**Market Transformation ESRPP Evaluation Protocol - DRAFT**

**August 18, 2022**

Table of Contents

[1 Purpose and Introduction 3](#_Toc105195134)

[1.1 Purpose 3](#_Toc105195135)

[1.2 Introduction 3](#_Toc105195136)

[2 Program Theory and Logic Model 3](#_Toc105195137)

[3 ESRPP Data and Cleaning 8](#_Toc105195138)

[3.1 Data Cleaning 9](#_Toc105195139)

[4 ESRPP Natural Market Baselines 9](#_Toc105195140)

[4.1 Data for NMB Determination 9](#_Toc105195141)

[4.2 Current NMB 10](#_Toc105195142)

[4.3 Criteria for NMB Updates 10](#_Toc105195143)

[5 Unit Energy Savings (UES) 11](#_Toc105195144)

[6 Annual ESRPP Savings 12](#_Toc105195145)

[6.1 Sales from Non-Participating Retailers 12](#_Toc105195146)

[6.2 Savings from Non-participating Retailers 12](#_Toc105195147)

[6.3 Interactions with Other Efficiency Programs 13](#_Toc105195148)

# Purpose and Introduction

## Purpose

This protocol provides guidance on the data inputs and methods used to evaluate the ENERGY STAR® Retail Products Platform (ESRPP) market transformation initiative, as required in Attachment C. The procedures outlined in this protocol are based on the ongoing evaluation of ESRPP within the ComEd territory.

## Introduction

ESRPP is a national market transformation initiative, and a collaborative effort of ENERGY STAR, efficiency program sponsors, retail partners, and stakeholders facilitated by the Northwest Energy Efficiency Alliance (NEEA)[[1]](#footnote-2). Coordinating with EPA ENERGY STAR, the platform works directly with corporate-level national retailers to provide mid-stream incentives on qualified energy-efficient products. These incentives influence retail buying and stocking practices, to ultimately drive manufacturing and higher product standards and specifications for a portfolio of energy-efficient products sold through the retail channel. In addition to incentives, NEEA and ESRPP Program Sponsors support development of new products, improve test procedures and advance efficiency standards.

This protocol covers five areas of the ESRPP evaluation.

1. Program Theory, Logic Model, and Market Progress Indicators.
2. Data Sources and Cleaning
3. Natural Market Baseline
4. Unit Energy Savings
5. Annual Savings

This protocol documents the current practice for ESRPP evaluation as of September 1, 2022. Future evaluation efforts and activities are planned and may result in modifications to this protocol if appropriate

# Program Theory and Logic Model

The ComEd ESRPP logic model[[2]](#footnote-3) provides the relationships and connections between the program activities and the anticipated market changes for each product category, separately. These market changes can be observed over short, medium and long term. The logic model for ESRPP includes the connections between the initiative activities, their expected outputs, and the anticipated future outcome. The current ESRPP logic model is shown in Table 1.

Evidence of a program’s influence on its target market is gathered through an assessment of market progress indicators (MPIs) designed to assess whether the program is achieving its intended outcomes. The MPIs for the ESRPP assess progress toward outcomes such as growing the national scale of the program, influencing retailer assortment and sales of qualified products, and influencing ENERGY STAR specifications, test procedures, and Federal standards for products in the ESRPP portfolio. The list of MPIs for ESRPP is shown in Table 2.

|  |
| --- |
| **Manufacturers respond to market changes and build EE into product design, creating permanent change to their process that results in energy savings**  **IMPACT**  What is the final state of the market after it has transformed?  **Mid-Term**  We expect that if completed or ongoing, these activities will lead to the following changes in 3-5 years.  **Long-Term**  We expect that if completed or ongoing these activities will lead to the following changes in 3-5 years.  **Outcome X: Change in federal minimum standards for RPP categories**  **Outcome VIII: Data management system builds sufficient trust with retailers so that access to data is no longer a barrier**  **Outcome V: Retailers and merchants incorporate incentives into their assortment and marketing decision-making process**  **Outcome VII: Reliable per unit energy savings values for RRP product categories**  **Market’s Response**  **Lack of access to full category sales data inhibits ability to influence formal specification/ standards process and allow for informed program decisions**  **Participate in extra-regional coordination efforts with program sponsors and retailers to increase program scale**  **Benefits of energy savings are too small to highly impact most consumers’ choices**  **Manufacturers are unlikely to respond outside of specification and standards process to increase EE of consumer products**  **EE is not considered strongly enough by corporate retail buyers**  **Develop and implement a data management system and market intelligence process for use in program design and related decisions**  **Develop and execute a portfolio management process that includes protocols for efficiency tiers and on/offboarding of products**  **Work jointly with market actors to influence specifications, standards, and test procedures**  **Validated portfolio management process and product strategy documents**  **Data platform with participating retailer sales data and analysis results**  **Comment letters supporting changes to codes, standards, specifications, and test procedures**  **Increase in the number of participating program sponsors and retailers**  **Barriers**  **Activities**  In order to address our problem or asset, we will conduct these activities  **Outputs**  We expect that once completed or under way these activities will produce the following evidence  **Outcomes**  **Short-Term**  We expect that if completed or ongoing, these activities will lead to the following changes in 1-3 years.  **Outcome IV: Reliable market share and portfolio management informs program design and evaluation**  **Outcome Ill: Data Platform enables effective program operations processes**  **Outcome Il: ENERGY STAR data and federal test procedures better reflect real world energy consumption**  **ENERGY STAR® Retail Products Platform Logic Model**  **Outcome Vl: Increase in ENERGY STAR (or higher tiers) market share for RPP product categories**  **Participating retailers are aware of specifications and incentives and receive incentives for selling qualifying products and providing data**  **Recruit, engage, and provide incentives to retailers**  **Outcome I: Program achieves sufficient scale of program sponsors, customers, and incentives budgets to influence retailer decision-making**  **Outcome IX: Increase in ENERGY STAR (or higher tiers) qualifying criteria for RPP product categories**  **ComEd’s Role**  **INITIATIVE** Retail Products Platform  **PREPARED BY** NEEA  **LAST REVISION** Nov. 15, 2021 by Guidehouse  **APPROVAL STATUS** Draft |

Table . ENERGY STAR® Retail Products Platform Logic Model

Table . Market Progress Indicators

| Outcome (Timing) | Outcome | Market Progress Indicator | 2020-2023 Target | Data Sources |
| --- | --- | --- | --- | --- |
| I (S) | Program **achieves sufficient scale** of program sponsors, customers, and incentive budgets to influence retailer decision-making. | Portion of US households in ESRPP areas and the related total value of all program sponsor incentive budgets. | Portfolio-level target:  Program represents 25% of nationwide customers and program sponsor incentive budgets grow proportionally. | * EIA-861 Utility Dataset * ESRPP program documents |
| II (S) | ENERGY STAR data and federal **test procedures better** **reflect** real world energy consumption. | 1. Number of products for which RPP provides data to ENERGY STAR 2. Number of products for which test procedures are improved | Product-level targets:   1. Data provided to ENERGY STAR for two products 2. *There are unlikely to be opportunities to influence federal test procedures for products in ComEd’s RPP portfolio in 2020-2023. We will continue to monitor.* | * Longitudinal tracking of RPP engagement with ENERGY STAR revision process (MPI 1) * DOE rulemaking documents (MPI 2) |
| III (S) | Data platform enables **effective program operations processes.** | 1. Data access and accuracy are sufficient to support product-by-product analysis and participation in the ENERGY STAR specification process. 2. Speed with which incentives are paid 3. Number of corrections or data errors 4. Program sponsor confidence in program operations process | Portfolio-level target:   1. Data access and accuracy continue to be sufficient to support participation in the ENERGY STAR specification process. 2. Incentives are paid on time 3. Correction/data error rates are low 4. All program sponsors report confidence in the program operations process. | * Longitudinal tracking of data quality indicators available through the data portal (MPIs 1-3) * Longitudinal tracking of RPP engagement with ENERGY STAR revision process (MPI 1) * Qualitative evidence from ENERGY STAR stakeholder interviews (MPI 1) * Quantitative evidence from program sponsor interviews (MPI 4) |
| IV (S) | **Reliable market share** **and** **portfolio management** informs program design and evaluation. | 1. Efficient and transparent portfolio management process 2. Annual savings process and evaluation are efficient and verifiable. | Portfolio-level target:   1. Portfolio management process continues to be efficient and transparent. 2. Annual savings process and evaluation work are conducted efficiently and can be verified. | * Quantitative evidence from program sponsors interviews (MPIs 1-2) * Quantitative evidence from RPP staff interviews (MPIs 1-2) |
| V (S/M) | Retailers and merchants **incorporate incentives into their assortment and marketing** decision-making process. | Retailer consideration of ESRPP qualification in assortment and marketing decisions | Portfolio-level target:  All retail partners report using incentives to inform product decisions. | * Quantitative evidence from retailer interviews * Quantitative evidence from RPP staff communication * Quarterly presentations and information provided by retailers to ESRPP |
| VI (S/M) | Increase in ENERGY STAR (or higher tiers) **market share** for RPP product categories at Participating and Non-Participating Retailers | Market share ESRPP qualified product tiers | Product-level targets:  Measurable increase in market share for at least one product (Note: this shift could have a different pace among different products.) | * Longitudinal tracking of market share and product assortments * Web scraping of retailer web sites |
| VII (M) | Reliable **per-unit energy savings** value for RPP product categories | Number of product categories (bins, tiers, configurations) with reliable energy savings values | Product-level targets:  All active products in portfolio have reliable energy savings values. | Longitudinal tracking of measure planning documentation and methodologies |
| VIII (M) | Data management system builds sufficient trust **with retailers** that access to data is no longer a barrier. | 1. Timeliness and completion of retailer uploads 2. Retailer confidence in data warehousing | Portfolio-level target:   1. Retailer uploads continue to be timely and complete. 2. All retailers report confidence in data warehousing and their contract extensions continue on schedule each year. | * Longitudinal tracking of data quality indicators available through the data portal (MPI 1) * Quantitative evidence from retailer interviews (MPI 2) * ESRPP program documents (MPI 2) |
| IX (M/L) | Increase in **ENERGY STAR** (or higher tiers) **qualifying criteria** for RPP product categories | Number of products for which ESRPP influences an increase in ENERGY STAR (or higher tiers) qualifying criteria apart from expected updates | Product-level targets:  *2 ENERGY STAR revision process are expected to begin in 2020-2023 for products in ComEd’s portfolio. We will continue to monitor.* | * Longitudinal tracking of RPP engagement with ENERGY STAR revision processes (MPI 1) * Qualitative evidence from ENERGY STAR stakeholder interviews (MPI 2) |
| X (L) | Change in **federal minimum standards** for RPP categories | ESRPP sponsors inform federal minimum standards for product categories in the portfolio. | Product-level targets:  *2 federal standard revision processes are expected to begin in 2020-2023 for products in ComEd’s portfolio. We will continue to monitor.* | Longitudinal tracking of RPP engagement with federal standard revision processes |

# ESRPP Data and Cleaning

There are a variety of data sources required to evaluate ESRPP. The most significant is the data from the national ESRPP sales portal. All program sponsors have access to the monthly sales data from participating retailers in their territory via a data portal that is maintained by ICF. The ESRPP sales portal provides evaluation data reports which contain most of the data required for measuring net market lift. The portal provides separate evaluation data reports for each product category. The evaluation data reports contain the following monthly data:

* Unit sales by model number
* Qualified status of model
* Per-unit incentive
* Retailer (for qualified products)
* Inputs for gross savings (energy factor, capacity, etc.)

Each of the five participating ESRPP MT program retailers provide full category sales data by model number for each product category. The evaluation data reports include sales of each model number by month and the qualified status of each model number in that month. The monthly sales data includes 12 months of pre-program sales data as well as sales from each month the program has been active. ICF also includes the name of the retailer for incentive qualified sales but does not include retailer name for non-qualifying sales[[3]](#footnote-4).

## Data Cleaning[[4]](#footnote-5)

The data from the portal requires additional cleaning and validation to ensure that it is complete and includes the technical information required to calculate unit energy savings (UES). Model-specific performance specifications relevant to savings should be verified for each model number in the program sales data.

Product performance specifications, or product configurations, may evolve over time as testing and measurement procedures improve. Therefore, evaluators should verify performance specifications against the most recent sources, such as the qualified product lists (QPLs) for ENERGY STAR,[[5]](#footnote-6) the Compliance Certification Management System of the U.S. Department of Energy (DOE),[[6]](#footnote-7) and the California Energy Commission (CEC).[[7]](#footnote-8) Evaluators should also utilize historical sources to aggregate current and discontinued models, as discontinued models may no longer be present in current sources.

In some cases, manufacturers update the attributes for a model number. When this occurs, evaluators should confirm relevant performance specifications are correctly applied for each time period. Where there are discrepancies among the different QPL sources, this protocol recommends the data from ENERGY STAR takes priority over DOE or CEC data, unless evaluators have primary data. This prioritization order applies for all attributes except the DOE product class determination, where the DOE data source is prioritized before ENERGY STAR, and the CEC data source is still the last to be referenced.

Once ESRPP targeted products and configurations are known, energy and peak demand savings can be calculated using relevant TRM algorithms. Table 3 provides an example matrix of how the different tiers match to each of the products currently offered through the ESRPP. The product types and tiers within the program can be altered by the program sponsor each year. Evaluators should ensure that the most recent product types, configurations, and efficiency tiers are up to date.

Table . Tier Matrix for Current ESRPP Products

| **Tier** | **Refrigerators** | **Clothes Washers** |
| --- | --- | --- |
| Basic | ENERGY STAR Most Efficient, between 10% and 15% more efficient than federal standards | ENERGY STAR, up to 10% more efficient than federal standards (top-load only) |
| Advanced | ENERGY STAR Emerging Tech, at least 15 % greater efficiency than federal standards | ENERGY STAR Most Efficient, at least 10% greater efficiency than federal standards |
| Non-Qualified | All other models | All other models |

# ESRPP Natural Market Baselines

Market transformation programs aim to transform the entire market for each product category. To estimate savings for the ESRPP MT program, evaluators need to estimate the natural market baseline (NMB) across the entire market. Because the NMB estimates market shares absent any ESRPP MT program influence, the NMB represents expected market shares in both participating and non-participating retailers.

## Data for NMB Determination

The NMB calculation should account for historical as well as regionally specific trends in sales and market shares of ESRPP sponsored products. This may require additional data sources to supplement program sales data obtained from the ESRPP data portal as retailers provide only 12 months of historical sales when a new ESRPP sponsor joins the program or a new product category is added. For example, the CY2021 evaluation of ComEd’s ESRPP pilot combined ESRPP tracking data from participating retailers and historical reported market shares from a prior program sponsor in Wisconsin, Focus on Energy. Because the ComEd ESRPP MT initiative began in 2020, historical sales data only covered 2019 through 2020 for Illinois retailers. Focus on Energy sponsored ESRPP from March 2016 – December 2018, and thus provided Midwest sales data covering March 2015 – December 2018, which left a gap of only five months in the data series, from January through May of 2019.

Supplementing ComEd’s ESRPP portal data with ESRPP reported market shares from Wisconsin Focus on Energy provided a more robust dataset with which to estimate market shares and control for any naturally occurring trends prior to the launch of ESRPP in Illinois. The Wisconsin data provided additional Midwest representation to compare with other national data. The data from Wisconsin contains all the same fields as the ComEd data since it is an extraction from the same ESRPP data portal.

## NMB Algorithm

The algorithm used to quantify the natural market baseline for market shares is specified as a linear forecast based on historical sales data. The actual, annual efficient market shares should be used to derive a linear function to predict the market shares in subsequent years. Equation 1 shows the general form of the NMB that should be used for both clothes washers and refrigerators.

Equation . NMB Algorithm

Where *MS* is the expected annual market share, *year* is the actual year, *i* indicates the years over the baseline period, and *n* is the forecasted year.

## Criteria for NMB Updates

Over time, there may be circumstances where revisions to the natural market baseline become necessary. Appendix C outlines five different criteria for what might constitute an update to the NMB, all of which are applicable to ESRPP.

* New data available. The addition of program sponsors, or new data features may show the initial forecast of market shares did not follow the actual market conditions at the time.
* New technologies. The introduction of low cost and very efficient technologies, or the inverse with extremely popular higher energy features may alter the energy consumption or characterization of a particular product category.
* Timing of Codes and Standards Change. The delay of codes and standards updates, either by government decision or economic factors.
* Revisions to ENERGY STAR specifications for a product category or configuration which is currently part of the initiative.

Updates to the NMB will be made when needed, based on the examination of ongoing sales data and MPI assessments by the evaluators. At least once per plan cycle, the evaluator should review all available data and inputs into the natural market baseline to ensure it remains applicable to the current market conditions, but updates are not required if market conditions are not substantially different from those anticipated when the most recent NMB was constructed.

# Unit Energy Savings (UES)

The unit energy savings (UES) for each model should be calculated using the TRM equations for each product category and configuration. Currently, ComEd’s ESRPP portfolio includes only clothes washers[[8]](#footnote-9) and refrigerators[[9]](#footnote-10). Unit and product configurations for which energy savings are not included in the Illinois TRM should be verified by program evaluators and added to this protocol as needed.

# Annual ESRPP Savings

Equation 2 is the general equation for estimating ESRPP savings.

Equation . ESRPP Energy Savings

Where:

* *UES* is the difference between sales-weighted average annual kWh for program qualified models and federal baseline models
* *Total Market Units* are the total quantity of qualified model sales from participating retailers plus the estimated quantity of qualified units sold through non-participating retailers
* *NMB* is the forecast natural market baseline market share
* *OPS* is the savings from other energy efficiency programs which may overlap with ESRPP, see section 6.3.

## Sales from Non-Participating Retailers[[10]](#footnote-11)

National shipments data from the Association of Home Appliance Manufacturers (AHAM) should be used to estimate non-participating retailer sales that occur within the utility service territory outside of the participating retailers. *Non-Program Sales* are estimated by Equation 3:

Equation 3. Non-Program Sales

where NPSComEd represents Non-Program Sales in the utility service territory, as calculated by the product of five components:

1. The number of national shipments, NS;
2. The state’s share of the national appliances, represented by HHIL, the number of Illinois households weighted by SaturationIL, the saturation of appliances within Illinois households, divided by HHus, the national number of households weighted by SaturationUS, the saturation of appliances within households nationally;
3. The utility share of the state’s residential customers, represented by ResCutility, the number of residential customer accounts in the utility’s territory divided by ResCIL, the number of residential customer accounts in the state;
4. Configuration split, represented by PUClass, the number of program units per class (e.g. top-loading clothes washers), divided by PUCategory, the number of program units per category (e.g. clothes washers);
5. Sales from participating retailers, PS.

## Savings from Non-participating Retailers

Retailer decision making is complex, and retailers consider many factors when deciding whether to mimic other retailers in the market. For example, firm A may not have the resources to conduct primary research on which products are likely to appeal to consumers over the next buying cycle. In this case, they may copy a competitor, firm B, if firm A believes firm B to have access to better information about trends in consumer demand. Alternatively, firm C may try to differentiate from firms A and B and may decide to purchase a different set of products, especially if firm C believes they do not have the resources to compete directly with firms A or B. Or firm C may use their own information and expectations of what their consumers will demand.

Evaluators should determine the appropriate lift for non-participating retailers. Research can include secondary reviews of research papers discussing inventory management, product substitution and pricing strategies, optimal retailer stocking levels competitive dynamics, strategy and organizational survival, retailer power and market performance, why firms imitate one another, and strategies of low market share businesses. Evaluators may also conduct primary research with retailers within the utility service territory to assess net lift from non-participating retailers.

The ComEd evaluation team conducted a detailed literature review of 17 different research papers. While the literature review was not conclusive, there are certain conditions under which retailers may choose to imitate their competitors. Marketing and stocking behavior was highly structured for smaller retailers. In comparison, larger box stores specialize in higher volume of lower-end washers. However, none of the papers directly supported the claim that non-participating retailers will mirror decisions made by participating retailers. ComEd’s evaluator determined the net lift for non-participating retailers should be set at 50% of the lift observed in participating retailers in ComEd territory, to acknowledge the program may be influencing non-participating retailers, but further investigation is needed to understand the full nature of program influence on non-participating retailers.

## Interactions with Other Efficiency Programs

In order to avoid double counting savings from the same piece of equipment, the like-for-like energy and demand savings from other resource acquisition programs (i.e., ComEd’s Appliance Rebate Program) should be removed from the ESRPP savings. Tracking data from resource acquisition programs are likely to differ from the program administrator data portal provided through the ESRPP, which may require additional data cleaning and processing.

Tracking data from other resource acquisition programs should be cleaned and categorized using the same procedures which are applied to the ESRPP sales portal data. Only the net energy and net demand savings from product configurations and efficiency tiers which match the efficiency categories incented through ESRPP should be removed. ESRPP does not apply a NTG ratio as other programs since program savings are only those above the natural market baseline, referred to here as gross ESRPP savings. Verified net savings for ESRPP are then equal to gross program savings less net downstream savings.

1. Program description from the NEEA website. https://neea.org/our-work/programs/rpp. [↑](#footnote-ref-2)
2. The logic model and MPI list are the current working versions form the CY2021 evaluation of ComEd’s ESRPP pilot. They were both developed by the program implementer, NEEA, and reviewed by the Guidehouse evaluation team. [↑](#footnote-ref-3)
3. This is done to protect retailer data privacy. [↑](#footnote-ref-4)
4. The methods for cleaning data, gathering product attributes, and assigning a category were developed by NEEA. These steps were documented and provided to ComEd in the RPP Data Cleaning Memo, dated May 18, 2022. [↑](#footnote-ref-5)
5. <https://www.energystar.gov/productfinder/advanced> [↑](#footnote-ref-6)
6. <https://www.regulations.doe.gov/certification-data/> [↑](#footnote-ref-7)
7. <https://cacertappliances.energy.ca.gov/Pages/Search/AdvancedSearch.aspx> [↑](#footnote-ref-8)
8. Measure 5.1.2 ENERYG STAR Clothes Washers, Illinois TRM V10. [↑](#footnote-ref-9)
9. Measure 5.1.6, ENERGY STAR and CEE Tier 2 Refrigerator. [↑](#footnote-ref-10)
10. NEEA Memo to ComEd Regarding Baseline Approaches. September 23, 2021. [↑](#footnote-ref-11)