



R1707 Net-to-Gross (NTG) Study of Residential New Construction

Study Kickoff
for Connecticut Energy Efficiency Board, Eversource,
United Illuminating, and Stakeholders

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NMR Group, Inc.


R1707 NTG Kickoff Agenda




- Background
- Tasks
- Methodology
- Schedule

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Background




- RNC program
 - Builder-focused
 - Driving efficient construction
 - Tiered incentives
- Rich data from recent studies
 - 2011 RNC baseline
 - 2016 R1602
 - Baseline, process, billing



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Goals



1. Calculate program impacts
2. Develop NTG ratios for the PSD
 - “What would have happened in 2016 if the program hadn’t existed after 2011?”
 - Free-ridership, spillover
3. Estimate NTG values for:
 - Multifamily
 - Solar PV
 - Net Zero

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Key Tasks

- Kickoff
- Research plan
 - Workplan
 - Data request
- Data collection
 - Conversations w/ RNC staff
 - Background research
 - Delphi Panel (2 rounds)
- Analysis
 - Delphi responses
 - Energy modeling
 - NTG calculations
- Reporting

Data Request

- From companies:
 - 2011 Program REM/Rate files
 - Program application forms (gaps between 2011 and 2017)
 - # of Net Zero homes annually
- Leverage R1602, additional research for remainder

Cross-Study Opportunities

The flowchart shows a central 'kick-off' box. Above it is 'R1707 RNC NTG' with an upward arrow. Below it is 'R1702 Codes & R1710 Standards' with a downward arrow. To the right is 'R1602 RNC Baseline Study' with a rightward arrow pointing to the 'kick-off' box.

The Delphi Panel

- 15 experts
- \$500 incentive
- ID'd by NMR + EA team
- NMR recruits, provides background info, analyzes responses
- Participant goals
 - HERS raters / EE consultants (6)
 - National evaluation experts (4)
 - Non-CT program managers (2)
 - Code officials (2)
 - Regulators (1)

Delphi Panel Process

The flowchart shows NMR sending a questionnaire to the Delphi Panel. The panel responds with 'Anonymized Delphi Panel Round 1 Results'. NMR asks 'Are you sure?'. The panel responds with 'Revised R1602 Program and Non-program Counterfactual Estimates'.

THE PANEL

Compile background research

- Background from the 2011 & 2016
- Program Baseline 2011 & 2016
- Program Penetration
- Local and Net Zero Background
- Multifamily Background
- Other Programs in CT Market

NMR sends questionnaire

Panel responds, sends back

NMR: "Are you sure?"

Panel responds, sends back

Analyze Round 1 Responses

Analyze Round 2 Responses

"How efficient would \$1602 homes be if the RNC program had stopped in 2011?"

Revised R1602 Program and Non-program Counterfactual Estimates

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Delphi Panel Questionnaire – Round 1

- Measure-level data from baseline studies
 - Participant vs. Non-Participant
 - Key measures from R1602 baseline
 - Air/duct leakage, insulation, lighting, windows, mechanicals
 - Most efficient 25%, middle 50%, least efficient 25%
 - Average efficiency in each tier
- Without the program:
 - How many in low, middle, high tiers?
 - Average efficiency in each tier?

Duct Leakage	Program Homes (single-family only)				Non-Program Homes (single-family only)			
	2011 % of Homes	Duct Leakage	Percent of Homes in Each Tier in Absence of Program (example response)	Average Duct Leakage in Each Tier in Absence of Program (example response)	2011 % of Homes	Duct Leakage	Percent of Homes in Each Tier in Absence of Program (example response)	Average Duct Leakage in Each Tier in Absence of Program (example response)
Average Duct Leakage (CFM25/100 ft ² conditioned space)	100%	3.1			100%	12.4		
High (poor) Duct Leakage Tier aka to xxx CFM25/100 ft ²	25%	12.5	30%	17.1	23%	17.8	90%	25.0
Mid Duct Leakage Tier aka to xxx CFM25/100 ft ²	50%	9.8	30%	10.2	50%	10.5	40%	12.1
Low Duct Leakage Tier aka to xxx CFM25/100 ft ²	25%	2.5	30%	4.8	27%	4.5	10%	4.8

Please type an explanation of your reasoning behind inclusion estimates in the space below (example response): Many participating builders learned about duct leakage through the program, but the best would have done it anyway, including in the homes they built outside the program. Because of the program, building inspectors and non-participating builders also learned about duct leakage—indirectly—and without the program duct leakage would have been much worse.

Delphi Panel Questionnaire – Round 2




- Customized for each panelist
- Panelists review others' responses, revise as needed
- Analyze Round 2 results
 - Outliers removed
- Use results for modeling effort
 - **How would homes have been built without the program?**

Poor-Gas/Propane Furnace – Low Tier AFUE <90%							
Actual	9%	30.0%			Actual	12%	30.1%
Panelists' Round 1 Responses			Low 0% Mean 13.9% High 36%	Low 30.0% Mean 81.9% High 88.0%	Panelists' Round 1 Responses		
Your Response (First Round)					Your Response (First Round)		
Your Response (Second Round)			20.0%	82.0%	Your Response (Second Round)		
						25.0%	30.0%

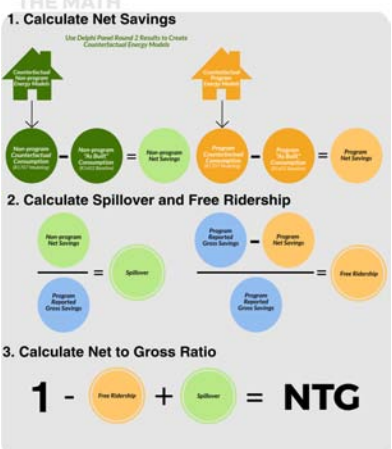
Your Comments: Codes haven't changed. Little reason for average efficiencies to have advanced since 2004 absent any program direct or indirect effects.

Other Comments: (Program manager outside ME) Program has increased awareness of efficient equipment. Some would have purchased efficient equipment anyway.



NTG Calcs

Use Delphi Panel Round 2 Results to Create Counterfactual Energy Models




1. Calculate Net Savings


2. Calculate Spillover and Free Ridership

3. Calculate Net to Gross Ratio

1 - Free Ridership + Spillover = NTG




Reporting Approach

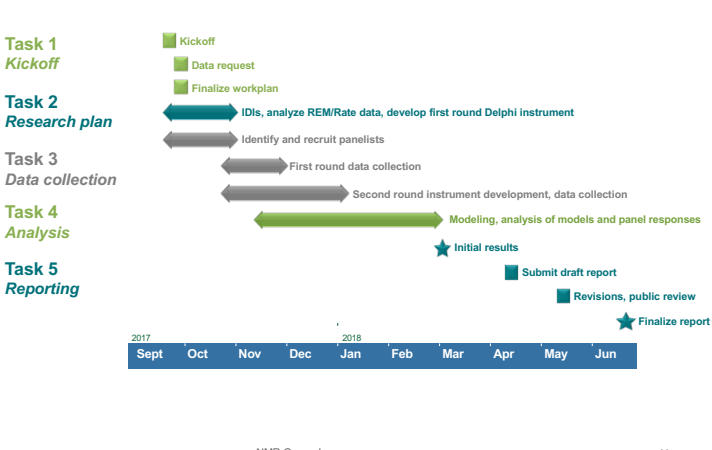


- Concise abstract, executive summary
- Recommendations for PSD
- Methodology
- Delphi Panel findings
 - Measure-level results
 - Key panelist comments
- Counterfactual energy model results
- NTG results
 - Overall, by fuel, MF, Solar PV, Net Zero

- Tables
 - 90% confidence intervals
 - Results by fuel type
- Appendices
 - Delphi instruments
 - Detailed methodology



Study Timing



Task 1 Kickoff


Task 2 Research plan

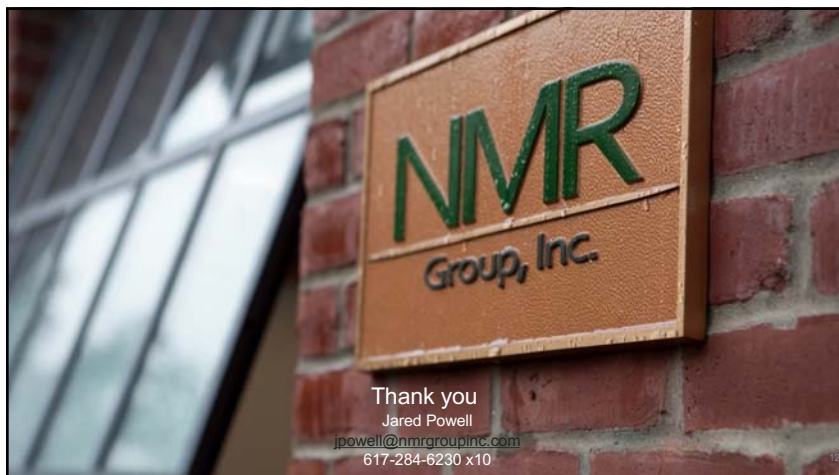
Task 3 Data collection

Task 4 Analysis

Task 5 Reporting

2017 Sept Oct Nov Dec 2018 Jan Feb Mar Apr May Jun





RNC NTG Study Budget

Task	Total
Task 1: Kickoff	\$9,600
Task 2: Research plan	\$27,750
Task 3: Data collection implementation	\$26,850
Task 4: Analysis	\$52,650
Task 5: Reporting	\$33,150
Total	\$150,000



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