



COMED CY2019 – CY2021 EVALUATION PLAN OVERVIEW

PREPARED FOR COMED AND SAG

December 3, 2018

AGENDA

1. 2019 Summary
2. 2019 Programs Being Evaluated
3. Evaluation Methods
4. Non-Program-Specific Research
5. Updates to the TRM
6. Use of AMI Data, RCT and QED
7. Budget
8. Evaluation Coordination Across Utilities

FEJA Brings Key Changes

- Cumulative Persisting Annual Savings (CPAS)
- Final data available January 30th
- Final Report due April 30th
- Tight timeline between data available and draft
- Tight timeline for reviews
- Solutions
 - Separating impact report from process and NTG
 - Process results presented near time of research
 - Waves of impact research
 - Simplified impact report

CY2019 Summary

- Impact evaluations on at least 36 programs by April 30th
- Business, Residential, Income Eligible, and Open Source Programs
- Pilot Programs
 - Business: 5 in progress, 2 in planning
 - Residential: 6 in progress, 2 in planning
 - Income Eligible: 3 in progress
- TRM Support
 - Effective Useful Life (EUL) research
 - Smart Thermostats
 - Measure updates: VSDs, refrigerator recycling, load shapes, smart thermostats, AC Tune-Up
- Non-Energy Impacts
- Process Evaluation, as needed, separate from impact
- NTG Research
- PJM

CY2019 PROGRAMS

Business Programs

1. CHP
2. Custom
3. Energy Advisor
4. Industrial Systems
5. Instant Discount
6. LED Street Lighting
7. Monitoring-Based Commissioning
8. New Construction
9. Operational Efficiency
10. Public Housing Authorities
11. Public Small Facilities
12. Retro-Commissioning
13. Small Business
14. Standard
15. Strategic Energy Management

Residential Programs

1. Appliance Rebates
2. Fridge and Freezer Recycling
3. Home Energy Assessment
4. Home Energy Reports
5. HVAC Rebates
6. Lighting Discounts
7. Multi-Family Market Rate
8. New Construction
9. Weatherization Rebates

CY2019 PROGRAMS

Income Eligible Programs

1. Affordable Housing New Construction
2. Lighting Discounts
3. Multi-Family Energy Efficiency
4. Single-Family Retrofit

Voltage Optimization

Open Source (Third Party) Programs

TBD

Pilot Programs

1. Adsorbent Air Cleaner
2. Commercial Ground Source Heat Pump
3. Ductless Heat Pump and Building Envelope
4. HVAC SAVE
5. LED Holiday Light Exchange
6. LUCHA Passive House
7. Save and Share

Three Types of Impact Evaluation Approaches

- TRM-Based

- Custom and Model-Based

- Regression

- Majority of Residential and Income Eligible program evaluations are TRM-based
- Majority of Business Programs evaluations are custom

TRM-Based Impact Evaluation

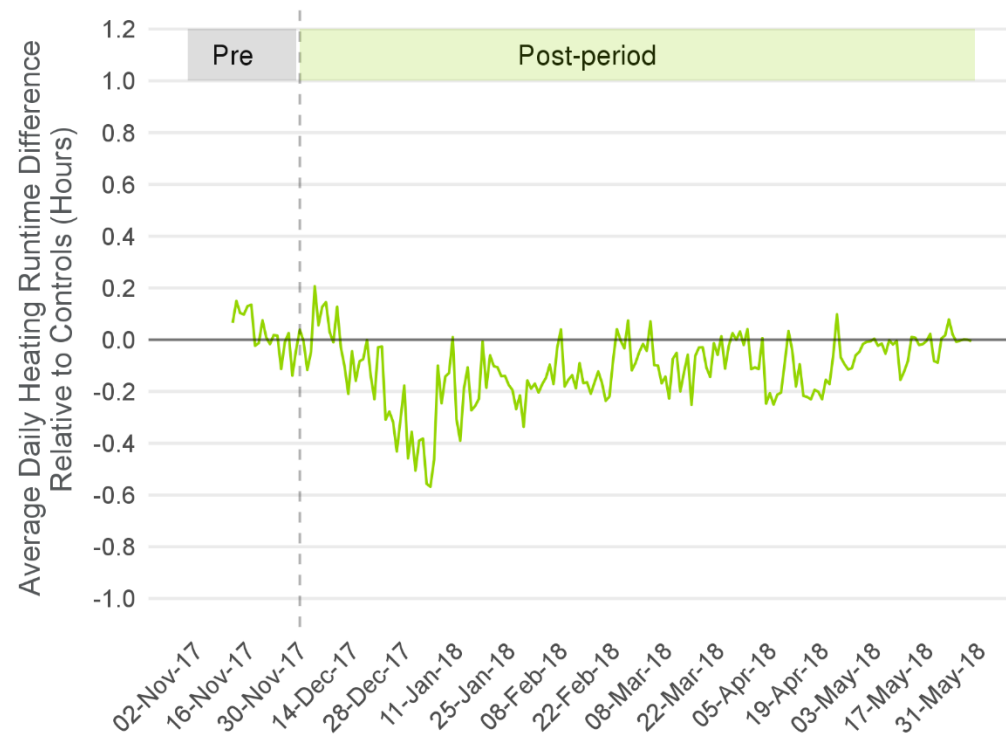
- Program tracking database review
- QC on project-level impact estimate
 - Can we recreate the savings claimed given the inputs and the TRM formulas?
 - If not, why do our numbers diverge from the ex ante?
- Verify program-level ex ante estimate
- Verify installation – surveys, on-sites, review invoices
- Apply deemed NTG ratio to get net savings

Custom Impact Evaluation

- Program tracking database review
- Sample selection for desk reviews and on-sites
- Verify input assumptions – surveys, on-site measurement, review invoices
- QC on project-level impact estimate
 - Can we recreate the savings claimed given the inputs and the TRM formulas?
 - If not, why do our numbers diverge from the ex ante?
- Verify program-level ex ante estimate
- Apply deemed NTG ratio to get net savings

IMPACT EVALUATION METHODS – REGRESSION

- Example: Connected Savings - Joint ComEd/Nicor Thermostat Optimization Program
- Randomized Control Trial
 - Recruit and Deny Approach
 - Program applicants randomly assigned
 - Program Period:
 - 2017-12-01 through 2018-05-31
 - 1,000 participants and 1,000 controls
 - RCT validated by comparing treatment and control furnace runtime before program start
- 15-minute telemetry data
- Compared daily furnace runtimes for participants and controls
- Fixed-effects regression model to estimate savings



PROCESS EVALUATION

Based on what criteria will we conduct process evaluation?

- We review program tracking data every year
 - Program data tells us how the program is performing relative to goals
- We conduct PM/IC interviews every year
 - These interviews help to highlight program concerns and areas for evaluation
- As needed, we conduct additional research to uncover valuable ways to improve the program and enhance customers' experience. Activities may include:
 - Program materials and website review
 - Participant interviews and surveys
 - EESP interviews
 - Secondary research, including benchmarking
 - Focus groups
 - GIS analysis
 - Journey mapping and lead lifecycle analysis

Other Research Includes

- Updates to the TRM
- Attribution (Net-To-Gross)
- Non-Energy Impacts
- PJM
- AMI
- Market Transformation
- Etc.

TRM Updates in 2018

- Demand Control Ventilation - update to energy savings factors and assumptions
- Variable Speed Drives for HVAC Supply/Return Fans and HVAC Pumps and Cooling Tower Fans - update to incremental cost assumptions
- Loadshapes - updates to residential lighting and commercial lighting loadshapes
- Effective Useful Life - review and update of all measure lifetimes
- Air Sealing and Insulation - update to energy savings factors based on billing analysis and modeling
- Streetlighting - update to streetlighting HOU based on secondary research
- Residential Lighting - update to ISR, HOU, leakage, res/nonres split based on primary research
- Pipe Insulation - update to equivalent lengths
- Smart Thermostats - update to energy savings factors and part load factor for multifamily
- Efficient Refrigerated Compressed Air Dryer - update to conversion factor
- Standardized zip code mapping - provided zip codes to standardize climate zones

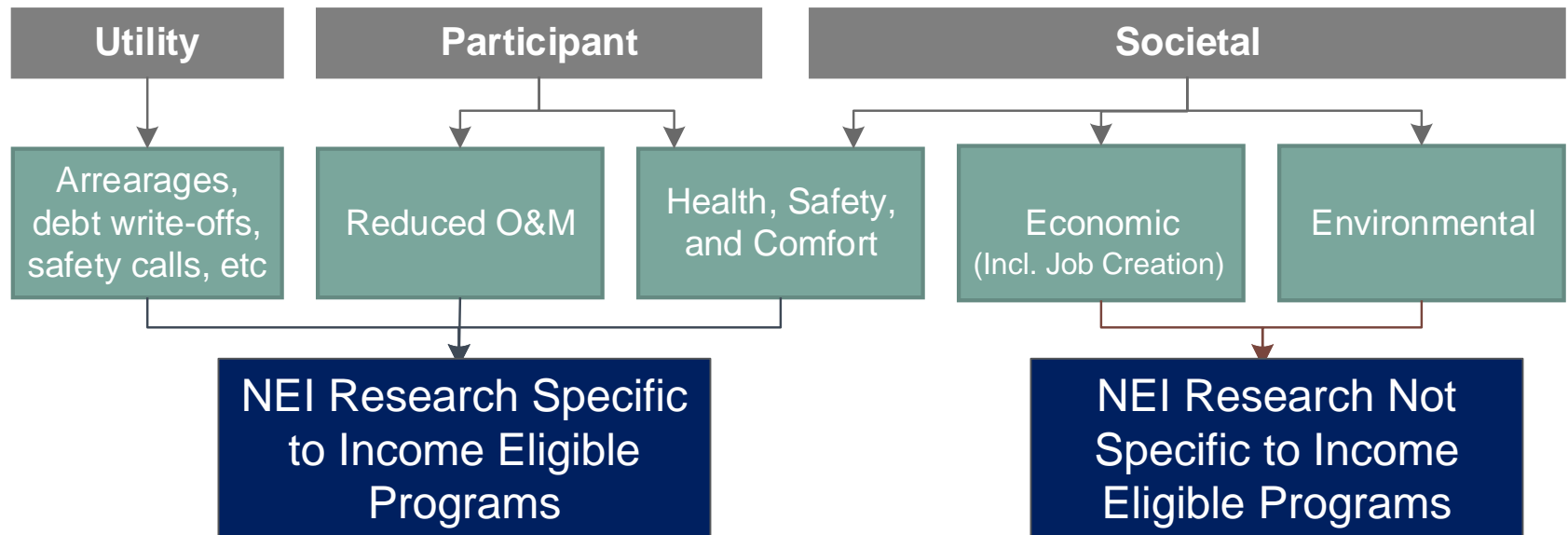
TRM Updates in 2019

- Variable Speed Drives for HVAC Pumps and Cooling Tower Fans - secondary research to update savings factors
- Refrigerator and Freezer Recycling - secondary research to update savings factors
- Effective Useful Life - primary research for high impact measures
- Loadshapes - secondary research to update high impact loadshapes
- Smart Thermostats - additional primary research to update savings factor
- Non-Energy Impacts - primary research to include NEIs in the TRM
- Air Conditioner Tune-Up - primary research to update savings factors

Attribution - Net-to-Gross Research

- Statewide NTG Working Group to update the TRM
- Program-Specific Free Ridership and Spillover research
- Updates to the deemed NTG values
- No NTG research when regression analysis of consumption data provides net savings

Phase 1 for Income Eligible Programs



Use of AMI Data

■ Energy Usage Regression Analysis

- Residential advanced thermostats impact analysis
- Weather-normalized bulk regression analysis for the population of C&I custom projects
- Small commercial programmable thermostats
- Other TRM measures will be considered, but no studies are planned at this time

■ M&V

- Standard program
- Custom program
- Monitoring Based Commissioning Program
- Voltage Optimization

Randomized Controlled Trials and Quasi-Experimental Designs

■ RCT

- Home Energy Report
- Connected Savings

■ QED

- Nest Seasonal Savings
- Bidgely
- Advanced Thermostat
- Income Eligible Single Family Retrofit: QED in CY2020 to confirm TRM savings for groups of measures.
- Save and Share Pilot (QED)

RED and QED

The evaluation team will not use the Randomized Control Trials (RCT) or Quasi-Experimental Design for evaluations when:

- There are not enough participants in this program to achieve statistically significant savings estimates using this method.
- An RCT can only be used when the program is designed with a random control group.
- It would not be possible to create a valid matched control group for the customers.
- RED or QED would estimate average savings across all program participants and all measures. Some programs are better suited for analysis that creates customer- or measure-specific impacts.
- The program does not know which specific customers participated in the program for some upstream programs and so cannot create treatment and control groups.
- The program's savings represent a small percentage of the total household savings.

Program Level Year-by Year Evaluation Plan

See Accompanying Spreadsheet

- Program by program
- Year by year
- Matrix with research tasks

Program Level 3-Year Evaluation Plan Example – Affordable Housing New Construction

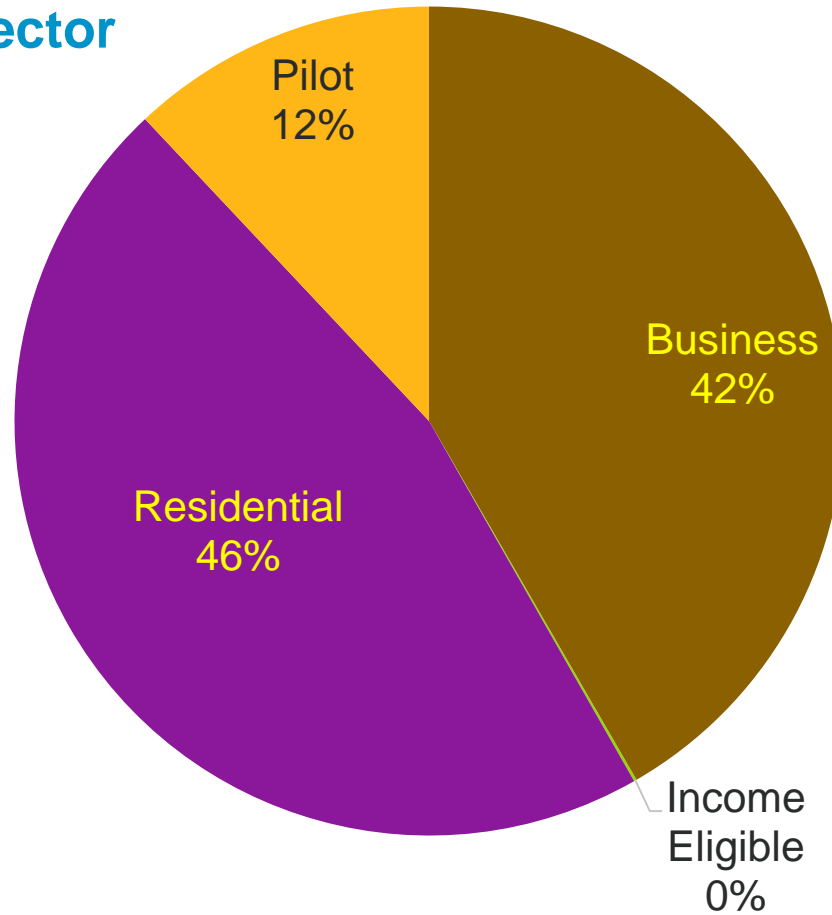
Sector	Program	Task	2018	2019	2020	2021
Income Eligible	Affordable Housing New Construction	Tracking System Review	X	X	X	X
Income Eligible	Affordable Housing New Construction	Data Collection – Program Materials Review		X		X
Income Eligible	Affordable Housing New Construction	Data Collection – Program Manager and Implementer Interviews	X	X	X	X
Income Eligible	Affordable Housing New Construction	Data Collection – Developer Interviews	X		X	
Income Eligible	Affordable Housing New Construction	Impact – Engineering Review	X	X	X	X
Income Eligible	Affordable Housing New Construction	Impact – Measure-Level Deemed Savings Review	X	X	X	X
Income Eligible	Affordable Housing New Construction	Impact – Verification & Realization Rate	X	X	X	X
Income Eligible	Affordable Housing New Construction	Process Analysis	X	X	X	X

Program Level 3-Year Evaluation Plan Example – Business New Construction

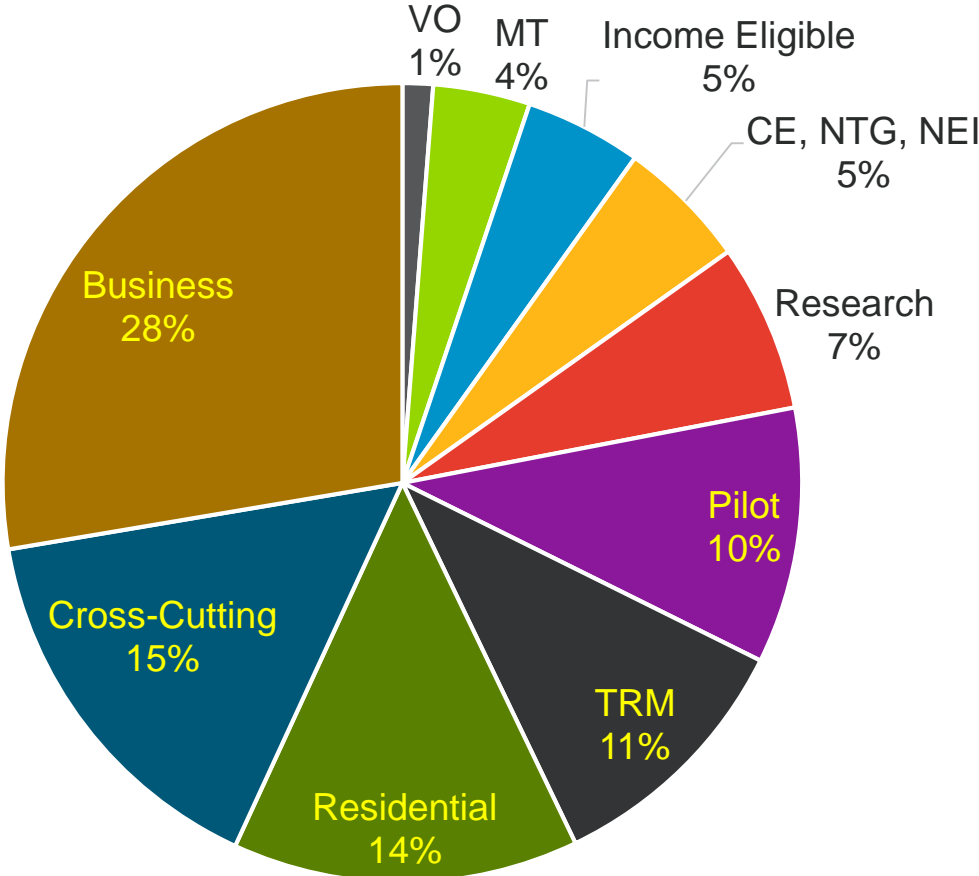
Sector	Program	Task	2018	2019	2020	2021
Business	New Construction	Tracking System Review	X	X	X	X
Business	New Construction	Data Collection – Materials Review		X	X	X
Business	New Construction	Data Collection – Participant Surveys	X	X	X	X
Business	New Construction	Data Collection – Program Manager and Implementer Interviews	X	X	X	X
Business	New Construction	Impact – Engineering Review	X	X	X	X
Business	New Construction	Impact – Building Energy Simulation Modeling	X	X	X	X
Business	New Construction	Impact – Verification & Realization Rate	X	X	X	X
Business	New Construction	Net-to-Gross – Free Ridership Self-Report Survey		X		X
Business	New Construction	Net-to-Gross – Spillover Research			X	
Business	New Construction	Process Analysis	X	X	X	X
Business	New Construction	Tracking System Review	X	X	X	X

Budget Overview

PY9 Net kWh by Sector



EM&V Budget Overview



COORDINATION ACROSS UTILITIES

- Navigant collaborates on an ongoing basis with the other Illinois evaluation teams
- The Illinois evaluators currently hold a monthly evaluation coordination call to keep abreast of key issues
- Methodological coordination occurs regularly as part of SAG meetings on specific topics, including:
 - Illinois NTG Working Group
 - Illinois TRM Technical Advisory Committee (TAC)
- Coordination also occurs on an ad-hoc basis on Illinois-wide key issues or program-specific issues that might impact multiple utility programs
- In a number of cases, the Illinois evaluation teams collaborate on statewide research

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