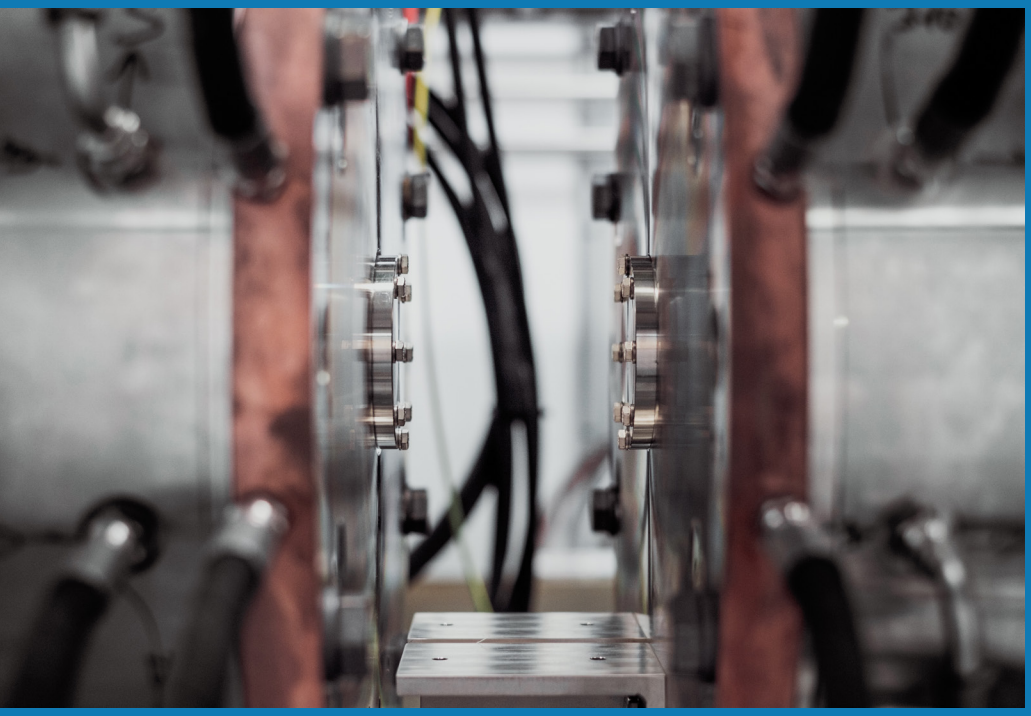

Midwest Industrial Energy Efficiency's Future:

Using Strategic Energy Management Strategies to Overcome Policy Barriers

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Abstract

In the Midwest, several policies have come in the last few years that reduce opportunities for industrial energy efficiency programs, thereby reducing the overall cost-effectiveness and potential for comprehensive utility energy efficiency portfolios across the region. This paper will then use Indiana and Ohio as examples of recent policy rollbacks to quantify the impacts as to energy savings. The paper will pivot to continuous energy improvement through company culture change as the emerging successful approach to promote and sustain customer participation and energy savings. Lastly, the paper will identify existing models and ongoing efforts to improve industrial program design in the Midwest, culminating with a series of recommendations for utilities and advocates.

Introduction

Manufacturing is a fundamental part of the Midwest's[1] identity and a critical contributor to regional economic prosperity. Manufacturing represents a 16% share of the Midwest region's total GDP (MGA 2012) and is an important source of jobs in the Midwest. According to the National Association of Manufacturers, Indiana (17.24%), Iowa (18.12%), Michigan (19.05%) and Wisconsin (18.22%) are amongst the top states in the nation in percentage of overall workforce dedicated to manufacturing (NAM 2019).

The industrial sector in the Midwest is a major consumer of energy. The Midwest's industries account for 38% of the nation's total industrial electricity use (EIA 2014). Five Midwest states are in the top ten total energy consumers in the industrial sector:

- Indiana (4),
- Illinois (5),
- Ohio (6),
- Kentucky (9), and
- Iowa (10),

and four more are in the top half:

- Michigan (12),
- Minnesota (13),
- Wisconsin (17), and
- Kansas (22). (EIA 2014).

An Alliance for Industrial Efficiency (AIE) report found that 40% of the country's energy efficiency potential exists in the industrial sector and the largest opportunities for industrial efficiency are in heavy manufacturing states. It included Illinois, Indiana, Kentucky, Michigan and Ohio in its top ten states with the greatest potential for energy savings in the industrial sector (AIE, 2016). Due to the region's substantial manufacturing sector, the Midwest is well-positioned to benefit from industrial energy efficiency improvements.

Energy efficiency is a good value for the Midwest's industries. It is the lowest cost energy resource in the Midwest at $18 per megawatt hour for the utility and $27 for the participating customer (averaged across all customer sectors). Nationwide, energy efficiency programs for the combined commercial, industrial and agricultural sector average $27 per MWh for the utility and $28 for the participating customer. (Hoffman et al. 2018). Compare that with national levelized cost ranges of $41-74 per MWh for electricity from natural gas combined cycle generation or $60-143 per MWh for coal generation. (Lazard 2018). Unfortunately, at a time when our energy system is striving for resiliency and cost savings, energy efficiency programs designed for industrial customers have experienced reductions in funding, focus and, ultimately, energy savings. The program benefits related to the energy system are being left on the table. The energy savings these programs could provide for industrial customers translate into cost savings that could lead to lower prices, enhanced profitability, competitive advantages and other positive business outcomes.

[1] As our definition of the Midwest for this paper we use the footprint of the Midwest Energy Efficiency Alliance, covering 13 states: Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin.

Energy efficiency programs seek generally to reduce unnecessary energy use to optimize what is needed to accomplish certain tasks. Especially in residential programs, and often in commercial programs, prescriptive programs for specific measure types are common and effective. For instance, LED lighting retrofits reduce the electricity needed to provide lighting, equipment rebates make it easier to upgrade less efficient HVAC systems and insulation programs can make sure that energy use for heating and cooling is not being wasted. Industrial energy efficiency programs have the same goals, but the seemingly endless number of customized processes, mechanical systems and configurations of industrial systems often requires a more customized approach to energy efficiency programming.

We do not mean to suggest that industrial customers cannot still benefit from the more prescriptive programs like lighting, smart control systems for HVAC and insulation retrofits. Such programs implemented at the scale of many large industrial operations can have an immense impact on those customers' energy use and costs. However, beyond these more prescriptive "low-hanging fruit" opportunities, industrial programs require adequate funding and creativity to identify deeper, continuous savings if they want to maintain customer interest.

The Midwest is home to a variety of statewide policies that mandate or merely encourage utilities and their customers to engage in energy efficiency programming. These programs are funded by the utility customers, generally as a charge on each customer's monthly bill. The cost for each customer depends on their rate class and is generally in the form of a charge based on the volume of energy used. The costs and benefits of all programming are reviewed by state public utility commissions and programs must pass one or more cost-effectiveness tests to be approved for implementation and cost recovery. It is widely, if not unanimously, accepted across the Midwest that industrial programs are among the most cost-effective parts of the utility energy efficiency portfolios. In every Midwest state that has energy efficiency requirements or goals, however, there is a policy allowing the largest customers to decide whether they want to pay into the programs. Hence, state policies simultaneously require/encourage energy efficiency and allow the loss of the most cost-effective savings opportunities.

Since energy efficiency programs are normally required to be offered to each sector in proportion to the funding contribution from each customer sector, the loss of contributing and participating customers from the industrial portfolio means that there is less funding for industrial programming. Incomplete funding negatively impacts program design and the comprehensiveness of offerings to industrial customers, which in turn reduces continued and new customer interest - effectively gutting program value and leaving customers frustrated and indifferent to energy efficiency. This frustration can feed into the state legislative actions that undermine otherwise efficacious energy efficiency policies, while the indifference spreads amongst industrial customers. In the end, utilities are left with under-funded and under-utilized energy efficiency programs that do not serve their whole customer base. This cyclical, self-defeating process benefits no one. We need to break this cycle with creative, beneficial and adaptable programming for the industrial customers who provide significant numbers of jobs, economic benefits and identity to the Midwest.

There is a different way to engage industrial energy efficiency: Strategic Energy Management (SEM). SEM aims to reconfigure the outcomes of energy efficiency as a continuous process inseparable from a business' operational decision-making. Given there is no one-size-fits-all solution for energy efficiency in the myriad industrial processes, process-specific information

gathering, solution design and programmatic decision-making must be inextricably linked to business management structures, employee resources/training and every individual aspect of the operation. This holistic approach takes time, resources and expertise. Accordingly, SEM can be daunting for businesses that only know about the program-by-program return on investment/equity model of energy efficiency. In that regard, we call for a fundamental shift at all levels of industrial programs – customer engagement, utility program design and resource allocation – to a data-driven, company-wide, informed decision-making model that prioritizes sustained continuous energy improvement.

Industrial Cost-Effectiveness

Industrial energy efficiency programs are some of the most cost-effective utility offerings due in no small part to the relatively high and sustained energy usage by industrial customers. The economies of scale that can be achieved and the high volume of savings per customer mean that these programs are often much cheaper per unit of energy savings than from residential and small commercial customers.

MEEA has covered industrial program cost-effectiveness in previous papers presented at the Summer Study on Energy Efficiency in Industry. Ehrendreich (2015) looked at changes in cost-effectiveness over time and concluded that "[u]tilities' commercial and industrial energy efficiency programs are cost-effective and contribute to their overall energy efficiency portfolio performance. These programs have remained cost-effective over time and are integral for meeting statewide energy efficiency goals." Similarly, Scull (2017) looked at industrial customer participation and concluded that "[w]hen the largest energy users fully participate in utilities' energy efficiency programs" the statewide goals and targets are more easily achieved. The evidence presented in those previous papers demonstrates the continued cost-effectiveness of industrial energy efficiency programs and their important place in balancing the costs of utility energy efficiency program portfolios. Despite the clear cost-effectiveness of industrial programs, as we discuss next, current Midwest policies do not recognize the value of these programs and therefore do not prioritize them.

Midwest Industrial Energy Efficiency Policies

Over the past decade, the Midwest has experienced an exponential increase in utility energy efficiency investment, resulting in energy savings that have benefitted customers, utility operations and the broader energy system. This relatively recent expansion of energy efficiency was no accident. States across the region have required or encouraged energy efficiency through legislation, executive orders, regulatory decisions and local community leadership. To some extent, utilities have independently increased investment in energy efficiency because of the opportunity to improve relationships with customers and to avoid more costly supply-side resource investments, but overwhelmingly, Midwest energy efficiency gains have been driven by policy.

The energy efficiency policies in the Midwest have few details in common, but they do share a common pattern: a tendency to focus on the "low-hanging fruit" energy savings. As policies persist and ramp-up over time, utilities must find and achieve cost-effective energy

savings to meet their respective goals (whether required or encouraged). Accordingly, low-cost, savings-rich and widely applicable measures are targeted to a willing, but finite, set of customers – largely residential and small commercial customers. As those easy-to-reach measures are saturated in the market after a decade or more of energy efficiency programs, utilities must try harder to reach additional participants and, in doing so, tend to prioritize the most cost-effective remaining opportunities. Thus, industrial customers become a natural target for utilities to look to for savings; industrial processes enjoy consistently high usage and high demand and the scale of operations means that even relatively simple retrofits and other low-cost/no-cost process efficiency measures can reap huge savings rewards. In the Midwest, industrial energy efficiency potential remains largely untapped and therefore provides an attractive path toward achieving energy savings goals.

Now, imagine that you remove those customers from utility energy efficiency program participation by enacting a policy that either lets them choose not to participate or prevents them from participating. That leaves a statewide approach that simultaneously requires/encourages energy savings while removing the most fruitful means of achievement. Increasingly, this is happening in the Midwest. States are passing laws exempting industrial customers or otherwise allowing them to discontinue paying into programs, removing their load and savings potential from the equation.

In the Midwest we have seen this happen in the following types of policies:

1) an exclusion for:
    a) customers with peak demand over 10 MW (Illinois, passed in 2016) and
2) opt-outs for:
    a) all customers if a utility's proposed plans for energy efficiency and demand response offerings cumulatively score a ratepayer impact test below 1.0 at the time of regulatory approval (Iowa, 2018),
    b) any customers that are industrial customers with energy intensive processes (Kentucky, 2009) and
    c) customers with annual demand of over 1 MW (Indiana, 2014), 5 MW (Missouri, 2009), or usage over 4.5 GWh (Ohio, 2014).[2]

These policies, some of which we describe further below in selected detailed case studies, have many negative effects that include promoting free-ridership, risk shifting onto other customer classes, unfairness among customer treatment and discouragement of a leaner, more resilient and competitive stock of industrial companies in the nation's most concentrated manufacturing region. Ultimately, these policies – seemingly the result of large customer dissatisfaction with program offerings as relayed to legislators – reduce overall program funding for their sector thereby reducing the effectiveness and value of these programs. This self-destructive policy trend hampers Midwest industrial customers with bloated energy costs, reducing overall competitiveness within regional, national and global markets.

In the below review of select state approaches to industrial energy efficiency policy, we identify concerns and resulting impacts, and lay out a roadmap for how to implement the

[2] These do not include self-direct policies in Michigan, Minnesota and Wisconsin, which have resulted in limited amounts of energy savings as well.

opportunities we know exist for industrial customers. The goal is to increase the regional use of strategic energy management and continuous energy improvement principles to ensure that industrial customers, utilities and policymakers alike recognize the value of energy efficiency in maintaining a robust industrial sector in the Midwest.

Midwest Case Studies

Indiana

Indiana has been a cautionary tale from a policy standpoint. In 2009, the Indiana Utility Regulatory Commission (IURC) ordered the states' utilities to adopt an energy efficiency resource standard (EERS) (IURC 2009). Utilities began implementing energy efficiency programs in 2010 including "Core" programs run by a statewide jointly administered program administrator called Energizing Indiana and "Core Plus" programs run by individual utilities. The savings goal set forth in the EERS by the commission was 2% of annual total electric sales by 2019 (IURC 2009). From 2010-2014, Indiana's utilities achieved almost 2.5 GWh of electricity savings. Then in 2014, legislators passed a law repealing the statewide EERS and allowing non-residential customers with a peak demand over 1 megawatt (MW) to opt-out of paying into the newly voluntary utility energy efficiency programs. In the post-Energizing Indiana environment, utilities are still required by the IURC to file energy efficiency plans and reports, though they are not held to any specific energy savings requirements. Utilities are not subject to any penalties for not achieving approved savings targets but can propose financial incentives for achieving plan goals and can receive lost revenue recovery for offset electricity sales.

Indiana's opt-out provision reads as follows:

> (e) for purposes of this section, "industrial customer" means a person that receives services at a single site constituting more than **one (1) megawatt of electric capacity** from an electricity supplier [and] (f) An industrial customer may opt out of participating in an energy efficiency program that is established by an electricity supplier. (IC 8-1-8.5-9) (emphasis added)

Both commercial and industrial customers can technically qualify as an industrial customer under this section by reaching that single-site peak demand of 1 MW. This means, depending on utility, that customers representing around 50-70 percent of non-residential sales were eligible to, and ultimately chose to, opt-out of energy efficiency programs. Statewide, electricity savings across all customer sectors fell about 26% in 2015, though they rebounded somewhat to about 83% of 2014 levels by 2017. (Figure 1). The growth in energy efficiency savings since 2015 has been from residential, small commercial, and the remaining few non-opted-out industrial customers.

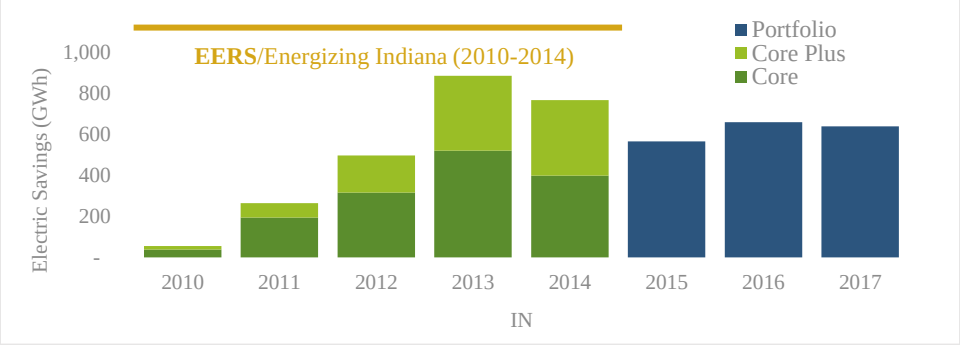

Figure 1:Indiana statewide all-sector electricity savings from utility energy efficiency portfolios. From 2010 to 2014, Core programs were run by a statewide third-party administrator while Core Plus programs were run by individual utilities. From 2015 onward, each utility has been entirely responsible for its own energy efficiency portfolio. (*Source*: MEEA tracking data)

Despite not having mandatory savings targets, Indiana does have mandatory filing requirements for EE plans. In proposing their savings goals for upcoming planning cycles, the utilities must build an energy efficiency portfolio and demonstrate portfolio-wide cost-effectiveness without being able to count on highly cost-effective savings from most of their large C&I customers.

While the opt-out provisions from the 2014 legislation did not go into effect until 2015, the uncertainty during the legislative session and preparing for the upcoming policy changes had a dampening effect on industrial and commercial energy efficiency in Indiana during 2014. The end of EERS requirements meant an all-sectors reduction of about 26% in statewide energy savings from 2014 to 2015, as previously noted in Figure 1, but that reduction hit the non-residential programs much harder. (Figure 2). For the one Indiana utility that has complete sector-level EE reporting on federal Form EIA-861,[3] industrial sector energy efficiency savings went down 41%. If we expand to look at the combined commercial & industrial (C&I) data representing all of Indiana's investor-owned utilities, the reduction is 36%.

[3] The remaining IOUs had industrial EE savings reported in 2012, but not for any subsequent years, though we know because of subsequent customer opt-out that industrial customers were part of 2013-2014 EE portfolios.

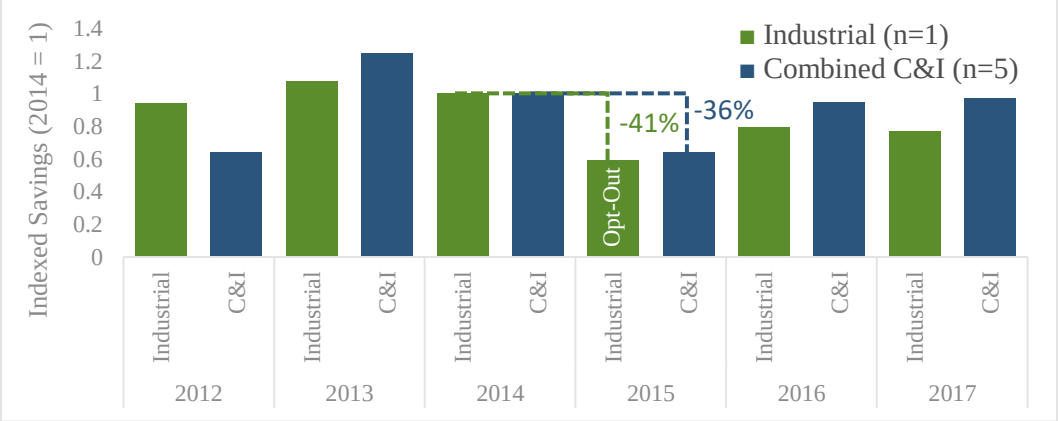

Figure 2: Sector-level electricity savings in Indiana, 2012-2017, indexed to 2014. Industrial-sector data represents the single utility with complete sector-specific energy efficiency data in federal reporting, while the C&I-sector data represents all five of Indiana's investor-owned utilities. Indiana's opt-out went into effect in 2015. (*Source*: EIA-861)

As updated plans were approved and utilities provided programs to their remaining eligible customers, there was some rebounding from the low 2015 levels. Combined C&I savings have returned, by 2017, to 97% of what they were before the end of the EERS, but industrial-specific savings have only rebounded to 77% of 2014 savings. Taken together, this data suggests that increases in EE subsequent to the EERS have come from all sectors, but primarily from the residential sector. Rebounding in the non-residential portfolios has come from customers who could not (or chose not to) opt-out, but that growth in EE is coming mostly from commercial customers. Savings from the smaller industrial customers that did not opt out are not enough to make up the loss of the larger industrial customers from the portfolio.

It is hard to make definitive conclusions about industrial energy efficiency impacts from EIA-861 data because, as noted, not all utilities report the same way. State regulatory reporting is for two sector-level portfolios, residential and C&I. While Form EIA-861 asks utilities to report three customer sectors, many of them only report residential and commercial to EIA, the same as with their in-state reporting. The industrial EE data is blended with the commercial data and there is no way to disaggregate it. That leaves us with conclusions that are not as robust as they could be if we had access to disaggregated data.

We hope that ongoing work with our utility members to gain access to more specific data on opted-out customers will provide us with the numbers to strengthen this analysis and fully understand the impact in terms of savings and investment levels on Indiana's utility EE portfolios.

Ohio

Ohio has become something of a clean energy battleground. The past several years have featured heated debates over renewable energy standards, wind turbine siting, energy efficiency standards and a customer opt-out. Initially established by legislation in 2008, Ohio's EERS was frozen by law for 2015 and 2016, during which a legislative energy mandates study committee was formed, met and issued a report covering only the costs (but not the benefits) of energy efficiency. The law that created the freeze (Senate Bill 310) also created a customer opt-

out which became effective January 1, 2017. In contrast to Indiana, Ohio's industrial opt-out is based on volumetric energy use by a customer, rather than the customer's demand peak.

Ohio's opt-out provision reads as follows:

> Sec. 4928.6610. "Customer" means any customer of an electric distribution utility to which either of the following applies:
>
> 1. The customer receives service above the primary voltage level as determined by the utility's tariff classification.
> 2. The customer is a commercial or industrial customer to which both of the following apply:
>   a. The customer receives electricity through a meter of an end user or through more than one meter at a single location in a **quantity that exceeds forty-five million kilowatt hours of electricity for the preceding calendar year**.
>   b. The customer has made a written request for registration as a self-assessing purchaser pursuant to section 5727.81 of the Revised Code.
>
> Sec. 4928.6611. Beginning January 1, 2017, a customer of an electric distribution utility may opt out of the opportunity and ability to obtain direct benefits from the utility's portfolio plan.[4] Such an opt out shall extend to all of the customer's accounts, irrespective of the size or service voltage level that are associated with the activities performed by the customer and that are located on or adjacent to the customer's premises. (ORC 4928) (emphasis added)

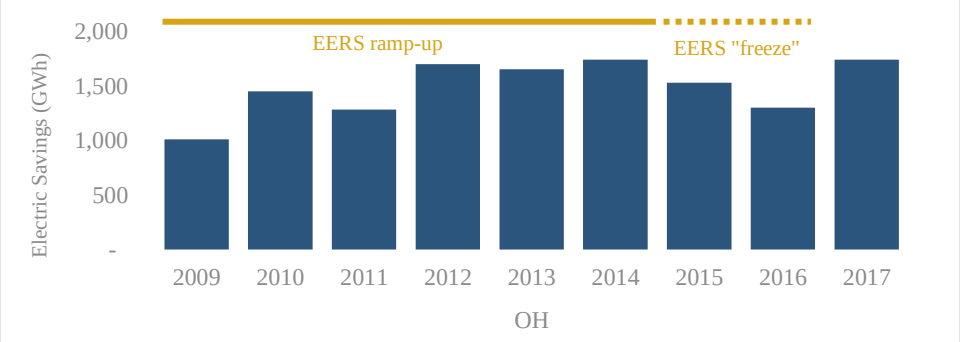

Figure 3: Ohio statewide all-sector electricity savings from utility energy efficiency portfolios, 2019-2017. Legislative action froze the energy efficiency standard at 2014 levels for two years, 2015-2016. (*Source*: MEEA tracking data)

Statewide energy efficiency savings in Ohio were dramatically impacted by a "freeze" of the required energy efficiency savings from the state's EERS at 2014 levels for two years. The subsequent rebound of savings after the freeze obscures the impact of 2017's industrial opt-out on the utility portfolios. If we look at sector-specific savings from EIA-861, however, the impact of

[4] "Portfolio plan" refers to the comprehensive energy efficiency and peak-demand reduction program portfolio plan required under rules adopted by the public utilities commission and codified in Chapter 4901:1-39 of the Administrative Code or hereafter re-codified or amended.

the policy changes – the EERS freeze and the subsequent opt-out – on industrial energy efficiency savings are quite evident. (Figure 4)

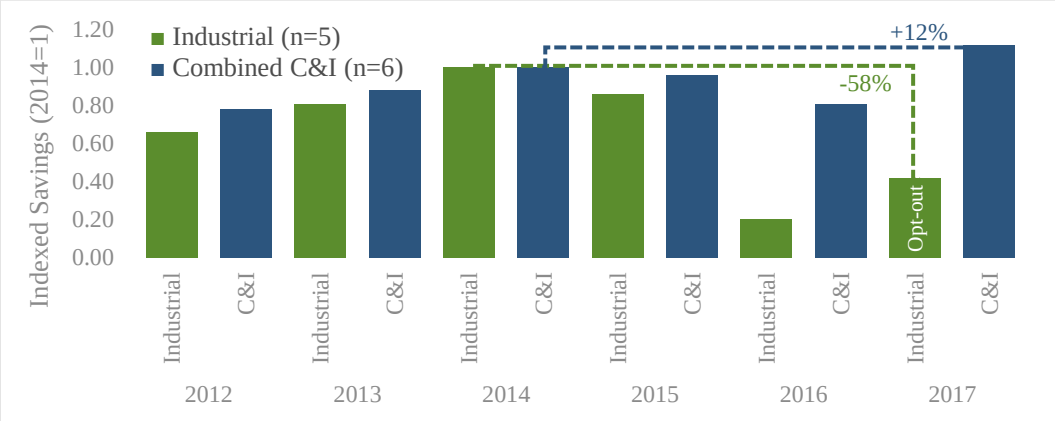

Figure 4: Sector-level electricity savings in Ohio, 2012-2017, indexed to 2015. Industrial-sector data represents five utilities with complete sector-specific energy efficiency data in federal reporting, while the C&I-sector data represents all six of Indiana's investor-owned utilities. (First Energy's three subsidiary utilities are considered separately here, as they report separately on EIA-861). Indiana's EERS was frozen at 2014 levels from 2015-2016 and its opt-out went into effect in 2017. (*Source*: EIA-861)

The combination of the EERS freeze and the opt-out was devastating to industrial energy efficiency in Ohio. In the first year of the freeze (2015) there were moderate reductions of 14% in purely industrial-sector EE and only 4% in combined C&I EE. In the second year of the freeze, 2016, with the opt-out due to start the next year, industrial savings collapsed by 80% from 2014 levels, while combined C&I was down 19%. In 2017, after the freeze ended, the rebound in savings took C&I back up to 112% of 2014 savings, while industrial-specific EE only rebounded to 42% of previous levels. It is clear from this data that the end of the freeze allowed commercial customers to take advantage of utility EE programs again and did so dramatically, while a substantial portion of the industrial customers opted out of participation and did not return to program participation. This means a much smaller rebound in savings came from only small industrial customers.

The EIA-861 data on industrial energy efficiency in Ohio is much clearer than that in Indiana because all but one of Ohio's IOUs reported savings in all three customer sectors. That said, we hope that ongoing efforts to obtain disaggregated data from the utilities will make this even more definitive.

Other Notable Jurisdictions

Illinois. Following the passage of the Future Energy Jobs Act (FEJA 2016), Illinois' energy efficiency policy is now structured as an internally conflicted framework, pairing aggressive energy savings goals with exclusion of the largest customers. Illinois' exemption provision reads as follows:

> 1) For the calendar years covered by a multi-year plan commencing after December 31, 2017, **subsections (a) through (j) of this section do not apply to any**

> **retail customers of an electric utility** that serves more than 3,000,000 retail customers in the State and whose total highest 30 minute demand was more than **10,000 kilowatts**, or any retail customers of a an electric utility that serves less than 3,000,000 retail customers but more than 500,000 retail customers in the state whose highest 15 minute demand was more than **10,000 kilowatts**. For purposes of this subsection (1), "retail customer" has the meaning set forth in Section 16-102 of this Act.[5] A determination of whether this subsection is applicable to a customer shall be made for each multi-year plan beginning after December 31, 2017. The criteria for determining whether this subsection (1) is applicable to a retail customer shall be based on the 12 consecutive billing periods prior to the start of the first year of each such multi-year plan. (FEJA 2016) (emphasis added)

With this provision, FEJA set in motion a new world of required energy efficiency investments, energy savings levels and a complicated incentive system tied to energy savings achievement. Yet, at the same time, it pulled approximately 10 percent of ComEd's total load (ComEd 2017) and nearly 42 percent of Ameren's historical business savings (ICC 2017) out of the equation. As required by FEJA, excluded customers do not pay into utility programs. Therefore, customers with a peak demand in excess of 10MW cannot participate in programs and utilities cannot claim savings for energy savings program activities undertaken at these facilities. Just as required energy savings targets increase, the most cost-effective programs are preempted as the targeted customers for those programs are excluded. Given that this provision went into effect in 2017, it is too early to determine with any certainty the toll the exclusion has taken in terms of energy savings, energy efficiency portfolio-wide cost-effectiveness and resulting economic benefits to Illinois.

Iowa. Iowa has been a quiet leader in energy efficiency for the past decade or more. Historically, Iowa maintained a system wherein the Iowa Utilities Board approved five-year energy efficiency planning cycles with no spending caps, no lost revenue mechanisms and no incentive mechanism for savings achievements. What set Iowa apart is that these plans applied to and were therefore paid for by the regulated utilities' full customer base. In 2018, the Iowa legislature passed a law that will allow all customers to opt-out under specific circumstances. The presently operational (2019-2023) utility plans did not trigger the opt-out provision, but the possibility remains for future planning cycles.

> The board **shall allow a customer of an electric utility** that is required to be rate regulated to **request an exemption from participation in any five-year energy efficiency plan** offered by an electric utility **if the energy efficiency plan and the demand response plan, at the time of approval by the board, have a cumulative rate-payer impact test result of less than 1**. Upon receipt of a request for exemption submitted by a customer, the electric utility shall grant the exemption

[5] "Retail customer" means a single entity using electric power or energy at a single premises and that (A) either (i) is receiving or is eligible to receive tariffed services from an electric utility, or (ii) that is served by a municipal system or electric cooperative within any area in which the municipal system or electric cooperative is or would be entitled to provide service under the law in effect immediately prior to the effective date of this amendatory Act of 1997, or (B) an entity which on the effective date of this Act was receiving electric service from a public utility and (i) was engaged in the practice of resale and redistribution of such electricity within a building prior to January 2, 1957, or (ii) was providing lighting services to tenants in a multi-occupancy building, but only to the extent such resale, redistribution or lighting service is authorized by the electric utility's tariffs that were on file with the Commission on the effective date of this Act. (220 ILCS 5. Article 16. Section 16-102 (1997)).

> and, beginning January 1 of the following year, the customer shall no longer be assessed the costs of the plan and shall be prohibited from participating in any program included in such plan until the exemption no longer applies, as determined by the board. (IA 2018) (emphasis added)

Taken together, these policies demonstrate a Midwest-wide relationship with energy efficiency that is fundamentally broken. We are interested in what can be done within these problematic regulatory frameworks. It is clear education is needed, at all levels, to make the case to customers, policymakers and utilities that cost-effective energy efficiency saves customers, voters and ratepayers money. It is also evident that we collectively need widespread creativity in program design for industrial customers.

Strategic Energy Management

We need to change the way we talk about energy efficiency as a business strategy and reevaluate the way we approach industrial program design. The current model of utility program touchpoints and energy use tracking has been useful but until the industrial systems are tracked in-house and the business decision-making incorporates energy decisions on a level playing field, long term savings opportunities are unlikely to happen. Strategic Energy Management (SEM) is the most complete strategy to strengthen the industrial energy efficiency programming system. SEM involves company-wide buy-in, informed decision-making through energy data tracking, regression modeling of savings and process equipment performance, and utility programming opportunities. These program components can be added to existing program offerings or used to create more holistic program approaches.

SEM can be defined as:

> Taking a holistic approach to managing energy use in order to continuously improve energy performance, by achieving persistent energy and cost savings over the long term. It focuses on business practice change from senior management to the shop floor staff, affecting organizational culture to reduce energy waste and improve energy intensity. SEM emphasizes equipping and enabling plant management and staff to impact energy consumption through behavioral and operational change. While SEM does not emphasize a technical or project-centric approach, SEM principles and objectives may support capital project implementation. (Stewart 2017)

To entice large energy users, the initial step toward increasing the prevalence of strategic energy management program participation involves explaining and demonstrating the value to the customers. If the utility can help the customer to understand that incremental process efficiency and energy efficiency measures can help them expand production capabilities, then the company's decision makers will be able to see the value in tracking granular energy use data, establishing a corporate policy and building a corporate culture that celebrates the prospect of optimizing the business' energy use at all levels of employment. True commitment to informed energy management decision-making requires prioritization from all levels of the company – from the corporate officers to the employees.

Informed decision-making is the guiding force of the strategic management of continuous energy improvement in a business. To make informed decisions about energy costs, the decision makers need to place energy costs on equal footing with other company fixed costs and investments. One way is to frame energy usage on a production basis. Unless we

understand energy usage, for instance, as a measure of production (e.g. kWh per widget) the magnitude of the situation and opportunity could be lost. Another way is to track the productivity of each piece of equipment over time to better understand the output over time in the context of the equipment's energy use. Once baselines (monthly energy use, output quotas, equipment expectations, etc.) are established, the information can be used to forecast potential energy savings through upgrades or to see what energy savings process changes/equipment changes would have produced. This data analysis ensures the company understands its equipment, the potential for savings and embeds a level of confidence into the system of checking the true value of energy savings measures. Tracking this information will first lead to low cost and no-cost process changes and technologies, which will reinforce the potential for savings, leading to a continuous stream of small, medium and large energy saving projects.

Once energy costs are established as a priority, companies can enlist their employees to be on the lookout for opportunities to reduce energy waste. In the SEM field, stories about the employee who finally questioned that old duct to nowhere, the fan or compressor or vent that was always running or the doors which were propped open for convenience that caused the HVAC system to run exhaustively are common. These seemingly innocuous issues can go unnoticed, but they have a profound impact on indoor climate control, equipment life and energy bills. Simple processes and employee procedures can serve as checks on these costly outliers. To make it a team-building opportunity, companies across the country have instituted treasure hunts and contests whereby perceptive employees can earn prizes while reducing operational energy costs. Holding all owners and employees to organizational stewardship and responsibility raises the attention to plant details, turning to the discovery and reduction of waste.

Strategic Energy Management, which has been a small but slowly growing part of voluntary federal program offerings and utility-specific programming, is enjoying recent popularity as a result of an influential international standard. The International Organization for Standardization (ISO) has set forth ISO 50001. The standard itself is proprietary to ISO, but the essential tenets are as follows:

1) Develop a policy for more efficient use of energy;
2) Fix targets and objectives to meet the policy;
3) Use data to better understand and make decisions about energy use;
4) Measure the results;
5) Review how well the policy works; and
6) Continually improve energy management. (ISO 2018).

The ISO 50001 standard is commonly employed in Europe and multinational companies that have operations in the United States have carried the practices here. Increasingly, ISO 50001 is entering the Midwest manufacturing and energy management conversation. However, compliance with the standard, which is certified through a third-party evaluation, is costly.

Accordingly, facilities located in the United States have been slow to take up ISO 50001 certification.[6]

Beyond actual compliance, the standard's hallmark checklist of steps has more thoroughly influenced our national program approaches. The U.S. Environmental Protection Agency (EPA) is committed to SEM principles and has partnered with organizations like MEEA, with a broad goal to undo some of the damage caused by industrial opt-outs and other deficiencies in industrial energy policy. In 2007, the U.S. Department of Energy (DOE) launched Superior Energy Performance (SEP), an initiative based on SEM principles but branded as a national program. SEP has evolved over time but consistently involves ISO 50001 standard completion and improvement of company energy performance up to 30% over three years. In 2016, DOE announced "50001 Ready", an initiative based on the ISO 50001 checklist to more practically incorporate SEM principles into distinct utility program portfolio offerings. The basic premise and resources include: completing the 25 tasks in the 50001 Ready Navigator, including planning, energy review, continual improvement and system management topic areas, self-attestation to checklist completion and measuring improvement of energy performance over time. These federal programs provide a platform of resources, data analytics tools, job advancement trainings and recognition/certification opportunities.

There are many light and heavy-touch approaches to incorporating SEM into existing industrial energy efficiency offerings. A more complete or immersive approach involves tiers of customer interest, for instance an SEM-lite offering based on generic ISO 50001 principles, an ISO 50001 pre-certification and full ISO 50001 certification. Other Midwest utilities incorporate elements of Superior Energy Performance, DOE Better Plants, EPA's ENERGY STAR Challenge for Industry and DOE's 50001 Ready. The program offerings can typically be for those larger energy users, with eligibility varying based on the utility's customer base. Depending on program funding levels, program administrators can develop close and personal contact used to assist customers with progressing in the programs. A high level of customer contact might not be practical for utilities with smaller budgets or more rigid existing program delivery frameworks. In some cases, utility and implementer staff facilitate peer-to-peer SEM discussions while offering small financial incentives for participation and measure installations. Not all utilities have the same level of dedicated resources. Budgets reflect program participation and statewide goals or requirements. Accordingly, different utility territory circumstances and utility program capacity mean creativity is the key to infusing program offerings with SEM principles.

SEM Best Practices and Recommendations

Recommendations for Utilities

- Create a tiered structure for low, medium and high-level strategic energy management program commitments
- Increase investment in custom programs for manufacturers
- Transition to utility-initiated, but customer-driven models for program design to ensure they are tailored to each customer's onsite processes

[6] According to the 2017 ISO Survey, 258 companies have received certification between 2011-2017 in the United States. (ISO Survey 2017).

- Incorporate strategic energy management (SEM) principles, including taking an operational and equipment-specific look at data tracking, organization-wide buy-in and continuous energy improvement
- Incorporate cohort or peer-to-peer best practice sharing opportunities for similarly situated customer groups (window/glass, car, etc. manufacturers)
- Catalogue federal recognition programs to provide customers a menu of options to be recognized for achievements, commitments and process efficiency changes
- Use data tracking tools to normalize energy expenses in terms of production, single out equipment/assets and make informed decisions alongside other business expenses
- Quantify the value of energy efficiency programs for customers who would otherwise opt-out, including: 1) bill reduction value of energy efficiency programs to the customer beyond individual measure benefits and 2) proportionality of customer's energy usage/payments compared to that of other customers
- Host events featuring speakers and resources regarding strategic energy management.
    - Include bonus rebates for any program participation that is initiated due to event
    - Recognize the positive operational impacts that program participation has had for other similarly situated customers
    - Use events to inform customers of program participation benefits and dissuade customers from opting out/persuade customers to opt back in
- Separate industrial energy efficiency investment and savings to ensure the utility and other analysts can accurately identify the impacts associated with exclusive energy efficiency policies

Recommendations for Educating Policymakers

- Create better educational materials that make a clear connection between customer energy efficiency bill charges and the participant, nonparticipant, energy system, economic and other non-energy benefits of energy efficiency
- Create a regulatory framework that provides large energy users policy flexibility without wholesale removal of those customers from programs – through prioritization of flexible planning timelines, sector-specific program/project funding mechanisms and SEM savings valuations that will drive utilities to prioritize SEM practices
- Provide the value of industrial energy efficiency prioritization when considering clean energy proposals as pathway to achieve goals while increasing resiliency and cost-effectiveness

Conclusion

Industrial energy efficiency is cost-effective, yet Midwest policymakers continue to allow industrial customers to avoid paying their fair share into utility programs. Industrial opt-out policies are expanding throughout the Midwest and continue to have negative impacts on energy savings. Most importantly, lack of program funding and increase in opt-outs puts the Midwest's industrial sector at a competitive disadvantage. Given this situation, the Midwest's energy efficiency industry must get creative with program offerings and targeted customer-friendly resources. Strategic Energy Management tenets specific to continuous energy improvement

principles provide the framework to hook the interest of industrial customers through energy data-driven informed decision-making. Integration of SEM into programs is feasible and effective with a little creativity. Any strategy to disseminate SEM principles must target utility program administrators and policymakers, in addition to customers, to keep the value clear through case studies and reinforced by messaging and education.

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