Synapse
Energy Economics, Inc.

Energy Efficiency as a Resource

presented by Paul Peterson

NAESCO Midwest Regional Meeting

How an Evolving Utility Industry May Change the Current Market for Energy Efficiency

June 6, 2013

Synapse Energy Economics

- Consulting firm in Cambridge Massachusetts with a staff of 30 people
- Issues
  - Electric industry restructuring & utility rate cases
  - Wholesale markets, ISOs, and RTOs
  - Resource development and retirements
  - Environmental impacts of power industry
- Clients
  - State Consumer Advocates and Utility Commissions
  - Public Interest and Environmental groups
  - EPA and DOE
  - RTO stakeholders

Energy Efficiency Resource Attributes

- Non-dispatchable, passive resource
- Predictable operation
- Measurable savings:
  - Direct measurement (meter)
  - Profiled measurement from studies
  - Custom measurement
- Savings vary by time of day and season
- Reduces energy consumption
- Reduces peak loads
- Reduces environmental impacts

New England Case Study

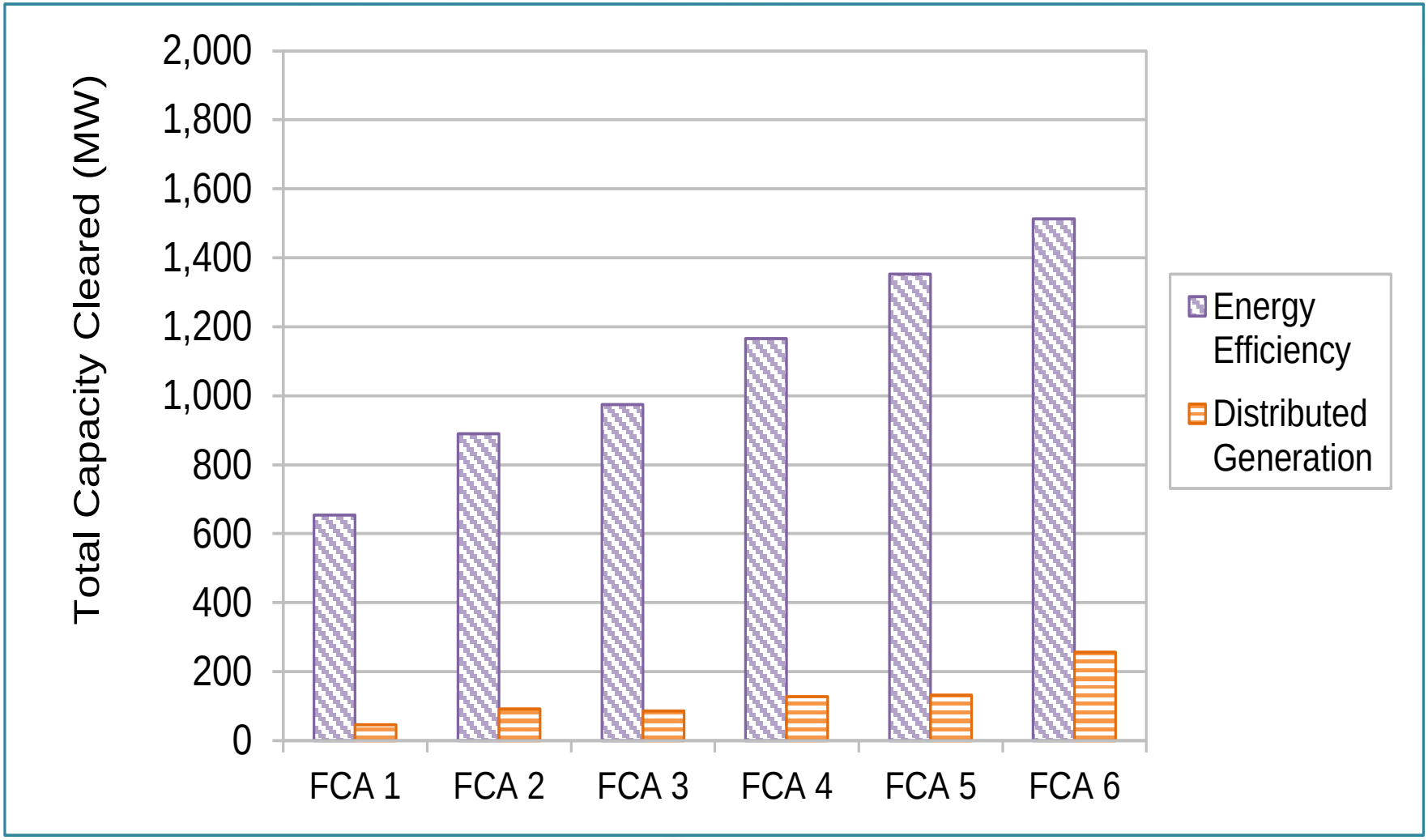
1. Energy Efficiency as a Capacity Resource

2. Energy Efficiency Forecast for System Planning

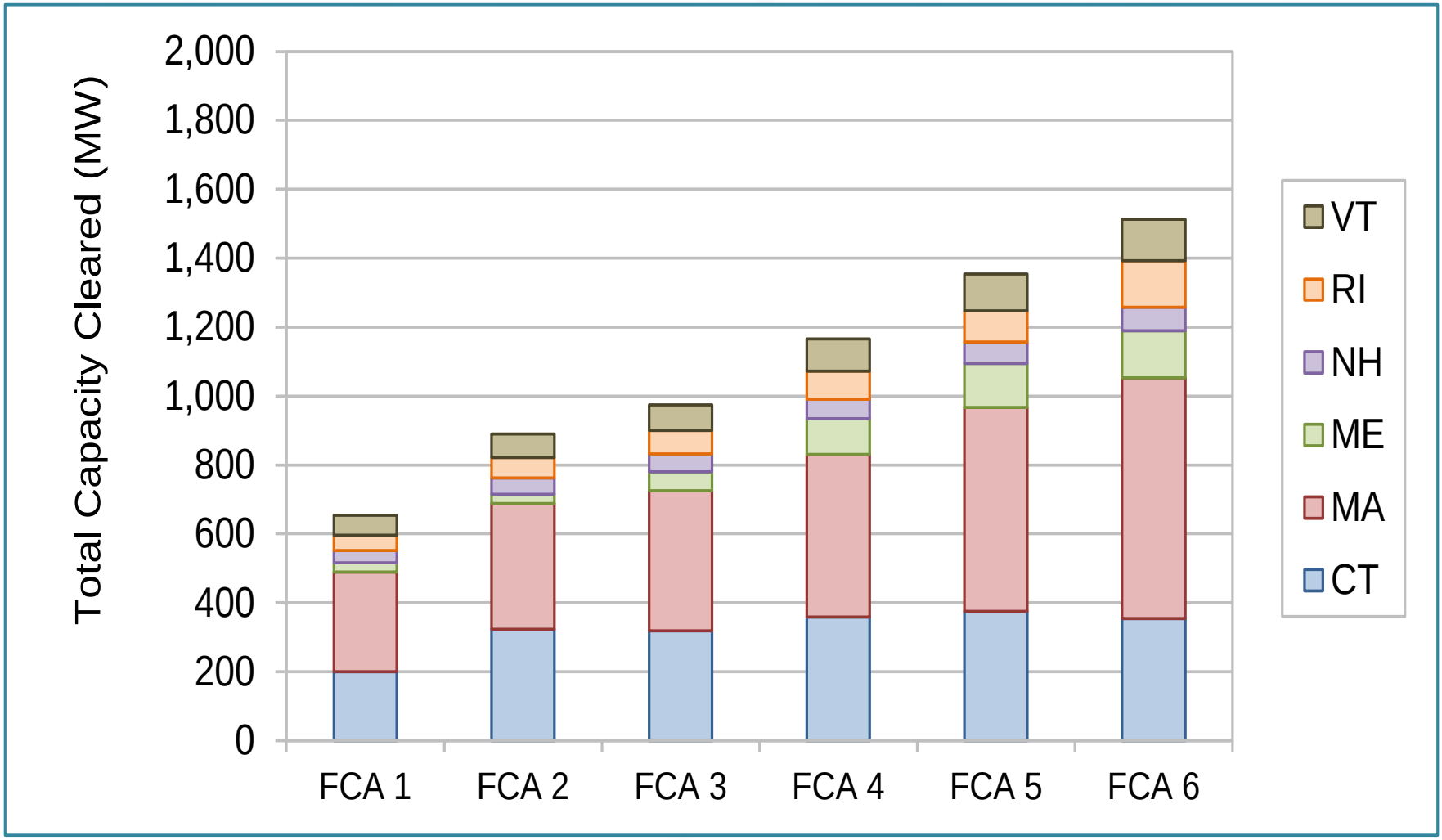
Energy Efficiency in New England Forward Capacity Market

- Qualification package submitted nine months prior to auction; M&V part of qualification
- ISO designates a maximum capacity supply amount (MW) for each qualification package
- EE resources that are offered and clear must submit financial assurance shortly after auction (three years in advance of delivery)
- Annual M&V must substantiate installed measures; variety of methods
- Long-term M&V must confirm savings

Passive Demand Resources



Energy Efficiency resources by state



Impact on State EE Budgets

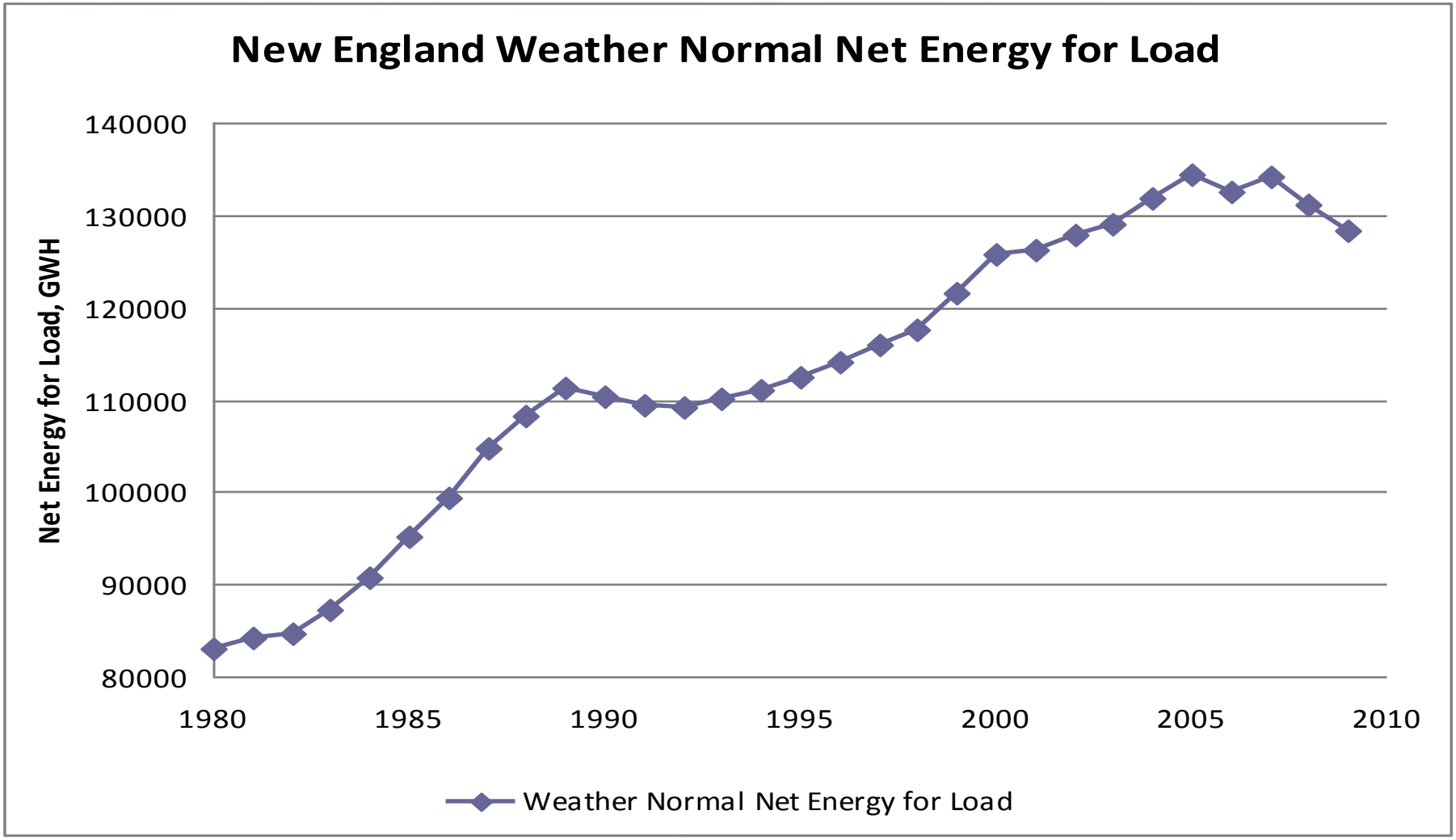
State	2010 Annual Budget ($m)	Approx. FCM Revenue ($m) 2010 – 2011	% extra from FCM
Vermont	$ 34.0	$ 2.9	9%
New Hampshire	$ 26.3	$ 1.6	6%
Maine	$ 14.0	$ 1.3	9%
Massachusetts	$ 301.9	$ 13.7	5%
Rhode Island	$ 32.1	$ 2.2	7%
Connecticut	$ 126.9	$ 9.7	8%

Notes:

1. Annual Budget from ACEEE 2011 Scorecard, Table 4.

2. Estimated FCM revenues for June 2010 – May 2011. Does not account for over/under delivery nor pro-ration.

Energy consumption 1980-2009 (weather normalized)



Key Parameters for ISO-NE EE Forecast Model

MW = $ * %Spent * MWh/$ * Realization Rate * MW/MWh

- **$:** an estimate of the dollars to be spent on EE (Including Budget Uncertainty)
- **%Spent:** percentage of dollars that can be spent on EE programs in that time period – developed from historical data
- **MWh/$:** MWh savings per dollar spent – developed from historical data
- **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 and possibly load forecast

Key Disputed Assumptions for ISO-NE EE Forecast

- Production costs will increase annually by 5%
  - Low-cost measures will all be achieved
  - Program efficiencies are not recognized
- Inflation assumption (2.5%) is applied to program cost, but not to program budgets
- Some program budgets are discounted
- Only M&V qualified measures are counted
  - Penalties for non-performance create conservative assumptions
  - M&V for some measures is impractical

ISO-NE Forecast of EE resources (2012)

GWh Savings

Year	Sum of States	ME	NH	VT	CT	RI	MA
2015	1619	99	65	110	244	163	948
2016	1518	82	62	102	230	153	889
2017	1423	77	59	95	216	143	833
2018	1333	71	56	88	204	134	780
2019	1247	65	53	82	191	125	731
2020	1167	60	50	77	180	117	684
2021	1092	55	48	71	169	109	640
Total	9399	499	393	625	1434	944	5505
Average	1343	71	56	89	205	135	786

MW Savings

Year	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	7	8	13	23	19	99
Total	1444	55	65	115	193	163	853
Average	206	8	9	16	28	23	122

ISO-NE Forecast of EE resources (2013)

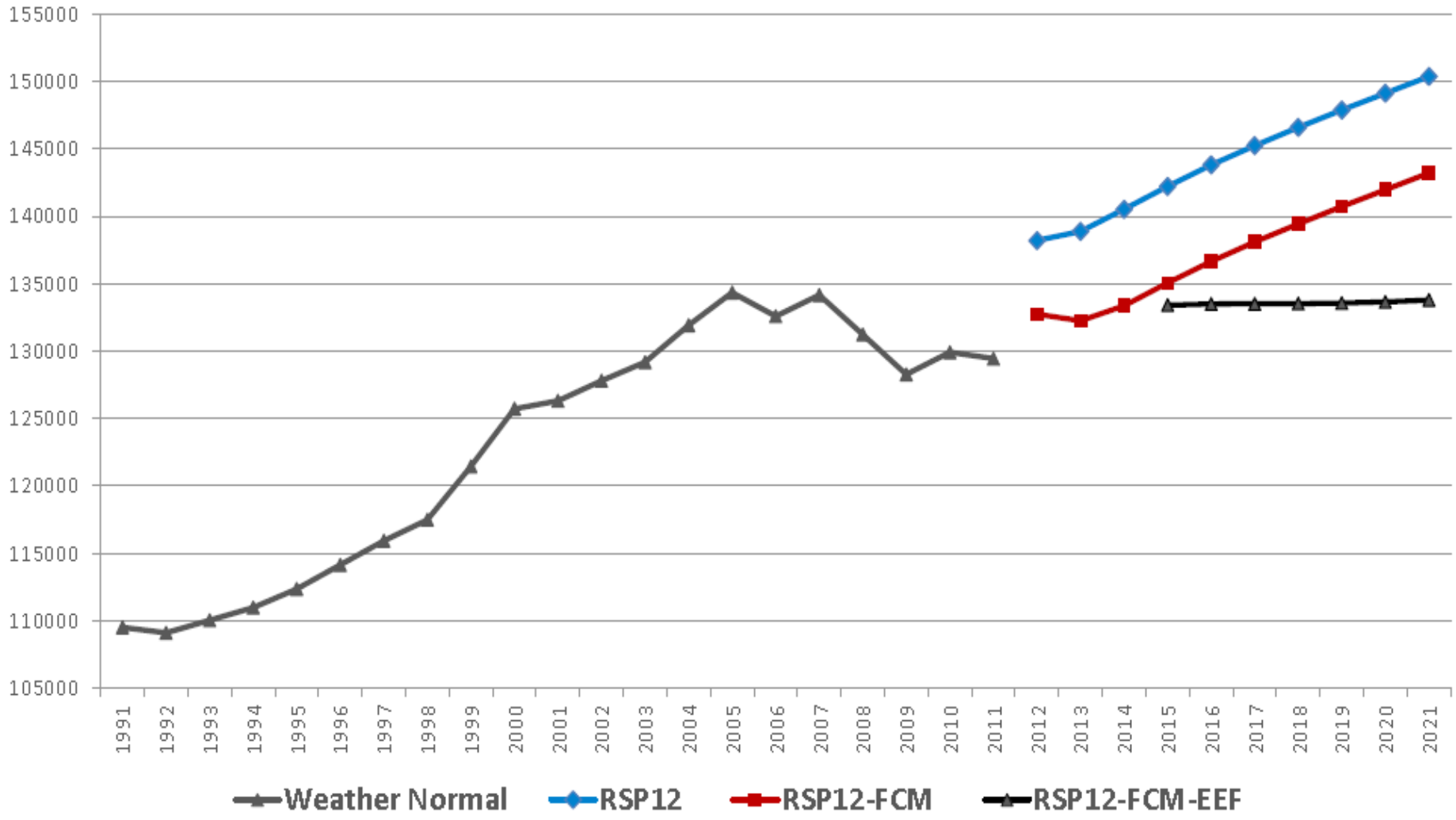
GWh Savings

	Sum of States	ME	NH	VT	CT	RI	MA
2016	1,621	108	68	120	246	161	919
2017	1,529	102	65	119	232	150	861
2018	1,435	97	61	113	218	140	806
2019	1,349	91	58	109	204	131	754
2020	1,268	86	55	107	192	122	706
2021	1,187	81	52	100	180	114	660
2022	1,114	76	49	97	169	106	618
Total	9,503	641	408	765	1,441	924	5,324
Average	1,358	92	58	109	206	132	761

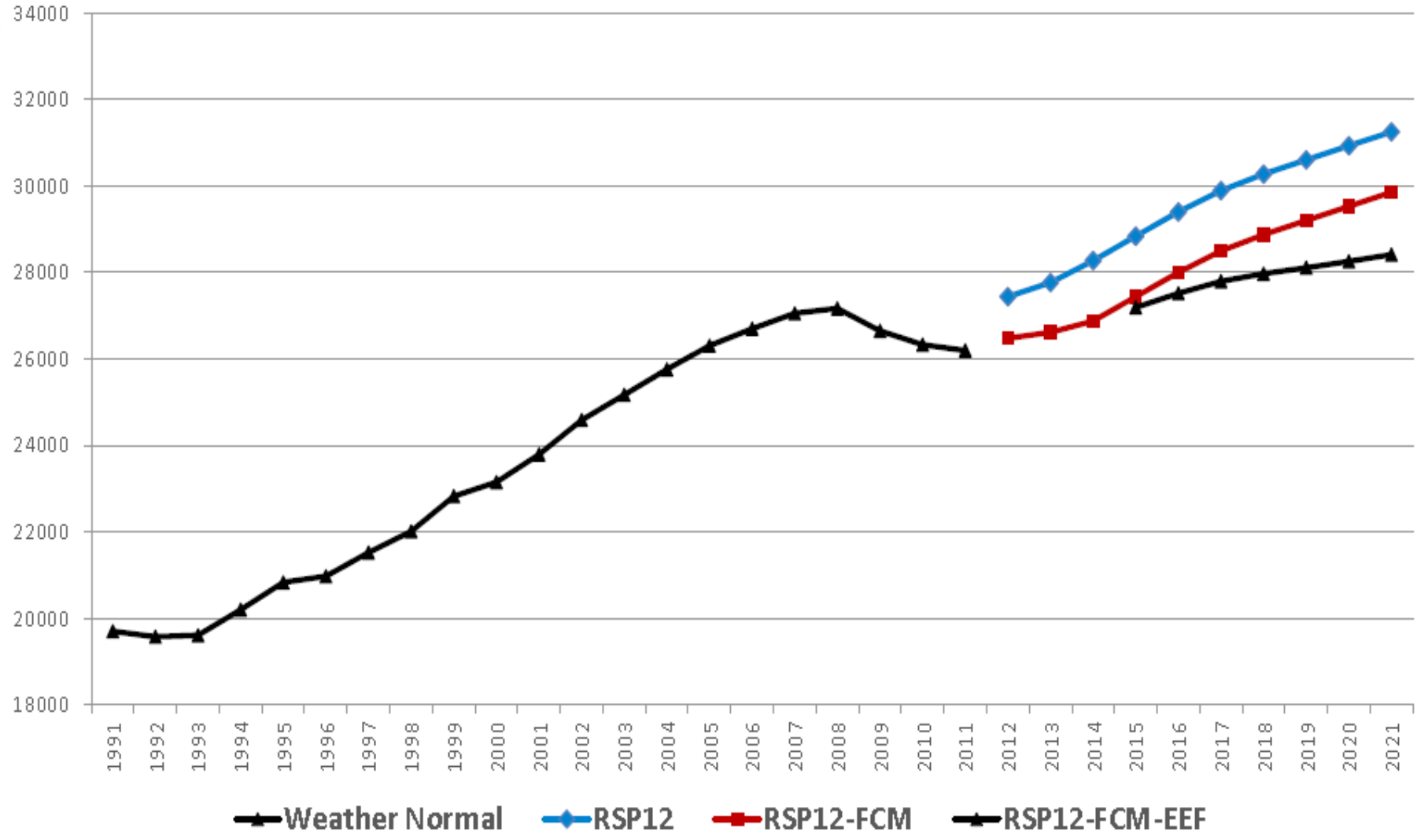
MW Savings

	Sum of States	ME	NH	VT	CT	RI	MA
2016	231	12	11	18	31	26	133
2017	218	12	11	18	29	24	124
2018	204	11	10	17	27	23	116
2019	192	10	10	16	26	21	109
2020	180	10	9	16	24	20	102
2021	169	9	9	15	23	18	95
2022	159	9	8	14	21	17	89
Total	1,353	73	68	114	181	149	768
Average	193	10	10	16	26	21	110

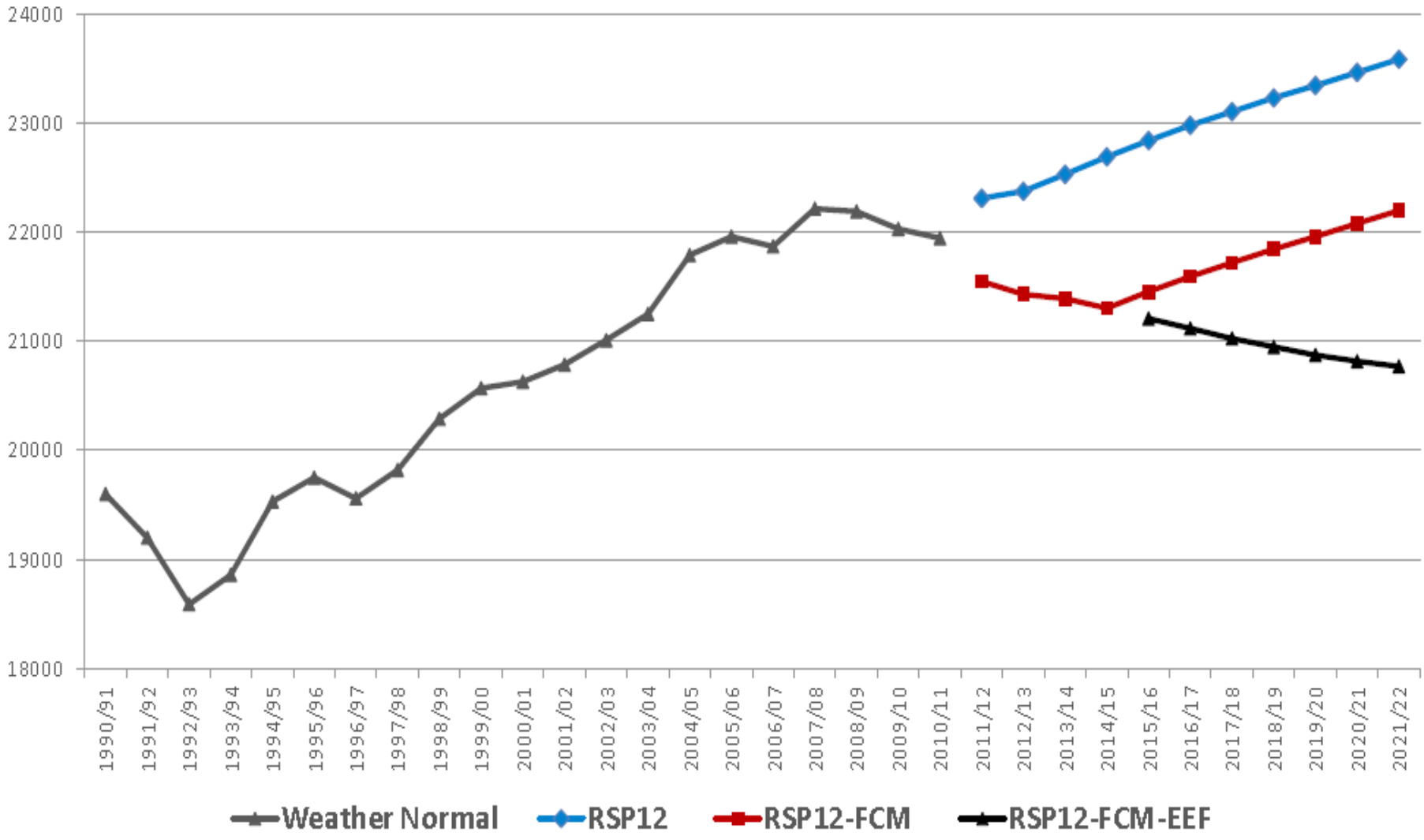
ISO-NE RSP12 Annual Energy (GWh)
Weather Normal History 1991-2011 and Forecast 2012-2021



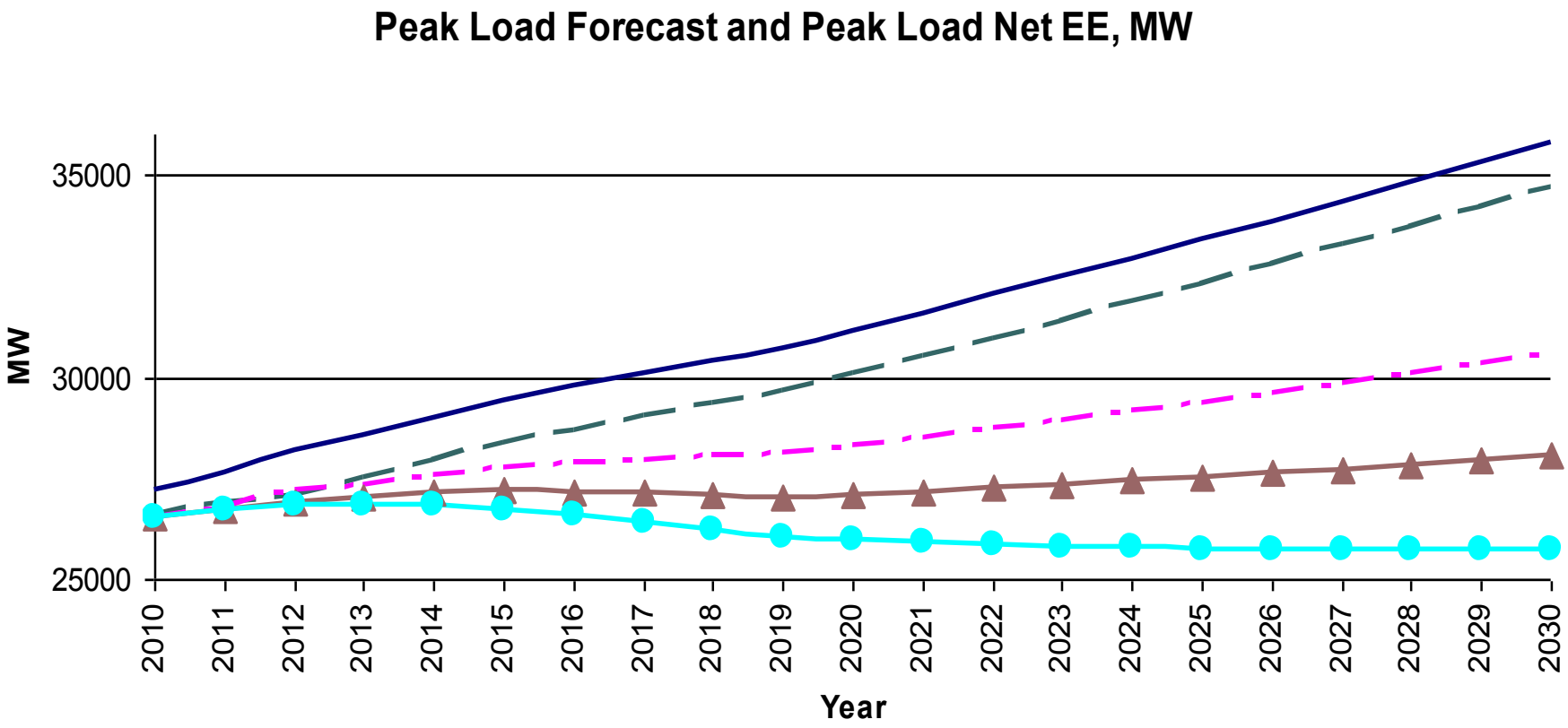
ISO-NE RSP12 50/50 Summer Peaks (MW)
Weather Normal History 1991-2011 and Forecast 2012-2021



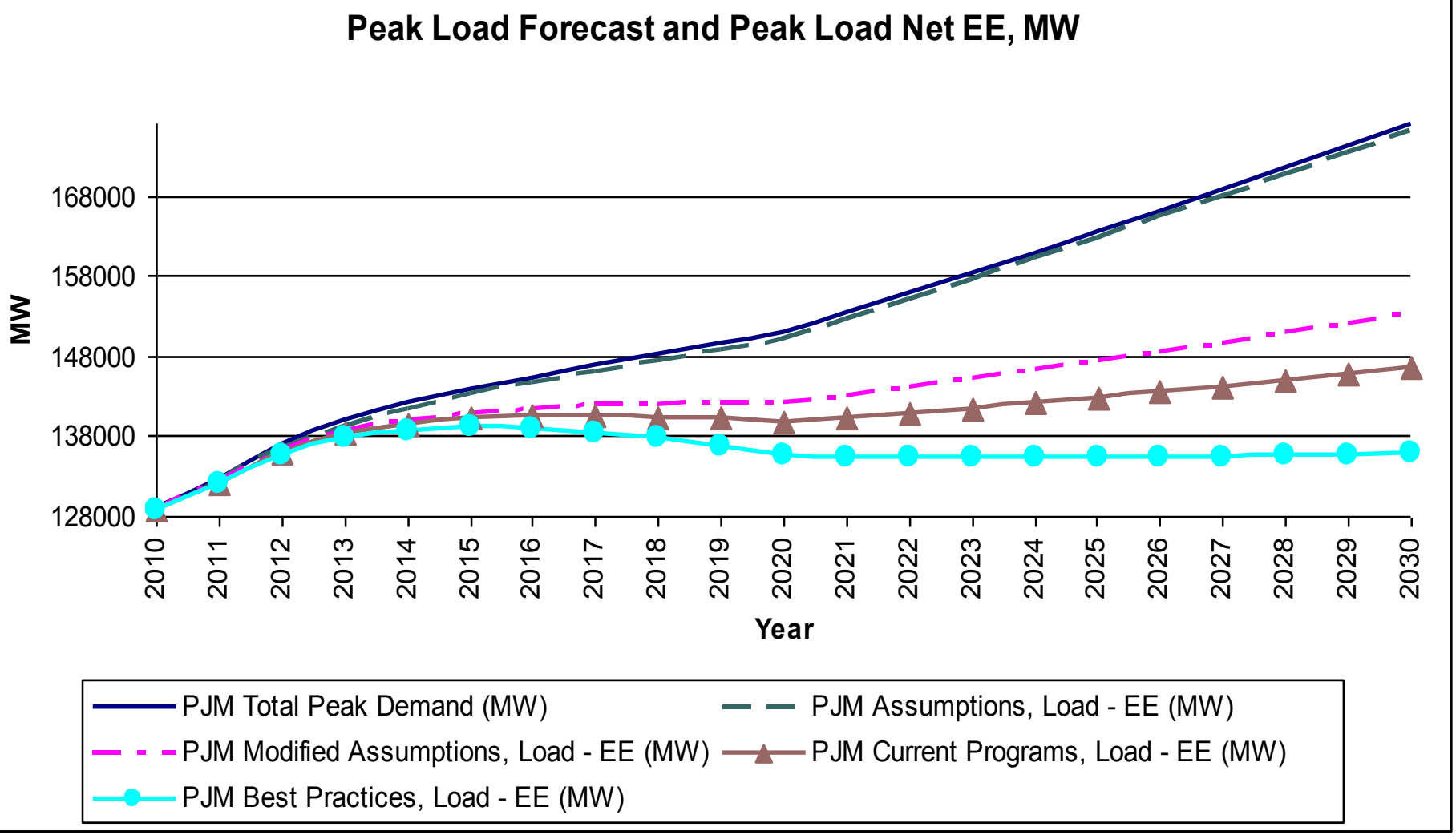
ISO-NE RSP12 50/50 Winter Peaks (MW) Weather Normal History 1991-2011 and Forecast 2012-2021



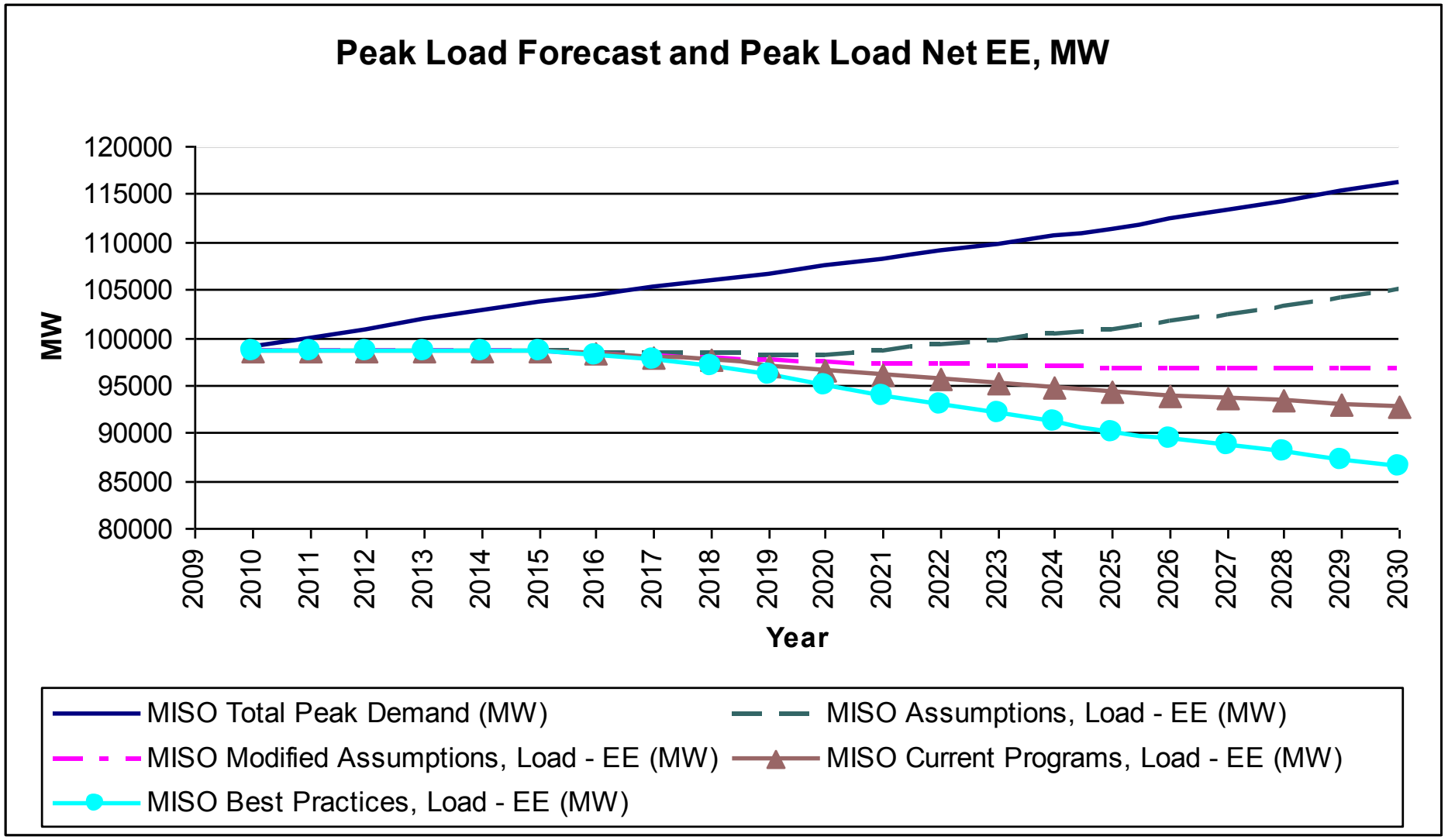
New England Peak Load Forecast



PJM Peak Load Forecast



MISO Peak Load Forecast



Contact information

Paul Peterson
Synapse Energy Economics
802-387-5105

ppeterson@synapse-energy.com

