Home Energy Reports Impact Evaluation Report

Energy Efficiency Plan Year 2021 (01/01/2021-12/31/2021)

Prepared for:

Nicor Gas

Final

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Table of Contents

List of Tables, Figures, and Equations

1. Introduction

This report presents results from the CY2021 impact evaluation of Nicor Gas' Home Energy Reports (HER) Program. The appendices provide the impact analysis methodology and details of the total resource cost (TRC) inputs.

CY2021 covers January 1, 2021 through December 31, 2021. However, for two new program waves launched in late 2020, the CY2021 savings for this program reflect savings from the waves' launch (September 1, 2020) to December 31, 2021. Savings were not claimed for these waves in CY2020; the savings from September 1, 2020 to December 31, 2020 were not reviewed in CY2020 as they were not expected to be statistically different from zero. Guidehouse, Nicor Gas, the implementer, and Illinois Commerce Commission (ICC) staff agreed that these savings can be counted with the next program year to avoid penalizing the gas companies for the heating season starting so late in the program year. For these waves, persistence from 2020 into 2021 is subtracted from the CY2021 savings estimate.

2. Program Description

The HER Program is designed to generate energy savings by providing residential customers with information about energy use and conservation strategies. Program participants receive information from regularly mailed and emailed home energy reports, including:

- Assessment of how their recent energy use compares to their past energy use
- Tips on how to reduce energy consumption, some of which are tailored to the customer's circumstances
- Information on how their energy use compares to that of neighbors with similar homes

An important feature of the Nicor Gas HER program is that it is designed as a randomized controlled trial (RCT). To estimate changes in energy use due to the program, customers in each target group of residential customers were randomly assigned to either the recipient group or the control (non-recipient) group.[1] Customers may opt *out* of the program at any time but cannot opt *in* due to the RCT design. An implication of the RCT design is that the savings estimates are intrinsically net of free-ridership and most spillover bias. Unless otherwise noted, reported "savings" in this report refer to *normalized net savings*.[2]

The Nicor Gas HER program includes three waves. The first wave was launched in October 2019 and targeted 155,000 participants and 45,000 controls. The second and third waves were launched in September 2020. The second wave targeted 215,000 treatment customers and 72,000 control customers, while the third wave targeted 200,000 treatment customers and 67,000 control customers. Table 2-1 shows active accounts at the beginning of the evaluation period, January 2021 for Wave 1 and since launch for Waves 2 and 3.

[1] Guidehouse conducted randomization of each wave in the Nicor Gas program. Randomization results for the two waves being newly evaluated in CY2021 were delivered to Nicor Gas in a memo, *Nicor Gas Home Energy Report Randomization Memo for Waves 2 and 3*, on August 21, 2020.

[2] In some instances, the word "net" appears in column headings and summary sentences for added clarity. For CY2021 specifically, the reported savings are normalized savings.

Table 2-1. CY2021 Volumetric Findings Detail

Wave	Participant Count	Control Count
Wave 1	154,286	44,811
Wave 2	214,851	71,088
Wave 3	199,877	66,155

Source: Guidehouse analysis of Nicor Gas program tracking and customer billing data.

3. Program Savings Detail

Table 3-1 summarizes the energy savings the HER Program achieved in CY2021. The savings values in the table represent actual savings estimated by Guidehouse.[3] These savings reflect adjustments for uplift,[4] as well as removing savings persisting from 2019 and 2020 into 2021 per the Illinois Statewide Technical Reference Manual (IL-TRM).[5] Additionally, since the RCT design inherently estimates net savings, neither the evaluation team nor the implementer estimated gross savings, and there is no gross realization rate and no net-to-gross (NTG) ratio. Across all three waves, the realization rate is 74%. Before adjusting for uplift and persistence, the realization rate is 120%; the evaluation team thinks it likely that the implementer did not account for the persistence and uplift adjustments in their ex-ante savings. This has a particularly big impact on Wave 1 where a full year of persistence from 2020 (and October to December 2019) must be subtracted.[6]

Table 3-1. CY2021 Annual Energy Savings Summary

Wave	Ex Ante Savings, therms	Verified Unadjusted Savings, therms	Total Uplift† and Persistence‡ Adjustments, therms	Final Verified Savings, therms	Verified Realization Rate§
Wave 1	1,190,520	1,263,255	580,878	682,376	57%
Wave 2	344,906	503,955	95,537	408,418	118%
Wave 3	137,834	244,299	89,486	154,813	112%
Total	1,673,260	2,011,509	765,901	1,245,607	74%

† The uplift adjustment accounts for savings caused by uplift into other programs which must be removed from the HER program to avoid double counting. The adjustment accounts for both uplift in the current program year and from prior program years where the measures uplifted into are still generating savings. These adjustments are described in Appendix A.1.3.
‡ The persistence adjustment reduces savings reduces the savings by the amount attributable to sending reports in 2019 and 2020 and is prescribed in the Adjustments to Behavior Savings to Account for Persistence measure in the IL-TRM. See IL-TRM, Measure 6.1.1, Volume 4, Version 8.0. Per IL-TRM Version 9.0, HER "evaluations of CY2021 should use IL-TRM v8.0." This is also described in Appendix A.1.4.
§ The verified realization rate compares final verified savings with ex ante savings.
Source: Guidehouse analysis of Nicor Gas program tracking and customer billing data.

[3] The methodology is described in Appendix A.1Appendix A.

[4] See Appendix A.1.3.

[5] See IL-TRM, Measure 6.1.1, Volume 4, Version 8.0 (per IL-TRM Version 9.0, HER "evaluations of CY2021 should use IL-TRM v8.0.") and Appendix A.1.4.

[6] Persistence is much lower for Waves 2 and 3 where only the final months of 2020 (September to December) are being subtracted.

4. Program Savings by Measure

The HER Program includes a single measure, behavioral savings, and so the program savings and measure savings are the same. Detailed savings are presented in Appendix B.

5. Impact Analysis Findings and Recommendations

For Nicor Gas' HER program, Guidehouse verified CY2021 impacts of 1,245,607 therms.

Finding 1. Across all three waves, Guidehouse found an energy savings realization rate of 74% compared with the program implementer ex ante savings estimate. Prior to adjusting for uplift and persistence, Guidehouse's savings were about 20% higher than the implementer's. The uplift and persistence adjustments both lower savings by removing 1) savings that are attributable to other energy efficiency programs, and 2) savings attributable to sending home energy reports in prior program years. Uplift lower savings by about 12% and persistence by a further 30%. These adjustments placed Wave 1 savings considerably below the implementer's (57% realization rate) while Waves 2 and 3 remained modestly above (118% and 112%).

Recommendation 1. In future program years, the implementer should adjust their ex ante savings estimates for persistence and, if possible, uplift. The persistence adjustment has the bigger impact, particularly the longer a wave has been in place.

Recommendation 2. The implementer should share their ex ante estimation methodology for Guidehouse to review to determine whether differences in the method are causing the difference in savings before the adjustments for uplift and persistence.

Finding 2. Waves 2 and 3 have lower savings over their first 16 months in the program (0.14% and 0.10% savings, respectively) compared to Wave 1's first 15 months (0.40% savings). These waves have lower average daily usage than Wave 1 which may be driving the lower savings, or they may be slower to ramp up.

Recommendation 3. The program team should continue to monitor savings for these waves to anticipate where savings will plateau, and determine whether additional interventions (for example, more reports) may be needed to drive further savings.

Finding 3. The evaluation team relied on custom savings calculations to derive CY2021 program savings. Though the COVID-19 pandemic continued to impact customer lives and routines throughout 2021, normalization for COVID-19 was not explicitly performed in CY2021 (said another way, actual savings were assumed to be normal). This decision was primarily driven by 1) the CY2020 analysis where the team found that the custom analysis produced very similar savings to the normalization method used to claim savings in CY2020, 2) Waves 2 and 3 were launched in late 2020 and thus had no pre-pandemic history to determine per household per day savings values to support the normalized savings estimate, and 3) the normalized savings for Waves 2 and 3 were much higher than actual in CY2021 suggesting those waves may be overestimated by normalized savings given how similar normalized and actual savings were for Wave 1 in CY2020 and the waning influence of the pandemic in CY2021. Using actual savings will simplify the adjustment for persistence in the future.

Recommendation 4. Continue to monitor the pandemic and plan to leverage custom savings calculations for the program moving forward.

Appendix A. Impact Analysis Methodology

The CY2021 impact methodology uses the same custom ("actual") savings methodology as CY2020. In CY2020, Guidehouse verified savings for Nicor Gas' HER program using normalized savings estimates based on historic gas HER program performance. Guidehouse also ran actual savings using the team's typical regression estimate methods. In CY2020, normalized savings (after accounting for persistence) were 4% higher than the actual savings from the regression. In CY2021, Guidehouse has shifted to verifying savings using actual savings (that is, assuming actual savings are normal as is typical for HER programs) as 1) normalized and actual savings were so similar in CY2020, 2) Waves 2 and 3 were launched in late 2020 and thus had no pre-pandemic history to determine per household per day savings values to support the normalized savings estimate, and 3) the normalized savings for Waves 2 and 3 were much higher than actual in CY2021 suggesting those waves may be overestimated by normalized savings given how similar normalized and actual savings were for Wave 1 in CY2020 and the waning influence of the pandemic in CY2021. Guidehouse also estimated normalized savings for comparison. Using actual savings will simplify the adjustment for persistence in the future.

The following subsections describe both the actual and normalized savings methodologies.

A.1 Savings Methodology – Actual Savings Modeling

This section details the methodology employed for developing custom savings estimates for CY2021. These estimates were used for verifying savings for all three waves.

A.1.1 Data Cleaning

The evaluation team removed customers and data points from the analysis in several steps:

- Excluded data from outside of the period of examination and relevant pre-period for each wave
- Removed exact duplicate observations
- Aggregated bills that ended in the same month
- Excluded observations with a bill length greater than 90 days
- Excluded outlier observations, defined as observations with average daily usage outside plus or minus one order of magnitude from the median
- For the lagged dependent variable (LDV) model, removed observations that did not have a usage value in the same month of the pre-period

Across all three waves, these cleaning steps removed less than 1% of customers and 5% of observations (after subsetting to the relevant analysis period), evenly distributed across participants and controls. This suggests that the evaluation team's cleaning steps did not introduce non-random biases into the data.

A.1.2 Modeling Methodology

The evaluation team used LDV and linear fixed effects regression (LFER) models to estimate actual program savings.[7] Both approaches should, in principle, produce unbiased estimates of program savings under a wide range of conditions, but Guidehouse prefers the LDV results for two reasons. First, savings estimates produced by the LDV model tend to be more accurate and more precisely estimated than those from the LFER model[8] based on past experience analyzing similar HER programs' impacts and findings from the academic literature.[9] Second, the implementer uses a similar model for their evaluation, which makes the two sets of results comparable. Although the LDV and LFER models are structurally very different, they should generate similar program savings estimates, assuming the RCT is well balanced with respect to the drivers of energy use. Guidehouse used the LDV results for reporting total program savings for CY2021, while the LFER provided a robustness check.

Lagged Dependent Variable Model

The LDV model controls for non-treatment differences in energy use between treatment and control customers using lagged energy use as an explanatory variable. The model frames energy use in calendar month *t* of the post-program period as a function of both the treatment variable and energy use in the same calendar month of the pre-program period. The underlying logic is that systematic differences between control and treatment customers will be reflected in differences in their past energy use, which is highly correlated with their current energy use. Formally, the model is shown in Equation A-1.

Equation A-1. Lagged Dependent Variable Regression Model

$$ADU_{kt} = \beta_1 Treatment_k + \sum_J \beta_2 Month_{jt} + \sum_J \beta_3 Month_{jt} \cdot ADUlag_{kt} + \varepsilon_{kt}$$

Where:

ADU_{kt}	is average daily consumption of therms by household *k* in bill period *t*
$Treatment_k$	is a binary variable taking a value of 0 if household k is assigned to the control group, and 1 if assigned to the treatment group
$Month_{jt}$	is a binary variable taking a value of 1 when j = t and 0 otherwise[10]
$ADUlag_{kt}$	is household *k*'s energy use in the same calendar month of the pre-program year as the calendar month of month *t*
ε_{kt}	is the cluster-robust error term for household *k* during billing cycle *t;* cluster-robust errors account for heteroskedasticity and autocorrelation at the household level.

[7] Across the two models, the parameter estimates were not statistically different for any of the three waves; that is, the estimates for each model are within the 90% confidence bounds for the other model. This supports the methodological approach, and indicates the results are robust.

[8] One likely reason for this is that the LDV model embodies more flexibility than the LFER model, in that the former allows the individual customer control variable to vary seasonally while the latter does not – a particularly attractive feature given the highly seasonal nature of natural gas usage. The LFER model treats all unobserved inter-household heterogeneity affecting households' energy usage as time-invariant, while the LDV model uses lagged individual controls that can vary over time.

[9] Allcott, Hunt and Todd Rogers, 2014. "The Short-Run and Long-Run Effects of Behavioral Intervention: Experimental Evidence from Energy Conservation." *American Economic Review*, 104(10): 3003-37.

[10] In other words, if there are *T* post-program months, there are *T* monthly dummy variables in the model, with the dummy variable $Month_{tt}$ the only one to take a value of 1 at time t. These are, in other words, monthly fixed effects.

The coefficient β_1 is the estimate of average daily therms energy savings due to the program.

Linear Fixed Effects Regression Model

The LFER model used by the evaluation team is one in which the average daily consumption of therms by household *k* in bill period *t*, denoted by ADU_{kt} is a function of the following three terms:

1. The binary variable $Treatment_{k.}$
2. The binary variable $Post_t$, taking a value of 0 if month *t* is in the pre-treatment period, and 1 if in the post-treatment period.
3. The interaction between these variables, $Treatment_k \cdot Post_t$.

Formally, the LFER model is shown in Equation A-2.

Equation A-2. Linear Fixed Effects Regression Model

$$ADU_{kt} = \alpha_{0k} + \alpha_1 Post_t + \alpha_2 Treatment_k \cdot Post_t + \varepsilon_{kt}$$

Coefficient α_{0k} captures all household-specific effects on energy use that do not change over time, including those that are unobservable. Coefficient α_1 captures the average effect across all households of being in the post-treatment period. The effect of being both in the treatment group and in the post period, i.e., the effect directly attributable to the program, is captured by the coefficient α_2. In other words, whereas the coefficient α_1 captures the change in average daily therms use across the pre- and post-treatment for the control group, the sum $\alpha_1+\alpha_2$ captures this change for the treatment group and so α_2 is the estimate of average daily therms energy savings due to the program.

A.1.3 Accounting for Uplift in Other Energy Efficiency Programs

Accounting for Uplift in CY2021

The home energy reports sent to participating households included energy-saving tips, some of which encouraged participants to enroll in other Nicor Gas energy efficiency (EE) programs. If participation rates in other EE programs were the same for HER participant and control groups, the savings estimates from the regression analysis are already "net" of savings from the other programs, as this indicates the HER Program had no net effect on participation in the other EE programs. However, if the receipt of reports increased participation rates of recipients relative to controls in other EE programs, then the combined savings across all programs would be lower than indicated by the simple summation of savings in the HER and the other EE programs. For instance, if the HER Program increases participation in another EE program, the resulting increase ("uplift") in savings may be allocated to either the HER Program or the EE program but cannot be allocated to both programs simultaneously.[11] When the HER Program decreases participation in other programs, there is no issue of double counting, and no adjustment to the savings total is made.

[11] It is not possible to avoid double-counting of the savings generated by programs for which tracking data are not available, such as upstream programs.

As data permitted, Guidehouse used a difference-in-difference (DID) statistic to estimate uplift in other EE programs. To calculate the DID statistic, Guidehouse calculated the difference between the HER treatment and control groups in average EE program savings per customer in the post period,[12] and subtracted the same difference from the pre-period.[13] For instance, if the EE program savings during CY2021 is five therms for the treatment group and three therms for the control group, and the savings during the year before the start of the HER Program is two therms for the treatment group and one therm for the control group, then the DID statistic is one therm, as reflected in Equation A-3.

Equation A-3. Current Year Uplift Calculation

(CY2021 treatment group savings – CY2021 control group savings) – (pre-year treatment group savings - pre-year control group savings) = DID statistic

(5 – 3) – (2 – 1) = 1

The DID statistic generates an unbiased estimate of uplift when the baseline average savings is the same for the treatment and control groups, or when these values are different due only to differences between the two groups in time-invariant factors, such as the square footage of the residence.

An alternative statistic that generates an unbiased estimate of uplift when the baseline average savings in the EE program is the same for the treatment and control groups, is a simple difference in savings during CY2021. Guidehouse uses this alternative statistic –the "post-only difference" (POD) statistic – in cases where the EE program did not exist for the entire pre-program year.

Guidehouse examined the uplift associated with four other Nicor Gas programs: Energy Savings Kits (ESK), Home Energy Efficiency Rebates (HEER), Home Energy Savings (HES), and Income Qualified Single Family (IQ).

Accounting for Legacy Uplift

The uplift adjustment methodology above only accounts for uplift which occurs in the current program year because EE program tracking files in any given program year only capture the new measures installed in that year, regardless of the expected measure life.[14] For other EE programs that include measures with multiyear measure lives however, the HER Program savings capture the portion of savings due to uplift in each year of that program's measure life. For instance, a measure with a 10-year measure life that was installed in 2019 would generate savings captured in the HER Program savings not just in 2019, but in 2020 through 2029 as well.

Consider the following example. A household receiving home energy reports through the HER Program enrolls in the HES Program in CY2020. The uplift adjustment subtracts HES CY2020 Program savings to avoid double counting. In CY2021 this household still receives savings from

[12] Where the averages are calculated over all treatment and control group customers, not just those who participated in other EE programs.

[13] Other EE program savings were pro-rated to the program participation date assuming a flat load shape. Additionally, EE program savings above the 99th percentile of savings for that program in the relevant program year were removed.

[14] Tracking data files are set up this way because, in conformity with the IL-TRM, Section 3.2, savings are first-year savings, not lifetime savings.

the HES Program because it has a 13-year measure life. However, the CY2021 HER uplift adjustment does not remove these savings because the CY2021 adjustment only accounts for measures installed in CY2021, the initial year the household entered a program. When only relying on the uplift adjustment, HES second-year savings would be included in the CY2021 HER Program's savings, which is inconsistent with Illinois' practices of only crediting utilities with first-year EE program savings. Legacy uplift removes double counted energy savings from programs that include measures with multiple-year measure life.

The evaluation team accounts for legacy uplift by subtracting the double counted savings from previous years, adjusted for the average annual move out rate,[15] from CY2021 HER savings through the measure lives of measures from other EE programs. The legacy uplift adjustment is shown in Equation A-4.

Equation A-4. Legacy Uplift Calculation

$$\text{HER Savings}_{\text{PY}}^{\text{Adjusted}} = \text{HER Savings}_{\text{PY}}^{\text{Unadjusted}} - \text{Uplift Savings}_{\text{PY}} - \sum_{i=1}^{\text{PY-1}} \text{"Live" Legacy Uplift Savings}_{i} \cdot (1 - \text{MOR})^{\text{PY} - i}$$

Where, "Live" Legacy Uplift Savings refers to uplift savings where the other EE programs' measure lives have not yet run out (i.e., where measure life exceeds the difference between *PY* and *i*) and MOR refers to the move out rate. To streamline the analysis, instead of using individual measure lives in developing legacy uplift savings, and subsequently removing measures one-by-one once they reach the end of their EULs, the evaluation team calculated EULs at the program level by weighting measure-specific EULs by savings. Once the program reaches its weighted average measure life (WAML), it is removed from the legacy uplift calculation.

In CY2021, the legacy uplift adjustment only affects Wave 1 as the other two waves are being evaluated for the first time this year. The legacy uplift adjustment removes double counted savings from the CY2020 evaluation for the ESK, HEER, HES, and IQ programs.

A.1.4 Accounting for Savings Persistence and Participant Retention

Continued implementation of HER programs in Illinois and across the country has demonstrated persistence of savings beyond the first year, leading Illinois to adopt a measure persistence framework in Version 8.0 of the IL-TRM.[16] This framework assumes that savings persist over five years, but the persistence decays in each year. The IL-TRM recommends using the persistence factors presented in Table A-1 over the five-year life to estimate lifetime gas savings for the program. In CY2021, Nicor Gas' two 2020 waves are in Year 2[17] and the 2019 wave is in Year 3.

[15] Because HER Program participants are dropped from that program when they move, other EE programs' savings are no longer captured in the HER Program savings from that point forward.

[16] Per IL-TRM Version 9.0, HER "evaluations of CY2021 should use IL-TRM v8.0."

[17] Note, 16 months of savings are being claimed for these waves in CY2021 (from September 2020 to December 2021). Persistence from the last four months of 2020 is subtracted from the savings estimate.

Table A-1. HER Gas Savings Persistence Factors

Year	Gas Persistence Factor
Year 1	100%
Year 2	45%
Year 3	20%
Year 4	9%
Year 5	4%

Source: IL-TRM, Measure 6.1.1, Volume 4, Version 8.0.[18]

Per the IL-TRM, the adjustment for persistence also accounts for the program retention rate.

For Wave 1, Guidehouse used the actual savings from CY2020 to subtract from CY2021 actual savings. Even though the normalized savings were claimed and verified in CY2020, we felt that using the actual savings was a better reflection of the persisting savings given the shift to claiming actual savings in CY2021.

A.2 Savings Methodology – Normalized Savings

Guidehouse also calculated normalized savings in CY2021 aligned with our evaluation method from CY2020. These normalized values were not used to estimate verified savings in CY2021.

The Nicor Gas HER program's first wave was launched in late 2019 and two waves were added in late 2020 and therefore limited to no program data prior to the coronavirus pandemic is available. Thus, Guidehouse normalized based on percentage rather than absolute (therm) savings. The per household percentage savings are multiplied by normalized baseline usage and then persisting savings from 2019 and 2020 are subtracted to get final, claimable normalized savings.

Table A-2 shows the normalized per household savings based on research on historic program data (from Nicor Gas and other utilities) and feedback from Nicor Gas and the implementer. A detailed description of the methodology used to create these recommendations is presented below the table.

[18] Per IL-TRM Version 9.0, HER "evaluations of CY2021 should use IL-TRM v8.0."

Table A-2. Recommended Normalized Per Household Per Day Savings for CY2021

Wave	Time Period	Normalized Savings Based On	Percentage value
Wave 1	January through December 2021	Normalized savings from CY2020 adjusted for expected ramp up from year 2 to year 3	0.56%*
Waves 2 and 3	September 2020 through March 2021	Percentage savings from Nicor Gas CY2019 interim analysis	0.38%†
	April through December 2021	Adjust percentage savings from the preliminary analysis for expected ramp-up between year 1 and year 2	0.50%‡

* Based on expected ramp up of 24% from year 2 to year 3 which is the average of other gas HER programs in IL.
† Based on preliminary analysis results from October 2019 to March 2020 of 0.39% (*Guidehouse. 2020.* Home Energy Report Interim Impact Evaluation Savings Memo) adjusted for 2.5% uplift.
‡ Based on expected ramp up of 32% from year 1 to year 2 which is the average of other gas HER programs in IL.
Source: Guidehouse analysis of historic HER program data from various jurisdictions.

The evaluation team used the methodology described in the following paragraphs to create the normalized savings values. Nicor Gas' 2019 wave was launched in October 2019 and thus has only five months of program history prior to the pandemic. The other two waves were launched in late 2020 and thus had no pre-pandemic history. Therefore, we were not able to rely on program history to determine per household per day savings values as the evaluation teams did for other HER programs in Illinois.

Wave 1: CY2021 savings build on CY2020. In CY2020, the evaluation team used percentage savings from the interim analysis[19] for October 2019 through March 2020[20], and multiplied that value by average ramp-up across other gas HER programs in Illinois from year 1 to year 2 for April through December 2020. Guidehouse adjusted these values for expected double counting (i.e., uplift). In our view, it is important to use normalized savings estimates that account for expected double counting because suspensions in other program operations, as well as changes to the HER program cross-promotion of other programs, likely resulted in different than normal uplift during the coronavirus pandemic. Based on review of other programs, we reduced the savings by 2.5% for double counting.

For CY2021, Guidehouse took the weighted average savings from CY2020 (0.56%) and multiplied that value by average ramp-up across other gas HER programs in Illinois from year 2 to year 3.

Waves 2 and 3: Guidehouse used the method described above for the October 2019 Wave in CY2020 to get normalized savings for these two waves. That is, these waves have the same percentage savings values in CY2021 as Wave 1 did in CY2020.

Guidehouse multiplied the normalized percentage savings by expected baseline usage to get total normalized CY2021 savings. Persistence from CY2020 and CY2019 was subtracted using the same method described in Section A.1.4 except that the normalized savings from CY2020 were used in persistence for Wave 1.

[19] Guidehouse. 2020. *Home Energy Report Interim Impact Evaluation Savings Memo.*
[20] This period is expected to be mostly unaffected by the coronavirus pandemic.

Appendix B. Detailed Impact Analysis Results

This appendix presents detailed savings and aggregated uplift analysis results. Tables with the regression outputs and detailed uplift results are available upon request.

B.1 Actual Savings

Table B-1 summarizes estimated, actual program savings including uplift adjustments. The table also includes the number of participants, controls, and average savings rates. Both modeled savings and average savings rates include standard error figures. This table reflects claimed savings for CY2021 for all three waves.

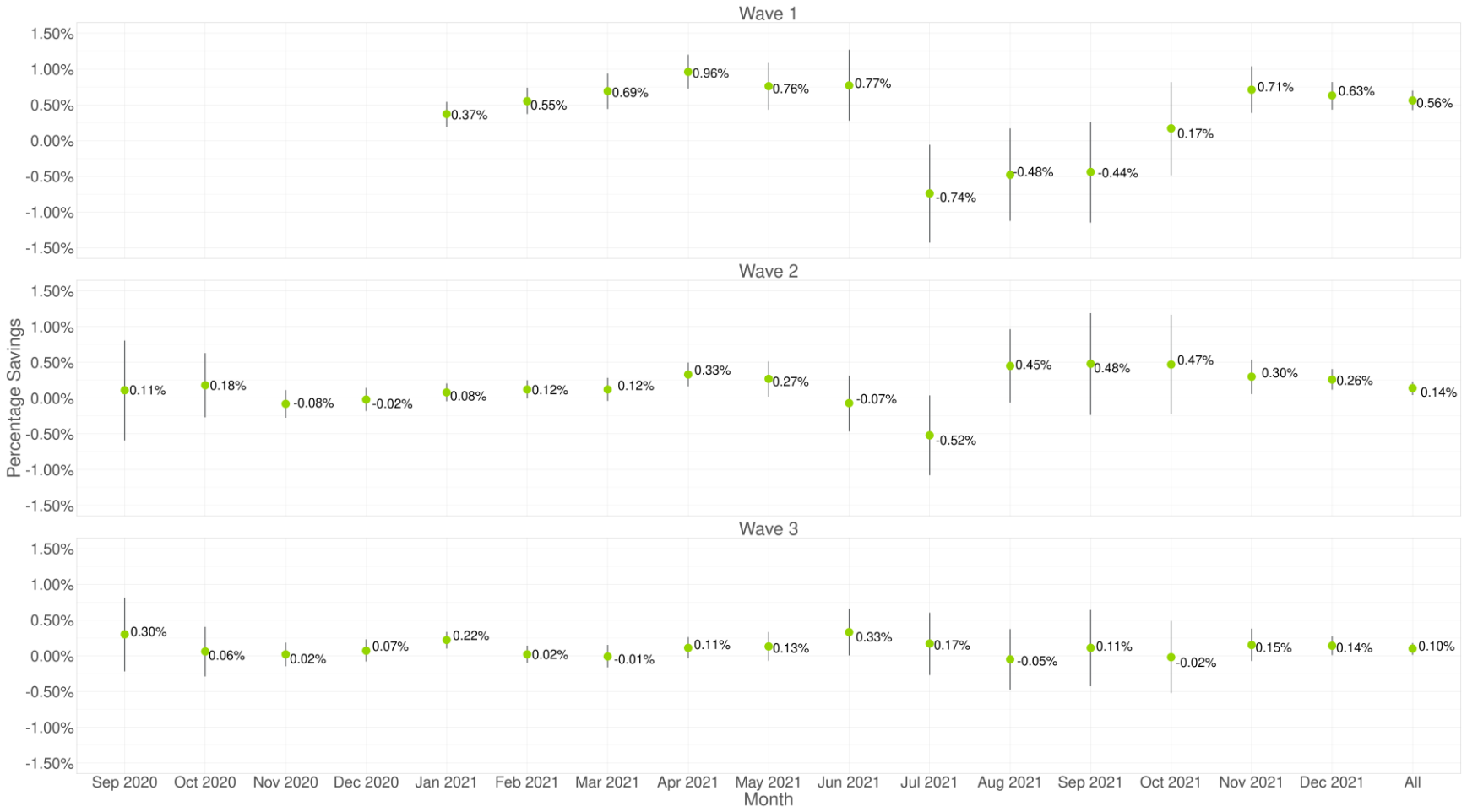
Table B-1. CY2021 HER Program – Actual Savings Results

Savings Category	Wave 1	Wave 2	Wave 3
Treatment Customer Count*	154,286	214,851	199,877
Control Customer Count*	44,811	71,088	66,155
Percent Savings	0.56%	0.14%	0.10%
Percent Savings Std. Err.	0.08%	0.06%	0.05%
Annualized Customer Savings, therms†	9.17	1.84	0.96
Annualized Customer Savings Std. Err.	1.34	0.77	0.51
Net Savings Prior to Uplift, therms	1,263,255	503,955	244,299
Net Savings Std. Err.	184,896	210,701	129,197
CY2021 Uplift, therms‡	11,441	94,902	72,277
Legacy Uplift, therms‡	65,064	0	0
CY2021 Custom Savings Calculation	1,186,750	409,053	172,022
Savings Attributed to Prior Years§	504,373	635	17,209
Verified Net Savings, therms||	682,376	408,418	154,813

* These counts are for active customers at the beginning of the evaluation period.
† Annualized savings are average daily savings multiplied by 365 but note that total savings are pro-rated for participants that closed their accounts during the evaluation period.
‡ No adjustment was made to total savings for negative uplift, (i.e., cases where the HER Program decreased participation in other programs).
§ Savings attributed to prior years are those deducted for persistence from 2019 and 2020 within the IL-TRM framework.
|| Verified Net Savings are equal to Net Savings, Prior to Uplift less CY2021 Uplift, Legacy Uplift, and Savings Attributed to Prior Years.
Source: Guidehouse analysis of Nicor Gas program tracking and customer billing data.

Figure B-1 shows actual energy savings with 90% confidence intervals.

Figure B-1. CY2021 Percent Savings and 90% Confidence Interval, by Wave



Source: Guidehouse analysis of Nicor Gas program tracking and customer billing data.

B.2 Uplift Analysis Results

This section summarizes CY2021 uplift results. The uplift of savings in other EE programs was 243,684 therms, or approximately 12% of total savings. The uplift can be broken down into uplift in CY2021 and legacy uplift from previous program years. The CY2021 uplift was 178,620 therms or 9% of total program savings, and the legacy uplift was 65,064 therms or 3% of total program savings. The relatively large portion of savings double counted with other Nicor Gas EE programs suggests that the home energy reports are doing a good job of channeling customers into other EE programs.

Table B-2 through Table B-4 present program savings due to participation in other EE programs in CY2021 for each of the HER program waves. Each column provides information on one of four EE Programs for which estimates for deemed savings are available.[21] While these tables show estimates of both positive and negative uplift, only positive values were used to adjust program savings for double counting. For all cases where the EE program did not exist in the pre-program year, the estimate is based on a probability of detection (POD) statistic; otherwise, it is based on a DID statistic.[22]

Table B-2. CY2021 Nicor Gas HER Uplift Adjustment Details, Wave 1

Program	ESK	HEER	HES	IQ
Median program savings, annual therms per EE participant	35.49	102.51	28.08	95.05
Number of treatment customers	154,994	154,994	154,994	154,994
Number of control customer	44,997	44,997	44,997	44,997
Avg. savings per HER treatment customer, CY2021	0.22	0.63	0.1	0.18
Avg. savings per HER control customer, CY2021	0.17	0.62	0.1	0.2
CY2021 savings difference	0.05	0.01	0.01	-0.02
Avg. savings per HER treatment customer, pre	0.07	0.84	0.17	0.04
Avg. savings per HER control customer, pre	0.07	0.79	0.18	0.05
Pre savings difference	0	0.05	-0.02	-0.01
DID or POD statistic	0.05	-0.04	0.02	-0.01
Savings attributable to other programs, therms	7,838	-6,709	3,603	-1,195
Implied change in participation	220.8	-65.5	128.3	-12.6

Source: Guidehouse analysis of Nicor Gas program tracking and customer billing data.

[21] See Section A.1.3 for more information about the programs considered.
[22] See Section A.1.3 for more information on POD and DID statistics.

Table B-3. CY2021 Nicor Gas HER Uplift Adjustment Details, Wave 2

Program	ESK	HEER	HES	IQ
Median program savings, annual therms per EE participant	70.98	102.51	34.43	95.05
Number of treatment customers	216,323	216,323	216,323	216,323
Number of control customer	71,450	71,450	71,450	71,450
Avg. savings per HER treatment customer, CY2021	0.71	1.35	0.19	0.3
Avg. savings per HER control customer, CY2021	0.33	1.35	0.18	0.39
CY2021 savings difference	0.37	0	0.01	-0.08
Avg. savings per HER treatment customer, pre	0.43	0.77	0.12	0.06
Avg. savings per HER control customer, pre	0.45	0.8	0.11	0.06
Pre savings difference	-0.02	-0.03	0.01	0
DID or POD statistic	0.4	0.03	0	-0.08
Savings attributable to other programs, therms	85,509	6,231	360	-17,939
Implied change in participation	1,204.70	60.8	10.5	-188.7

Source: Guidehouse analysis of Nicor Gas program tracking and customer billing data.

Table B-4. CY2021 Nicor Gas HER Uplift Adjustment Details, Wave 3

Program	ESK	HEER	HES	IQ
Median program savings, annual therms per EE participant	70.98	88.44	34.43	95.05
Number of treatment customers	201,494	201,494	201,494	201,494
Number of control customer	66,562	66,562	66,562	66,562
Avg. savings per HER treatment customer, CY2021	0.64	1.46	0.21	0.25
Avg. savings per HER control customer, CY2021	0.38	1.42	0.19	0.21
CY2021 savings difference	0.26	0.04	0.02	0.04
Avg. savings per HER treatment customer, pre	0.53	1.03	0.14	0.08
Avg. savings per HER control customer, pre	0.51	1.05	0.13	0.09
Pre savings difference	0.02	-0.02	0.01	-0.01
DID or POD statistic	0.24	0.06	0.01	0.05
Savings attributable to other programs, therms	48,266	11,508	2,281	10,222
Implied change in participation	680	130.1	66.2	107.5

Source: Guidehouse analysis of Nicor Gas program tracking and customer billing data.

B.3 Normalized Savings

This section shows details of the normalized savings calculation in Table B-5. Note that these values were not used to claim or verify savings in CY2021. Guidehouse estimated normalized savings as described in Section A.2.

Table B-5. CY2021 HER Program – Normalized Savings Results

Savings Category	Wave 1	Wave 2	Wave 3
Treatment Customer Count*	154,286	214,851	199,877
Control Customer Count*	44,811	71,088	66,155
Normalized Per Participant Per Day Savings†	0.025	0.016	0.012
Per Participant Average Days	326	464	463
Normalized Annualized Customer Savings, therms‡	9.01	5.70	4.26
Normalized Net Savings, therms	1,241,414	1,556,323	1,079,418
Savings Attributed to Prior Years§	445,928	136,591	92,422
Normalized Net Savings After Adjustments, therms||	795,486	1,419,732	986,996

* These counts are for active customers at the beginning of the evaluation period.
† Savings values are adjusted for assumed uplift.
‡Total savings are pro-rated for participants that closed their accounts during the evaluation period.
§ Savings attributed to prior years are those deducted for persistence from 2019 and 2020 within the IL-TRM framework.
|| Normalized Net Savings After Adjustments are equal to Normalized Net Savings minus Savings Attributed to Prior Years.
Source: Guidehouse analysis of Nicor Gas program tracking and customer billing data.

B.4 Comparison of Normalized and Actual Savings

This section compares normalized and actual savings in CY2021. Table B-6 compares two sets of savings values: 1) savings adjusted for uplift but not for persisting savings and 2) savings adjusted for uplift and persisting savings. Both comparisons are useful, the first offers insight into the magnitude of difference in savings estimates, while the second offers insight into the additional difference caused by the persisting savings adjustment. As Table B-6 shows, normalized savings adjusted for uplift but not for persisting savings are 219% higher than equivalently adjusted actual savings. After adjusting for persisting savings, normalized savings are 257% higher than actual savings.

The large difference is driven by Waves 2 and 3. For Wave 1, savings are different by 5% before adjustments and 17% after adjustments; however, the savings after adjustments for Wave 1 are not totally apples-to-apples across the methods as the persistence adjustment used different numbers from CY2020 for each method (actual savings from CY2020 for the adjustment to actual savings and normalized for normalized). Given this, the actual and normalized savings for Wave 1 are quite similar as we found in CY2020.

For Waves 2 and 3, the normalized savings are much higher than the actual. Those waves may have been overestimated with normalized savings given how similar normalized and actual savings were for Wave 1 in CY2020 and the waning influence of the pandemic in CY2021. Guidehouse used the same percentage normalized savings as we did for Wave 1 in CY2020, however, Waves 2 and 3 wound up having lower average daily use than Wave 1[23] which would tend to drive lower percentage savings.

[23] Post period usage by the treatment group in CY2021 was 4.4 therms per day for Wave 1 compared to 3.7 and 2.8 for Waves 2 and 3.

Table B-6. Normalized and Actual Savings Comparison

Wave	Treatment Customer Count	Control Customer Count	Savings Adjusted for Uplift and Prior to Adjusting for Persisting Savings					Savings Adjusted for Uplift and Persisting Savings		
			Per Participant Per Day Savings (Normalized), therms	Per Participant Per Day Savings (Actual), therms	Total Normalized Savings, therms	Total Actual Savings, therms	Normalized Savings/Actual Savings	Total Normalized Savings, therms	Total Actual Savings, therms	Normalized Savings/Actual Savings
Wave 1	154,286	44,811	0.025	0.025	1,241,414	1,186,750	1.05	795,486	682,376	1.17
Wave 2	214,851	71,088	0.016	0.005	1,556,323	409,053	3.80	1,419,732	408,418	3.48
Wave 3	199,877	66,155	0.012	0.003	1,079,418	172,022	6.27	986,996	154,813	6.38
Total	569,014	182,054	0.016	0.008	3,877,155	1,767,825	2.19	3,202,214	1,245,607	2.57

Source: Guidehouse analysis of Nicor Gas program tracking and customer billing data.

Appendix C. Program Specific Inputs for the Illinois TRC

Table C-1, the Total Resource Cost savings table for Nicor Gas, includes cost-effectiveness analysis inputs available at the time of finalizing the CY2021 HER 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 evaluation later.

Table C-1. Total Resource Cost Savings Summary for Nicor Gas

Savings Category	Nicor Gas
Number of Participants	569,014
Effective Useful Life (Years)	5
Ex Ante Savings, therms	1,673,260
Verified Net Savings, therms	1,245,607

Source: Guidehouse analysis of Nicor Gas program tracking and customer billing data.