

Missed Opportunities - The Impacts of Recent Policies on Energy Efficiency Programs in Midwestern States

Kenji Takahashi, Tim Woolf, Ben Havumaki, David White, PhD, Danielle Goldberg, Shelley Kwok, Andrew Takasugi, Synapse Energy Economics

ABSTRACT

In recent years, several midwestern states have adopted or proposed policies with substantial impacts on the effectiveness of ratepayer-funded energy efficiency programs. Some of these states are restricting the programs by limiting funding, repealing efficiency targets, exempting large business customers, or failing to adopt progressive proposals on energy efficiency policies. Synapse Energy Economics analyzed the impacts of such regressive policies (or the failure to adopt progressive policies) for six selected Midwestern states: Illinois, Indiana, Iowa, Missouri, Ohio, and Wisconsin. More specifically, we analyzed the following:

- **Cost-effectiveness:** We assessed the cost-effectiveness of policy impacts from different perspectives, including utility system, total resource cost, societal, and non-participant perspectives. This assessment considered utility system avoided costs, non-energy impacts, and social costs of carbon.
- **Emissions and health impacts:** We estimated and projected emissions impacts from the policies and estimated health impacts (in terms of dollar amounts) from the expected changes in power plant emissions.
- **Macroeconomic impacts:** We used the IMPLAN model to assess potential changes in the number of jobs, incomes, and gross domestic product.
- **Affordability implications:** We assessed affordability implications of the policies by determining the potential changes in rate, bill, and program participation impacts.

Our study concluded that recently adopted or proposed energy efficiency policies (or the failure to adopt progressive policies) in the Midwest result in enormous missed opportunities for energy and emissions savings, economic and health benefits, and job creation.

Introduction

States across the Midwest have adopted or proposed various policies concerning ratepayer-funded energy efficiency programs through regulatory orders and legislative actions. Some of these policies restrict the scale of the energy efficiency programs by limiting the program funding, exempting large business customers, or even repealing an existing requirement to achieve certain levels of annual energy savings. Synapse Energy Economics (Synapse) was engaged by the Midwest Energy Efficiency Alliance (MEEA) to assess the impacts of recently adopted or proposed energy efficiency policies for six selected Midwestern states (Takahashi, K. et al. 2021). We assessed the cost-effectiveness, emissions impacts, health impacts, and macroeconomic impacts, as well as the affordability implications of these policies. Our cost-effectiveness analysis took into account different perspectives, including societal benefits (e.g.,

avoided costs of carbon) and non-participant benefits. The analysis also quantified health impacts for the potential changes in morbidities and mortalities in terms of dollar amounts and incorporated the results into our cost-effectiveness analysis. Further, we assessed potential changes in the number of jobs due to the recent energy efficiency policies. Finally, we assessed affordability implications of the policies by reviewing the potential changes in rate, bill, and program participation impacts.

State Policy Scenario Development

Synapse’ analysis focused on electric energy efficiency programs for Illinois, Indiana, Iowa, Missouri, Ohio, and Wisconsin all six states. For Iowa, we also assessed natural gas energy efficiency programs.¹

We developed two scenarios for energy efficiency programs (the Policy Case and the Reference Case) for each of the six selected states and assessed energy, economic, and societal impacts of these scenarios for Program Year 2021. These scenarios assume energy efficiency programs implemented in 2021 only and our analysis estimates the potential impacts of the Policy Case relative to the Reference Case from energy efficiency measures implemented in 2021 over the lifetime of the measures. The two scenarios are defined as follows:

- **Policy Case:** For all the six states except Wisconsin, the energy efficiency program policies/laws that we assume under the Policy Case are regressive policies that have been adopted or proposed. Most of these policies are effective today. The regressive policy in Missouri analyzed in our study was not adopted. For Wisconsin, the Policy Case assumes the acceptance of a progressive policy that was recently proposed but was not adopted.
- **Reference Case:** The Reference Case for each state assumes that the policies we studied were never enacted, with the exception of Wisconsin and Missouri where the Reference Cases represent the current policy environments. The energy savings under this case are higher than the Policy Case for each state except Wisconsin.

Table 1 below describes details of the Policy Case for each state.

Table 1. Policy Case Descriptions

State	Policy type	Detailed description
Illinois	Regressive policy (adopted)	At the end of 2016, Illinois passed the Future Energy Jobs bill which exempted large C&I customers (at 10 MW peak demand or more) from paying any surcharges to and participating in the state’s energy efficiency programs. This law became effective in 2017 and exempted many large C&I customers from the program. ² The Policy Case assumes an energy efficiency program operating today that has the full impact of this customer exemption policy. This impact was estimated to be as large as 10-30 percent of utility load. (MEEA 2017)

¹ The analysis included gas efficiency for Iowa because Iowa was the only state where the proposed policy specifically targeted gas efficiency programs.

² This policy was updated to an opt-out provision through the Climate & Equitable Jobs Act (Public Act 102-0662) which became effective in September 2021.

State	Policy type	Detailed description
Indiana	Regressive policy (adopted)	Indiana passed two regressive policies in a combined bill that was signed in 2014 and effective starting 2015. SB 340 (2014) allowed large C&I customers with peak demand of over 1 MW to opt out of energy efficiency program participation, while also repealing the state's energy efficiency resource standard (EERS). The Policy Case assumes an energy efficiency program operating today that has a full impact of these regressive policies.
Iowa	Regressive policy (adopted)	Iowa enacted laws restricting the budgets for gas and electric energy efficiency programs in 2018 and 2019. SF 2311 (2018) and SF 638 (2019) both limited gas and electric program budgets to no more than 1.5 percent and 2 percent of the utilities' expected retail rate revenue, respectively. The Policy Case assumes an energy efficiency program operating today that has a full impact of the law that limits program budgets.
Missouri	Regressive policy (not adopted)	In 2018, the Missouri PSC staff proposed a substantially scaled-down energy efficiency program portfolio for Ameren Missouri and Kansas City Power and Light (KCPL)/Evergy for 2019 through 2021 (Missouri Public Service Commission Staff 2018 and 2019). The Policy Case mirrors the level of energy efficiency program investments in this staff proposal for 2021. This policy was not adopted.
Ohio	Regressive policy (adopted)	In 2019, Ohio's HB 6 (2019) repealed its Energy Efficiency Resource Standard (EERS), which had previously been set to achieve 2 percent annual savings for 2021–2027. Furthermore, Ohio has allowed large C&I customers to opt out of energy efficiency programs since 2014. The Policy Case reflects and assumes the current status of the state's energy efficiency programs, which essentially ceased to operate due to the 2019 repeal of the EERS.
Wisconsin	Progressive policy (not adopted)	Back in February 2021, Governor Tony Evers proposed to double the funds for the state's energy efficiency program administrator—Focus on Energy—to 2.4 percent of the utility's operating revenues (approximately \$100 million) (State of Wisconsin 2021). The Policy Case assumes this scenario.

The following table provides an overview of major scenario assumptions for each state. The recent policies analyzed in our study are four actual and two hypothetical policy shifts across the six states. The reference year (RY) refers to the most recent historical or current year that had/has no impacts of the policies analyzed. For example, for Illinois, the historical year used to represent the no policy impact was 2016 as its large C&I exemption policy became effective in 2017. The policy year (PY) refers to the most recent year or the current year that had/has the impacts of the policies analyzed. We relied on the following data sources to develop energy savings and program spending assumptions for the two cases for each state: (a) annual energy efficiency program reports by utilities in each state; (b) program evaluation reports

prepared for the utilities; and (c) the U.S. Energy Information Administration's (EIA) Form 861 database for electric energy efficiency programs and utility sales, revenue, and customer data.³

Table 2. Summary of energy efficiency program scenario assumptions

State	Policy	Reference year (RY)	Policy year (PY)	Major scenario assumptions
<i>Electric EE</i>				
Illinois	Large C&I exemption	2016	2019	RY: 2019 savings + 2016 PY inc. savings for large C&I; PY: 2019 savings
Indiana	Repeal of the Energy Efficiency Resource Standards (EERS) and large C&I opt-out	2013	2019	RY: 2013 savings for all sectors with current performance on peak savings (kW/MWh), measure life and costs of saved energy; PY: 2019 savings
Iowa	2% budget cap	2018	2019	RY: 2018 data; PY: 2019 data
Missouri	Staff's energy efficiency program proposal (not adopted)	2021	2021	RY: 2021 approved program; PY: staff proposal
Ohio	Repeal of EERS and large C&I opt-out	2014	2021	RY: 2019 savings for RES and COM and 2014 savings for IND sector; PY: no energy efficiency impact
Wisconsin	Proposed 2021 budget (not adopted)	2019	2021	RY: 2019 data; PY: doubling budget and savings
<i>Gas EE</i>				
Iowa	1.5% budget cap	2018	2019	RY: 2018 data; PY: 2019 data

Source: Takahashi, K. et al. 2021. Appendix A.

Based on these scenario assumptions, we developed annual energy and peak savings impacts, shown in Figure 1 and Figure 2. These figures show that all states except Wisconsin are or would be experiencing a large reduction in energy and peak savings due to the regressive policies. Among these states, the impacts for Illinois, Indiana, Iowa, and Ohio represent our estimates of missed savings opportunities due to the actual regressive policies implemented in these states. In contrast, the impact for Missouri represents an impact of a regressive policy that was not adopted. The impact for Wisconsin represents our estimate of missed additional savings due to the progressive policy (doubling program budget) that was not adopted.

Ohio represented the largest annual policy impact or missed savings opportunity. In 2019, the state repealed its EERS policy. The impacts in Ohio are about 1.4 percent of annual energy savings and 280 MW of peak capacity savings. This represents the impacts from just a single program-year. This means the negative impacts of the policy over two years would be roughly twice these missed savings (i.e., 2.8 percent of annual cumulative savings and 560 MW of peak

³ For details of program cost and savings assumptions see Takahashi, K. et al. 2021. Appendix A.

capacity savings). Other states with potential large policy impacts are Wisconsin, Iowa (gas), and Missouri. Annual energy impacts range from 0.67 percent in Missouri to 0.9 percent in Iowa (for gas programs). As with Ohio, the impacts for Missouri and Iowa represent the savings these states are or would be missing out on due to regressive policies. Wisconsin is also losing a large amount of savings, at about 0.8 percent of sales. However, this represents the additional annual savings from a single program-year that Wisconsin would have attained if the proposed progressive policy had been adopted. The savings impacts in Illinois and Indiana are relatively small because most of the impact of the adopted regressive policies in these states focus on a limited customer segment (i.e., large C&I customers).

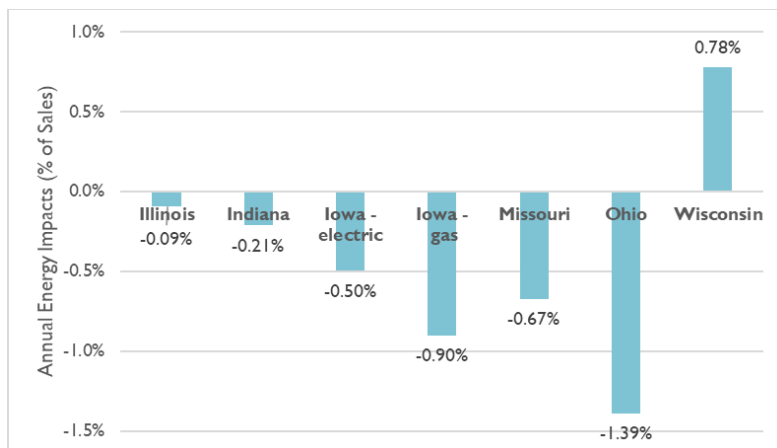


Figure 1. Annual Energy Impacts in the Policy Case

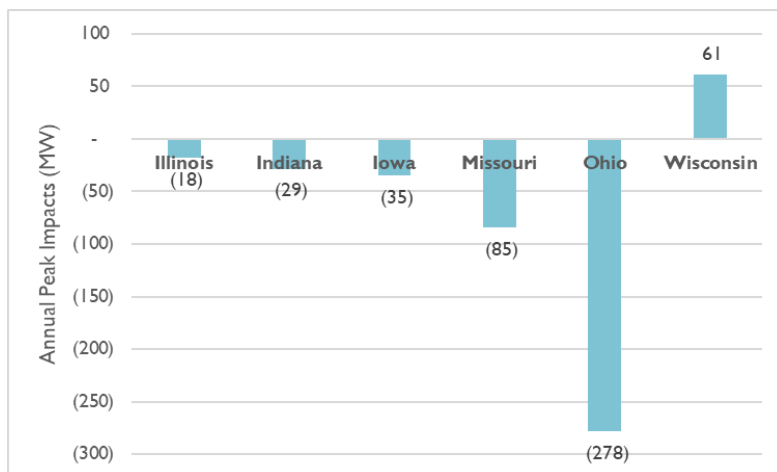


Figure 2. Annual Peak Load Impacts due to the Policy Case

Analysis of Cost-Effectiveness and Emissions and Health Impacts

Key methodologies

To assess the benefit-cost impacts of recent policies for energy efficiency programs for each state, we employed three separate cost-effectiveness analysis frameworks. These were the

Utility Cost Test (UCT), the Total Resource Cost (TRC) test, and the Societal Cost Test (SCT). Table 3 presents the types of impacts included in each test.

Table 3. Cost-Effectiveness Analysis Framework

	UCT	TRC Test	SCT
Electric Utility System Impacts	✓	✓	✓
Gas Utility System Impacts	✓	✓	✓
Other Fuel Impacts	-	✓	✓
Participant Impacts	-	✓	✓
Participant costs	-	✓	✓
Participant non-energy impacts	-	✓	✓
Societal Impacts	-	-	✓

The UCT considers utility system impacts including the costs of energy efficiency programs and benefits of avoiding utility system costs (e.g., energy, capacity, and transmission and distribution). We developed utility system avoided costs for this study based on the recent historical market price data and the avoided cost estimates currently used by some of the utilities in the Midwest.⁴ **The TRC Test** expands the scope of the assessment from the UCT and incorporates program participant impacts such as participants' own out-of-pocket costs and various non-energy impacts (NEI) that the participants experience by participating in energy efficiency programs. Such NEIs include, but are not limited to, avoided operations and maintenance (O&M) costs, increased comfort, increased participant health and safety. Our NEI estimates range from approximately 8 percent to 15 percent of total benefits based on a literature survey. **The SCT** expands the scope of the assessment from the TRC test and incorporates various societal impacts. Such impacts could include GHG emissions, other air emissions, public health damages, and job creation. Synapse' SCT analysis incorporated both emissions and health impacts when assessing the societal impacts of energy efficiency programs. Brief descriptions of our methodologies for determining these societal impacts are below.

- **Avoided Emissions from Power Plants:** We used the U.S. Environmental Protection Agency's (EPA) Avoided Emissions and Generation Tool (AVERT) to estimate the current marginal emission rates by utility jurisdiction that energy efficiency programs could influence (U.S. EPA n.d.). We then used the data available in Rocky Mountain Institute's (RMI) Utility Transition Hub to project future marginal emission rates (RMI n.d.).
- **Avoided Emissions from Natural Gas Supply:** Our analysis of emission impacts from natural gas supply focuses on carbon dioxide (CO₂) and methane. It excludes other emissions such as nitrogen oxide from the combustion of natural gas in buildings. For estimating CO₂ and methane emissions impacts of natural gas supply, we used emissions factors from EPA (U.S. EPA 2020).⁵

⁴ For details of these key assumptions, see Takahashi, K. et al. 2021. Appendix B.

⁵ We assumed an emission leak rate of 1.42 based on EPA's current estimate.

- **Social Cost of Carbon (SCC):** Our analysis used the SCC value developed by New York State’s Department of Environmental Conservation in its guideline document titled “Establishing a Value of Carbon.” This SCC value considers the global impact of emissions and high-risk situations and uses a relatively low discount rate of 2 percent. The SCC was calculated using estimations from the Obama-era guidelines but used a different range of discount rates.
- **Avoided Health Impacts:** Our analysis used EPA’s CO-Benefits Risk Assessment Health Impacts Screening and Mapping Tool (COBRA) to estimate the health and economic benefits of reductions in fossil fuel generation by the change in emissions associated with increased energy efficiency. COBRA utilizes a reduced form air quality model to measure the impacts of emission change on air quality and translates them into health and monetary effects. For this analysis, Synapse modeled avoided criteria pollutants (SO₂, NO_x, and PM_{2.5}) that were output from AVERT.

Lost Net Benefits Results

Our cost-effectiveness analysis of the Policy Case scenarios found substantial lost net benefits relative to the Reference Case scenarios across the Midwestern states. Such impacts range from \$44 million in Illinois to as large as \$960 million in Ohio from the utility system perspective, shown in Figure 3 as “UCT: Net Benefits.” From the TRC perspective, which also includes costs and benefits for program participants, the total net lost benefits are about 10 to 40 percent lower than the total net lost benefits under the UCT, except for Ohio which presents very similar net lost benefits in both perspectives. Net benefits from the TRC perspective are lower partly because our estimates of non-participant benefits are conservative (roughly 8 to 15 percent of total benefits) and exclude other resource savings such as water, propane, or oil.⁶

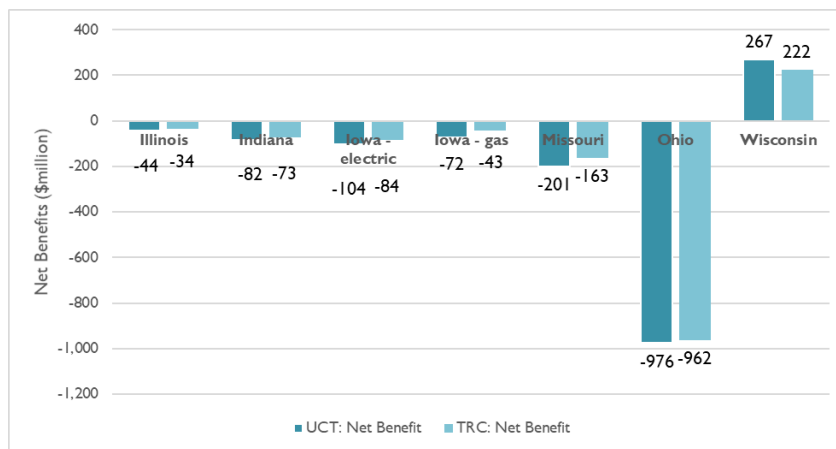


Figure 3. Lost Net Benefits – UCT and TRC Perspectives

⁶ For detailed results for each state, see Takahashi, K. et al. 2021. *Missed Opportunities: The Impacts of Recent Policies on Energy Efficiency Programs in Midwestern States*. Available at: <https://www.synapse-energy.com/missed-opportunities-impacts-recent-policies-energy-efficiency-programs-midwestern-states>.

These cost impacts represent approximate economic impacts of the regressive policies in the state from the operation of a single program-year over the lifetime of the program. Alternatively, this represents additional net benefits that all customers can enjoy from a single program-year if these regressive policies did not exist today (or if the progressive policy had been adopted today in the case of Wisconsin).

We added the social costs of carbon and health damage costs to our estimates of total resource benefits in order to present a comprehensive assessment of social cost impacts of the Policy Case scenarios. Our analysis found that the total net lost societal benefits are substantially larger than the total resource benefits. The net lost societal benefits are 3 to 5 times as large as the net lost total resource benefits, as shown in Figure 4 below. Including all social impacts, the total net lost benefits range from about \$120 million in Illinois to as much as \$2.7 billion in Ohio.

The impacts of the social cost of carbon are larger than the impacts of health damage costs in all states except Illinois. Among these states, Missouri, Iowa, and Wisconsin especially have higher impacts of social costs of carbon relative to total resource benefits because these states have higher electric grid emissions rates. Illinois has relatively lower lost benefits in the social costs of carbon because avoided emission rates in this state are lower than other states due to its large share of nuclear power plants. Yet, it is important to note that the impact of the social cost of carbon in Illinois is still almost as large as the total resource benefit. We did not estimate health damage costs for Iowa's gas efficiency programs because they do not reduce grid emissions.⁷

We estimated a range of health damage costs, shown as Health Costs–Low and Health Costs–High in the figures below, based on outputs from U.S. EPA's COBRA health impact model. Health damage cost impacts are comparable to total resource benefits, ranging from \$50 million in Illinois to \$700 million in Ohio. These results on both health damage costs and social costs of carbon clearly show that conventional approaches of estimating the cost-effectiveness of energy efficiency programs using the TRC test are insufficient in capturing full impacts of energy efficiency programs and policies.

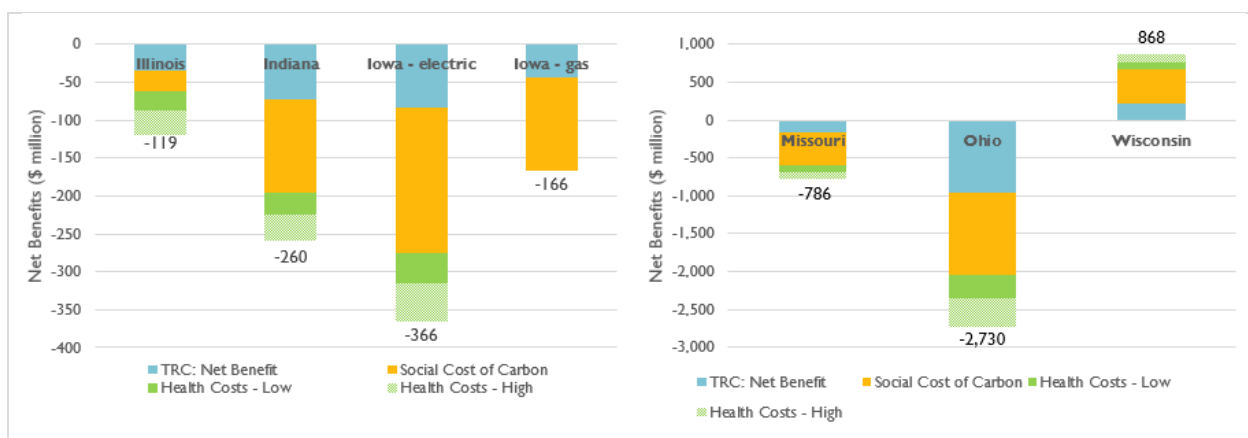


Figure 4. Lost Net Benefits – TRC with SCT and Health Impacts

⁷ While it is not clear how much energy efficiency can reduce health impacts from natural gas equipment in buildings, reductions in methane will certainly reduce health damage costs.

Figure 5 represents net social impacts per residential customers due to the Policy Case. This includes the impacts associated with just the residential programs in these states. We consider this illustrative because many social lost benefits would accrue beyond the state's boundary. Thus, the graph includes benefits from which residential customers in these states would not directly benefit. Illinois has no impact because its Policy Case does not affect any residential programs. Excluding Illinois, the net lost social benefits due to the Policy Case scenarios range from approximately \$25 to about \$190 per residential customer with just carbon cost impacts and from approximately \$30 to \$250 per residential customer including all potential health damage impacts. These values again represent the lifetime impacts from a single program-year. If the Policy Case conditions persist for multiple years, the lost benefits would increase substantially over the life of energy efficiency measures.

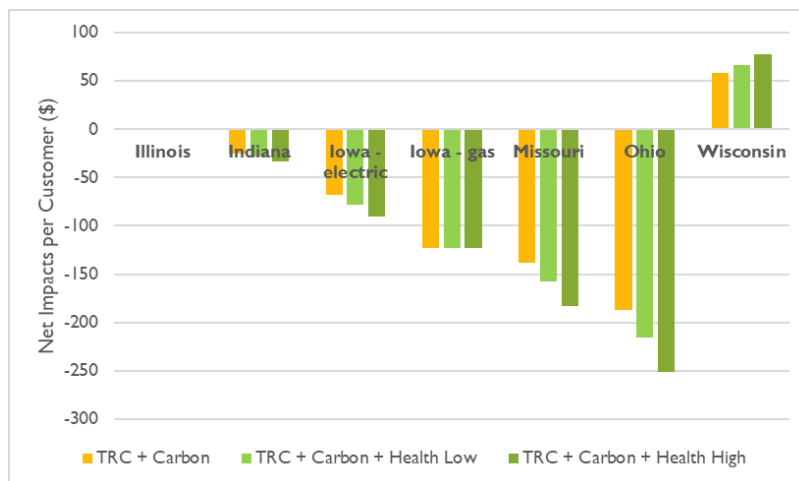


Figure 5. Illustrative Net Societal Impacts from Residential Programs per Customer due to the Policy Case

Macroeconomic Analysis

Key methodology

We used the IMPLAN model to determine the macroeconomic impacts of changes in spending on energy efficiency programs in six Midwestern states.⁸ Energy efficiency programs provide incentives and technical assistance for consumers and businesses to invest in new appliances, equipment, and technologies that shift economic activity away from traditional energy resources, while also supporting jobs to install energy efficiency measures. These trade-offs in turn may result in overall changes in total employment, income, and GDP statewide.

This research paper focuses on job impacts within each state due to the Policy Case, while the original research also evaluated impacts on state incomes and gross domestic products (GDP) (Takahashi et al. 2021).⁹ Job impacts within each state means that our job analysis excludes job impacts occur beyond the state boundary for each state scenario.

⁸ IMPLAN is an industry standard input-output model that was developed by the Minnesota IMPLAN Group. IMPLAN allows users to assess macroeconomic impacts of various economic activities and policies across the United States.

⁹ Due to the page limit of this paper, we focused on the job impact results from our analysis—job growth is a standard indicator, more common in the literature than income or GDP, used to assess macroeconomic impacts of clean energy programs.

Our IMPLAN-based analysis assessed changes in spending on energy efficiency programs and measures, utility system investments, and responding patterns as follows.

Change in Spending on the Utility System: Increased investment in energy efficiency reduces both energy consumption and peak demand, resulting in decreased utility-system spending. These reductions result in foregone spending on energy, generation capacity, and transmission and distribution (T&D) capacity. Alternatively, reduced investments in energy efficiency tend to increase utility-system spending on energy, capacity, and T&D.

Change in Responding: Changes in spending on energy efficiency may cause changes in consumption and investment spending in the broader economy. Changes in energy efficiency spending may be associated with either positive or negative changes in consumption and investment spending depending on whether the net of the following two effects is positive or negative: (a) changes in participant spending on energy efficiency, and (b) changes in aggregate utility bills resulting from changes in rates and changes in overall energy consumption.

Job Impact Analysis Results

Figure 6 presents a breakdown of our job impact analysis of the Policy Case for Ohio. Job impacts are expressed in terms of full-time equivalent (FTE) job-years.¹⁰ This figure shows that Ohio's regressive policy produces additional jobs in the construction and O&M of gas combined cycle (CC) power plants as well as in T&D construction within the state. This is mainly because lower energy savings (or increased energy consumption) spur jobs in the energy supply industry. Such jobs amount to slightly more than 3,000 job-years due to the Policy Case over the life of efficiency measures implemented in a single program-year. On the other hand, the Policy Case results in reduced energy efficiency spending, leading to both increased energy consumption and increased energy bills. This in turn leads to a corresponding reduction in consumer spending in the wider economy. These reductions in spending results in a substantial job loss in Ohio.. Electricity energy efficiency program activities ceased to operate around 2020 as the state repealed its EERS policy in 2019. We estimate that this regressive policy results in a loss of approximately 2,000 job-years. Further, we estimate that the increased energy bill spending due to higher consumption resulting from no active energy efficiency programs leads to over 2,000 job-year losses in the residential sector and over 4,200 job (year) losses in the commercial sector. Combining all of these impacts, we estimate that the Policy Case results in approximately 5,460 fewer job-years relative to the Reference Case from a single program-year over the life of the measures implemented in that year.¹¹

¹⁰ One FTE job-year is equivalent to a single person working full-time for a year (e.g., five job-years could be five full-time positions for one year or one full-time position for five years).

¹¹ While our job analysis does not incorporate the impacts of the economic downturn due to COVID, this effect does not generally affect the results of our analysis, as our analysis focuses on the delta job impacts between the Policy Case and the Reference Case.

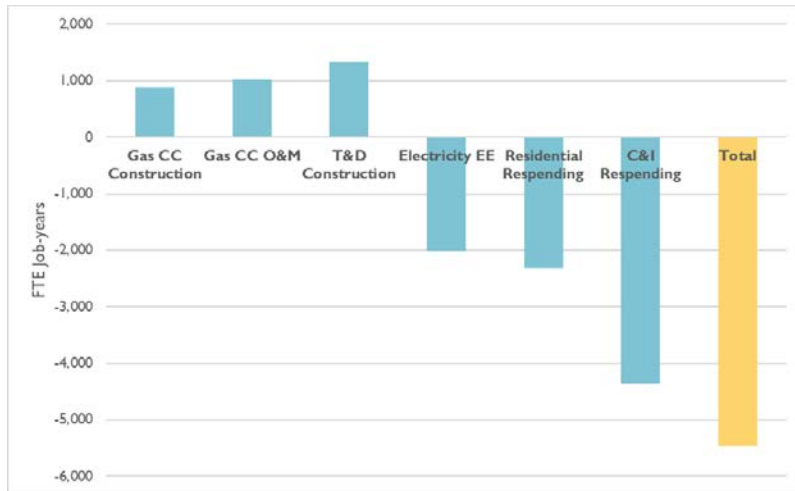


Figure 6. Ohio - Lifetime Macroeconomic Results

Figure 7 presents the job impacts associated with the Policy Case in each state that we analyzed, including the impact in Ohio mentioned above. In Illinois, Indiana, Iowa, we estimate the regressive policies in these states result in job losses ranging from 235 fewer job-years in Illinois to approximately 533 fewer job-years in Iowa (combining 124 fewer jobs from the electric programs and 409 fewer jobs from the gas programs). In Missouri, we estimate that the energy efficiency program proposal (that was not adopted) would have resulted in over 780 fewer job-years just from a single program-year. Finally, Wisconsin is missing generating approximately 1,530 additional job-years because the state did not adopt the policy proposal to double the state's energy efficiency program budget.

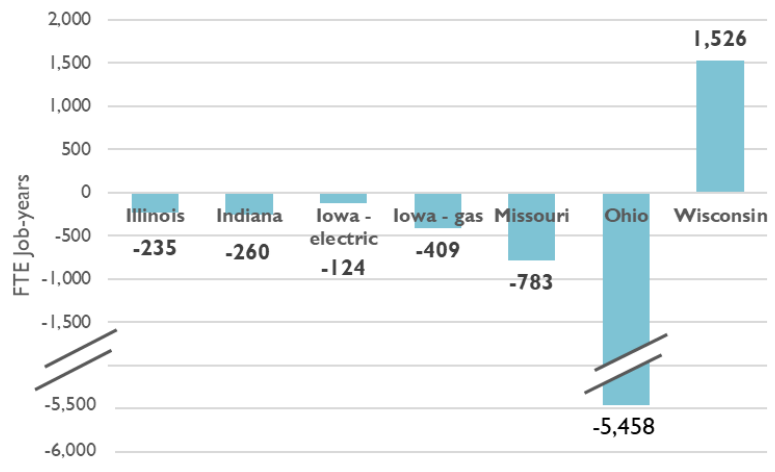


Figure 7. Lifetime Job Impacts for all 7 States

Energy Affordability Implication Assessment

Key methodology

Our study also assessed energy affordability implications of the changes in energy efficiency investments under the Policy Case for each state relative to the Reference Case. This assessment includes the following three aspects:

- **Rate impact:** The rate impact due to energy efficiency programs is one useful metric to assess the affordability of energy efficiency investments. We estimated the expected rate impacts of energy efficiency investments (in terms of percentage of the current rate) under the Policy Case and the Reference Case by sector for each state, based on the estimated program spending on energy efficiency programs as well as the estimated changes in sales and revenue requirements due to the energy efficiency programs. Reductions in utility-system investments (avoided costs) expected from energy efficiency programs reduce revenue requirements. On the other hand, they also reduce sales and often lead to an increase in rates.
- **Bill impact:** The bill impact due to energy efficiency programs is another useful metric to assess affordability implications of energy efficiency programs. Given the total participation counts are not available for the energy efficiency scenarios we analyzed, we estimated average bill impacts for all customers by sector for each scenario. We estimated such bill impacts by comparing the total revenue requirements with and without energy efficiency investments by sector for each scenario, which we then divided by the total number of customers.
- **Participation impact:** We also reviewed affordability implications by assessing how program participants would change between the Policy Case and Reference Case scenarios. This assessment shows an illustrative example; we select one program example for each state with a focus on residential programs (e.g., low-income weatherization, whole-house program, residential HVAC program).

Affordability Implication Assessment Results

In all states except Wisconsin, the states are experiencing or would experience lower utility rates under the Policy Case scenarios due to the regressive policies because the regressive policies reduced or would reduce spending on energy efficiency programs (See Figure 8). Wisconsin's Policy Case has an opposite result of increasing rates because its Policy Case represents a progressive policy in which the state would increase its energy efficiency program budget.

Despite the large lost benefits discussed in the previous sections, the rate impacts due to the Policy Case are relatively small, ranging from less than 0.1 percent to 0.4 percent, except residential customers in Ohio with approximately 1.2 percent rate impact. Across many states, we estimate that business customers experience smaller rate impacts than residential customers because business programs in these states have much lower costs per kWh of savings (e.g., 1 to 2 cents per kWh) than residential programs.



Figure 8. Annual Average Rate Changes under the Policy Case relative to the Reference Case

As shown in Figure 9, we estimate that these lower rates lead to average bill increases due to the Policy Case scenarios in all states except Wisconsin. The impacts range from less than 0.1 percent of annual bills in Illinois and Indiana to 0.5 percent in Iowa (for gas programs) and to 0.8 percent in Ohio. Actual bill impacts differ by the type of customers (e.g., participants, non-participants). In most energy efficiency programs, program participants will experience lower bills and non-participants will experience higher bills. Combining the impacts for all customers, our analysis found that customers are or would be paying higher bills under the Policy Case scenarios in all states except Wisconsin. In Wisconsin, customers would pay lower bills under the Policy Case. However, because the state did not adopt the progressive policy (the Policy Case for the state) to increase the program budget, customers in the state are currently paying higher bills on average (the Reference Case) compared to the Policy Case.

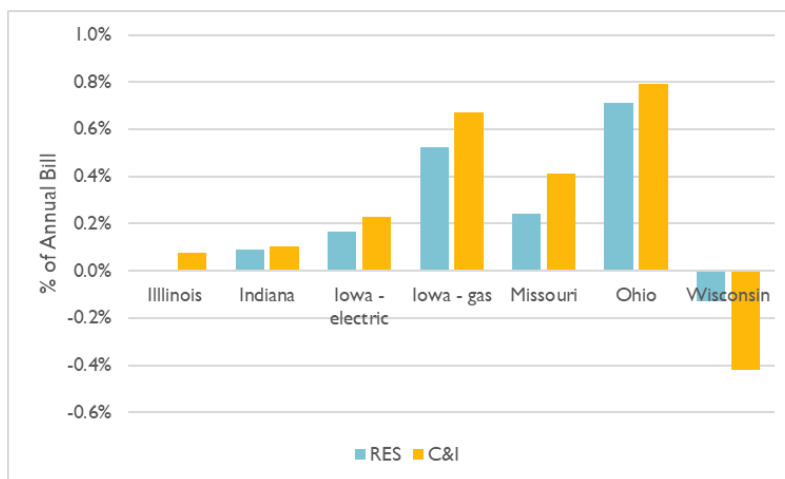


Figure 9. Annual Average Bill Changes under the Policy Case relative to the Reference Case

Table 4 presents our illustrative analysis of program participation impacts due to the Policy Case for each state case. As mentioned above, we selected one residential program for each state case. Illinois is not included as its Policy Case does not affect residential programs. We developed the participation data primarily based on actual data before and after the

regressive or progressive policies under the Policy Case were implemented or would have been implemented.

Across all state examples, we estimate a substantial reduction in participation rates for the selected residential programs under the Policy Case (except Wisconsin), ranging from about 60 percent reduction in Iowa (for a gas program) to 100 percent reduction in participation in Ohio. On the other hand, we estimate that the participation rates for Wisconsin's Home Performance with Energy Star would have increased from about 26,650 customers to 53,300 customers under the Policy Case. This illustrative assessment exhibits the magnitude of potential participation impacts under the Policy Case for each state.

Table 4. Illustrative Program Participation Impacts

State	Utility	Program	Policy Case	Reference Case	Participation change (%)
Indiana	Duke	Low Income Weatherization	205	3,000	-93%
Iowa (electric EE)	MidAmerican	HVAC	3,986	17,896	-78%
Iowa (gas EE)	MidAmerican	High Efficiency Furnace	5,330	12,972	-59%
Missouri	Ameren Missouri	Low Income Weatherization	15	487	-97%
Ohio	AEP Ohio	Appliance Recycling	0	18,230	-100%
Wisconsin	Focus on Energy	Home Performance with Energy Star	53,290	26,645	100%

Source: AEP Ohio. 2020; Duke Energy 2020; NiSource 2014; MidAmerican 2019; MidAmerican 2020; Opinion Dynamics 2020.

Conclusion

We conducted a comprehensive analysis of the impact of recent policies on energy efficiency programs in several Midwestern states. Our analysis found most of such recent policies resulted in or revealed enormous lost opportunities in generating net benefits for households and businesses in these states. More specifically, these states are losing substantial amounts of economic benefits, ranging from about \$40 million to as high as about \$980 million just from the implementation of a single program year (over the lifetime of the program) due to policy decisions. Our analysis also found:

- Social costs of carbon and health damage costs increase the total lost net benefits by three to five times, amounting to about \$120 million to \$2.7 billion impacts, collectively.
- The regressive policies (or not adopting the progressive policy in one state) resulted in or would result in 235 to 5,460 fewer job years.
- Most of the regressive policies (or, in one state, not adopting the progressive policy) resulted in or would result in a relatively small rate reduction, ranging from less than 0.1 percent to 0.4 percent (except residential customers in Ohio with approximately 1.2 percent), and yet also resulted in slightly higher energy bills on average, with increases ranging from less than 0.1 percent to 0.8 percent.

- The potential impacts on program participation are also substantial. Our illustrative analysis revealed the regressive policies (or, in one state, not adopting the progressive policy) would reduce participation by 60 to 100 percent for the selected residential programs.

Further, our cost-effectiveness analysis revealed that conventional approaches of estimating the cost-effectiveness of energy efficiency programs using the TRC are considerably inadequate in capturing the full impacts of energy efficiency programs, because they leave out enormous societal impacts. In particular, we found that carbon benefits would dwarf the total resource benefits if appropriate social costs of carbon are applied. Costs of health damages are also substantial. They could be as high as or even higher than total resource benefits

Finally, our analysis offers important information for states that have adopted or are considering adopting regressive policies. In particular, the conclusion of our analysis suggests: (a) those Midwestern states evaluated for their regressive policies (or the progressive policy not adopted in Wisconsin) in our study should consider repealing such regressive policies (or adopting the progressive policy); and (b) other states that have regressive energy efficiency policies in place or are considering adopting regressive policies should assess the full impacts of such policies as soon as possible, and consider reversing such policy decisions based on the results of the assessment. These actions will ensure that states across the country will not miss the opportunity to enjoy the full benefits of energy efficiency programs, including the value of carbon reduction, health benefits, job creation, and utility bill savings.

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