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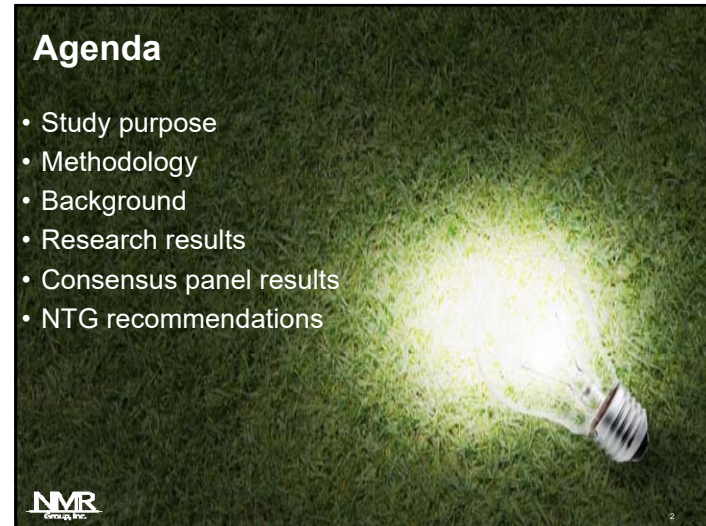
## R1615 Light Emitting Diode Net-to-Gross Research Study

**Final Results**  
for Connecticut Energy Efficiency Board, Eversource, United Illuminating, and Stakeholders

September 21, 2017

NMR Research Team:  
Lisa Wilson-Wright and Chris Russell, Nicole Rosenberg, NMR; Jason Christensen, Cadmus; and Chris Dyson, DNV GL

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## Agenda

- Study purpose
- Methodology
- Background
- Research results
- Consensus panel results
- NTG recommendations

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## Study Purpose

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- Recommend PSD and C&LM plan updates
- Estimate NTG ratios for LEDs
  - Retrospective: 2015 and 2016
  - Prospective: 2017 through 2020
  - Standard, specialty, hard-to-reach
- Prepare for R1616 Lighting Baseline
  - Market trends/predictions
  - Impacts of EISA and ENERGY STAR® 2.0

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## NTG Estimation (Conducted 8/2016-2/2017)

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- Supplier IDIs (n=16; 88% of program sales)
  - Retrospective: Program impact on sales
  - Prospective: Predictions of future LED market share with and without program activity
- Sales data modeling (n=17 states)
  - Retrospective: Impact of LED program activity on LED market share
  - LightTracker Data from CREED
- Demand elasticity modeling (all program sales)
  - Retrospective: Relationship between changes in incentive levels / shelf price and program sales
  - Program data so estimate is Net of Freeriders

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## NTG Estimation, cont. (Conducted 8/2016-2/2017)



- Benchmarking
  - Review of recent NTG ratios from other areas
- Consensus panel
  - Experts interpretation of research results, predictions of NTG ratios
  - Reduces bias of any single method or individual
  - Comprised individuals familiar with Connecticut program, programs elsewhere, and the regional and national lighting market

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## Research Considerations




- Supplier interviews
  - Don't kill the golden goose bias
  - Green retailer bias
- Sales data modeling
  - Potential for undercounting
  - Lack of household-level saturation data
  - Quality of program activity documentation varies by state
- Demand elasticity modeling
  - Missing merchandising data
  - Can only provide net-of-freeriders
- Benchmarking
  - Results precede recent market / political changes
  - Methodological inconsistencies across studies
  - Some group CFLs & LEDs, as well as types of LEDs
  - Consensus panel decided not to use results

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## Background




- Last estimates, 2013/2014 (R86)
- Program phasing out CFLs (ES v2.0)
- Program focus on HTR
- Many factors in play
  - EISA 2020 / lamp definition
  - LED price decreases
  - Lighting industry momentum
  - Value-line LEDs
  - Reduction in delta watts
  - Federal admin. changes




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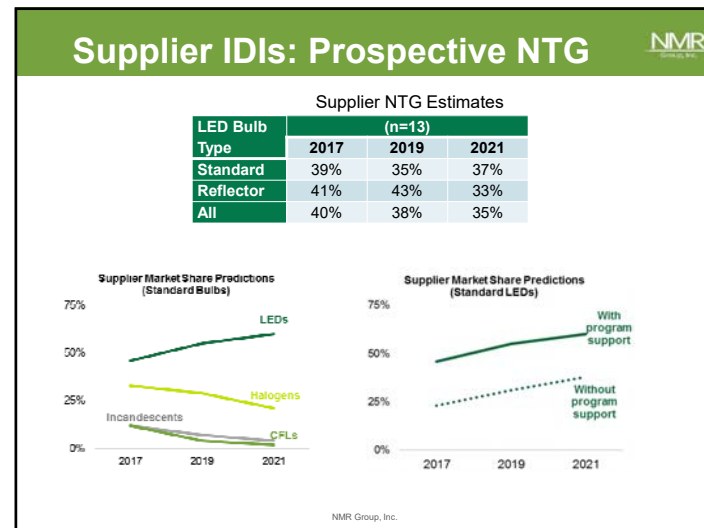
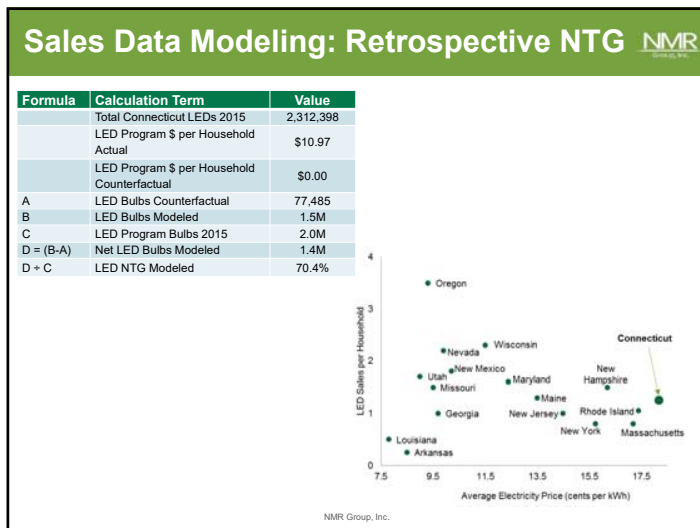
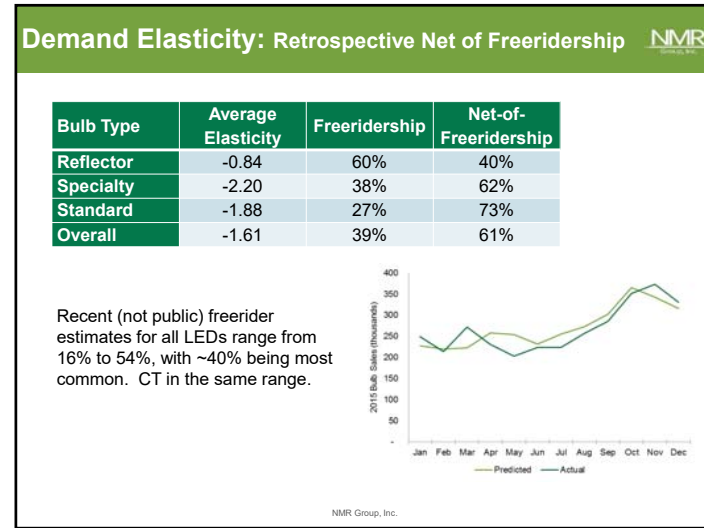
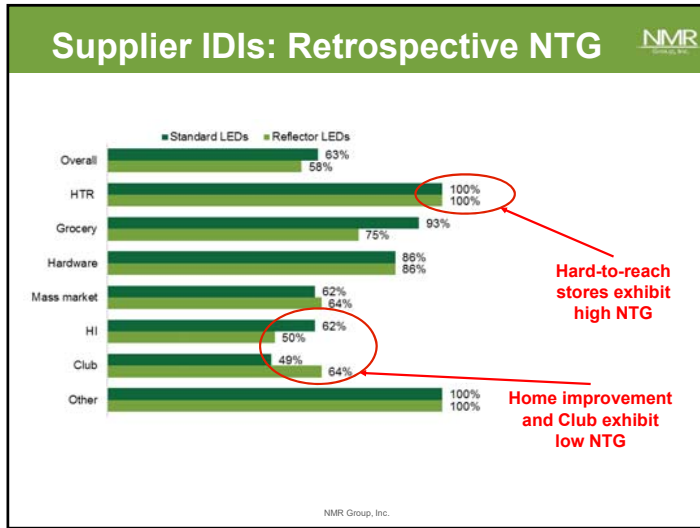
## Research Summary: Retrospective



Source	Type of Estimate	LED Bulb Type				HTR
		All	Standard	Reflector	Specialty	
2016 to 2018 PSD	NTG	82%	-	-	-	-
In-depth supplier interviews	NTG	61%	63%	58%	-	100%
Sales data modeling	NTG	70%	-	-	-	-
Demand elasticity modeling	Net of FR	61%	73%	62%	40%	-

High  
Low





## Consensus Panel NMR

- Presented with research results
- Submitted estimates
- Reviewed consolidated results
- Consensus Reached
  - Steady decreases
  - Combine standard / specialty bulbs
  - HTR differentiation

**Consensus Panel LED NTG Estimates**

Year	Overall market	Hard-to-Reach market
2015	63%	83%
2016	57%	77%
2017	47%	67%
2018	40%	60%
2019	36%	56%
2020	33%	53%

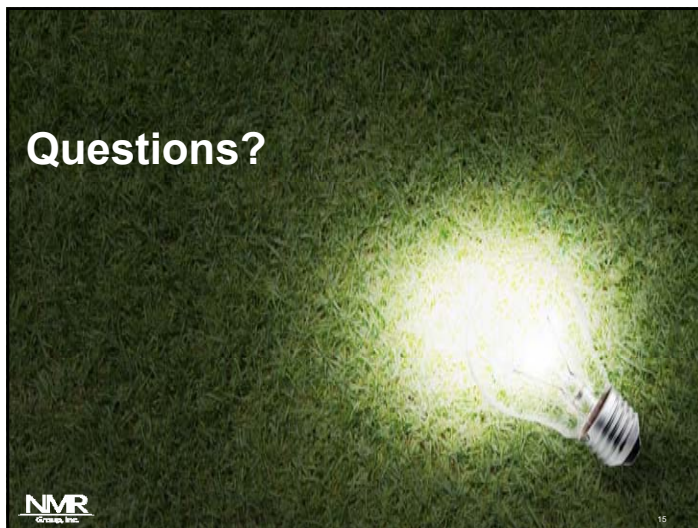
■ Overall market ■ Hard-to-Reach market

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## Recommendations NMR

- Continue LED support in short term
- Continue targeting of HTR
- Adopt consensus panel recommendations for prospective NTG ratios
  - Integrate 2018 - 2020 NTG into program planning and PSD
  - Distinguish HTR rates
- Monitor market changes / policy decisions
- Improve tracking of in-store displays

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## NTG Algorithms: Retrospective NMR

- **Supplier interviews**
  - Retrospective: (Reported total sales – Reported sales without program) ÷ Actual total program sales = Net-to-gross*
  - Prospective: (Predicted market share with program – Predicted market share without program) ÷ Predicted market share with program = Net-to-gross*
- **Sales data modeling**
  - (Bulbs sold with program – Bulbs sold with no program) ÷ Program bulbs sold = Net-to-gross*
- **Demand elasticity**
  - Predicted savings without program ÷ Predicted savings with program = Free ridership*

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