Energy-Efficiency Forecast

New Hampshire
Energy Efficiency & Sustainable Energy Board

Eric Wilkinson
EXTERNAL AFFAIRS

Who is ISO New England, and What is Our Role?

- ISO New England was created to oversee the region's restructured electric power system
  - Private, not-for-profit corporation
  - Regulated by the Federal Energy Regulatory Commission (FERC)
- ISO-NE is the Regional Transmission Organization
  - Independent of companies doing business in the market
  - No financial interest in companies participating in the market
- Major Responsibilities
  - Reliable operation of the electric grid
  - Administer wholesale electricity markets
  - Plan for future system needs

New England's Electric Power Grid at a Glance

- 6.5 million households and businesses; population 14 million
- 350+ generators
- 8,000+ miles of high-voltage transmission lines (115 kV and above)
- 13 interconnections to electricity systems in New York and Canada
- 32,000 megawatts (MW) of supply
  - About 2,000+ MW are demand resources
- 28,130 MW all-time peak demand, on August 2, 2006
- Over 400 participants in the marketplace
- $5-11 billion annual wholesale electricity market value

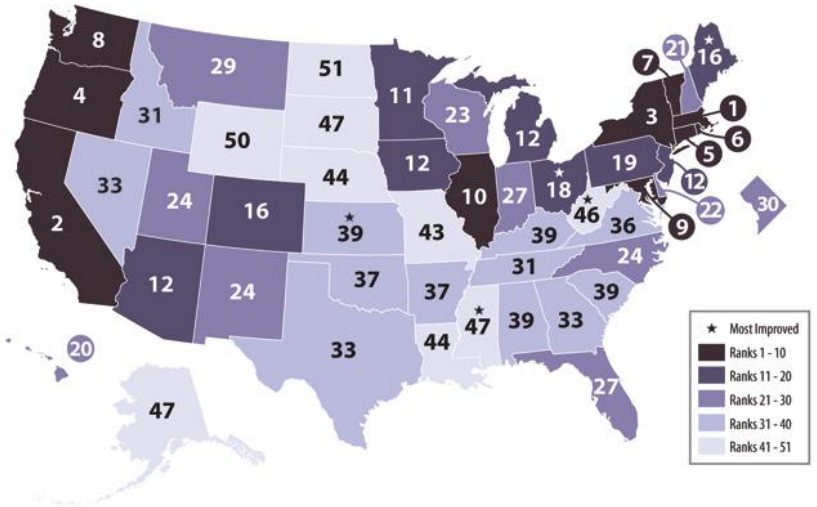
ENERGY-EFFICIENCY IN NEW ENGLAND

Background

Energy Efficiency (EE) Basics

- New England states rank high in national EE assessments
  - See www.aceee.org
- Individual states set goals for reduced electricity use
  - EE programs directly funded by various state-approved sources
  - Fairly long track record

2013 State Energy-Efficiency Scorecard



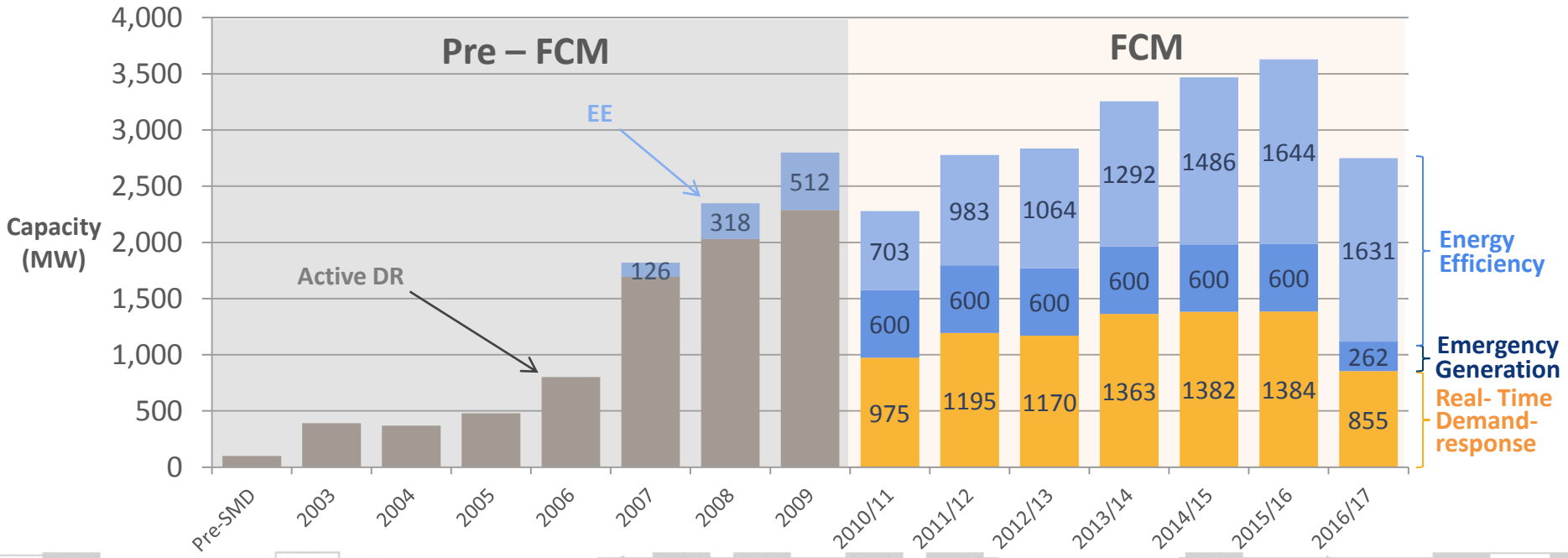
- EE measures are installed devices or processes that use less electricity
  - Common measures: lighting, building insulation, HVAC upgrades, appliances, and industrial process improvements

EE Treated as a Resource in the Forward Capacity Market

- ISO New England's Forward Capacity Market (FCM) compensates EE as a resource, the same as power plants
  - All EE resources participate in the FCM
  - FCM provides a revenue stream that facilitates development of EE
- Results for each annual FCM auction provide the ISO with specific data on EE quantities three years into the future
  - Example: the February 2014 auction commits EE resources for the one-year period June 1, 2017 through May 30, 2018
- But ISO's long-term system plans look ahead 10 years
  - Example: the 2014 Regional System Plan covers 2014-2023

EE Has Grown Significantly Under the FCM

- 2013 auction procured resources obligated for 2016-2017
  - 32,968 MW total capacity that will be needed – about 5% from EE



Stakeholder Input Critical to Understanding EE

- The ISO created the Energy-Efficiency Forecast Working Group
- Consists of wide range of stakeholders:
  - Regulators
  - Utilities
  - EE program administrators
  - Advocates
  - Other interested parties
- Meets regularly
  - Assists with EE data collection
  - Reviews preliminary results and methodology

ENERGY-EFFICIENCY FORECAST

Development

ISO Incorporates EE into Long-term System Planning

- Cumulative FCM auction results tell ISO-NE exactly how much EE savings can be counted on for years 1 through 3 of the 10-year forecast
- States encouraged ISO-NE to forecast incremental growth in energy savings
  - Previously, ISO held EE constant beyond the three-year FCM timeframe for planning studies
- **Result**: ISO developed a EE forecast that is now integrated into ISO's planning processes

Creation of an EE Forecast Model

- ISO developed a forecast of “EE savings”—how much electric energy will not be used—across a 10-year planning horizon
- First multi-state, long-term forecast of energy-efficiency savings
  - Does not include estimates of how much money was saved
  - Forecasts only results from state-sponsored EE programs
- An EE forecast requires data on each program’s spending and level of energy savings achieved
  - No aggregated data available; required collection of data on 125+ individual programs with different funding sources, goals, and reporting methods

Fundamentals of EE Forecast Model

1) MWh = [(1-BU) * Budget $] / [$/MWh * PCINCR]

Budget $	estimate of EE dollars to be spent	$/MWh	production cost ($/MWh)
BU	budget uncertainty (%)	PCINR	increases in production costs (%)

2) MW = MWh * PER

PER	peak to energy ratio (MW/MWh)

DRAFT ENERGY-EFFICIENCY FORECAST

2017 to 2023

Summary of Draft EE Forecast (2017 to 2023)

- Draft forecast results are slightly larger than the 2013 forecast results due to increased budgets in ME and CT
- Program performance changes from 2013 forecast
  - Production cost increased slightly: less energy reductions from equivalent budgets
  - Peak-to-Energy Ratios decreased slightly: less demand reductions from equivalent energy reductions
- Results vary state by state, generally:
  - Energy remains flat for the region with notable reductions in energy in VT and RI
  - Demand reductions from EE slows peak growth rate in the region
- This draft forecast will be updated with the results of the 8th Forward Capacity Auction

Draft Regional EE Forecast Results (2017 to 2023)

- Peak demand rises more slowly than with traditional forecast
  - Average annual reduction in peak demand: **204 MW**
  - Total projected reduction over seven years: **1,426 MW**
  - In VT, forecasted peak demand declines

- Annual electricity consumption remains flat compared to traditional forecast
  - Average annual energy savings: **1,504 GWh**
  - Total projected reduction over seven years: **10,525 GWh**
  - RI and VT forecasts show declining annual electricity consumption

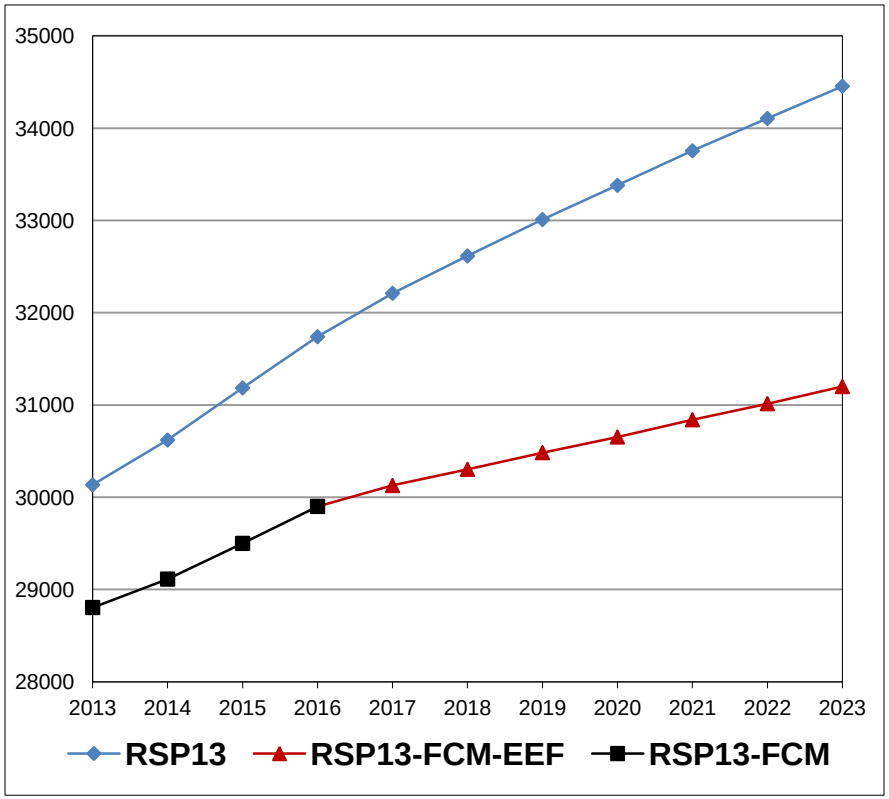
Energy and Summer Peak EE Forecast Data

GWh Savings							
	ME	NH	VT	CT	RI	MA	ISO-NE
2017	152	70	131	384	147	927	1,811
2018	142	66	125	360	137	868	1,698
2019	132	63	120	337	128	812	1,592
2020	122	59	117	316	119	759	1,493
2021	114	56	110	296	111	710	1,397
2022	106	53	106	277	104	663	1,308
2023	99	50	102	259	96	620	1,225
Total	**866**	**417**	**811**	**2,227**	**843**	**5,360**	**10,525**
Average	124	60	116	318	120	766	1,504
MW Savings							
2017	21	11	18	47	23	125	245
2018	20	11	18	44	21	117	230
2019	19	10	17	41	20	109	216
2020	17	10	17	38	18	102	202
2021	16	9	16	36	17	96	189
2022	15	9	15	34	16	89	177
2023	14	8	14	31	15	83	166
Total	**122**	**68**	**114**	**271**	**130**	**721**	**1,426**
Average	17	10	16	39	19	103	204

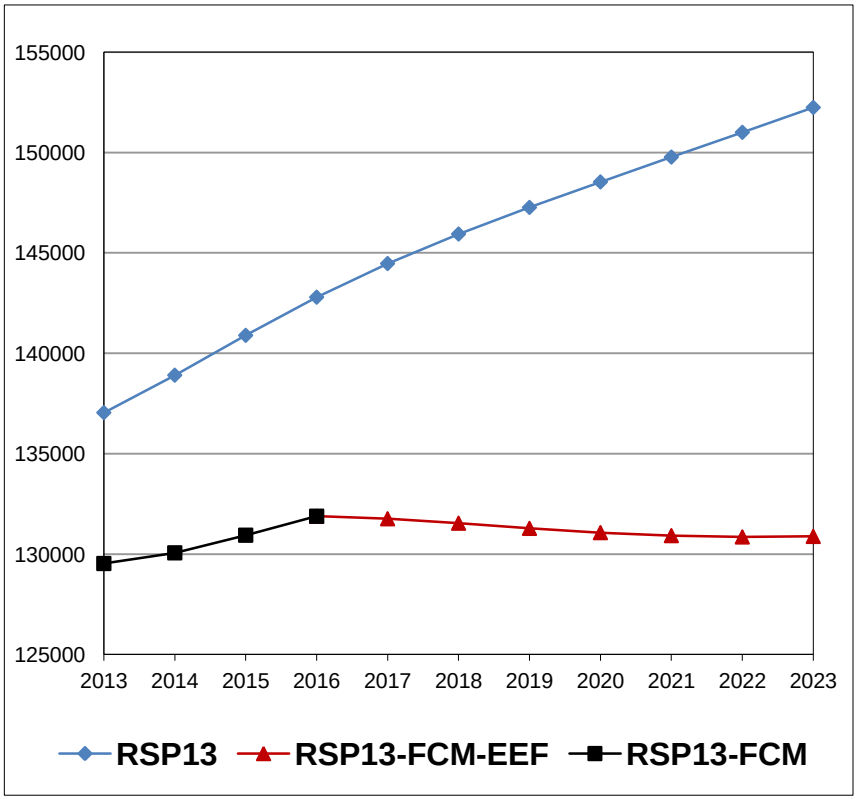
New England Results

Lower Peak Demand Growth, Level Energy Demand

Peak (MW)



Annual Energy (GWh)



ENERGY-EFFICIENCY FORECAST

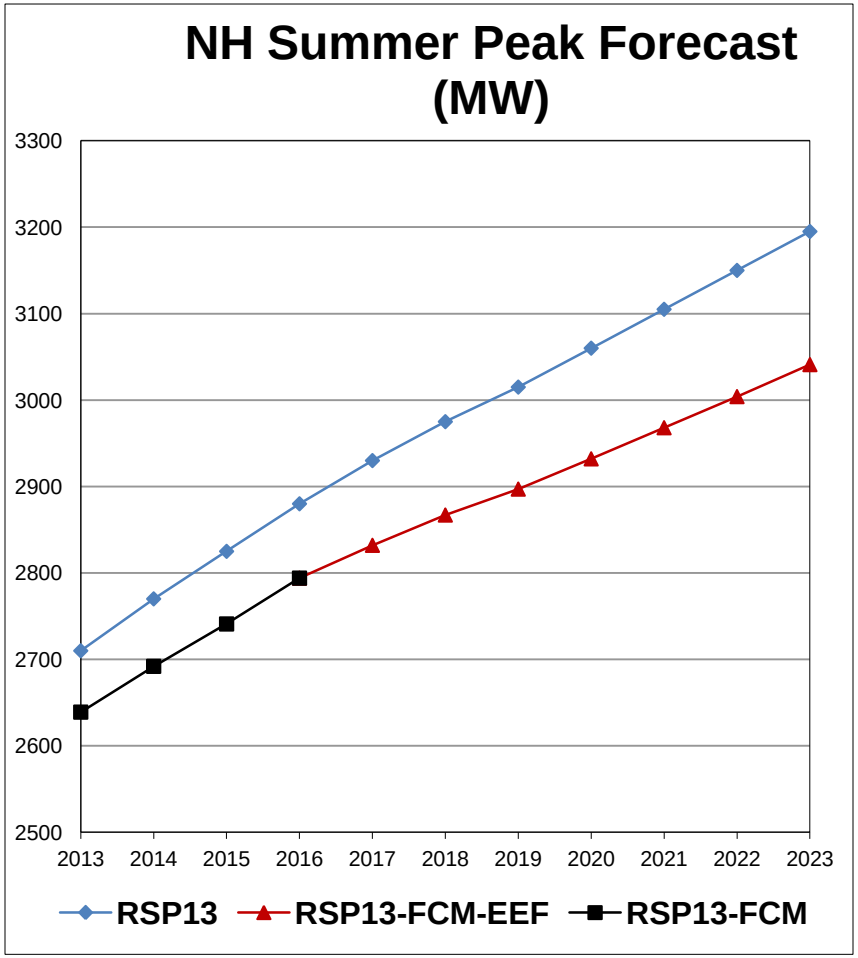
New Hampshire and Maine Results

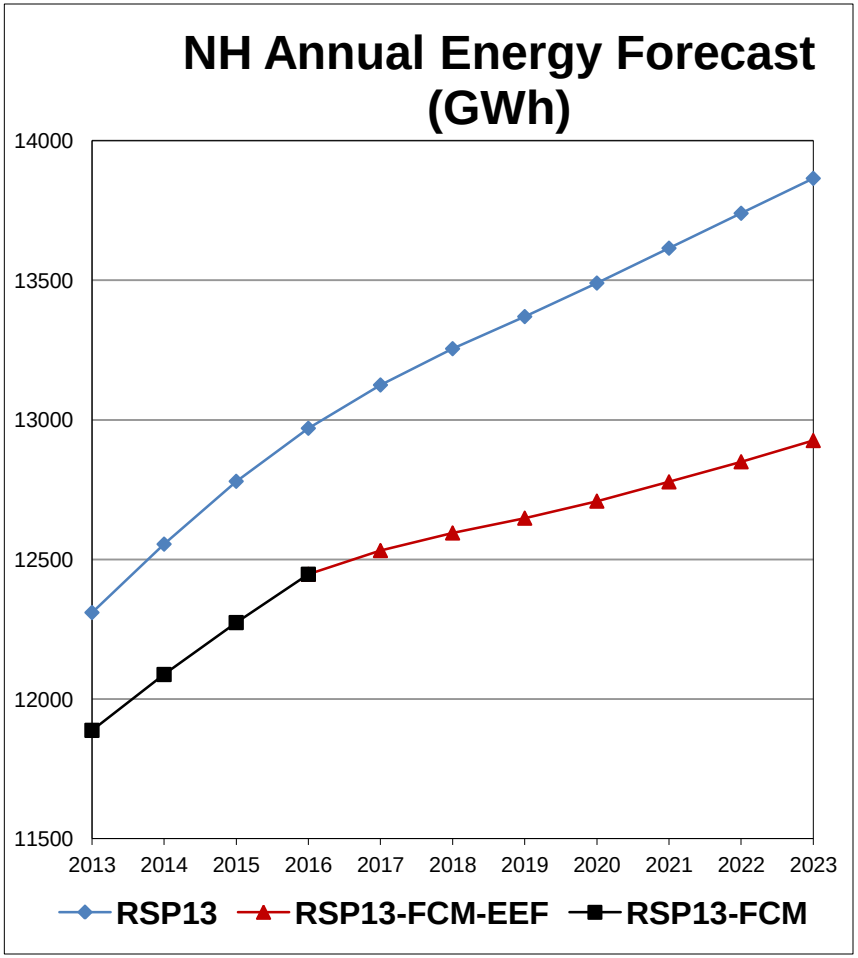
New Hampshire: Energy Efficiency by the Numbers

- Energy-efficiency forecast, 2017-2023:
  - Total spending: $222.8 million
  - Projected total reduction in energy consumption
    - 417 GWh
    - Annual average: 60 GWh
  - Projected total reduction in peak demand:
    - 68 MW
    - Annual average: 10 MW

- NH program administrators:
  - PSNH
  - Unitil
  - Liberty
  - NHEC

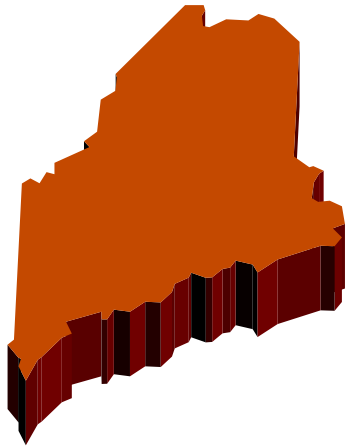
New Hampshire Peak and Annual Energy Consumption Forecast, 2013-2023





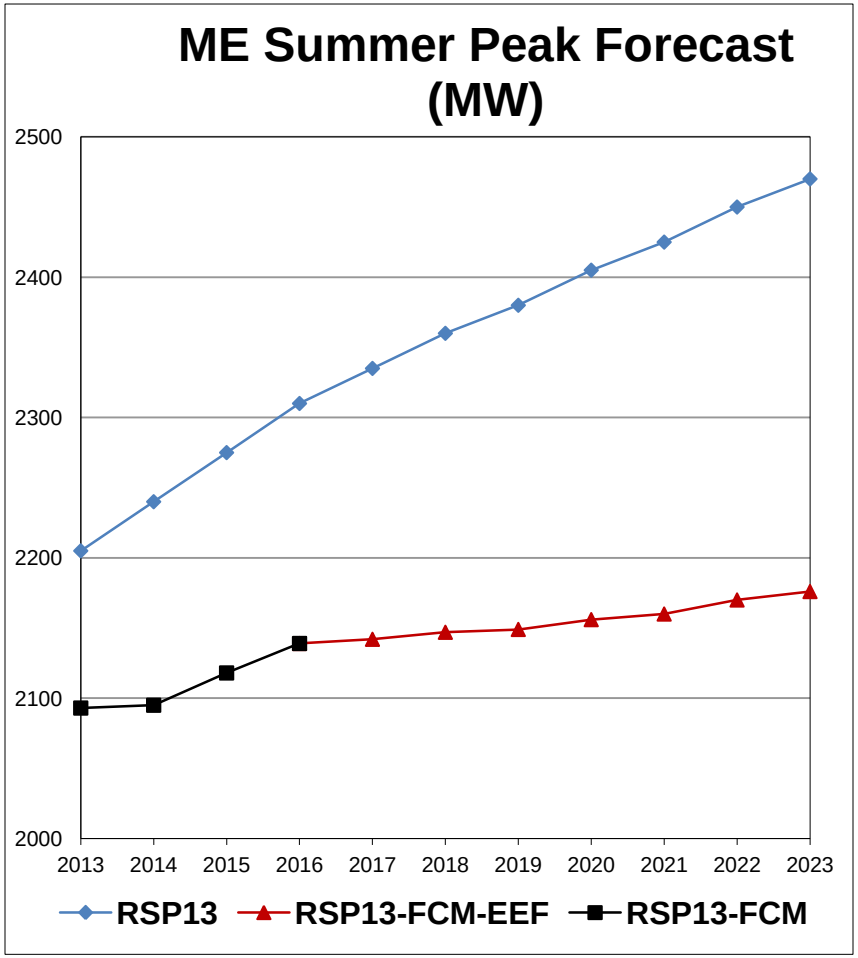
Maine: Energy Efficiency by the Numbers

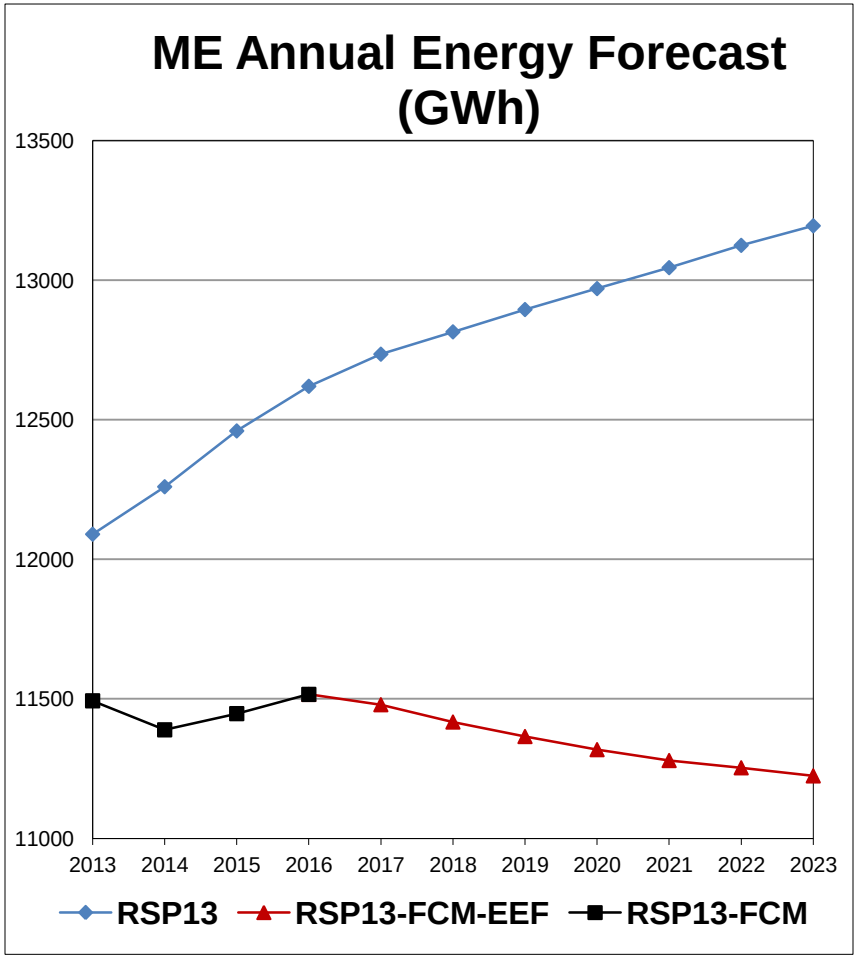
- Energy-efficiency forecast, 2017-2023:
  - Total spending: $364 million
  - Projected total reduction in energy consumption
    - 866 GWh
    - Annual average: 124 GWh
  - Projected total reduction in peak demand
    - 122 MW
    - Annual average: 17 MW



- ME Program Administrators:
  - Efficiency Maine
  - Maine Public Utilities Commission

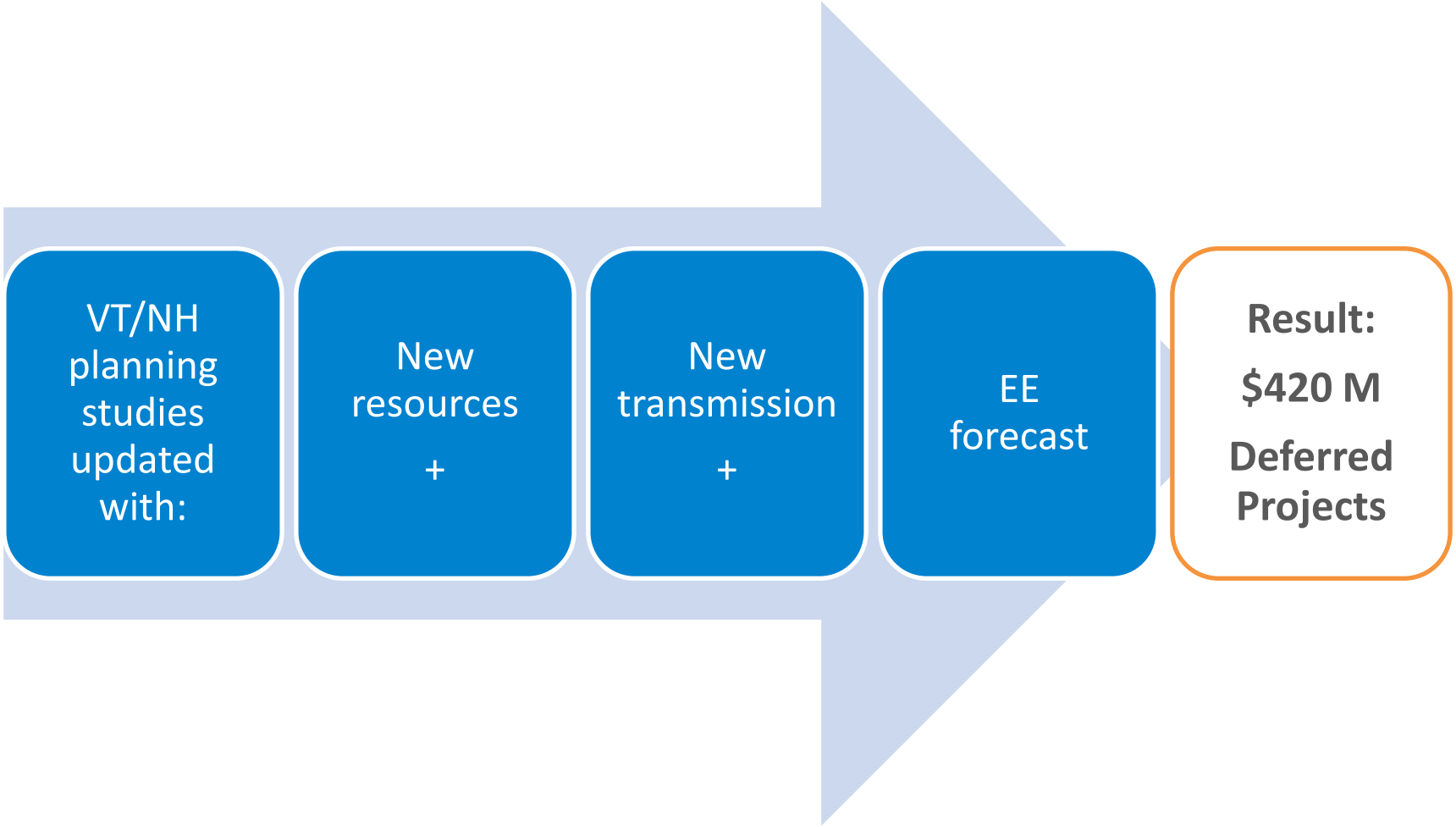
Maine Peak and Annual Energy Consumption Forecast, 2013-2023





EE Forecast Is Affecting Grid Planning

Previously Identified Transmission in Vermont & New Hampshire Deferred



Conclusions

- States continue to make large investments in EE
- ISO worked successfully with stakeholders to integrate EE data into ISO's long-term planning processes
- EE forecast shows the states' investment is having a significant impact on electric energy consumption and peak demand
- EE forecast affecting regional planning decisions
- Similar effort is now underway to forecast distributed generation

APPENDIX

Additional State and Regional Information Available

- See www.iso-ne.com/eefwg for:
  - Draft EE forecast results for the other New England States
  - Data submitted by all EE program administrators used in calculating the EE forecast
  - Stakeholder meeting information

Acronyms

- FCM—Forward Capacity Market
- PA—Program Administrator
- RGGI—Regional Greenhouse Gas Initiative
- SBC—System Benefit Charge
- CSO—Capacity Supply Obligation (FCM)
- RSP—Regional System Plan
- CELT—10-year forecast of capacity, energy, loads and transmission

2014 EE Forecast Timeline

Subject to modification