



STATE OF RHODE ISLAND  
**ENERGY EFFICIENCY &  
RESOURCE MANAGEMENT COUNCIL**

## **MEETING MINUTES**

**Thursday, July 14, 2016**

**3:30 PM - 5:30 PM**

Conference Room B, 2<sup>nd</sup> Floor, Department of Administration, One Capitol Hill, Providence, RI

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**Members in Attendance:** Abigail Anthony, Bob Bacon, Joe Cirillo, Carol Grant, Anthony Hubbard, Jennifer Hutchinson, Tom Magliocchetti, Michael McAteer, Shigeru Osada, Chris Powell, Betsy Stubblefield Loucks, Karen Verrengia

**Members Absent:** Roberta Fagan, Diane Williamson

**Others Present:** Michael Baer, Brian Buckley, Kat Burnham, Sandra Charves, Linda George, Mike Guerard, Seth Handy, Eric Johnson, Dino Larson, Angela Li, Aubrey McDonough, Danny Musher, Weezie Naura, Jeremy Newberger, Brigid Ryan, Michael Sciascial, Rob Sherwood, Rachel Sholly, Becca Trietch, Nick Ucci, Eric Winkler, Chon Meng Wong, Belinda Wong, Muxi Yang

### **1. Call to Order**

Chairman Chris Powell called the meeting to order at 3:30 pm.

### **2. Approval of June Meeting Minutes**

Chairman Powell made a motion to approve the June minutes. Bob Bacon seconded and all approved.

### **3. New Member Welcome and Introductions**

Council members introduced themselves and gave brief explanations of their backgrounds and roles within the Council.

### **4. Executive Director Report**

Commissioner Carol Grant presented a summary of proposed Regional Greenhouse Gas Initiative (RGGI) auction proceeds allocation plan, which included \$2.0 million to support efficiency programs by the utility and \$2.0 million to support public sector projects through the Efficient Building Fund. She also described the proposed timeline for adopting the allocation plan.

### **5. Executive Committee Report**

Chairman Powell explained to the new members that the purpose of the Executive Committee is to oversee administrative matters. He reported that the Committee discussed the status of finance work, targets and standards development, demand response work, and the EERMC budget.

Dunsky has provided input on program evaluations for National Grid's Revolving Loan Fund and Heat Loan. They will continue to work on estimating the potential impact of financing on 2018-2020 savings targets. There are still funds available in the budget to support upcoming 2017 Energy Efficiency Program Plan development as it relates to potential consideration of keeping, expanding or re-orienting

current financing options. Finally, Alex and Jerome from the Dunsky team will be in Providence to provide updates at the end of July.

With guidance from the Executive Committee, the decision to file targets and standards together in December has been directly communicated to the Public Utilities Commission (PUC) and the Division of Public Utilities and Carriers (Division). Both appreciated the communication and thought it seemed reasonable. A preliminary informational meeting with PUC staff is set for August 16<sup>th</sup> and a formal statement from the EERMC will be provided by Scudder Parker and Marisa Desautel. Additionally, the Division has authorized EERMC consultants to reach out their Synapse consultants with regard to the issues of potentially revising the cost-effectiveness test as part of the standards revision process.

The Executive Committee felt that the presentation by Doug Hurley at the last EERMC meeting was helpful. About four days of work remain on the contract with Synapse. The consultant team will work with the Executive Committee on final deliverables from Synapse.

The Committee also reviewed the EERMC budget in the context of the request for funds to support stretch code development. There are approximately \$260,000 of unallocated funds remaining in the budget.

## **6. Vote on Stretch Code Development Funding Request**

As a follow-up to the June Council presentation on codes work, the Office of Energy Resources (OER) and National Grid presented a proposal to hire a consultant to support the development of a Rhode Island stretch code.

Becca Trietch explained that OER's purpose in developing a stretch code is in keeping with the Governor's Lead by Example Executive Order which requires state agencies to take the lead in energy efficiency. Ms. Trietch presented an in-depth explanation of how the stretch code will be developed based on the International Green Construction Code (IGCC) and that it will be available to private and public entities. It was proposed that National Grid's existing commercial code consultant, ERS, be hired to help write the code. National Grid has agreed to provide some funding toward this. OER requested the remaining \$50,260 from the EERMC.

Shigeru Osada noted that Rhode Island is already behind in complying with existing code and expressed concern that a stretch code would add costs to building projects. Mr. Powell explained that the stretch codes will be voluntary. Joe Cirillo voiced concern about the effectiveness of implementation, and raised the question of whether there should be certification to ensure builders are in compliance with the stretch code. Abigail Anthony was not sure that money spent on a study would be cost-effective. Karen Verrengia wanted to make sure the Council would be able to verify what it is getting in return for the funding. The Council decided that, because stretch code development would likely lead to energy savings with no burden to ratepayers, it would be worth supporting. The Council would like the consultant team to review the scope of work and code development process before it is finalized.

***Joe Cirillo made a motion to approve OER's request for \$50,260.00 for consultant services on stretch code development. Karen Verrengia seconded and the motion was approved.***

## **7. Presentation on Energy Efficiency Program Evaluation in Rhode Island**

Jeremy Newberger from National Grid presented an overview of the methods used in Rhode Island to evaluate the effectiveness of utility administered energy efficiency programs. The presentation included an overview of evaluation, how evaluation is done, the Technical Reference Manual and how it is used, and how energy efficiency is treated in load forecasting. Mr. Osada asked why one of the graphs showed

level loads while a 10% reduction in load has been previously reported. National Grid will provide an explanation on this before the next Council meeting.

#### **8. Presentation from ISO NE on Energy Efficiency and the Grid**

Eric Winkler from the Independent Service Operator of New England (ISO NE) built on Mr. Newberger's presentation and explained the impacts of state-by-state efficiency investments on the grid, system planning processes, the impacts of energy-efficiency forecasting on range planning and load forecasting utilizing local data.

#### **9. Public Comment**

There was no public comment.

#### **10. Adjournment**

The meeting was adjourned at 5:45 PM.

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**MEMORANDUM**

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**TO:** EERMC MEMBERS  
**FROM:** CAROL GRANT, COMMISSIONER, OFFICE OF ENERGY RESOURCES  
**SUBJECT:** PROPOSED 2016-B RGGI ALLOCATION PLAN  
**DATE:** JULY 11, 2016

**Summary of Proposed 2016-B RGGI Allocation Plan**

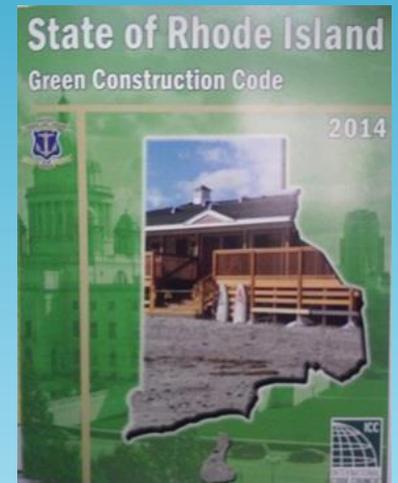
- Per Rhode Island General Laws, the Office of Energy Resources (OER) is tasked with preparing the State's plan for allocating its Regional Greenhouse Gas Initiative (RGGI) auction proceeds. RGGI is the first mandatory market-based program in the United States to reduce greenhouse gas emissions, and is a cooperative effort among nine states. These allocation plans are prepared in consultation with EERMC.
- As previously discussed with the EERMC and other stakeholders, to improve the timeliness of its investments, OER has implemented a twice-per year (at minimum) cycle of developing and approving allocation plans (approximately, March and August).
- The proposed August 2016 plan (2016-B) will allocate a total of *\$4.0 million* in net auction proceeds from RGGI auctions conducted in March and June 2016.
- OER proposes to allocate these funds for the following purposes:
  - *\$2.0 million* to support cost-effective energy efficiency programs and incentives administered by the utility, consistent with the 2017 Energy Efficiency Plan; and
  - *\$2.0 million* to support public-sector energy efficiency and renewable energy projects implemented through the Efficient Buildings Fund, which is administered by the Rhode Island Infrastructure Bank (RIIB) with the cooperation of OER.
- OER believes that the proposed allocation plan:
  - represents an allowable use of the State's RGGI proceeds pursuant to RIGL §23-82-6;
  - is consistent with State economic, energy and environmental policy goals, including LCP;
  - will advance cost-effective energy efficiency initiatives that service all Rhode Island consumers, as well as support clean energy project financing to reduce energy costs throughout the public sector;
  - is consistent with previously-approved State RGGI Allocation Plans; and
  - will reduce the total amount of ratepayer funds required to support utility-administered energy efficiency programs adopted pursuant to Rhode Island's least cost procurement statute.
- Importantly, the proposed plan reflects a decline in auction revenue (when compared to recent auctions), a trend which may continue over the coming year as RGGI undergoes a comprehensive program review.
- OER welcomes the opportunity to receive comment or answer any questions the EERMC may have regarding this proposal. There will be another opportunity to discuss the proposed plan during the August 11<sup>th</sup> meeting. In the meantime, individual Council members may contact Rachel Sholly by phone (401-574-9121) or email ([rachel.sholly@energy.ri.gov](mailto:rachel.sholly@energy.ri.gov)) to discuss further.
- Proposed Timeline (*dates are tentative and subject to change*)
  - July 14 EERMC Meeting
  - July 15 Public Notice of Draft Plan and Public Comment Hearing
  - August 11 EERMC Meeting
  - August 15 Public Hearing
  - August 26 Plan Finalized



# Stretch Codes

*EERMC Meeting  
July 14, 2016*

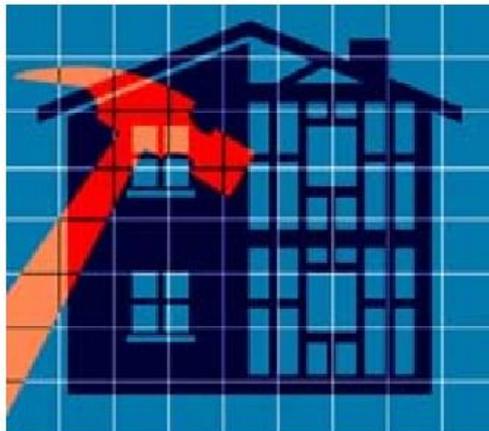
*Becca Trietch*



STATE OF RHODE ISLAND  
**OFFICE OF  
ENERGY RESOURCES**

# What is a Stretch Code?

- A local code or alternative compliance pathway that is more aggressive than base code
- Also known as Reach Codes, Stretch Codes help buildings to achieve higher energy savings & implement advanced practices
- Can be voluntary or mandated



# What are the benefits?

## Spurring & Directing the Market

- Train the building and development communities in advanced practices before base code is improved
- Accelerate market acceptance and adoption of more stringent energy efficiency codes
- Opportunity to work in tandem with utility incentive programs
- Improve code compliance – education & practice implementing more advanced requirements before it is required by base code



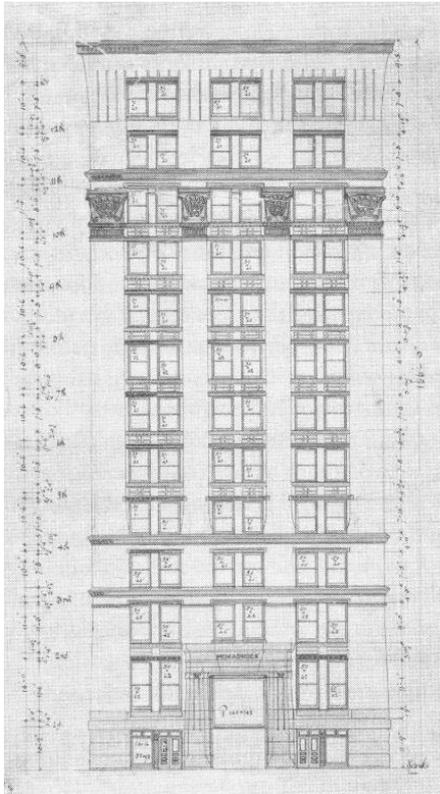
# Lead By Example Executive Order

- **EO 15-17 requires OER, EERMC, National Grid, and GBAC to:**

- “...establish a voluntary aspirational or stretch building code based on the IGCC or equivalent by 2017.”
- “...code shall be available for use in all State construction and renovation projects as well as those in the private sector.”



# RI's Stretch Code Goals



- **Conduct monthly meetings with OER, EERMC, National Grid, GBAC**
- **Create a stretch code that:**
  - Can be used by state agencies or any other public or private entity
  - Will reduce energy usage below RI's energy conservation code
  - Will help applicable entities comply with the Green Buildings Act
  - Help entities qualify for utility incentive programs
  - Will spur advanced green building techniques

# Expected Commercial Stretch Code Sections

- Site Development and Land Use
- Material Resource Conservation and Efficiency
- Energy Conservation, Efficiency and CO<sub>2</sub>e Emission Reduction
- Water Resource Conservation, Quality and Efficiency
- Indoor Environmental Quality and Comfort
- Commissioning, Operation and Maintenance

# Example Links Between Energy & Sustainability

- Site Development & Land Use: bike & pedestrian accessibility, resiliency, potable water use/irrigation limitations, preferred parking for EVs/hybrids, mitigate heat island effects
- Material Resource Conservation & Efficiency: increase local material sources, waste reduction from construction
- Energy Conservation, Efficiency & CO<sub>2</sub>e Emission Reduction: Appliances, Equipment/Systems, Building Envelop, Renewable Energy Systems, Automated Demand Response

# Example Links Between Energy & Sustainability

- Water Resource Conservation, Quality and Efficiency: Reduce water use (hot & cold)
- Indoor Environmental Quality and Comfort: Indoor air quality and ventilation systems, natural light in interior spaces (fenestration)
- Commissioning, Operation and Maintenance: Building inspections & documentation requirements to help O&M personnel to effectively operation & maintain the building

# Additional Benefits of a Sustainability Code

- More attractive to builders and developers
- Simplicity



# How to achieve our immediate goals?

**OER proposes utilizing National Grid's consultant to write the technical details of the commercial stretch code:**

Total Cost Estimate:	\$65,260
<u>National Grid cost-share:</u>	<u>~\$15,000</u>
<b>Remaining:</b>	<b>\$50,260</b>

# Excerpts from the EERMC Statutes

*“§ 42-140.1-6 Additional general powers. – In order to effectuate its powers and duties the council has the following powers...*

*(d) To work with the appropriate federal, regional, and state agencies, and private entities.*

*(e) To apply for, accept and expend allocations, grants and bequests of funds, for the purpose of carrying out the lawful responsibilities of the council.”*

*“§ 42-140.1-5 Powers and duties. – The council shall have the power to: Develop and recommend for implementation plans, programs and standards for energy conservation, energy efficiency, and diversification of energy resources...”*

# Funding Request

- OER requests that the EERMC allocate \$50,260 to support collaborative development of the commercial stretch code
- OER will oversee the expenditure of the funds based on the task schedule provided in the ERS cost proposal, and provide budget/project updates to EERMC Executive Council
- Upon project completion or upon request, OER will present results to full EERMC

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**Office of Energy Resources**  
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## P R O P O S E D   S C O P E   O F   W O R K

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**DATE:** May 17, 2016 Revised July 12, 2016

**TO:** Eric Beaton; Puja Vohra

**FROM:** Brian McCowan

**RE:** Rhode Island Commercial Building Stretch Code Program Assistance - proposed scope of work

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### **INTRODUCTION:**

The following proposed scope of work has been developed in response to the request for ERS to assist National Grid in the development of efficiency program activities related to the development and adoption of a commercial stretch code for the State of Rhode Island.

Project staff will consist of:

Brian McCowan, Senior Vice President

Ari Michelson, Senior Consultant

Aditi Parlikar, Project Engineer

### **Stretch Code Research**

ERS will work with Eric Beaton in researching stretch codes in use and under development throughout the U.S. This limited effort will identify successes and challenges with stretch code adoption and provide critical guidance for the R.I. effort. In addition to state and municipal stretch code activities, we will research various standards that provide protocols that can serve as the basis for stretch codes.

In addition we will research sustainability protocols and compliance methodologies that would be appropriate for implementation as part of a R.I. stretch code that includes comprehensive sustainability provisions as well as enhanced energy provisions.

### **International Green Construction Code (IGCC) Research**

Following initial discussions and research the State of Rhode Island intends to adopt the IGCC as a commercial buildings stretch code, modifying the document as needed to match the climatic and market conditions present in the state. The IGCC is a

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comprehensive sustainability code which includes energy efficiency, renewable energy, building operations, indoor air quality, and societal benefit provisions.

It is National Grid's states desire to support the development and implementation of the code and to utilize its energy efficiency programs to support energy savings provisions with technical support and financial incentives for provisions that meet regulatory cost effectiveness mandates.

In response to recent requests, ERS proposes to provide technical and policy support to both National Grid and the State of Rhode Island as the stretch code is developed and implemented. The associated tasks for this effort include:

### **Key stretch code assistance tasks**

- ❑ **Task 1; Identify energy impact provisions** – The IGCC is a comprehensive sustainability code, including both provisions that do and do not impact energy usage. Although National Grid supports the adoption of a comprehensive stretch code, there is a need to identify the energy impacting provisions in order to assess the potential for financial incentives and technical assistance.
- ❑ **Task 2; Perform code and program comparative analysis** – Previously, ERS performed an analysis comparing the provisions of the Rhode Island version of the 2014 IGCC with the 2013 Rhode Island and the requirements of National Grid's energy efficiency programs. We will update that analysis to reflect the significant changes included in the current (2015) IGCC and the current efficiency programs.
  - Deliverable – Spreadsheet analysis
- ❑ **Task 3; Participate in stretch code development negotiations** - ERS will continue to represent participate in monthly stakeholder meetings conducted by the R.I. Office of Energy Resources, and provide ancillary support as needed to assist in developing a robust stretch code.
- ❑ **Task 4; Develop recommendations for energy provisions** – Utilizing the comparison of the IGCC with National Grid program requirements, we will recommend amendments to the IGCC provisions for inclusion in the stretch code. The goal will be to assure that National Grid is able to support the stretch code provisions within their program regulatory guidelines.
- ❑ **Task 5; Review cost-effectiveness recommend program methodology** – We will work with the OER and National Grid to review provision practicality and cost-effectiveness and provide program recommendations for supporting stretch code projects with National Grid technical assistance and financial incentives.
- ❑ **Task 6; Identify and summarize non-energy impact provisions** – We will identify the provisions that do not have identifiable energy savings potential and produce a summary description of such provisions.

- Deliverable – Summary report
- ❑ **Task 7; Research and identify IGCC overlaps and possible conflicts with state procedures** – Se will identify provisions that are similar to provisions adopted through other mechanisms such as the provisions for the Collaborative for High Performance Schools, and/or provisions and regulations associated with indoor air quality, transportation, etc.
  - Deliverable – Summary report
- ❑ **Task 8; Research and recommend compliance procedures** – Stretch code energy provision compliance will fall within the scope of code officials’ duties. However, compliance with non-energy sustainability provisions is outside their jurisdiction and area of expertise. In addition, National Grid is limited by regulation to restrict assistance to energy impacted measures. We will research compliance verification options and recommend alternative paths.
  - Deliverable – Summary report with recommendations for compliance paths

**Task 9; Develop final stretch code and program support recommendations**

Following the assessment of both energy impact and non-energy sustainability measures, we will work with the OER led advisory group to propose an amended IGCC based protocol for adoption as a statewide stretch code.

**Budget**

As this is a cooperative effort involving several entities, it is not possible to fully predict the effort needed. As such the following budget amount is our best estimate of the effort needed. ERS will invoice on a time and expense basis, updating monthly the status of progress and budget.

**Estimated Project Cost: \$65,260**

NGRID Estimated Budget Share												
		Estimated Hours										
ERS Staff	Rate	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Task 7	Task 8	Task 9	Totals	Total Estimated Cost
Brian McCowan	\$250	2	6	10	4	4	2	0	4	8	40	\$10,000
Ari Michelson	\$165	0	2	0	6	6	0	0	4	2	20	\$3,300
Aditi Parlikar	\$140	3	2	0	3	0	2	0	2	0	12	\$1,680
<b>Total Estimated Cost</b>											\$14,980	
Rhode Island OER Estimated Budget Share												
		Estimated Hours										
ERS Staff	Rate	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Task 7	Task 8	Task 9	Totals	Total Estimated Cost
Brian McCowan	\$250	2	14	38	16	16	6	16	8	24	140	\$35,000
Ari Michelson	\$165	0	6	0	10	10	0	0	8	6	40	\$6,600
Aditi Parlikar	\$140	5	10	0	5	0	28	8	6	0	62	\$8,680
<b>Total Estimated Cost</b>											\$50,280	

Travel expenses as incurred at standard rates.

**Proposed Payment Schedule**

National



Grid

<b>Invoice 1</b>	<b>Delivery of Task 2 spreadsheet analysis</b>	<b>20%</b>
<b>Invoice 2</b>	<b>Delivery of draft provision recommendations</b>	<b>30%</b>
<b>Invoice 3</b>	<b>Delivery of compliance methodology recommendations</b>	<b>30%</b>
<b>Invoice 4</b>	<b>Completion of all tasks</b>	<b>20%</b>

# Energy Efficiency Evaluation in Rhode Island

## Presentation to EERMC

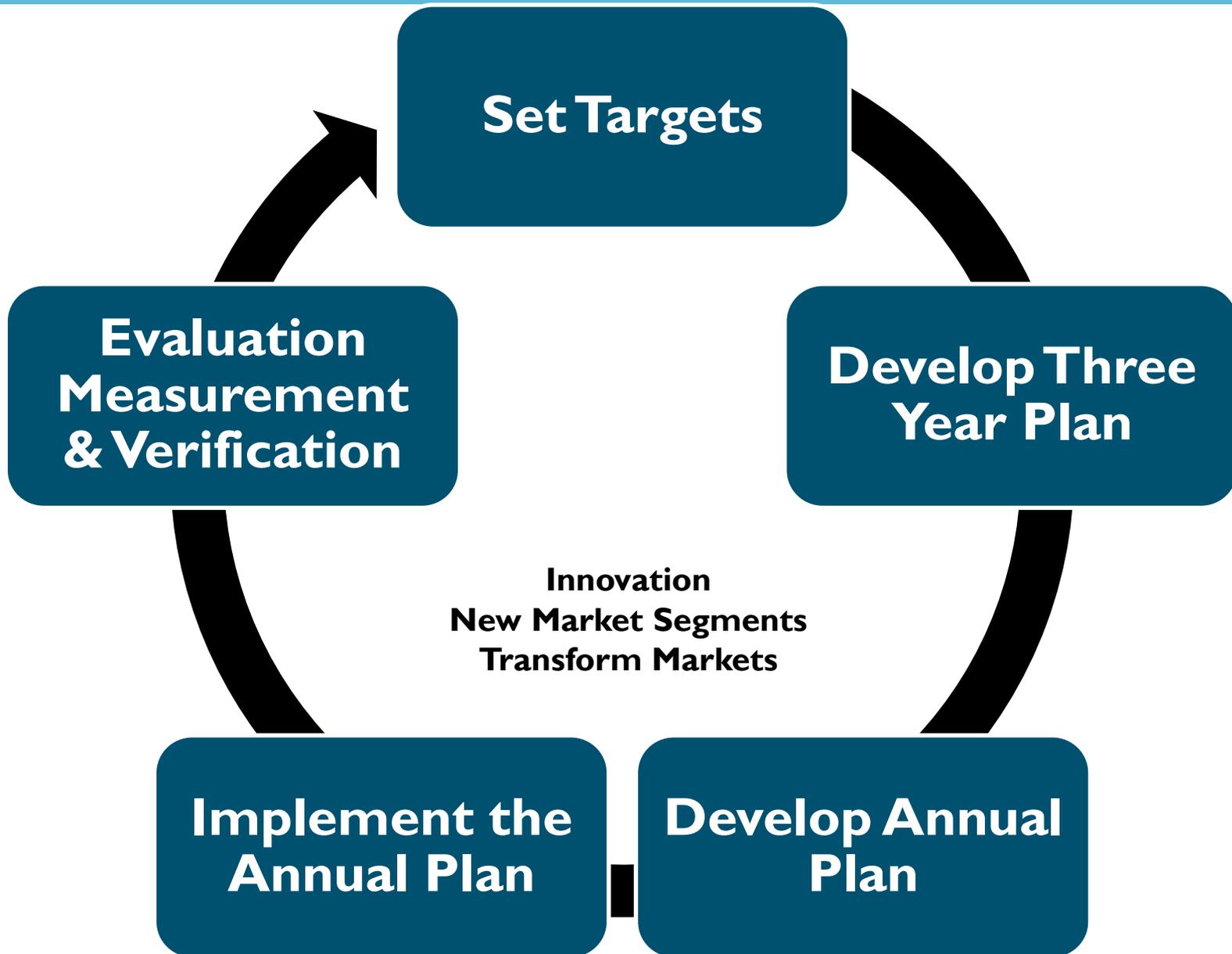
July 14, 2016



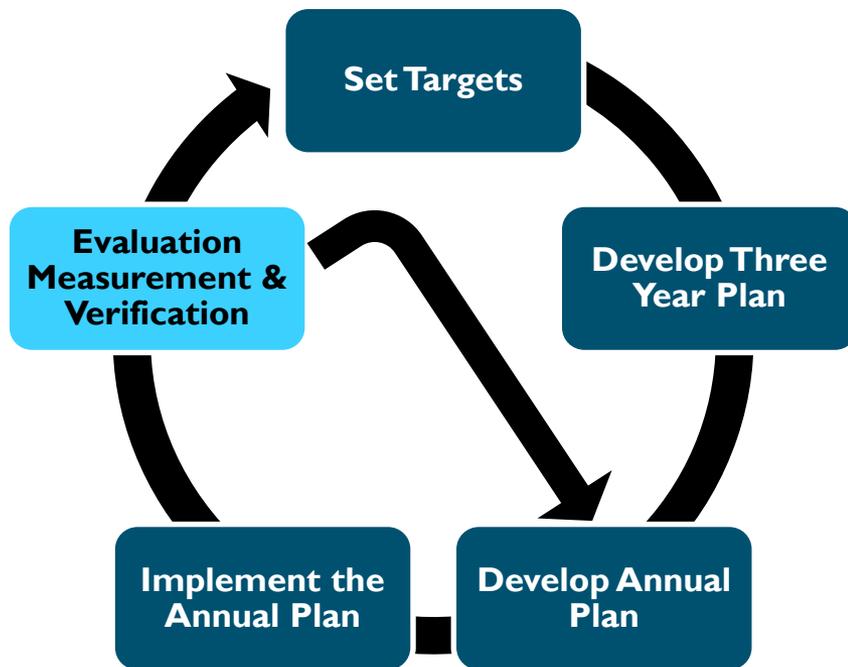
- What is evaluation?
- How we evaluate
- What is the Technical Reference Manual and how is it used?
- How is energy efficiency treated in load forecast
- Discussion and questions

- Evaluation provides credence for savings resulting from energy efficiency programs
- Evaluation of program results is a key input into program planning and load forecasting
- National Grid is a recognized leader in the United States in evaluation

# The Process



# EM&V



- Evaluation and verification by National Grid improves program design and delivery
  - Impact evaluations
  - Process evaluations
  - Market assessments
- National Grid applies evaluation results prospectively in annual and three-year planning

- Estimating Energy Efficiency Plan savings
- Developing energy efficiency strategies
- Technical Reference Manual
- Case studies for Annual Reports

- Evaluation is the analysis, study, and research of various aspects related to the performance of energy efficiency programs
- Types of studies: Impact, Process, Market Assessments
- Methods: Direct metering, proxy variables, billing analysis, engineering analyses
  - All methods consistent with International Performance Measurement and Verification Protocol (IPMVP) and ISO-New England procedures
  - All studies designed to provide statistically valid results
- Evaluation done by independent third parties, managed by Company, with oversight by EERMC

- Objective to get quality results using limited budget, affects which studies we decide to do and when
  - Amount of savings, stability of program and prior results, time since last study also affect study decisions
  - Not everything evaluated every year
- Leverage Massachusetts evaluation studies where possible
  - Benefits of MA's scope and scale
  - Commonality of technologies and delivery channels
  - RI Consulting teams includes same evaluation expert as MA
- Participate in regional studies and information sharing
  - Northeast Energy Efficiency Partnerships Regional Evaluation Measurement & Verification Forum and its Steering Committee

- EM&V program has reached a mature, steady state
- Large scale of operations: 35 studies completed in past 12 months
- Collaborative process between PAs and EEAC consultants is generally working well
- All parties (PAs, EEAC consultants, evaluators, implementers) are devoting significant attention to the feedback loop
- Program has responded proactively to changing policy environment
- EM&V program is innovative program and regularly leads the country in conference papers and other refereed publications
- Evaluation results continue to ensure that the energy efficiency resource is reliable; overall effect is to enhance credibility of savings claims and incentivize PAs to pursue what is working

- Current Energy Efficiency Program Plan, Attachment 3 (see inclusion in packet)
- EERMC Website  
<http://www.rieermc.ri.gov/evaluationstudies/>
- SEE Action's *Energy Efficiency Program Impact Evaluation Guide*  
[https://www4.eere.energy.gov/seeaction/system/files/documents/emv\\_ee\\_program\\_impact\\_guide\\_0.pdf](https://www4.eere.energy.gov/seeaction/system/files/documents/emv_ee_program_impact_guide_0.pdf)

# Technical Reference Manual (TRM) nationalgrid

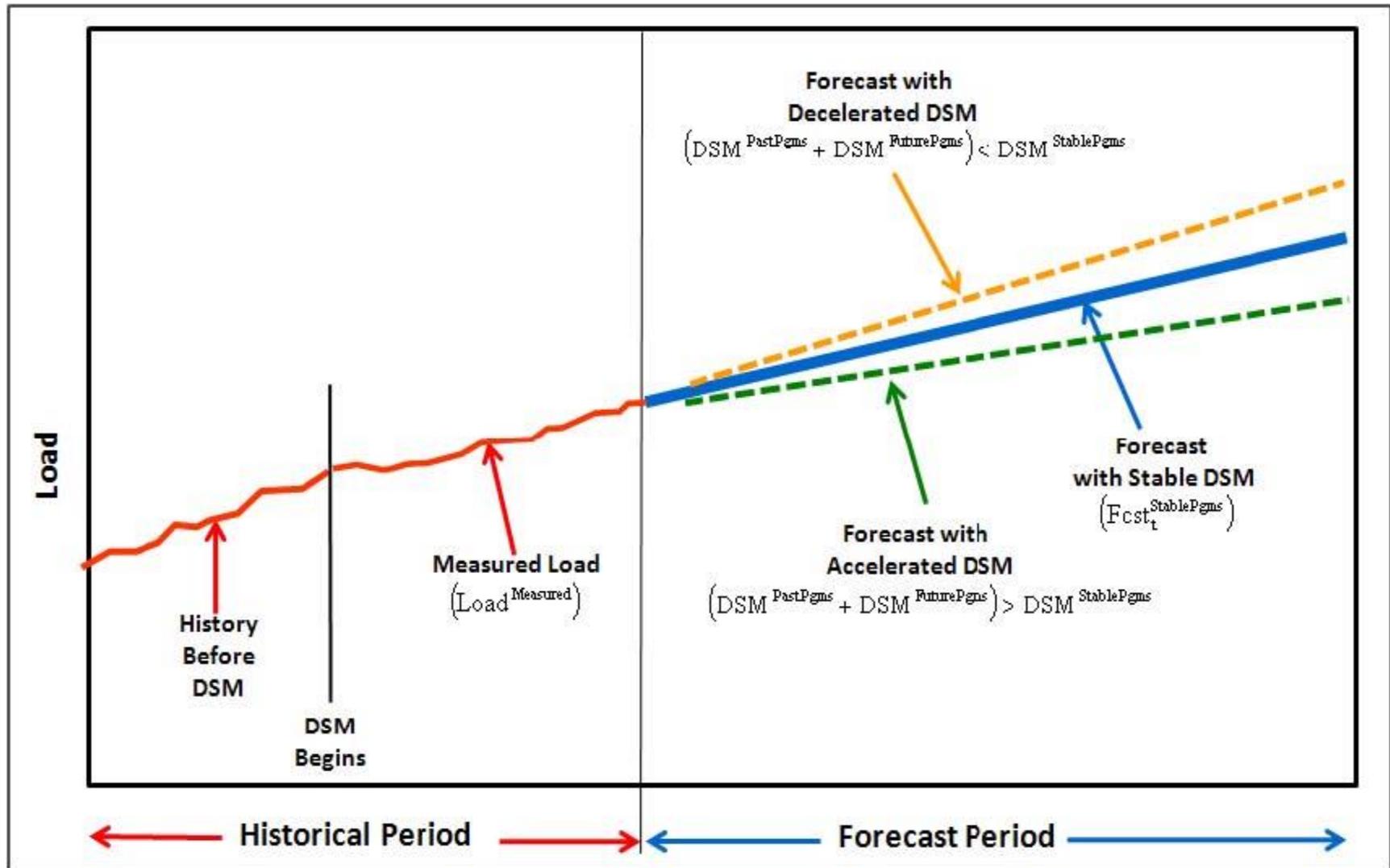
- TRM is reference document that documents at a measure level the savings that we expect to realize through energy efficiency
  - Characterizes each measure with several parameters
  - Identifies savings algorithms and input variables
  - Documents sources for savings assumptions
    - Evaluation studies
    - Engineering analyses
  - Consistent with approved cost effectiveness framework
- Evaluation results applied prospectively, as part of next planning cycle
- Because it documents savings, TRM review by EERMC is key element in confirming Energy Efficiency (EE) Plan cost-effectiveness

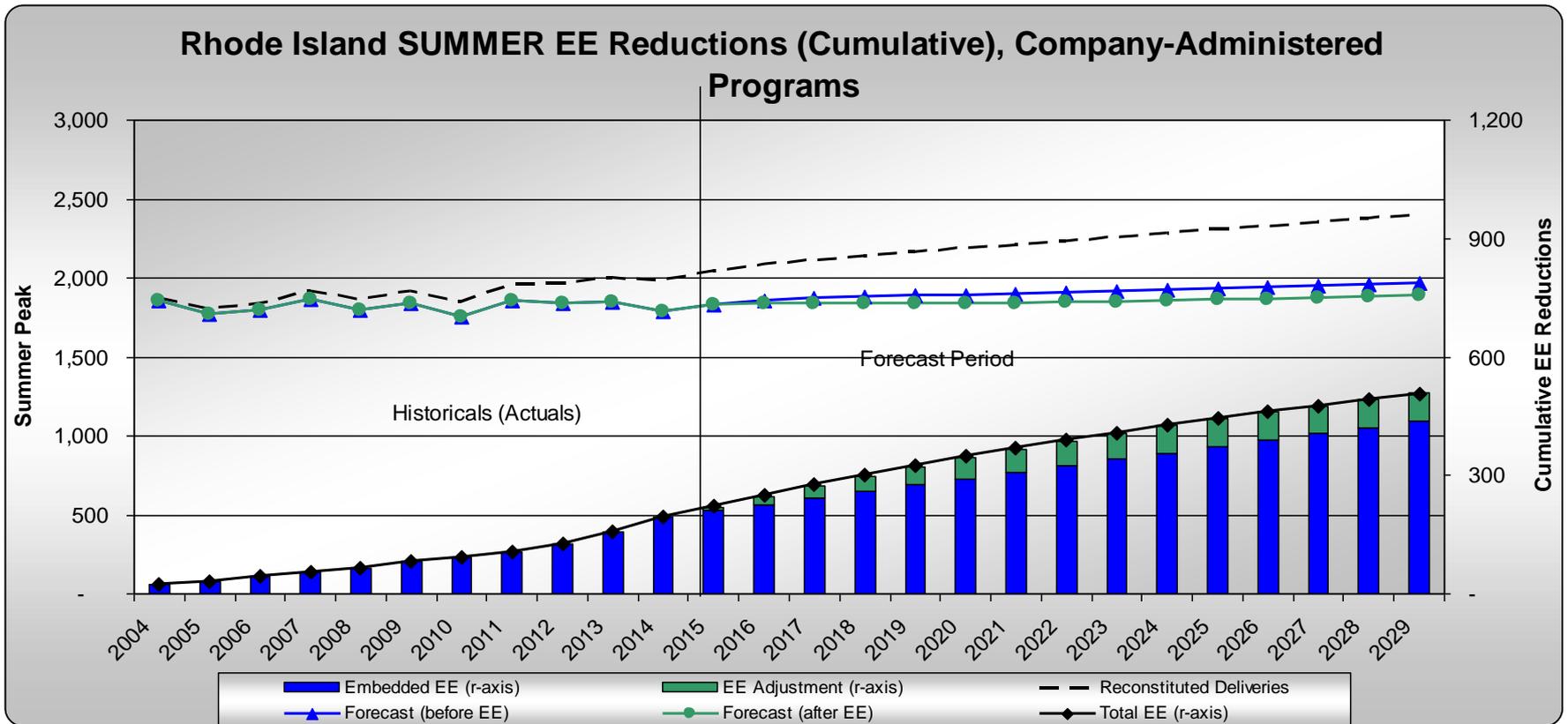
- Evaluation tells us EE has a measurable impact at a customer level, and in aggregate across the state
- Also seen in actual loads – and reflected in load forecasting
  - Electric Peak (MW) forecasts for Reliability & Capital Planning
  - Electric Sales (GWH) forecasts for Financial, Pricing and Revenue Planning
- What load forecast captures and why it is important
  - EE in RI loads
  - EE in New England loads

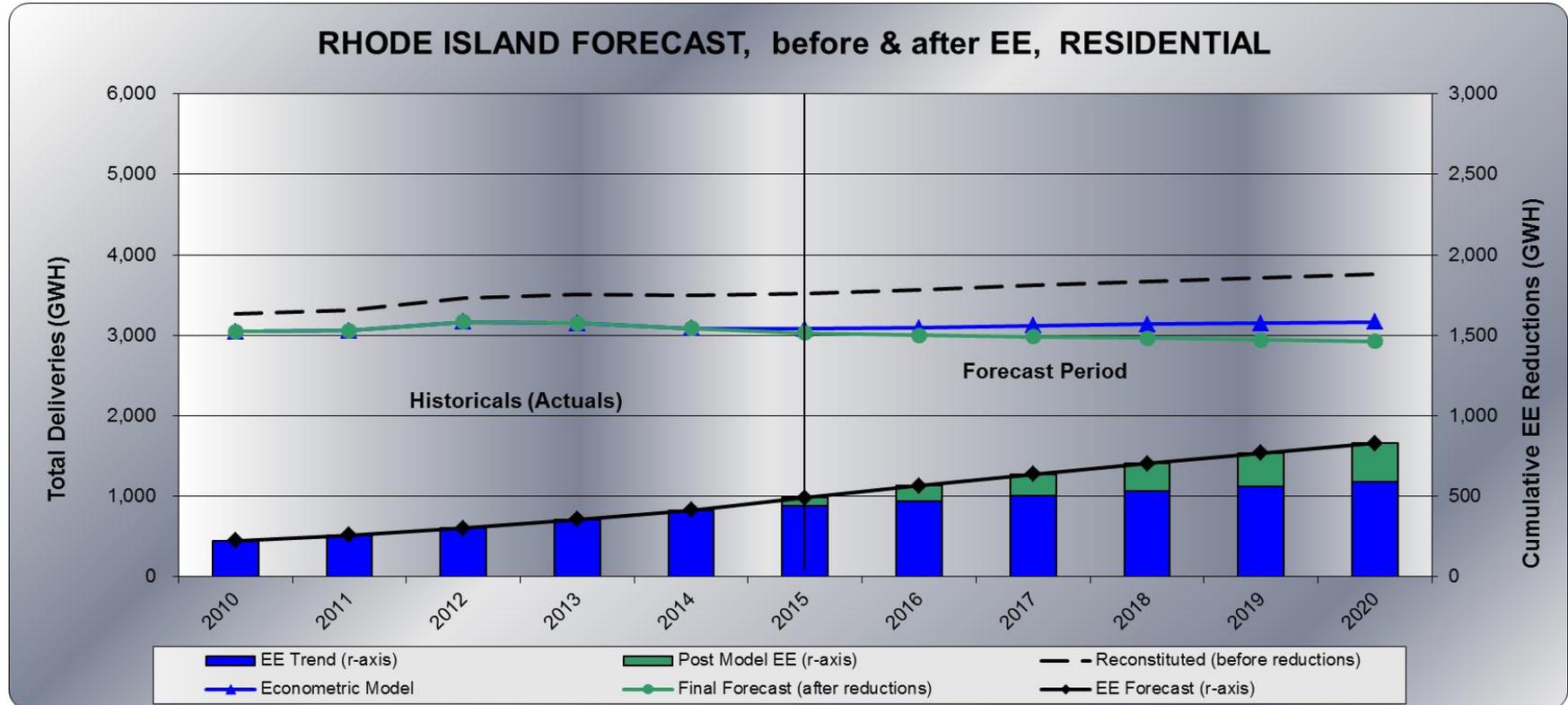
- Econometric Regression Based (GDP, employment, Real Personal Income (RPI))
- Load Factors for Peaks
- Weather adjusted (normal (50/50), Extreme (90 & 95))
- Post Model Adjustments for Existing and Emerging Technologies & Programs (EE, DG, DR, etc.)
- By Jurisdiction, by “Zone” (ISOs), zips/planning supply area (PSA)

- Explicit, Post-Model Reductions to Econometric Models
- We use Embedded Trend method
- Almost 10% to date in RI over last 10-years; growing up to 17% over next ten-years
- Implicit assumption is that this is allocated by load share (informal study finds reasonable) to planning areas

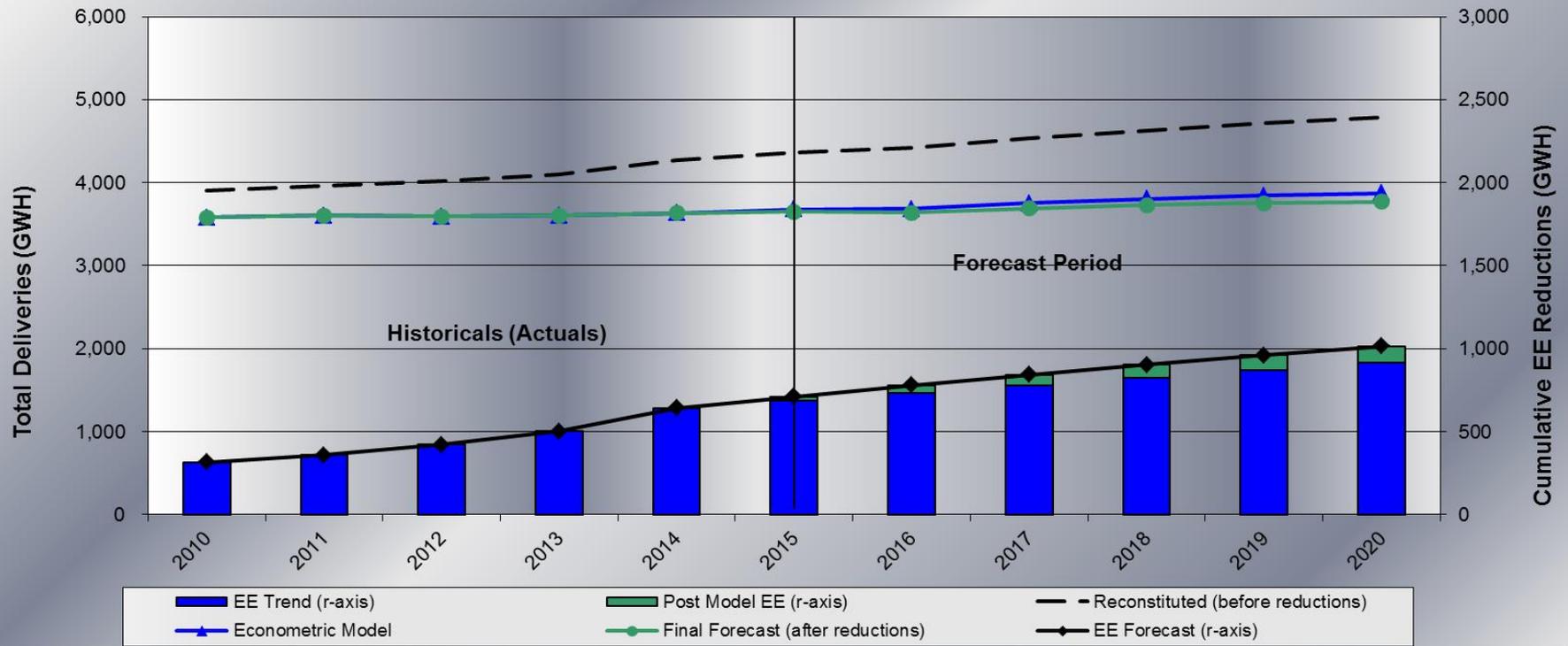
# Energy Efficiency Embedded Trend nationalgrid

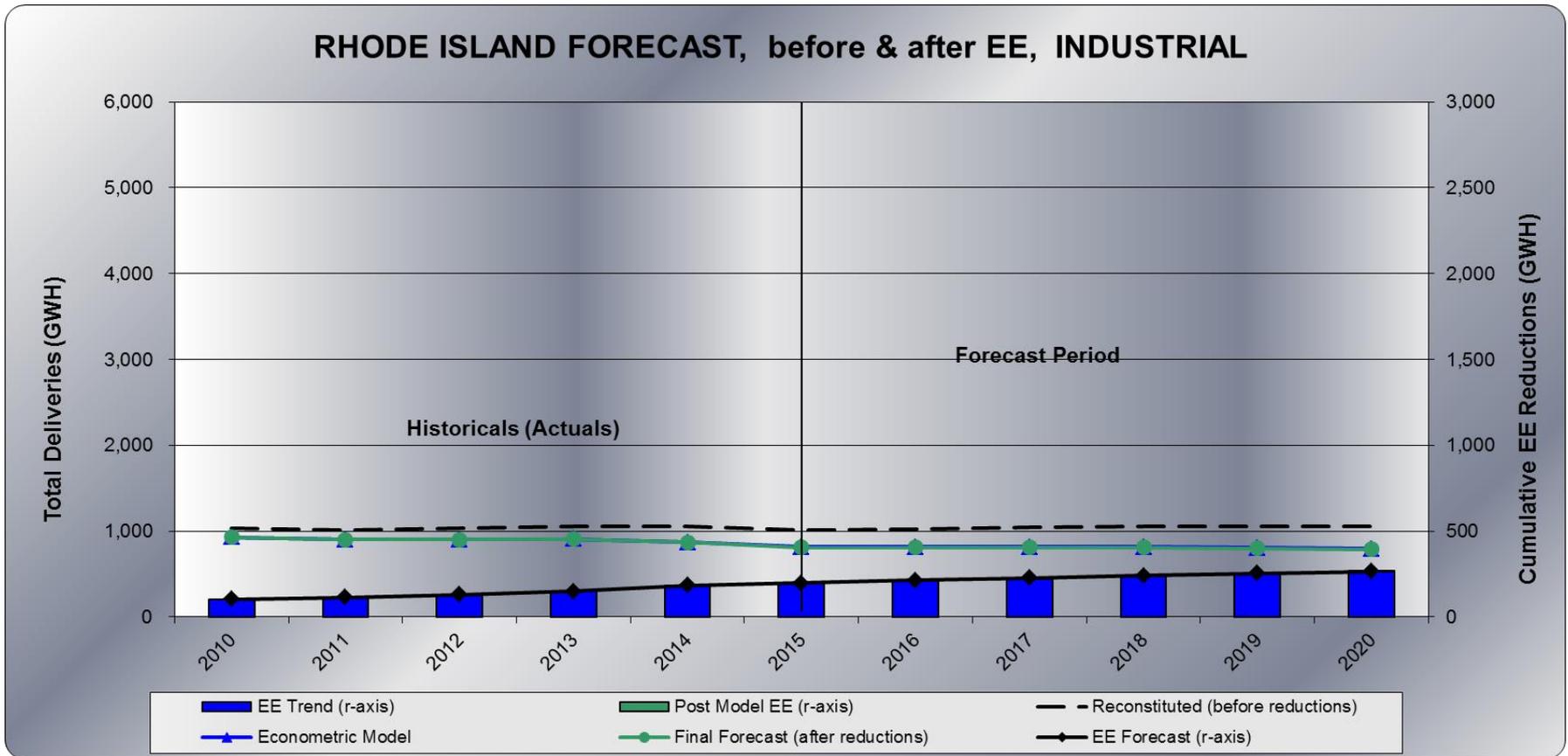




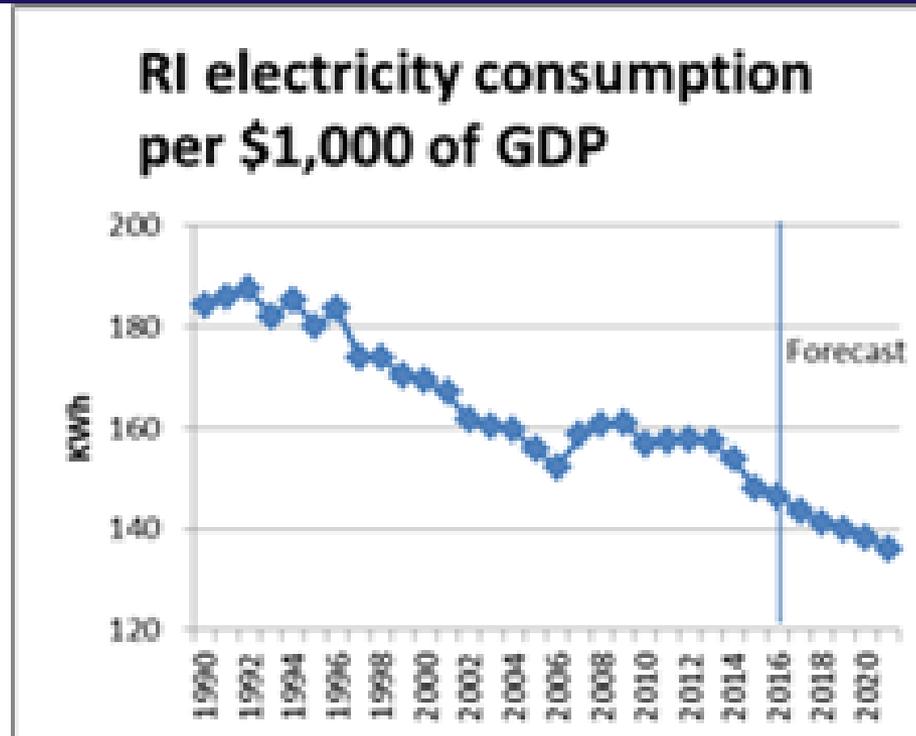


## RHODE ISLAND FORECAST, before & after EE, COMMERCIAL





- EE influences loads in the state and in the region
- Gross domestic product (GDP)
- Energy Use Intensity (EUI)

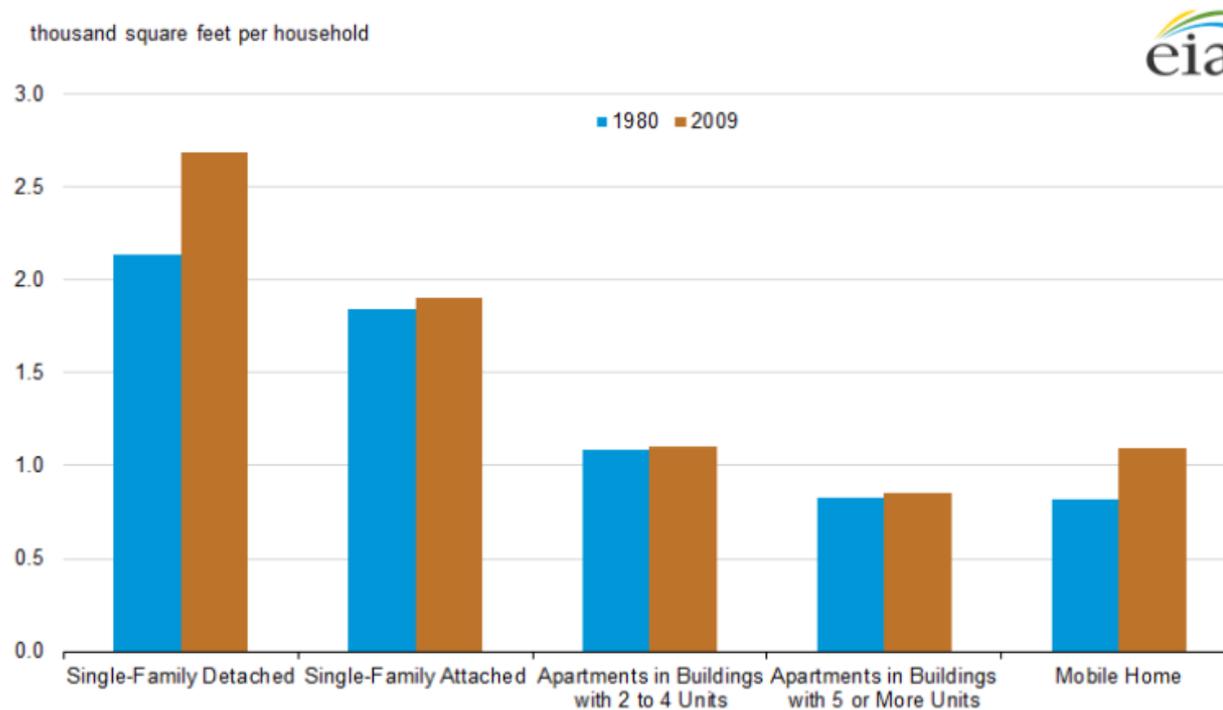


- Slow RI population growth, continual erosion of heavy industry, EE and solar are reducing kWh consumption versus GDP
- Since the recession ended, Rhode Island electric volumes have declined at an average rate of 0.4% per year while GDP has increased 2.0% per year

- Usage by residential customers has increased by 3.1% since 2008, while total residential customers has only increased by 2.3% since 2008
  - If the EE savings as documented by the EMV process described previously are real, why is there this increase?
  - Additional cost and effort could go into parallel analysis of other factors in electricity consumption, but the following illustrate at a high level why the apparent disparity exists...

## Residential units are getting bigger....

Figure 3. Average size of homes by housing-type 1980 and 2009

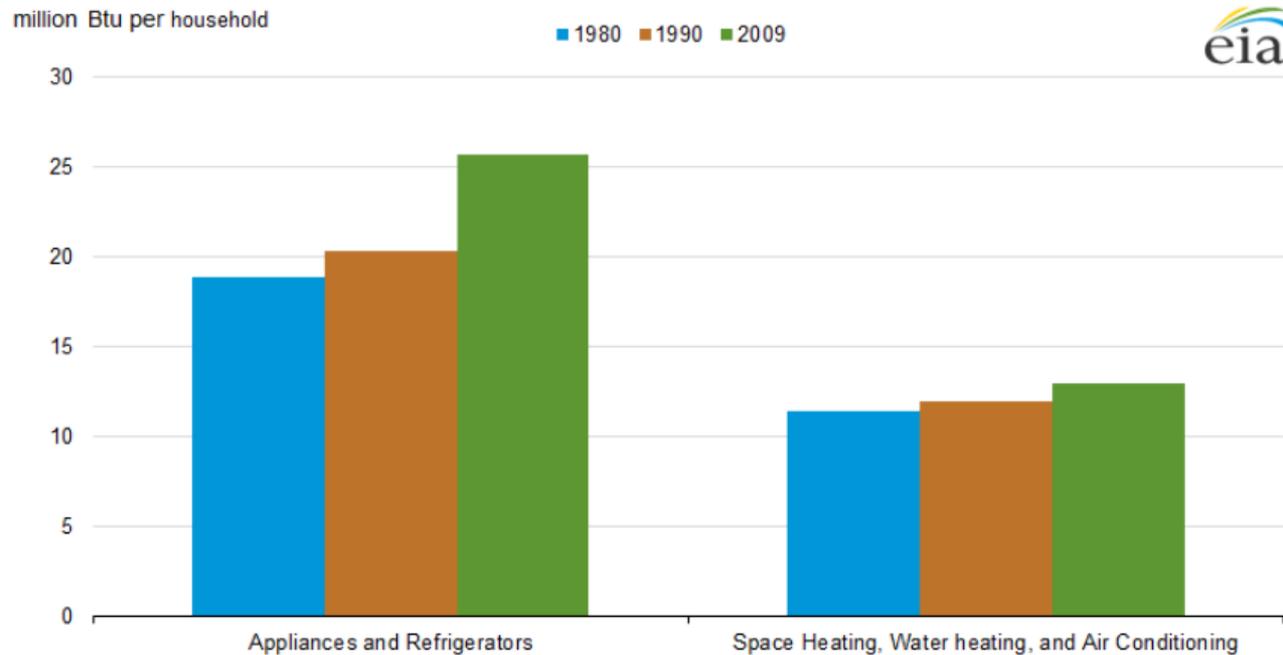


Sources: Hojjati and Wade (2012) and U.S. Energy Information Administration, Residential Energy Consumption Surveys, 1980 and 2009.

U.S. Energy Information Administration report: Drivers of U.S. Household Energy Consumption, 1980-2009 -- published February 2015

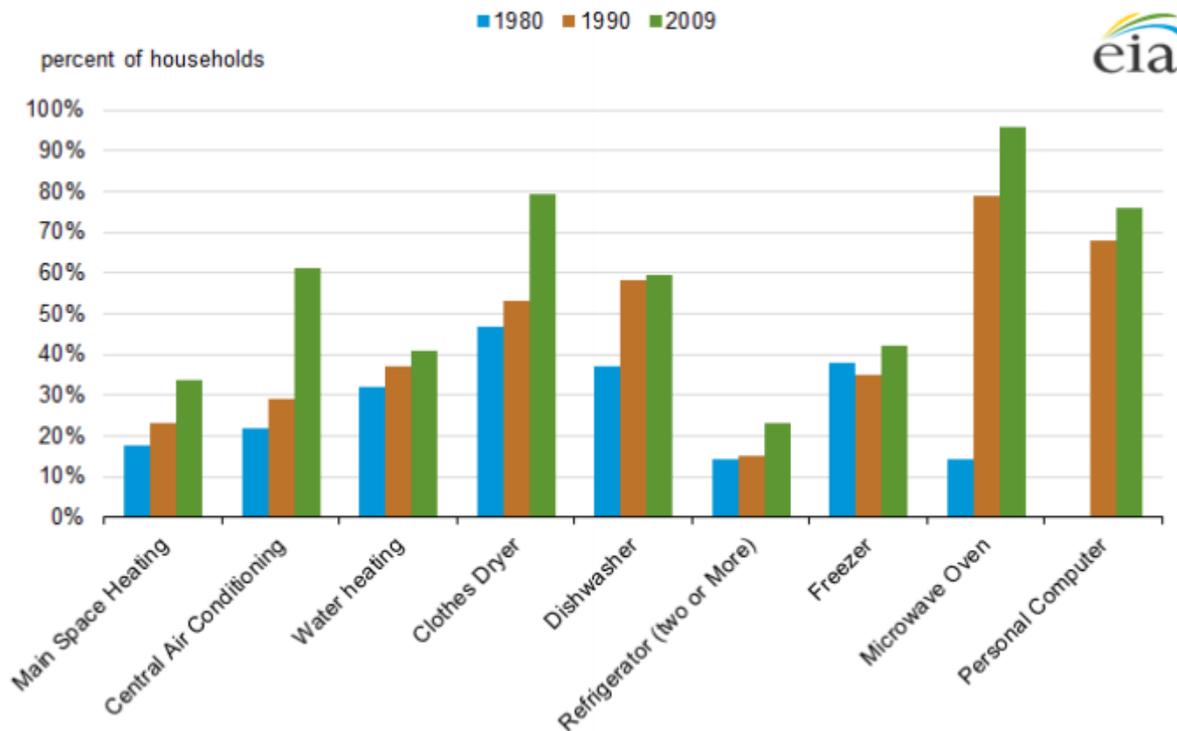
## Electric appliances and equipment increasing....

Figure 8. Electricity intensity consumption per household by end uses, 1980, 1990, and 2009



Sources: U.S. Energy Information Administration, Residential Energy Consumption Surveys, 1980, 1990, and 2009.

Figure 9. Penetration of selected electrical appliances in U.S. households, 1980, 1990, and 2009



Sources: Hojjati and Wade (2012) and U.S. Energy Information Administration, Residential Energy Consumption Surveys, 1980, 1990, and 2009.

# Energy-Efficiency Forecast Impacts on Markets and Long-Range Planning

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*Rhode Island Energy Efficiency and Resource  
Management Council*

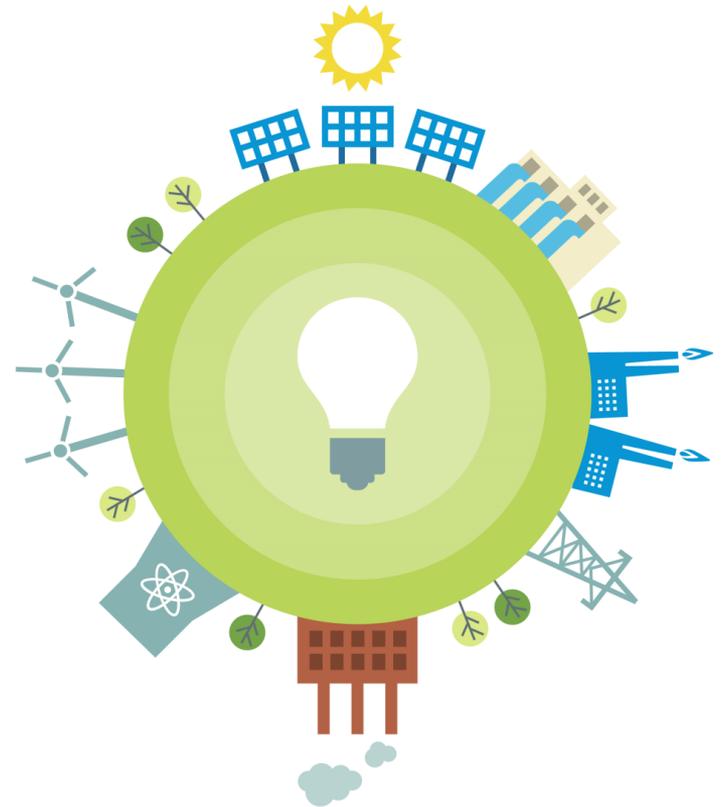
**Eric Winkler, Ph.D.**

TECHNICAL MANAGER, SYSTEM PLANNING



# Overview of Presentation

- Forward Capacity Market and Performance Verification
- Energy-Efficiency Forecast
- Energy-Efficiency Forecast Impacts on Long-Range Planning
  - Transmission Planning and Economic Studies



# ISO New England (ISO) Has Two Decades of Experience Overseeing the Region's Restructured Electric Power System

- **Regulated** by the Federal Energy Regulatory Commission
- **Reliability coordinator** for New England under the North American Electric Reliability Corporation
- **Independent** of companies in the marketplace and neutral on technology



# Reliability Is the Core of ISO New England's Mission

*Fulfilled by three interconnected and interdependent responsibilities*

Managing  
comprehensive  
**regional power**  
system planning



Overseeing the day-to-day  
**operation** of New England's  
electric power generation and  
transmission system

Developing and  
administering the region's  
competitive **wholesale**  
**electricity markets**



# FORWARD CAPACITY MARKET



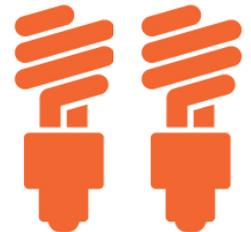
# Forward Capacity Market Overview

- The Forward Capacity Market (FCM) is a **locational** market that procures capacity to meet New England's forecasted Installed Capacity Requirement (ICR) three years in the future
  - Capacity Zones are developed to align with system transmission constraints and are a mechanism to signal areas of need to the marketplace
- The FCM allows **new capacity projects** to compete in the market and set the price for capacity in the region
- The FCM selects a portfolio of **generation** and **demand-side** resources through a competitive Forward Capacity Auction (FCA) process
  - Resources must be pre-qualified to participate in the auction
  - Resources must clear in the auction and perform to be paid for capacity during the Capacity Commitment Period (CCP)
- The FCM provides a **long-term** (up to 7-year) **commitment** to new supply and demand resources to encourage investment

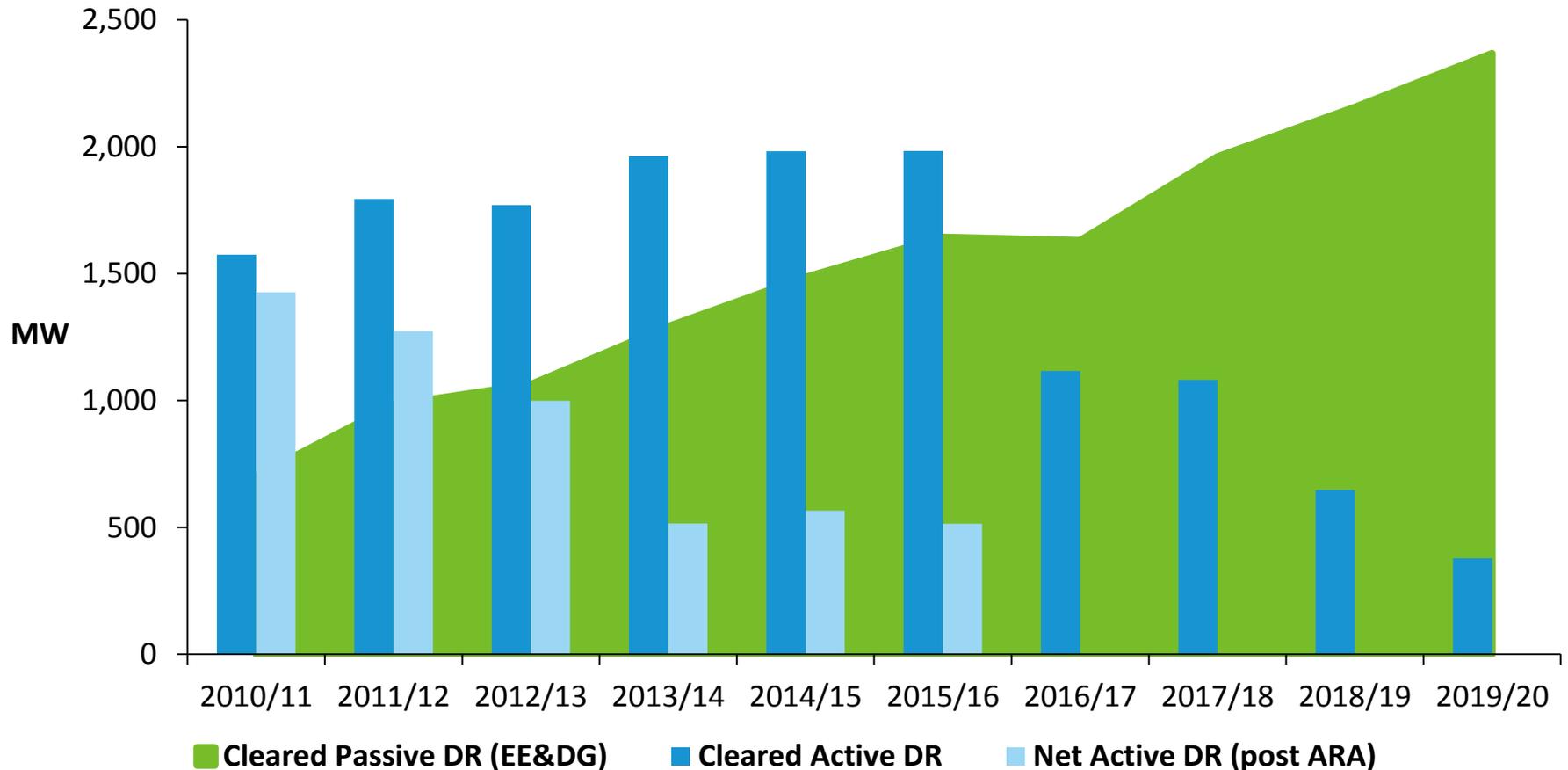


# Forward Capacity Market Objectives and Results

- New England's capacity market has **two main objectives**:
  1. Ensure sufficient resources to meet New England's electricity demand and reliability standards, and
  2. Ensure that sufficient resources are procured in appropriate locations and in a cost-effective manner
- The capacity market aims to foster **competition** by creating a level playing field with respect to technology, investors, and existing versus new entrants
- Ten Forward Capacity Auctions have been conducted and five commitment periods completed
  - Market has generated participation from **diverse** types of resources, including demand-response and energy-efficiency resources
    - **Rhode Island** energy-efficiency resources participate
  - Lowest-cost resources have been developed and brought to market



# FCM Has Attracted a Significant Amount of Demand Resources (DR) and the Mix Has Changed Over Time



**Notes:** *Cleared Active DR* represents Real-Time DR and Real-Time Emergency Generation that cleared in the FCA. *Net Active DR* represents Active DR remaining at the start of the CCP, net of resources that shed Capacity Supply Obligations after the FCA in reconfiguration auctions.



# ENERGY-EFFICIENCY FORECAST

# Energy-Efficiency Forecast Origins



- Since 2012, the ISO has developed a state-by-state energy-efficiency (EE) forecast to project the **long-term impacts** of state-sponsored EE investments on New England's peak and overall demand for energy
- All forecast assumptions, data, and results are vetted through the **Energy-Efficiency Forecast Working Group**
- Each state has its own **structure** for planning and implementing EE programs, although all of the programs generally cover the residential, commercial, and industrial sectors
- **Lighting and mixed-lighting measures** constitute most of the savings in energy use and peak demand, and the commercial and industrial sectors provide a majority of the overall savings

## Energy-Efficiency Forecast Origins, *continued*



- The savings in energy use resulting from EE programs result in demand reductions that can be **bid** into the Forward Capacity Market (FCM)
- The region's EE program administrators (PAs) typically bid their EE portfolios into this market
- Historical data on EE performance in the FCM provides the ISO with a solid understanding of the amount of EE available in the region in the **one- to four-year future timeframe**
- The EE forecast provides information about the amount of EE anticipated to be deployed over the **five- to 10-year planning horizon** beyond the current FCM forward obligations

# Energy-Efficiency Forecast Methodology



- The ISO's EE forecast calculates future energy reductions and peak demand savings based on **three** major elements:
  - EE program budgets
  - Production costs (expressed as dollars per megawatt-hours; \$/MWh)
  - A ratio of peak demand to the annual savings in energy use (MW/MWh)
- The ISO applies modest and reasonable uncertainty factors to future EE budgets to reflect spend rates as programs change in size
- The ISO also applies a production cost modifier to account for program penetration, technology and market transformation, codes and standards
  - For all states, the ISO has escalated production costs by 5% each year to account for the increasing costs of energy-efficiency measures
- In addition, the ISO has applied a 2.5% inflation rate increase on production costs

# Summary of 2016 Energy-Efficiency Forecast



- The EE forecast results were largely unchanged from the 2015 forecast results due to offsetting increases and decreases in forecasted EE production
- Program performance changes from the 2015 forecast were observed:
  - Production costs increased in all states (except RI where it remained about the same) resulting in a decrease in energy reductions from equivalent budget dollars
- Peak-to-Energy Ratios changed in multiple directions, decreasing in ME, NH, RI and VT, increasing in CT, and nearly unchanged in MA
- Average annual program dollars spent increased over the average annual program dollars spent in the 2015 forecast
- Budget spend rates improved in MA and RI

Source: [Final ISO New England Energy-Efficiency Forecast 2020-2025](#) (May 2016)

# Summary of 2016 Energy-Efficiency Forecast

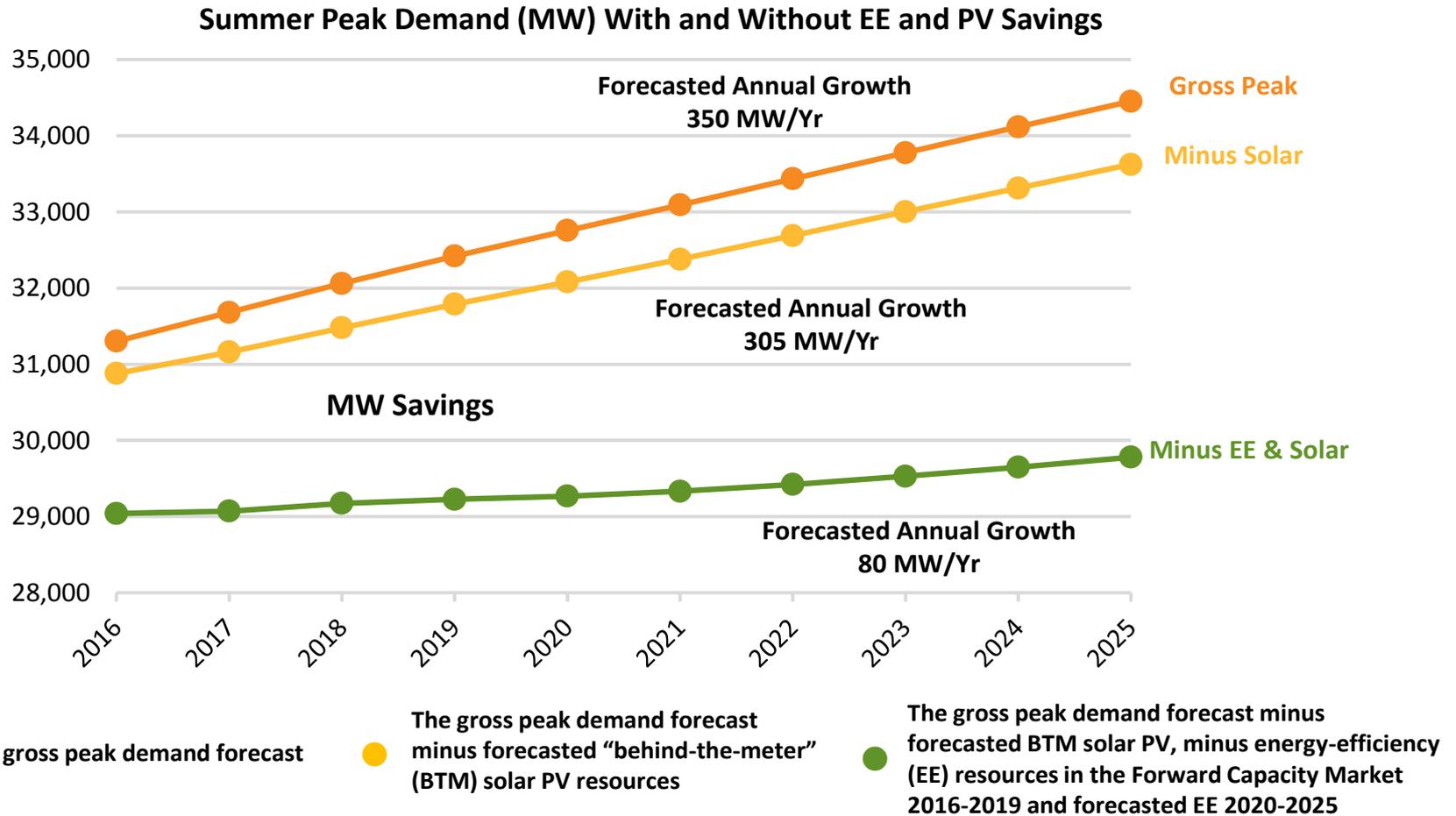


## 2016 Energy-Efficiency Forecast Results Table

GWh Savings							
	ME	NH	VT	CT	RI	MA	ISO_NE
2020	141	56	108	368	148	1,069	1,890
2021	131	53	104	347	138	994	1,767
2022	122	51	99	327	128	925	1,652
2023	114	48	95	308	119	860	1,545
2024	106	46	91	290	111	800	1,444
2025	98	43	87	273	103	745	1,350
<b>Total 2020-2025</b>	<b>713</b>	<b>297</b>	<b>584</b>	<b>1,914</b>	<b>747</b>	<b>5,394</b>	<b>9,646</b>
<b>Average</b>	<b>119</b>	<b>49</b>	<b>97</b>	<b>319</b>	<b>125</b>	<b>899</b>	<b>1,608</b>
MW Savings							
	ME	NH	VT	CT	RI	MA	ISO_NE
2020	14	8	14	48	22	146	251
2021	13	8	13	45	20	136	235
2022	13	7	13	42	19	126	220
2023	12	7	12	40	18	117	206
2024	11	7	12	38	16	109	192
2025	10	6	11	35	15	102	180
<b>Total 2020-2025</b>	<b>73</b>	<b>43</b>	<b>74</b>	<b>248</b>	<b>110</b>	<b>735</b>	<b>1,283</b>
<b>Average</b>	<b>12</b>	<b>7</b>	<b>12</b>	<b>41</b>	<b>18</b>	<b>123</b>	<b>214</b>

Source: [Final ISO New England Energy-Efficiency Forecast 2020-2025](#) (May 2016)

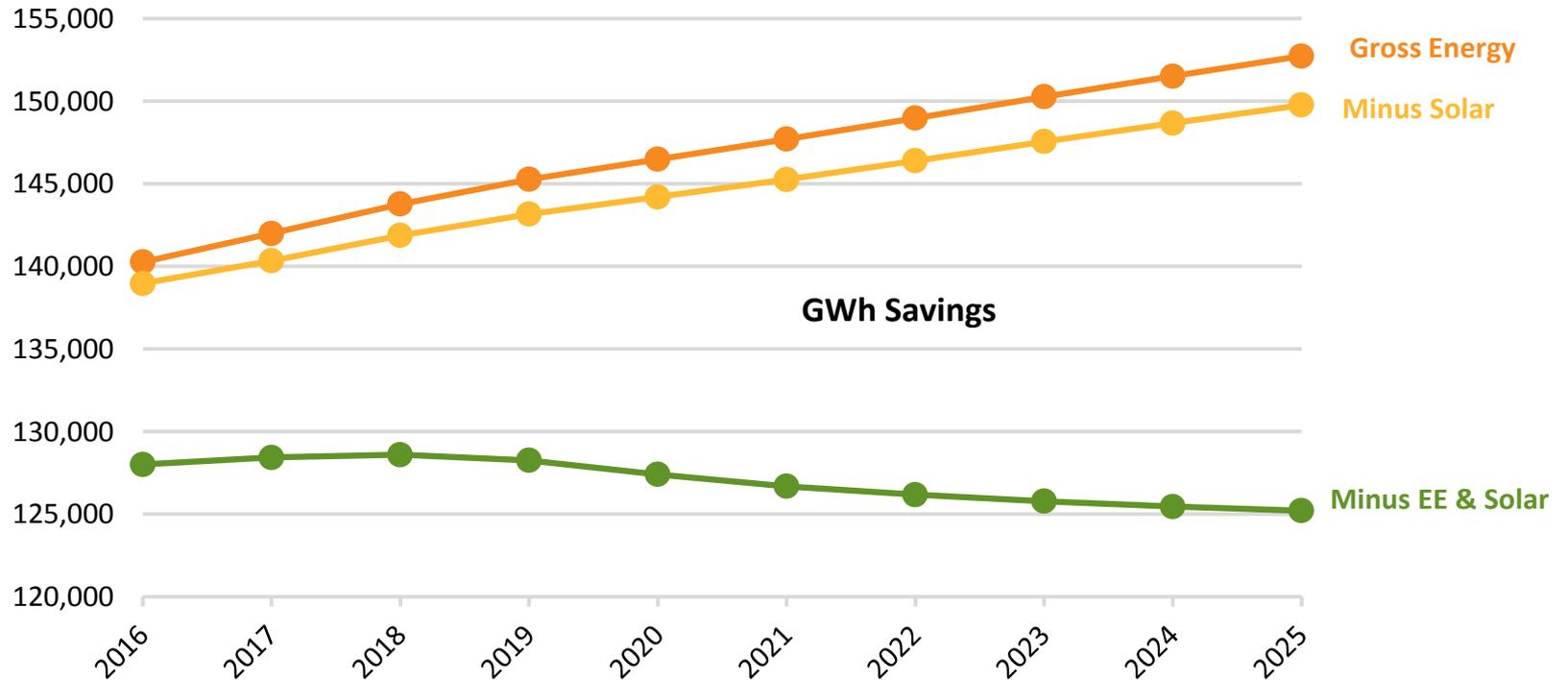
# Energy Efficiency and Behind-the-Meter Solar Are Reducing Peak Demand Growth



Note: Summer peak demand is based on the “90/10” forecast, which accounts for the possibility of extreme summer weather (temperatures of about 94° F).  
 Source: [Final ISO New England Energy-Efficiency Forecast 2020-2025](#) and [Final 2016 Solar PV Forecast Details](#) (May 2016)

# Energy Efficiency and Behind-the-Meter Solar Are Flattening Annual Energy Use

Annual Energy Use (MW) With and Without EE and PV Savings



● The gross load forecast

● The gross load forecast minus forecasted “behind-the-meter” (BTM) solar PV resources

● The gross load forecast minus forecasted BTM solar PV, minus energy-efficiency (EE) resources in the Forward Capacity Market 2016-2019 and forecasted EE 2020-2025

Source: [Final ISO New England Energy-Efficiency Forecast 2020-2025](#) and [Final 2016 Solar PV Forecast Details](#) (May 2016)

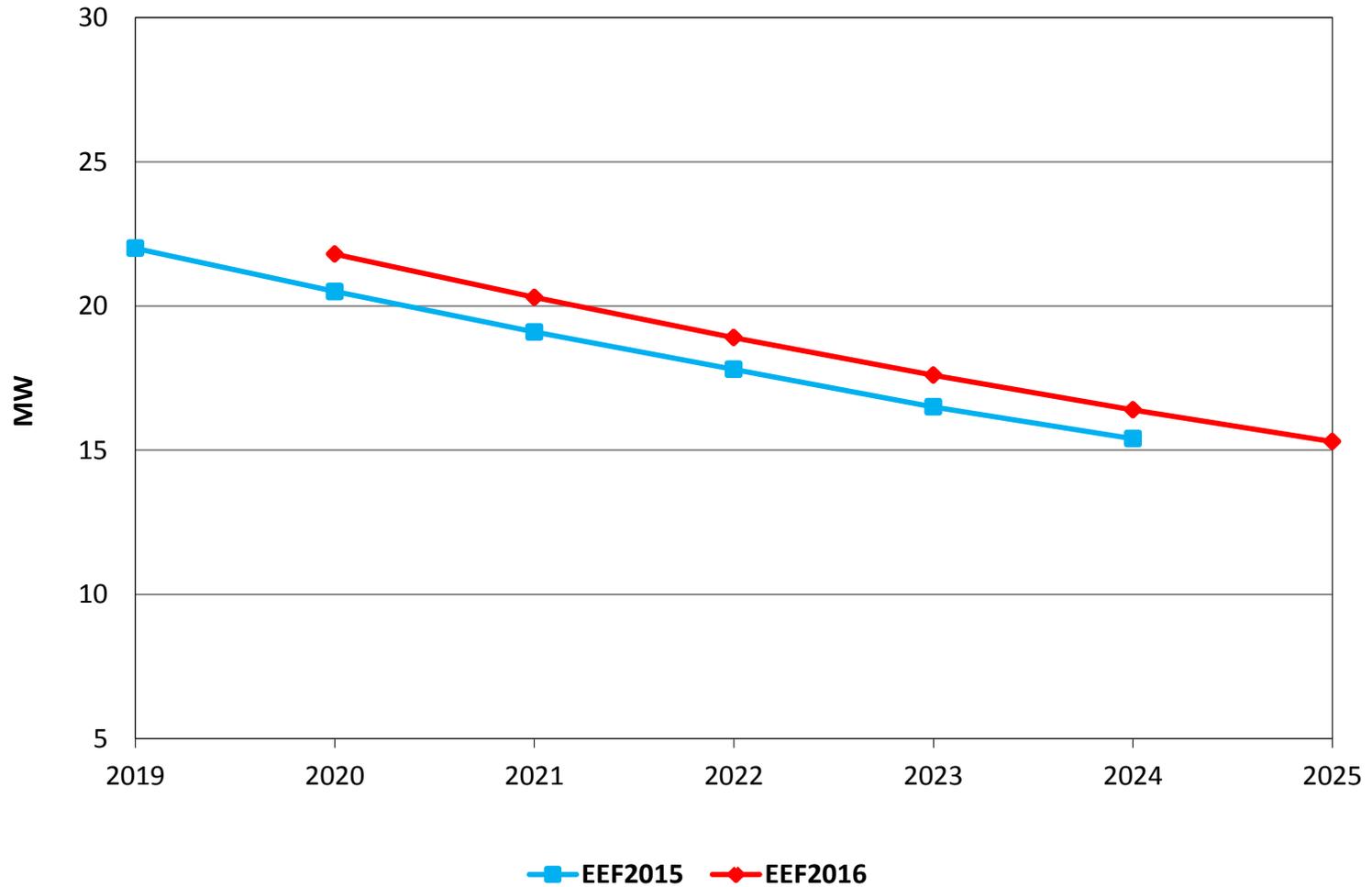
# RHODE ISLAND-SPECIFIC RESULTS



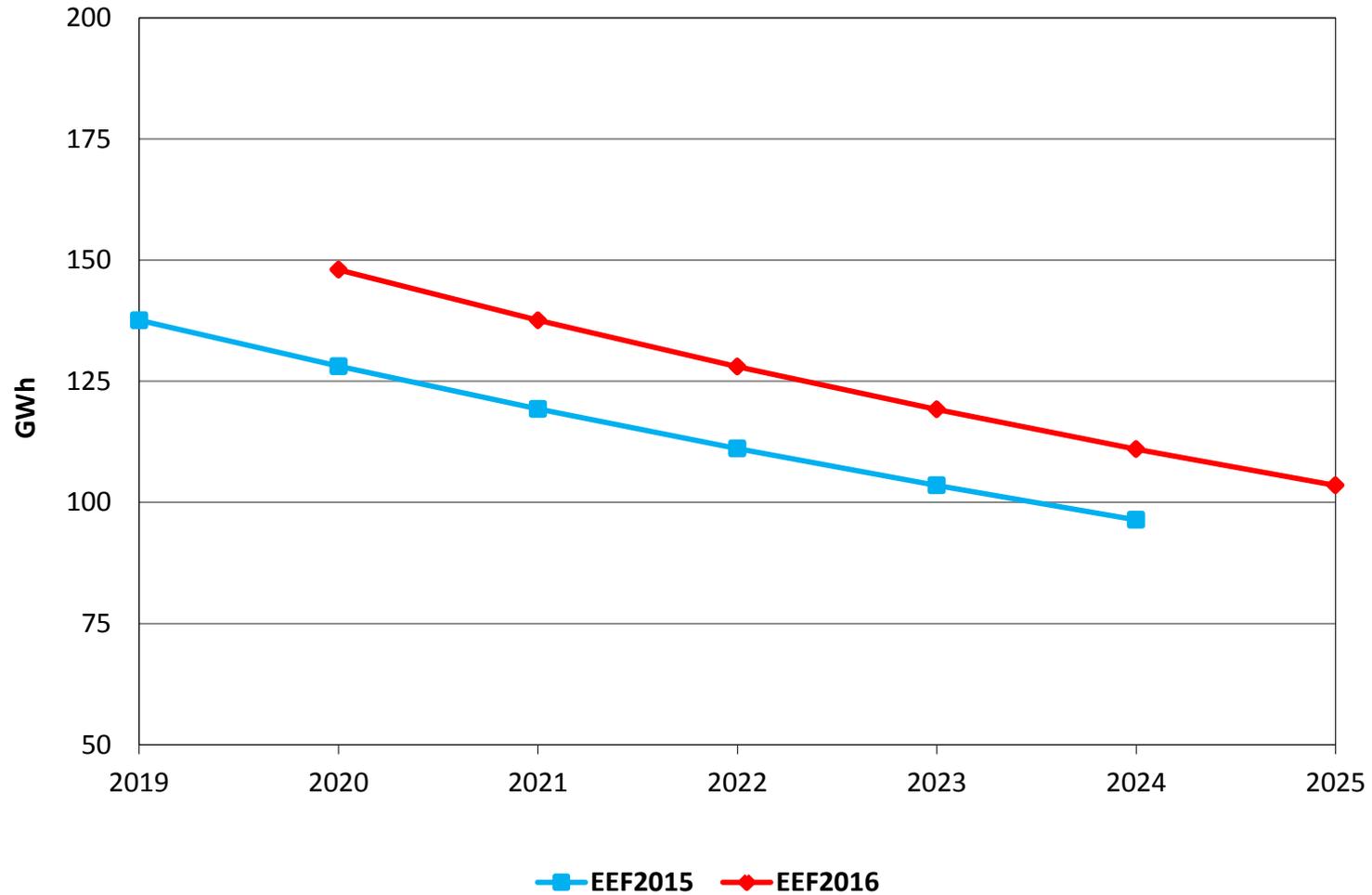
# State-Level Assumptions for Rhode Island

- Budget: Based on illustrative budgets from Commission approved 2015-2017 Energy-Efficiency Plan
- Budget Spend Rate: not applicable
- Production Cost: Based on average of 2012-2014 PA data
- Production Cost Escalation Rate: 5% + 2.5% inflation
- Peak-to-Energy Ratio: Based on average of 2012-2014 PA data

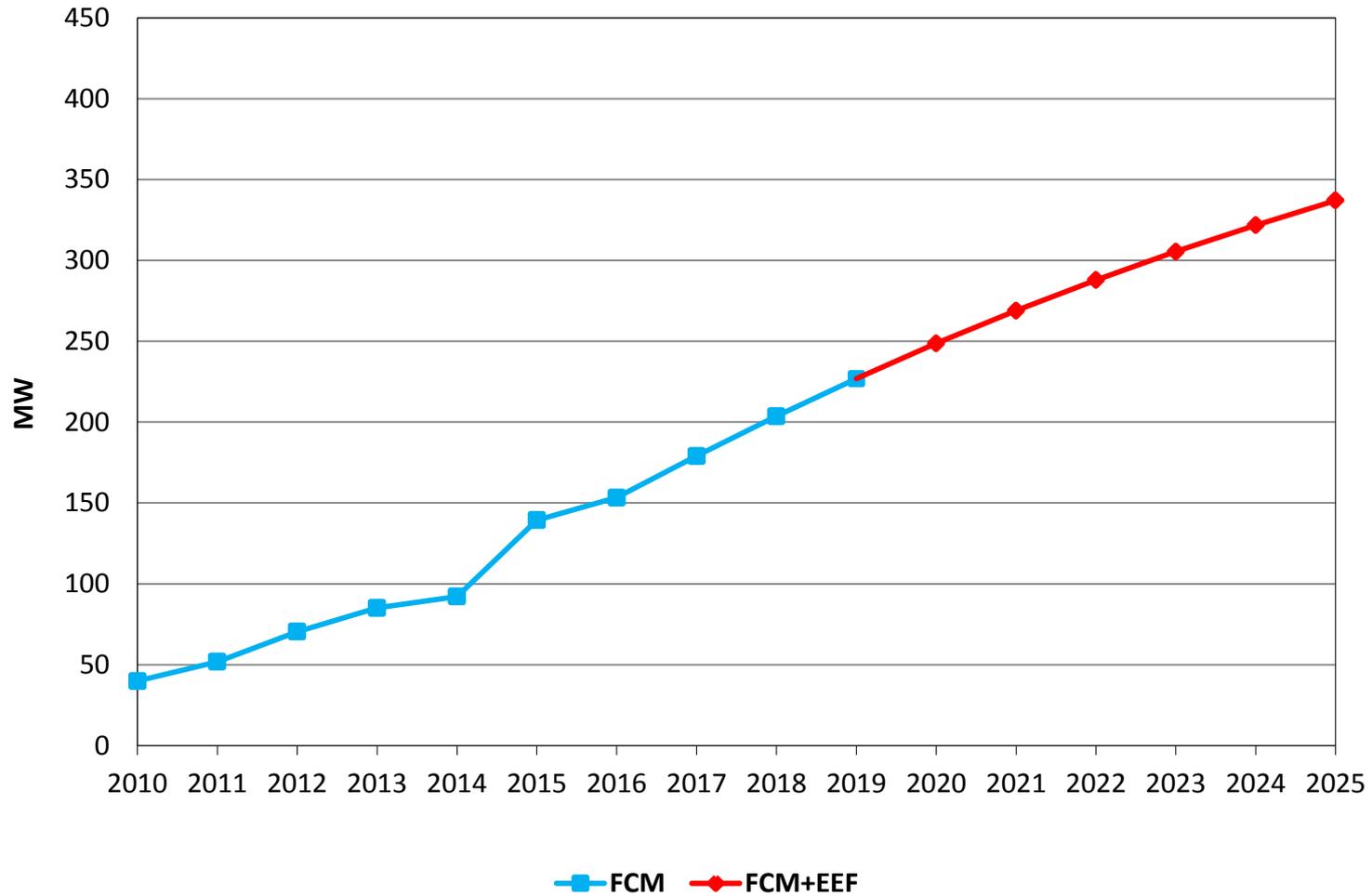
## Rhode Island Forecasted Energy Efficiency Annual Summer Peak Reduction



## Rhode Island Forecasted Energy Efficiency Annual Energy Reduction



## Rhode Island FCM and Forecasted Energy Efficiency Cumulative Summer Peak Reduction

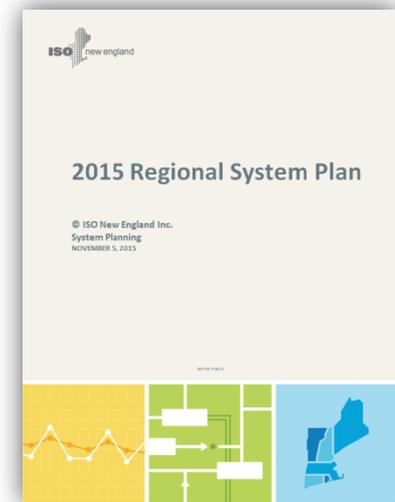


# ENERGY-EFFICIENCY FORECAST IMPACTS ON LONG-RANGE PLANNING

*Transmission and Economic Studies*

# Overview of Transmission Planning

- As the **Regional Transmission Organization**, the ISO is required to identify transmission infrastructure solutions that are essential for maintaining power system reliability in New England
- Through an **open stakeholder process**, the ISO develops long-range plans for the region's networked transmission facilities to address future system needs over the ten-year planning horizon
  - Summarized in a **Regional System Plan (RSP)**
- The transmission planning process is governed by a **FERC-approved tariff**
- The transmission planning process has been revised to comply with the Federal Energy Regulatory Commission's (FERC) **Order 1000**, which requires planning for public policy



# Energy-Efficiency Impacts on Transmission Planning and Economic Studies

- The energy-efficiency forecast is incorporated into long-range transmission planning studies and economic planning studies performed by the ISO
- In 2012, when the ISO launched the energy-efficiency forecast, the New Hampshire-Vermont transmission planning study was updated to include the “proof-of-concept” energy-efficiency forecast, *along with other updates*
- As a result of these updates, six transmission line upgrades, three substation capacitors, and one series circuit breaker were deferred to years beyond 2020
  - A total of \$265.4 million worth of upgrades were deferred

Source: Follow-Up Analysis to the 2011 NH/VT Needs Assessment and Solutions Study

[https://smd.iso-ne.com/committees/comm\\_wkgrps/prtcpnts\\_comm/pac/ceii/mtrls/2012/mar152012/nh\\_vt\\_follow\\_up.pdf](https://smd.iso-ne.com/committees/comm_wkgrps/prtcpnts_comm/pac/ceii/mtrls/2012/mar152012/nh_vt_follow_up.pdf)

# Questions

