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ISO New England's Energy-Efficiency Forecast

The New England Electricity Restructuring Roundtable

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DEMAND RESOURCE QUALIFICATION RESOURCE ANALYSIS AND INTEGRATION

About ISO New England

Not-for-Profit Corporation

- Created in 1997 to oversee New England's restructured electric power system; regulated by Federal Energy Regulatory Commission

Regional Transmission Organization

- Independent of companies doing business in market; no financial interest in companies participating in the market

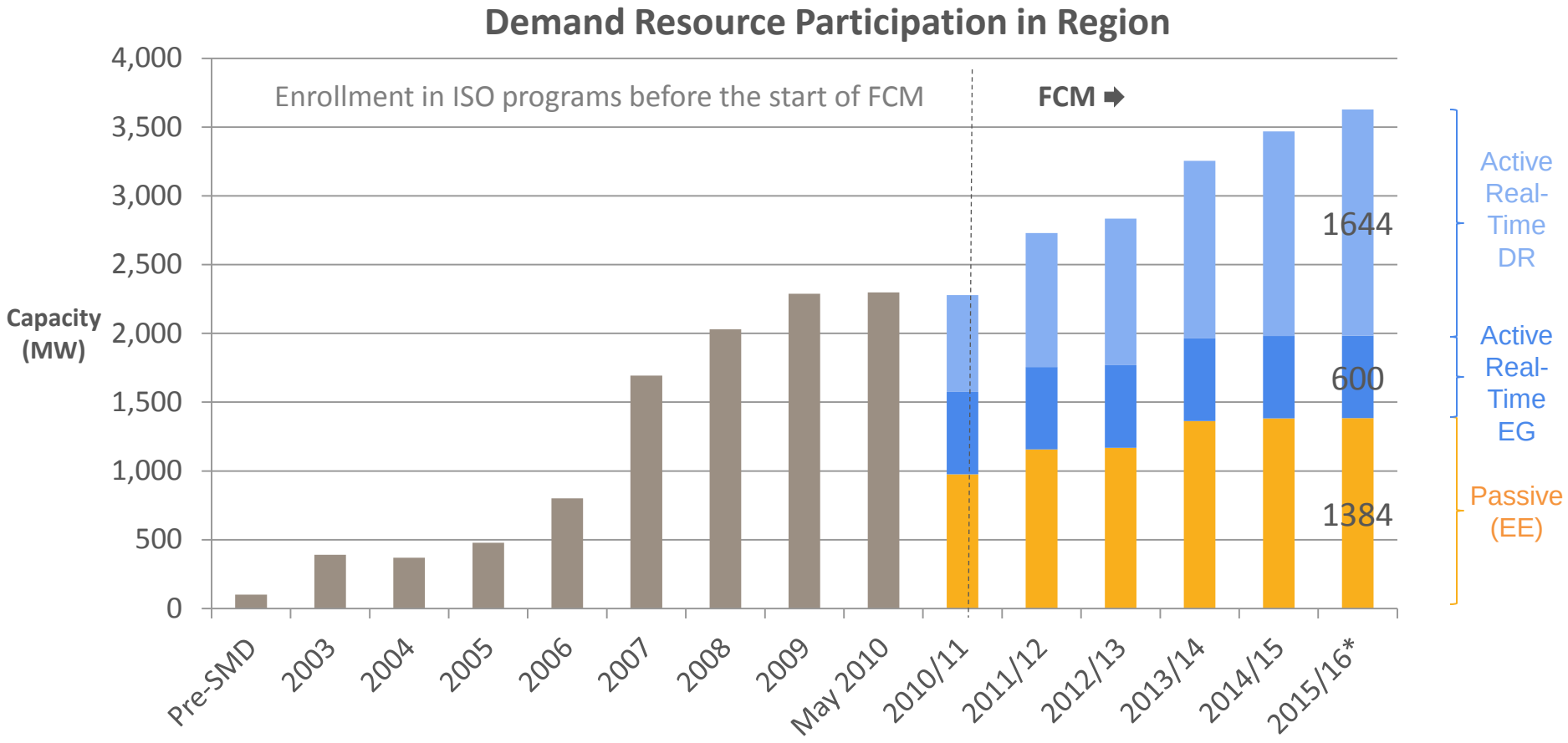
Major Responsibilities

- Maintain reliable operation of the electric grid
- Administer wholesale electricity markets
- Plan for future system needs

Energy-Efficiency (EE) Forecast Background

- New England states are making large investments in EE through many programs.
- ISO staff has been working with regional stakeholders to explore the long-range impacts of state-sponsored EE.
  - Created the Regional Energy-Efficiency Initiative in 2009
    - Met with states and utilities to understand the magnitude of EE programs
    - Results summarized in the *2010 Regional System Plan* (RSP10)
- ISO-NE conducted research on EE forecasting and developed proof-of-concept EE forecast (EEF) for stakeholder input in 2011.

Demand Resources Growing in New England



2010/11–2014/15: Total DR cleared in FCAs #1 – #5; real-time emergency generation capped at 600 MW

* Results for FCA #6 are preliminary and subject to certification by ISO New England and its auction contractor Power Auctions LLC

ISO's Current Forecast Practice

EE Incorporated

- Load Forecast
  - Past actual EE not modeled as a resource in FCM is reflected in historical data and subsequent load forecasts.
  - Impact of future federal appliance-efficiency standards is reflected.
- Installed Capacity Requirement (ICR)
  - EE resources with obligations in the FCM are treated as resources that contribute toward meeting New England's ICR.

Longer-term Incremental EE Not Incorporated

- Beyond the FCM timeframe, levels of EE are held constant.
- Therefore, incremental EE growth is not captured in ten-year-out transmission planning studies.

ISO-NE EE Forecast Process

- Completed EE forecast during normal forecasting cycle and include in the annual RSP
- Published EE forecast would be to accompany the traditional 10-year load forecast, typically in early spring of each year
- EE Working Group provides ongoing input on EE forecast assumptions and methodology
  - State representatives and utility Program Administrators (PAs)
  - Chaired by ISO staff
- Collect data from PAs
- Review data and preliminary model results in EE Working Group
- Finalize forecast for the annual RSP

Use of EE Forecast

- EE forecast would be used in studies looking beyond the FCM timeframe
  - Long-term transmission planning studies
  - Economic planning studies
  - Other planning studies
- EE forecast would not affect:
  - FCM auctions
  - ICR/local sourcing requirement/maximum capacity limit
  - FCM-related reliability studies (qualification, delist bids, non-price retirement bids)
  - Any system operations analysis across the four-year FCM window

Key Parameters for EE Forecast Model

MW = Budget $ * %Spent * MWh/$ * RR * MW/MWh

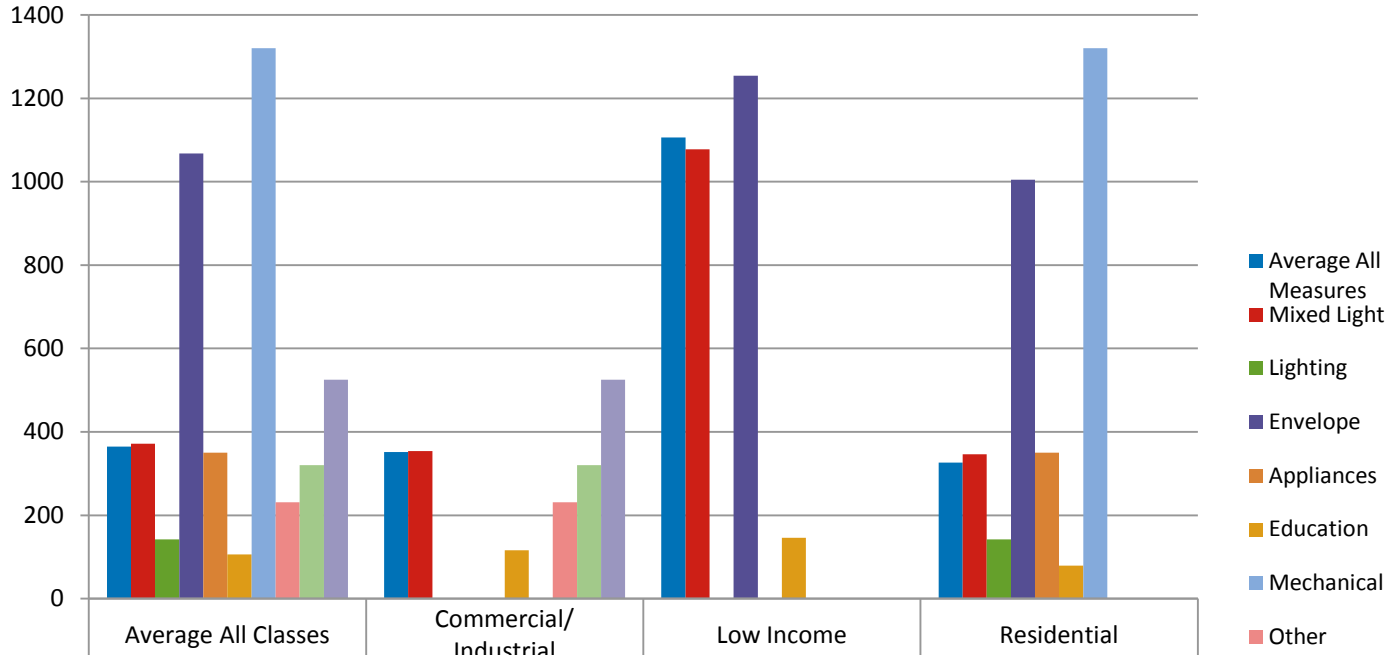
- **Budget $**: an estimate of the dollars to be spent on EE (including budget uncertainty)
- **%Spent**: percentage of dollars that can be spent on EE programs in that time period–developed from historical data
- **MWh/$**: megawtt-hour savings per dollar spent–developed from historical data (includes cost increases and decreases)
- **RR**: realization rate comparison of observed/measured savings to estimated savings–developed from historical data
- **MW/MWh**: peak-to-energy ratio (inverse of load factor)–developed from historical data (from the load forecast for proof-of-concept)

Production Cost Summary

	Total Costs $1000s	Achieved Annual ergy (MWh)	Dollars per MWh	Achieved Summer Peak (MW)	Dollars per MW	% Energy Achieved	% Budget Spent	Achieved Lifetime Energy	Lifetime Dollars per MWh	Peak to Energy Ratio MW/GWh
New England										
2008	193491	663634	292	104	1864396	103	103	7401611	26	0.15638
2009	351008	933470	376	153	2294948	83	107	10685610	33	0.16385
2010	499665	1370739	365	196	2548389	110	105	14625840	34	0.14304
2011	142243	534638	266	61	2316632	130	132	4611472	31	0.11485
Connecticut										
2009	73411	222500	330	34	2150181	60	83	2464777	30	0.15345
2010	144938	405043	358	50	2907253	113	124	3533541	41	0.12308
2011	119426	381974	313	43	2769431	93	111	3163706	38	0.11290
Maine (Maine Efficiency Trust)										
2009	13806	55176	250	6	2127537	0	0	519953	27	0.11760
2010	16846	74180	227	8	2198392	0	0	709392	24	0.10330
2011	22817	152663	149	18	1248348	0	0	1447766	16	0.11973
Massachusetts										
2008	126376	388254	325	59	2149443	98	106	4452237	28	0.15143
2009	192362	424652	453	70	2751448	81	114	5075859	38	0.16464
2010	253086	619638	408	92	2756933	100	92	7336580	34	0.14815
New Hampshire										
2008	18177	64173	283	13	1358547	127	94	770818	24	0.20850
2009	17988	59691	301	13	1413028	139	99	750029	24	0.21326
2010	21763	73710	295	17	1309063	121	100	894648	24	0.22555
Rhode Island (NECO NGRID)										
2008	16248	60053	271	10	1589028	110	112	717714	23	0.17027
2009	26211	81543	321	15	1702327	103	113	899331	29	0.18882
2010	27581	81275	339	13	2163860	116	110	929242	30	0.15683
Vermont										
2008	32689	151154	216	21	1528816	106	96	1460841	22	0.14146
2009	27230	89907	303	14	1907265	92	94	975655	28	0.15880
2010	35451	116894	303	17	2039380	88	104	1222437	29	0.14871

PA data for missing years (2008 or 2011) are excluded in state-level data.

2010 New England Energy Efficiency
Average Production Costs – Dollar/MWH



	Average All Classes	Commercial/ Industrial	Low Income	Residential
Average All Measures	365	352	1106	326
Mixed Light	372	354	1078	346
Lighting	142	0	0	142
Envelope	1068	0	1254	1005
Appliances	350	0	0	350
Education	106	116	146	79
Mechanical	1320	0	0	1320
Other	231	231	0	0
Process	320	320	0	0
Mech/Proc	525	525	0	0

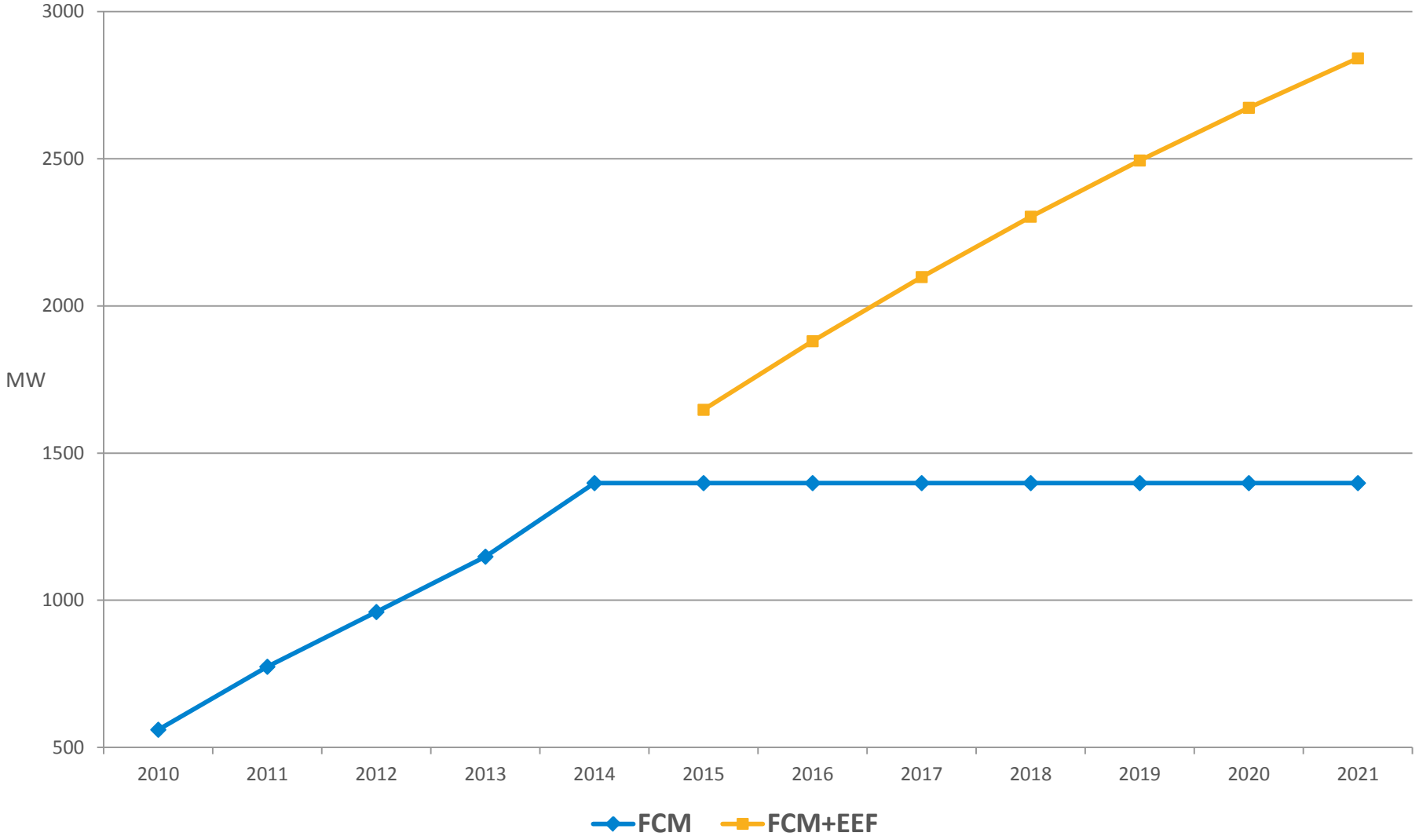
Production Cost and Total Dollars

Production Cost ($/MWh)							
		ME	NH	VT	CT	RI	MA
2015		324	398	443	465	502	570
2016		352	428	476	500	540	613
2017		384	460	512	537	580	659
2018		419	494	550	577	624	708
2019		459	531	591	621	670	762
2020		504	571	636	667	721	819
2021		555	614	684	717	775	880
Total Dollars ($1,000s)							
	Sum of States	**ME**	**NH**	**VT**	**CT**	**RI**	**MA**
2015	791,927	27,103	24,282	45,900	107,103	77,417	510,122
2016	798,485	27,416	24,858	45,900	108,400	77,882	514,030
2017	804,873	27,720	25,430	45,900	109,673	78,312	517,837
2018	811,026	28,011	25,978	45,900	110,887	78,756	521,494
2019	816,760	28,287	26,511	45,900	112,034	79,057	524,971
2020	822,303	28,552	27,028	45,900	113,151	79,371	528,300
2021	827,738	28,802	27,538	45,900	114,265	79,685	531,548
Total	5,673,112	195,891	181,625	321,300	775,513	550,480	3,648,302
Peak-to-Energy Ratio (MW/GWh)		0.109	0.164	0.185	0.134	0.173	0.155

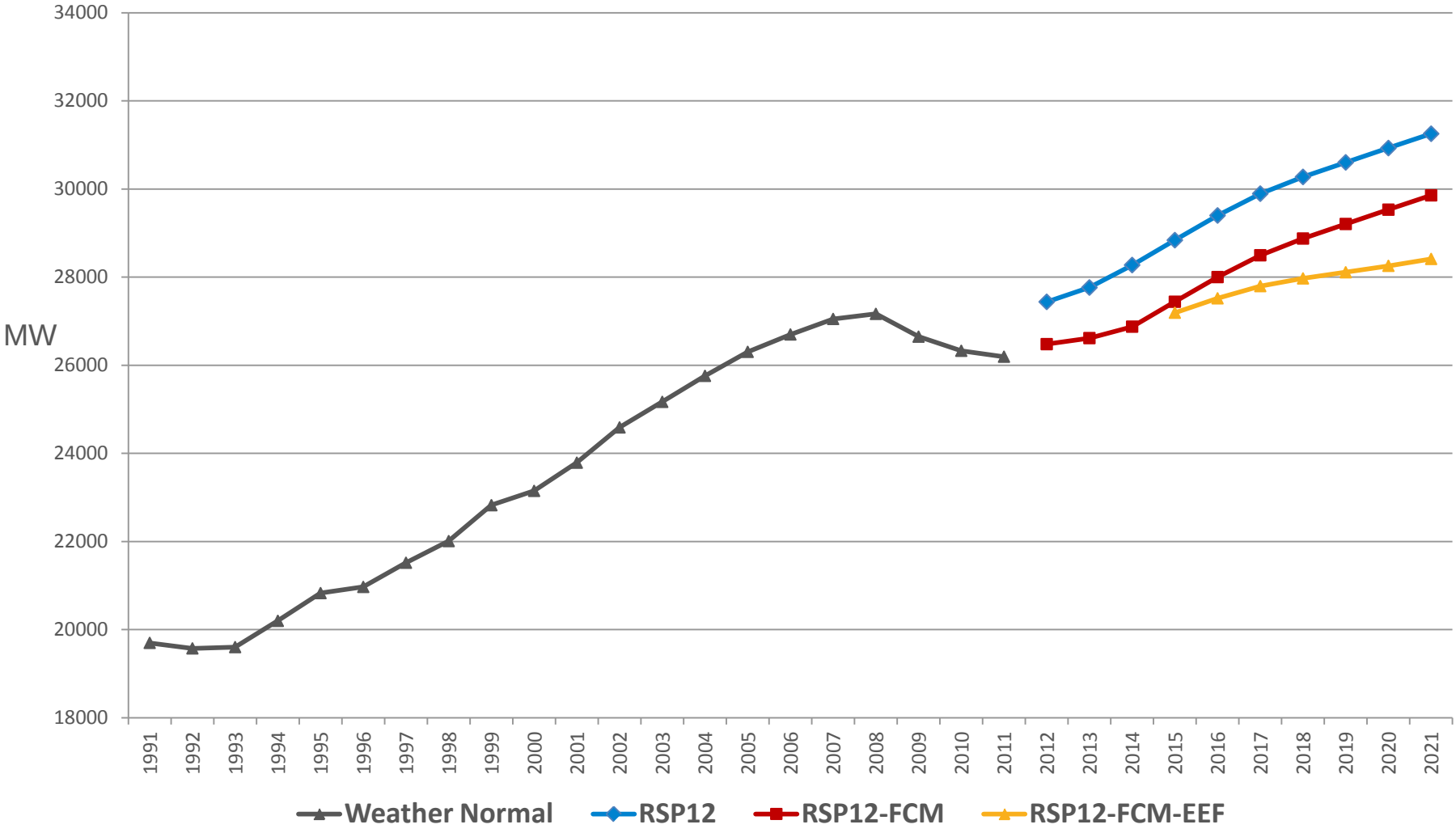
Energy and Summer Peak EE Forecast Data

GWH Savings							
	Sum of States	ME	NH	VT	CT	RI	MA
2015	1,619	89	65	110	244	163	948
2016	1,518	82	62	102	230	153	889
2017	1,423	77	59	95	216	143	833
2018	1,333	71	56	88	204	134	780
2019	1,247	65	53	82	191	125	731
2020	1,167	60	50	77	180	117	684
2021	1,092	55	48	71	169	109	640
Total	9,399	499	393	625	1,434	944	5,505
Average	1,343	71	56	89	205	135	786
MW Savings							
	Sum of States	ME	NH	VT	CT	RI	MA
2015	249	10	11	20	33	28	147
2016	233	9	10	19	31	26	138
2017	218	8	10	18	29	25	129
2018	205	8	9	16	27	23	121
2019	192	7	9	15	26	22	113
2020	179	7	8	14	24	20	106
2021	168	6	8	13	23	19	99
Total	1,444	55	65	115	193	163	853
Average	206	8	9	16	28	23	122

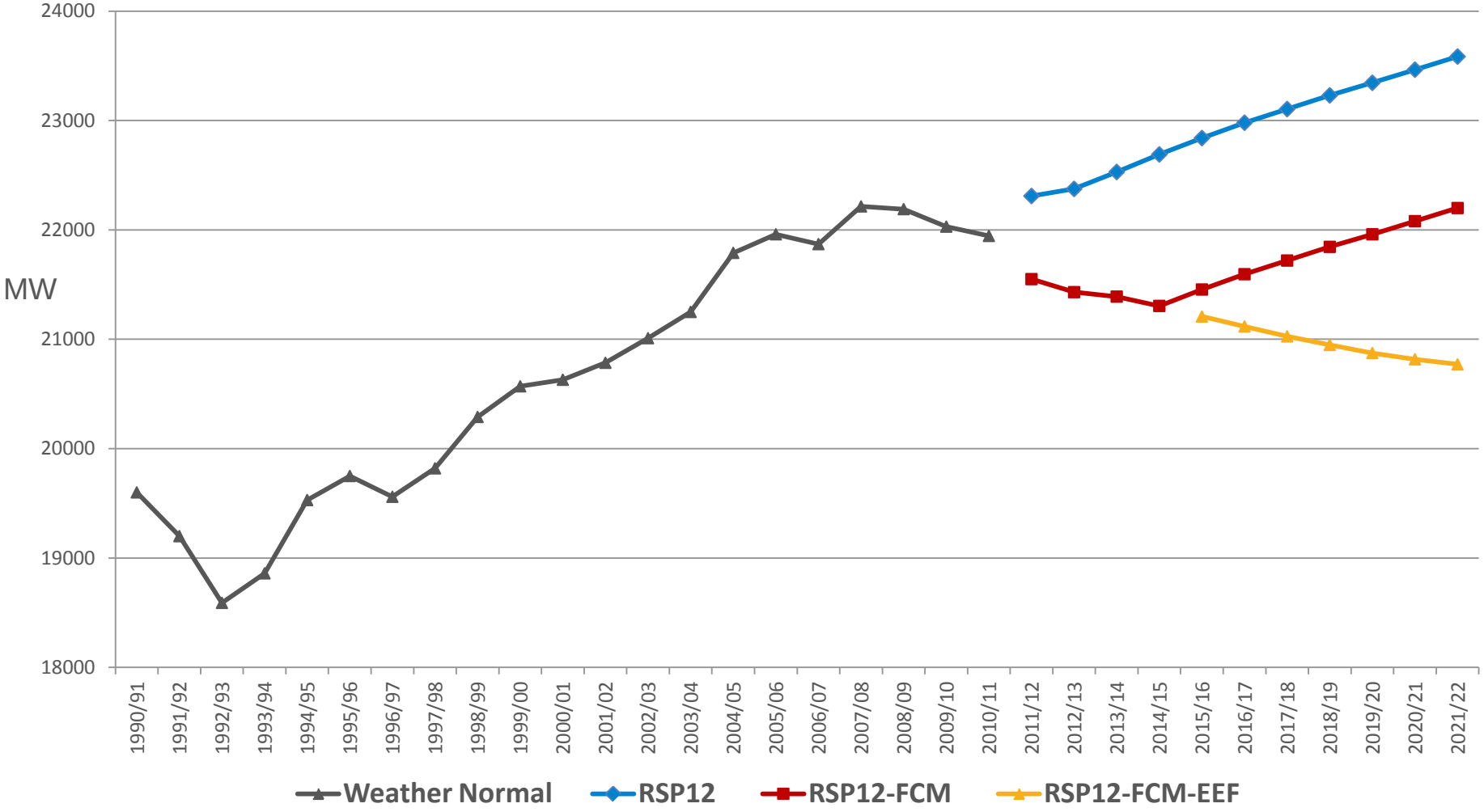
ISO-NE Energy Efficiency on Summer Peak



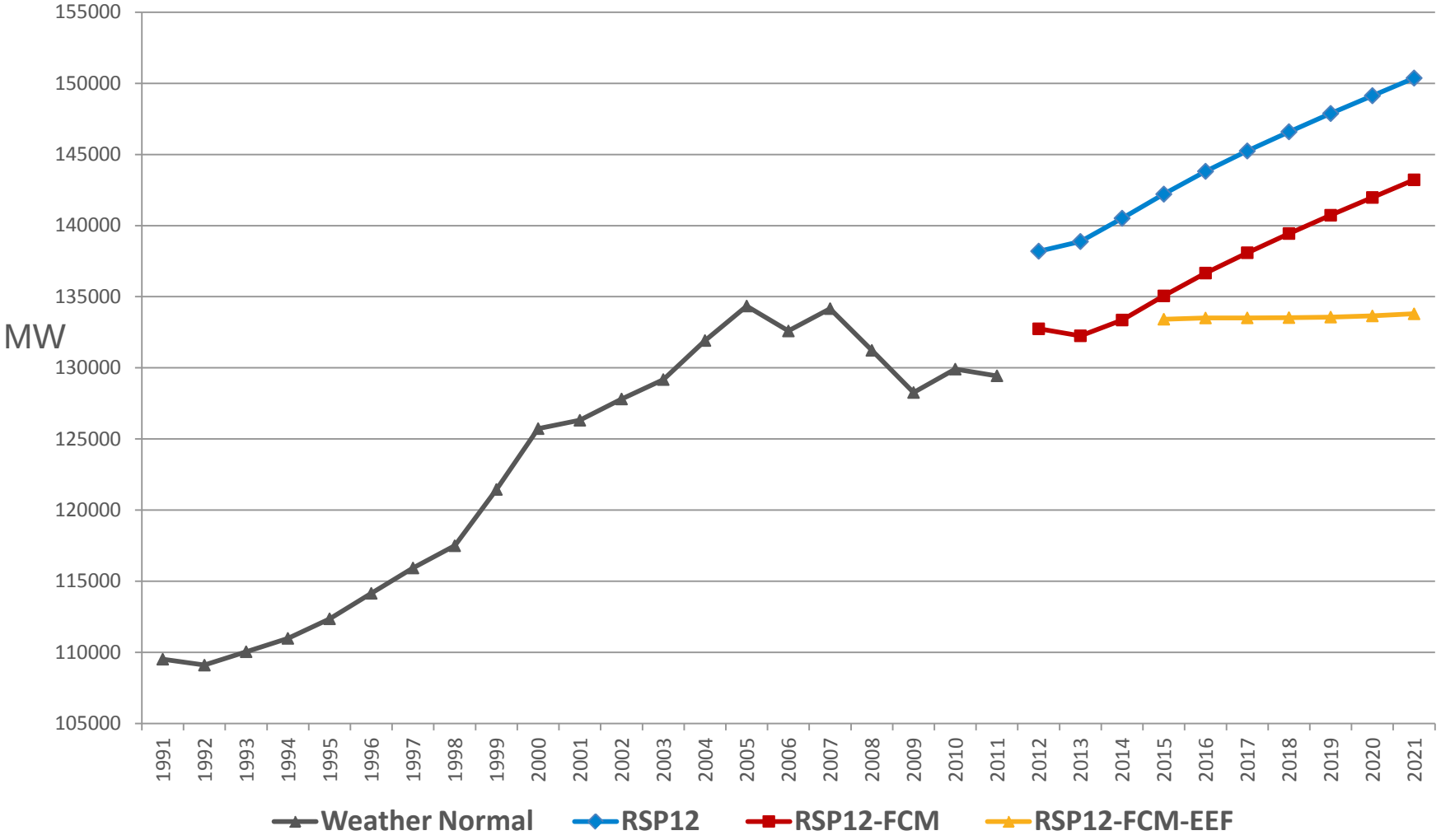
ISO-NE RSP12 50/50 Summer Peaks
Weather-Normal History 1991—2011 and Forecast 2012—2021



ISO-NE RSP12 50/50 Winter Peaks
Weather-Normal History 1991—2010 and Forecast 2011—2021



ISO-NE Annual Energy
Weather-Normal History 1991–2011 & Forecast 2012–2021



Questions