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EEAC EM&V Briefing

July 12th, 2011

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Introduction

- Today's talk will provide highlights on the results of recent EM&V studies
- Some 30 studies have recently been completed, and several others are nearing completion
- As a result we have a large mass of new findings on program impacts, processes, and target markets
- Presentation will necessarily be highly selective
  - Emphasis on recently completed studies
  - Some degree of priority given to impact evaluation results
- Most studies discussed today will be filed with annual reports and posted shortly on EEAC web-site

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Keep in Mind that EM&V is a Big Tent

- Many different kinds of studies
- Many different stakeholders
- Many different applications for the results
- Different stakeholders tend to be interested in different studies, and different results from the same studies

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What's Under the Big Tent: Types of EM&V Studies

Type of Study	Methods	How Applied
Impact evaluation (gross)	End-use metering, billing analysis, site visits, engineering re-analysis	•Refine planning assumptions prospectively, via TRM •True up savings retrospectively, via annual reports •Inform program screening and cost-benefit analysis
Impact evaluation (net to gross)	Survey research, sales data analysis, quasi-experimental design, econometric analysis	•Same as above
Market assessment	Surveys, interviews, focus groups, secondary research	•Support program planning and implementation •Inform policymaking
Process Evaluation	Surveys, interviews, focus groups, database review	•Improve program design and delivery
Other (Measure cost, baseline, persistence, NEBs, etc.)	Various	Various

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Recently Completed Studies: Residential

Impact Evaluations

- Residential Lighting Impact Evaluation and Market Assessment
- Appliance Turn-In Impact, Process and Market Evaluation
- Behavioral Program Evaluation
- Residential Net-to-Gross Methods Study
- Mass-Save Net-to-Gross Study
- Residential Gas NTGR Literature Review

(Note: studies are classified as impact evaluation if they include an impact component. Most of above studies include other components in addition to impact evaluation)

Process Evaluations and Other Studies

- Interim Report on Community-Based Partnerships
- Low Income Process Evaluation
- Mass-Save Process Evaluation
- Deep Energy Retrofit Process Evaluation
- Brushless Fan Motor Process Evaluation
- Residential New Construction Mystery Shopper Study, Potential Savings Study, and Phase 1 Baseline Report
- Residential New Construction Pilot Reports on V3 Pilot, Major Renovation Pilot, 4-8 Story Pilot

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Recently Completed Studies: Non-Residential

Impact Evaluations

- Custom HVAC Impact Evaluation
- Comprehensive Design Assistance (CDA) Impact Evaluation
- Prescriptive Gas Impact Evaluation
- Small C&I Impact Evaluation
- High-Bay Lighting Market Effects Study
- C&I Net-to-Gross Methods Study
- C&I Electric Net-to-Gross Study
- C&I Gas NTGR Literature Review
- EM&V Forum Lighting Loadshape Study
- EM&V Forum HVAC Loadshape Study
- EM&V Forum C&I Lighting Persistence Study

Market Assessment Studies

- New Construction Customer Profile
- New Construction Supply Chain Profile
- Chain/Franchise Study
- CHP Market Assessment

Process Evaluations

- Overall Large C&I Process Evaluation
- Small C&I Process Evaluation

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Additional Studies Nearing Completion (Most Not Discussed Today)

- Residential Non-Energy Impacts Study
- C&I Gas Net-to-Gross Study
- C&I Custom Gas Impact Evaluation
- Umbrella Marketing Evaluation
- Small C&I Datamining Study
- EM&V Forum Incremental Costs Study
- Residential New Construction Code Compliance Assessment
- Residential New Construction Market Baseline

Note: Many other in-progress studies (mainly those recently initiated for Round 2) are not listed here because they are not nearing completion.

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Results:
Our Take on the Big Picture

- Based on impact evaluations completed to date, the PAs generally appear to be doing a good job of accurately forecasting savings.
  - **However… some provisos to this conclusion:**
    1. A few problem areas, which tend to be newer programs/measures being evaluated for the first time (e.g., C&I gas, behavioral, appliance turn-in)
    2. Some potential issues regarding forecasting of demand savings.
    3. Not all key programs/measure categories have received impact evaluations yet (this is as planned)
- Net-to-gross ratios vary widely (evaluated range thus far of 43% to 112%)
  - This wide range is consistent with research elsewhere, and is part of the reason NTGR is important to research.
- Pilot programs, not surprisingly, often need fine-tuning.
- We're developing a much better understanding of many target markets
- We need a better understanding of the specific effects of behavioral programs.
- It is important to consider market effects.

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Residential Results: Evaluations of Behavioral Programs

- A systematic research program is in place addressing numerous different behavioral programs and pilots.
- However, only one program has been in place long enough for final EM&V results to be reported: National Grid Home Energy Report Pilot.
- Methods: participant and non-participant surveys, pre and post; billing analysis, site visits.
- HER savings results:
  - Electric: 1.6% per household (81% of initial forecast)
  - Gas: .8% per household (76% of initial forecast)
- Effect of savings over-estimation may be limited by the fact that some other similar MA programs have already reduced their savings forecasts.
- Suggestive evidence that program effects may be mainly through the adoption of physical measures rather than behavioral changes.
- Savings overlap with other programs was minimal (and above results adjust for it)
- Evaluators recommend:
  - More differentiation of information across household types
  - Clarification of the strategic role of behavioral programs

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Residential Results: Lighting Impact Evaluation & Market Assessment

- Due to uncertainties regarding whether program is still having a significant impact on market, key focus on estimating net impacts
- Study also provided a wealth of information on market conditions.
- Evaluated NTGRs for 2010 program are low but in the neighborhood of what had been assumed.
  - Spirals: 43%
  - Specialty bulbs: 60%
  - Hard-to-Reach: 60%
- Evaluators recommend continuing program in its current form, with limited modifications
  - Be ready to start channeling some funds toward LEDs
  - For specialty bulbs, consider instituting requirements in MOUs regarding retail pricing
  - Consider eliminating income and education from the definition of hard-to-reach, as they do not predict lack of CFL awareness and adoption as strongly as other HTR indicators.

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Residential Results:
Appliance Turn-In Impact, Process and Market Evaluation

- Estimated net per-unit savings
  - Ex-ante assumption: 724 kWh for fridge or freezer
  - Ex-post evaluated result: 522 kWh for fridge, 391 kWh for freezer
  - Shortfall appears to be due to over-estimation of appliance usage and under-estimation of free riding, among other factors
- Evaluation estimates that there are roughly 1.3 million fridges and freezers eligible for removal in MA. Of these, program removed about 1% in 2010
- Evaluators recommend:
  - Either increase enforcement of requirement that unit be secondary, or open program up entirely to primary units.
  - Consider partnering with major retailers and/or municipalities to market and implement program
  - Consider targeting towns without municipal appliance recycling programs

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Residential Results: Additional Net-to-Gross Results

- MassSAVE NTGR Study
  - Used self-reports and econometric modeling of participants, non-participants, and trade allies
  - Estimate an overall NTG of 1.12 with range from .72 to 1.38 for specific measures.
- Residential NTGR Literature Review
  - Intended as temporary placeholder for programs for which primary studies have not yet been performed in MA
  - Examined NTGR studies from around the country
  - Produced NTGRs ranging from 42% to 100%, depending on program and measure category
  - Results to be used in 2010 annual reports, and in some cases also in 2012 TRM

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Residential Results: Deep Energy Retrofit Process Evaluation

- Four PAs (National Grid, NSTAR, WMECO, and Cape Light Compact) provided incentives
- Goal of having 130 completed projects fell short—12 completed projects from 118 inquiries.
  - High project costs were major concern for all stakeholders
  - Large majority that declined still went forward with re-roof, re-side, insulate or other renovation.
- Recommendations
  - Refocus effort from completion to researching ways to reduce costs and develop techniques that can be deployed as part of a scalable program
  - Partial DER—develop track that meets needs of those undertaking major retrofit, but not committed to full DER
  - Deep (but not as deep) retrofits—concentrate effort on developing measures that fill gap between Mass-Save measures and full DER.

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Non-Residential Results: Gross Impact Realization Rates

- Large C&I Custom HVAC
  - kWh savings: 110%
  - On-peak summer kW savings: 88%
  - On-peak winter kW savings: 86%
- CDA:
  - kWh savings: 91%
  - On-peak summer kW savings: 64%
  - On-peak winter kW savings: 60%
- Small C&I
  - kWh savings: 108%
  - Current TRM estimates of coincidence factors appear to be born out for Winter, but could be significantly over-stated for Summer
    - Reliability of Summer result is uncertain due to timing of study, so we are doing follow-up research this Summer.
- Prescriptive Gas
  - Therm savings: 54%
  - Low realization rate is not surprising, as in our experience programs receiving their first impact evaluation often yield this kind of result.

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Non-Residential Results: Net-to-Gross Ratios

- Methods study
  - Updated a standardized statewide C&I NTGR method that had been in place since 2003 to account for changes in state of the art
  - Method relies on self-reports by participants and vendors
- Electric C&I NTGR study:
  - Overall NTGR: 94%
  - Overall Free Riding Factor: 15%
  - Overall Spillover Factor: 9%
  - Numerous variations by End-Use, Program, and PA
  - These results to be used in 2010 annual reports and 2012 TRM plan version
- Gas C&I NTGR literature review
  - Produces estimates of 83% for prescriptive measures, 96% for custom
  - Results to be used only as placeholders pending completion of gas field study in August
  - 2012 TRM plan version will use results of field study
  - Thus only application of these results is for certain sections of 2010 annual reports

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Non-Residential Results: High-Bay Lighting Market Effects Study

- Most impact evaluation focuses on direct program impacts (savings from tracked measures installed by known participants)
- However, programs can also have broader effects on markets that result in energy savings
- Savings from market effects can be very difficult to measure, but important to capture and credit them to the extent possible
- Study motivated by results from studies in other leading states, along with anecdotal evidence in MA, suggesting there might be substantial market effects in this market
- Methods: comparisons of total sales in MA vs four no-program states, combined with upstream market actors interviews
- Study confirms existence of substantial market effects
  - Even with direct program measures stripped out, adoption of EEMs much higher in MA than comparison states; market actors attribute to programs
- Estimated savings in 2010 of 12 gWh

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Non-Residential Results: Market Assessment

What have completed market assessment studies achieved?

Study	Objectives
New Construction Customer Profile	1. Characterize MA NRNC population in terms of building type, size, ownership, location, chain/franchise, and energy use 2. Assess construction trends over past 15 years 3. Estimate % of new buildings and total new square footage being reached by programs
New Construction Supply Chain Profile	1. Characterize design, engineering and construction management firms involved in MA NRNC market 2. Characterize design and specification practices with regard to EE 3. Assess awareness and participation in MA NRNC programs
Chain/ Franchise Study	1. Characterize MA chain and franchise market by size, business type, ownership structure, key players 2. Understand decision-making practices 3. Assess whether there are systematic differences in free riding between C/F and independent establishments.
CHP Market Assessment	1. Characterize CHP market including key players and market segments 2. Understand decision-making processes used by potential CHP customers 3. Estimate CHP opportunities by key market segments and provide PAs with lists of specific customers likely to be suitable candidates

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A Look Behind the Scenes: Issues and Challenges Encountered in Developing These Results

- Lack of methodological precedent: some of these studies are breaking new ground nationally
  - Example: Gas C&I impact evaluations
- Lack of policy precedent
  - Example: High-Bay Market Effects Study and claiming of market effects savings in C&I
- Need to forge methodological consensus
  - Example: most net-to-gross studies
- Differences in tracking systems across PAs
  - Applies to numerous studies
- Many complications arise in applying the results
  - Applies to numerous studies.
  - It has taken a fair amount of time, but we have worked most of these out – at least regarding application to 2010 annual reports

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Closing Slide

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