Guidehouse

ComEd Agriculture Impact Evaluation Report

Energy Efficiency / Demand Response Plan:
Program Year 2020 (CY2020)
(1/1/2020-12/31/2020)

Prepared for:

ComEd

FINAL

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1. Introduction

This report presents results from the CY2020 impact evaluation of ComEd's Agriculture Program. It summarizes the total energy and demand impacts for the program broken out by relevant measure and program structure details. The appendices provide the impact analysis methodology and details of the total resource cost (TRC) inputs. CY2020 covers January 1, 2020 through December 31, 2020.

2. Program Description

The Agriculture Program targets the full market vertical including farms (dairy, poultry, hogs, cash crops, etc.), greenhouses, indoor agriculture facilities, supply houses, and onsite processing facilities, as well as farm facilities on residential properties (excluding the residence) and office space utilized by agriculturally-oriented businesses. This program serves existing and new facilities, offering both standard and custom incentives. The program is managed by ComEd and implemented by Franklin Energy Services.

Per the program's Scope of Work, CY2020 activities included the following:

1. Franklin Energy advisors reached out to small to medium agriculture customers through a combination of channels, including direct farmer outreach, industry associations, dealer networks, and energy efficiency service providers.

2. Agriculture customers received ongoing personalized energy advisor support. Energy advisors were the face and voice of the program to farmers, industry associations, dealer networks, and energy efficiency service providers. Interested customers were offered a free walk-through assessment appropriate for the facility to identify energy efficiency opportunities.

3. Based on findings from the initial energy audit, the Agriculture Program's energy advisor worked with the farm owner to determine the optimal program participation level.

4. Based on the projects the farmer was interested in pursuing, the farmer is free to work with the contractor of his or her choice.

5. All prospects and interactions were tracked within ComEd's Salesforce system.

The Agriculture Program offered incentives for a wide range of prescriptive and custom energy efficiency measures, including:

- Indoor and outdoor lighting fixtures and controls
- Variable speed drives (VSD)
- High speed exhaust and ventilation/circulation fans
- Air compressors and ancillary equipment
- Engine block timers

- Thermally insulated livestock waters
- Agriculture specific equipment not covered through a prescriptive program.

The CY2020 program had 94 participants who submitted 113 projects. Further context related to the measure diversity of these projects is provided in Table 2-1 and Figure 2-1.

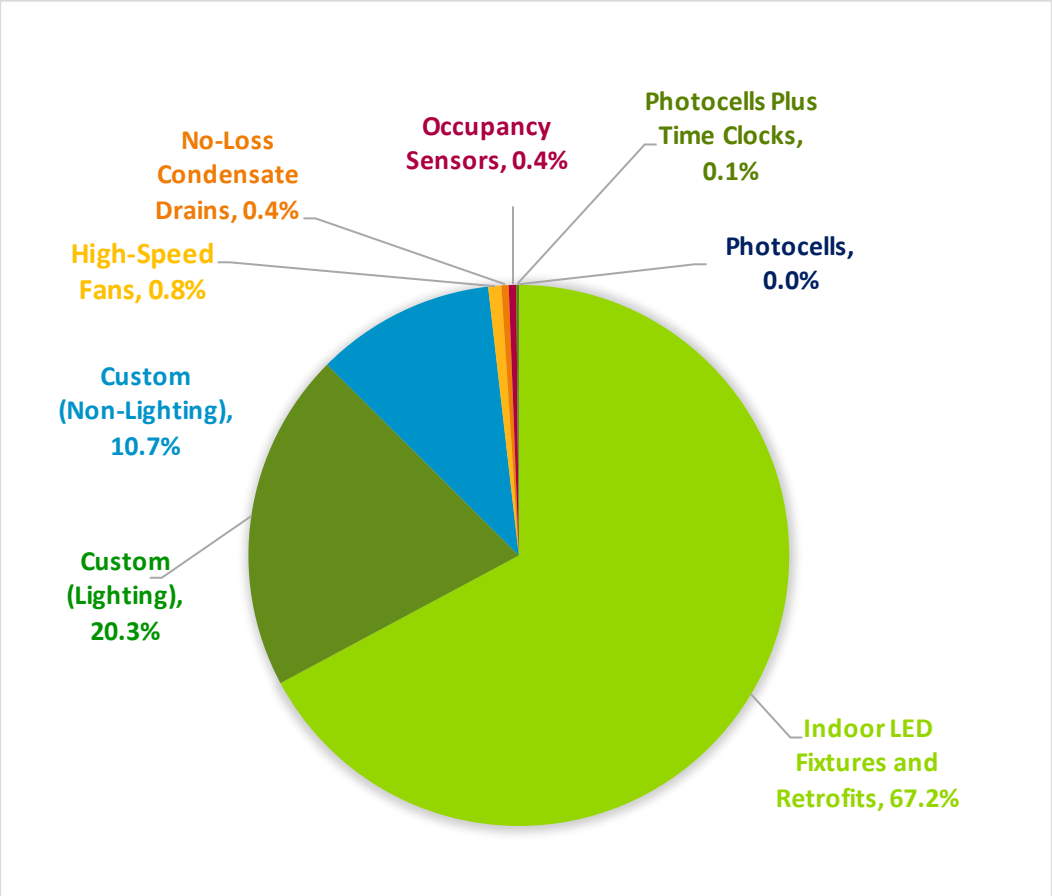
Table 2-1. CY2020 Volumetric Findings Detail

Participation	Total
Projects	113
Participants	94
Total Measures	469
Indoor LED Fixtures and Retrofits	355
Occupancy Sensors	44
Photocells	40
Custom (Non-Lighting)	14
No-Loss Condensate Drains	6
High-Speed Ventilation & Circulation Fans	5
Custom (Lighting)	4
Photocells Plus Time Clocks	1

Note: Measure quantity was not included in the year-end database. The Total Measures metric in the table reflects the total number of individual measure rows in the database, not the physical equipment count.

Source: ComEd tracking data and evaluation team analysis.

Figure 2-1. Measures Installed by Type



Source: ComEd tracking data and evaluation team analysis

3. Program Savings Detail

Table 3-1 summarizes the incremental energy and demand savings the Agriculture Program achieved in CY2020. The program reported zero gas impacts for CY2020.

Table 3-1. CY2020 Total Annual Incremental Electric Savings

Savings Category	Energy Savings (kWh)	Summer Peak* Demand Savings (kW)
Electricity		
Ex Ante Gross Savings	5,445,709	2,672
Program Gross Realization Rate	0.74	0.85
Verified Gross Savings	4,003,596	2,259
Program Net-to-Gross Ratio (NTG)	0.77	0.67
Verified Net Savings	3,100,046	1,516
Converted from Gas†		
Ex Ante Gross Savings	NA	NA
Program Gross Realization Rate	NA	NA
Verified Gross Savings	NA	NA
Program Net-to-Gross Ratio (NTG)	NA	NA
Verified Net Savings	NA	NA
Total Electric Plus Gas		
Ex Ante Gross Savings	5,445,709	2,672
Program Gross Realization Rate	0.74	0.85
Verified Gross Savings	4,003,596	2,259
Program Net-to-Gross Ratio (NTG)‡	0.77	0.67
Verified Net Savings	3,100,046	1,516

NA = not applicable (refers a piece of data cannot be produced or does not apply)

* The coincident summer peak period is defined as 1:00 p.m.-5:00 p.m. Central Prevailing Time on non-holiday weekdays, June through August.

† The Agriculture Program reported zero gas impacts in CY2020.

‡ NTG shown here is a weighted average based on verified savings; see also Table A-1.

Source: ComEd tracking data and evaluation team analysis

4. Cumulative Persisting Annual Savings

Table 4-1 shows the total verified gross savings for the Agriculture Program and the cumulative persisting annual savings (CPAS) for the program in CY2020. Figure 4-1 shows the savings across the useful life of the measures. Table 4-1 shows the electric CPAS across all measures incentivized in CY2020 equal to 3,100,046 kWh. The historic rows in each table are the CPAS contributions and expiring savings for the program back to CY2018. The program did not report gas savings in CY2020.

Table 4-1. Cumulative Persisting Annual Savings (CPAS) – Electric

End Use Type	Research Category	EUL	CY2020 Verified Gross Savings (kWh)	NTG*	Lifetime Net Savings (kWh)†	Verified Net kWh Savings 2018	2019	2020	2021	2022	2023
Lighting	Indoor LED Fixtures and Retrofits	15.0	2,217,371.7	0.83	27,373,521			1,840,418	1,840,418	1,827,517	1,822,097
Custom	Custom (Lighting)	14.0	1,106,182.4	0.70	10,861,305			774,328	774,328	774,328	774,328
Custom	Custom (Non-Lighting)	14.8	583,961.9	0.70	6,062,785			408,773	408,773	408,773	408,773
Non-Lighting	High-Speed Ventilation & Circulation Fan	7.0	42,550.7	0.78	232,327			33,190	33,190	33,190	33,190
Non-Lighting	No-Loss Condensate Drains	10.0	21,850	0.78	170,429			17,043	17,043	17,043	17,043
Lighting	Occupancy Sensors	8.0	23,260	0.83	154,444			19,306	19,306	19,306	19,306
Lighting	Photocells Plus Time Clocks	8.0	6,383	0.83	42,383			5,298	5,298	5,298	5,298
Lighting	Photocells	8.0	2,036	0.83	13,521			1,690	1,690	1,690	1,690
CY2020 Program Total Electric Contribution to CPAS			4,003,596		44,910,715			3,100,046	3,100,046	3,087,144	3,081,724
Historic Program Total Electric Contribution to CPAS‡						-	410,675	410,675	410,675	410,675	410,675
Program Total Electric CPAS						-	410,675	3,510,720	3,510,720	3,497,819	3,492,399
CY2020 Program Incremental Expiring Electric Savings§									-	12,901	5,420
Historic Program Incremental Expiring Electric Savings‡§								-	-	-	-
Program Total Incremental Expiring Electric Savings§								-	-	12,901	5,420

End Use Type	Research Category	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Lighting	Indoor LED Fixtures and Retrofits	1,822,097	1,822,097	1,822,097	1,822,097	1,822,097	1,822,097	1,822,097	1,822,097	1,822,097	1,822,097	1,822,097	-
Custom	Custom (Lighting)	774,328	774,328	774,328	774,328	774,328	774,328	774,328	774,328	774,328	774,328	20,717	-
Custom	Custom (Non-Lighting)	408,773	408,773	408,773	408,773	408,773	408,773	408,773	408,773	408,773	408,773	339,958	-
Non-Lighting	High-Speed Ventilation & Circulation Fan	33,190	33,190	33,190	-	-	-	-	-	-	-	-	-
Non-Lighting	No-Loss Condensate Drains	17,043	17,043	17,043	17,043	17,043	17,043	-	-	-	-	-	-
Lighting	Occupancy Sensors	19,306	19,306	19,306	19,306	-	-	-	-	-	-	-	-
Lighting	Photocells Plus Time Clocks	5,298	5,298	5,298	5,298	-	-	-	-	-	-	-	-
Lighting	Photocells	1,690	1,690	1,690	1,690	-	-	-	-	-	-	-	-
CY2020 Program Total Electric Contribution to CPAS		3,081,724	3,081,724	3,081,724	3,048,535	3,022,241	3,022,241	3,005,198	3,005,198	3,005,198	3,005,198	2,182,772	-
Historic Program Total Electric Contribution to CPAS‡		410,675	410,675	410,675	401,207	401,207	401,207	369,845	369,845	369,845	369,845	-	-
Program Total Electric CPAS		3,492,399	3,492,399	3,492,399	3,449,741	3,423,448	3,423,448	3,375,043	3,375,043	3,375,043	3,375,043	2,182,772	-
CY2020 Program Incremental Expiring Electric Savings§		-	-	-	33,190	26,294	-	17,043	-	-	-	822,426	2,182,772
Historic Program Incremental Expiring Electric Savings‡§		-	-	-	9,468	-	-	31,361	-	-	-	369,845	-
Program Total Incremental Expiring Electric Savings§		-	-	-	42,658	26,294	-	48,404	-	-	-	1,192,271	2,182,772

Note: The green highlighted cell shows program total first year electric savings. Gray cells are irrelevant to the CY2020 contribution to CPAS.

* NTG is a deemed value. Source: is found on the Illinois Stakeholder Advisory Group (SAG) website: https://www.ilsag.info/ntg_2020.

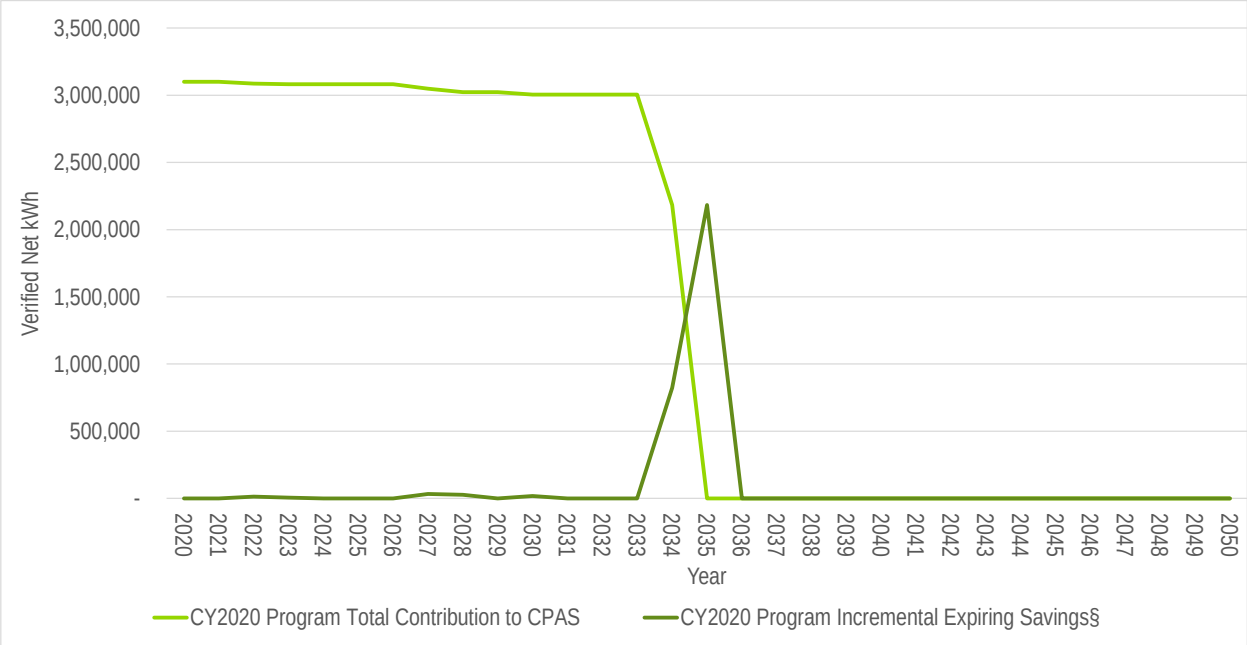
† Lifetime savings are the sum of CPAS savings through the Effective Useful Life.

‡ Historical savings go back to CY2018.

§ Incremental expiring savings are equal to CPAS Y_{n-1} - CPAS Y_{n}.

Source: Evaluation team analysis

Figure 4-1. Cumulative Persisting Annual Savings



* Expiring savings are equal to CPAS Y_{n-1} - CPAS Y_n + Expiring Savings Y_{n-1}.

Source: Evaluation team analysis

5. Program Savings by Measure

The program included eight measures in 2020, as the following tables show. The lighting LED fixtures and retrofits measure contributed the majority of program savings (59%), custom lighting has the second highest savings contribution with 25% of the verified energy savings. Custom non-lighting is the third largest measure group with (13%). These three measures combined create 97.5% of the program's total savings. The remaining five measures make up the remaining 2.5% of the program's verified energy savings.

The evaluation team analyzed savings for the Agriculture Program at a strata level, using a statistically valid, stratified random sample. The verified savings for each measure are summed by project, with strata level realization rates extrapolated to determine the final, program-level results.

Given that the program achieved 97.5% of program savings through the three measures mentioned above and these measures are well represented in the sample, we are confident in the statistical validity of the results for lighting fixtures and custom measures. The remaining measures, or those that make up 2.5% of measure impacts, have lower (minimal, but non-zero) representation within the sample. Therefore, total program-level savings for these measures is dependent primarily on the realization rates of projects within their strata.

Table 5-1 and Table 5-2 summarize measure-level savings. Figure 5-1 shows the breakdown of savings between the measures graphically.

Table 5-1. CY2020 Energy Savings by Measure – Electric

End Use Type	Research Category	Ex Ante Gross Savings (kWh)	Verified Gross Realization Rate	Verified Gross Savings (kWh)	NTG*	Verified Net Savings (kWh)	EUL (years)
Lighting	Indoor LED Fixtures and Retrofits	3,658,227	0.61	2,217,372	0.83	1,840,418	15.0
Custom	Custom (Lighting)	1,104,225	1.00	1,106,182	0.70	774,328	14.0
Custom	Custom (Non-Lighting)	584,366	1.00	583,962	0.70	408,773	14.8
Non-Lighting	High-Speed Ventilation & Circulation F	42,636	1.00	42,551	0.78	33,190	7.0
Non-Lighting	No-Loss Condensate Drains	23,710	0.92	21,850	0.78	17,043	10.0
Lighting	Occupancy Sensors	24,246	0.96	23,260	0.83	19,306	8.0
Lighting	Photocells Plus Time Clocks	6,180	1.03	6,383	0.83	5,298	8.0
Lighting	Photocells	2,118	0.96	2,036	0.83	1,690	8.0
	Total	5,445,709	0.74	4,003,596	NA	3,100,046	14.5

* A deemed value. Source: is found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.

Source: ComEd tracking data and evaluation team analysis

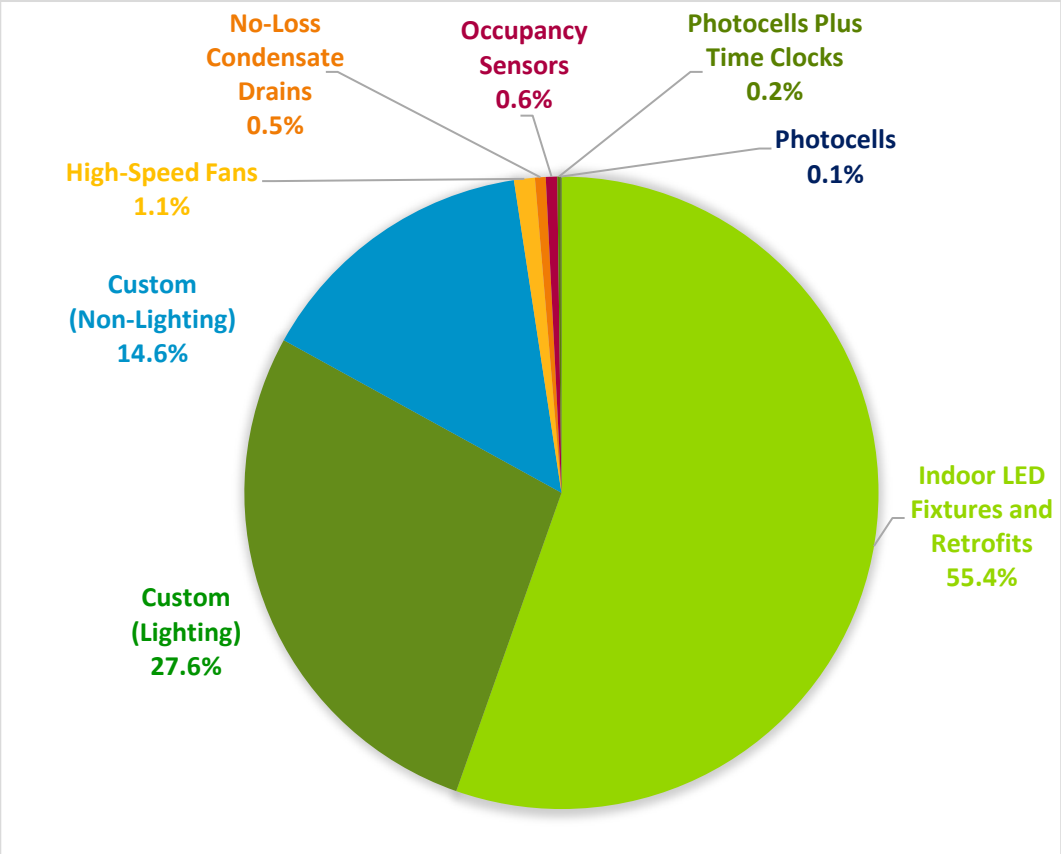
Table 5-2. CY2020 Summer Peak Demand Savings by Measure

End Use Type	Research Category	Ex Ante Gross Peak Demand Reduction (kW)	Verified Gross Realization Rate	Verified Gross Peak Demand Reduction (kW)	NTG*	Verified Net Peak Demand Reduction (kW)
Lighting	Indoor LED Fixtures and Retrofits	721.66	0.60	433.89	0.83	360.13
Custom	Custom (Lighting)	173.63	0.95	165.36	0.63	104.17
Custom	Custom (Non-Lighting)	1,735.75	0.94	1,626.15	0.63	1,024.48
Non-Lighting	High-Speed Ventilation & Circulation Fans	13.53	0.98	13.21	0.78	10.31
Non-Lighting	No-Loss Condensate Drains	3.67	0.84	3.07	0.78	2.40
Lighting	Occupancy Sensors	23.86	0.72	17.25	0.83	14.32
Lighting	Photocells Plus Time Clocks	0.00	1.00	0.00	0.83	0.00
Lighting	Photocells	0.00	1.00	0.00	0.83	0.00
	Total	2,672	0.85	2,259	NA	1,516

* A deemed value. Source: is found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.

Source: ComEd tracking data and evaluation team analysis

Figure 5-1. Verified Net Savings by Measure – Electric



Source: ComEd tracking data and evaluation team analysis

6. Impact Analysis Findings and Recommendations

6.1 Impact Parameter Estimates

The implementer developed Excel based analysis templates specifically for this program. These program and measure specific analysis templates (calculators) calculate energy and demand savings, and incentive. These ex ante savings are based on savings algorithms and deemed inputs (wattages, hours of use, HVAC interactive impacts, coincidence factors, and unit level savings) defined by the Illinois Statewide Technical Reference Manual (TRM) v8.0.

In verifying variables not informed by the tracking data, the team relied on defaults from the TRM v8.0. Otherwise, the evaluation team sourced key inputs to the savings analysis on program tracking data and supporting project documents (product spec sheets, invoices, application, ex ante analysis workbooks). These sources allowed the team to verify, on a site-by-site basis, the following details:

- Pre- and post-retrofit fixture wattage
- Pre- and post-retrofit fixture quantity
- Lighting control types

- Installed measure location (e.g., for faucet aerators)
- Custom Measure inputs unique to the specific technology and application

The vast majority of program savings stemmed from lighting measures. The evaluation team estimated the annual energy savings for lighting equipment using Equation 6-1, per the TRM v8.0, Section 4.5.

Equation 6-1. Lighting Measures Energy Savings Equation

$$\Delta kWh = ((Watts_{base} - Watts_{EE}) / 1{,}000) * Hours * WHF_e * ISR$$

Where:

$Watts_{base}$	Input wattage of the existing (for early replacement) or baseline system.
$Watts_{EE}$	Actual wattage of LED purchased and installed.
Hours	Annual hours of use.
WHF_e	Waste Heat Factor – Energy: coefficient that captures HVAC interactive impacts on annual energy savings.
ISR	In-service rate: fraction of lamps installed as opposed to stored.

As mentioned previously, the non-lighting, non-custom measures covered in the Agricultural Program had very low impact on total program savings. In the rare situation where these measures were included in the evaluation sample (e.g., one condensate drain was included) Guidehouse applied the deemed, per unit savings directly from TRM v8.0.

For custom non-lighting measures, the verified analysis is completely unique to the measure and application. It is not practical to capture each of these instances as a whole, and so they are not covered in this section.

Across all measures, the evaluation team used the project's supporting documents to validate any parameters not specified in the TRM v8.0. Table 6-1 details these inputs. The team estimated lifetime energy savings by multiplying the verified savings by the Effective Useful Life (EUL) for each measure.

Table 6-1. Savings Parameters

Gross Savings Input Parameters	Value	Units	Deemed or Evaluated?	Source *
Quantity	Varies	Each	Evaluated	Project documentation; typically invoices.
Net-to-Gross (NTG)	Varies	Fraction	Deemed	Illinois SAG Consensus
Measure Type and Eligibility	NA	NA	Evaluated	Program database and Project spec sheets
Hours of Use	Varies	Hours/year	Evaluated and Deemed	Participant interviews and TRM v8.0 – Section 4.5
No-Loss Condensate Drains	1,090	kWh/each	Deemed	TRM v8.0 – Section 4.7.3
Effective Useful Life (EUL)	Varies	Years	Mixture	TRM v8.0 – Sections: 4.1.3, 4.5, and 4.7.3

* TRM is the State of Illinois Technical Reference Manual version 8.0 from http://www.ilsag.info/technical-reference-manual.html. The NTG values can be found on the IL SAG website: https://www.ilsag.info/ntg_2020.

Source: Evaluation team analysis

6.2 Other Impact Findings and Recommendations

The evaluation team developed several recommendations based on findings from the CY2020 evaluation, these follow Table 6-2 and are bundled by overall topic.

Table 6-2 provides measure-level savings and realization rates. Note, the low Realization Rate for Indoor LED Fixtures and Retrofits is almost entirely attributed to a single project (AGRI-124) which is addressed in greater detail below.

Table 6-2. Measure-Level Savings and Realization Rates

Research Category	Realization Rate	Percentage of Verified Net Savings
Indoor LED Fixtures and Retrofits	0.61	59.4%
Custom (Lighting)	1.00	25.0%
Custom (Non-Lighting)	1.00	13.2%
High-Speed Ventilation & Circulation Fans	1.00	1.1%
No-Loss Condensate Drains	0.92	0.5%
Occupancy Sensors	0.96	0.6%
Photocells Plus Time Clocks	1.03	0.2%
Photocells	0.96	0.1%

Source: Evaluation team analysis

6.2.1 Calculations and eTrack

Finding 1. The evaluation team found for the majority of projects that the accompanying documentation (i.e., spec sheets, invoices, applications, etc.) matched the provided Excel analysis files (program specific calculators). However, for many sampled projects, the energy and demand savings listed in the provided calculator files did not match the values in the eTrack

database. The discrepancies were generally small but spanned most measure types, including lighting and non-lighting applications.

For example, no-loss condensate drains have a prescriptive energy savings value of 1,090 kWh in the TRM v8.0, and this value was accurately reflected in the calculator files. However, when the same project's savings is viewed in the database, no-loss condensate drain measures are assigned a savings value of 3,387 kWh. Guidehouse discussed this inconsistency with ComEd and the implementer. The implementer believes this is a data transfer issue and has committed to working with ComEd to ensure the issues with data import is resolved for the CY2021 program year.

Recommendation 1. The implementer should continue to work with ComEd's eTrack management team to correct the error. Part of this process needs to include a periodic review of the program database, as exported from eTrack, by the implementer. Use this feedback loop to identify any further discrepancies between the implementer's tracking database and that produced by eTrack.

Finding 2. The end of year database includes four projects that have their status listed as "Payment Requested." Given that these projects are listed on the "Paid" tab, the evaluation team assumed that the projects were complete and paid; while failing to update the Status field was a simple data entry oversight. The impacted project IDs are: AGRI-106, AGRI-122, AGRI-147, and AGRI-149.

Recommendation 2. The implementer and ComEd program manager should review the final end of year data for possible inconsistencies in any field populated from a fixed list. Ensure all project inputs are cohesive and consistent for the status and nature of the project.

Finding 3. Waste heat factors were not always included in the lighting calculator template. Most of the time, this is not a problem for agricultural applications, as a space like a barn is often classified as a warehouse for lack of a better match in the TRM v8.0 space type table. However, barns are rarely heated or cooled, so the lack of waste heat factors was appropriate.

When the actual space type does include an interior, heated, and cooled space (such as an office or actual warehouse space), waste heat factors should be included. When calculating verified savings, the evaluation team added both energy and demand waste heat factors where appropriate. The team also reviewed the lighting calculator template for the CY2021 program year and found that this omission was corrected.

6.2.2 Baseline

Finding 4. The most significant project level savings adjustment occurred with the largest (ex ante) project in the program, AGRI-124. The evaluation team determined that the baseline conditions were improperly defined in the original analysis for this project.

AGRI-124 is a lighting project where part of the site's indoor grow space was converted to a two-shift manufacturing space. The retrofit also included updates to the HVAC system. ComEd informed us that the insight around the HVAC upgrades were not shared with the Agriculture Program team during the phase of this project, but did impact classification of this building renovation as a major retrofit. The TRM v8 defines a "major renovation or change of use" as one

that involves the retrofit of two types of building systems (in this case, lighting and HVAC), and mandates use of code-minimum equipment for the baseline, not the existing fixtures.[1]

After correcting the baseline for AGRI-124 from the original use and associated high lighting power density, this project's verified realization rate was 0.027.Given the magnitude of the ex ante savings (i.e., 25% of the program total), it negatively impacted the program's realization rates which is attributed almost entirely to this specific adjustment.

Recommendation 3. When feasible, Guidehouse recommends that the utility, implementer and evaluator undertake a review and discussion for each of the program's largest projects as well as those with atypical aspects prior to final submittal of the application. The implementer should provide a copy of the proposed analysis and copies of any pertinent communications with the participant a minimum of one week prior to this roundtable discussion. As a starting point, the evaluation team recommends following this process for any projects with total savings above 100 MWh. The frequency and scope of a review process should be established by ComEd going forward.

6.2.3 Measure Diversity

Finding 5. Eighty-nine percent of ex ante energy savings came from lighting measures (LED fixtures, custom lighting, and lighting controls). Although the program did produce some savings from custom non-lighting and HVAC projects, there remains a significant opportunity to diversify the measure mix impacted by this program. As lighting standards become increasingly stringent and businesses transitions to LEDs as the market standard baseline, lighting savings will be harder to achieve. A more diverse measure portfolio will help the program to continue to accrue substantial energy savings without such significant reliance on lighting based measures.

Recommendation 4. The implementer and utility need to coordinate on messaging and marketing approach to ensure the broader agriculture customer base is receiving constant messaging from program staff, the implementer, trade allies, distributors, on-farm service providers, and local equipment retailers. This messaging needs to include economic based justification for adopting energy efficient practices beyond lighting. Ensure that all stakeholders have quality data on the energy benefits and reliability and non-energy benefits of the measures offered. Discuss other measures included in the Agriculture Program with the participant before, during, and after lighting projects. Seek feedback from participants regarding barriers to adoption of non-lighting measures and seek to address those barriers more broadly.

[1] Prior to submitting final application, the implementation team emailed the evaluation team for input on this project. The breadth and depth of the change to the facility was not apparent from that email. Therefore, the evaluation team's recommendation was simply to follow a prescriptive approach.

Appendix A. Impact Analysis Methodology

The evaluation team initiated the impact evaluation process by designing a stratified, random sample of the CY2020 Agriculture Program participants. This stratified approach is used to maximize sampling efficiency while maintaining a high degree of confidence in the overall results and representation across the full range of project sizes and participants, with a distribution of measures in the sample that organically tracks with the overall representation of these measures within the overall program.

The team categorized measures by annual energy savings strata, defined as follows:

- **Very Large:** Greater than 500,000 kWh
- **Large:** 100,000 to 500,000 kWh
- **Mid:** 35,000 to 100,000 kWh
- **Small:** 1,500 to 35,000 kWh
- **Very Small:** Less than 1,500 kWh (cumulatively, smallest 2%)

To achieve the 85% confidence interval and 15% maximum relative precision, the evaluation team selected 24 projects according to the following distribution:

- **Very Large:** Two
- **Large:** Four
- **Mid:** Four
- **Small:** Fourteen
- **Very Small:** None

The team requested documentation associated with the sampled projects for review. We determined project savings by measure-specific program calculators which were reviewed by the evaluation team during the program year prior to the evaluation. Site and project specific details were input to this semi-custom analysis process by the implementer. These tools are robust, yet transparent; and provide consistent, reputable, verifiable results.

The evaluation team determined verified gross savings for each project by:

1. Reviewing the savings algorithm inputs in the implementation contractor's measure calculations for agreement with the TRM v8.0.
2. Validating the savings algorithm was applied correctly.
3. Where savings reported in the database do not agree with the verified values in Guidehouse's calculations, cross-checking TRM deemed inputs with the implementation contractor's supporting calculations and the projects other project files.

4. Verifying the reported measure quantity with invoices, as able.

The team used the following documents to verify the savings inputs for each sampled project:

- Final ComEd CY2020 tracking data: AGRI_CY2020_EOY_Data_Rev2_01272021.xlsx.
- TRM v8.0 for deemed input parameters or secondary evaluation research to verify any custom inputs used in the ex ante calculations. For example, participant interviews to confirm hours of use.
- Implementer Savings Calculations, for example, [participant name] - 2020 Ag Lighting Tool v1.01.xlsx, and [participant name] - Ag Comp Air - No-Loss Cond Drain.xlsx.
- When available: Program applications, measure specifications, and project invoices.

Final ex post values were determined through a detailed review of the sampled projects. The evaluation team developed realization rates for each strata based on the ex post savings for the projects sampled within that strata. These strata level realization rates are then extrapolated to the remainder of projects within each strata to determine the program realization rate. The final ex post savings resulted in 90% confidence interval and 2.9% relative precision which was much better than original sample target.

Net savings are determined by multiplying the verified gross savings estimates by the program specific net-to-gross (NTG) ratio as approved by the Illinois SAG.[2] These ratios vary by measure type as Table A-1 shows.

Table A-1. NTG by Measure Category

Measure	NTG
Lighting Measures	0.83
Non-Lighting Measures	0.78
Custom Measures, kWh	0.7
Custom Measures, kW	0.63

Source: Evaluation team analysis

[2] Source: http://ilsagfiles.org/SAG_files/NTG/2020_NTG_Meetings/Final_NTG_Ratios/ComEd_NTG_History_and_CY2020_Recs_Final_2019-10-01.xlsx

Appendix B. Total Resource Cost Detail

Table B-1 shows the TRC cost-effectiveness analysis inputs available at the time of finalizing 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.

Table B-1. Total Resource Cost Savings Summary

End Use Type	Research Category	Units	Quantity	EUL (years)*	ER Flag†	Gross Electric Energy Savings (kWh)	Gross Peak Demand Reduction (kW)	Gross Gas Savings (Therms)	Gross Secondary Savings due to Water Reduction (kWh)	Gross Heating Penalty (kWh)	Gross Heating Penalty (Therms)	NTG (kWh)	NTG (kW)	NTG (Therms)	Net Electric Energy Savings (kWh)	Net Peak Demand Reduction (kW)	Net Gas Savings (Therms)	Net Secondary Savings due to Water Reduction (kWh)	Net Heating Penalty (kWh)	Net Heating Penalty (Therms)
Lighting	Indoor LED Fixtures and Retrofits	Each	355	15.0	No	2,217,372	433.9	0	0	0	0	0.83	0.83	NA	1,840,418	360.1	0	0	0	0
Custom	Custom (Lighting)	Each	4	14.0	No	1,106,182	165.4	0	0	0	0	0.70	0.70	NA	774,328	104.2	0	0	0	0
Custom	Custom (Non-Lighting)	Each	14	14.8	No	583,962	1,626.2	0	0	0	0	0.70	0.70	NA	408,773	1,024.5	0	0	0	0
Non-Lighting	High-Speed Ventilation & Circulation Fans	Each	5	7.0	No	42,551	13.2	0	0	0	0	0.78	0.78	NA	33,190	10.3	0	0	0	0
Non-Lighting	No-Loss Condensate Drains	Each	6	10.0	No	21,850	3.1	0	0	0	0	0.78	0.78	NA	17,043	2.4	0	0	0	0
Lighting	Occupancy Sensors	Each	44	8.0	No	23,260	17.3	0	0	0	0	0.83	0.83	NA	19,306	14.3	0	0	0	0
Lighting	Photocells Plus Time Clocks	Each	1	8.0	No	6,383	0.0	0	0	0	0	0.83	0.83	NA	5,298	0.0	0	0	0	0
Lighting	Photocells	Each	40	8.0	No	2,036	0.0	0	0	0	0	0.83	0.83	NA	1,690	0.0	0	0	0	0
	Total		469	14.5	NA	4,003,596	2,259	0	0	0	0	NA	NA	NA	3,100,046	1,516	0	0	0	0

Note: The CY2020 Agriculture Program did not generate any secondary savings from reduced water consumption.

*The total of the EUL column is the weighted average measure life (WAML) and is calculated as the sum product of EUL and measure savings divided by total program savings.

† Early replacement (ER) measures are flagged as YES; otherwise a NO is indicated in the column.

Source: ComEd tracking data and evaluation team analysis