

Evaluation, Measurement, and Verification (EM&V) Briefing

Consultant Team Presentation

Date: March 31, 2025

Outline



EM&V Background

EM&V Process

Recent & Upcoming Studies

Council Discussion



EM&V Background

What is EM&V?



Evaluation, Measurement and Verification (EM&V):
practices used to assess performance and impact of
demand-side management programs

- M&V: measuring, collecting, and analyzing data to verify and report energy savings
- Provides accurate and transparent metrics

EM&V explores program impacts, how those impacts were achieved, and how those impacts can be improved

Why EM&V?



EM&V is mandated by the Least Cost Procurement Standards

- *“The distribution company shall include an EM&V Plan in its Annual Energy Efficiency Plan”*

Three critical objectives:

1. **Accountability of program impacts**
 - *Did the program deliver its estimated benefits?*
2. **Risk management**
 - *How certain are program savings?*
3. **Continuous improvement**
 - *What can be done to continually improve program performance?*

Rhode Island EM&V Requirements



Per the Least Cost Procurement Standards, the EM&V Plan shall address:

- **Savings verification**, including where appropriate analysis of customer usage;
 - Verification should also facilitate participation in ISO-NE's forward capacity market*;
- Issues of **ongoing program design and effectiveness**;
- Coordination with program **pilots, demonstrations, or assessments**;
- Efforts related to **market assessment and methodologies to claim savings from market effects**, among others;
- **Regional and other cooperative EM&V efforts** the distribution company is participating in, or plans to participate in; and
- **Longer-term studies**, as appropriate, to assess programs over time.

*Forward Capacity Market (FCM): mechanism to ensure the New England power system will have sufficient resources to meet future electric demand through Forward Capacity Auctions

Types of EM&V



Comprehensive Evaluations (9-12+ months) – Holistic review of the program's performance.

- Extensive data collection, in-depth analysis, comprehensive report

Quick-Hit Evaluations (~6 months or less) – Rapid insights with reduced time and effort

- Preliminary assessments, short-term impact reviews, or basic process evaluations that identify obvious issues or quick wins

Embedded Evaluations (coincide with implementation) – Integrate the evaluation process directly into the design and implementation of the intervention

- Continuous monitoring, real-time feedback, accelerated adaptation and improvement
- Building commissioning study

Types of EM&V



Impact Evaluations – Assesses quantitative outcomes attributable to programs

- **Methods:** Billing analysis, pre- and post-metering, simulations and algorithms using vetted software and practices
- **Outputs:** Net-to-Gross Ratios, Realization Rates

Process Evaluations – Assesses program operations to identify and recommend areas of improvement

- **Methods:** Interviews, Focus Groups, Surveys
- **Outputs:** Recommendations on program design and implementation

Market Evaluations – Assesses broad aspects of the marketplace with respect to energy efficiency

- **Methods:** Interviews, Primary data collection, simulations and algorithms based on economic/business theory
- **Outputs:** Baseline assumptions, customer demographic insights

*Interviews and surveys may be directed at customers, program staff, program implementers, distributors, and other market actors



EM&V Process

EM&V Team

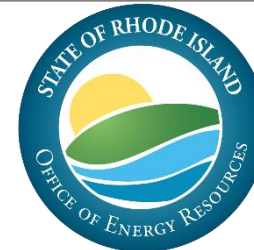


Rhode Island Evaluation Team

Independent Evaluation Contractors



Oversight Team



Ann Clarke
Jeremy Newberger*
Dave Jacobson*

Andrew Johnson
Adrian Caesar
Ralph Prah*
Glenn Reed*
Mike Honeychuck*

Steve Chybowski
Jack Green

CADMUS



ILLUME



Plus other subject matter experts from each team as needed

*Denotes subcontractor

EM&V Oversight

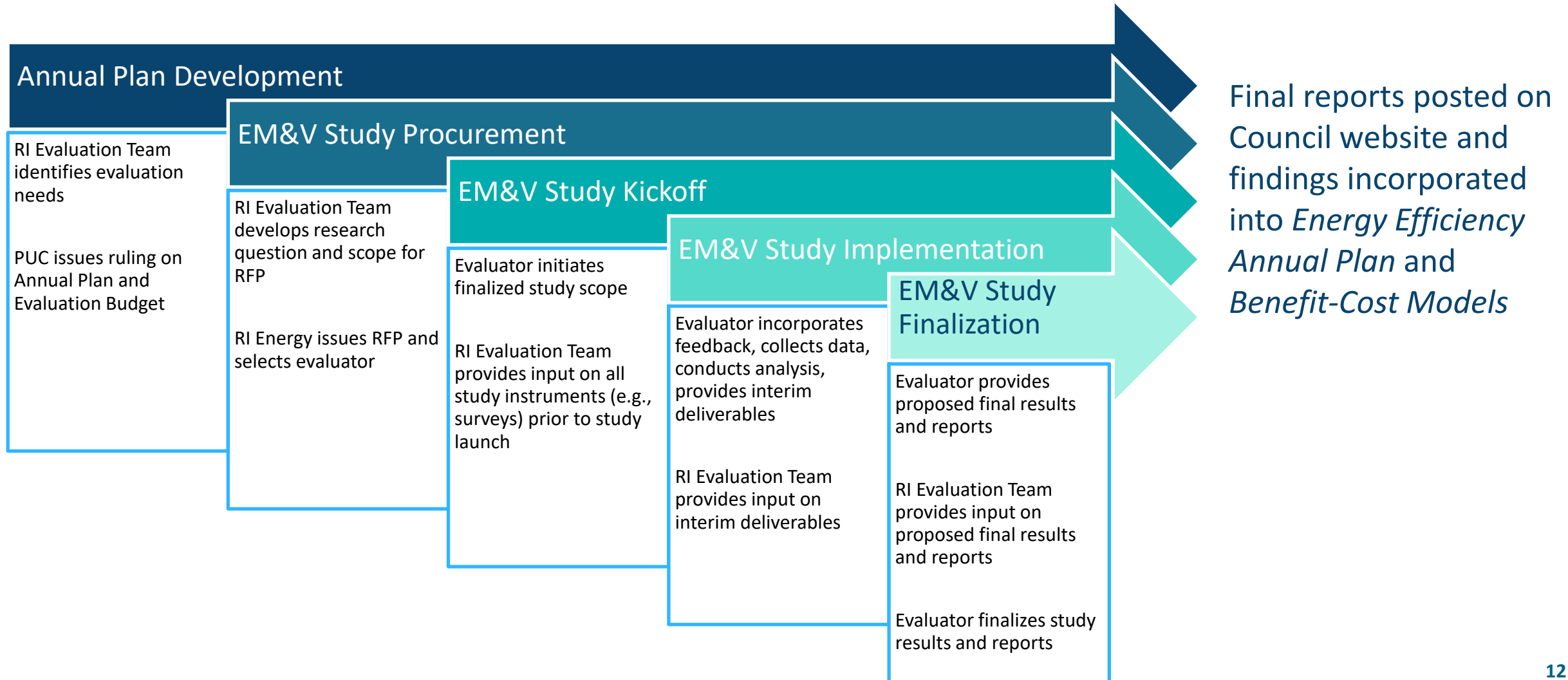
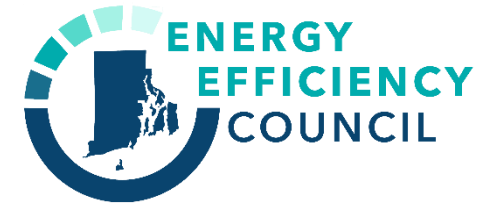


RI Evaluation Team meets twice each month to review EM&V Study Tracker and discuss status of all EM&V studies

- One meeting for each sector
- Additional meetings scheduled on ad hoc basis

Sect	Progr	Study name	Study Manager	Fund	Type	St	Status (Upcoming, In-progress, Complete)	When completed in time for 2024 PI	Report due in 2024	RI Energy Comments
Residential Program Studies										
Rer	Multiple	RI-25-RI-MarketResearch - Residential Market Research	TBD	Elec/Gar	Market	RI	Upcoming	TBD	TBD	N/A
Rer	Multiple	RI-25-RI-RASS - Residential Appliance Saturation Study	Ann	Elec/Gar	Market	RI	Upcoming	Y	Y	2/26/2025: Draft evaluation workplan expected later this week.
Rer	ES App	RI-25-RE-Product - Residential Product Impact and Market Effects Evaluation	GH (Tim)	Elec/Gar	Impact/Proc	RI	Upcoming	Y	Y	2/26/2025: Draft evaluation workplan received on 2/7/2025. Reviewed by RIE and sent back to Rer Innov for revision. Revised draft expected this week.
Rer	EWMF & IEMF	RI-25-RI-MultiFam - Energy/Wire & Income-Eligible Multifamily Impact Evaluation (Prescriptive-Facur)	GH (Annemarie)	Elec/Gar	Impact	RI	Upcoming	Y	Y	2/26/2025: Draft evaluation workplan received on 2/17/2025. Added NTG and resubmitted workplan on 2/18.
Rer	Multiple	RI-25-RI-GAOCProc - Residential & Income-Eligible GA/OC Process Evaluation	GH (Kathryna)	Elec/Gar	Process	RI	Upcoming	Y	Y	2/26/2025: Draft evaluation workplan received on 2/14/2025, still being reviewed by RIE.
Commercial & Industrial Program Studies										
C&I	C&I NC	RI-22-C&I-C&I New Construction Baseline Study	Dave Jacobson	Elec/Gar	C&I	RI	In-progress	Y	Y	2/26/2025: Final Report and Addendum discussed with DNV and O-team; decided to average the results as well as develop a weighting factor to use for the analysis that is in its final form; DNV is still reviewing the revision internally and expects to send RI Energy added text for both the report and addendum by 2/28.
C&I	C&I NC	RI-24-C&I-C&I New Construction Evaluation of C&I New Construction	GH (Nicola)/RIE (Ann)	Elec/Gar	Process	RI	In-progress	Y	Y	2/26/2025: This report and annex are final and will be sent to the EEO/EOER with the next batch.
C&I	C&I	RI-24-C&I-C&I New Construction Evaluation of C&I Curtam Approach	RIE (Ann)/GH (Nicola)	Elec/Gar	Process	RI	In-progress	Y	Y	2/26/2025: O-team comments shared with C&I (Resource Innovation); final draft report expected on 2/28.
C&I	C&I	RI-24-CE-Lighting - Market Characterization and Impact Evaluation of C&I Lighting Controls	Dave Jacobson	Elec/Gar	Impact	RI	In-progress	Y	Y	2/12/25: DNV finalizing installer IDI guide this week for RIE review comment. Based on installer IDI comments, DNV will update in progress distributor and program implementer IDI guide and send to RI Energy for review as well.
C&I	C&I Gar	RI-24-CG-CurtGarPY23 - Impact Evaluation of PY2023 Curtam Gar Installation	Dave Jacobson	Gar	Impact	RI	In-progress	Y	Y	Install to be conducted in February. MSV plans are being drafted. The remaining 3 sites are being actively recruited and DNV has reached out to RIE for Account Manager assistance to expedite and assist recruitment. 1st of those sites has been recruited and we are awaiting a confirmation of the site visit date.
C&I	C&I Elec	RI-24-CE-CurtElecPY23 - Impact Evaluation of PY2023 Curtam Electric Installation	Dave Jacobson	Elec	Impact	RI	In-progress	Y	Y	2/12/2025: 8/10 sites installed, with last two hard scheduled for within the week (2/13 and 2/18). Lagers have been picked up at four sites with analysis underway, and one draft site report has been submitted and has been finalized.
C&I	Multiple	RI-25-C&I-ISF Research - C&I Industry Standard Practice Research	Dave Jacobson	Elec/Gar	Impact	RI	Upcoming	Y	Y	2/12/2025: Internal RI Energy discussion continues. DNV will consult with both CT and MA for possible collaboration. MA ISF activity has paused down stretching out timeframe for collaboration.
C&I	C&I Retrofit	RI-25-C&I-ExstCommisioning - Existing Building Commissioning Process Evaluation	Ann Clarke	Elec/Gar	Process	RI	Upcoming	Y	Y	2/12/2025: Draft evaluation workplan under development.
C&I	Multiple	RI-25-CE-CommLighting - C&I Lighting Impact Evaluation	GH (Jeremy)	Elec	Impact	RI	Upcoming	Y	Y	2/12/2025: Draft evaluation workplan under development.
C&I	Multiple	RI-25-CE-C&I Heat Pump - Research for C&I Heat Pump	TBD	Elec	Market	RI	Upcoming	TBD	TBD	2/12/2025: RIE had internal preliminary discussion with C&I Strategy lead about research needs to support heat pump deployment.
Special & Cross Sector Studies										
Cross	Multiple	RI-24-RI-MultiFamCurtam - Multifamily Curtam Measure Impact Evaluation	Jerome	Elec/Gar	Impact	RI	In-progress	Y	Y	2/26/2025: Final draft report expected from C&I (Resource Innovation) by 2/28.
Cross	SHVAC & SB	RI-25-RI-HP App - Heat Pump Study Review and Application	GH (Jerome)/Annemarie	Elec/Gar	Impact	RI	Upcoming	TBD	TBD	2/26/2025: Review of MA/CT study completed and undergoing internal review.
Cross	Multiple	RI-25-RI-TMYx - TMY3 to TMYx Savings Review and Adjustments	Ann/Jerome	Elec/Gar	Impact	RI	Upcoming	TBD	TBD	2/26/2025: Initial scoping discussion with C&I and Rer evaluation ongoing.

EM&V Process



Application of EM&V Studies

EM&V Studies

- Measure-level Impacts
- Realization Rate
- Net-to-Gross Ratios
- Program Design Recommendations

Technical Reference Manual (TRM)

- Outputs from EM&V Studies
- Measure-level Savings Algorithms

Plan Benefit-Cost Models

- Cost Effectiveness of Programs and Measures
- Measure-level quantities and savings

Energy Efficiency Plan

- Funding Goals
- Savings Targets
- Program- and Sector-level Cost-Effectiveness
- Program Designs and Offerings

Technical Reference Manual (TRM) – compendium of all measure-level impacts used in program planning and implementation (e.g., energy savings, capacity savings, fuel savings, resource impacts)

Benefit-Cost (BC) Models – measure-level quantitative models that use evaluation study outputs to develop planned program benefits and costs



Recent & Upcoming Studies

Recent & Upcoming Studies



Recently Completed Studies

- RI Electric Heat Customer Characterization Study
- Moderate-Income Weatherization Market Research Study
- C&I Free-Ridership and Spillover Study
- Small Business Process Evaluation
- Comprehensive Measure Life Study

Upcoming Studies

- Residential Mechanical Systems Study
- Residential & Income-Eligible QA/QC Process Evaluation

Council Discussion





Appendix

Trends in EM&V: Embedded Evaluation



Growing emphasis on continuous improvement in program design and implementation

Benefits of embedded evaluation

- Shorter feedback loops to accelerate adaptation and improvement
- Less rigorous data collection and shorter evaluation timelines reduce study costs
- Ensure program design is tied to measurable outcomes
- Information sharing between evaluators and implementers