Status Report: 
Verification of Savings

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Introduction

• Verification of Savings Project Objectives
  – Address industry’s needs to demonstrate savings are real and long-lasting
  – Investigate existing practices
  – Promote best practices in savings verification
  – Provide guidance on appropriate and practical methods to assure RCx delivers savings

• Project team:
  – David Jump, QuEST
  – Ken Gillespie, PG&E
VoS Project Tasks

• Phase I (45% - authorized)
  – Stakeholder Objectives
  – Review Existing Methods
  – Establish Categorization Framework
  – Establish Evaluation Framework
VoS Project Tasks

• Phase II (55% - not authorized)
  – Revisions pending feedback from CCC & Stakeholders
  – Identify New Methods
  – Final Categorization of Methods
  – Research Policy Roadmap
  – Dissemination Plan
Stakeholder Objectives

• Identify stakeholder motivations
• Identify quality assurance key elements
• Develop & disseminate questionnaire
• Conduct interviews
• Compile results
Assessment of Stakeholder Objectives

- **Building Owners**
  - Validation of investment, persistence

- **RCx Program Managers**
  - Validation of program approach, effectiveness
  - Savings estimates stand up to 3rd party review
  - Assurance that savings persist
  - Simple, repeatable processes

- **RCx Providers**
  - Validation of savings estimates, measure effectiveness and longevity

- **EM&V Contractors**
  - Access to baseline data
  - Ability to conduct rigorous analysis

- **Government / Regulatory Agencies**
  - Verification of savings, savings lifetimes, and program cost-effectiveness in order to select effective programs
  - Accurate forecasting and planning activities
Questionnaire

- Economic benefits
- Confidence in RCx savings estimates
- Level of risk in conducting RCx projects
- Guidance needed to manage risk
- Interest in tools to help manage risk
- Familiarity with M&V
- Appropriate level of expense for verification
- Third party verification or formal M&V
- Agree/disagree with a narrative on RCx program savings and evaluation processes
- Rank QA process elements
- Reaction to a graphical representation of M&V
- Increase or decrease level of confidence in savings if M&V used
- Useful formats for disseminating useful M&V
Questionnaire Respondents

- 4 RCx Providers
- 4 Owners
- 8 RCx Program Managers
- 3 EM&V Contractors
- 0 Regulators

- Also held breakfast meeting at 07 NCBC
  ~ 10-12 owner representatives
  ~ 7-8 providers
Main Feedback

• Savings Estimates Confidence
  – 50% are confident in savings estimates
  – Program managers & evaluators more skeptical

• Savings and Persistence Risk
  – RCx Provider: reputation
  – Program Managers: misspent funds
  – RCx programs in jeopardy
Feedback II

• Savings Risk Tolerance
  – Average between 10 and 20%

• Other RCx Project/Program Risks:
  – Shifting usage to other systems
  – Complaints
  – Over payment for simple maintenance items
  – Damage to equipment
  – Loss of future funding
  – Loss in respect for commissioning
  – Loss of programs
Feedback III

• Some familiarity with M&V
• “Reasonable” M&V expense: 1 - 20%
• Most preferred that RCx providers follow formal M&V requirements rather than have a 3rd party conduct an independent analysis
Feedback from Evaluators

• Risks perceived:
  – Savings not real
  – Energy use shifted to other end-uses in building
  – Measures do not last
  – RCx programs determined to be not cost-effective

• CPUC Policy
  – Implementers cannot influence evaluators work
  – Coordination discouraged
## Dissemination Methods

<table>
<thead>
<tr>
<th>Stakeholder Group</th>
<th>Frequency of Response</th>
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<tbody>
<tr>
<td></td>
<td>Detailed guideline for integrating M&amp;V into RCx projects</td>
</tr>
<tr>
<td>RCx Provider</td>
<td>4</td>
</tr>
<tr>
<td>Owner</td>
<td>3</td>
</tr>
<tr>
<td>RCx Program Manager</td>
<td>6</td>
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<tr>
<td>Program Evaluator</td>
<td>2</td>
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<tr>
<td>Total Score</td>
<td>15</td>
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</tbody>
</table>
Review Existing Methods

• Objectives
  – Understand common practices
    • Savings verification
    • Savings persistence
  – How well are stakeholder needs addressed
Methodology

• Develop Categorization Framework:
  – Document the baseline
  – Verify measure installation and effectiveness
  – Verify savings
  – Promote savings persistence

• Formal vs. Informal verification methods:
  – Formal: adhere to IPMVP or ASHRAE 14
  – Informal: do not/not required to adhere
Resources Reviewed

• RCx Program Guidelines/RFPs/Resources
• RCx Projects
• Guidelines
  – RCx Program Guidelines
  – M&V Guidelines
  – EE Program Evaluation Protocols
  – EE Program Best Practices
• Reports and Conference Papers
• Tools and Software
RCx Program Overlap w/ Verification

• Planning phase
  – Develop M&V plan (some)

• Investigation phase
  – Baseline documentation – eqp. inventory, operations, energy data and model

• Implementation phase
  – Verify improved equipment operation
  – Verify Savings (per M&V or other method)

• Hand-off Phase
  – Periodic re-measurement & analysis (persistence tracking)
RCx Project Reviews

• Methods used to verify savings (see matrix):
  – Benchmarking
  – Deemed RCx Measure Savings (not in use)
  – Calculation & Visual Inspection
  – Calculation & Performance Verification
  – Ex-Post Savings Estimation
  – IPMVP Option C Utility Bill Analysis
  – IPMVP Option D Calibrated Simulation
  – IPMVP Option B Retrofit Isolation
Guideline Reviews

• RCx Guidelines
  – Not much emphasis on savings verification
  – Plan early – document the baseline
  – Assess level of M&V rigor against potential savings

• RCx Program Guidelines
  – Use IPMVP or ASHRAE
  – Install permanent monitoring equipment
  – Track performance over time
Guideline Reviews, cont.

• CA Evaluation Protocols
  – Require IPMVP adherent M&V be used
    • Option D for Cx & O&M programs
  – Unclear on gathering of baseline information
  – Occurs generally in year after measures installed
  – Results not generally provided to customer
Guideline Reviews, cont.

• Best Practices
  – Conduct pre-install inspections for highly uncertain savings
  – Conduct in-program measurement on largest projects or those that have largest uncertainty
  – Consider using third-party team for in-program M&V
  – Involve evaluators during baseline data collection
Reports

• ESCO Industry Success Example
  – Work together to maintain savings
  – M&V over long term

• Technique for Option B M&V in RCx

• ASHRAE RP 1050 – Inverse energy models – useful for Option B (and C with interval data)

• ASHRAE RP 1051 – guidelines for calibrating whole-building simulations
Tools and Software

• M&V Software:
  – Metrix – utility bill analysis tool
    • Option C methods
  – Emodel or Energy Explorer
    • Option B or Option C (w/ interval data)

• Data Management Software:
  – Universal Translator
  – ECAM (CCC tool – beta)
Discussion

• Given that implementers cannot facilitate the EM&V process
  – What can CCC do to make sure RCx programs achieve savings?

• Stakeholder’s Preferred Methods:
  – Guidelines for integrating verification into RCx?
  – Toolkit (example M&V plans, savings reports, etc.)?
  – Specifications for RCx contracts that describe verification of savings requirements?
How to Improve Robustness of RCx Savings?

• Document how to integrate M&V into RCx

• Require M&V by RCx providers
  – Or hire independent M&V consultants

• Improve M&V knowledge and skill of program managers

• Develop and provide M&V training
How to Improve Savings Persistence?

• Require periodic re-measurement and analysis
• Extend program cycles
• Establish permanent upgrades to customer monitoring equipment
• Provide information on how to track savings
What is the Next Step?

• Re-scope Phase II to deliver one of preferred methods?
  – If so, which one?
  – May be limited in scope
• Continue with current scope
  – Research to determine best method and technical requirements?
  – Obtain industry buy-in for proposed method
  – Develop more specific scope & budget for new project
• How will product be made available?