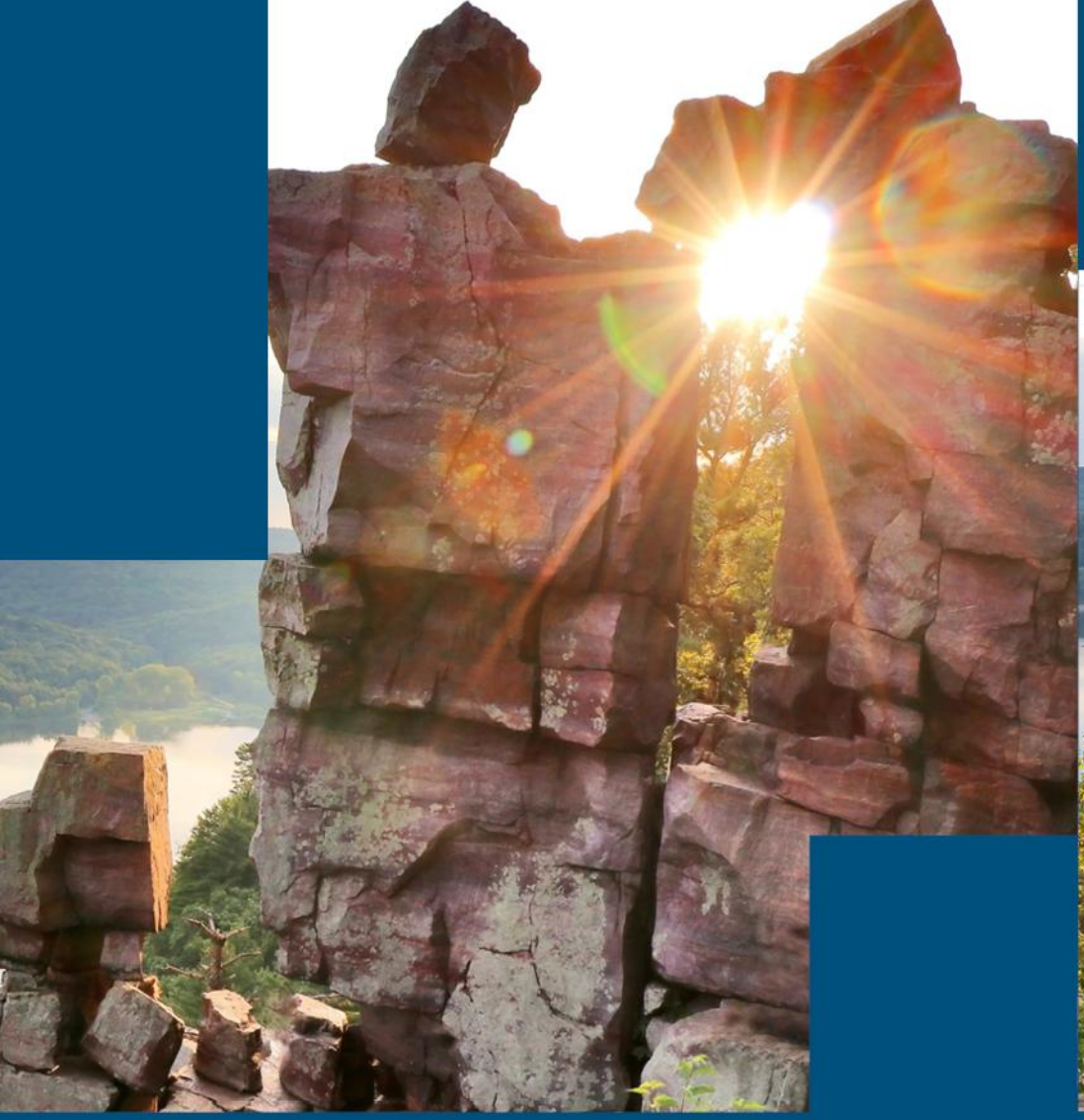

Devil's Lake State Park, Wisconsin

FOCUS ON ENERGY

2023–2024 Biennium Economic Impacts

April 6, 2026

CADMUS

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Table of Contents

Figures

Tables

Appendix

Table of Acronyms

Acronym	Term
CY	Calendar year (corresponds with program year)
E3+	Energy, Environment & Economy
EIA	U.S. Energy Information Administration
EM&V	Evaluation, measurement, and verification
EPA	U.S. Environmental Protection Agency
EUL	Effective useful life
EWG	Evaluation Work Group
GWh	Gigawatt per hour (1 million kWh)
IO	Input-output (matrix)
kWh	Kilowatt-hour
MThm	Thousand therms
MWh	Megawatt per hour (1,000 kWh)
NO_X	Nitrogen oxide
PM	Particulate matter
PSC	Public Service Commission of Wisconsin
SO_2	Sulfur dioxide
SPECTRUM	Statewide Program for Energy Customer Tracking, Resource Utilization, and Data Management
T&D	Transmission and Distribution
TRC (mTRC)	Total Resource Cost test (Modified Total Resource Cost test)
TRM	Technical reference manual
REMI	Regional Economic Models, Inc.

Glossary of Terms

Term	Definition
Customer funding	Payments by Wisconsin customers that fund Focus on Energy offerings.
Direct spending	Focus on Energy program funds spent on administration, implementation, marketing, EM&V services, and incentives.
Disposable personal income	After-tax money that is available to Wisconsin consumers to spend and/or save at their discretion.
Economic benefits (value added)	Contributions of private industries and government to Wisconsin's gross state product. Describes the total wealth created regionally, including wages, profits, and taxes.
Employment	The number of jobs supported for oneyear, including both full-time and part-time jobs. Consistent with REMI and Bureau of Economic Analysis definitions, full-time and part-time jobs are counted equally; wage and salary jobs and proprietor jobs are included, while unpaid family workers and volunteers are excluded.
Incentives	Focus on Energy program funds that encourage participation and investment in energy-saving technologies and behaviors.
Net economic impacts	The difference between the economic impacts created by Focus on Energy and a hypothetical (baseline) scenario where Focus on Energy does not exist, and equal funds are spent on other goods and services.
Participant utility bill savings	The estimated decrease in participant spending on utility bills resulting from Focus on Energy offerings. Utility bill savings by participants result in revenue losses for utilities.
Participant co-funding	Participant payments to complete Focus on Energy projects. The combination of incentives and participant co-funding represents the full cost of energy efficiency and renewable energy projects.
Revenue requirements	Mandates for utilities to generate certain amounts of revenue. Because Focus on Energy creates energy savings that reduce utilities' revenues, utilities may increase energy prices in order to meet revenue requirements.
Utility avoided costs	Avoided utility expenditures on fuel, purchased power, and infrastructure due to reduced demand for utility energy resources from Focus on Energy activities and resulting energy savings.

1. Executive Summary

Cadmus estimated the net economic impacts of Focus on Energy's 2023–2024 energy efficiency and renewable energy portfolio using the Energy, Environment & Economy (E3+) macroeconomic modeling software from Regional Economic Models, Inc. (REMI).

The analysis includes all energy efficiency and renewable energy investments made through Focus on Energy in each calendar year (CY) 2023 and CY 2024, and the long-term impacts of those investments persisting through CY 2048. The resulting net economic impacts represent the difference between the Wisconsin economy with and without investment in Focus on Energy. In the latter (baseline) case, Wisconsin customers do not fund Focus on Energy and, therefore, no energy-saving projects occur.

While this analysis focuses specifically on the net economic impacts attributable to Focus on Energy investments made in CY 2023 through CY 2024, these investments build upon the ongoing economic impacts created by program activities from previous years. Likewise, current and future Focus on Energy investments will generate economic impacts that will add to the benefits from prior years, ensuring stable, ongoing economic benefits.

This section provides a summary of the overall net economic impacts with a topline look at key numbers and figures.

Key Finding. Focus on Energy achieves positive net economic impacts because it increases in-state spending.

Focus on Energy not only increases spending on industries related to energy efficiency and renewable energy but also results in participants saving money on their utility bills. Money that would have been spent on fuel imports (electric and natural gas)[1] is instead spent locally on goods and services, boosting Wisconsin's regional industries and statewide economy. Moreover, emissions reductions generated by energy savings, particularly reductions in nitrogen oxides (NO_X), sulfur dioxide (SO2), and fine particulate matter (PM2.5), make Wisconsin a more attractive place to live, thus increasing in-migration and stimulating additional economic activity.

Table ES-1 summarizes the net economic impacts attributable to the CY 2023 and CY 2024 program years and to the 2023–2024 biennium in aggregate. Cadmus used changes in employment, economic benefit (value added), and disposable personal income as its key indicators of changes in economic activity for this analysis.[2] Focus on Energy investments and activity during the 2023–2024 biennium is projected to add more than 5,400 jobs, $675 million in economic benefits, and $593 million in disposable personal income to the Wisconsin economy through CY 2048.

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[1] Per the U.S. Energy Information Administration (EIA) State Profile for Wisconsin, Wisconsin consumes more electricity than it generates, and it imports all its natural gas. Last updated, October 16, 2025. https://www.eia.gov/state/analysis.php?sid=WI.

[2] Definitions for these key indicators can be found in *Analysis Findings*.

Table ES-1. Cumulative Net Economic Impacts through CY 2048

Key Economic Indicator	CY 2023	CY 2024	Biennium[1]
Employment (jobs)	2,611	2,793	5,411
Economic Benefit (millions of dollars)[2]	$333	$340	$675
Disposable Personal Income (millions of dollars)[2]	$281	$311	$593

[1] Program year impacts do not perfectly sum to biennium impacts because the REMI model incorporates dynamic feedbacks and lagged adjustments, causing impacts to evolve differently when modeled over multiple years.
[2] Fixed 2024 U.S. dollars.

Table ES-2 shows economic impacts normalized by Focus on Energy spending. Direct spending includes costs of administration and implementation; incentives paid to participants; and costs of evaluation, measurement, and verification (EM&V). Over the biennium, every $1 million spent on Focus on Energy increases statewide employment by 28 jobs, and every dollar spent generates an additional $3.52 of economic benefit and $3.09 of disposable personal income through CY 2048.

Table ES-2. Cumulative Net Economic Impacts, Normalized for Direct Spending

Key Economic Indicator	Normalized Impacts		
	CY 2023	CY 2024	Biennium
Employment per $1MM spent	27	29	28
Economic Benefit[1] per dollar spent	$3.46	$3.56	$3.52
Disposable Personal Income[1] per dollar spent	$2.92	$3.26	$3.09

[1] Fixed 2024 U.S. dollars.

Key Finding. Focus on Energy investments in energy efficiency and renewable energy during the 2023–2024 quadrennium will cumulatively add more than $675 million in economic benefits to the Wisconsin economy through CY 2048.

On average, biennial Focus on Energy investments are projected to generate nearly $26 million of economic benefits per year for the next 25 years.[3]

Nearly all of Wisconsin's industries will experience employment gains as a result of Focus on Energy investments. The largest increases in cumulative net employment are projected to occur in the manufacturing, retail, and health care sectors. Increased purchases of energy-efficient and renewable energy technologies through Focus on Energy positively impacted specialized fields in the short term. The benefits of participants' utility bill savings and emissions reductions will also positively impact Wisconsin's largest sectors over the long term. Four sectors are projected to create at least 600 net jobs through

[3] These benefits will occur whilst economic benefits from the past years' program investments, not modeled as part of this study, are also occurring.

CY 2048 (at least 24 net jobs per year) because of Focus on Energy investments during the 2023-2024 biennium:

- Manufacturing (960 jobs added through CY 2048)
- Retail (720 jobs added through CY 2048)
- Health care and social assistance (691 jobs added through CY 2048)
- Professional, scientific, and technical services (620 jobs added through CY 2048)

Key Finding. Focus on Energy increases disposable personal income by $240 per Wisconsin household through CY 2048. Cumulative disposable personal income gains of $593 million—nearly $23 million annually on average for the next 25 years—will benefit Wisconsin households (both for program participants and non-participants alike). Additionally, the 2023–2024 biennium will save an estimated $1.2 billion on participants' utility bills through CY 2048.

2. Introduction

The purpose of this macroeconomic impact analysis is to quantify the net economic impacts of ratepayer investment in Wisconsin Focus on Energy on the state economy. Focus on Energy is Wisconsin's statewide energy efficiency and renewable resource program. As required under Wisconsin Statute §196.374(2)(a), Focus on Energy is funded by customers of the state's investor-owned energy utilities and participating municipal utilities and electric cooperatives. APTIM serves as the program administrator and is responsible for designing, managing, and coordinating Focus on Energy's offerings.

The Public Service Commission of Wisconsin (PSC) provides oversight of Focus on Energy. The PSC contracted with Cadmus to verify Focus on Energy's energy savings, including environmental and non-energy benefits, and evaluate its 2023–2024 Biennium achievements. As part of this evaluation, Cadmus quantified net economic impacts attributable to Focus on Energy during the 2023-2024 biennium. Statewide impacts include employment, economic benefits (value added), and disposable personal income.

Focus on Energy provides information, technical support, and financial incentives to eligible Wisconsin residents and businesses to complete energy-saving projects. Focus on Energy thus helps Wisconsin residents and businesses manage rising energy costs, protect the environment, and promote in-state economic activity while controlling the growing demand for electricity and natural gas.

As with previous studies, Cadmus used the E3+ macroeconomic modeling software from REMI[4] to assess Focus on Energy's economic impacts. Cadmus calculated net economic impacts as the difference between the economic impacts created by Focus on Energy and a baseline scenario in which Focus on Energy does not exist.

This analysis covers Focus on Energy projects completed during the biennium (CY 2023 or CY 2024) and their persisting impacts. For modeling purposes, Cadmus set the persistence to end after 25 years, corresponding to the high end of project effective useful life (EUL) observed in Focus on Energy's portfolio. As such, the CY 2023 analysis period runs through CY 2047, and the CY 2024 and biennium analyses run through CY 2048 (Table 3).

Table 3. Study Period by Program Year

Program Year(s)	Timeframe Modeled
2023	2023–2047
2024	2024–2048
2023–2024	2023–2048

[4] For more information on REMI: https://www.remi.com/

2.1. How Focus on Energy Improves Wisconsin's Economy

Changes in spending, captured as changes in consumption and investment within various sectors and industries, produce ripple effects throughout a regional economy, affecting supply chains and household spending. Changes in consumption and investment affect consumer demand, which in turn impacts employment and compensation in industries both directly and indirectly related to the changes in spending. Money continues to cycle through the regional economy—individuals continue to spend and save, and businesses continue to invest and meet rising demand—until the ripple effects caused by the initial changes in spending disappear. This modeling framework assumes that households and businesses make economically rational choices that align with their own objectives, reallocating spending in response to changes in costs, income, and investment opportunities.

Although changes in direct spending by utilities and participants modeled for this report occur only during CY 2023 and CY 2024, the energy efficiency and renewable energy projects completed during the 2023–2024 biennium generate long-term economic impacts. Most notably, persisting energy bill savings allow participants to spend less money on energy and more money on other products and services, many of which have more localized supply chains than those associated with energy. Local utilities can reduce the amount of fuel and power imported into the region, while regional supply for energy-efficient, renewable energy measures and services increases to meet demand within Wisconsin.

Participating utilities benefit from reducing their fuel and power purchases, transmission and distribution (T&D) costs, and capacity costs. However, because participating households and businesses purchase less energy after participating in Focus on Energy offerings, utilities also forego revenues from energy sales. To meet revenue requirements, Cadmus assumes in its models that utilities will recoup a portion of lost revenues by increasing the retail rates they will charge in future years.

Additional functionality of REMI's E3+ model includes the net economic impacts of emissions reductions. Emissions reductions make Wisconsin a more attractive place to live, thereby increasing in-migration and stimulating additional economic activity through bolstering the labor force and consumption of regional goods and services.

2.2. Key Changes

The biggest differences between the current economic impact analysis (for the 2023-2024 biennium) and the previous economic impact analysis (for the 2019–2022 quadrennium) are updated assumptions for avoided costs of energy, as well as changes to REMI model backend parameters pertaining to private fixed investment. Periodically, as needed, the PSC and the Evaluation Work Group (EWG) update methodology, data, and assumptions related to the calculation of utility avoided costs.

The avoided costs of natural gas ($/therm) and electricity ($/kWh) as used by Cadmus for cost-effectiveness calculations reduced for the 2023-2024 biennium by roughly 22% to 52%, respectively. Because avoided costs benefit utilities by helping offset revenue losses, the decrease in avoided costs reduces net economic benefits. In CY 2020, the PSC also began to incorporate T&D avoided costs. The inclusion of T&D costs increases avoided costs benefit estimates for utilities (and thus net economic

benefits). These changes are explained in Changes to Electric Avoided Cost Assumptions and Changes to Natural Gas Avoided Cost Assumption. .

3. Analysis Findings

Consistent with previous analyses, Cadmus reports the net economic impacts of Focus on Energy according to three key indicators:

- **Employment** counts the change in the number of full- and part-time jobs lasting a year. Full-time and part-time jobs are counted at equal weight.[5]
- **Economic benefits (value added)** measures the changes in contributions of each private industry and of government to Wisconsin's gross state product. It describes the total wealth created in Wisconsin, including wages, profits, and taxes. Throughout this report, economic benefits are presented in fixed 2024 U.S. dollars.
- **Disposable personal income** represents the change in after-tax money available to Wisconsin consumers to spend and save at their discretion. In REMI, this measure reflects major reported income categories captured in federal economic accounts, including wages and salaries, benefits, proprietor (owner) income, rental income, investment income, and transfer payments from public entities such as Social Security. Like economic benefits, disposable personal income is presented in fixed 2024 U.S. dollars.

During the CY 2023 and CY 2024 program years, net economic impacts decrease because customers spend money (above what they would have spent in the baseline scenario, absent Focus on Energy) to fund Focus on Energy offerings and help pay for their energy efficiency and renewable energy projects.[6] However, following the program years in which initial investments are made, each Focus on Energy project generates positive net economic impacts for decades. The net economic impacts presented in this report capture the cumulative impacts generated during the lifecycle of all Focus on Energy projects completed in CY 2023 and CY 2024, which can last up to 25 years.

3.1. Summary of Net Economic Impacts

Table 4 summarizes net economic impacts attributable to each program year. Through CY 2048, the Focus on Energy 2023–2024 biennium will add more than 5,400 jobs, almost $675 million in economic benefits, and more than $590 million in disposable personal income to the Wisconsin economy.

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[5] This is not the same as number of employed individuals, some of whom may have more than one job. "Equal weight" is explained on pg. 4 of the PDF from REMI.

REMI. 2011. *Data Sources and Estimation Procedures*. https://www.remi.com/wp-content/uploads/2017/10/Data_Sources_and_Estimation_Procedures-4.pdf

[6] In reality, prior years' investments are creating net positive economic impacts that offset the net decrease observed when modeling is constrained to the CY 2023-2024 program years.

Table 4. Cumulative Net Economic Impacts

Key Economic Indicator	CY 2023	CY 2024	Biennium[1]
Employment (jobs)	2,611	2,793	5,411
Economic Benefit (millions of dollars)[2]	$333	$340	$675
Disposable Personal Income (millions of dollars)[2]	$281	$311	$593

[1] Program year impacts do not perfectly sum to biennium impacts because the REMI model incorporates dynamic feedbacks and lagged adjustments, causing impacts to evolve differently when modeled over multiple years.
[2] Fixed 2024 U.S. dollars.

When normalized for spending on administration, implementation, incentives, and EM&V services, Focus on Energy is projected to generate roughly 28 jobs per $1 million of direct spending and returns on investment of more than $3 of economic benefits and disposable personal income per dollar of direct spending.

Table 5. Cumulative Net Economic Impacts, Normalized for Direct Spending

Key Economic Indicator	Normalized Impacts		
	CY 2023	CY 2024	Quadrennium
Employment per $1 million spent	27	29	28
Economic Benefit[1] per dollar spent	$3.46	$3.56	$3.52
Disposable Personal Income[1] per dollar spent	$2.92	$3.26	$3.09

[1] Fixed 2024 U.S. dollars.

3.1.1. Interpreting Results

The following sections show net economic impacts attributable exclusively to the Focus on Energy 2023–2024 biennium. While this analysis focuses specifically on CY 2023 and CY 2024, these investments build on the ongoing economic impacts created by program activities from previous years. Likewise, current and future Focus on Energy investments will generate economic impacts that will add to the benefits from prior years, ensuring more economic benefits for longer.

For example, in 2026, CY 2023 and CY 2024 investments are projected to add roughly 200 and 150 jobs, respectively (Figure 1 in the *Employment* section); combined, they will add approximately 350 jobs. However, as noted, this study omits ongoing impacts created in previous program years. The 2019–2022 quadrennial investments—which, like 2015–2018 quadrennial investments, will create ongoing future impacts for up to 25 years—are projected to add nearly 1,900 jobs in CY 2026, bringing the total employment impact in CY 2026 of the last nine Focus on Energy program years to 4,250 jobs added.[7] Each previous and future program year of Focus on Energy activity would contribute similarly additive

[7] Cadmus. July 3, 2020. *Focus on Energy 2015–2018 Quadrennium Economic Impact Analysis*. https://www.focusonenergy.com/sites/default/files/inline-files/Evaluation_Report-Economic_Impacts_2015-2018.pdf.

employment effects, underscoring the importance of sustained investment by Focus on Energy in energy efficiency and renewable energy.

3.2. Employment

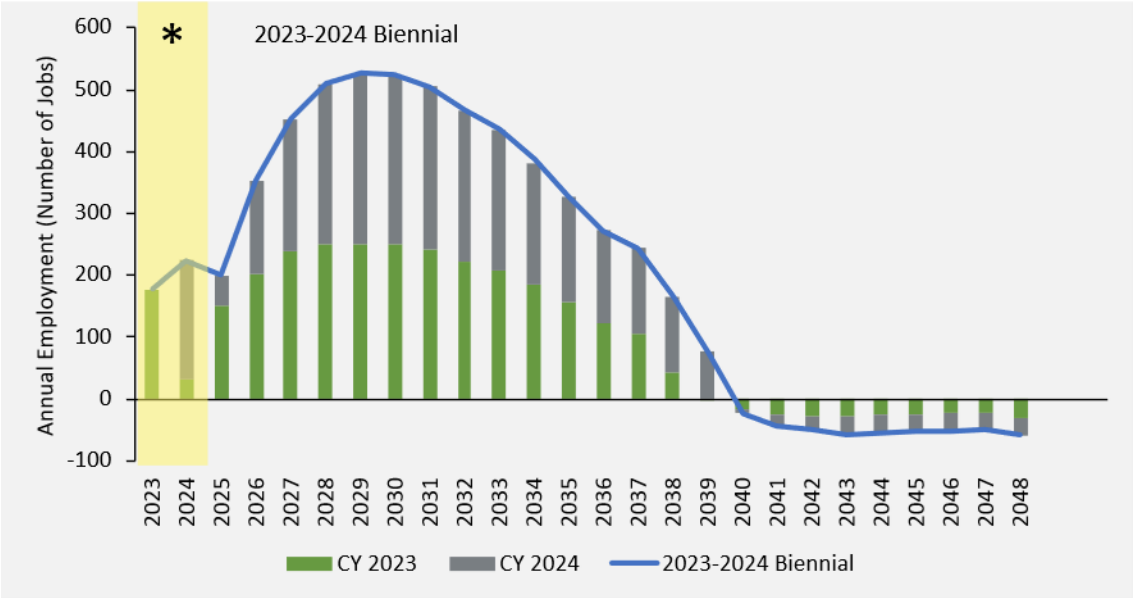
Focus on Energy's energy efficiency and renewable energy offerings, and the investments that fund them, increase employment statewide. Trade allies and equipment installers who participate in Focus on Energy benefit from increased business activity, which strengthens the opportunity to hire more staff. New employees may have been unemployed or moved to Wisconsin seeking employment; both scenarios represent increases in employment and the labor force. Newly hired employees spend their wages locally on goods and services, as a result, stimulating the Wisconsin economy. Ongoing energy savings from energy efficiency result in long-term utility bill savings that spur additional spending on local goods and services by participating businesses and residential customers that would not have occurred in the baseline scenario, absent the Focus on Energy program.

Like other forms of investment, the completion of Focus on Energy projects requires initial investments from utilities and participants that redirect spending toward energy efficiency and away from typical patterns of consumption to cultivate long-lasting benefits. As such, the Wisconsin economy incurs a nominal loss of jobs up front with each year of Focus on Energy investment, ensuring nearly two decades of employment growth thereafter.

Figure 1 shows changes in annual employment by program year.[8] As energy savings accumulate, annual employment growth increases rapidly and peaks at 530 annual jobs in CY 2029. Employment gains begin to taper off in CY 2040 as energy-efficient measures reach the end of their EULs, marking the Wisconsin economy's return to its baseline equilibrium in the absence of Focus on Energy.

[8] The employment impacts in Figure 1 are presented as a table in *Annual Net Employment Impacts*.

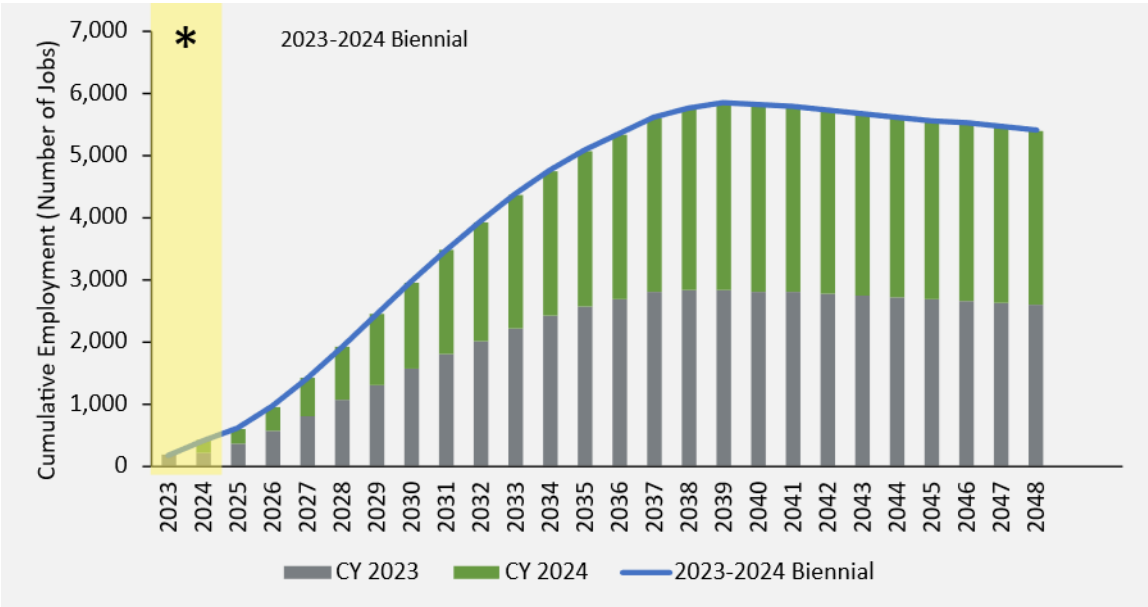
Figure 1. Annual Jobs Added by Program Year



Note: Asterisk, along with yellow shading, indicates the biennium (or first two years) of the analysis period.

Similarly, Figure 2 shows how annual employment changes in Figure 1 accumulate over time.

Figure 2. Cumulative Jobs Added by Program Year



Note: Asterisk, along with yellow shading, indicates the biennium (or first two years) of the analysis period.

Cumulative employment gains realized by Focus on Energy CY 2023 and CY 2024 investments will peak at 5,848 jobs in CY 2039. Afterward, employment contracts slightly as the effects of initial direct spending and ongoing energy savings wear off. By the end of the analysis window in CY 2048, Focus on Energy will have added more than 5,400 jobs. The following five industries show the greatest employment increases:

- Manufacturing (960 jobs added through CY 2048)
- Retail (720 jobs added through CY 2048)
- Health care and social assistance (690 jobs added through CY 2048)
- Professional, scientific, and technical services (620 jobs added through CY 2048)
- State and local government (1,820 jobs added through CY 2048)

3.3. Economic Benefits

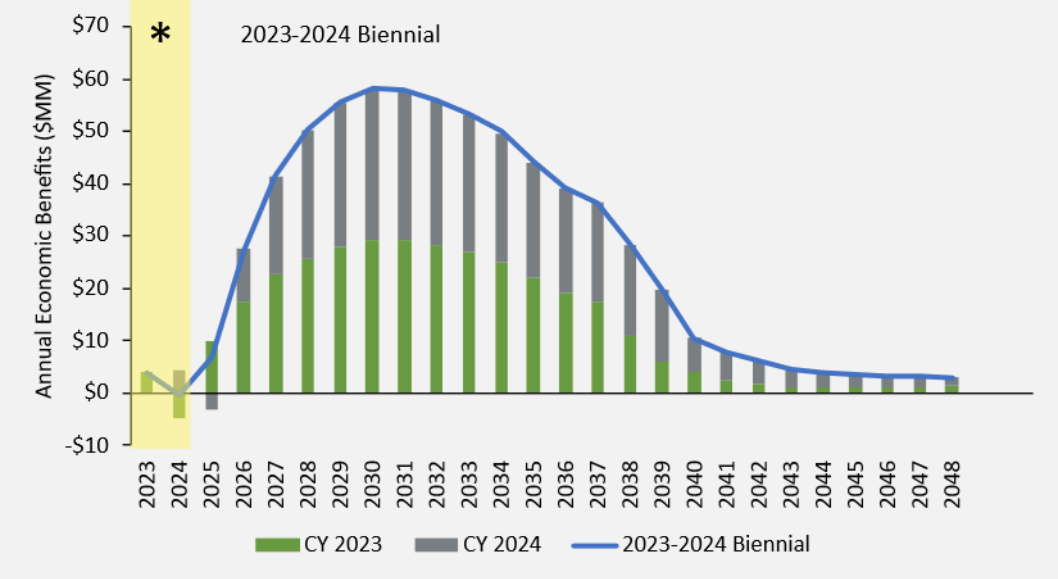
Focus on Energy offerings not only stimulate demand for energy efficiency and renewable energy technologies and services but also redirect money spent on fuel imports from out of state back into the Wisconsin economy.[9] This results in additional positive impacts on statewide wages, profits, and taxes, which boost economic benefits in the form of value added to Wisconsin's gross state product.

Figure 3 shows economic benefits by year. Because the initial costs of Focus on Energy outweigh the immediate benefits, annual economic benefits dip during the initial program years. However, they rapidly increase to a peak of $58 million in 2030, then taper off as the Wisconsin economy returns to its baseline equilibrium. Additionally, the positive economic benefits generated by earlier years of Focus on Energy program investments (such as the 2019–2022 quadrennium) offset the economic costs of funding the 2023-2024 biennium—a pattern that continues indefinitely, for as long as Focus on Energy is funded and administered.

[9] Per the U.S. EIA, Wisconsin consumes almost six times as much energy as it produces.

EIA. "Wisconsin End-Use Energy Consumption 2023 Estimates." https://www.eia.gov/state/?sid=WI.

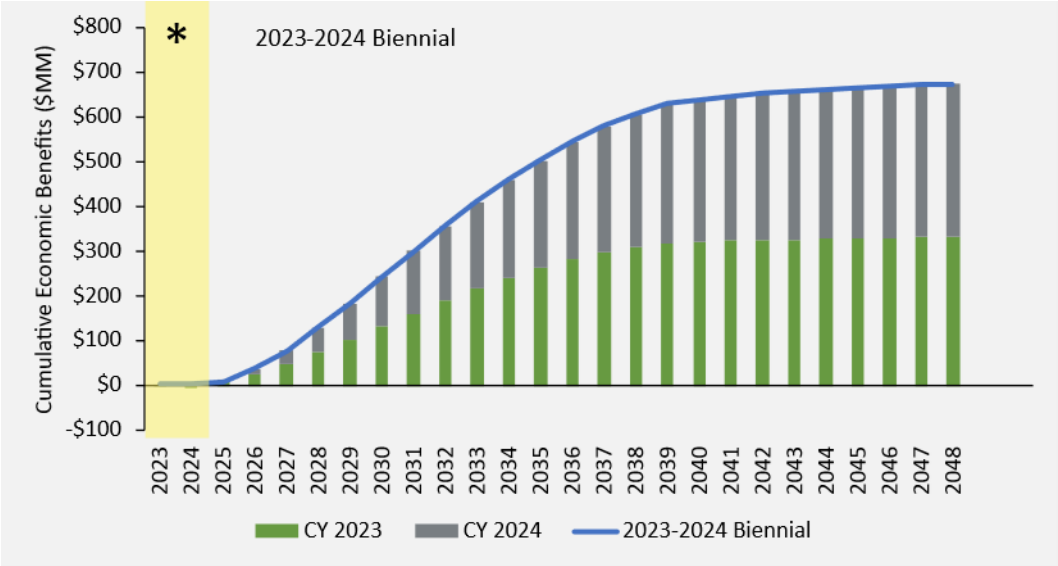
Figure 3. Annual Economic Benefits by Program Year



Note: Asterisk, along with yellow shading, indicates the biennium (or first two years) of the analysis period.

Similarly, Figure 4 shows how the annual economic benefits in Figure 3 accumulate over time. Cumulative economic benefits generated by Focus on Energy in CY 2023 and CY 2024 investments will reach their peak of more than $675 million at the end of the analysis window in CY 2048.

Figure 4. Cumulative Economic Benefits by Program Year



Note: Asterisk, along with yellow shading, indicates the biennium (or first two years) of the analysis period.

3.3.1. Impact of Economic Benefits on Cost-Effectiveness

The PSC currently considers the modified Total Resource Cost (mTRC) test the primary test for assessing the cost-effectiveness of individual offerings and the Focus on Energy portfolio as a whole.[10] The test's purpose is to determine if the total costs incurred by residents, businesses, and Focus on Energy in delivering energy efficiency and renewable energy offerings are outweighed by the total benefits they receive. The mTRC accounts for benefits in the form of avoided utility and environmental costs from avoided energy consumption. Economic benefits are not among the component benefits accounted for by the mTRC.

In addition to the mTRC test, Cadmus calculates an expanded TRC test that incorporates economic benefits. This section shows how mTRC test results change when the economic benefits derived from this analysis are included. Economic impact analyses are intended to estimate the magnitude of economic benefits, not to develop exact dollar values for economic benefits. However, because cost-effectiveness is calculated using exact dollar values, and to remain consistent with prior economic impact analyses, Cadmus provides dollar values for economic benefits in the tables below. Rounding these estimates (to the closest $1 million, for example) would have a very small effect on total TRC benefits and the TRC benefit/cost ratios.

Table 6 lists the results of the modified and expanded TRC tests for CY 2023. Economic benefits attributable to Focus on Energy activity in CY 2023 increase total TRC benefits from $726 million to $1.1 billion and the benefit/cost ratio from 2.58 to 3.76.

[10] The use of the mTRC test as the primary cost-effectiveness test is directed by the PSC.
Public Service Commission of Wisconsin. November 14, 2022. *Quadrennial Planning Process IV – Final Decision*. PSC Docket 5-FE-104, PSC REF#: 453081. https://apps.psc.wi.gov/ERF/ERFview/viewdoc.aspx?docid=453081.

Table 6. CY2023 TRC Test Results

Test Component	Modified TRC (without economic benefits)	Expanded TRC (with economic benefits)
Administrative Costs	$2,902,485	$2,902,485
Delivery Costs	$32,354,216	$32,354,216
Incremental Measure Costs	$246,614,209	$246,614,209
Total TRC Costs	**$281,870,910**	**$281,870,910**
Electric Benefits	$286,312,750	$286,312,750
Natural Gas Benefits	$148,407,096	$148,407,096
Emissions Benefits	$244,712,899	$244,712,899
T&D Benefits	$46,444,919	$46,444,919
Economic Benefits	$0	$333,273,000
Total TRC Benefits	**$725,877,664**	**$1,059,150,664**
TRC Benefits Minus Costs	**$444,006,754**	**$777,279,754**
TRC Benefit/Cost Ratio	**2.58**	**3.76**

Table 7 lists the results of the modified and expanded TRC tests for CY2024. Economic benefits attributable to Focus on Energy activity in CY2020 increase total TRC benefits from $680 million to $1.02 billion and the benefit/cost ratio from 2.45 to 3.68.

Table 7. CY 2024 TRC Test Results

Test Component	Modified TRC (without economic benefits)	Expanded TRC (with economic benefits)
Administrative Costs	$2,645,458	$2,645,458
Delivery Costs	$33,067,777	$33,067,777
Incremental Measure Costs	$241,433,674	$241,433,674
Total TRC Costs	**$277,146,909**	**$277,146,909**
Electric Benefits	$276,326,594	$276,326,594
Natural Gas Benefits	$107,631,645	$107,631,645
Emissions Benefits	$253,968,393	$253,968,393
T&D Benefits	$42,058,320	$42,058,320
Economic Benefits	$0	$340,157,000
Total TRC Benefits	**$679,984,952**	**$1,020,141,952**
TRC Benefits Minus Costs	**$402,838,043**	**$742,995,043**
TRC Benefit/Cost Ratio	**2.45**	**3.68**

Table 8 lists the results of the modified and expanded TRC tests for the biennium. Economic benefits attributable to Focus on Energy biennium activity increase total TRC benefits from $1.4 billion to roughly $2.1 billion and improve the benefit/cost ratio from 2.51 to 3.72.

Table 8. 2023–2024 Biennium TRC Test Results

Test Component	Modified TRC (without economic benefits)	Expanded TRC (with economic benefits)
Administrative Costs	$5,547,943	$5,547,943
Delivery Costs	$65,421,993	$65,421,993
Incremental Measure Costs	$488,047,883	$488,047,883
Total TRC Costs	**$559,017,819**	**$559,017,819**
Electric Benefits	$562,639,344	$562,639,344
Natural Gas Benefits	$256,038,741	$256,038,741
Emissions Benefits	$498,681,292	$498,681,292
T&D Benefits	$88,503,239	$88,503,239
Economic Benefits	$0	$673,430,000
Total TRC Benefits	**$1,405,862,616**	**$2,079,292,616**
TRC Benefits Minus Costs	**$846,844,797**	**$1,520,274,797**
TRC Benefit/Cost Ratio	**2.51**	**3.72**

3.4. Disposable Personal Income

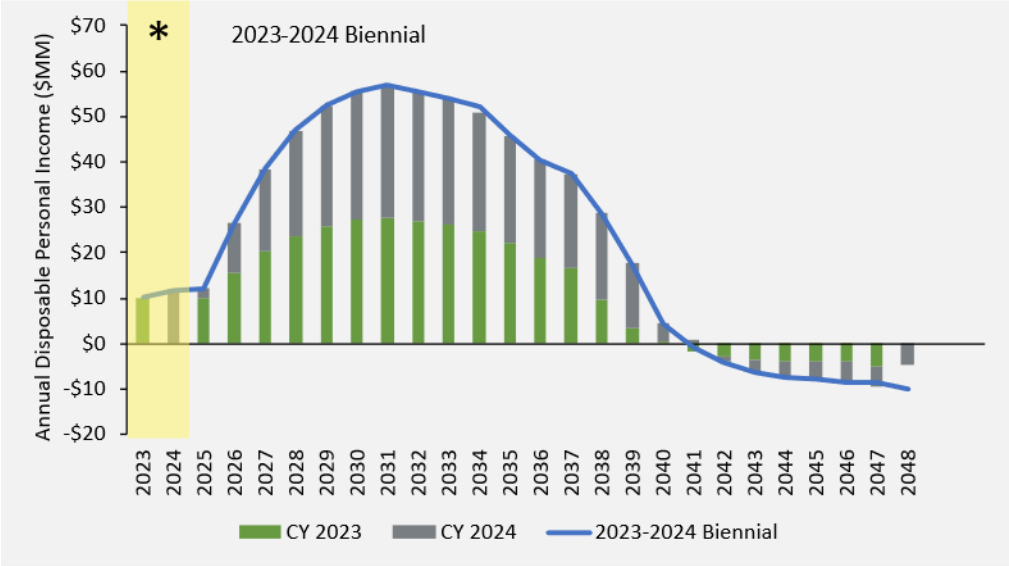
Direct spending that funds Focus on Energy and the utility bill savings generated by energy efficiency and renewable energy projects increases labor demand. In turn, the regional economy sees increases in employment and compensation, generating more disposable personal income that can be saved or spent at the individual's discretion on goods and services across Wisconsin's sectors and industries, stimulating further regional economic activity. These changes to disposable personal income accrue to both participants and non-participants alike.

Disposable personal income impacts are calculated within the REMI E3+ model as part of the broader macroeconomic response to changes in spending, prices, and labor demand. Specifically, the model tracks how Focus on Energy–related cash flows, such as program spending, participant co-funding, utility bill savings, and changes in utility rates, affect employment, wages, and other income components across the Wisconsin economy. These changes are translated into after-tax income available to households, consistent with the Bureau of Economic Analysis (BEA) definition of disposable personal income. The results presented here reflect the difference between the modeled economy with and without Focus on Energy (i.e., net impacts), rather than a direct measurement from observed data.

Figure 5 illustrates how disposable personal income changes over time. Annual impacts shown in Figure 5 represent the year-by-year net change in disposable personal income relative to the baseline (no-program) scenario as estimated by the REMI model. Disposable personal income decreases for both biennium years during the second year of the investments. This is due to both the initial costs of funding Focus on Energy outweighing the immediate benefits generated by energy efficiency and renewable energy projects, and to changes to the private fixed investment parameters to account for the errors in previous modeling. Disposable personal income rapidly increases and then peaks at $57 million in

CY 2031, tapering off as the Wisconsin economy slowly returns to its baseline equilibrium. As with economic benefits, the ongoing positive disposable personal income impacts created in previous program years (such as the 2019–2022 quadrennium) offset the small declines during biennium program years.

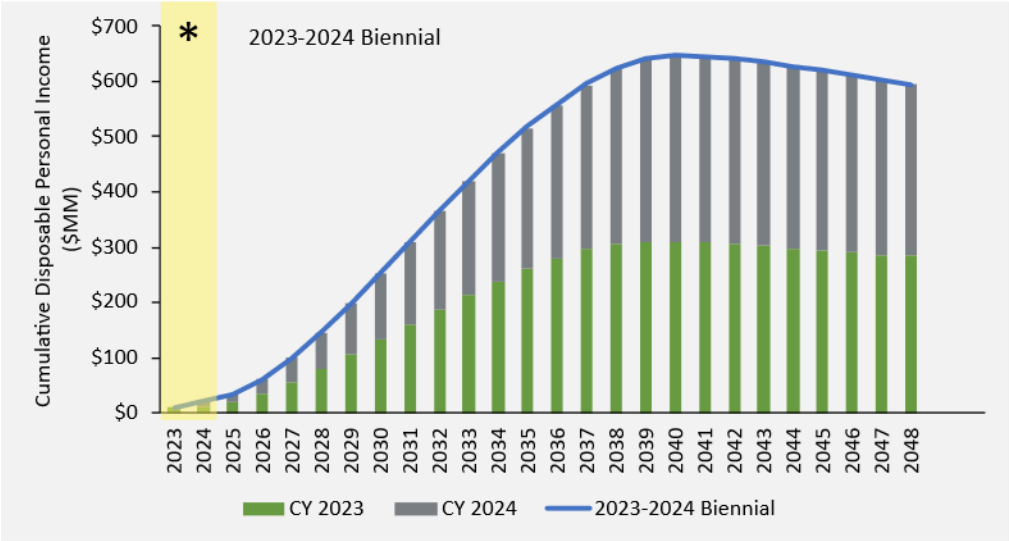
Figure 5. Annual Disposable Personal Income Gains by Program Year



Note: Asterisk, along with yellow shading, indicates the biennium (or first two years) of the analysis period.

Similarly, Figure 6 shows how disposable personal income in Figure 5 accumulates over time. Cumulative impacts represent the sum of annual net changes over the analysis period, reflecting the total additional income generated by Focus on Energy investments. Cumulative disposable personal income created by Focus on Energy CY 2023 through CY 2024 investments will peak at roughly $647 million in CY 2040.

Figure 6. Cumulative Disposable Personal Income Gains by Program Year



Note: Asterisk, along with yellow shading, indicates the biennium (or first two years) of the analysis period.

3.4.1. Household Disposable Personal Income Impacts

The U.S. Census Bureau estimates there are more than 2.5 million occupied households in the state of Wisconsin.[11] With cumulative disposable personal gains nearing $600 million, Focus on Energy is estimated to generate an average of $240 in additional disposable personal income per household through CY 2048. This average represents a statewide estimate; actual impacts will vary across households depending on factors such as income level, employment status, geography, and other demographic characteristics. This analysis does not disaggregate impacts by household type or socioeconomic group.

[11] U.S. Census Bureau QuickFacts, Wisconsin. 2024. "Populations and People."https://data.census.gov/profile/Wisconsin?g=040XX00US55#populations-and-peoplehttps://www.census.gov/quickfacts/WI.

4. Analytical Approach

This section describes the REMI E3+ modeling software, the approach Cadmus used to determine net economic impacts attributable to Focus on Energy, and the model inputs used in the REMI E3+ model framework.

4.1. REMI E3+ Modeling Software

Studies that assess the net economic impacts of energy efficiency and renewable energy programming and investment typically use one of two types of modeling analysis:

- The first type uses an input-output (IO) matrix to assess interactions between industries under static economic conditions, which is suitable for determining the approximate impacts of program-related cash flows that lead to ripple effects throughout the economy. However, an IO assessment does not incorporate future economic changes—such as labor migration, price changes, and general economic equilibrium—that affect the economic impacts of ongoing energy savings.
- The second type of analysis incorporates dynamic changes in those variables and is a better option for assessing the near-term and long-term impacts of energy efficiency and renewable resource programs like those offered by Focus on Energy. In a dynamic model, economic conditions are allowed to adjust over time rather than remain fixed. For example, energy efficiency projects reduce participants' electricity and natural gas use, which lowers utility bills and changes how households and businesses allocate spending in future years. At the same time, reduced energy sales may affect utility revenues and future retail rates, which can partially offset participant bill savings. The model also accounts for how changes in demand for energy efficiency goods and services affect employment, compensation, and household spending over the analysis period.

REMI E3+ features both types of economic analysis, incorporating an IO matrix, general equilibrium, econometrics, and economic geography:

- **The IO matrix** is at the core of how the REMI E3+ model captures industry-to-industry interactions within a particular region—in this case, the state of Wisconsin.
  - For example, buying home insulation directs funds to the insulation industry. REMI E3+ includes a set of spending multipliers that account for how the insulation industry interacts with other industries, such as the fiberglass industry.
- **General equilibrium** captures the long-term stabilization of the economic system as supply and demand become balanced.
  - For example, as investments in energy-efficient equipment increase, general equilibrium is established as contractors hire more employees to install and maintain the new energy-efficient equipment in the region. Additionally, commercial and industrial program participants have lower long-term energy costs, improving their competitiveness relative to neighboring states and allowing them to capture a greater share of the regional market.

- **Econometrics** estimates responses to economic changes and the speed at which they occur.
  - For example, as Focus on Energy program participants demand less energy because they are using more energy-efficient equipment, utilities increase energy rates to maintain revenue and profits. In this case, the econometric factor "price elasticity of energy demand" describes how utilities change prices to account for reductions in demand.
- **Economic geography** represents spatial characteristics of the economy, such as productivity and competitiveness, arising from industry clustering and labor market access.
  - For example, as investments in energy-efficient equipment increase, clusters of specialized labor and firms related to energy efficiency and renewable energy will develop in Wisconsin. In other words, Focus on Energy helps develop the energy efficiency and renewable energy industries in Wisconsin.

Unlike standard IO models, the REMI E3+ model accounts for the expected annual changes in the statewide economy over the entire analysis period. The economic production and growth data underpinning the model are based on real historical and forecasted conditions. As a result, the REMI E3+ model accounts for near-term conditions that affect calculated investment impacts and spending completed during the program operational period, and the model considers long-term conditions that affect calculated impacts from ongoing energy savings.

4.2. Modeling Approach

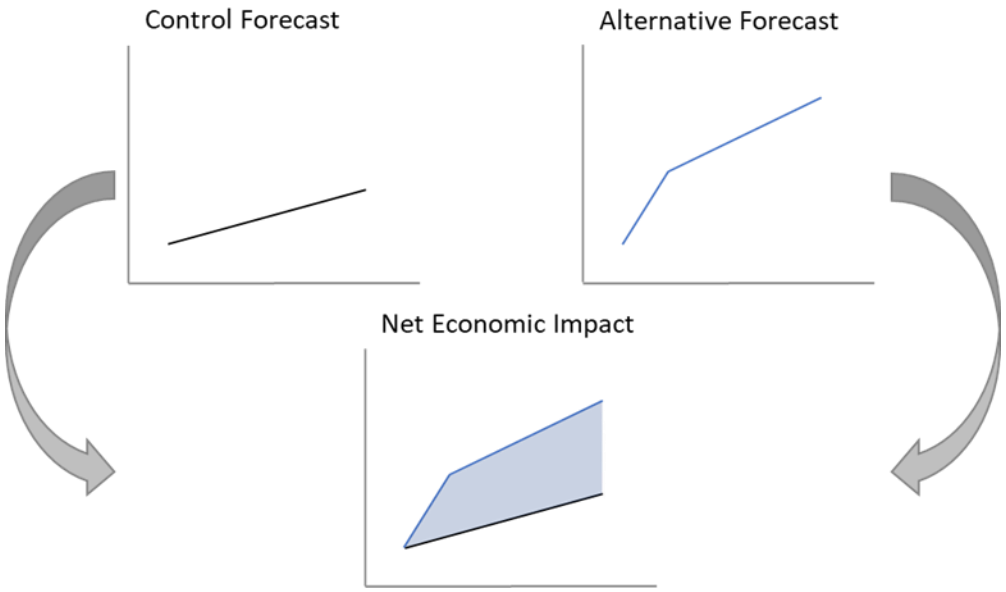
Cadmus used a customized REMI E3+ model for the state of Wisconsin to determine the net impacts on economic benefits (value added), employment, and disposable personal income resulting from Focus on Energy investments in energy efficiency and renewable energy programming during the quadrennium, both by program year and in aggregate.

Most critically, spending in one sector of the Wisconsin economy must be offset by spending elsewhere, such that money is neither created nor destroyed. For example, increased consumer spending on energy-efficient appliances (to participate in Focus on Energy) is offset by decreased spending on other goods and services that would have occurred in the absence of Focus on Energy. Additionally, investments in Focus on Energy must be funded by customers through added rates to their utility bill payments. As a result, total statewide spending remains constant, and modeled results represent the difference between an economy with and without Focus on Energy (net economic impacts).

Cadmus used the REMI E3+ model's standard regional control as the baseline scenario (control forecast) against which the economic impacts created by Focus on Energy (alternative forecast) can be compared. The standard regional control captures the impacts of economic activity that would have occurred without Focus on Energy investments in energy efficiency and renewable energy, project spending by customers, and the resulting energy savings and emissions reductions. This baseline economic activity primarily comprises participants' consumption of fuel and power had they not received incentives from Focus on Energy to purchase energy-efficient or renewable energy technologies or services.

As Figure 7 illustrates, the REMI E3+ model compares the differences in impacts from the control and alternative forecasts to estimate the net economic impacts created by Focus on Energy.

Figure 7. Determining Net Economic Impacts with REMI E3+

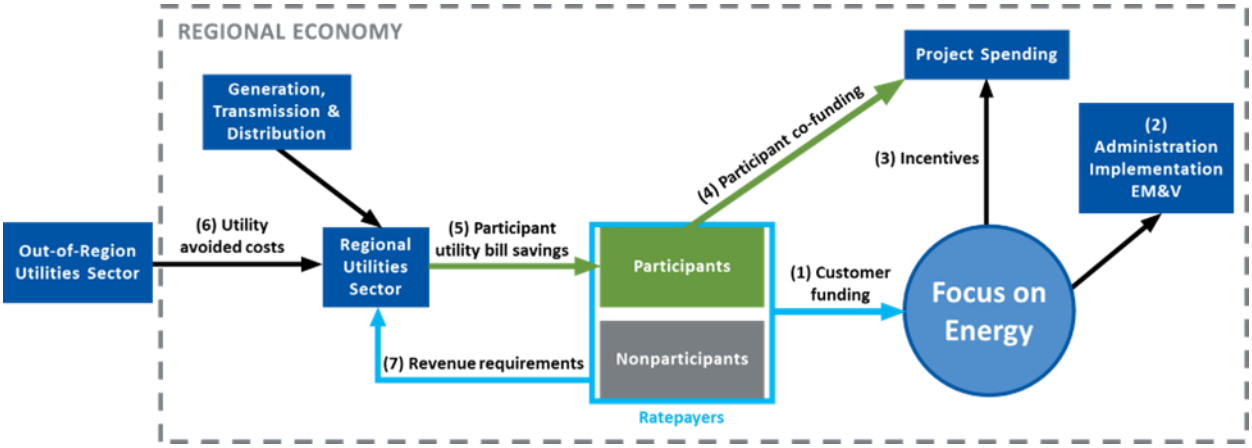


The REMI E3+ model calculates the control forecast based on the standard regional control and the alternative forecast based on user-customized model inputs (which, for this analysis, reflect economic activity related to Focus on Energy). The model integrates economic data collected by various federal government agencies. Employment and wage data are from the Bureau of Economic Analysis, Bureau of Labor Statistics, and County Business Patterns database. Information on fuel wholesale and retail costs is from the U.S. EIA. Data from the U.S. Census Bureau form the basis for model assumptions of population growth and migration within and between regions.[12]

For each program year of the biennium and in aggregate, Cadmus customized REMI E3+ inputs to model Focus on Energy-related cash flows among relevant stakeholder groups, as shown in Figure 8.

[12] For a more detailed breakdown of the data sources and estimate procedures included in the REMI E3+ model forecasts, please reference REMI's user documentation online: https://www.remi.com/wp-content/uploads/2019/11/Model-Equations.pdf.

Figure 8. Economic Cash Flows Attributable to Focus on Energy



These cash flows—consisting of customer funding; spending on administration, implementation, and EM&V; incentives; participant co-funding; participant utility bill savings; utility avoided costs; and revenue requirements—affect the Wisconsin economy as follows:

(1) Customer funding. Funding for Focus on Energy originates from participating utilities' revenues, which are collected from Wisconsin customers through a charge embedded in their utility bills.

(2) Administration, implementation, and EM&V (direct spending). Focus on Energy funds are spent on program administration activities, technical and customer support, marketing, and EM&V services provided by program trade allies and partners.

(3) Incentives. Focus on Energy funds are also spent on direct financial and service-based incentives that encourage investments in energy-saving technologies and behaviors.

- For accounting purposes, customer funding equals direct spending plus incentives**.** In other words, utility expenditures on Focus on Energy are offset dollar-for-dollar by customer funding.

(4) Participant co-funding. In addition to receiving incentives from Focus on Energy programs, participants provide their own co-funding to complete payments for project goods and services.

- Because participants choose to invest in energy efficiency or renewable energy (Project Spending, Figure 8), Cadmus assumes that participants would have spent these funds elsewhere in Wisconsin's economy. Accordingly, participant co-funding is offset by an equal-and-opposite decrease in customer spending in other industries.[13]

[13] Assigned automatically by REMI.

(5) Participant utility bill savings. Participants save energy for as long as energy-efficient and renewable energy measures remain installed and operational, as informed by EULs deemed by the Wisconsin TRM. Those energy savings translate to participant utility bill savings.

- Every dollar saved by participants results in a dollar of lost revenues by utilities.

(6) Utility avoided costs. As a result of decreased demand for energy resources, Wisconsin utilities benefit from avoided fuel costs, calculated as a function of energy savings.

(7) Revenue requirements. Utilities may seek to recover lost revenues (due to participant utility bill savings) by increasing future retail rates paid by Wisconsin customers. When utilities increase rates, energy costs increase for all customers, resulting in higher utility bill payments and, in turn, higher future revenues that help recover lost revenues. Cadmus assumes utilities pay a small return on investment to shareholders and reinvest the remaining recovered lost revenues in utility infrastructure.

Lastly, energy savings that generate participant utility bill savings and utility avoided costs also generate emissions reductions, which are not shown in Figure 8. With REMI's E3+ model, Cadmus can account for emission reductions as a non-cash-flow input that affects Wisconsin's "attractiveness," leading to in-migration and additional stimulus to economic activity, including higher labor force participation and employment and increased retail and real estate activity. Table 9 summarizes model inputs according to their positive and negative impacts on relevant stakeholder groups.

Table 9. Summary of Positive and Negative Model Impacts by Cash Flow

Cash Flow	Positive Impacts	Negative Impacts
Customer funding	N/A	Reduces consumption and investments in other sectors of the regional economy
Direct spending	Funds program administration, implementation, marketing, and EM&V	N/A
Incentives	Reduces up-front cost of project or measure for participant	N/A
Participant co-funding	Increases consumption of goods and services in sectors specific to Focus on Energy activity	Reduces consumption and investments on other goods/services by participants
Participant utility bill savings	Increases residential disposable income for savings and spending; Reduces commercial costs of production	Reduces utility revenue
Utility avoided costs	Reduces generation and T&D costs for in-state utilities	N/A
Revenue requirements	Partially offsets utility revenue losses, which utilities reinvest in infrastructure	Partially increases future bill rates charged to customers on their utility bills
Emissions reductions[1]	Increases attractiveness of Wisconsin, which stimulates more economic activity	N/A

[1] Not shown in Figure 8.

5. Model Input Data

This section describes evaluated spending and monetized energy-savings data for energy efficiency and renewable energy projects completed through Focus on Energy, which Cadmus translated into REMI E3+ model inputs. All monetary inputs are presented in fixed 2022 U.S. dollars.[14]

For more information about the bolded terminology used in this section, refer to *Modeling Approach*.

5.1. First-Year Spending

First-year spending consists of direct spending by utilities on Focus on Energy offerings (including administrative costs and incentives) and project co-funding by participants.

5.1.1. Direct Spending

Direct spending on Focus on Energy offerings comprises administration, implementation, and EM&V costs and incentives and is funded by customers in participating utility service territories. As shown in Table 10, direct spending totaled roughly $189 million during the 2023–2024 biennium. Cadmus sourced direct spending data from Baker Tilly and Statewide Energy Efficiency and Renewable Administration (SEERA) annual expense reports.[15]

Table 10. Focus on Energy Direct Spending by Category

Program Year	Direct Spending Categories ($1000s)				
	Administration	Implementation	Incentives	EM&V	Total
CY 2023	$2,903	$32,439	$55,273	$2,467	$93,082
CY 2024	$5,634	$32,200	$53,888	$3,820	$95,542
Biennium	**$8,537**	**$64,639**	**$109,161**	**$6,287**	**$188,624**

5.1.2. Participant Co-Funding

While some participants benefit from free direct-to-customer offerings, such as appliance recycling and mail-order packs of energy-efficient measures, many Focus on Energy participants pay the cost of their energy efficiency and renewable energy projects that are not covered by utility incentives. Participant co-

[14] Calculated using the U.S. Bureau of Labor Statistics consumer price index for the Illinois-Indiana-Wisconsin region. https://www.bls.gov/cpi/data.htm.

[15] Baker Tilly currently serves as the Focus on Energy Compliance Agent. SEERA is the legal entity (nonprofit) formed by Energy Utilities to fulfill their obligations under Wisconsin Statute § 196.374(2)(a). SEERA creates and funds the statewide energy efficiency and renewable energy programs.

funding represents customer spending on energy efficiency and renewable energy that would have otherwise been spent elsewhere in the Wisconsin economy.[16]

Table 11 shows participant co-funding by program year and customer segment. Co-funding exceeded $211 million for the biennium, with commercial and industry co-funding accounting for more than 61% of all co-funding.

Table 11. Participant Co-Funding by Customer Segment

Program Year	Participant Co-Funding ($1000s)[1]		
	Residential	C&I	Total
CY 2023	$42,347	$57,634	$99,980
CY 2024	$40,044	$71,257	$111,301
Biennium	**$82,391**	**$128,891**	**$211,282**

[1] Totals may not sum due to rounding.

5.2. Energy Savings

The main benefit of Focus on Energy is participant energy savings. In its role as evaluation contractor for Focus on Energy, Cadmus calculates gross reported, gross verified, and net verified energy savings. For evaluation purposes, Cadmus uses net verified gross savings to calculate participant utility bill savings and utility avoided costs. These data are extracted from SPECTRUM, Focus on Energy's database.

Figure 9 illustrates first-year and future electric net verified savings by program year. Lifecycle savings, which represent the sum of first-year and future savings, vary based on the EULs of energy efficiency and renewable energy measures installed in each customer segment by program year. Residential participation generated 14% of first-year net verified energy savings (103 GWh) and 12% of lifecycle net verified energy savings (1,300 GWh).

[16] In SPECTRUM, participant co-funding is represented by net verified incremental costs. Net verified energy savings account for various market and behavioral forces for which adjustments are made to gross verified energy savings. The ratio between net and gross verified savings (net-to-gross) is then applied to incremental costs so that energy savings and incremental costs are scaled proportionally.

Figure 9. First-Year and Future Electric Net Verified Energy Savings (GWh)

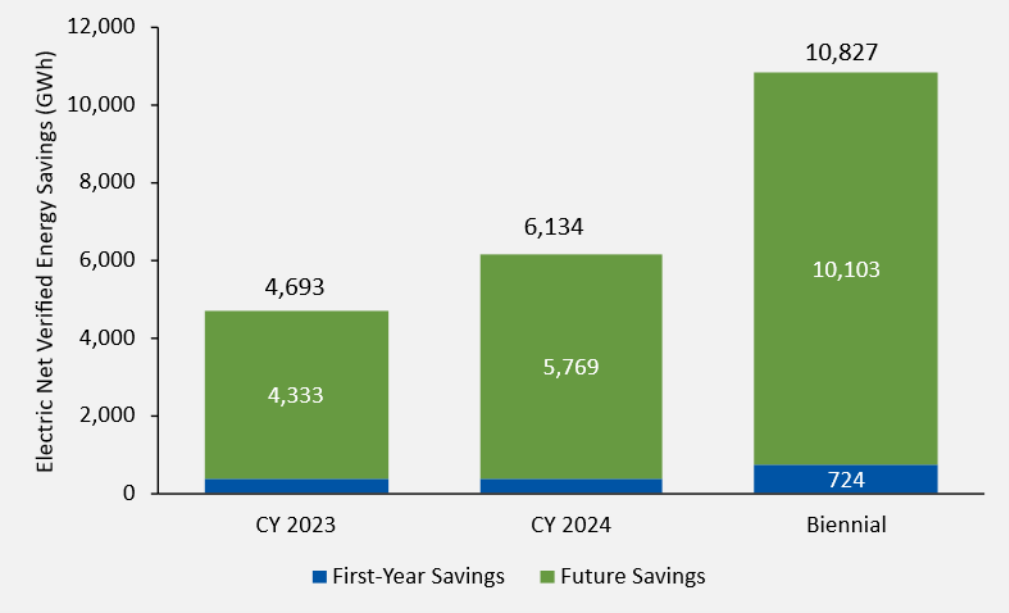


Figure 10 illustrates net verified demand reduction by program year. Residential participation accounted for 16% of net verified demand reduction (18 MW).

Figure 10. Electric Net Verified Demand Reduction (MW)

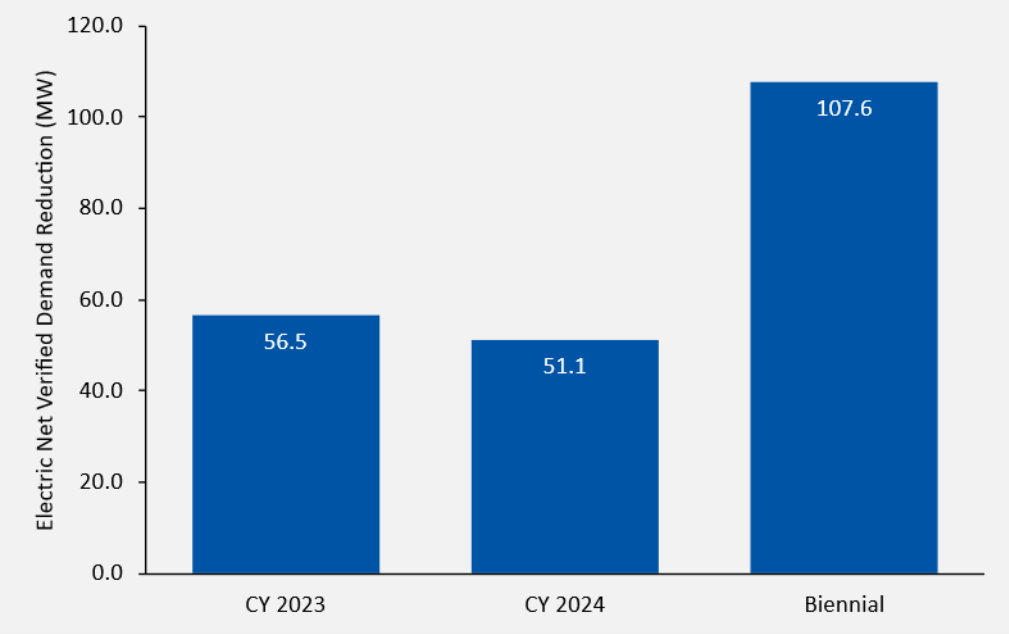
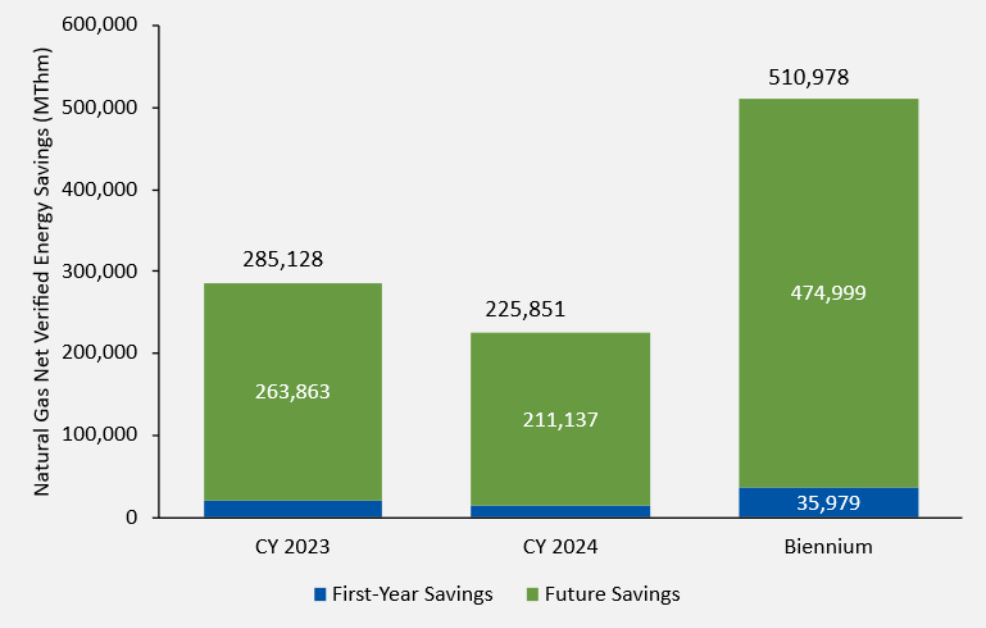


Figure 11 illustrates first-year and future natural gas net verified energy savings by program year. Residential participation generated 35% of first-year net verified energy savings (12,657 MThm) and 35% of lifecycle net verified energy savings (179,820 MThm).

Figure 11. First-Year and Future Natural Gas Net Verified Energy Savings (MThm)



5.2.1. Participant Bill Savings

Customers benefit from participating in Focus on Energy by saving energy, which helps them save money on their utility bills. Cadmus used net verified savings and retail rate data and projections to calculate bill savings for participants,[17] which recur annually until energy efficiency and renewable energy projects reach the end of their EULs, as deemed by the TRM.

Electric Bill Savings

Table 12 presents first-year and lifecycle electric bill savings attributable to each Focus on Energy program year. The biennium totaled over $79 million of first-year electric bill savings and will produce roughly $1.2 billion of lifecycle electric bill savings through CY 2048.

Table 12. Participant Electric Bill Savings

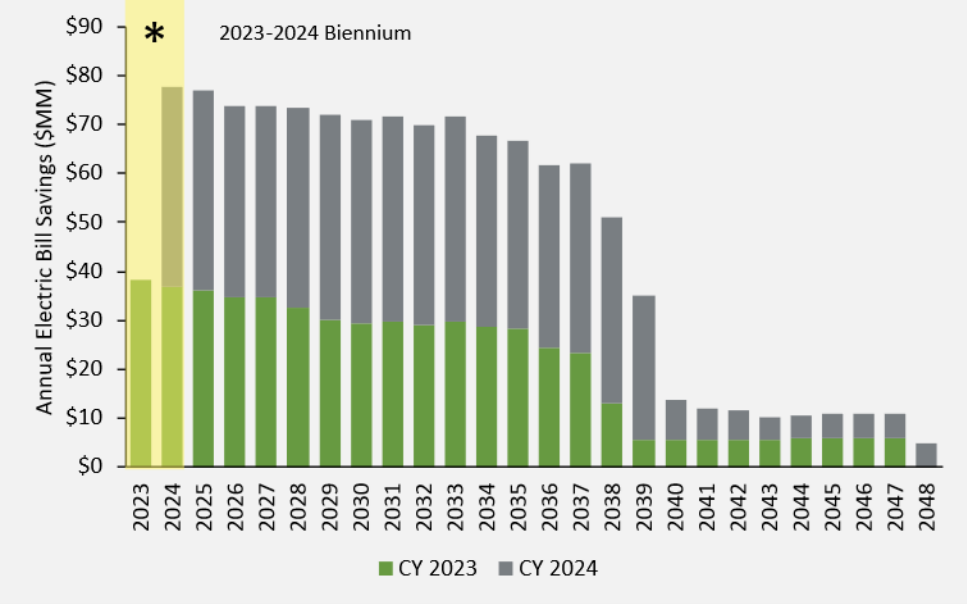
Program Year	Participant Electric Bill Savings ($1000s)[1]	
	First-Year	Lifecycle
CY 2023	$38,149	$531,553
CY 2024	$41,081	$678,567
Biennium	**$79,230**	**$1,210,120**

[1] Totals may not sum due to rounding.

[17] U.S. EIA Annual Energy Outlook 2021: https://www.eia.gov/outlooks/aeo/data/browser/.

Figure 12 illustrates the ongoing annual electric bill savings attributable to each Focus on Energy program year. Electric bill savings peak at roughly $42 million annually per program year ($78 million annually for the biennium), begin to taper off about 11 years after energy efficiency and renewable energy projects are originally completed, and fall below $10 million annually by 2048.

Figure 12. Participant Annual Electric Utility Bill Savings by Program Year



Note: Asterisk, along with yellow shading, indicates the biennium (or first two years) of the analysis period.

Natural Gas Bill Savings

Table 13 presents first-year and lifecycle natural gas bill savings attributable to each Focus on Energy program year. In sum, the biennium created nearly $4.4 million in first-year natural gas bill savings and will create more than $65 million in lifecycle natural gas bill savings through CY 2048. Natural gas bill savings were primarily generated by commercial and industrial projects.

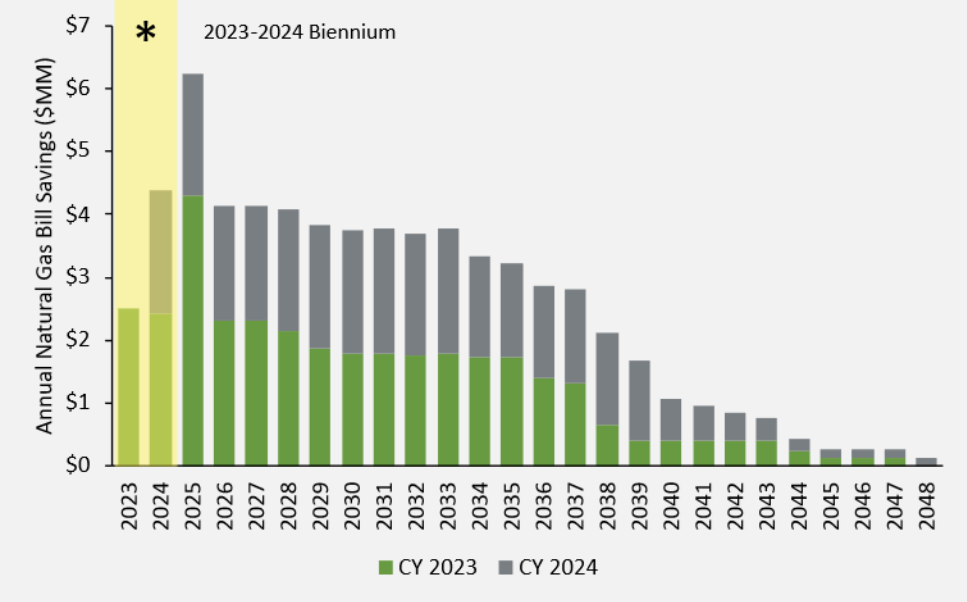
Table 13. Participant Natural Gas Bill Savings

Program Year	Participant Natural Gas Bill Savings ($1000s)[1]	
	First-Year	Lifecycle
CY 2023	$2,517	$34,549.08
CY 2024	$1,935	$30,798.31
Biennium	**$4,452**	**$65,347**

[1] Totals may not sum due to rounding.

Figure 13 illustrates the ongoing annual natural gas bill savings attributable to each program year of Focus on Energy investments and activity. Natural gas bill savings peak at roughly $6 million annually for the biennium in CY 2025, taper off after CY 2034, and cease completely by CY 2048.

Figure 13. Participant Annual Natural Gas Bill Savings by Program Year



Note: Asterisk, along with yellow shading, indicates the biennium (or first two years) of the analysis period.

5.2.2. Utility Avoided Costs

Most of the energy that Wisconsin utilities sell to customers is purchased from out of state. When participants conserve energy through Focus on Energy, utilities benefit from avoiding the cost of purchasing energy.

Cadmus used net verified energy savings (kWh) and net verified demand savings (kW), along with data provided by the PSC, to calculate avoided costs of energy and T&D, which recur annually until energy efficiency and renewable energy projects reach the end of their EULs, as deemed by the TRM. Avoided costs used in the economic impact analysis were also used in cost-effectiveness calculations.

Electric Avoided Costs

Table 14 presents first-year and lifecycle electric avoided costs attributable to each Focus on Energy program year. Energy savings generated roughly $22 million of first-year electric avoided costs and nearly $269 million of lifecycle electric avoided costs through CY 2048.

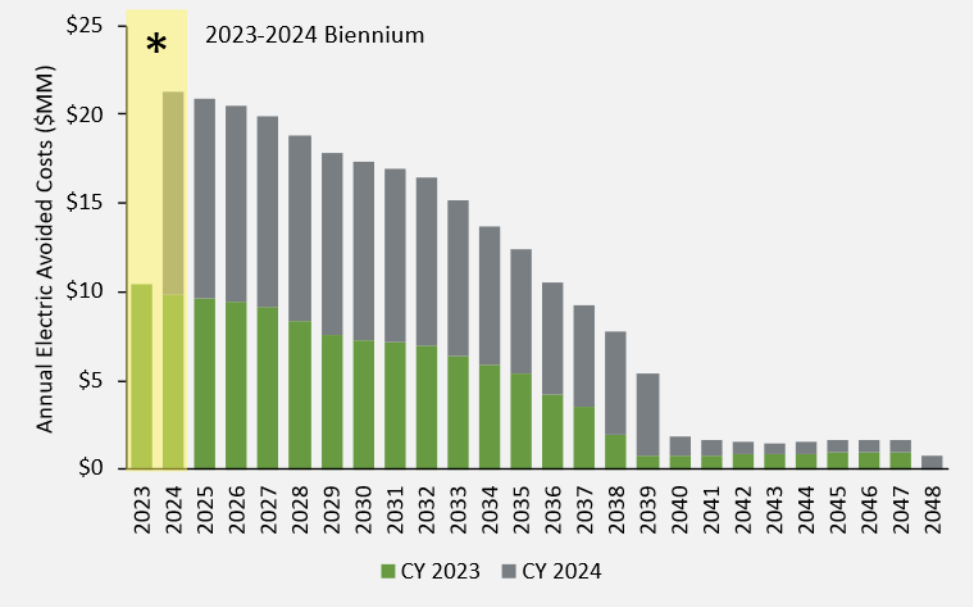
Table 14. Utility Electric Avoided Costs

Program Year	Utility Electric Avoided Costs ($1000s)[1]	
	First-Year	Lifecycle
CY 2023	$10,417	$120,949
CY 2024	$11,490	$147,368
Biennium	**$21,907**	**$268,317**

[1] Totals may not sum due to rounding.

Figure 14 illustrates the ongoing annual electric-avoided costs attributable to each Focus on Energy program year. After the first two program years, electric-avoided costs peak at roughly $21 million in CY 2025 and continually decrease each year, eventually falling to $2 million annually in CY 2040.

Figure 14. Utility Annual Electric Avoided Costs by Program Year



Note: Asterisk, along with yellow shading, indicates the biennium (or first two years) of the analysis period.

Changes to Electric-Avoided Cost Assumptions

Periodically, as needed, the PSC, with guidance from the Focus on Energy EWG, updates the methodology, data, and assumptions used to calculate avoided costs. Following the 2019-2022 quadrennium, Cadmus updated the avoided costs for the new cost-effectiveness calculations. These new avoided costs of electricity would decrease over time, while older avoided costs of electricity would increase over time.

Table 15 compares the forecasted avoided costs of energy per megawatt-hour of electricity between the previous 2019–2022 quadrennium and the current 2023–2024 biennium.

Table 15. Avoided Costs of Electricity ($/MWh) by Forecast

Year	2019–2022 Quad	2023–2024 Biennium	Year	2019–2022 Quad	2023–2024 Biennium
2023	$32.29	$29.90	2036	$50.16	$16.90
2024	$33.66	$29.20	2037	$51.53	$15.10
2025	$35.03	$28.60	2038	$52.91	$15.40
2026	$36.39	$28.00	2039	$54.29	$15.80
2027	$37.76	$27.30	2040	$55.67	$16.10
2028	$39.13	$26.70	2041	$57.04	$16.50
2029	$40.51	$26.00	2042	$58.42	$16.80
2030	$41.89	$25.40	2043	$59.80	$17.10
2031	$43.27	$24.80	2044	$61.18	$17.50
2032	$44.64	$24.10	2045	$62.55	$17.80
2033	$46.02	$22.30	2046	$63.93	$18.20
2034	$47.40	$20.50	2047	$65.31	$18.50
2035	$48.78	$18.70	2048	$66.69	$18.90

The difference between previously and currently forecasted avoided costs of electricity grows to as much as 4.78 cents per kWh (in CY 2048) and approximately amounts to a 72% decrease in avoided costs overall.

Table 16 shows the forecasted avoided costs of T&D per kilowatt.

Table 16. Avoided Costs of T&D ($/kW-yr)

Year	2023–2024Biennium	Year	2023–2024Biennium
2023	$135.46	2036	$176.99
2024	$139.56	2037	$179.83
2025	$143.66	2038	$182.67
2026	$147.76	2039	$185.52
2027	$151.88	2040	$188.38
2028	$154.64	2041	$191.25
2029	$157.40	2042	$194.12
2030	$160.18	2043	$197.01
2031	$162.96	2044	$199.90
2032	$165.75	2045	$202.81
2033	$168.55	2046	$205.72
2034	$171.35	2047	$208.65
2035	$174.17	2048	$211.58

Natural Gas Avoided Costs

Table 17 presents first-year and lifecycle natural gas utility avoided costs attributable to each Focus on Energy program year. Energy savings generated roughly $17 million of first-year natural gas avoided costs and will generate nearly $291 million of lifecycle natural gas avoided costs through CY 2048.

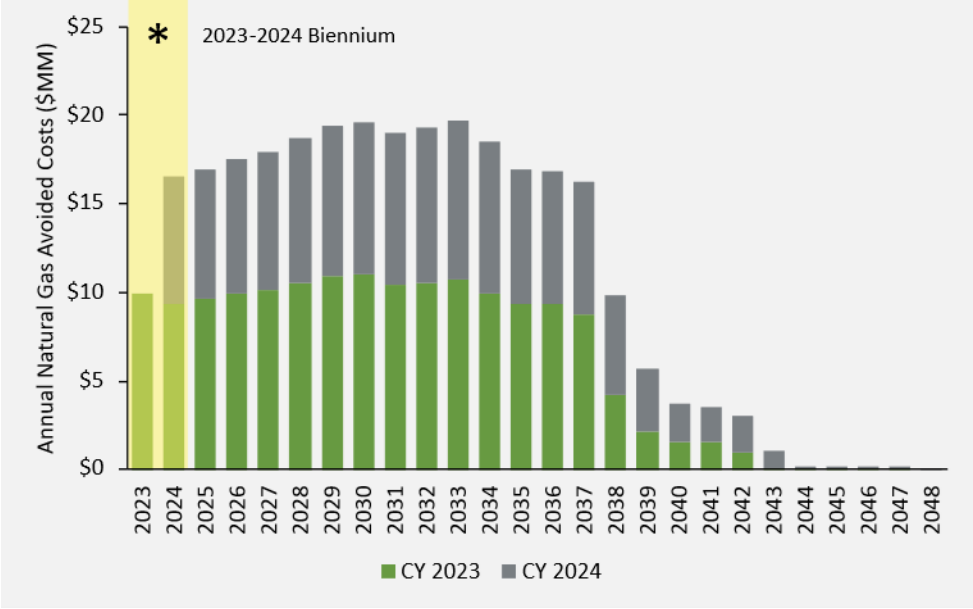
Table 17. Utility Natural Gas Avoided Costs

Program Year	Utility Natural Gas Avoided Costs ($1000s)	
	First-Year	Lifecycle
CY 2023	$9,909	$161,301
CY 2024	$7,167	$129,319
Biennium	**$17,076**	**$290,621**

[1] Totals may not sum due to rounding.

Figure 15 illustrates the ongoing annual natural gas avoided costs attributable to each Focus on Energy program year. Natural gas avoided costs peak at roughly $20 million in CY 2033, taper off after CY 2037, and cease almost completely by CY 2043.

Figure 15. Annual Utility Natural Gas Avoided Costs by Program Year



Note: Asterisk, along with yellow shading, indicates the biennium (or first two years) of the analysis period.

Changes to Natural Gas Avoided Cost Assumptions

Following the 2019-2022 quadrennium, Cadmus updated the avoided costs of natural gas generation for the new cost-effectiveness calculations. These new avoided costs of electricity would decrease over time, while older avoided costs of electricity would increase over time.

Table 18 compares the forecasted avoided costs per therm of natural gas between the previous 2019–2012 quadrennium and the current 2023-2024 biennium.

Table 18. Avoided Costs of Natural Gas ($/therm) by Forecast

Year	2019–2022 Quad	2023–2024 Biennium		Year	2019–2022 Quad	2023–2024 Biennium
2023	$0.546	$0.463		2036	$0.715	$0.569
2024	$0.577	$0.451		2037	$0.719	$0.568
2025	$0.617	$0.464		2038	$0.721	$0.571
2026	$0.629	$0.480		2039	$0.724	$0.571
2027	$0.633	$0.490		2040	$0.735	$0.571
2028	$0.647	$0.511		2041	$0.732	$0.571
2029	$0.650	$0.530		2042	$0.740	$0.568
2030	$0.657	$0.538		2043	$0.750	$0.564
2031	$0.654	$0.541		2044	$0.764	$0.564
2032	$0.677	$0.551		2045	$0.777	$0.565
2033	$0.688	$0.561		2046	$0.785	$0.567
2034	$0.695	$0.566		2047	$0.797	$0.571
2035	$0.702	$0.569		2048	$0.819	$0.579

The difference between previously and currently forecasted avoided costs of natural gas grows to as much as 24 cents per therm (in CY 2048) and approximately amounts to a 29% decrease in avoided costs overall.

5.2.3. Net Revenue Effects

Net revenue effects describe the competing impacts of energy savings. Utilities benefit by spending less on fuel and other variable costs associated with energy and T&D (avoided costs). However, when participants consume less energy, utilities sell less energy, resulting in participant bill savings but also less utility revenue. In most cases, including for Wisconsin utilities, the costs of lost revenue exceed the benefits of avoided costs, which may cause utilities to collect less revenue than forecasted.

Net revenue effects are calculated as the difference between revenue losses and avoided costs. In Wisconsin, utilities charge more to deliver energy to customers (retail rates) than they pay to purchase energy from out of state and to transmit and distribute electricity (avoided costs). Thus, when participants save energy, the loss of revenue from each unit of energy saved exceeds its avoided cost, which results in negative net revenue effects that exert downward pressure on net economic impacts.

As described in *Modeling Approach*, utilities may seek to recover lost revenues on a lagged schedule by increasing retail rates in future years to fulfill revenue requirements. In coordination with the EWG, Cadmus developed an approach to address this effect. For this analysis, it is assumed that half of the revenues lost to energy savings annually will be recovered by utilities in the following year.

Electric Net Revenue Effects

Table 19 presents the first-year and lifecycle electric net revenue effects attributable to each Focus on Energy program year. Lifecycle net revenue effects of electric energy savings sum to roughly –$942 million through 2048.

Table 19. Utility Electric Net Revenue Effects

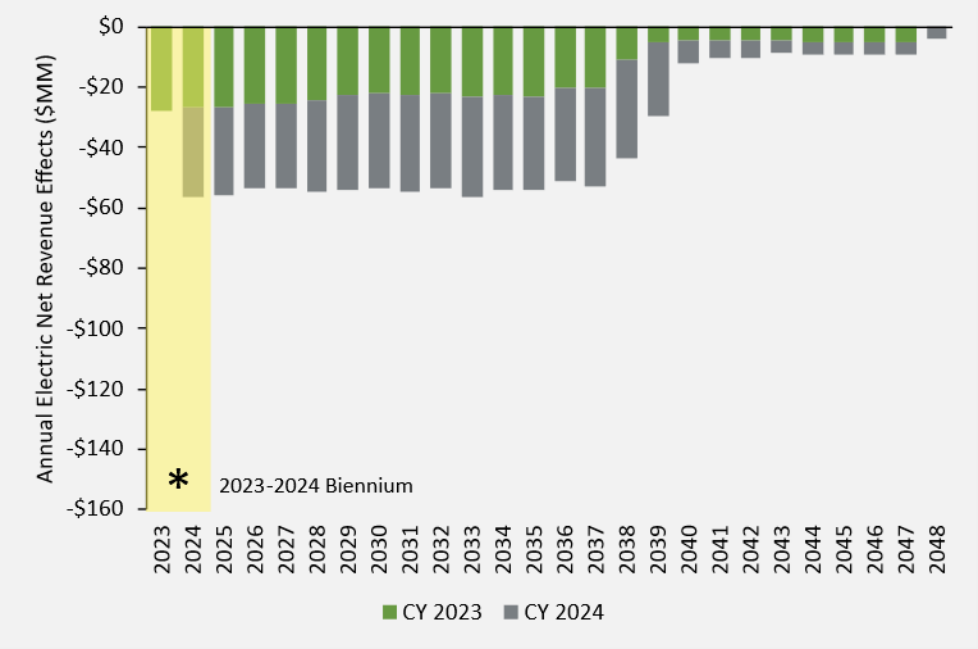
Program Year	Electric Net Revenue Effects ($1000s)[1]	
	First-Year	Lifecycle
CY 2023	-$27,732	-$410,604
CY 2024	-$29,591	-$531,199
Biennium	**-$57,323**	**-$941,803**

[1] Totals may not sum due to rounding.

Figure 16 illustrates the annual utility electric net revenue effects that accumulate from energy savings generated by Focus on Energy participants. Electric net revenue effects are expected to reach an annual peak of nearly –$56 million in CY 2024, taper off slowly through CY 2040, then fade quickly until CY 2048, consistent with annual participant bill savings and utility avoided costs. The inclusion of T&D avoided-cost benefits reduces peak annual electric net revenue effects by -$78 million.[18]

[18] Annual Net Revenue Effect = Annual Avoided Costs – Annual Bill Savings. T&D avoided cost benefits are treated the same as Annual Bill Savings and are subtracted from annual avoided costs. Thus, the net revenue effect gets more negative (i.e., reduces).

Figure 16. Annual Utility Electric Net Revenue Effects by Program Year



Note: Asterisk, along with yellow shading, indicates the biennium (or first two years) of the analysis period.

Natural Gas Net Revenue Effects

Table 20 presents the first-year and lifecycle natural gas net revenue effects attributable to each Focus on Energy program year. Lifecycle net revenue effects of natural gas energy savings sum to nearly $225 million through CY 2048. CY 2023 and CY 2024 both saw positive natural gas net revenue effects, unlike electric net revenue effects, because the total annual avoided costs were greater than annual bill savings. Natural gas bill savings were quite a bit lower in the 2023-2024 biennium compared to previous analysis periods. Hence, the natural gas net revenue effects are positive for both investment years.

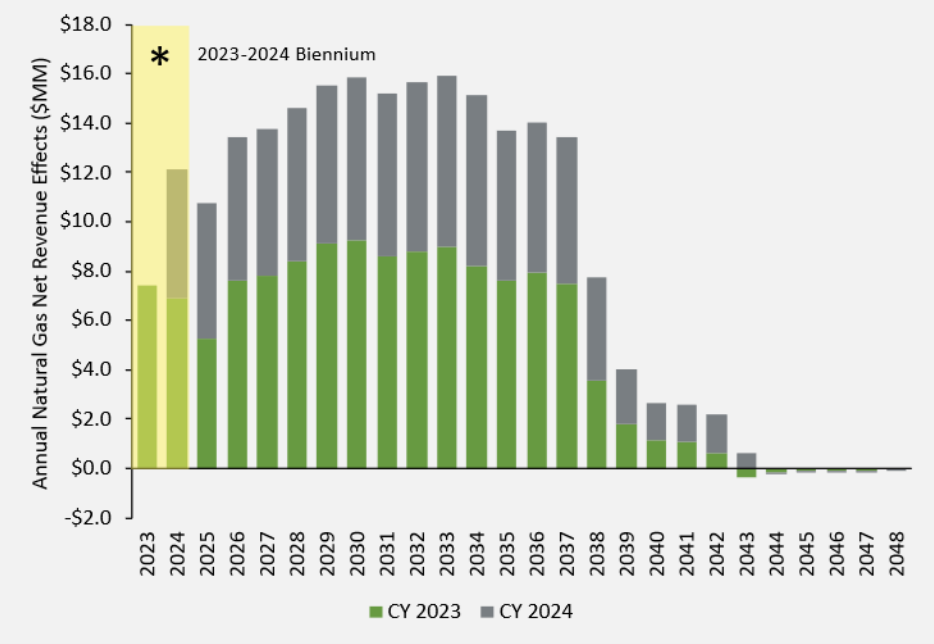
Table 20. Utility Natural Gas Net Revenue Effects

Program Year	Natural Gas Net Revenue Effects ($1000s)[1]	
	First-Year	Lifecycle
CY 2023	$7,392	$126,752.13
CY 2024	$5,232	$98,521.00
Biennium	**$12,624**	**$225,273**

[1] Totals may not sum due to rounding.

Figure 17 illustrates the annual utility natural gas net revenue effects that accumulate from energy savings generated by Focus on Energy participants. Natural gas net revenue effects are expected to reach an annual peak of $16 million in CY 2023, taper off slowly through CY 2037, then fade until CY 2043, consistent with annual participant bill savings and utility avoided costs.

Figure 17. Annual Utility Natural Gas Net Revenue Effects by Program Year



Note: Asterisk, along with yellow shading, indicates the biennium (or first two years) of the analysis period.

5.2.4. Emissions Reductions

To quantify emissions reductions, Cadmus used emissions factors[19,20] that depict the rates at which a unit of energy emits pollutants. Table 21 shows emission reduction factors specific to each fuel type and pollutant, including nitrogen oxides (NO_X), sulfur dioxide (SO_2), and fine particulate matter ($PM_{2.5}$).

Table 21. Emissions Factors by Pollutant and Fuel Type

Fuel Type	Emission Factors (Tons/Unit)		
	NO_X	SO_2	$PM_{2.5}$
Electricity (tons/MWh)	7.8 E-04	1.6 E-03	8.0 E-05
Natural gas (tons/therm)	4.7 E-06	3.0 E-08	3.8 E-08

The product of the emissions factors and the net lifecycle energy savings establishes the total weight (in tons) of emissions reduced by energy saved through Focus on Energy projects. Table 22 shows cumulative emissions reductions for each pollutant and program year.

[19] Electric emissions derived from U.S. Environmental Protection Agency's (EPA's) AVERT (AVoided Emissions and geneRation Tool): https://www.epa.gov/statelocalenergy/avoided-emissions-and-generation-tool-avert.

[20] Natural gas emissions factors derived from EPA's AP-42: Compilation of Air Emissions Factors: https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors.

Table 22. Lifecycle Emissions Reductions (Tons) by Pollutant

Program Year	Lifecycle Emissions Reductions (Tons)[1]		
	NO_X	SO_2	$PM_{2.5}$
CY 2023	-5,003	-7,576	-484
CY 2024	-5,758	-9,709	-567
Biennium	**-10,761**	**-17,286**	**-1,051**

[1] Totals may not sum due to rounding.

Appendix A. Annual Net Employment Impacts

Table A-1 summarizes the annual net employment impacts (jobs added) attributable to each program year of the 2023–2024 biennium. Program year impacts do not sum to biennium impacts due to dynamic factors in the REMI model.

Table A-1. Annual Jobs Added by Program Year

CY Year	CY 2023	CY 2024	Biennium
2023	178	0	178
2024	31	193	225
2025	152	48	200
2026	203	149	352
2027	239	214	453
2028	251	258	508
2029	251	274	526
2030	249	273	522
2031	241	264	505
2032	223	243	465
2033	207	227	434
2034	184	198	382
2035	157	170	327
2036	122	151	272
2037	105	140	245
2038	42	124	166
2039	-3	78	76
2040	-15	-8	-23
2041	-24	-17	-41
2042	-27	-22	-49
2043	-28	-28	-56
2044	-26	-28	-54
2045	-24	-27	-51
2046	-23	-27	-50
2047	-22	-27	-49
2048	-30	-27	-58
Total	**2,611**	**2,793**	**5,403**