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| Business New Construction Impact Evaluation Report  Energy Efficiency Plan: Program Year 2024  (1/1/2024-12/31/2024) | | | | | | | |
| Prepared for:  Nicor Gas Company  DRAFT  March 12, 2025 | | | | | | | |
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# Introduction

This report presents the results of the impact evaluation of the Nicor Gas 2024 Business New Construction (BNC) program. The appendices present the impact analysis methodology, detailed engineering desk review results, and Illinois total resource cost (TRC) inputs. Program year 2024 (PY2024) covers January 1, 2024, through December 31, 2024.

# Program Description

The BNC program is offered jointly to commercial and industrial (C&I) and public sector (PS) customers served by ComEd, Nicor Gas, Peoples Gas, and North Shore Gas. The program aims to capture immediate and long-term energy efficiency opportunities available during the design and construction of non-residential and multifamily buildings. The program covers new buildings, additions, and major renovations.

Slipstream (formerly Seventhwave) implements the program by reaching out to design professionals, commercial real estate developers, and customers at the beginning of the design process. The implementation team provides technical assistance in building design to reduce energy use beyond what is required by existing building codes and standards. The Nicor Gas BNC program coordinates with ComEd where their service areas overlap. Nicor Gas purchases therms savings from the program using a dollar per therm payment model on a project-by-project basis.

Overall, the program had 42 participants in PY2024 and completed 42 projects. Of these projects, 33 included gas savings, 16 of which were served jointly by ComEd and Nicor Gas. However, the savings detailed in this report exclude three projects completed in 2024 that Nicor will claim in PY2025, and seven projects completed in PY2023 that Nicor is claiming in PY2024, as seen in Table 1.

Table 1. 2024 Volumetric Findings Detail

| **Participation** | **ComEd (Overall with Gas Utilities)** | **Nicor Gas §** | **Total** |
| --- | --- | --- | --- |
| Private Sector |  |  |  |
| Participants \* | 27 | 16 | N/A |
| Installed Projects † | 27 | 16 | N/A |
| Measure Types Installed ‡ | Whole Building | Whole Building |  |
| Public Sector |  |  |  |
| Participants \* | 6 | 4 | N/A |
| Installed Projects † | 6 | 4 | N/A |
| Measure Types Installed ‡ | Whole Building | Whole Building |  |
| Program 2024 Total |  |  |  |
| Participants \* | 33 | 20 | N/A |
| Installed Projects † | 33 | 20 | N/A |
| Measure Types Installed ‡ | Whole Building | Whole Building |  |

\* Participants are the distinct count of addresses

† Installed Projects are the distinct count of project ID

‡ Measure Types Installed are the distinct count of Nicor measure names

§ Nicor Gas’ participant and project counts exclude three projects completed in 2024 that Nicor has elected to claim in 2025 (CINC-1609, CINC-1365, CINC-1529) and include seven projects completed that Nicor elected to claim in 2024 (CINC-1190, CINC-1229, CINC-1231, CINC-1320, CINC-1357, CINC-1464, CINC-1473).

Source: Nicor Gas tracking data and evaluation team analysis.

# Program Savings Detail

Table 2 summarizes the energy savings the Nicor Gas BNC Program achieved in 2024.

Table 2. 2024 Annual Energy Savings Summary

| **Program Category** | **Program Path** | **Ex Ante Gross Savings (Therms)** | **Verified Gross RR\*** | **Verified Gross Savings (Therms)** | **NTG†** | **NSPO** | **Verified Net Savings (Therms)** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Private, Non-Disadvantaged Communities | Whole Building | 227,282 | 1.01 | 229,058 | 0.43 | N/A | 98,495 |
| Private, Non-DAC Subtotal |  | 227,282 | 1.01 | 229,058 | 0.43 | N/A | 98,495 |
| Public, Non-Disadvantaged Communities | Whole Building | 75,472 | 1.01 | 76,062 | 0.43 | N/A | 32,707 |
| Public, Non-DAC Subtotal |  | 75,472 | 1.01 | 76,062 | 0.43 | N/A | 32,707 |
| **Total or Weighted Average** |  | **302,754** | **1.01** | **305,119** | **0.43** | **N/A** | **131,201** |

\* Verified Gross RR, the realization rate (RR) is the ratio of Verified Gross Savings to Ex Ante Savings

† NTG, Net to Gross is the deemed value available on the SAG website: <https://www.ilsag.info/evaluator-ntg-recommendations-for-2024/>.

‡ The market rate residential non-participant spillover (NPSO) factor of 1.048 does not apply to this program.

Note: As of March 12, 2025, the evaluation team is still finalizing the application of the Net to Gross Policy for Disadvantaged Areas. The evaluation team applied a NTG ratio of 1.0 to the verified gross savings estimates of eligible projects, which, as of this time, included public and private projects in disadvantaged communities (ZIP codes) with square footage values under the area threshold for eligibility based on building type. The area threshold criteria acts as a proxy in the absence of reliable electric rate and annual gas consumption data. The second half of this policy, which assigns public sector projects in DAC municipalities qualified as general delivery service municipal, public school, or local government projects a NTG of 1.0 was not applied in the first draft but will be applied in subsequent drafts.

Source: Nicor Gas tracking data and evaluation team analysis.

# Program Savings by Measure

The BNC program claims savings at the whole building level, so this report does not present measure-level savings. Evaluation-verified savings for the program are based on a random sample of projects and reported at the project level (whole building analysis). Appendix B provides more information about sampled project-level savings.

# Impact Analysis Findings and Recommendations

## Impact Parameter Estimates

BNC program participants completed 42 projects (33 with gas savings) in 2024. The evaluation team used a stratified random sampling approach to select 30 projects to receive an engineering desk review. Of the 30 sampled projects, 26 projects had gas savings. Of the 26 projects with gas savings, 13 were served jointly by ComEd and Nicor Gas (see Appendix A for more detail on the sampling approach). For nine of the 13 Nicor Gas projects, the desk reviews resulted in realization rates (RR) of 1.0 and, therefore, independently confirmed the ex-ante savings and required no adjustments.

The evaluation team calculated RRs with and without interactive effects (see Appendix A for more detail on interactive effects). The final RRs for projects with gas savings was 101% for therms without interactive effects and 107% for therms with interactive effects.

The evaluation team calculated verified gross and net energy savings using participant specific whole-building energy models developed by the implementation team for baseline and projected design scenarios. For each participant, the design energy model estimates the proposed building’s annual whole-building energy consumption based on architecture; building envelope; heating, ventilation, and air conditioning (HVAC); lighting; and other parameters from the building design plans. The baseline energy model for a project estimates the counterfactual annual energy consumption the building would be expected to consume if it were built to meet the baseline energy performance standards. The estimated first-year savings are the difference in annual electric and gas consumption between the two models. Most of the models were developed in the Sketchbox program, which utilizes the DOE2.2 engine. The evaluation team reviewed the models using Sketchbox or eQuest, which also utilizes the DOE2.2 engine.

Table 3 shows the parameters used in the verified gross and net savings calculations and indicates which were calculated through evaluation activities and which were deemed. The following section provides findings and recommendations, including a discussion of all measures with RRs above or below 100%. Appendix A provides a description of the impact analysis methodology.

Table 3. Verified Gross Savings Parameters

| Gross Savings Input Parameters | Deemed or Evaluated? | Source\* |
| --- | --- | --- |
| Program Model Inputs | Evaluated | Program-supplied building models and savings calculation spreadsheet |
| Evaluation Model Inputs | Mixture | Desk review of project documentation; IL-TRM v12.0 |
| Evaluation Model Results | Evaluated | eQuest/DOE2.2/DOE2.1E/Project Calculations |
| Realization Rate - All Projects | Evaluated | Program savings and evaluated savings |
| NTG - Electric and Gas | Deemed | Illinois SAG Consensus |
| EUL | Mixture | IL-TRM v12.0 – Volume 4 Attachment B |

\*TRM is the Illinois Technical Reference Manual version 12.0 (IL-TRM v12.0): https://www.ilsag.info/illinois-statewide-technical-reference-manual-version-12-0/. The net-to-gross (NTG) values can be found on the Illinois Stakeholder Advisory Group (SAG) website: <https://www.ilsag.info/evaluator-ntg-recommendations-for-2024/>.

*Source: Evaluation team analysis.*

## Findings and Recommendations

The factors that had the largest effect on adjusting ex ante gross savings were inconsistencies between installed equipment specifications and performance characteristics and incorrect application of code requirements or baselines.

**Finding 1.** The ex ante savings for several projects were different from the verified savings due to installed equipment quantities or specifications being inconsistent with performance characteristics included in the building models or calculations. Adjustments included:

* Project CINC-1430. Window solar heat gain coefficient values
* Project CINC-1451. Lighting power density (LPD) and window u-values
* Project CINC-1512. LPD values and HVAC equipment efficiencies
* Project CINC-1607. Installed exterior lighting power wattages

Recommendation 1. The evaluation team recommends that building simulations are kept up to date to accurately represent the final as-built building construction and installed equipment.

**Finding 2.** The evaluation team changed the savings for one project due to incorrect application of code requirements or baselines:

* Project CINC-1430 included the installation of packaged vertical heat pumps; however, the baseline efficiency values were incorrectly based on the requirements for packaged terminal heat pumps instead of packaged vertical heat pumps. Making this correction increased the savings for this measure by 37% and increased the realization rate for the entire project by 4%.

Recommendation 2. Increase quality control (QA/QC) processes to ensure baselines for building simulations or savings calculations are consistent with applicable codes and standards for the installed equipment.

**Finding 3.** The evaluation team reduced the savings associated with occupancy sensor control strategies for project CINC-1106. The project included turning lights off after 15-minutes, instead of the 20-minute delay required by code. The ex ante analysis assumed that reducing the shutoff period by 5 minutes would result in the lights being turned off twice as much as if the code-required 20-minute delay was used. Based on a literature review,[[1]](#footnote-2) the evaluation team calculated a 12% increase in lighting-off time from a 15-minute setpoint, compared to the 20-minute setpoint.

**Recommendation 3.** Ensure savings levels for incremental improvements to controls above code requirements are reasonable and consistent with actual expected changes to equipment operation (i.e., reduced shutoff time).

##### Appendix A. Impact Analysis Methodology

Engineering Methodology

Table 5 includes a description of the building energy models used in the measurement and verification (M&V) engineering analysis. The analysis included the following:

* Adjusting the model inputs in the executable files to match the as-built conditions identified in the evaluation team’s review of the BNC program’s project files and then rerunning the model
* Quantifying impacts by comparing two simulations representing the projected design and baseline scenarios

The baseline model is the Illinois Energy Conservation Code for Commercial Buildings, which references and incorporates the applicable International Energy Conservation Code (IECC). The Illinois Energy Conservation Code for Commercial Buildings explicitly allows for the use of American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 90.1 as an alternate compliance method.

The program assumes the appropriate baseline based on the program application date. Projects designed through CY2019 used IECC 2015 (based on ASHRAE 90.1-2013) with more recent projects (2020 or sooner) using IECC 2018 (based on ASHRAE 90.1-2016). The evaluation team relied on the same software, methods, and approach to assigning baseline assumptions that the program implementers used to estimate the ex ante models.

The team also calculated interactive effects for each fuel type, where applicable. Interactive effects are the resulting changes to savings that occur when the installation of one measure has a positive or negative effect on the consumption of another fuel type. Interactive effects are calculated in the model. For utilities’ goal tracking, the evaluation team provides the savings without the penalties from interactive effects. The implementation team calculated savings for joint projects including interactive effects. However, the evaluation team calculated savings with and without interactive effects for reporting purposes. Unless noted, the results in this report exclude penalties from cross-fuel interactive effects.

The evaluation team calculated verified net energy savings by multiplying the verified gross savings estimates by a net to gross (NTG) ratio. In CY2024, the NTG values used to calculate the net verified savings were based on past evaluation research and approved by the Illinois SAG. The evaluation team applied a NTG ratio of 1.0 to verified gross savings estimates corresponding to eligible projects under the Net to Gross Policy for Disadvantaged Areas. Eligible projects consisted of public and private projects in disadvantaged communities ([DACs] ZIP codes) with square footage values under the area threshold for eligibility based on building type. The last of these criteria acts as a proxy in the absence of reliable electric rate and annual gas consumption data.

The evaluation team selected a stratified random sample for the BNC program to support the engineering desk reviews. The team designed the sample to provide 90/10 confidence and precision for evaluated therms savings estimates.

Sampling Approach

Consistent with previous evaluations, the evaluation team developed an MMBtu stratified random sample of projects to support the engineering desk reviews. This approach focused on electric and gas savings. The team designed the sample to provide 90/10 precision for evaluated kW, kWh, and therms savings, considering savings with and without interactive effects. This approach also targeted 90/10 precision at the MMBtu level.

The team sampled CY2024 projects in two waves. The Wave 1 sample frame contained all 14 projects with electricity or gas savings completed as of June 30, 2024. The Wave 2 sample frame contained the remaining 28 projects completed between July 1, 2024, and December 31, 2024. For each wave, the evaluation team divided the sample frame into strata based on the overall MMBtu savings of each project and randomly selected projects within those strata. After completing the desk reviews and calculating project-specific realization rates (RRs), the team developed case weights to extrapolate the results to similar projects, ensuring the engineering results represent the population of 2024 participants. Table A‑1 shows the MMBtu profile of the sample selection. Table A‑2 shows the profile of the sample for therms savings and roll up gross realization rate and precision estimate.

Table A-1. 2024 BNC Program Profile of Gross Impact Sample for Projects (MMBtu)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Population Summary\*†** | | | **Sample Summary\*** | | |
| **Program** | **Sampling Strata** | **Number of Projects (N)** | **Ex Ante Gross Savings** | **n** | **Ex Ante Gross Savings** | **Sampled % of Population** |
| **(MMBtu)** | **(MMBtu)** | **(% MMBtu)** |
| Coordinated Non-Residential New Construction | 1 | 21 | 9,422 | 11 | 4,860 | 52% |
| 2 | 10 | 16,199 | 8 | 13,638 | 84% |
| 3 | 10 | 42,354 | 10 | 42,354 | 100% |
| Certainty | 1 | 6,653 | 1 | 6,653 | 100% |
| **Total** |  | **42** | **74,627** | **30** | **67,504** | **90%** |

\*The gross impact population and sample include MMBtu savings for Nicor Gas, as well as Peoples Gas, North Shore Gas, and ComEd.

†Three Nicor Gas projects (CINC-1609, CINC-1365, CINC-1529) were included in the population during sampling, with two of them (CINC-1609, CINC-1365) being selected. Although ComEd claimed the electric savings for these projects in 2023, Nicor Gas elected to claim the gas savings in program year 2025.

*Source: Evaluation team analysis.*

Table A-2. 2024 BNC Program Profile of Gross Impact Sample for Projects and Realization Rate

|  | **Population Summary\*†** | | | **Sample Summary\*** | | | **Statistical Verification Results** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Program** | **Sampling Strata** | **Number of Projects (N)** | **Ex Ante Gross Savings** | **n** | **Ex Ante Gross Savings** | **Sampled % of Population** | **Realization Rate** | **Precision** |
| **(Therms)** | **(Therms)** | **(% Therms)** | **(Therms)** |  |
| Coordinated Non-Residential New Construction | 1 | 14 | 30,166 | 9 | 15,611 | 52% |  |  |
| 2 | 8 | 86,607 | 6 | 74,918 | 87% |  |  |
| 3 | 10 | 231,253 | 10 | 231,253 | 100% |  |  |
| Certainty | 1 | 33,509 | 1 | 33,509 | 100% |  |  |
| **Total** |  | **33** | **381,535** | **26** | **355,291** | **93%** | **1.01** | **0.5%** |

\*The gross impact population and sample include MMBtu savings for Nicor Gas, as well as Peoples Gas, North Shore Gas, and ComEd.

†Three Nicor Gas projects (CINC-1609, CINC-1365, CINC-1529) were included in the population during sampling, with two of them (CINC-1609, CINC-1365) being selected. Although ComEd claimed the electric savings for these projects in 2023, Nicor Gas elected to claim the gas savings in program year 2025.

*Source: Evaluation team analysis.*

Impact Analysis Supplemental Information

Table A‑3 shows the results of the engineering desk review for Nicor Gas projects, including the ex ante savings, verified savings, and the resulting RR for each project in the desk review sample. The table also includes, where applicable, a narrative describing the reasons for any discrepancies between ex ante and verified savings. A RR less than 1.00 indicates that a project received a downward adjustment to energy savings while a RR more than 1.00 indicates that a project received an upward adjustment to energy savings. All energy savings exclude interactive effects.

Table A-3. 2024 BNC Program Researched Gross Savings for Sampled Projects

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | |  | | **Ex Ante** | |  | | **Verified** | | |  | | **Realization Rate** | | |
| **Project ID** | **Gas Utility** |  | | **Electric Savings (kWh/yr)** | | **Gas Savings (therm/yr)** | |  | | **Electric Savings (kWh/yr)** | **Gas Savings (therm/yr)** | |  | | **Electric (kWh) Savings Realization Rate** | **Gas (therm) Savings Realization Rate** |
| CINC-1430 | Nicor Gas |  | | 544,163 | | 17,611 | |  | | 597,884 | 16,550 | |  | | 1.10 | 0.94 |
|  | Based on the available window documentation, the evaluation team changed the achieved glazing U-value from 0.30 to 0.28 and the SHGC from 0.28 to 0.29. For the PTHP measure, the evaluation team adjusted the baseline because the units were packaged vertical heat pumps, not packaged terminal heat pumps. The evaluation team also made changes to the low-flow fixtures measure, switching from a per-fixture to a per-apartment basis for calculations to align more closely with the Illinois Technical Reference Manual (IL-TRM). | | | | | | | | | | | | | | | |
| CINC-1451 | Nicor Gas |  | | 171,829 | | 903 | |  | | 213,733 | 1,749 | |  | | 1.24 | 1.94 |
|  | The evaluation team changed the achieved window assembly U-value from 0.37 to 0.28. From the provided documentation, it appeared that 0.37 was the U-value for the curtainwall windows. The evaluation team calculated a weighted average of apartment windows and curtainwall windows to arrive at the new U-value of 0.28. The evaluation team also made changes to LPD measures, with the living unit LPD achieved value changing from 0.6 W/sf to 0.531 W/sf and the corridor achieved LPD changing from 0.59 W/sf to 0.78 W/sf. | | | | | | | | | | | | | | | |
| CINC-1487 | Nicor Gas |  | | 967,819 | | 33,509 | |  | | 967,819 | 33,509 | |  | | 1.00 | 1.00 |
|  | No changes. | | | | | | | | | | | | | | | |
| CINC-1512 | Nicor Gas |  | | 31,601 | | 395 | |  | | 32,273 | 451 | |  | | 1.02 | 1.14 |
|  | The evaluation team increased the achieved interior LPD from 0.56 W/sf to 0.58 W/sf. The evaluation team also changed the RTU cooling efficiency baseline from 9.7 EER to 9.57 EER, using a baseline of 9.5 EER for the RTUs, and weighting it with the efficiencies of two air conditioners. The eQuest model for this measure uses EIR, and the evaluation team could not replicate the model's EIR value using 9.5 or 9.7 EER. The evaluation team changed the eQuest model to include updated EIR values for the baseline and achieved cases. | | | | | | | | | | | | | | | |
| CINC-1564 | Nicor Gas |  | | 72,239 | | 4,973 | |  | | 72,229 | 4,973 | |  | | 1.00 | 1.00 |
|  | No changes. | | | | | | | | | | | | | | | |
| CINC-1598 | Nicor Gas |  | | 554,986 | | 13,015 | |  | | 554,986 | 13,015 | |  | | 1.00 | 1.00 |
|  | No changes. | | | | | | | | | | | | | | | |
| CINC-1106 | Nicor Gas |  | | 313,152 | | 15,687 | |  | | 298,986 | 15,687 | |  | | 0.95 | 1.00 |
|  | The ex ante analysis claimed decreasing occupancy sensor shutoff time from 20 minutes (per code) to 15 minutes would double the savings (increase from a 10% reduction in hours to a 20% reduction in hours). Based on a National Electrical Manufacturers Association (NEMA) study,[[2]](#footnote-3) going from a 20-minute shutoff time to a 5-minute shutoff time resulted in a 28% reduction in hours. Based on linear interpolation, the evaluation team used a 12% reduction in hours for the reduction from 20 minutes to 15 minutes. | | | | | | | | | | | | | | | |
| CINC-1365 | Nicor Gas |  | | 75,936 | | 2,768 | |  | | 75,936 | 2,768 | |  | | 1.00 | 1.00 |
|  | No changes. | | | | | | | | | | | | | | | |
| CINC-1478 | Nicor Gas |  | | 909,221 | | 22,784 | |  | | 909,221 | 22,784 | |  | | 1.00 | 1.00 |
|  | No changes. | | | | | | | | | | | | | | | |
| CINC-1479 | Nicor Gas |  | | 452,272 | | 38,547 | |  | | 452,272 | 38,547 | |  | | 1.00 | 1.00 |
|  | No changes. | | | | | | | | | | | | | | | |
| CINC-1554 | Nicor Gas |  | | 892,454 | | 17,758 | |  | | 892,454 | 17,758 | |  | | 1.00 | 1.00 |
|  | No changes. | | | | | | | | | | | | | | | |
| CINC-1607 | Nicor Gas |  | | 193,998 | | 7,868 | |  | | 196,865 | 8,676 | |  | | 1.01 | 1.10 |
|  | The evaluation team updated the achieved exterior lighting power to match the claimed installed wattage per the supplied project documentation. | | | | | | | | | | | | | | | |
| CINC-1609 | Nicor Gas |  | | 647,999 | | 43,212 | |  | | 647,999 | 43,212 | |  | | 1.00 | 1.00 |
|  | No changes. | | | | | | | | | | | | | | | |

EER – Energy Efficiency Ratio

PTHP – Packaged Terminal Heat Pump

SHGC – Solar Heat Gain CoefficientRTU - Rooftop Unit

*Source: Nicor tracking data and evaluation team analysis.*

##### Appendix B. Program Specific Inputs for the Illinois TRC

Table B‑1 shows the Total Resource Cost (TRC) cost-effectiveness analysis inputs available at the time of producing this impact evaluation report. Additional required cost data (e.g., measure costs, program level incentive and non-incentive costs) are not included in this table and will be provided to the evaluation team later. Guidehouse will include annual and lifetime water savings and greenhouse gas reductions in the end of year summary report.

Table B‑1. Verified Cost Effectiveness Inputs

| **Program Category** | **Program Path** | **Savings Category** | **DAC Project** | **Units** | **Quantity** | **Effective Useful Life** | **Early Replacement Flag** | **Verified Gross Annual Water Savings (Gallons)** | **Ex Ante Gross Savings (Therms)** | **Verified Gross Savings (Therms)** | **Verified Net Savings (Therms)** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Private | Whole Building | DAC Ineligible Projects | FALSE | Project | 16 | 20.60 | NO | N/A | 227,282 | 229,058 | 98,495 |
| Public | Whole Building | DAC Ineligible Projects | FALSE | Project | 4 | 20.60 | NO | N/A | 75,472 | 76,062 | 32,707 |
| **Total or Weighted Average** | | |  |  |  | **20.60** |  | **N/A** | **302,754** | **305,119** | **131,201** |

Note: As of March 12, 2025, the evaluation team is still finalizing the application of the Net to Gross Policy for Disadvantaged Areas. The evaluation team applied a NTG ratio of 1.0 to the verified gross savings estimates of eligible projects, which, as of this time, included public and private projects in disadvantaged communities (ZIP codes) with square footage values under the area threshold for eligibility based on building type. The area threshold criteria acts as a proxy in the absence of reliable electric rate and annual gas consumption data. The second half of this policy, which assigns public sector projects in DAC municipalities qualified as general delivery service municipal, public school, or local government projects a NTG of 1.0 was not applied in the first draft but will be applied in subsequent drafts. *Source: Evaluation team analysis.*

1. National Electrical Manufacturers Association, *Demand Reduction and Energy Savings Using Occupancy Sensors*, <https://synergylightingusa.com/wp-content/uploads/2010/06/NEMA-Occupancy-Study.pdf>, accessed March 21, 2025. [↑](#footnote-ref-2)
2. National Electrical Manufacturers Association, *Demand Reduction and Energy Savings Using Occupancy Sensors*, <https://synergylightingusa.com/wp-content/uploads/2010/06/NEMA-Occupancy-Study.pdf>, accessed March 21, 2025. [↑](#footnote-ref-3)