MEETA
MIDWEST ENERGY EFFICIENCY ALLIANCE

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Executive Summary: Energy Efficiency & Reliability in Ohio

Key Points

- Energy efficiency (EE) and demand response (DR) enhance electric system reliability by reducing the energy needs of customers. Demand-side resources reduce the risk of blackouts from customers needing more electricity than the grid has available.
- If energy efficiency had continued after 2020, Ohioans could have used 5.4 million MWh less electricity in 2023.
- Demand response from 2009-2020 already reduced Ohio customer summer peak demand by 29%. Missed demand savings could have reduced the peak by a further 24%.

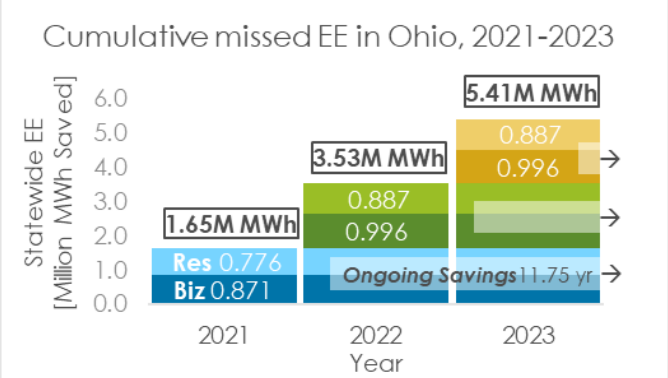
Demand-side Resources Enhance Reliability

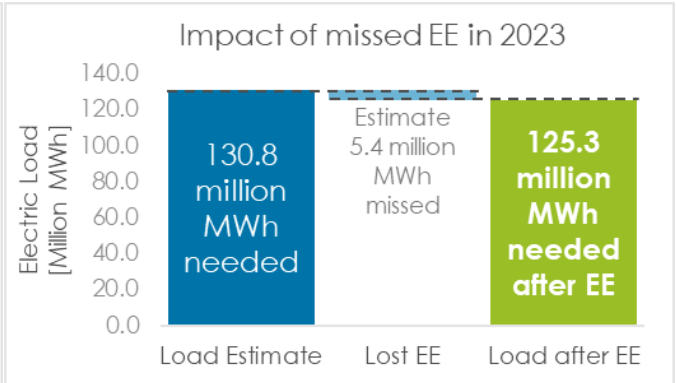
Demand-side management (DSM) has clear impacts on the reliability of the electric grid. Energy efficiency (EE) and its companion, demand response (DR), are essential first steps to ensuring that electric utilities can meet the needs of their customers, even when events reduce the amount of available electricity from generators on the grid.

The chance that high customer electricity use will cause system unreliability is known as the *Loss of Load Probability (LOLP)*. Increasing utility customers' access to EE and DR supports system reliability by reducing the risk that the available generation will not be enough to support customer electricity use, causing a loss of load (i.e., blackout) event.

Ohio's Missed Energy Savings

Ohio's energy efficiency resource standard was overturned in 2019 and utility programs ended in 2020. If Ohio's electric utilities had been allowed to continue energy efficiency programs after 2020 at the same level, they could have saved 5.4 million megawatt-hours of electricity for their customers over the past three years.





The cumulative electricity savings could have reduced Ohio's customer electricity needs in 2023 by about 4%, and those missed savings would have persisted for over a decade.

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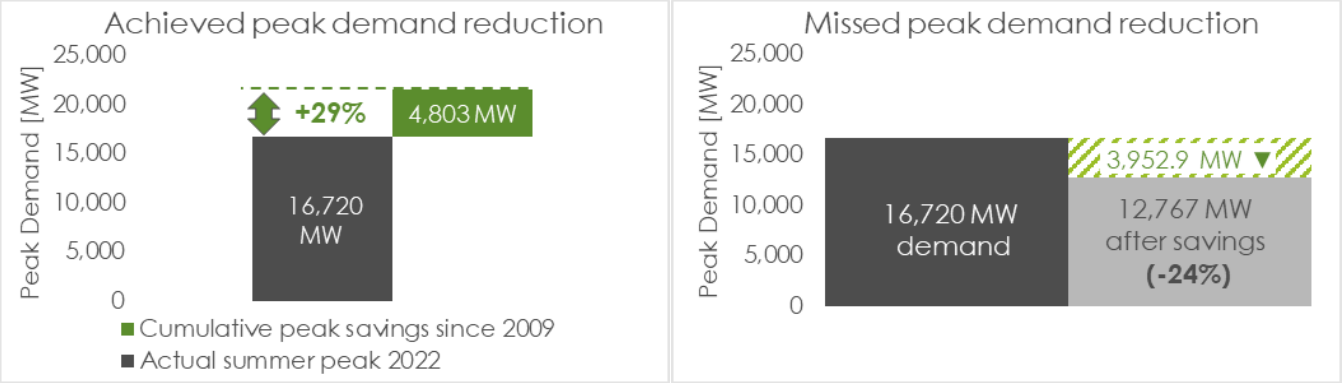
Ohio's Missed Demand Savings

Ohio's electric utilities reported their cumulative demand savings since 2009 in their 2020 final reports. Savings already achieved mean that the current summer demand peak in Ohio is 29% lower than it would have been without those programs.



If the strong DR program achievements from 2020 had continued through 2023, peak demand could have been reduced by as much as 24% more based on 2022 peak levels.

Conclusion

Demand-side management has a strong role to play in ensuring the reliability of the electric grid. Ohioans are concerned that grid-based electricity resources will be inadequate for meeting future energy needs, and the response to that risk is focusing on new fossil-fueled generation assets. This is misplaced because Ohio has eliminated the first, lowest cost category of resources from the demand side: energy efficiency and demand response. The additional energy and demand savings that could have been achieved over the last three years would have had a substantial impact on the energy needs of Ohio utility customers and could have lessened the risk that is being felt today.

These comments reflect the views of the Midwest Energy Efficiency Alliance – a Regional Energy Efficiency Organization as designated by the U.S. Department of Energy – and not the organization's members or individual entities represented on our board of directors.

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MEMO:

Energy efficiency & reliability; Estimate of savings lost in Ohio from 3 years without electric IOU energy efficiency portfolios.

G. Ehrendreich / MEEA Revised 2/16/2024.

The goal of this analysis was to look at the energy and demand savings that could have occurred over the last three years in Ohio if electric investor-owned utility energy efficiency had continued in the state, through the lens of electric system reliability.

Demand-side Resources Enhance Reliability

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Increasing utility customers' access to energy efficiency supports system reliability, reducing the risk of not having adequate resources on the grid. As illustrated in the conceptual figure below, energy efficiency reduces the chance that customer needs and electricity supply will not match up and customers will lose power.

The chance of this occurring is the *Loss of Load Probability (LOLP)*. The red curve shows the probability distribution of the electric load – the chance that end-use customers will be drawing a given number of megawatts of electricity from the electric grid. Energy efficiency shifts that curve lower, as illustrated by the green curve – customers are demanding fewer megawatts at one time because of their reduced electricity needs.

The probability of loss of load – a blackout because customers cannot draw enough electricity from the grid – is where the load distribution curve intersects with the blue generation distribution curve.

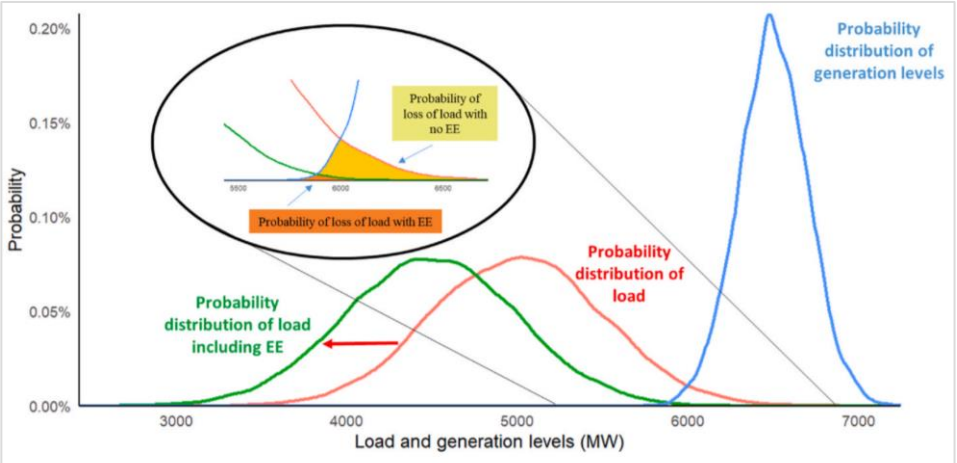

Fig. 3. Conceptual probability distribution for generation and load, illustrating the concept of LOLP.

Image source: J.P. Carvallo et al. *Energy Policy* 169 (2022) 113185. Link

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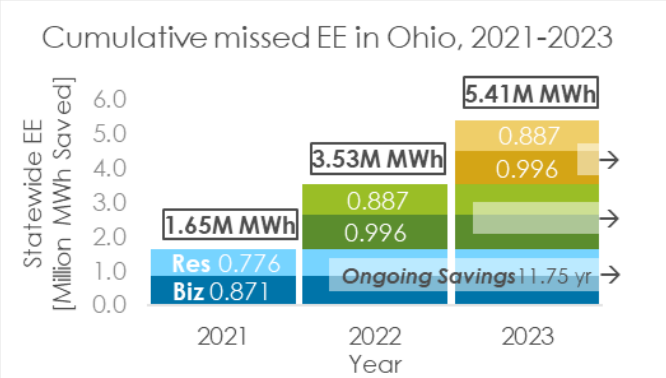
With the original red load curve, the area where those curves overlap – in yellow in the zoomed in area – is the chance of having a blackout. The much smaller area – in orange – is the chance of having a blackout with the addition of EE.

Ohio's Missed Energy Savings

To estimate the savings that could have been achieved over the three years that Ohio has not had electric investor-owned utility (IOU) energy efficiency, the analysis started with the results from the last year of energy efficiency programs, 2020. The final reports provided by the electric IOUs in their respective dockets[1] formed the basis for estimation.

The annual incremental energy savings reported by each utility were used as the estimate for the subsequent years, except that 2021 savings were reduced by 10.25% consistent with the regional trend of savings drop-off due to program pauses during the COVID-19 pandemic.

Each year of energy efficiency programs would generate incremental savings in the first year, and those savings continue to accrue over subsequent years. The average expected useful life (EUL) for utility energy efficiency programs, based on the average EUL for the electric utilities' respective portfolios from 2020, is 11.75 years. This means that over the period studied, the 2021 programs would continue to produce savings in 2022 and 2023. The 2022 programs would also produce savings in 2023. The 2023 savings would accrue in that year. All of those savings would continue to persist into the future. The figure to the right shows the results of the lost energy savings analysis.



From just these three years of programs, customer energy needs could have been reduced by 5.4 million megawatt-hours in 2023, and cumulatively over those three years alone, 10.6 million megawatt-hours could have been saved.

To put this into perspective, the customers of the electric IOUs in Ohio use about 130 million megawatt-hours of electricity every year according to federal data.[2] In 2023, if

[1] AEP: *21-0139-EL-EEC*; AES: *21-0051-EL-POR*; Duke: *21-0481-EL-EEC*; First Energy: *21-0537-EL-EEC*

[2] Energy Information Administration [EIA]. 2023. *Annual Electric Power Industry Report, Form EIA-861 detailed data files.* "Sales_Ult_Cust_2022.xlsx" https://www.eia.gov/electricity/data/eia861/

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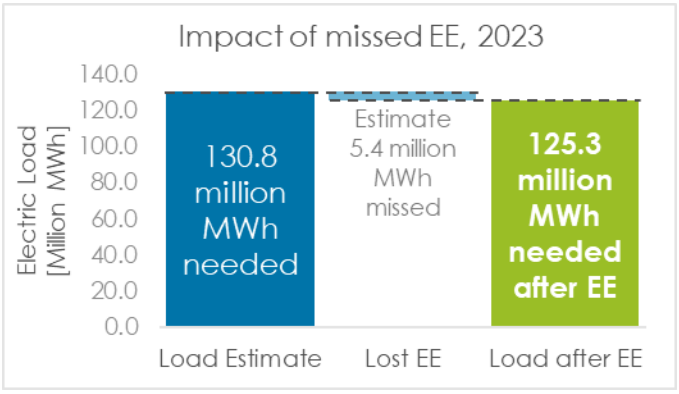
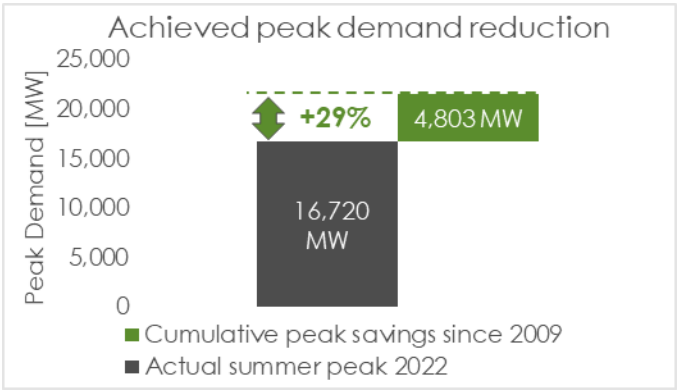


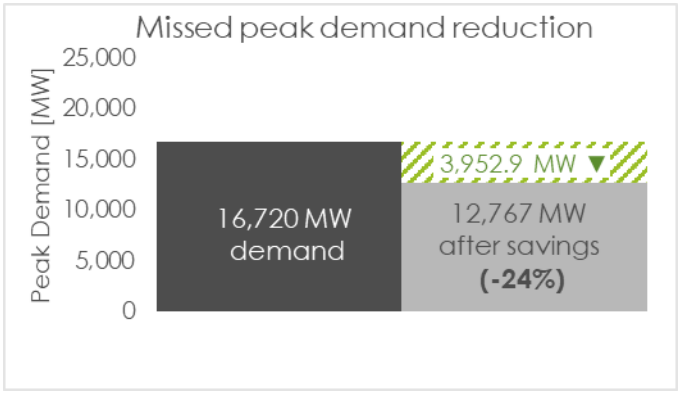
energy efficiency had not been eliminated, only 125 million megawatt-hours would have been needed. This is shown in the figure to the left.

Ohio's Missed Demand Savings

Electric utilities also had strong demand response programs in 2020 as part of their portfolios, along with gaining coincident demand savings from energy efficiency programs. If those savings had continued from 2021-2023 at the levels achieved in 2020, the megawatt reduction would have been quite substantial.

Actual summer peak electricity demand for the investor-owned electric utilities totaled 16,720 megawatts in 2022 according to federal utility data.[3] From the utility docketed EE reports, cumulative peak demand savings from 2009-2020 provided 4,803 MW of permanent demand reduction already achieved. As shown, without actual existing demand reduction the current peak demand level could have been 29% higher in 2022 than it was.





Estimated peak demand savings from three years of additional programs could have generated almost 4,000 MW of additional savings. This would result in a summer peak 24% lower than the current level.

Conclusion

Demand-side management has a strong role to play in ensuring the reliability of the electric grid. Ohioans are concerned that grid-based electricity resources will be inadequate for meeting future energy needs, and the response to that risk is focusing on new fossil-fueled generation assets. This is misplaced because Ohio has eliminated the first, lowest cost category of resources from the demand side:

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[3] EIA. 2023. *Annual Electric Power Industry Report, Form EIA-861 detailed data files.* "Operational_Data_2022.xlsx" https://www.eia.gov/electricity/data/eia861/

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