Opinion Dynamics

Guidehouse

APPROPRIATE NTG TREATMENT FOR IL-TRM MEASURES CHARACTERIZED WITH CONSUMPTION ANALYSIS

SAG NTG Meeting #4

9/25/2020

Agenda

- Residential advanced thermostats
- Nonresidential thermostats
- Air sealing

Residential Advanced Thermostats - Cooling

- Cooling savings from residential advanced thermostats are characterized in IL-TRM V9.0 based on the recently completed 2020 Guidehouse study, and use a combination of savings estimates from an econometric study with matching to future participants (90%), as well as an adjusted ENERGY STAR analysis (10%)
  - Per the IL-TRM, the econometric study falls into the "quasi-experimental design – matching to future participants" category and is therefore gross with respect to free-ridership
  - The ENERGY STAR analysis is also gross with respect to free-ridership
- Therefore an adjustment to savings from this measure must be made for free-ridership
- The cooling savings are net with respect to participant spillover, and gross with respect to non-participant spillover

Residential Advanced Thermostats - Heating

- Heating savings (both electric and gas) from residential advanced thermostats are characterized in IL-TRM V9.0 based on a 2015 Navigant study that used consumption analysis with matching to non-participants
  - Per the IL-TRM, the study falls into the "quasi-experimental design – matching to non-participants" category and is therefore "somewhere in between net and gross" with respect to free-ridership
  - The heating savings are net with respect to participant spillover, and gross with respect to non-participant spillover
- The evaluators have no data-driven basis by which we can determine the degree of free-ridership effects that are captured in this savings estimate, and therefore any adjustments made for free-ridership are rooted in evaluation judgement

Residential Advanced Thermostats – NTG Recommendation (Cooling)

- The evaluators do not currently have up-to-date, Illinois-specific net-to-gross research that accurately represents the current utility residential programs rebating advanced thermostats
  - AIC-specific research was conducted by Opinion Dynamics in 2018 that found FR of 29%, but the AIC program has changed substantially with respect to the mix of incented products since that point
  - Guidehouse secondary research located a 2017 Ameren Missouri study that found FR of 23%, but this value is not Illinois-specific
- The evaluators recommend the Policy Manual default NTGR of 0.80 be applied to cooling impacts from all residential market-rate advanced thermostats, and that a NTGR of 1.00 be applied to cooling impacts from all advanced thermostats delivered through low-income programs per general SAG consensus
- The evaluators for ComEd and AIC commit to completing residential advanced thermostat cooling-specific NTG research in 2021 to update this assumption for application in 2022

Residential Advanced Thermostats – NTG Recommendation (Heating)

- The evaluators recommend that a NTGR of 0.90 be applied to heating impacts from all residential market-rate advanced thermostats, and that a NTGR of 1.00 be applied to heating impacts from all advanced thermostats delivered through low-income programs per general SAG consensus
- This recommendation is based in evaluation judgement and attempts to address the concern that the existing heating parameter estimate is "somewhere between net and gross"
- This recommendation should not be interpreted as precedent for future years – the evaluators agree that this issue requires a substantial amount of additional discussion – but should be used as an acceptable compromise for 2021 in lieu of additional research

Nonresidential Thermostats - Cooling

- Cooling savings from nonresidential thermostats (programmable and advanced) are characterized in IL-TRM V9.0 based on the recently completed 2020 Guidehouse Small Commercial Thermostat study that used consumption analysis with matching to nonparticipants
  - Per the IL-TRM, the econometric study falls into the "quasi-experimental design – matching to non-participants" category and is therefore "somewhere in between net and gross" with respect to free-ridership
  - Savings are net with respect to participant spillover, and gross with respect to non-participant spillover
- The evaluators have no data-driven basis by which we can determine the degree of free-ridership effects that are captured in this savings estimate, and therefore any adjustments made for free-ridership are rooted in evaluation judgement

Nonresidential Thermostats - Heating

- Heating savings from nonresidential thermostats (programmable and advanced) are characterized in IL-TRM V9.0 using the same 2015 Navigant study used to characterize residential advanced thermostat heating savings
- This value is used as a proxy because nonresidential-specific thermostat heating research is not available
  - Per the IL-TRM, the econometric study falls into the "quasi-experimental design – matching to non-participants" category and is therefore "somewhere in between net and gross" with respect to free-ridership
  - Savings are net with respect to participant spillover, and gross with respect to non-participant spillover
- The evaluators have no data-driven basis by which we can determine the degree of free-ridership effects that are captured in this savings estimate, and therefore any adjustments made for free-ridership are rooted in evaluation judgement

Nonresidential Thermostats – NTG Recommendation

- While we have up-to-date, Illinois-specific net-to-gross research that accurately represents the current utility programs rebating these measures, we have no data-driven basis by which we can determine the degree of free-ridership effects that are captured in the TRM savings estimates
- One approach to resolve this, presented in our spreadsheets, would be to subtract 50% of our researched program- or measure- level free-ridership rates from 1, and add non-participant spillover if applicable

Air Sealing – Background

- Savings from air sealing in IL-TRM V9.0 are characterized via engineering algorithms that estimate gross savings, plus a consumption analysis-derived adjustment factor from a 2018 Navigant study that is applied in certain cases
- The adjustment factor was based on a consumption analysis that used matching to non-participants and therefore is in between gross and net with respect to free-ridership, net with respect to participant spillover, and gross with respect to non-participant spillover
- As with thermostats, the evaluators have no data-driven basis by which we can determine the degree of free-ridership effects that are captured in this savings estimate, and therefore any adjustments made for free-ridership are rooted in evaluation judgement
- In cases where the adjustment factor applies, our spreadsheets present the same net impact adjustment suggested for nonresidential advanced thermostats, which is to subtract 50% of our researched program- or measure- level free-ridership rates from 1, and add non-participant spillover if applicable

Air Sealing – $IE_{NetCorrection}$

- In previous versions of the IL-TRM, an assumption was made that all consumption analysis results were net with respect to free-ridership
- Therefore, a term called "$IE_{NetCorrection}$" was included in the measure characterization to "undo" net effects presumed to be captured in the adjustment factor when the adjustment factor is applied to income qualified participants (for which SAG has agreed that no NTG adjustment should be made)
- The $IE_{NetCorrection}$ adjustment factor in the TRM is 10%, implying the savings adjustment factors had a NTG of about 0.90 built in. This is close to our new estimates, and we do not believe a change is necessary (changing it to utility-specific values would need to be shown in a table added to the TRM)

Appendix

TRM Guidance

TRM Background

- A few measures in the Illinois TRM are characterized using consumption analysis to estimate parameters used in prescriptive savings algorithms
- Unlike engineering estimates, consumption analyses are not always gross with respect to all net effects
- Section 5.3.1 of Attachment A to the Illinois TRM (Illinois Statewide Net-to-Gross Methodologies) provides specific guidance to evaluators on how to appropriately treat savings estimates resulting from consumption analysis with respect to net effects

TRM Background

- Table 5-3 provides specific guidance on how savings parameters determined through consumption analysis methods should be treated with respect to free-ridership, participant spillover, and non-participant spillover

Table 5-3. NTG Summary for Consumption Data Analysis

Consumption Data Analysis Method	Free Ridership	Participant Spillover*	Nonparticipant Spillover**
Randomized Controlled Trial (RCT)	✓	✓	§
Random Encouragement Design			
No Instrumental Variable (IV)	†	✓	§
IV	†	✓	§
IV w/ Inverse Mills Ratio (IMR)	†***	✓	§
Quasi-Experimental Design (QED) ****			
Matching			
To Nonparticipants	†*****	✓	§
To Prior or Future Participants	§	✓	§
Regression Discontinuity (RD)	✓	✓	§
Variation-in-Adoption (VIA)	§	✓	§
Without a Comparison Group	§	✓	§

§ Indicates not accounted for (gross)
✓ Indicates fully accounted for (net)
† Indicates partially accounted for (between net and gross)
* Participant spillover within the analysis timeframe in the same building and fuel type is captured. Other sources of participant spillover may not be captured. See the subsection on participant spillover below for details.

TRM Background

- Consumption analysis approaches are always *net* with respect to participant spillover, and always *gross* with respect to nonparticipant spillover
- Status with respect to free-ridership is dependent on study design

Table 5-3. NTG Summary for Consumption Data Analysis

Consumption Data Analysis Method	Free Ridership	Participant Spillover*	Nonparticipant Spillover**
Randomized Controlled Trial (RCT)	✓	✓	§
Random Encouragement Design			
No Instrumental Variable (IV)	†	✓	§
IV	†	✓	§
IV w/ Inverse Mills Ratio (IMR)	†***	✓	§
Quasi-Experimental Design (QED) ****			
Matching			
To Nonparticipants	†*****	✓	§
To Prior or Future Participants	§	✓	§
Regression Discontinuity (RD)	✓	✓	§
Variation-in-Adoption (VIA)	§	✓	§
Without a Comparison Group	§	✓	§

§ Indicates not accounted for (gross)
✓ Indicates fully accounted for (net)
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* Participant spillover within the analysis timeframe in the same building and fuel type is captured. Other sources of participant spillover may not be captured. See the subsection on participant spillover below for details.