

# State of Wisconsin Department of Administration Division of Energy

Focus on Energy Statewide Evaluation

Economic Development Benefits:  
Interim Economic Impacts Report

Final: March 31, 2003

Evaluation Contractor: PA Government Services Inc.

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## **EXECUTIVE SUMMARY**

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### **OBJECTIVE OF THIS REPORT**

One of the goals of Wisconsin's Focus on Energy (Focus) programs is to support economic development. In general, economic development is a process of enhancing the state's economy by supporting the growth, retention, and attraction of business activity in the state. By strengthening and diversifying the state's economic base, Wisconsin residents can enjoy better job opportunities, higher incomes, and higher living standards. Economic prosperity can also increase revenue for state and local government. In an era of global economic change and uncertainty, it is particularly important to see that programs such as Focus are indeed addressing these economic development goals.

This report examines economic development impacts of Focus on Energy programs as one part of a multi-faceted suite of program evaluation reports. It describes the nature and magnitude of economic development impacts by tracing program effects on income and spending in the state, and by calculating the larger long-term effects on the net growth of business and generation of jobs in the Wisconsin economy. These results are measured by four alternative views: business sales, value added to the Gross Regional Product, jobs, and income. The report examines the size of these impacts, their timing, and their characteristics.

It is important to note that economic development impact is one of many program impacts. Other program impacts include reductions in energy use, consumer non-energy benefits, environmental benefits, and cost effectiveness. There is some inter-relationship among these various types of program impacts, though they are measured differently and are associated with different policy objectives. Other impacts are examined in other reports in this series.

### **WHAT ARE THE FOCUS ON ENERGY PROGRAMS?**

In April 2001, Focus on Energy began offering a variety of energy-efficiency programs across the state to business and residential customers. These programs are intended to produce short-term and long-term benefits for Wisconsin residents. In the short term, Focus programs are designed to result in the participating customers gaining the benefits of purchasing more energy-efficient equipment: reduced energy usage, reduced energy bills, and more income to spend on other needs. Installing more energy-efficient equipment of all kinds, from light bulbs to refrigerators to industrial motors, will also reduce the demand for electricity generated in the state during the peak hours of the day and add to the system's reliability (while also helping to avoid price spikes that have plagued Midwest utilities in recent years). The Low-income Programs historically delivered by the State of Wisconsin are also now associated with the Public Benefits-funded Focus programs. Low-income Program economic impacts will be presented in a forthcoming report.

Focus also has the long-term policy objective of transforming Wisconsin's energy efficiency and renewable energy markets over time, so that all Wisconsin energy consumers will eventually realize benefits from a marketplace where the basic level of energy efficiency in all kinds of energy-using devices is greater than it was previously. Given these broad policy objectives associated with Focus programs, there are many types of benefits to be assessed. This report focuses solely on one of them—specifically impacts on the Wisconsin economy.

## HOW DOES FOCUS AFFECT THE ECONOMY?

Focus directly affects participating business and residential customers' energy costs. Decreasing energy costs through increased efficiency and conservation can make business operations more profitable and can also leave more money in families' pockets (to spend on other desired purchases.) By lowering costs of doing business, it also makes Wisconsin a more competitive location for additional business attraction, investment and expansion.

Focus also creates other direct and indirect impacts throughout Wisconsin's economy. Wisconsin businesses are major manufacturers of heating and air conditioning equipment, motors, and controls. Focus stimulates sales for these industries in Wisconsin, as well as the development of solar, wind and biomass energy production within the state. At the same time as it is increasing the flow of dollars staying within Wisconsin, it is also reducing the outflow of money from the state associated with importation of coal and natural gas. Each of these effects produces jobs, increases personal income, and overall makes the Wisconsin economy more efficient and competitive.

There are also cost effects. When customers make energy-efficiency purchases that they might not have made, they are also spending some of their own money, because Focus pays only part of the extra cost of buying energy-efficient equipment. The Public Benefits charge that funds Focus is a cost to customers, although not a new one, since customers have paid the cost of demand-side management programs through utility rates for a number of years.

In general, Focus leads to a wide set of shifts in spending by government, households and businesses. The result is that some sectors of the economy gain sales while others do not. For instance, reductions in the growth of demand for traditional energy sources can mean less growth (or actual reductions) in business activity and jobs associated with construction and operation of coal-fired power plants, and retail sales from those plants. On the other hand, this is offset by increased business sales and jobs associated with energy-efficient products and services made in Wisconsin. The report covers all aspects of changes in the economy, and describes the types of jobs and industries where there are changes in business sales, value added, employment and income attributable to Focus on Energy.

## HOW DO WE ANALYZE IMPACTS ON WISCONSIN'S ECONOMY?

There are three steps in the process of analyzing economic development impacts of the Focus on Energy programs:

(1) Document Direct Effects. The first step is to track the net direct effects of the program. These are changes in program-related spending by Focus and program participants, household and business savings in energy costs, and spending on new equipment. Here, careful attention is given to establishing net changes *compared to what would otherwise be expected to occur without the program.*

(2) Apply the Economic Model. The second step is to apply the REMI economic model of Wisconsin. This is a tool used to trace how the direct effects (from step 1) lead to changes in household and business costs, spending and sales patterns in the state. In our analysis, we apply the Wisconsin statewide REMI model to track impacts including:

- Lower business operating costs

- Lower household living costs
- Reduced outflow of dollars to purchase out-of-state coal and natural gas
- Increase in dollars going to equipment manufacturers and installers in Wisconsin
- Emissions Benefits (monetized)
- Non-Energy Benefits (monetized)
- Indirect effects on orders for business suppliers and induced effects of workers respending their income within Wisconsin.

Results of the REMI model represent changes in the state economy over time. The key indicators of change in the state's economy are changes in business sales, jobs, personal income, and value added (Gross Regional Product) in Wisconsin.

(3) Analyze of Policy Implications. The third and final step in the analysis process is to apply results of the economic model (from step 2) to assess how the forecast program impacts translate into economic development changes. These include:

- Diversified business growth
- Expanded mix of those jobs available to Wisconsin residents
- Shifts in the nature and size of impacts occurring over time
- Shifts in the competitiveness of Wisconsin as a place to live and to locate a business
- Changes in the incidence of economic impacts, in terms of urban and rural locations.

This general approach for conducting economic impact analysis, using a regional economic model, has been proven in use around the country including studies of the economic impacts of energy programs and policies in over 20 states.

## **SUMMARY OF ECONOMIC ANALYSIS RESULTS**

The REMI economic model generated estimates of the current and projected future economic impacts of Focus on Energy. Since a key feature of Focus programs is energy cost savings for households and businesses, and since those savings continue over the lifetime of installed equipment, it is necessary to measure economic impacts over a period of time. Since Focus programs are also projected to expand in the second and third years and continue at that higher level in subsequent years, it is also necessary to measure economic impacts assuming continuation of the programs over a period of time. This analysis examined Focus programs assuming a 10-year span. However, some economic impacts will continue for an additional 15 years beyond any active program period.

Table ES-1 summarizes the economic analysis results for all Focus programs combined—including Residential, Renewables<sup>1</sup>, and Business Programs. The table shows the projected economic impacts for selected years and periods. It also shows how program impacts accumulate over time within an assumed 10-year period of program operation. These economic impacts are presented in terms of (1) the number of job years created for Wisconsin residents, (2) the sales generated for Wisconsin businesses, (3) the value added portion of those sales, and (4) disposable income generated for Wisconsin residents.

The table also summarizes impacts with and without expected “market effects” for each program group—increases in households and businesses purchasing energy efficient products and adopting energy efficient practices without formal program participation. Market effects reflect the behavior of customers, retailers, wholesalers and manufacturers who are influenced by Focus programs to take additional actions on their own to increase the supply and use of energy-efficient equipment *that they would not have done without the existence of the program*. Since Focus programs specifically incorporate information dissemination, training and market intervention elements which are intended to encourage such market effects, it is reasonable to expect that such effects would occur, although they are off in the future. These effects, estimated through surveys of customer and market actors, produce measurable effects over time and increase program impacts.

Altogether, the analysis found that Focus leads to significant economic development benefits for Wisconsin’s economy. Even without counting market effects, the first year of program operation causes a variety of household and business cost savings and spending changes that altogether support over 582 jobs in the state, and that impact grows to 1,667 jobs by the fifth year of program operation. The disposable income generated in Wisconsin from program-generated savings and this additional business activity represents \$11 million in the first year, and grows to \$127 million by the fifth year of program operation. The market effects also grow over time, adding essentially no impact in the first year, adding roughly 4.75 – 6.5% to income and jobs by in the fifth year, and roughly 16% by the tenth year of program operation.

These economic development impacts are significantly larger than early estimates made in the 2001 Pilot Study, primarily because they incorporate a more complete representation of program operations and impacts than was shown in prior preliminary studies of economic development impacts. In particular, they assume a program that grows in size over the first three years, so that the level of program budget, participation, and benefits is roughly double the level of the first year effects.

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<sup>1</sup> Excluding the photovoltaic component.

**Table ES-1.  
Economic Development Impacts for All Focus on Energy Programs**

Year	First Year	Fifth Year	Tenth Year	Sum of 10 years
<b>Impact Without Market Effects</b>				
Job Years	582	1,667	2,401	17,243
Sales generated <i>(In Millions)</i>	\$43	\$125	\$190	\$1,322
GRP (Value Added)* <i>(In Millions)</i>	\$24	\$78	\$123	\$824
Disposable income generated** <i>(In Millions)</i>	\$11	\$63	\$127	\$613
<b>Impact With Market Effects</b>				
Job Years	630	1,774	2,778	18,956
Sales generated <i>(In Millions)</i>	\$46	\$135	\$224	\$1,483
GRP (Value Added)* <i>(In Millions)</i>	\$26	\$85	\$146	\$934
Disposable income generated** <i>(In Millions)</i>	\$11	\$66	\$149	\$779

NOTE: All dollar amounts are in millions of year 2001 constant dollars.

\* GRP = Gross Regional Product, reflecting both net personal incomes to households and net income to businesses.

\*\* Disposable Income reflects both earned income and household savings in energy costs resulting from program participation.

## WHO BENEFITS?

To assess the diversity of economic development benefits, the REMI economic model was applied to show the breakdown of economic growth impacts by industry sector and occupation category. The comparison of job impacts by industry shows that Focus programs provide widespread benefits among all sectors of the economy. While many of the program participants are manufacturing and commercial businesses, many of the spillover economic benefits accrue to wholesalers, retailers and service providers that provide goods and services to participating businesses, or that benefit from the re-spending of additional household income within the state. A breakdown of job impacts by occupation shows that the types of additional jobs created or supported by Focus programs span a wide range of skill levels among both blue-collar and white-collar categories.

## FUTURE DIRECTIONS

The results shown here provide a starting point for further policy analysis. The distribution of these economic impacts can be compared to a various indicators of Wisconsin statewide economic patterns and trends, in order to better understand the value of Focus as an impetus to economic diversification. The magnitude of these economic impacts can also be compared to those associated with a variety of energy and public benefit programs in other states. The nature of these economic impacts can also be compared with those associated with other types of public programs and policies in Wisconsin.

Our preliminary efforts to compare this report with other impact studies has shown that great care must be taken to ensure comparability and appropriateness in the selection of

comparisons. For instance, some public programs and policies are designed specifically to address economic development, while others (such as Focus) recognize economic development as just one of a series of goals, and yet others are designed to address social welfare and equity goals that are important but do not necessarily grow the state's economy. Similarly, care must also be taken to distinguish economic development benefits from traditional measures of benefits in benefit-cost studies. In particular, it must be recognized that some social and environmental benefits can be expressed in dollar terms (based on "willingness to pay" studies) but do not necessarily affect the flow of dollars and hence the incomes of households or businesses in the state. Such impacts are recognized in benefit-cost studies, but are not economic development impacts. The results of this study should thus be viewed as a stepping-stone towards future policy analysis.

## **1. INTRODUCTION**

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This chapter discusses: (1) goals of this report, (2) types of programs covered, (3) ways in which economic development impacts occur, (4) how economic development impacts differ from other types of impacts, (5) steps in the analysis process, and (6) why some programs are designed to provide greater economic development impacts than others.

### **1.1 PURPOSE OF THIS REPORT**

This report describes the nature and magnitude of economic development impacts of the program—tracing changes in the flow of income and spending caused by the program, and showing how the program causes both direct and indirect effects on the flow of money in the Wisconsin economy as well as effects on the state's economic competitiveness for business attraction. The primary objective of economic development is to increase job opportunities and income levels, as part of a broader effort to improve the lives of Wisconsin residents by expanding and diversifying the state's economic base. These economic development impacts are of policy interest because economic development was one of the explicit goals of the Focus program. In this report, we measure economic development impacts through four alternative views: business sales, Gross Regional Product, jobs, and personal income. The report examines the size of these impacts, their timing, and their characteristics.

### **1.2 PROGRAM BACKGROUND**

Wisconsin Focus on Energy was initiated in April 2001 as a set of “Public Benefits” energy programs, designed to encourage residential and businesses customers, and local governments, to take advantage of available energy technologies and make more economically efficient (and environmentally-responsible) energy decisions. They are also designed to promote lasting changes in energy and equipment market supply/demand patterns by (a) reducing existing barriers to adoption of economically efficient (and environmentally-responsible) energy products and services, and (b) encouraging the development of new market structures and entities to support those efforts. Focus is intended to produce both short-term and long-term economic benefits for Wisconsin residents. In the short term, it should result in the participating customers gaining the benefits of purchasing more energy-efficient equipment: reduced energy usage, reduced energy bills, and more income to spend on other needs. Installing more energy-efficient equipment of all kinds, from light bulbs to refrigerators to industrial motors, also reduces the demand for electricity generated in the state during the peak hours of the day and thus adds to the system's reliability (while also helping to avoid price spikes that have plagued Midwest utilities in recent years). In the long term, Focus is designed to help transform Wisconsin's energy efficiency and renewable energy markets, so that all Wisconsin energy consumers will eventually realize benefits from a marketplace where the basic level of energy efficiency in all kinds of energy-using devices is greater than would otherwise be the case.

Focus on Energy was set up with six formal policy objectives:

1. Near-term resource acquisition (increased energy efficiency; decreased energy use)
2. Environmental benefits
3. Economic development

4. Market Transformation (overcome market barriers to increased energy efficiency)
5. System reliability (electricity generation, transmission and distribution in the state)
6. Stimulate the energy efficiency services industry.

Given these policy objectives, there are clearly many types of program benefits that need to be assessed: improvements in energy efficiency and total energy consumption; improved air quality resulting from decreased electricity generation; improved health and quality of life; and, improvements in Wisconsin's economy from the activities generated by the program. Each of these areas is being addressed as part of the overall evaluation of Focus on Energy. This report focuses solely on economic development impacts.

### 1.3 TYPES OF ECONOMIC DEVELOPMENT IMPACTS

Focus directly affects Wisconsin's economy, and thus the income and jobs of Wisconsin residents, in four primary ways:

(1) Enhanced Business Competitiveness. Decreasing energy costs through increased efficiency and conservation can make business operations more profitable and can also leave more money in families' pockets (to spend on other desired purchases.) By lowering costs of doing business, it also makes Wisconsin a more competitive location for additional business attraction, investment and expansion.

(2) Improved Cost of Living. Decreasing residential electric and gas customers' energy costs, through increased efficiency and conservation, can also make leave more money in families' pockets (to spend on other desired purchases.) Lowering the cost of living means that Wisconsin offers higher potential 'real' income'. This is not only attractive to the state's current residents but makes Wisconsin a more attractive place to live and work to people who offer skills the state economy needs to grow and expand.

(3) "Import Substitution." Focus also encourages more spending dollars to stay within Wisconsin. Wisconsin businesses are major manufacturers of heating and air conditioning equipment, motors, and controls. Focus stimulates sales for these industries in Wisconsin, as well as the development of solar, wind and biomass energy production within the state. At the same time as it is increasing the flow of dollars staying within Wisconsin, it is also reducing the outflow of money from the state associated with importation of coal and natural gas. Each of these effects produces jobs, increases personal income, and overall makes the Wisconsin economy more efficient and competitive.

(4) Spin-off Spending Changes. There are also various indirect and induced impacts that cause both positive and negative changes in spending. Suppliers to the directly affected businesses can realize increased orders for their products and services. Additional jobs and their associated worker income can mean more respending of that income on consumer purchases. On the other hand, reductions in the growth of demand for traditional energy sources can mean less growth (or actual reductions) in business sales and jobs associated with construction and operation of coal-fired power plants, and retail sales from those plants.

The report covers all aspects of changes in the economy, and describes the types of jobs and industries where jobs are gained as well as lost due to the Focus on Energy program. We refer to the sum of all of the above-cited effects as “economic development” impacts because they reflect changes in the growth and development of the State’s economy (i.e., the flow of money into, out-of and within the state, affecting jobs and income for Wisconsin residents).

#### 1.4 DISTINGUISHING ECONOMIC DEVELOPMENT FROM OTHER IMPACTS

Some aspects of energy, environmental and other non-energy impacts can cause changes in the flow of dollars as measured in this report. However, there are other aspects of those impacts that are *not* reflected in the analysis of economic development impacts in this report. They include some aspects of safety, security, reliability, health and other aspects of quality of life—which either lack estimates of how they affect the economy, or have policy importance beyond their mere effect on the flow of dollars.

It is also important to distinguish the analysis of economic development impacts from a traditional benefit-cost analysis. A benefit-cost study can include any type of benefits that can be put into dollar terms (based on either actual flows of money or willingness-to-pay studies), whereas economic development analysis considers only effects on the actual flow of dollars. On the other hand, a traditional benefit-cost study does not encompass impacts on economic competitiveness, on economic diversification, or on shifts in activity between this state and other states. An economic development impact analysis can consider all of these other types of impacts. Finally, a benefit-cost study considers program spending as a cost that is subtracted from program benefits, while an economic development impact analysis traces how program spending can also be a source of additional business growth.

#### 1.5 STEPS IN THE ANALYSIS PROCESS

There are three steps in the process of analyzing the economic development impacts of the Focus on Energy program. These steps are briefly summarized below, while a more detailed explanation of this methodology is provided in Appendix A.

(1) Document Direct Effects. The first step is to track the net *direct effects* of the program. These are net changes in:

- *Program operations spending* – in this case “public benefit” dollars are spent in operating the program and paying incentives to business and household participants;
- *Household and business savings* – these are dollar savings to businesses and households (resulting from reductions in energy and electric demand), realized because of the existence of the program;
- *Household and Business cost* – these are the additional household and business expenditures associated with the incremental cost of purchasing energy-efficient equipment (generally the total cost of new equipment minus incentives paid by the program, and net of what would otherwise have been spent anyway);
- *Other spending shifts* – shifts in patterns of spending and business sales among sectors of the state economy—affecting the flow of dollars into, out-of, and within the state.

We rely on other program evaluation reports to obtain the basic information for these four types of direct economic impacts. A key element of this process is careful attention to establishing the net change in government, household, and business behavior compared to what would otherwise be expected to occur without the program. In addition, attention is given to estimating the lifetime and persistence of energy savings for program participants, and longer-term market effects on households and businesses that are not formally participants but which are also affected by the program. In general, the representation of program cost, participation and energy impacts in this report builds upon program evaluation studies that are described in more detail in other reports.

(2) Apply the Economic Model. The second step is to apply the REMI economic model of the state of Wisconsin. The model is a tool used to trace how the direct effects lead to changes in household and business costs, spending and sales patterns throughout the state's economy. As illustrated in Figure 1-1 (on the next page), we apply the inputs from step 1 to the REMI economic model to track a series of shifts in the state economy, including:

- Lower Business Operating Costs (increased competitiveness for business attraction)
- Lower Household Living Costs (increased attraction as a place to live)
- Import-Substitution (Wisconsin-made products substitute for purchases of out-of-state equipment and fuels)
- Increased orders for firms supplying goods and services to equipment manufacturers and installers in Wisconsin (indirect effect)
- Re-spending of additional worker income within Wisconsin (induced effect).

The results of the REMI model represent changes in the economy of the state, on a year-by-year basis. The key indicators of change in the state's economy are:

- Total Volume of Business Sales – by type of business
- Total Number of Jobs associated with the change in business sales – by type of business and occupation category
- Total Disposable Income associated with the program-generated savings experienced by households and the change in the number jobs due to added business sales – by type of business
- Total Gross Regional Product – the change in “value added” that is generated in Wisconsin, which is essentially the sum of personal income and corporate income (profit).

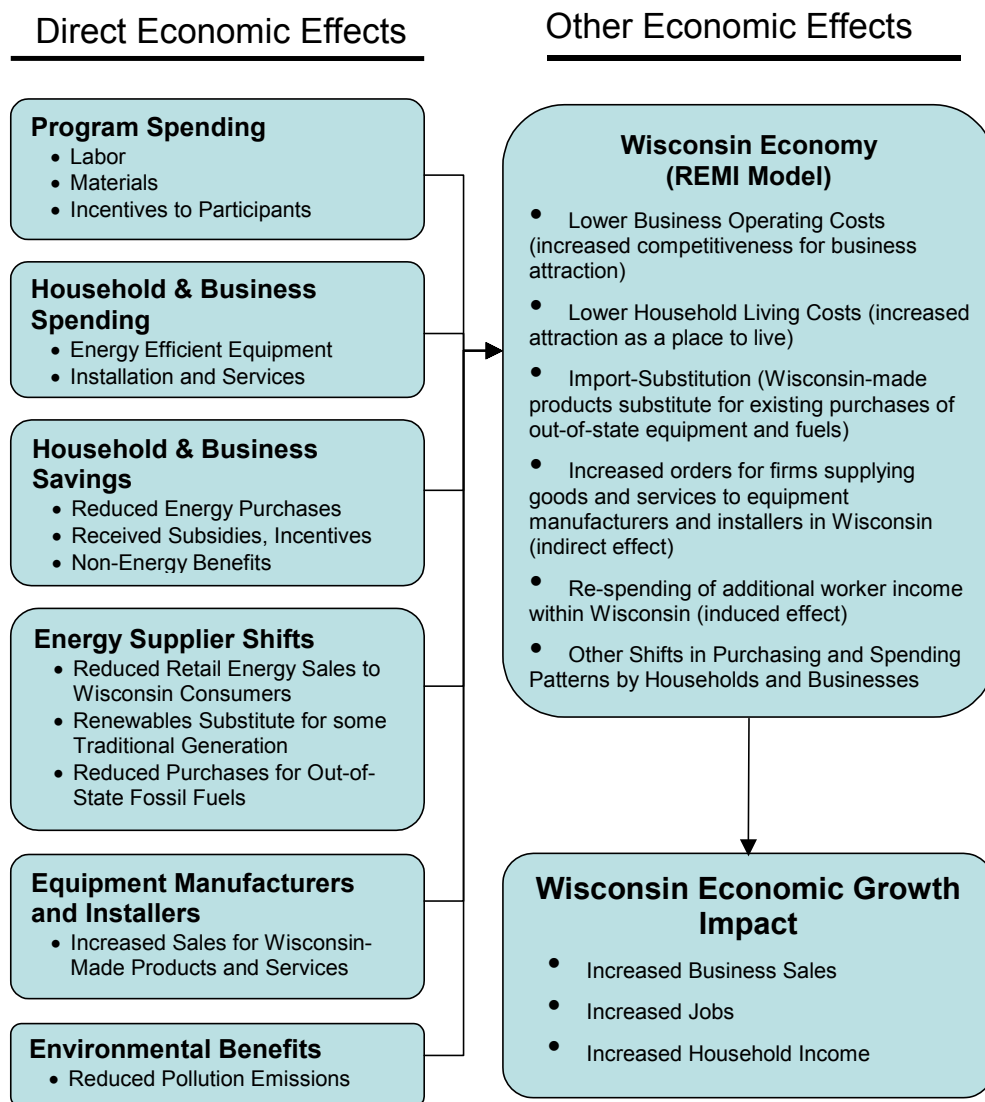
(3) Analyze Economic Development Implications. The third and final step in the analysis process is to apply results of the economic model (step 2) to assess how the forecast program impacts translate into economic development changes. These include:

- Changes in the growth and mix of jobs for Wisconsin residents, in terms of industries and occupations. These can lead to increased diversification of the

economy, increased opportunities for job skills and higher income levels for Wisconsin workers.

- Changes in the incidence of economic impacts, in terms of urban and rural locations.
- Shifts in the nature and size of impacts occurring over time.
- Shifts in the economic competitiveness and attractiveness of Wisconsin as a place to live and to locate a business.

**Figure 1-1.**  
**Key Elements of Economic Development Impact**



Appendix A provides a more in-depth discussion of economic models and our application of the REMI model for this study.

## 1.6 ROLES OF DIFFERENT PROGRAM ELEMENTS

It is important to recognize that Focus on Energy actually encompasses three types of programs, each of which has very different forms of economic impacts.

- The core Business Program and Residential Program are both designed to achieve energy efficiency through the purchase of more energy efficient equipment. As such, they encourage households and businesses to spend money on purchases of such equipment in cases where the households and businesses will subsequently receive even greater cost-savings benefits of reduced energy use over time.

In addition, Focus includes two public purpose programs that are designed to provide benefits other than energy cost savings.

- The Focus on Energy Renewable Energy Program is intended to stimulate the production of electricity in Wisconsin using non-fossil fuel sources. The Renewables Program does *not* reduce energy used but instead substitutes new forms of in-state electricity generation. The in-state generation can reduce the outflow of money from the state that is now going for imports of traditional fuels (e.g., coal and natural gas), and potentially increase electric system reliability. Some forms of renewable generation also add a benefit of decreased emissions. Biomass generation does produce emissions but has the added benefit of using in-state resources (farm waste, waste water products) that would otherwise produce no economic benefits to Wisconsin.

Structured as it is, the Renewables Program does not produce strong economic impacts within the framework of this economic analysis. It is noteworthy, however that other states operate such programs through public benefit funds and on the wholesale level, most states that have restructured their electric utility industries have specified that utilities include increasing percentages of electricity generated with renewable resources in their electric portfolios.

- The Low-income Weatherization Assistance Program (addressed in a separate report) transfers spending from the Public Benefits fund to low-income households by paying contractors to improve the energy efficiency of low-income households. Contractors install insulation, weather stripping, and other improvements that increase the homes' efficiency. They also install efficient lighting and in some cases provide energy efficient appliances. Low-income Program participants therefore realize energy savings while not spending any of their own resources. Through these subsidies, the Low-income Weatherization Assistance Program produces important benefits to program participants, not the least of which is increased home affordability. The economic impacts of the Low-income Weatherization Assistance Program will be presented in a separate forthcoming report.

All of these elements of Focus on Energy have some effects on the economy, either by shifting purchasing patterns, saving energy or providing other non-energy benefits. Thus, we apply the same economic analysis framework (discussed next) for all elements of the program. However, we note that those program elements that are specifically designed to

save money naturally emerge with the greatest magnitude of economic benefits, while programs with broader aims than just cost are less likely to show overwhelming economic benefits because part of their justification is beyond the current measurement of impacts on the economy.

## 2. OVERALL FINDINGS

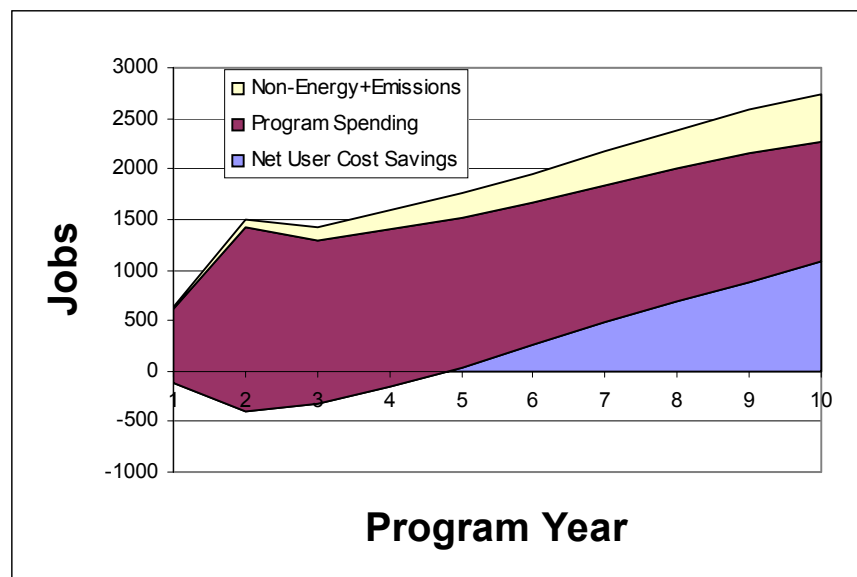
This chapter provides an overall summary of the economic development impacts, based on completion of the first year of Focus, and projections of program activity over subsequent years. It discusses: (1) how economic development impacts evolve over time, and (2) the types of industries and jobs benefiting from these economic development impacts. (A further breakout of impacts by type of program follows later in Chapter 3.)

### 2.1 EFFECTS OVER TIME

Through the analysis process that was previously described, the REMI economic model generated estimates of the current and projected future economic impacts of Focus on Energy. Since a key feature of Focus programs is energy cost savings for households and businesses, and since those savings continue over the lifetime of installed equipment, it is necessary to measure economic impacts over a period of time. Since Focus programs are also projected to expand in the second year (compared to the first year of operation) and continue at that higher level in subsequent years, it is also necessary to measure economic impacts assuming continuation of the programs over a period of time.

Figure 2-1 illustrates the economic analysis results for all Focus programs combined—including Residential, Renewable Generation, and Business Programs. It shows how overall program impacts increase as user cost savings benefits, non-energy and emission benefits, and non-program spending benefits all accumulate over time. On the other hand, the economic impact of government spending (on the program) alone leads to additional economic impacts that actually diminish over time. Further breakdowns of impacts by causal factor are provided in Appendix A.

**Figure 2-1.**  
**Employment Impact over Time, by Cause (All Focus on Energy Programs)\***



\* Excluding Low-income Programs; including market effects for all others.

Table 2-1 shows the projected economic impacts for selected years and periods, presented in terms of (1) the number of job years created for Wisconsin residents, (2) the sales generated for Wisconsin businesses, (3) the value added portion of those sales, and (4) disposable income generated for Wisconsin residents. The table also summarizes impacts with and without expected “market effects” for the Residential and Business Programs—increases in households and businesses purchasing energy efficient products and adopting energy efficient practices without formal program participation.

Market effects reflect the behavior of customers, retailers, wholesalers and manufacturers who are influenced by Focus programs to take additional actions on their own to increase the supply and use of energy-efficient equipment that they would not have done without the existence of the program. Since Focus programs specifically incorporate information dissemination, training and market intervention elements which are intended to encourage such market effects, it is reasonable to expect that such effects would occur, although they are off in the future. These effects, estimated through surveys of customer and market actors, produce measurable effects over time and increase the programs’ impacts.

**Table 2-1.**  
**Economic Development Impacts for All Focus on Energy Programs**

Year	First Year	Fifth Year	Tenth Year	Sum of 10 years
<b>Impact Without Market Effects</b>				
Job Years	582	1,667	2,401	17,243
Sales generated <i>(In Millions)</i>	\$43	\$125	\$190	\$1,322
GRP (Value Added)* <i>(In Millions)</i>	\$24	\$78	\$123	\$824
Disposable income generated** <i>(In Millions)</i>	\$11	\$63	\$127	\$613
<b>Impact With Market Effects</b>				
Job Years	630	1,774	2,778	18,956
Sales generated <i>(In Millions)</i>	\$46	\$135	\$224	\$1,483
GRP (Value Added)* <i>(In Millions)</i>	\$26	\$85	\$146	\$934
Disposable income generated** <i>(In Millions)</i>	\$11	\$66	\$149	\$779

NOTE: All dollar amounts are in millions of year 2001 constant dollars.

\*GRP = Gross Regional Product, reflecting both net personal incomes to households and net income to businesses.

\*\* Disposable Income reflects both earned income and household savings in energy costs resulting from program participation.

Altogether, the analysis found that Focus leads to significant economic development benefits for Wisconsin’s economy. Even without counting market effects, the first year of program operation causes a variety of household and business cost savings and spending changes that altogether support over 582 jobs in the state, and that impact grows to 1,667 jobs by the fifth year of program operation. The personal income generated in Wisconsin from this additional business activity represents \$11 million in the first year, and grows to over \$100 million by the fifth year of program operation. The market effects grow over time, adding essentially no impact in the first year, adding roughly 4.75 – 6.5% to income and jobs by in

the fifth year, and roughly 16% by the tenth year of program operation. Further breakdowns of economic development impacts by program category are shown in Chapter 3.

Finally, it should be noted that the results of this study, completed at the end of the first full year of Focus operation around the state, incorporate a much more complete representation of program operations and impacts than was shown in prior preliminary studies. They also differ from preliminary estimates in that they assume a program that grows in size over the first three years, so that the level of program budget, participation, and benefits is roughly double the level of the first year effects.

## 2.2 WHO BENEFITS?

Figure 2-2 shows a breakdown of overall job impacts by industry. It shows that Focus programs provide widespread benefits among all sectors of the economy. While many of the program participants are manufacturing and commercial businesses, many of the spillover economic benefits accrue to wholesalers, retailers and service providers that provide goods and services to participating businesses, or that benefit from the respending of additional household income within the state.

**Figure 2-2.**  
**Summary of Job Impacts by Industry**

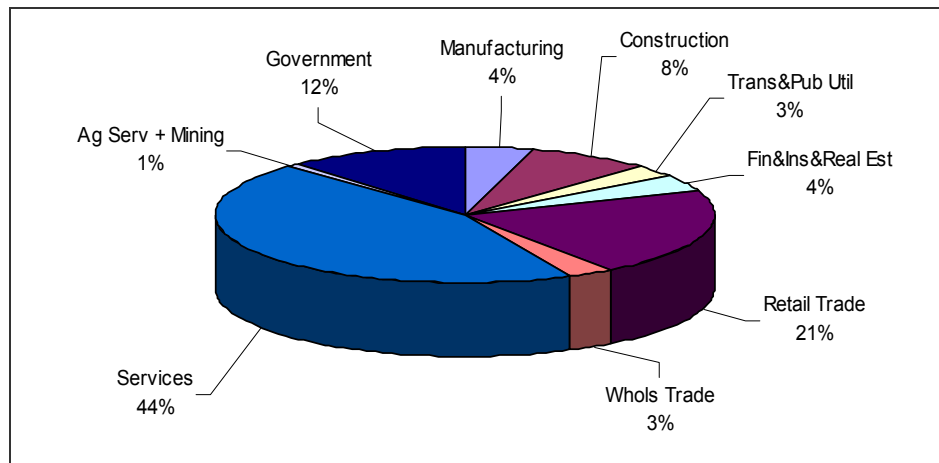
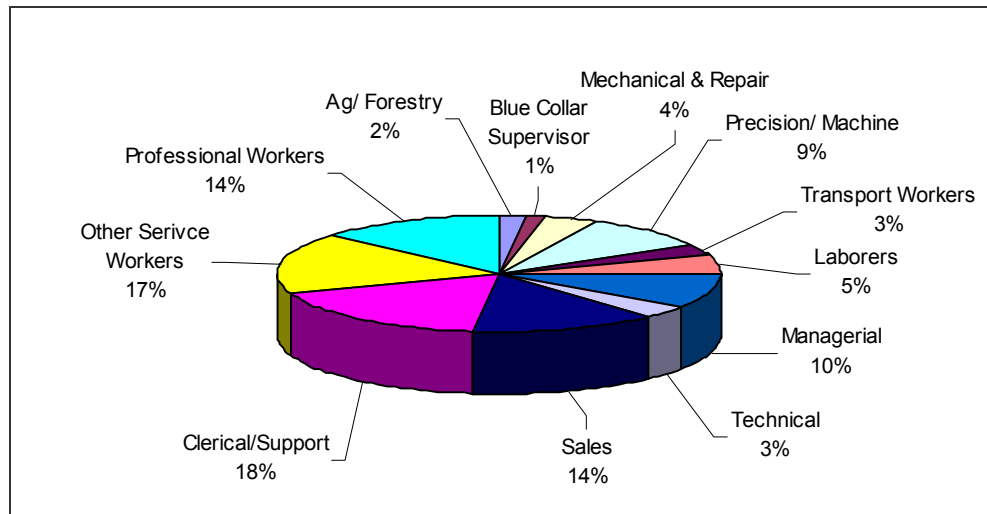


Figure 2-3 shows a breakdown of overall job impacts by occupation. It shows, most importantly, that the types of additional jobs created or supported by Focus programs span a wide range of skill levels among both blue-collar and white-collar categories.

**Figure 2-3.  
Summary of Job Impacts by Occupation**

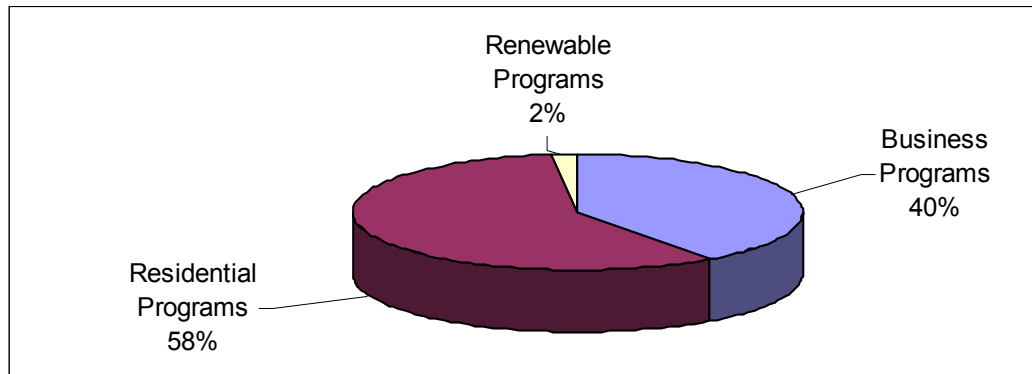


The results shown here provide a starting point for further policy analysis. The economic and geographic distribution of these economic impacts can be compared to a various indicators of Wisconsin statewide economic patterns and trends, in order to better understand the value of Focus as an impetus to economic diversification. The magnitude of these economic impacts can also be compared to those associated with a variety of energy and public benefit programs in other states. The nature of these economic impacts can also be compared with those associated with other types of public programs and policies in Wisconsin. Directions for future research and analysis of these related policy issues are discussed in a forthcoming paper on economic impact policy issues.

### 3. BREAKOUT OF IMPACTS BY PROGRAM CATEGORY

This chapter builds upon the overall summary (in Chapter 2) to provide a breakout of economic development impacts in terms of three program categories: (1) Business Programs, (2) Residential Programs, and (3) Renewable Energy Generation Program. Figure 3-1 summarizes the overall contribution of each program category to overall job creation impacts.

**Figure 3-1.**  
**Ten-year Job Creation Impacts: Breakout by Program Categories**



#### 3.1 BUSINESS PROGRAMS

The Milwaukee School of Engineering (MSOE) and a team of subcontractors offer ten programs covering industrial, commercial, agricultural, and government sectors. Table 3-1 summarizes Business Program spending and energy impacts, in terms of actual year-one results and projected results for the following two years. The analysis assumed continuation of the same level of program activity for years 3 to 10.

**Table 3-1.**  
**Business Programs: Spending and Energy Impacts**

	Year 1	Year 2	Year 3
\$ Budget	\$ 10,203,367	\$ 29,311,526	\$ 24,589,765
\$ Participant net cost after incentives	\$ 3,756,579	\$ 11,992,784	\$ 10,060,880
\$ Direct Savings	\$ 1,221,138	\$ 3,850,881	\$ 3,230,547
kWh Saved	15,756,425	52,606,341	44,132,044
Therms Saved	789,093	2,138,896	1,794,344

Table 3-2 summarizes the projected economic development impacts of the Business Programs over a 10-year period—both with and without expected market effects (i.e., additional impacts on non-participants).

**Table 3-2.**  
**Business Programs: Economic Impacts**

Year	First Year	Fifth Year	Tenth Year	Sum of 10 years
<b>Impact Without Market Effects</b>				
Job Years	303	717	809	7,207
Sales generated <i>(In Millions)</i>	\$24	\$51	\$63	\$536
GRP (Value Added)* <i>(In Millions)</i>	\$13	\$32	\$41	\$333
Disposable income generated** <i>(In Millions)</i>	\$6	\$21	\$31	\$216
<b>Impact With Market Effects</b>				
Job Years	304	731	887	7,480
Sales generated <i>(In Millions)</i>	\$25	\$54	\$73	\$582
GRP (Value Added)* <i>(In Millions)</i>	\$13	\$34	\$47	\$360
Disposable income generated** <i>(In Millions)</i>	\$6	\$21	\$35	\$226

NOTE: All dollar amounts are in millions of year 2001 constant dollars.

\* GRP = Gross Regional Product, reflecting both net personal incomes to households and net income to businesses.

\*\* Disposable Income reflects both earned income and household savings in energy costs resulting from program participation.

### 3.2 RESIDENTIAL PROGRAMS

In Year 1, six programs were targeted to the Residential sector and markets by Focus. The Residential Programs offered by Wisconsin Energy Conservation Corporation (WECC) and their subcontractors are quite diverse. Some are similar to programs that have been offered in Wisconsin for many years (e.g., the Targeted Home Performance with ENERGY STAR®; formerly Income Qualified Program) which mirrors Wisconsin's longstanding statewide Low-income Weatherization Assistance Program). Others are newer (e.g., Home Performance with ENERGY STAR for the retrofit market). Table 3-3 summarizes Residential Program spending and energy impacts, in terms of actual year-one results and projected results for the following two years. The analysis assumed continuation of the same level of program activity for years 3 to 10.

**Table 3-3.**  
**Residential Programs: Spending and Energy Impacts**

	Year 1	Year 2	Year 3
\$ Budget	\$11,001,524	\$2,490,775	\$26,900,000
\$ Participant net cost after incentives	\$2,625,172	\$9,995,836	\$14,526,707
\$ Direct Savings	\$1,980,806	\$10,250,691	\$18,464,484
kWh Saved	18,958,216	88,419,161	926,078,881
Therms Saved	668,925	1,857,245	2,021,487

Participants in Residential Programs have additional “non-energy benefits,” some of which represent real money. These range from increased sale value for ENERGY STAR homes standards to savings in lighting maintenance costs for fixtures with compact fluorescent bulbs.

Table 3-4 summarizes the projected economic development impacts of the Residential Programs over a 10-year period. This includes effects of both cost savings and non-energy benefits, and it is shown both with and without expected market effects (i.e., additional impacts on non-participants).

**Table 3-4.**  
**Residential Programs: Economic Impacts**

Year	First Year	Fifth Year	Tenth Year	Sum of 10 years
<b>Impact Without Market Effects (A)</b>				
Job Years	225	928	1,579	9,719
Sales generated <i>(In Millions)</i>	\$17	\$74	\$128	\$582
GRP (Value Added)* <i>(In Millions)</i>	\$9	\$45	\$82	\$480
Disposable income generated** <i>(In Millions)</i>	\$4	\$43	\$96	\$485
<b>Impact With Market Effects (A)</b>				
Job Years	217	997	1,867	10,818
Sales generated <i>(In Millions)</i>	\$17	\$82	\$155	\$891
GRP (Value Added)* <i>(In Millions)</i>	\$9	\$49	\$98	\$545
Disposable income generated** <i>(In Millions)</i>	\$3	\$46	\$115	\$553

NOTE: All dollar amounts are in millions of year 2001 constant dollars.

\* GRP = Gross Regional Product, reflecting both net personal incomes to households and net income to businesses.

\*\* Disposable Income reflects both earned income and household savings in energy costs resulting from program participation.

(A) All program impacts, including monetary non-energy benefits.

### 3.3 RENEWABLE ENERGY GENERATION PROGRAM

The Renewable Energy Generation Program seeks to encourage households, farms, and businesses to install electric generation that uses renewable fuels. The program has supported photovoltaic installations for homes and small businesses, wind-powered generators and biomass-fueled generators fueled by farm wastes and wastewater products. The program pays incentives based upon the number of kilowatt-hours expected to be produced and overall project size. The program does not decrease total electricity use but substitutes electricity produced by renewable fuels (at the participating home or business) for utility-generated electricity that is most likely produced by burning coal or natural gas. Table 3-5 summarizes Renewable Energy Generation spending and energy impacts, in terms of actual year-one results and projected results for the following two years. As with other Focus programs, the analysis assumed continuation of the same level of program activity for years 3 to 10.

**Table 3-5.**  
**Renewable Energy Generation\*: Spending and Energy Impacts**

	Year 1	Year 2	Year 3
\$ Budget	\$886,096	\$3,939,930	\$2,682,640
\$ Participant net cost after incentives	\$0	\$7,020,487	\$8,113,707
\$ Direct Savings	\$0	\$310,727	\$676,915
kWh Saved	\$0	3,693,828	8,003,632

\* Excludes the photovoltaic component.

Table 3-6 summarizes projected economic development impacts for the Renewable Energy Generation Program. It is important to note that the program does not save participants any money until after their up-front costs have been effectively paid back by reductions in their utility bills. Initial positive employment and income impacts occur from small increases in local spending associated with installation of renewable generation equipment, although much of the equipment is currently manufactured out-of-state. With projected program growth over time, the positive economic effect is offset by negative impacts associated with up-front costs for participants and by continuing losses of retail electricity sales and profits (reflected in value added) by utilities.

However, this result can be misleading for three reasons. First, the current economic analysis does not recognize a direct monetary value to businesses or households for environmental benefits or other benefits from distributed power generation. Second, the current analysis does not assume any growth of locally produced renewable generating equipment though the program is intended to help jump-start that industry. At this point in time, there are insufficient to estimate how renewable energy manufacturing industry might grow. Third, much of the cost savings to users does not occur until later years in the program (some of it after the tenth program year).

**Table 3-6.  
Renewable Energy Generation: Economic Impacts\*\*\***

<b>Year</b>	<b>First Year</b>	<b>Fifth Year</b>	<b>Tenth Year</b>	<b>Sum of 10 years</b>
<b>Impact Without Market Effects</b>				
Job Years	55	22	13	317
Sales generated <i>(In Millions)</i>	\$2	-\$1	-\$1	\$5
GRP (Value Added)* <i>(In Millions)</i>	\$2	\$0	\$0	\$11
Disposable income generated** <i>(In Millions)</i>	\$1	\$0	\$0	\$1
<b>Impact With Market Effects</b>				
Job Years	55	25	12	340
Sales generated <i>(In Millions)</i>	\$2	-\$1	-\$2	\$6
GRP (Value Added)* <i>(In Millions)</i>	\$2	\$1	\$1	\$18
Disposable income generated** <i>(In Millions)</i>	\$1	\$0	\$0	\$0

NOTE: All dollar amounts are in millions of year 2001 constant dollars.

\* GRP = Gross Regional Product, reflecting both net personal incomes to households and net income to businesses.

\*\* Disposable Income reflects both earned income and household savings in energy costs resulting from program participation.

\*\*\* Photovoltaics are excluded from this analysis.

The results of breaking out economic development impacts by program category serves to underscore a key point—that Focus on Energy actually encompasses a combination of programs, each of which has a unique combination of goals and capabilities for reducing current energy use, encouraging longer-term market changes, addressing social goals of low-income assistance and/or addressing broader societal goals of encouraging clean fuels and distributed energy generation. As a result, the short-term and long-term economic development impacts of each program follow a different pattern. However, economic development is only one of the objectives of Focus on Energy. Other reports in this series of evaluation studies examine program impacts from alternative perspectives.

## **4. CONCLUSIONS: NEXT STEPS**

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### **4.1 TOWARDS A MORE COMPLETE INTERPRETATION OF FINDINGS**

The findings of this report are based on actual measured impacts of the first completed year of Focus operation, and formal plans for the second and third years of operation (which are then extrapolated to continue for a decade). The report shows that all facets of Focus have impacts on the Wisconsin economy, and that overall the programs are on their way towards generating and supporting new jobs and expanded businesses across the state.

That being said, there is a remaining need to further carry these findings forward, and apply them to provide policy insight into the efficacy of Focus as a public benefit tool. There are three key steps in doing so. They are to: (1) establish the relative role of economic development benefits in a context of broader program goals, (2) define and apply measures for assessing the relative extent to which program benefits target the most critical economic development needs, and (3) identify and apply benchmarks for assessing program impacts, relative to those resulting from alternative forms of energy and non-energy programs.

Initial efforts to address these three steps are summarized below. This section should be viewed as initial steps towards progress in addressing broader policy issues, which will be continued in subsequent policy reports.

### **4.2 ROLE OF ECONOMIC DEVELOPMENT BENEFITS**

Focus on Energy was set up with a series of policy objectives, including near-term resource acquisition and long-term market transformation for energy efficiency, environmental benefits, economic development benefits, electric system reliability, and stimulating the energy efficiency services industry. To assess overall program efficacy, it is necessary to consider and assess achievement towards all of these objectives.

However, that does not mean that every program needs to be assessed equally in terms of achievement towards each of the policy goals. It is clear from this report that various programs within the Focus umbrella are differently oriented towards addressing specific goals, so it is possible to map programs to specific goals—including economic development goals. For instance, the analysis in this report showed that the Renewable Energy Generation Program is not designed to achieve immediate cost savings for its participants, and hence does not generate short-term growth of Wisconsin's economy. However, the program is designed to stimulate the long-term growth of an industry (installing alternative generation technologies) that can also ultimately have economic development implications.

On the other hand, the analysis of Residential Programs in this report showed that they are designed to promote immediate cost savings and hence increases in statewide disposable income, as well as to support longer-term market effects. By matching Focus programs to specific types of short-term and long-term economic development impacts, we can (in the future) better track the relative success of these programs in achieving those goals.

### **4.3 MEASURES OF ECONOMIC DEVELOPMENT TARGETS**

In general, economic development is a process of enhancing the state's economy by supporting the attraction, retention, growth, and diversification of business activity in the state.

However, the nature of economic development needs differs by industry, by type of worker skill, by urban/rural location and by area of the state. A key rule of economic developers is that their efforts should be targeted to those industries, types of workers, and areas where there is the greatest need to attract, retain, grow, and diversify economic activity.

It is also clear from this report that various Focus programs have different target audiences in terms of types of households and types of businesses (commercial, industrial, agricultural and local government). They also differ in technologies that they address (from construction to lighting equipment), which means that each supports a unique pattern of demand for manufactured products, construction services, and/or installation services. This also translates into a unique mix of occupations and pattern of benefiting industries.

Together, these two observations indicate the value of further tracking the distribution of economic impacts are comparing them to various indicators of economic need, as reflected in Wisconsin statewide economic patterns and trends. While Focus is not fundamentally designed or optimized as a purely economic development program, there can be value in placing our findings on its economic development impacts into the context of statewide economic need. This can be addressed in future policy studies.

#### 4.4 BENCHMARKS FOR ASSESSING PROGRAM IMPACTS

Economic impact studies are widely conducted around the state and country for energy-related policies and programs, as well as a wide range of other policies, programs, and activities. There is thus a natural interest in comparing the findings of this report with those of other economic impact studies. Sometimes there is also an interest in comparing the economic development benefits with program costs.

For a forthcoming report on policy aspects of the Focus on Energy economic impact analysis, EDR conducted a literature review of economic impact studies for energy efficiency and renewable energy programs around the nation. An annotated bibliography will be included in the policy report, which will be presented later in April 2003. While a literature review is instructive, it also illustrates the limitations and pitfalls of such comparisons. Specifically, there are four concerns:

- *Types of Studies* – There are major differences between measuring the (a) the economic role of *an already operating sector of the economy* such as the energy-efficiency industry or a university or research center, (b) the economic response to *regulatory changes* affecting prices or the availability of specific products or services, and (c) incremental economic changes resulting from a *new support program* (offering information, incentives, etc.). All three types of studies are often referred to as “economic impact” studies, and the set of studies reviewed in the policy report indeed spans all three categories. However, these are not comparable concepts.
- *Applications within Wisconsin* – There have also been a range of economic impact studies conducted within Wisconsin for various applications, covering economic impact of the University of Wisconsin, the transportation and logistics industry, airports and tourism. However, those are existing elements of the economy, and there is not much value to be gained in comparing the incremental impacts of Focus against the ongoing economic role of existing industries.

- *Program Type* – Energy-efficiency programs and renewable energy generation are very different concepts. One is designed primarily to reduce user costs without necessarily changing sources and fuels for electricity generation. The other is primarily designed to promote new industries and activities diversifying fuels and generation technologies. The available economic impact studies confirm that these programs have radically different economic impacts. There are also significant differences in the impacts of incentive versus information programs. Most of the earlier economic impact studies of DSM programs focused on incentive impacts, while Focus and public benefit programs in other states also focus significant attention on information dissemination and market barriers. Wisconsin is the first state to use a statewide economic model to estimate impacts of its public benefits program, though other states plan to do so in the future.
- *Program Effectiveness* – It is natural for interested parties to try to compare programs by developing ratios of the size of economic impacts to program costs. There are two problems with this. One problem is that the various studies are largely incompatible in terms of the time horizon being studied, since few of them develop streams of costs and benefits over a sufficient period of time to enable such comparisons. The second problem is that there are definitional differences between economic impacts and economic benefits that must be addressed before any such comparisons can be made. The key difference is the treatment of program budget spending, which is a benefit in economic impact studies but must be deleted and counted as a cost for benefit-cost studies. Essentially none of the studies that we reviewed provides this capability, though this has been done in the separate benefit-cost report now being completed for Wisconsin Focus on Energy.

Benefit-Cost analysis provides a potentially reliable and generally consistent means of assessing program effectiveness and comparing results of program. In particular, the benefit-cost analysis of Focus on Energy (contained in a separate report) is comparing traditional measures of program benefit with an economic development impact measure defined in this report, which is based on measuring personal income changes (comparison of the flow of dollars going into and out of the wallets of Wisconsin residents). This measure of economic benefit differs from traditional measures of societal benefit in the following ways:

- It only counts benefits that are actual flows of money, and then only if those benefits flow into the pockets of Wisconsin residents. Thus, it ignores portions of non-energy, environmental and other externality benefits that are not measurable as flows of money. It also ignores any benefits accruing to people outside of Wisconsin.
- It adds benefits that shift money from the outside world to Wisconsin residents. This includes “import substitution”—whereby money that was “leaking” from the state’s economy to pay for coal and natural gas is replaced by money going into the hands of Wisconsin businesses producing and installing energy efficient equipment. It also includes “economic multiplier” effects—whereby money saved by reducing energy use recirculates in the economy due to businesses and workers respending their savings.

This report should be seen as one step in a combined process of refining economic development targets, measuring progress in addressing them, and assessing program cost-effectiveness.

## **APPENDIX A: ECONOMIC MODELING PROCESS**

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### **A.1 ECONOMIC MODELS AND THEIR ENERGY APPLICATIONS**

The application of economic impact models to measure impacts of programs and policies is widely used and accepted around the nation. Nearly all, if not absolutely all, of the states use such models. The specific application of these models for energy efficiency, renewable energy, and energy pricing policies is also widely applied and proven.

- The most basic type of economic model is known as an “input-output (I-O) model” – an accounting table that traces the pattern of how households and industries buy from and sell to each other. This type of model is useful because it allows us to trace how changes in spending and business sales lead to indirect spin-off (or “multiplier”) effects on other aspects of the economy. A statewide input-output model can also trace program impacts on the net flow of money going into and out of the state.

Input-output models have been applied to assess the impacts of energy efficiency and renewable energy programs over a period of 20 years. Most of these studies used one of two input-output modeling tools” RIMS (developed by the U.S. Dept. of Commerce) or IMPLAN (originally developed by the U.S. Dept. of Interior and now offered by a private sector spin-off). Applications of RIMS include studies for the Nebraska, Florida, Wisconsin, and New York. Applications of IMPLAN include reports for Sacramento, Central Illinois, California, Ohio, Oklahoma, four Midwest states, and the nation. Applications using other I-O models include reports for California, the Pacific Northwest, British Columbia, Spain, and China.

- A more advanced type of economic model is known as a policy analysis and forecasting simulation model, which combines an input-output mode with an additional ability to forecast shifts in prices, competitiveness factors and business attraction over time. The REMI model (developed by Regional Economic Models, Inc.) is the most well-known and widely used policy analysis and forecasting model in the United States. Another policy analysis and forecasting model, known as the REAL model (developed by Regional Economics Applications Laboratory of the University of Illinois), has also been applied in a variety of studies for Midwestern states.

Applications of the REMI model for assessment of energy efficiency, renewable energy, and energy pricing policies include reports for California, Wisconsin, Iowa, Wyoming, Massachusetts, and New Jersey. Other applications using the REMI model to assess impacts of regulatory changes and shifts in energy fuels and technologies were reports for Maine, Missouri, Illinois, Michigan, Connecticut, Vermont, New Jersey, Florida, New York, and the Midwest. The REAL model was also recently used to assess impacts of clean energy technologies for ten Midwest states.

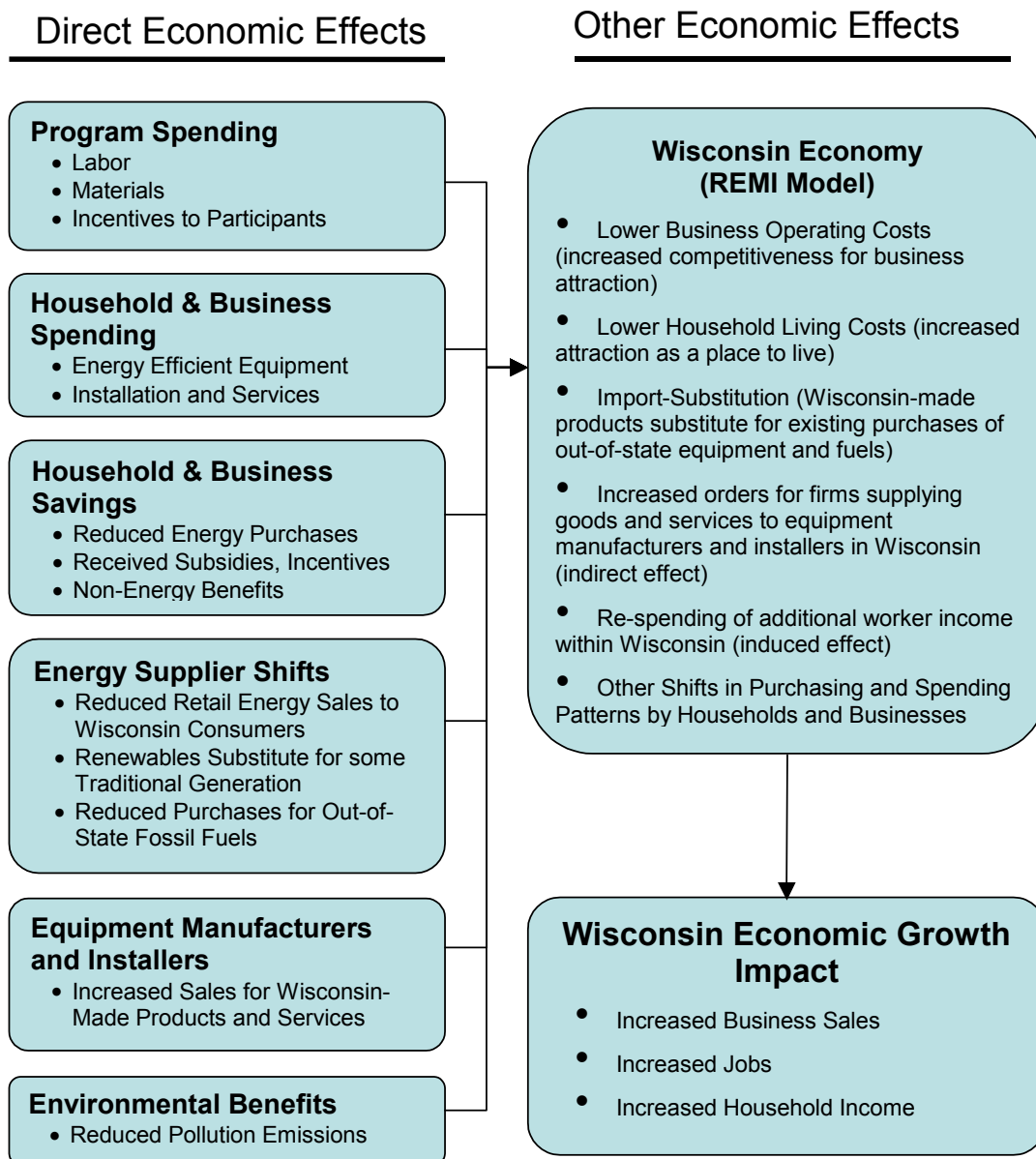
While there are differences in capabilities of the various types of models, they are generally consistent in their underlying structures and are built on similar foundations: (1) the inter-industry technology matrices and purchasing patterns provided in the US national input-output accounting tables, and (2) U.S. Census and Commerce Dept. data on state and regional economic patterns. The findings on economic impact of energy programs are also generally consistent in showing that economic impacts will vary widely depending on the type and magnitude of the program effort, the form of program assistance or intervention, the

focus on specific technologies or economic sectors, the level of program participation, the breadth and nature of the program impact area, and time periods covered by the analysis.

**A.2 ECONOMIC ANALYSIS PROCESS**

REMI calculates the economic effects of Focus on Energy on the state economy by tracking the flow of dollars, changes in purchasing and sales patterns, and impacts on prices and costs resulting from Focus on Energy programs. This process is illustrated in Figure A-1 and discussed in the text on the pages, which follow.

**Figure A-1. REMI Model Inputs, Calculations and Outputs for Focus on Energy**



### A.3 TYPES OF DIRECT ECONOMIC EFFECTS (INPUTS TO THE REMI MODEL)

There are six categories of direct effects, which are input to the Wisconsin REMI model, as illustrated in Figure A-1:

- Program Spending – The costs of implementing the Focus programs. This includes the costs of program administration and operation, the labor for installation and implementation of program energy saving measures, and incentives paid to participants.
- Household and Business Spending – Program participants pay a share of all measure equipment and installation costs. These costs are expenditures of business or household income that might have been used otherwise but produce positive results for the Wisconsin businesses that sell energy efficient goods and services. This also includes market effects—spending by households and businesses influenced by the programs to purchase energy-efficient equipment and appliances even if they do not do it through formal participation in the programs.
- Household, Business and Public-sector Savings – Program incentives decrease acquisition costs for participants' purchase of energy-efficient equipment and appliances by paying a portion of the difference in cost (incremental cost) between the price of standard-efficiency and energy-efficient equipment. Reductions in participant energy use lower energy bills freeing household income for other uses, making businesses more competitive and public-sector savings, such as at public schools are available for additional state and local program spending. Households can also realize non-energy benefits, such as increased water savings, decreased maintenance costs, increased property values.
- Energy Supplier Shifts – Reductions in participant energy use will result in some in-state reductions in retail energy sales and reduced importation of coal and other fossil fuels. The development of renewable energy electricity generation will substitute for some of the burning of coal and other fossil fuels. Electricity generation from renewable sources will provide a new revenue stream for farmers (farm biomass fuels) and may generate in-state manufacture and sales of photovoltaic and wind generation equipment.
- Equipment Manufacturers and Installers – Focus on Energy will produce increased sales for Wisconsin-made products and services. This spending buys energy-efficient equipment made in-state, such as motors, controls, cooling equipment. It also supports employment for insulation installers and other sorts of energy service providers.
- Environmental Benefits – The value of reduced power plant emissions resulting from reduced energy consumption of program participants. At present the evaluation can track two of four the primary emissions, sulfur and nitrogen oxides (SO<sub>x</sub> and NO<sub>x</sub>). An environmental analysis can estimate economic effects resulting from emissions reductions from the perspective of utility companies but there are no agreed-upon standards for valuing the dollar impact of emissions reductions from the perspective of individuals.

It is important to note that there is a time dimension to each of these previously-cited direct Focus program impacts. Program operation spending, as well as household and business spending, will occur in each year that the program is continued. However, each year of Focus operation will also produce a stream of energy savings benefits that will last for approximately the life of the energy savings measures installed by the program. This period differs by type of equipment and household or business type, but averages roughly 15 years. We also project that households and businesses will be influenced to install additional energy savings measures that will add to the stream of savings and add to the economic impacts. As a result, the economic impacts of Focus programs will have additional effects that continue for at least the life of the programs and likely longer.

It is therefore critical that the economic impact analysis examine impacts over time. For purposes of measuring these impacts, this study makes the assumption that Focus programs will be operating for 10 years. Our analysis then follows program impacts over an additional fifteen years (the average lifetime of installed equipment), for a total analysis period of 25 years.

#### **A.4 TYPES OF INTERMEDIATE EFFECTS (ASSESSED WITHIN THE REMI MODEL)**

There are six categories of resulting effects, which are assessed within the REMI model, as illustrated earlier in Figure A-1:

- Lower Business Operating Costs (Increased Competitiveness for Business Attraction) – Focus on Energy lowers business-operating costs by increasing energy efficiency, decreasing energy consumption, and possibly increasing productivity (where the program has influenced businesses to replace operating but obsolete equipment, for example). These effects are net gains to businesses. They can translate to increased profitability, increased productivity, increased ability to compete on price, and subsequent increases in payroll and taxes paid to the state.
- Lower Household Living Costs – Increased energy efficiency resulting from participation in Focus can result in decreased electricity and heating bills. The purchase of some energy-efficient appliances such as dishwashers and clothes washers can have additional non-energy benefits, such as decreased water use and decreased sewer taxes, depending upon the jurisdiction. These lower costs free up income that would otherwise be spent on energy for other uses. Decreased energy costs in a climate of moderate to severe weather also increase the attractiveness of Wisconsin as a place to live.
- Import Substitution (Wisconsin products substitute for out-of-state purchases) – Wisconsin imports most of the fuels made to generate electricity and heat homes. Decreasing these demands reduces the need to import fossil fuels into the state. The development of electricity generation through renewable sources decreases some of the need for importation of fossil fuels that generate electricity in-state. This sort of substitution represents a net gain to the state's economy, since more dollars are spent in-state than previously.
- Increased Orders for Wisconsin firms (indirect effect) – This is an indirect effect of Focus on Energy, resulting from increased purchases of energy efficiency products and services going to Wisconsin firms.

- Re-spending additional worker income (induced effect) – Wisconsin workers who benefit by increased demand for their labor increase their own income and in turn increase their spending in their home communities and in other businesses that operate within the state.
- Other Shifts in Purchasing and Spending – Focus on Energy produces net gains in jobs and income throughout the state, directly and indirectly. The increased economic activity resulting from the programs' primary and secondary effects serve to strengthen the state's economy by increasing income while decreasing spending on imported goods and services.

Each of these intermediate impacts also has a time dimension. The household and business cost reductions, increased income and import substitution impacts will continue to rise as energy savings impacts accumulate over time. As a result, the benefits of reduced costs of living and increase business competitiveness will continue well for decades beyond the assumed program period.

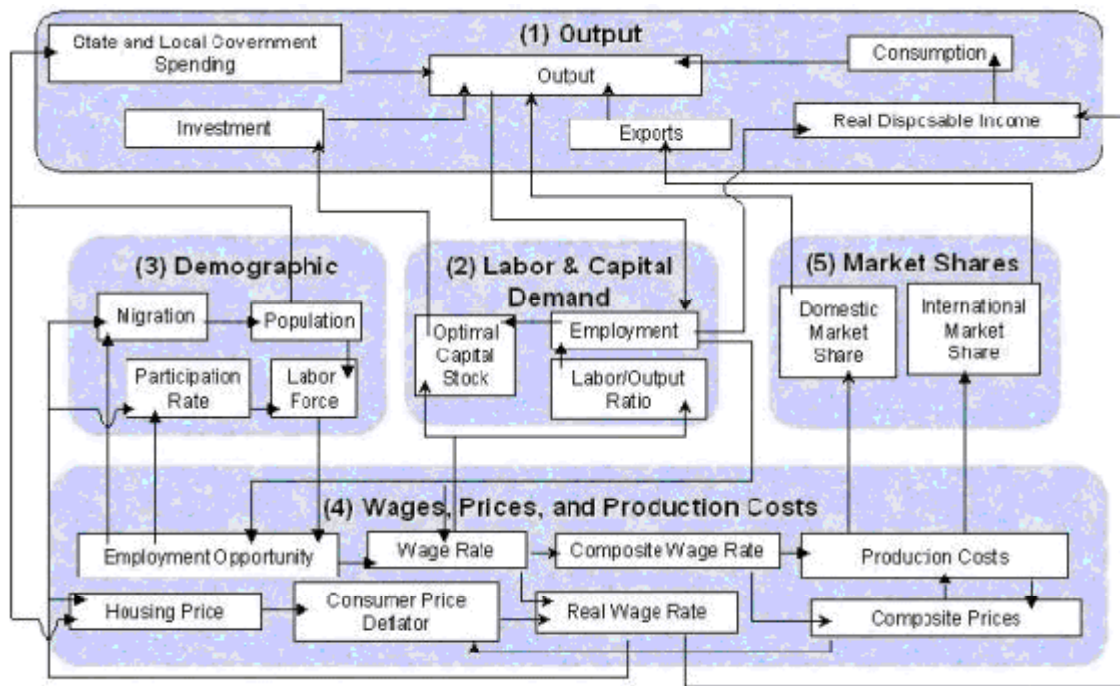
#### **A.5 CALCULATION OF ECONOMIC MODEL RESULTS (FORECAST BY REMI)**

The REMI analysis system assesses economic impacts of the preceding factors by applying a large series of economic relationships representing changes in inter-industry purchasing and sales transactions and long run equilibrium responses over time. These responses include changes in energy and other factor costs faced by households and businesses, as well as broader changes in labor demand and supply, wage rates, production costs and profitability, disposable household incomes, the proportions of local demand met by local production, investment demand, population shifts and market shares of national economic growth. (See Figure A-2.)

The end result is that the REMI model forecasts year-by-year changes in four key types of results on the Wisconsin economy:

- Business Sales – Increasing output and hence sales volume of goods and services provided by Wisconsin firms. This is shown by industry type.
- Gross Regional Product (GRP) – This is calculated as the value added portion of business sales, which are the business sales minus cost of materials. It essentially represents the sum of worker income and corporate (profit) income.
- Jobs – The number of jobs (both salaried workers and self-employed individuals) that is generated by expansion in business sales.
- Real After-tax Income – Household disposable income reflects the direct program savings in any given year as well as the after-tax wage income that results from the state's economy experiencing a positive growth response under Focus. Since the latter source of household income comes from a portion of the business sales, the income benefit cannot be added to the business expansion or GRP benefit.

**Figure A-2.**  
**Internal Calculation Modules within the Wisconsin REMI Model**



## A.6 ECONOMIC ANALYSIS ASSUMPTIONS AND LIMITATIONS

### A.6.1 Assumptions

Performing an economic analysis requires making a number of assumptions about what Focus on Energy will look like over an extended period of time. Following are some of the important assumptions that were made in advance of analyzing programs' economic impacts. In general, we made conservative assumptions to avoid over-estimating the programs' effects:

- For purposes of analysis, it was assumed that Focus on Energy programs were operated for 10 years, while program impacts were observed for 25 years. There are two reasons for this. First, it is necessary to assess program operations impacts for more than one or two years, so that we can observe the cumulative benefit of growing participation and market effects over time. Second, it is necessary to assess energy savings over a period over the lifetime of installed equipment, which averages approximately 15 years beyond the time of the last participant joining the program. In this study, program budgets and accompanying installation of energy efficiency measures were assumed to increase from years 1 to 3, and then level off to a constant for years 3 to 10.
- Each year, it is assumed that 5% of energy savings are lost (persistence losses) due to a wide range of factors including changes in building tenancy, business turnover, equipment failure and changes in equipment needs. When equipment

installed by the programs come to the end of their useful lives we assumed replacement with measures of equivalent efficiency but do not count that replacement as additional savings due to the program.

- For the Residential and Business Programs ‘market effects’ estimates were developed based on information provided by program administrators and additional projections made by program evaluators. Market effects estimate the extent to which Focus influences customers to make purchases of energy-efficient equipment they might not have otherwise made. Market effects factors are derived from Focus on Energy evaluation survey data and estimates made by knowledgeable practitioners.

Some additional issues affecting the model results are discussed in later section of the report. These include: longer-term market effects; modeling of program startup costs versus ongoing (mature) program costs; program duration; modeling of program growth trajectories; and, net-to-gross assumptions for the incremental costs borne by customers adopting energy efficiency and/or renewable energy measures.

### **A.6.2 Limitations**

Economic analysis does not capture some types of program benefits at all, or captures them incompletely.

A good example of this is calculating economic benefits of decreasing emissions of atmospheric pollutants such as Mercury, Sulfur oxides (SO<sub>x</sub>), Nitrogen oxides (NO<sub>x</sub>), and Carbon Dioxide (CO<sub>2</sub>). Decreasing emissions of these pollutants benefits health and improves other quality-of-life concerns, but it is currently difficult or impossible to quantify those impacts from the perspective of individuals living in the state.

It is possible to quantify the value of some avoided emissions by looking at their value in pollution trading credit markets. However, the pollution credit trading markets involve utility companies not individuals. The scale of utility operations statewide is so large that the economic benefits derived from reducing emissions, though significant in themselves, do not register well in the model. Carbon Dioxide reductions due to the program are significant but trading markets are only just being organized and we cannot currently place a value on reducing CO<sub>2</sub> emissions, even from the utility perspective.

Another type of economic benefit—non-energy benefits associated with the Low-income and Residential Programs—have been estimated and given dollar values in this interim economic analysis.

## **APPENDIX B: BREAKOUT OF IMPACTS BY KEY FACTORS (MODEL INPUTS)**

This appendix describes how we defined and calculated each of the key factors that represents an input to the economic model, and it then shows the contribution of each of those factors to total economic impacts.

### **B.1 ENERGY COST SAVINGS**

Energy cost savings represent the additional disposable income realized by households and the additional retained income realized by businesses as a result of installing program-supported measures that decrease energy use. Energy savings continue through the life of the program and beyond, to the end of measure lives of efficient equipment installed or purchased through the program, or whose purchase was influenced by the program.

Energy savings accrue cumulatively (after persistence loss) to participating business and institutional establishments as a reduction in the relative cost of doing business in Wisconsin—a positive effect on the economy. Over the 10-year period analyzed, new savings are generated each year, creating streams of savings that peak in the tenth year. For participating state and local government offices, energy savings are assumed to free up dollars for more public spending.

**Table B-1.  
Economic Impact of Energy Savings**

	<b>Jobs</b>	<b>Business Sales*</b> <i>(In Millions)</i>	<b>Value Added*</b> <i>(In Millions)</i>	<b>Income*</b> <i>(In Millions)</i>
<b><i>Without Market Effects</i></b>				
Year 1	61	\$5	\$3	\$3
Year 5	940	\$81	\$47	\$54
Sum: Years 1-10	9,976	\$886	\$527	\$593
<b><i>With Market Effects</i></b>				
Year 1	70	\$5	\$3	\$4
Year 5	1,167	\$98	\$58	\$67
Sum: Years 1-10	12,566	\$1,096	\$661	\$748

\* Values are in constant year 2001 dollars.

### **B.2 HOUSEHOLD AND BUSINESS SPENDING**

Household and business spending consists of the spending for the incremental costs between standard efficiency and high efficiency equipment and/or replacement of existing equipment before the end of their lifetimes. Since these are additional costs (and the offsetting energy savings are considered elsewhere), their net economic impact is negative. This spending is assumed to be generally constant through the 10-year period analyzed. For those programs for which market effects were estimated, additional household and business spending to purchase additional energy efficiency measures was assumed to be proportional to spending by program participants.

Partially offsetting the loss of income associated with bearing these costs, some of the spending goes back to Wisconsin businesses in the form of increased sales for various types of electrical equipment, machines & computers, instruments and building materials, as well as construction and professional engineering services. This growth in Wisconsin-based business sales is, however, also diminished slightly by a reduction in spending on electricity and gas purchases, which reduces business sales for Wisconsin utilities.

**Table B-2.  
Economic Impact of Household and Business Spending**

	<b>Jobs</b>	<b>Business Sales*</b> <i>(In Millions)</i>	<b>Value Added*</b> <i>(In Millions)</i>	<b>Income*</b> <i>(In Millions)</i>
<b><i>Without Market Effects</i></b>				
Year 1	-157	-\$13	-\$7	-\$10
Year 5	-830	-\$75	-\$44	-\$56
Sum: Years 1-10	-7,519	-\$690	-\$404	-\$514
<b><i>With Market Effects</i></b>				
Year 1	-190	-\$17	-\$9	-\$12
Year 5	-1,125	-\$104	-\$60	-\$75
Sum: Years 1-10	-10,115	-\$956	-\$555	-\$684

\* Values are in constant year 2001 dollars.

### **B.3 PROGRAM SPENDING**

Program spending consists of all the goods and services purchased by the program over its life. Program spending increases dramatically from Year 1 to Year 2, declines slightly in Year 3 and then is assumed to be approximately constant, over the rest of the 10-year period analyzed. All program spending derives from public benefits charges paid by Wisconsin ratepayers.

Values for the program budget and total program spending are included in the model. It was assumed there would be an approximately constant mix of labor, travel expenses and materials costs. Program spending generates jobs and business sales in Wisconsin—a positive effect on the economy. Table B-3 shows program-spending impacts with and without market effects.

**Table B-3.  
Economic Impact of Program Spending**

	<b>Jobs</b>	<b>Business Sales*</b> <i>(In Millions)</i>	<b>Value Added*</b> <i>(In Millions)</i>	<b>Income*</b> <i>(In Millions)</i>
<b>Without Market Effects</b>				
Year 1	667	\$51	\$28	\$17
Year 5	1,363	\$105	\$65	\$51
Sum: Years 1-10	12,752	\$978	\$603	\$472
<b>With Market Effects</b>				
Year 1	737	\$56	\$31	\$18
Year 5	1,474,964	\$120	\$74	\$54
Sum: Years 1-10	13,732	\$1,105	\$679	\$502

\* Values are in constant year 2001 dollars.

#### **B.4 ENVIRONMENTAL BENEFITS**

The economic analysis also considered some environmental impacts of the Focus programs as a whole. The Year 1 Focus programs' energy impacts have associated reductions in electricity power plant emissions. For this analysis, we have described some of the impacts of nitrogen and sulfur oxides (NO<sub>x</sub> and SO<sub>2</sub>) emissions results with respect to their impacts on utility generation costs for power generators within Wisconsin. Within this limited scope, though the reductions were significant accomplishments, their economic effects statewide were found to be minimal in this context. However, this analysis did not look at the economic effects of other environmental impacts that affect individuals directly, such as effects on health. This is a separate issue that should be addressed by the evaluation team and DOA staff (e.g., identification and application of an appropriate damage function that establishes dollar values for the externalities associated with the burning of fossil fuels for electricity generators supplying Wisconsin).

It is important to recognize that economic analysis does not capture some types of program benefits at all, particularly quality of life benefits, and some benefits are captured very incompletely. As suggested above, a good example of this is the calculation of economic benefits resulting from decreases in electric generation pollutant emissions (NO<sub>x</sub>, SO<sub>2</sub> and mercury) and greenhouse gas emissions (CO<sub>2</sub>). While it is recognized that decreased emissions of pollutants and greenhouse gases have beneficial impacts on health and other quality of life concerns, it is currently difficult or impossible to quantify those impacts from the perspective of individuals living in the state. It is possible to quantify the value of some avoided emissions by looking at their value in pollution trading credit markets. However, the pollution credit trading markets primarily involve and affect utility companies.

In this economic analysis, the scale of utility operations statewide is so large that the economic benefits derived from reducing emissions, though significant in themselves, barely register in the model. This is the case for the NO<sub>x</sub> and SO<sub>2</sub> pollutants, which have US markets where credit trading clearing prices have been applied. However, with no US carbon credit market it is more speculative to assign a monetary value; this is unfortunate because the scale of avoided CO<sub>2</sub> currently estimated to be attributable to Focus is significant.

**Table B-4.**  
**Economic Impact of Environmental Benefits**

	<b>Jobs</b>	<b>Business Sales*</b> <i>(In Millions)</i>	<b>Value Added*</b> <i>(In Millions)</i>	<b>Income*</b> <i>(In Millions)</i>
<b>Without Market Effects</b>				
Year 1	1	\$0.0	\$0	\$0.1
Year 5	18	\$2.0	\$0.1	\$1.4
Sum: Years 1-10	193	\$5.7	\$9.5	\$15.6
<b>With Market Effects</b>				
Year 1	1	\$0.0	\$0	\$1.8
Year 5	22	\$2.0	\$2.0	\$0.6
Sum: Years 1-10	240	\$19.8	\$11.8	\$19.8

\* Values are in constant year 2001 dollars.

**B.5 NON-ENERGY BENEFITS**

This report includes some estimations of the economic impacts of non-economic benefits of the Residential Programs, including such items as the impacts of increased ability to pay bills, fewer shutoffs and service calls, decreased maintenance costs, decreased water and sewer costs, and so on.

**Table B-5.**  
**Economic Impact of Non-energy Benefits Update**

	<b>Jobs</b>	<b>Business Sales*</b> <i>(In Millions)</i>	<b>Value Added*</b> <i>(In Millions)</i>	<b>Income*</b> <i>(In Millions)</i>
<b>Without Market Effects</b>				
Year 1	11	\$0.0	\$1	\$0
Year 5	173	\$0.1	\$8	\$6
Sum: Yrs. 1-10	1,810	\$0.8	\$89	\$63
<b>With Market Effects</b>				
Year 1	13	\$0.0	\$1	\$1
Year 5	217	\$1.9	\$10	\$7
Sum: Yrs. 1-10	2,298	\$19.7	\$113	\$79

\* Values are in constant year 2001 dollars.