009 EO program year is not representative of potential economic impacts in future years. This study therefore focuses on the 2010 EO program year.

Table ES1: Total Net Economic Impacts of Michigan's Energy Optimization Programs (2010$)

Impact Type	2010	Lifetime[2]
Jobs (job-years[3])	1,547	13,131
Gross State Product (million)	$119	$983
Personal and Proprietary Income (million)	$89	$601
Output, or Business Sales (million)	$234	$1,816

Another perspective for measuring the efficacy of the EO programs is to view the impacts as value produced per dollar of program spending, as shown below in Table ES2. This one-year investment is estimated to create, over a 20-year period, a net gain of 101 job-years per million dollars of program spending and a net increase of over seven dollars of cumulative Gross State Product (GSP) for every dollar spent.

Table ES2: Leverage of Program Spending

Program Spending Metric	Ratios
Total Budget (million, 2010$)	$130.6
Job-years per million $Budget	101
$GSP/$Budget	7.5
$Income/$Budget	4.6
$Output/$Budget	13.9

These impacts take on greater significance when we consider that Michigan's EO programs will continue to operate for multiple years, compounding these net benefits into the future.

[2] Energy savings and their economic impacts persist for the lifetimes of the installed efficiency measures.

[3] A job-year is the equivalent of one full time job for one year.

INTRODUCTION

BACKGROUND

In October of 2008, Michigan's "Clean, Renewable, and Efficient Energy Act", 2008 PA 295 was enacted through a bi-partisan effort with input from all significant industry players. Subpart B of the Act is entitled "Energy Optimization." It requires all providers (utilities) of retail electric and natural gas services in the State to offer Energy Optimization (EO) programs for their customers. This includes municipal and cooperative utilities as well as investor-owned utilities. The Michigan Public Service Commission was given oversight responsibilities for all programs whether the sponsoring provider is state-regulated or not.

The first EO programs were rolled out beginning in June 2009. By January, 2010, all providers were offering EO services to retail customers. All EO program expenditures in 2009 totaled $89,424,528. Total EO expenditures in 2010 were budgeted at $137,216,121, and expenditures in 2011 are expected to be $191,448,132.[4] By law, the energy savings targets and associated spending will increase by .25% in 2012 and then level out for the subsequent years.[5]

While the goals of 2008 PA 295 were not directly related to economic development and job creation, expenditures of the magnitude indicated above have unquestionably driven economic activity and created jobs in Michigan. Since economic development is a national as well as a Michigan priority, it is important to assess the degree to which the energy efficiency industry acts as a driver of economic activity.

OVERVIEW OF THE STUDY

The goal of this study is to quantify the economic impacts of energy efficiency investments made by administrators of EO programs in Michigan.[6] The results are based on actual 2010 spending and savings reported to the Michigan Public Service Commission for five of the State's program administrators. We estimate the total impacts of these programs to account for over 95% of ratepayer-funded energy

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[4] See "Report on the Implementation of P.A. 295 Utility Energy Optimization Programs", Michigan Public Service Commission Michigan Public Service Commission as revised in January 2011, for more detailed information.

[5] See 2008 PA 295, Section 77.

[6] A "Program Administrator" is an entity implementing Energy Optimization programs required by 2008 PA 295. For the scope of this report, this includes DTE Energy (Detroit Edison and Michigan Consolidated Gas), Consumers Energy (electric and natural gas), *Efficiency United* (administered by the Michigan Community Action Agency Association), *Energy Optimization* (administered by the Michigan Electric Cooperative Association (MECA)), and Lansing Board of Water & Light. Data related to these programs are assumed to be representative of the entire State in the context of this report.

optimization activity in the State, and are thus representative of the State's energy efficiency investment as a whole.

This study estimates the impact of this energy optimization spending on the State's economy. The scope of Michigan's energy optimization investment included in this report is as follows:

- $130.6 million in EO program spending[7]
- 739 GWh per year of installed annual electric energy savings
- 2,097 MMCF per year of installed annual natural gas savings.

The main spending categories associated with the EO programs include:

- the total outlays for installed efficient equipment and practices (relative to the baseline of standard-efficiency equipment and practices), comprised of two parts:
  - the "out-of-pocket" portion of those costs paid by program participants , plus
  - the portion of those costs paid by the efficiency programs, including any rebates or other incentives paid to program participants or vendors to promote the efficiency measures, and
- other spending for program planning and design, marketing, training, technical assistance, evaluation, and other operational expenses.

Although the EO programs began in 2009, this report focuses on the 2010 program year. Program startup dates in 2009 varied by utility, and startup efforts include many one-time purchases, such as office or information technology (IT) equipment purchases. As a result, the 2009 program is not representative of current or future implementation efforts, and was excluded from the study. From the same five program administrators, the 2009 program year provided 356 GWh per year of installed annual electric savings and 772 MMCF per year of installed annual natural gas savings.

This study focuses on the benefits to Michigan's economy of EO spending due to savings in electricity and natural gas usage. These savings and their economic benefits continue for as long as the efficiency measures are operational, which can be up to 20 years or more for the most durable measures. While this study only considers the

[7] The estimated total one-year spending and savings values were derived from reported values from Detroit Edison, Michigan Consolidated Gas, Consumers Energy, Efficiency United, MECA (EO) and the Lansing Board of Water & Light, which were extracted from annual reports, annual plans, testimony, and contracts. Where exact spending values were not provided by the supporting documents, they were estimated based on related values that were provided.

benefits from electricity and natural gas savings, the contributions of other benefits, such as water and reduced operation and maintenance costs, can be significant.[8]

Michigan's EO programs should also help to reduce electric and natural gas rates due to reduced need for generation capacity, transmission and distribution expenditures, and obligations to the Midwest Independent System Operator (MISO) and the PJM Regional Transmission Organization. Though modeling the effects of rate impacts was beyond the scope of this study, it should be noted that similar studies have found that reduced generation, transmission, and distribution obligations would result in lower electric and gas rates for all ratepayers as the energy savings accumulate over a period of years.

In considering net economic impact, the analysis should assess the impacts of reduced energy sales on the Michigan economy. Michigan's primary marginal electricity sources are coal and natural gas. Michigan imports all of its coal, and its natural gas production is approximately 20 percent of its consumption. Reduced consumption of natural gas would not necessarily impact in-state gas production, which is sold on the open market. Because primary energy production plays a relatively small role in the Michigan economy, the economic impact of reduced energy sales will also be minor. The negative economic impact from reduced utility revenue would also be offset by positive impacts due to other factors (e.g., reduced obligations to MISO and PJM).[9]

The results of this study represent the *net new economic activity* generated by the energy optimization investment: the difference between the increased amount of economic activity associated with the programs' stimulation of related commercial services and industries in Michigan, and the reduced amount of economic activity associated with the costs of the EO programs. The costs, savings and economic benefits resulting from the programs were evaluated over a 20-year study period using the IMPLAN economic model, as further described below.

OVERVIEW OF ECONOMIC IMPACTS

The impacts of any new economic activity depend on the extent to which it affects supporting services and industries in the region. Economic impacts emanate from:

1. direct economic effects (e.g. spending on goods and services at a construction site or the purchase of a piece of new equipment), and

[8] See the discussion of these benefits in *The Economic Impacts of Energy Efficiency Investments in Vermont*, available at: http://www.vtenergyplan.vermont.gov/sites/cep/files/Vol%202%20Public%20Review%20Draft%202011%20CEP%20appendixes%20inc%20VLS.pdf

[9] Since rate impacts fall outside of the scope of this study, the authors did not address the potential impact of "decoupling." Decoupling is a regulatory option which seeks to make utility return on equity independent of the energy sales levels. Since energy optimization spending reduces long-term capital infrastructure investment, ratepayers should benefit even under decoupled regulatory environment.

2. multiplier effects which include

    a. spending on supporting goods and services by the firms providing that direct activity ("indirect" impacts), and

    b. re-spending by workers of their wages or disposable income from savings or costs to households ("induced" impacts).

In general, energy optimization investments create net positive economic impacts in a given region[10]. In other words, usually more jobs are created through these projects than are lost by the activities they displace, such as electric generation or the sale of fuel oil, or spending on other goods and services rather than paying more for efficient equipment. This net positive impact is due to the fact that participants save money on their energy bills, and usually more of the dollars spent on energy optimization remain in the local economy than dollars spent on "traditional" electric generation or fossil fuel purchases.[11] Energy optimization is also a more labor-intensive activity than typical generation or fuel sales, so for any given amount of efficiency spending, more local jobs are created than lost by reducing spending on electric generation. The size of that net impact depends on how the region is defined, the amount of energy savings, and how much of the spending by each affected industry remains within that given region.

The range of economic impact resulting from new economic activity depends on the metric used to express that impact. This report provides estimates of two economic multipliers for the energy optimization programs evaluated. One is the ratio of change in Gross State Product (GSP) to EO program spending. The other is the ratio of change in wage income to EO program spending. Arguably, the most useful measure is *net job-years created per million dollars in program spending*, which represents the change in employment in the region due to EO program spending.[12] For studies that only capture the direct jobs associated with energy optimization, results typically show between three and ten *job-years per million dollars in program spending* (depending on program type and the specific region).[13] When including total economic impacts (direct, indirect and induced activity) the impacts are much higher, as with this study, which shows an estimated impact of *101 job-years* per million dollars.

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[10] *Economic Impacts and Potential Air Emission Reductions from Renewable Generation & Efficiency Programs in New England,* prepared for the Regulatory Assistance Project by Synapse Energy Economics, April 2005.

[11] About 75% of Michigan's electric generation is from natural gas and coal (Energy Information Agency State Profile, http://www.eia.gov/cneaf/electricity/st_profiles/sept04mi.xls). Michigan imports all of its coal and consumes about 5 times as much natural gas as it produces (*Natural Gas Production, Transmission, and Consumption, by State, 2009* (Table 2), Energy Information Agency, http://www.eia.gov/pub/oil_gas/natural_gas/data_publications/natural_gas_annual/current/pdf/table_002.pdf)

[12] Unlike other indicators discussed below, this number is not a typical economic multiplier since the denominator (program spending) does not include participants' out-of-pocket spending on energy efficiency.

[13] *Energy Efficiency Services Sector: Workforce Size and Expectations for Growth*, Ernest Orlando Lawrence Berkeley National Laboratory, September 2010. (http://eetd.lbl.gov/ea/emp/reports/lbnl-3987e.pdf)

The findings of this report are consistent with, and in some regards higher than, other recent studies on the economic impacts of efficiency investments. A report for Environment Northeast showed impacts between 36 and 60 job-years per million dollars spent (depending on the state) due to energy optimization.[14] One study in Wisconsin showed between 75 and 250 job-years per million dollars over 25 years (depending on the program type).[15] The higher results found in this analysis may be due to the nascence of Michigan's programs. Due to the fifteen-year gap in large scale ratepayer-funded energy optimization programs,[16] activity by program administrators thus far has likely focused on efficiency measures providing significant returns relative to investment. As programs pursue deeper savings, and baselines change due to improved energy codes and standards, the savings yield relative to program spending may decrease somewhat over time. However, experience in other states and regions with a long history of aggressive energy optimization programs demonstrates that strong net positive impacts still result after decades of energy optimization program implementation.

REPORT STRUCTURE

The following section of the report provides a summary of the results of the economic modeling, after which we provide a detailed explanation of the study methodology. Appendix A provides a summary of the data sources and assumptions used in the study. Unless otherwise stated, all tables and figures are the product of the report authors.

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[14] *Energy Efficiency: Engine of Economic Growth*, Environment Northeast, and EDR Group, October 2009.

[15] *Focus on Energy Evaluation*, State of Wisconsin Public Service Commission, March 2010, PA Consulting and EDR Group.

[16] From the early 1980s through the mid-1990s, investor-owned utilities in Michigan offered energy efficiency programs to customers pursuant to orders by the Michigan Public Service Commission. These orders related to the Residential Conservation Service (RCS) and Commercial and Apartment Conservation Service (CACS) programs mandated by the 1978 National Energy Conservation Policy Act (PL95-619, as amended) and other Commission initiatives.

SUMMARY OF RESULTS

Energy optimization generates economic activity throughout Michigan in the form of the purchase and installation of energy optimization goods and services, delivery of program services and products, and net energy savings to participants. Households that participate in the program save on energy costs and, therefore, can spend additional money in the local economy, spurring job growth. Businesses have lower energy costs that improve their bottom-line, which enables them to be more competitive and to expand production and related employment. The investment in efficient equipment itself also generates economic activity to the extent that the equipment is produced, sold, installed or maintained by Michigan businesses.

These efficiency investments also cost participants money for their part of the efficient equipment and installation costs. Further, all ratepayers participate in funding the program. These costs are taken into account in our analysis in that participants are negatively affected through their additional spending on the energy optimization goods and services (constricting their ability to spend elsewhere), and all ratepayers are negatively impacted by the inclusion of EO program costs on their energy bills. These negative impacts offset part of the positive impacts from savings and investment.

Table 1 shows the resulting net economic impacts in terms of job-years of employment (the equivalent of one full-time job for one year), personal and business proprietor income[17], Gross State Product (GSP),[18] and Output (i.e., business sales). These economic impacts result from program and participant spending, as well as participant net energy savings – participants spend a portion of these energy savings on other sectors of the economy, thus spurring additional economic activity. Program activity for the year 2010 is estimated to have generated a net increase of nearly 13,131 job-years and $983 million in GSP in Michigan over a 20 year time horizon. The largest impact year is 2010 itself, since this is when new equipment and installations are purchased. In the following years, positive net benefits continue due to energy cost savings to participants. (Please refer to Table 4 for examples of the types of jobs created by EO programs.)

[17] Personal and business income is defined by IMPLAN as "All forms of employment income, including Employee Compensation (wages and benefits) and Proprietor Income."

[18] The Gross State Product (GSP) captures the additional value-added activity produced in Michigan. It generally refers to the additional wage income, plus the additional profits of production and services in Michigan.

Table 1: Total Net Economic Impacts of Michigan Energy Optimization Programs (2010$)

Impact Type	2010	Lifetime
Jobs (job-years)	1,547	13,131
Gross State Product (million)	$119	$983
Personal and Proprietary Income (million)	$89	$601
Output (million)	$234	$1,816

Another perspective for measuring the efficacy of the programs is to present the impacts as value produced per dollar of program spending, as shown below in Table 2 for the 2010 energy optimization program budget of $130.6 million. Dividing the economic impacts above by that amount shows that this one-year investment creates a net gain of 101 job-years per million dollars of program spending and a net increase of over seven dollars of cumulative Gross State Product (GSP) for every dollar spent. Another important metric is personal and proprietary income. For every dollar of program spending, an additional four dollars is generated in the income of Michigan residents over the 20-year study period. In terms of industry production, the programs create fourteen dollars for every dollar spent on the program. This is due, in part, to the multiplier effects described earlier in the report which account for the re-spending of saved money by business and households, and the spending on supporting goods services by program participants. These impacts take on more significance when we consider that Michigan's energy optimization programs are designed to operate for multiple years, compounding these net benefits.

Table 2: Leverage of Program Spending

Program Spending Metric	Ratios
Total Budget (million, 2010$)	$130.6
Job-years per million	101
$GSP/$Budget	7.5
$Income/$Budget	4.6
$Output/$Budget	13.9

METHODOLOGY

THE IMPLAN MODEL

Economic multipliers used for this analysis were provided by the IMPLAN input-output model. IMPLAN (IMpact Analysis for PLANning) was developed by the University of Minnesota Agricultural Economics department and is now a product of MIG Inc. The IMPLAN model and data set is maintained to provide total impact of economic activities for every zip code, county, and state in the United States. IMPLAN models can be constructed to show the effects of a given change on the economy of interest.

IMPLAN models are used to study the impacts of user-specified changes in the chosen economy for more than four hundred different industries, as well as nine specific household income brackets. The model reflects a region's unique structure and trade situation by estimating the magnitude and distribution of three types of economic impacts: direct, indirect, and induced changes within the economy. Direct effects are determined by the event as defined by the user (e.g., a $10 million dollar transaction is a $10 million dollar direct effect). Indirect effects are determined by the amount of the direct effect spent within the study region on supplies, services, labor and taxes. Finally, induced effects measure the money that is re-spent in the study area as a result of spending from indirect effects. Each of these steps recognizes an important leakage from the economic study region spent on purchases outside of the defined area. The compounding effect is called the multiplier effect.

This analysis uses economic multipliers that are specific to the State of Michigan. These economic multipliers are used to determine the direct, indirect, and induced impacts of cost recovery from both residential and business customers, as well as the economic benefits achieved by increased program spending and energy savings. All spending and saving has an economic impact. Households are affected by the cost of EO program surcharges, as well as the dollar savings resulting from increased energy optimization. The analysis utilizes multipliers specific to nine income brackets within the State of Michigan and assesses the net effect of household spending patterns resulting from both surcharge spending and energy savings. The analysis also utilizes multipliers specific to the commercial and industrial sectors that make up the entire Michigan economy. Businesses, too, are affected by the cost of EO programs as well as the dollar savings resulting from increased energy optimization. Additionally, specific industries benefit from increased spending as a result of program delivery, incentives, and participant spending. The positive impacts on these specific sectors of the economy are thus incorporated into the analysis.

CASH FLOWS CAPTURED IN THE ECONOMIC MODEL

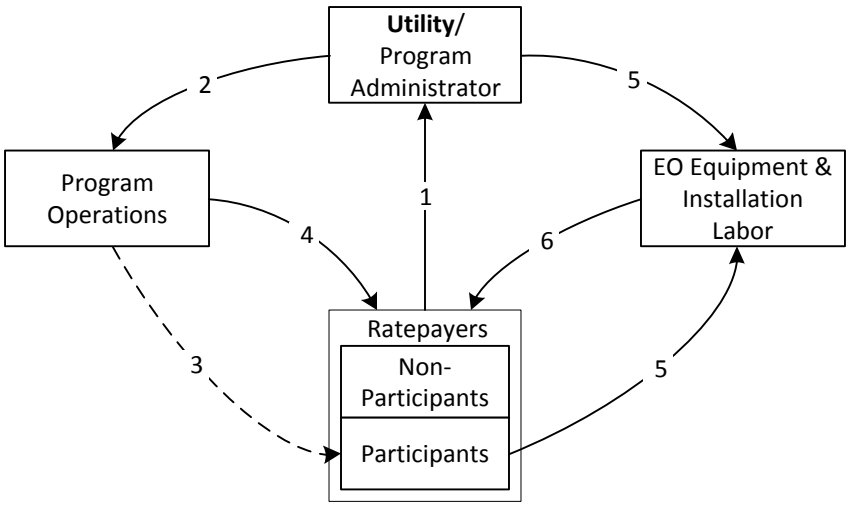
The economic modeling through IMPLAN takes into consideration most of the changes in cash flow due to the funding and activities of the EO programs.[19] Inputs to the IMPLAN model fall into two broad categories:

- **Program and Participant Spending** – Energy optimization investments have an economic impact from equipment that is produced within the region and to the extent that local contractors are installing the equipment. These investments are comprised of both participant costs and incentives contributed by the program administrators. The programs also require spending on operations – program planning and design, marketing, training, technical assistance, and evaluation – to generate energy savings through participant activity.
- **Participant net energy savings.** While users have to invest in upgrades or equipment at the outset, savings start to accrue after these costs have been offset (several months to several years after installation) and continue throughout the optimization measure's useful life. Households take these savings and spend a portion on other goods further stimulating the local economy. Businesses have lower costs, freeing up capital for investment and improving competitiveness. Types of savings modeled in this analysis include electricity and natural gas.

Energy optimization investments are modeled in IMPLAN as transfers of money from one party to another (from ratepayers to various industries in and out of state), whereas savings due to investments are modeled as increased discretionary spending for households and increased income for businesses that participate. Both are considered cash flows. To conceptualize the interactive effects of these cash flows, it is useful to look at an illustration. Figure 1 represents the various cash flows and how they relate, with explanations provided below the figure.

[19] The primary exceptions are the affects to electric rates due to reduced demand, and the non-energy benefits of efficiency investments.

Figure 1. Cash Flow Diagram of Michigan's Energy Optimization Investment



1. Payments by ratepayers via EO surcharge on their utility bills. In some cases, utilities choose to turn the surcharge revenues directly over to a third-party program administrator who operates the EO programs for them. The largest utilities run their own programs.
2. Program Operations include all aspects of program delivery except cash incentives (rebates).
3. Program Operations generate program participation and thus drive the economic benefits of the EO programs.
4. Program Operations spending increases wages and other economic activity for ratepayers.
5. The incremental cost of energy efficient equipment, above the cost of baseline equipment, paid by participants purchasing and installing the efficient equipment due to the EO programs. The EO Programs provide cash incentives (rebates) to offset participants' incremental costs.
6. The energy efficient equipment reduces end-user energy consumption, resulting in lower utility bills for program participants. Increased consumer and business spending results in economic impacts that benefit all ratepayers.

PROGRAM AND PARTICIPANT SPENDING

The EO programs require resources to operate, and these expenditures also induce economic activity for industries and services that operate in Michigan. Firstly, the program requires technicians, administrators, and other professionals to operate. Secondly, participants in the program often purchase efficient equipment for installation in their homes or businesses. These purchases include more efficient appliances,

lighting, furnaces, insulation, air compressors, etc., some of which must be installed by professional contractors.

Table 3 below shows the estimated, combined (i.e., utility plus participant) one-year spending of $233.5 million on program operation, equipment, and installation. The program operations and delivery cost (including technical assistance, marketing, and implementation costs) is estimated to be $58.8 million. The investments in equipment and installation are estimated to total $174.8 million, of which some is covered by financial incentives (estimated at $71.9 million) to purchase efficient equipment; participants then pay the remainder of the costs of investment "out-of pocket" (estimated at $102.9 million).

Table 3: Program and Participant Costs (2010$)

Spending Category	$Million
Total Equipment and Installation	$174.8
Participant out-of-pocket costs	*$102.9*
Incentives	*$71.9*
Program Delivery/Operations	$58.8
Total Program and Participant Spending	**$233.5**

This activity creates an initial stimulus in the local economy for the first year of the program's operation, followed by up to 20 years of annual energy savings. Moreover, this initial stimulus is felt by several industries, namely those associated with energy efficient equipment, building shell improvements and their installation. The magnitude of the impact felt by each industry depends on the total incremental cost associated with a given industry's corresponding equipment/services, and the amount purchased.

The process of matching equipment with industries was based largely on the experience of the authors with the activities and equipment purchases typical of efficiency programs. In general, the allocation correlates with the distribution of savings by end-use found in typical energy optimization portfolios (e.g., Air Conditioning, Refrigeration, and Air Heating Equipment Manufacturing represent the HVAC and refrigeration end-uses typically account for roughly one quarter of program incentive costs). The labor costs associated with installing measures is allocated to various construction industries. Table 4 below shows the general mapping of equipment and labor categories to IMPLAN industries.

Table 4: Mapping of Equipment and Labor Investments to IMPLAN Industries

IMPLAN Industry	% of Measure Cost
Architectural, engineering, and related services	5%
Maintenance and repair construction of residential structures	2%
Maintenance and repair construction of nonresidential structures	2%
Air conditioning, refrigeration, and warm air heating equipment manufacturing	25%
Retail Stores - Electronics and appliances	2%
Electric lamp bulb and part manufacturing	26%
Lighting fixture manufacturing	10%
Small electrical appliance manufacturing	3%
All other miscellaneous electrical equipment and component manufacturing	2%
Construction of new nonresidential commercial and health care structures	5%
Construction of new nonresidential manufacturing structures	5%
Construction of other new nonresidential structures	5%
Construction of new residential permanent site single- and multi-family structures	5%
Construction of other new residential structures	3%
Total	**100%**

In the IMPLAN model, the industries selected above will receive a portion of the measure costs (incentives + participant contributions), which will then be redistributed among other supporting industries according to the model's imbedded algorithms. In this way, the Michigan economy receives the benefits of the multiplier effects from businesses re-spending the money from efficiency investments. While the exact allocation of efficiency investments to Michigan's industries is unknown, it is important to note that the overall impact on Michigan's economy is more sensitive to the volume of money than to the specific industries receiving that money.

ECONOMIC BENEFITS OF ENERGY SAVINGS

Participants in the EO programs save by forgoing the purchase of energy and related expenses that they would have without the programs. Over the course of 20 years, residents and businesses participating in the EO programs are estimated to save over $1.09 billion in energy-related spending. The savings directly related to the EO investments are those reported by the Michigan program administrators, primarily the electric and natural gas utilities. The reported energy savings are verified by third-party program evaluation specialists and are, in general, subject to review in administrative hearings before the Michigan Public Service Commission.

Though beyond the scope of this report, all ratepayers are also subject to the responses of prices due the decreases in energy demand. In this case, ratepayers experience an initial cost due to utilities increasing rates to recover fixed costs. However, this initial impact is counteracted by the increased cumulative savings over time, and from price effects due to reduced demand. Other studies have found these effects to result in lower rates for all ratepayers.[20]

COSTS TO PARTICIPANTS AND RATEPAYERS

All ratepayers are subject to a charge that funds the EO programs. For the purposes of this analysis, this charge was assumed to equal total program expenditures - $130.6 million (2010$). This funding mechanism covers the cost to deliver the EO programs, the largest single component of which is the $71.9 million in financial incentives.

[20] For example, see the discussion of these benefits in *The Economic Impacts of Energy Efficiency Investments in Vermont* (2011), available at: http://www.vtenergyplan.vermont.gov/sites/cep/files/Vol%202%20Public%20Review%20Draft%202011%20CEP%20appendixes%20inc%20VLS.pdf

CONCLUSIONS

Michigan's Energy Optimization programs have significant, positive impacts on the State's economy. Energy savings from the EO programs reduce the need to import fossil fuels for electric generation and natural gas distribution, and result in increased, in-state economic activity. Based on this analysis of the 2010 EO programs, key positive impacts over the 20-year study period are estimated as follows:

- For each million dollars spent on EO programs, 101 job-years are created. This yields a life-time total of 13,131 from EO programming for 2010 alone.
- For each dollar spent on EO programs, there is a net increase of:
  - over seven dollars of cumulative Gross State Product (GSP),
  - over four dollars of income from wages and due to energy savings, and
  - about 14 dollars of business output.

According to the provisions of 2008 PA 295, energy savings targets will increase for Michigan's electric and natural gas utilities in 2011 and 2012. As spending on the EO programs increases, comparable economic impacts are likewise expected to increase in magnitude. Experience in other jurisdictions shows that a continued investment in Energy Optimization can sustain employment and contribute to growth in the State's economy.

APPENDIX A: Summary of Data Sources and Assumptions

This appendix catalogues the data sources and assumptions used for this study that are not described in the body of the report.

Inflation Rate: 1.69% - three year (2007-2010) running average inflation from the Bureau of Labor Statistics Consumer Price Index.

Blended Average Retail Electric Rate: $0.097 - calculated from the Energy Information Administration's (EIA) Form 861 for 2009. The blended rate was calculated as the total revenues across all sectors divided by the total sales across all sectors for the top two utilities – Consumers Energy Co., and Detroit Edison Co. Source data are available online at: http://www.eia.gov/Ftproot/pub/electricity/f86109.exe

Blended Average Retail Natural Gas Rate: $10.42 - calculated as a weighted average from the EIA records of average retail prices delivered to residential, commercial and industrial customers, over the course of a year (August 2010 to July 2011). Source data are available online at:
http://www.eia.gov/dnav/ng/xls/NG_SUM_LSUM_DCU_SMI_M.xls

Average Measure Lives: 10 years for electric programs and 15 years for gas programs – estimated based on the typical experience of efficiency programs elsewhere.

Total Surcharge: assumed to be equal to total program expenditures for 2010.

Total Incented Spending: Incented spending was estimated from the reported benefit-to-cost ratios of the Utility Cost Test and the Total Resource Cost, and from total program spending, based on reported values from Efficiency United, MECA (EO), Detroit Edison, Michigan Consolidated Gas, Consumers Energy, and Lansing Board of Water & Light, which were extracted from annual reports, annual plans, testimony, and contracts. Where exact spending values were not provided by the supporting documents, they were estimated based on related values that were provided. Incented spending was thus estimated to be 55% of total program spending, which is in line with efficiency programs elsewhere.

Total Participant Costs: calculated from the total program spending, Utility Cost Test, and Total Resource Cost Test (TRC) ratios reported by Michigan program administrators for the year 2010. This calculation assumes the program administrators were not including non-energy benefits in their calculation of the TRC.