Draft 2018 Energy Efficiency Forecast

Energy Efficiency Forecast Working Group

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SYSTEM PLANNING

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INTRODUCTION

Acronyms

- EE — Energy Efficiency
- EEFWG — Energy Efficiency Forecast Working Group
- FCM — Forward Capacity Market
- FCA — Forward Capacity Auction (FCM)
- CSO — Capacity Supply Obligation (FCM)
- ARA 3 — Third Annual Reconfiguration Auction (FCM)
- ICR — Installed Capacity Requirement
- PA — Program Administrator
- RGGI — Regional Greenhouse Gas Initiative
- SBC — System Benefit Charge
- CELT — 10-year forecast of Capacity, Energy, Loads and Transmission

Introduction

- This presentation contains the draft EE forecast for the period 2019 through 2027
- The forecast estimates reductions in energy and demand from state-sponsored EE programs in the New England control area by region and state (CT, MA, ME, NH, RI, VT)
- The data used to create the forecast originates from state-sponsored EE Program Administrators and state regulatory agencies
- The draft forecast excludes the results of FCA #12
  - FCA #12 results will be included in final forecast

Introduction

Process

- This forecast follows the same fundamental forecast process and methodology used in prior years, starting in 2012
- The EE forecast is based on average production costs, peak-to-energy ratios, and projected budgets of state-sponsored EE programs
- The Energy-Efficiency Forecast Working Group (EEFWG) provided input during two prior meetings on October 20, 2017 and December 15, 2017
- The EE forecast is updated annually
- The final EE forecast will be incorporated into the CELT report

Introduction

Impacts

- The EE forecast is used in ISO studies including:
  - Long-term transmission planning studies
  - Economic planning studies
- EE forecast will not impact:
  - ICR/Local Sourcing Requirement/Maximum Capacity Limit/Demand Curves
  - FCM auctions
  - FCM related reliability studies (qualification, de-list bid reliability reviews)

Introduction

Looking Forward

- The ISO will accept formal public comments on this draft forecast through March 6, 2018
  - Please submit comments to: eeforecast@iso-ne.com
  - Comments will be posted at: http://www.iso-ne.com/eefwg
  - Background information is available at: http://www.iso-ne.com/eefwg
- The ISO will issue the final EE forecast by May 1, 2018 as an updated slide deck
  - A generalized characterization of the forecast process can be found in the "Energy-Efficiency Forecast Background Report" available at https://www.iso-ne.com/static-assets/documents/2016/05/Final_EEF_Background_Report_050116.pdf

FORECAST ASSUMPTIONS AND METHODOLOGY

Forecast Model

General Assumptions

- Annual EE budgets provided by the Commissions or representatives on their behalf were used in the model and held constant in years after the latest approved budget
- Production cost baselines were derived from a three-year average of recent performance
- Peak-to-Energy Ratios were derived from a three-year average of recent performance and held constant through the forecast period
- Inflation rate set at 2.5% per year
- Current CELT energy forecast used in conjunction with SBC rates to forecast SBC dollars
- FCM revenue has no effect on overall budget in ME, VT, MA, and RI

Forecast Model

Input Assumptions

- 2017 CELT Energy Forecast
- 2017 CELT FCM CSOs and FCA #11 clearing price used for calculating budgets
  - Final forecast will use FCA #12 clearing price
- Production Cost: PA 2014-2016 average
- Peak-to-Energy Ratio: PA 2014-2016 average
- Production Cost Escalation Rate: 2.5% inflation + 1.25% graduated rate (starting in year 1)
- No Budget Spend Rate deduction

Forecast Model

Assumptions Regarding the Forward Capacity Market

- FCM clearing price was held constant at $5.3/kW-month[†], FCA clearing price for FCA #11
  - Final forecast will use FCA #12 clearing price of $4.63/kW-month[†]
- ISO assumes that all achieved EE capacity will be bid into and clear in future FCA's[‡]

[†] FCA clearing price used is for modeling purposes only and should not be considered an indication of future clearing prices.

[‡] The ISO assumption that all achieved EE capacity would be bid into and clear in future FCA's is only for modeling purposes and should not be considered an indication of any future FCA outcome.

Forecast Model

Fundamentals

- Compute Annual Energy Savings

$$\textbf{Annual Energy Savings} = \frac{\textbf{(1 – Budget Spend Rate Modifier)} * \textbf{(Budget)}}{\textbf{(Production Cost)} * \textbf{(Production Cost Esclator)}}$$

- Compute Annual Demand Savings

$$\textbf{Annual Demand Savings} = \textbf{(Annual Energy Savings)} * \textbf{(Peak–to–Energy Ratio)}$$

- Where:
  - Budget Spend Rate Modifier (%) = % to reduce state budgets
  - Budget ($) = $SBC + $RGGI + $FCM + $Policy
  - Production Cost ($/MWh) = unit cost to develop a MWh of annual savings
  - Production Cost Escalator(%) = % increase in annual production cost
  - Peak-to-Energy Ratio (MW/MWh) = ratio of annual demand to annual energy savings

UPDATE TO FORECAST METHODOLOGY

Incorporating ARA 3 Qualification

2018 Update to Forecast Methodology

Background

- FCM values are used as the starting point for the EE forecast and determine the overall magnitude of the EE forecast
- In 2012 and 2013 the actuals in the EE forecast were FCM CSO as acquired through the primary FCA
  - The CSO values were found to under represent EE in the market
  - Projects that delisted or failed to clear in the primary FCA were still in operation
- Beginning in 2014, the EE forecast actuals were represented by FCM Existing Qualified + New Cleared
  - Existing Qualified + New Cleared is a value determined over 3-years prior to the start of the relevant Capacity Commitment Period
- Qualification for ARA 3 is held just a few months prior to the start of the relevant Capacity Commitment Period
- ISO has observed that ARA 3 Qualification diverges from, and is higher than, Existing Qualified + New Cleared, especially in recent years

2018 Update to Forecast Methodology

Background

- In early Capacity Commitment Periods the Existing Qualified + New Cleared values line up with ARA 3 Qualification
- In more recent years the qualification values diverge
  - Projects come online early and participate in ARA 3 for earlier Capacity Commitment Periods
  - Terminated projects are removed from ARA 3 Qualification
- ARA 3 Qualification values are the best FCM indicator of what will actually be installed and operating for a given Capacity Commitment Period

2018 Update to Forecast Methodology

Structural Changes

- Replace Existing Qualified + New Cleared with ARA 3 Qualification
  - ARA 3 Qualification is the most up to-date annual FCM quantity available for any given Capacity Commitment Period
  - ARA 3 Qualification accounts for projects that come online early as well as those that undergo full or partial termination
- Impacts
  - Year 1 of the forecast will be ARA 3 Qualification (fixed)
  - Years 2 through 10 of the forecast will be forecast values
    - Forecast methodology will remain unchanged (budgets, production costs, peak-to-energy ratios)

FUTURE FORECAST CONSIDERATIONS

Expiring Measures

Incorporating Expiring Measures

Recap

- During the October 20, 2017 EEFWG meeting the ISO introduced the idea of incorporating future expiring measures into the EE forecast
  - The ISO's Energy Efficiency Management (EEM) database would be the source for expiring measures
  - During each forecast cycle, the EEM database would be queried to compute future expiring measures based on the currently available data
  - The computation of future expiring measures would mimic the calculation as it is executed during the FCM qualification process
  - Future expiring measures would then be subtracted from the EE forecast

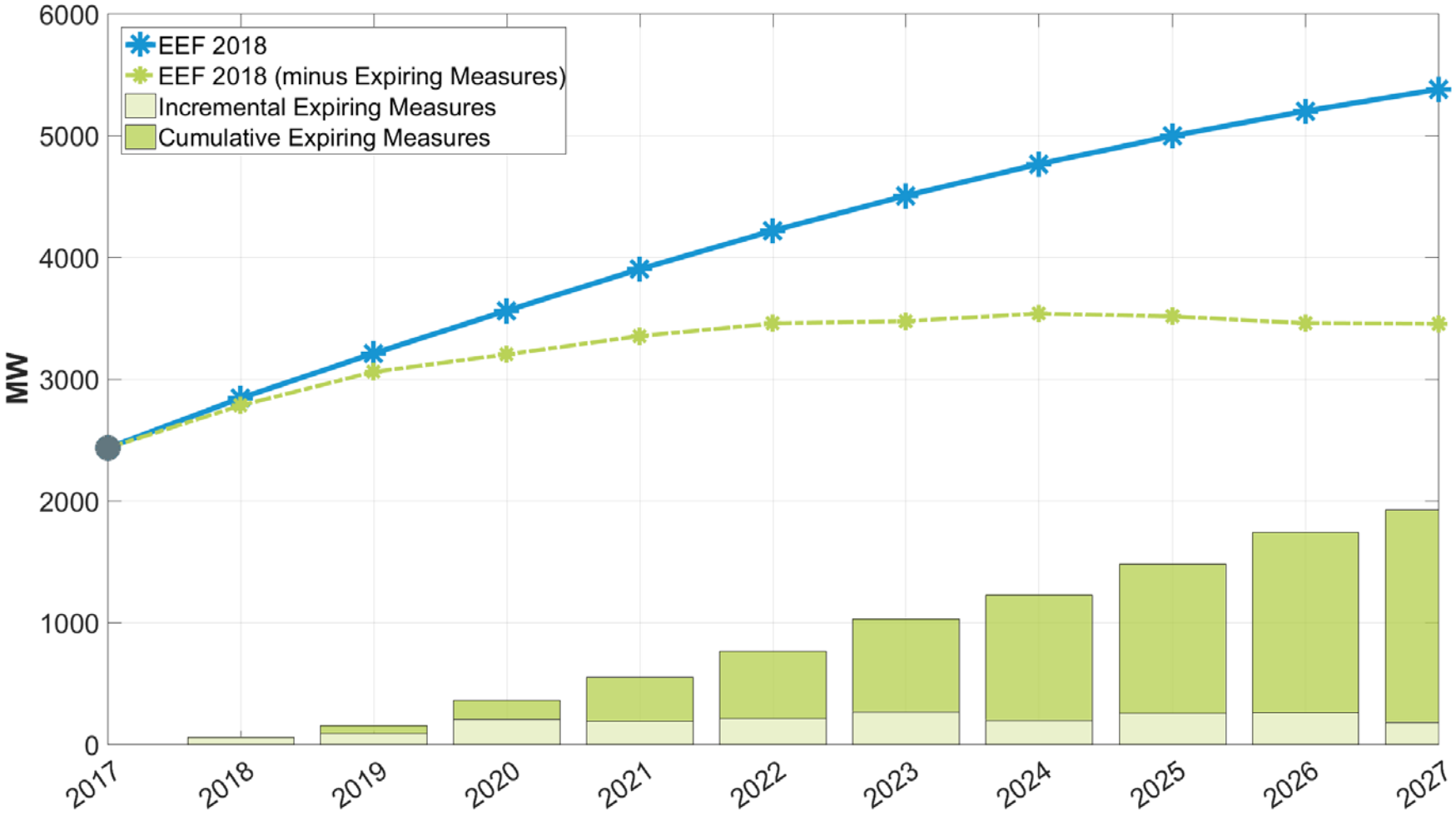
Incorporating Expiring Measures

Recap

- The results shown at the October 20, 2017 meeting did not fully account for the cumulative impact of expiring measures over the forecast horizon
- The next slide shows and example of what would result from fully incorporating the cumulative nature of expiring measures into the Draft 2018 EE Forecast

Incorporating Expiring Measures

Potential Impact on Regional Draft 2018 EE Forecast



More Work is Needed on Expiring Measures

- For the 2018 EE Forecast the ISO has decided not to incorporate expiring measures
- Preliminary comparisons of the Draft 2018 EE Forecast and forward-looking expiring measures suggest that growth in market-facing EE may flatten out within the current 10 year forecast horizon
- Gaining a fuller understanding of the implications of expiring measures to the EE forecast process and performing additional analysis on the expiring measures themselves will be an important work effort in 2018 and 2019

Next Steps on Expiring Measures

- The ISO will continue to work with stakeholders to better understand the nature and impacts of expiring measures
  - Are there trends within the expiring measures data that are relevant to the EE forecast?
  - When EE exits from the market, what are the chances it ceases to provide load reductions?
  - Are there certain measure types that are more likely to persist savings beyond their prescribed measure life?

FORECAST INPUTS

Summary of Program Administrator Data and Model Parameters

Summary of Program Performance Changes

2015 PA Data Versus 2016 PA Data

- Production Cost
  - Decreased in majority of states
  - Decreased for New England
- Peak-to-Energy Ratio
  - Decreased in majority of states
  - Decreased slightly for New England
- Budget Spend Rate
  - Decreased in majority of states
  - Decreased for New England

Program Data Summary

Period	Budget ($1000's)	Total Costs ($1000's)	Achieved Annual Energy (MWh)	Dollars per MWh	Achieved Summer Peak (MW)	Dollars per MW	% Energy Achieved	% Budget Spent	% Peak Achieved	Peak to Energy Ratio Achieved (MW/GWh)	Achieved Lifetime Energy (MWh)	Lifetime Dollars Per MWh
New England												
2011	665,087	518,865	1,575,302	329	200	2,588,882	90%	78%	75%	0.127	17,638,158	29
2012	745,761	648,848	1,723,357	377	221	2,930,052	98%	87%	86%	0.128	18,384,080	35
2013	727,655	707,930	1,833,883	386	254	2,787,351	109%	97%	105%	0.138	20,414,118	35
2014	857,984	862,384	2,063,624	418	275	3,140,299	139%	101%	99%	0.133	18,120,338	48
2015	897,172	923,581	2,375,192	389	333	2,774,547	123%	103%	129%	0.140	26,658,969	35
2016	976,266	908,011	2,454,794	370	335	2,707,974	117%	93%	122%	0.137	23,522,755	39
Avg 2013-2015	827,604	831,298	2,090,899	398	287	2,900,732	123%	100%	111%	0.137	21,731,142	39
Avg 2014-2016	910,474	897,992	2,297,870	392	314	2,874,273	126%	99%	117%	0.137	22,767,354	40
Massachusetts												
2011	432,796	283,898	777,100	365	101	2,823,162	86%	66%	67%	0.129	10,177,753	28
2012	508,987	400,607	980,105	409	125	3,198,050	88%	79%	75%	0.128	10,724,658	37
2013	499,584	438,951	1,116,236	393	160	2,737,910	93%	88%	92%	0.144	11,999,747	37
2014	511,262	517,796	1,217,150	425	166	3,115,182	151%	101%	103%	0.137	9,264,658	56
2015	518,345	541,862	1,396,513	388	195	2,771,794	116%	105%	129%	0.140	16,295,573	33
2016	579,676	533,147	1,471,088	362	206	2,593,869	110%	92%	118%	0.140	12,591,048	42
Avg 2013-2015	509,730	499,536	1,243,300	402	174	2,874,962	120%	98%	108%	0.140	12,519,993	42
Avg 2014-2016	536,428	530,935	1,361,584	392	189	2,826,948	126%	99%	117%	0.139	12,717,093	44
Connecticut												
2011	129,909	119,426	381,974	313	43	2,769,490	93%	92%	87%	0.113	3,163,706	38
2012	120,177	121,826	308,428	395	40	3,032,738	131%	101%	124%	0.130	3,116,688	39
2013	97,955	121,612	271,480	448	33	3,648,317	139%	124%	130%	0.123	2,885,413	42
2014	174,992	176,459	377,073	468	50	3,507,071	103%	101%	106%	0.133	4,067,290	43
2015	181,980	179,351	411,055	436	64	2,816,838	108%	99%	113%	0.155	4,282,544	42
2016	199,205	199,188	427,036	466	59	3,396,595	107%	100%	110%	0.137	4,977,875	40
Avg 2013-2015	151,642	159,141	353,203	451	49	3,324,075	117%	108%	117%	0.137	3,745,082	42
Avg 2014-2016	185,392	184,999	405,055	457	58	3,240,168	106%	100%	110%	0.142	4,442,569	42
Rhode Island												
2011	48,649	36,494	96,009	380	14	2,673,405	94%	75%	71%	0.142	1,076,778	34
2012	61,246	48,870	119,666	408	20	2,504,009	93%	80%	82%	0.163	1,288,325	38
2013	64,179	61,547	149,033	413	25	2,453,415	104%	96%	123%	0.168	1,602,369	38
2014	73,766	74,537	193,613	385	24	3,161,426	107%	101%	59%	0.122	1,781,643	42
2015	86,326	84,400	214,512	393	27	3,069,598	116%	98%	112%	0.128	2,121,586	40
2016	88,468	73,867	213,865	345	27	2,722,154	107%	83%	105%	0.127	2,027,270	36
Avg 2013-2015	74,757	73,494	185,720	397	25	2,894,813	109%	98%	98%	0.139	1,835,199	40
Avg 2014-2016	82,853	77,601	207,330	375	26	2,984,393	110%	94%	92%	0.126	1,976,833	39

Program Data Summary

Period	Budget ($1000's)	Total Costs ($1000's)	Achieved Annual Energy (MWh)	Dollars per MWh	Achieved Summer Peak (MW)	Dollars per MW	% Energy Achieved	% Budget Spent	% Peak Achieved	Peak to Energy Ratio Achieved (MW/GWh)	Achieved Lifetime Energy (MWh)	Lifetime Dollars Per MWh
Maine												
2011	-	22,817	152,663	149	18	1,248,326	117%	0%	100%	0.120	1,447,766	16
2012	-	23,712	143,532	165	12	1,904,497	101%	0%	114%	0.087	1,266,751	19
2013	-	24,279	141,978	171	15	1,603,990	0%	0%	0%	0.107	2,043,036	12
2014	26,976	21,972	115,847	190	14	1,621,745	0%	81%	0%	0.117	1,014,155	22
2015	41,991	45,493	166,500	273	21	2,124,405	0%	108%	0%	0.129	1,499,177	30
2016	39,288	32,608	139,037	235	21	1,564,454	0%	83%	0%	0.150	1,518,286	21
Avg 2013-2015	22,989	30,581	141,442	211	17	1,783,380	0%	63%	0%	0.117	1,518,789	21
Avg 2014-2016	36,085	33,358	140,461	232	19	1,770,201	0%	91%	0%	0.132	1,343,873	24
Vermont												
2011	36,066	37,325	109,514	341	15	2,502,506	72%	103%	69%	0.136	1,099,092	34
2012	35,678	35,130	117,653	299	16	2,172,427	119%	98%	109%	0.137	1,320,789	27
2013	39,495	35,989	96,323	374	12	2,966,434	97%	91%	81%	0.126	1,119,186	32
2014	44,690	45,795	96,557	474	11	4,121,184	113%	102%	74%	0.115	1,141,386	40
2015	44,637	46,598	113,112	412	13	3,516,048	101%	104%	89%	0.117	1,457,163	32
2016	45,189	46,346	134,107	346	15	3,140,437	117%	103%	99%	0.110	1,455,297	32
Avg 2013-2015	42,941	42,794	101,997	420	12	3,534,555	104%	99%	81%	0.119	1,239,245	35
Avg 2014-2016	44,839	46,246	114,592	411	13	3,592,556	110%	103%	88%	0.114	1,351,282	35
New Hampshire												
2011	17,667	18,904	58,042	326	10	1,910,689	123%	107%	121%	0.170	673,064	28
2012	19,673	18,703	53,973	347	8	2,376,052	106%	95%	101%	0.146	666,868	28
2013	26,442	25,552	58,833	434	8	3,207,104	111%	97%	107%	0.135	764,368	33
2014	26,298	25,826	63,384	407	10	2,622,172	124%	98%	76%	0.155	851,207	30
2015	23,894	25,877	73,499	352	12	2,240,227	129%	108%	119%	0.157	1,002,926	26
2016	24,441	22,856	69,661	328	8	2,724,396	139%	94%	103%	0.120	952,980	24
Avg 2013-2015	25,545	25,752	65,239	398	10	2,689,834	121%	101%	101%	0.149	872,834	30
Avg 2014-2016	24,878	24,853	68,848	363	10	2,528,932	131%	100%	99%	0.144	935,705	27

FCM and RGGI Funds

RGGI Dollars ($1000's) Applied to EE Annually							
	New England	MA	CT*	ME	RI	VT	NH
	76,513	64,757	7,192	-	2,009	-	2,555
FCM MW							
	New England	MA	CT	ME	RI	VT	NH
2021	2,791	1,546	621	139	267	98	120
FCM Dollars ($1000's, clearing price of $5.30*)							
	New England	MA	CT	ME	RI	VT	NH
2021	162,353	98,301	39,448	-	16,964	-	7,641
FCM Dollars for EE ($1000's)							
	New England	MA	CT	ME	RI	VT	NH
2019	174,753	107,268	41,694	-	18,293	-	7,498
2020	162,353	98,301	39,448	-	16,964	-	7,641
2021	162,353	98,301	39,448	-	16,964	-	7,641
2022	162,353	98,301	39,448	-	16,964	-	7,641
2023	162,353	98,301	39,448	-	16,964	-	7,641
2024	162,353	98,301	39,448	-	16,964	-	7,641
2025	162,353	98,301	39,448	-	16,964	-	7,641
2026	162,353	98,301	39,448	-	16,964	-	7,641
2027	162,353	98,301	39,448	-	16,964	-	7,641

* RGGI dollars were discounted in 2019, 2020, and 2021 to account for CT budget cuts

** Auction clearing price for Rest-of-Pool

Energy Forecast

2017 CELT Energy Forecast (GWh)							
	New England	MA	CT	ME	RI	VT	NH
2019	143,447	66,996	34,587	12,885	9,347	6,953	12,679
2020	144,611	67,706	34,733	13,003	9,410	6,992	12,767
2021	145,799	68,400	34,909	13,137	9,472	7,035	12,845
2022	147,127	69,147	35,128	13,291	9,542	7,085	12,933
2023	148,507	69,919	35,359	13,453	9,611	7,137	13,028
2024	149,884	70,691	35,586	13,611	9,685	7,189	13,122
2025	151,233	71,453	35,802	13,763	9,760	7,240	13,215
2026	152,593	72,227	36,018	13,910	9,836	7,291	13,311
2027	153,953	73,002	36,234	14,058	9,911	7,342	13,406

2017 CELT Energy Forecast - FCM Passive Demand Resources (GWh)							
	New England	MA	CT	ME	RI	VT	NH
2019	128,536	59,055	31,617	11,622	8,036	6,147	12,059
2020	127,573	58,437	31,126	11,825	7,861	6,263	12,062
2021	128,761	59,131	31,302	11,958	7,924	6,306	12,140
2022	130,089	59,878	31,521	12,113	7,994	6,356	12,227
2023	131,469	60,650	31,752	12,275	8,063	6,408	12,322
2024	132,846	61,421	31,979	12,433	8,136	6,460	12,416
2025	134,195	62,183	32,195	12,585	8,211	6,511	12,509
2026	135,555	62,958	32,411	12,732	8,287	6,562	12,605
2027	136,915	63,733	32,626	12,880	8,363	6,613	12,701

Energy Forecast

SBC Eligible							
		MA	CT	ME	RI	VT	NH
		85.9%	94.7%	98.7%	100.0%	100.0%	100.0%
SBC Eligible 2017 Energy Forecast - FCM Passive Demand Resources (GWh)							
	New England	MA	CT	ME	RI	VT	NH
2019	118,382	50,728	29,941	11,471	8,036	6,147	12,059
2020	117,530	50,197	29,476	11,671	7,861	6,263	12,062
2021	118,609	50,793	29,643	11,803	7,924	6,306	12,140
2022	119,818	51,435	29,850	11,955	7,994	6,356	12,227
2023	121,075	52,098	30,069	12,115	8,063	6,408	12,322
2024	122,329	52,761	30,284	12,272	8,136	6,460	12,416
2025	123,557	53,416	30,488	12,422	8,211	6,511	12,509
2026	124,795	54,081	30,693	12,567	8,287	6,562	12,605
2027	126,032	54,746	30,897	12,712	8,363	6,613	12,701

Energy Sales and System Benefit Charge

Sales (GWh)

	New England	MA	CT	ME	RI	VT	NH
2019	111,682	47,857	28,247	10,821	7,581	5,799	11,377
2020	110,877	47,356	27,808	11,010	7,416	5,908	11,379
2021	111,895	47,918	27,965	11,135	7,475	5,949	11,453
2022	113,036	48,524	28,161	11,279	7,541	5,996	11,535
2023	114,222	49,149	28,367	11,429	7,606	6,045	11,625
2024	115,405	49,774	28,570	11,577	7,675	6,094	11,714
2025	116,563	50,392	28,763	11,718	7,747	6,142	11,801
2026	117,731	51,020	28,955	11,855	7,818	6,190	11,892
2027	118,898	51,648	29,148	11,993	7,889	6,239	11,982

SBC Rate ($/kWh)

		MA	CT	ME	RI	VT	NH
		0.00250	0.00300	-	0.01122	-	0.00275

SBC Dollars ($1000's)

	New England	MA	CT*	ME	RI	VT	NH
2019	320,715	119,642	11,858	-	85,047	-	31,286
2020	321,848	118,390	25,330	-	88,743	-	31,292
2021	325,218	119,796	78,966	-	90,032	-	31,494
2022	328,865	121,310	79,553	-	91,351	-	31,722
2023	332,557	122,873	80,172	-	92,615	-	31,968
2024	336,228	124,436	80,780	-	93,870	-	32,212
2025	339,820	125,980	81,358	-	95,098	-	32,454
2026	343,398	127,550	81,937	-	96,280	-	32,702
2027	346,928	129,119	82,516	-	97,415	-	32,950

* Reflects reduced SBC funds to account for CT budget cuts

Impacts of New EE on Revenue Streams

Lost SBC Dollars ($1000's)							
	New England	MA	CT	ME	RI	VT	NH
2022	14,875	6,944	2,229	-	5,196	-	506
2023	21,392	9,979	3,204	-	7,482	-	728
2024	27,275	12,713	4,082	-	9,551	-	929
2025	32,526	15,149	4,865	-	11,404	-	1,109
2026	37,162	17,295	5,556	-	13,044	-	1,267
2027	41,210	19,166	6,158	-	14,481	-	1,406
New FCM Dollars ($1000's)							
	New England	MA	CT	ME	RI	VT	NH
2022	36,585	24,500	6,700	-	3,697	-	1,687
2023	52,589	35,206	9,631	-	5,324	-	2,429
2024	67,019	44,851	12,272	-	6,797	-	3,099
2025	79,884	53,444	14,627	-	8,115	-	3,698
2026	91,228	61,016	16,702	-	9,282	-	4,228
2027	101,123	67,615	18,512	-	10,305	-	4,691

Policy Dollars and Total Budgets

Policy Dollars ($1000's)*

	New England	MA	CT	ME	RI	VT	NH
2019	525,897	423,965	81,409	39,494	-	53,911	-
2020	555,472	434,184	85,659	39,494	-	54,229	-
2021	600,240	423,642	86,877	39,494	-	55,156	-
2022	590,998	413,709	86,877	39,494	-	55,847	-
2023	582,514	404,474	86,877	39,494	-	56,598	-
2024	574,911	395,999	86,877	39,494	-	57,470	-
2025	569,586	388,298	86,877	39,494	-	59,847	-
2026	563,384	381,303	86,877	39,494	-	60,639	-
2027	557,332	375,005	86,877	39,494	-	60,885	-

Total Budget Dollars ($1000's)

	New England	MA	CT	ME	RI	VT	NH
2019	1,097,879	715,631	142,153	39,494	105,350	53,911	41,339
2020	1,116,186	715,631	157,629	39,494	107,715	54,229	41,488
2021	1,175,622	715,631	214,810	39,494	108,227	55,156	42,304
2022	1,180,439	715,631	217,542	39,494	108,825	55,847	43,099
2023	1,185,135	715,631	220,117	39,494	109,429	56,598	43,865
2024	1,189,748	715,631	222,487	39,494	110,088	57,470	44,578
2025	1,195,630	715,631	224,637	39,494	110,782	59,847	45,239
2026	1,199,714	715,631	226,601	39,494	111,491	60,639	45,858
2027	1,203,039	715,631	228,387	39,494	112,211	60,885	46,430

* Policy dollars are funds not from SBC, RGGI, or FCM revenues. Policy dollars are present in states that set the SBC rate based on budget alone (VT and ME) and states that have a surcharge to cover the balance of the total budget (MA and CT). MA is adjusted to reflect a lower portion of budget coming from SBC due to higher FCM revenue.

Production Costs and Peak-to-Energy Ratio

Production Cost Multiplier (includes inflation)

	MA	CT	ME	RI	VT	NH
2017	1.0250	1.0250	1.0250	1.0250	1.0250	1.0250
2018	1.0375	1.0375	1.0375	1.0375	1.0375	1.0375
2019	1.0500	1.0500	1.0500	1.0500	1.0500	1.0500
2020	1.0625	1.0625	1.0625	1.0625	1.0625	1.0625
2021	1.0750	1.0750	1.0750	1.0750	1.0750	1.0750
2022	1.0875	1.0875	1.0875	1.0875	1.0875	1.0875
2023	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000
2024	1.1125	1.1125	1.1125	1.1125	1.1125	1.1125
2025	1.1250	1.1250	1.1250	1.1250	1.1250	1.1250
2026	1.1375	1.1375	1.1375	1.1375	1.1375	1.1375
2027	1.1500	1.1500	1.1500	1.1500	1.1500	1.1500

Production Cost ($/MWh)

	MA	CT	ME	RI	VT	NH
2017	402	468	238	384	421	372
2018	417	486	247	398	437	386
2019	438	510	260	418	458	405
2020	465	542	276	444	487	430
2021	500	583	296	478	524	462
2022	544	634	322	520	570	503
2023	598	697	355	572	626	553
2024	665	776	395	636	697	615
2025	748	872	444	715	784	692
2026	851	992	505	814	892	787
2027	979	1,141	581	936	1,026	906

Peak-to-Energy Ratio (MW/GWh)

MA	CT	ME	RI	VT	NH
0.139	0.142	0.132	0.126	0.114	0.144

DRAFT FORECAST

New England

Energy and Summer Peak EE Forecast

Energy Savings (GWh)							
	New England	MA	CT	ME	RI	VT	NH
2019	2,690	1,733	295	161	267	125	108
2020	2,568	1,631	308	152	257	118	102
2021	2,498	1,517	391	141	240	112	97
2022	2,306	1,395	364	130	222	104	91
2023	2,104	1,269	335	118	203	96	84
2024	1,898	1,140	304	106	184	87	77
2025	1,695	1,014	273	94	164	81	69
2026	1,495	891	242	83	145	72	62
2027	1,303	775	212	72	127	63	54
Total 2019-2027	18,558	11,366	2,724	1,058	1,809	857	745
Average	2,062	1,263	303	118	201	95	83

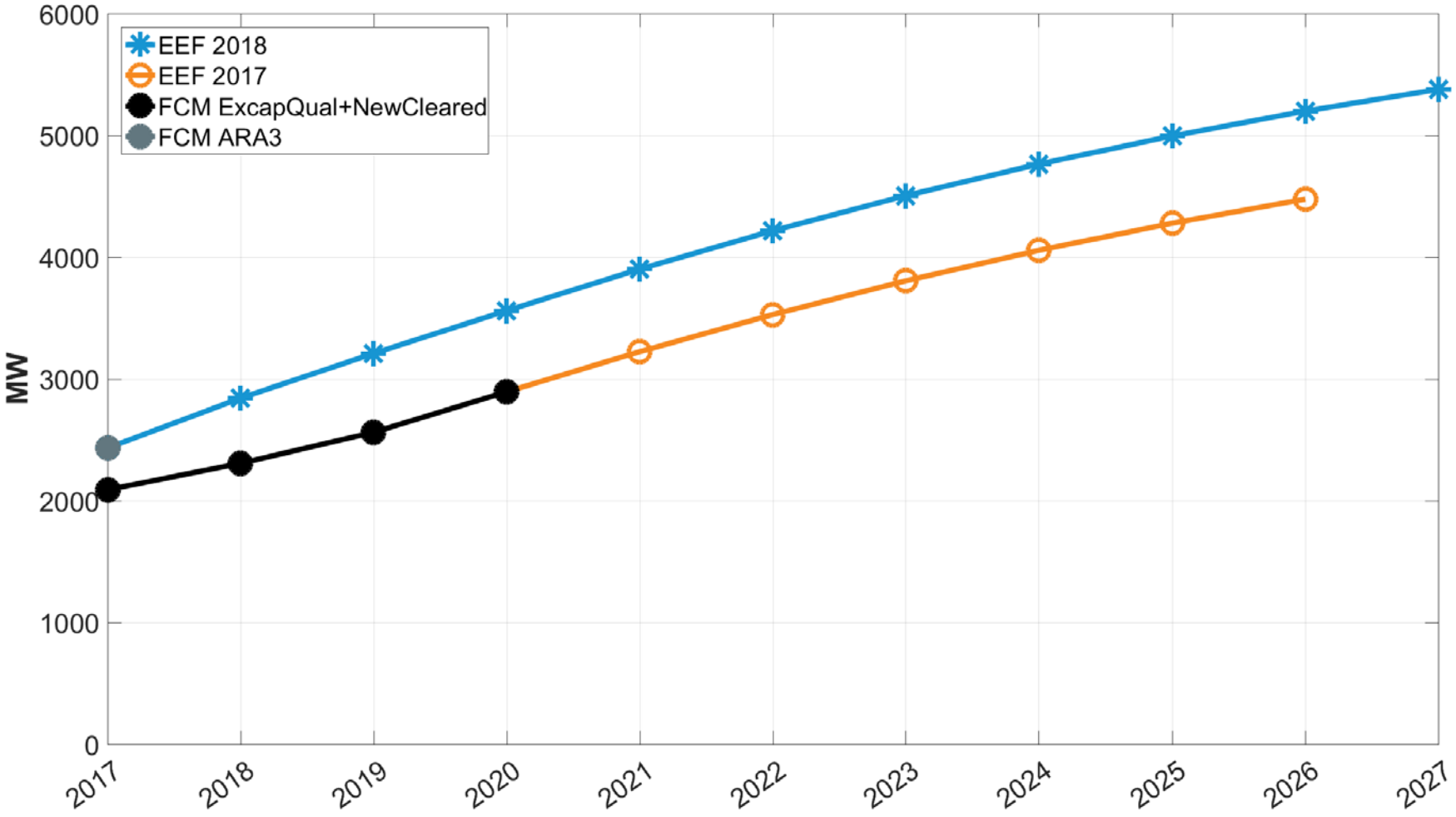
Demand Savings (MW)							
	New England	MA	CT	ME	RI	VT	NH
2019	367	241	42	21	34	14	16
2020	351	226	44	20	32	13	15
2021	342	211	55	19	30	13	14
2022	315	194	52	17	28	12	13
2023	288	176	47	16	25	11	12
2024	259	158	43	14	23	10	11
2025	232	141	39	12	21	9	10
2026	204	124	34	11	18	8	9
2027	178	108	30	10	16	7	8
Total 2019-2027	2,535	1,577	387	139	227	98	107
Average	282	175	43	15	25	11	12

EE Forecast Comparison

PA Average Production Cost ($/MWh)							
	New England	MA	CT	ME	RI	VT	NH
2017 EE Forecast		402	451	211	398	420	398
2018 EE Forecast		392	457	232	375	411	363
PA Average Peak-to-Energy Ratio (MW/GWh)							
	New England	MA	CT	ME	RI	VT	NH
2017 EE Forecast		0.140	0.137	0.117	0.139	0.119	0.149
2018 EE Forecast		0.139	0.142	0.132	0.126	0.114	0.144
Total EE Dollars (1000s)							
	New England	MA	CT	ME	RI	VT	NH
2017 EE Forecast							
Total 2018-2026	10,699,221	6,451,205	2,188,561	355,446	825,036	568,241	310,733
Average	1,188,802	716,801	243,173	39,494	91,671	63,138	34,526
2018 EE Forecast							
Total 2019-2027	10,543,392	6,440,682	1,854,363	355,446	984,119	514,582	394,200
Average	1,171,488	715,631	206,040	39,494	109,347	57,176	43,800
Summer Peak Impacts (MW)							
	New England	MA	CT	ME	RI	VT	NH
2017 EE Forecast							
Total 2018-2026	2,386	1,491	509	56	212	37	80
Average	265	166	57	6	24	4	9
2018 EE Forecast							
Total 2019-2027	2,535	1,577	387	139	227	98	107
Average	282	175	43	15	25	11	12

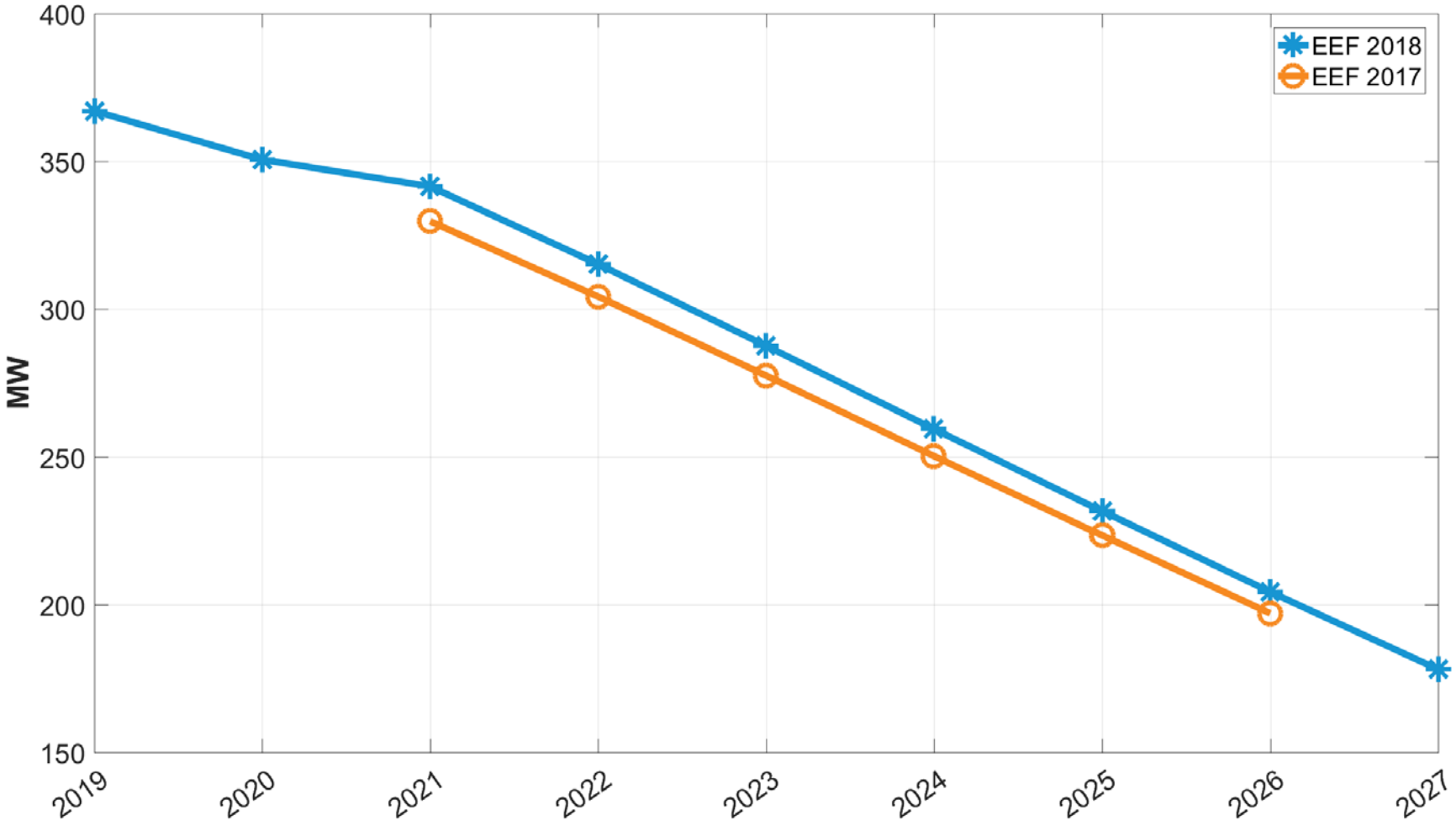
New England

Energy Efficiency on Summer Peak



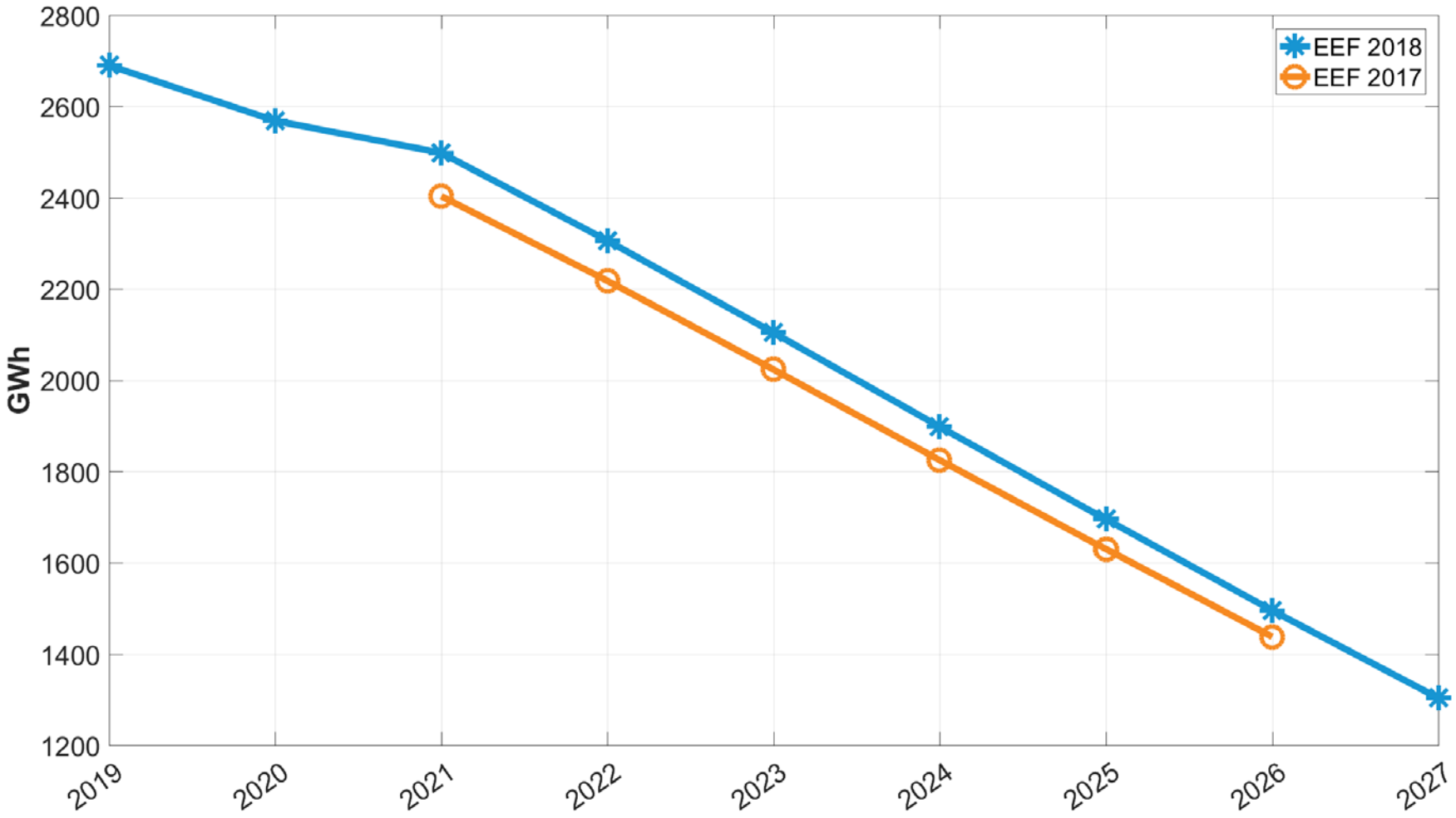
New England

Energy Efficiency on Summer Peak



New England

Energy Efficiency on Annual Energy

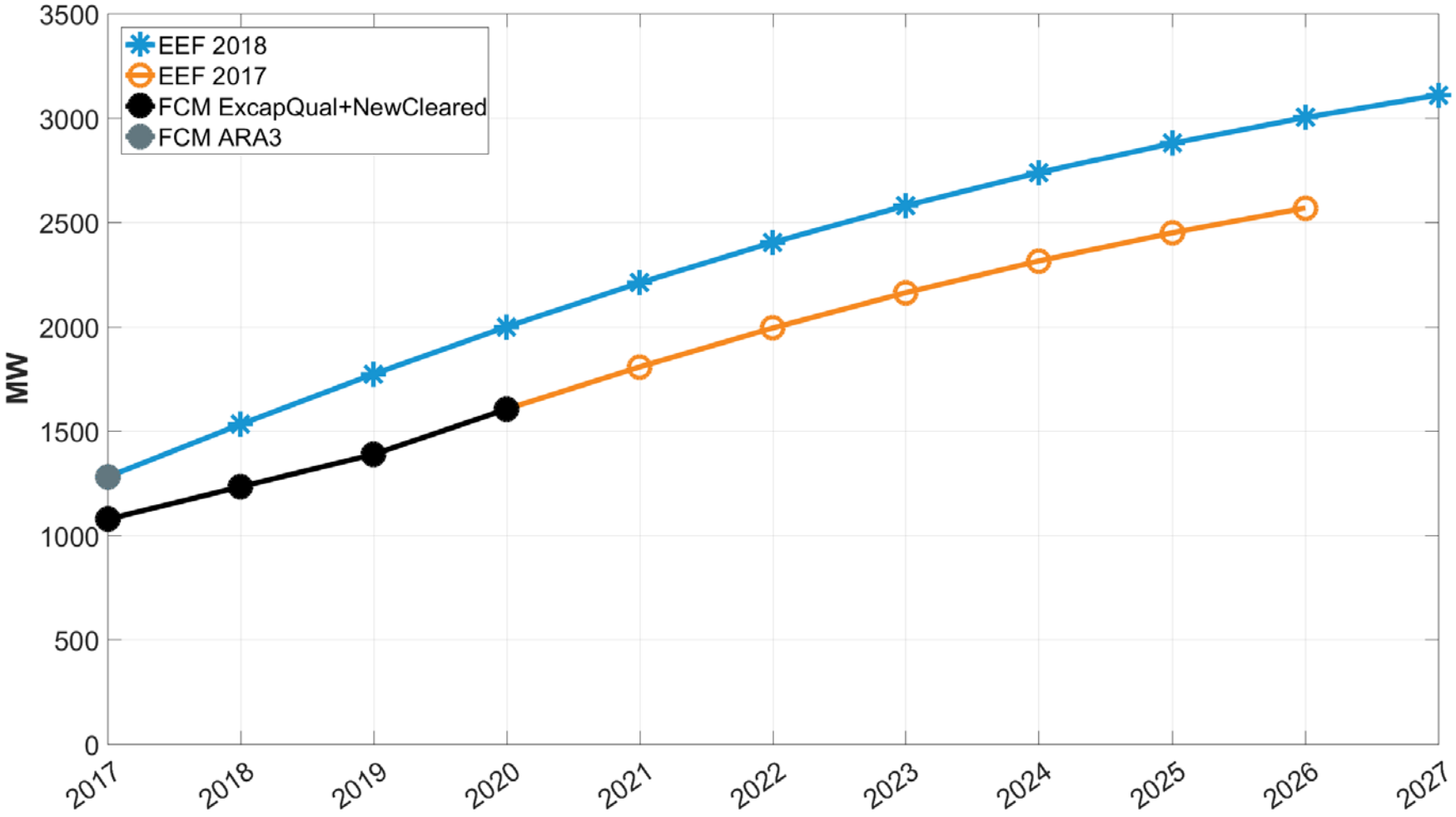


DRAFT FORECAST

States

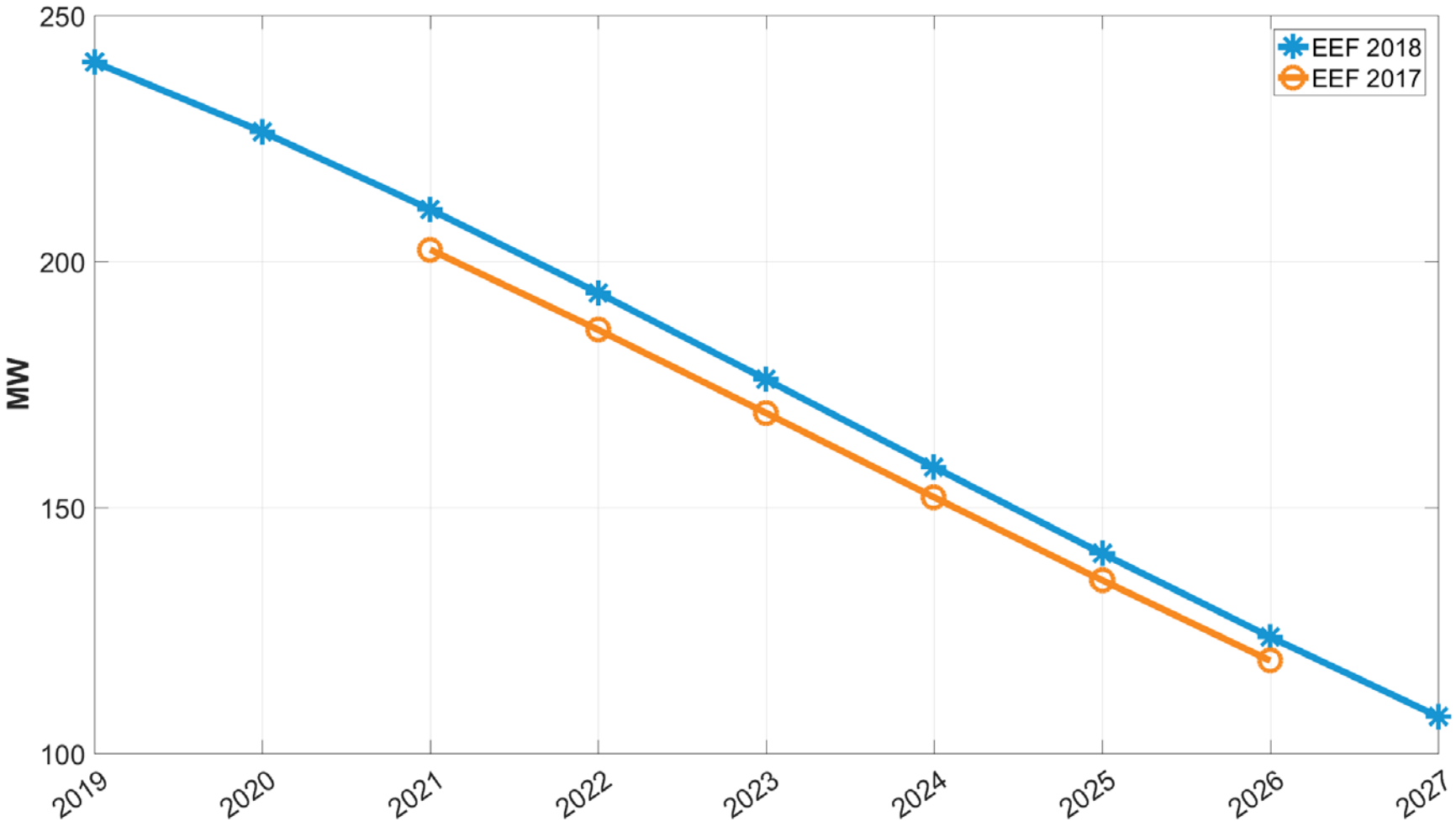
Massachusetts

Energy Efficiency on Summer Peak



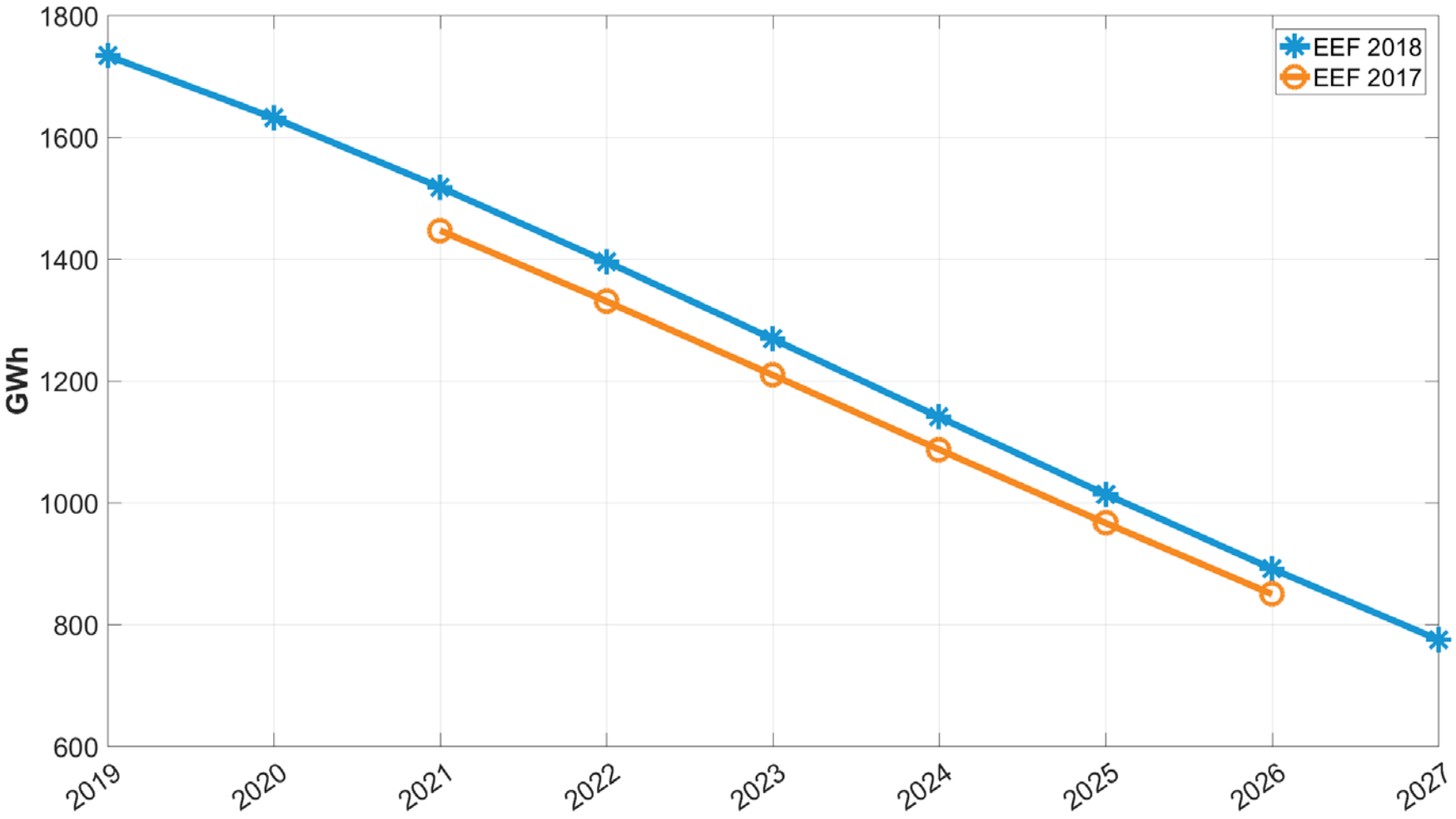
Massachusetts

Energy Efficiency on Summer Peak



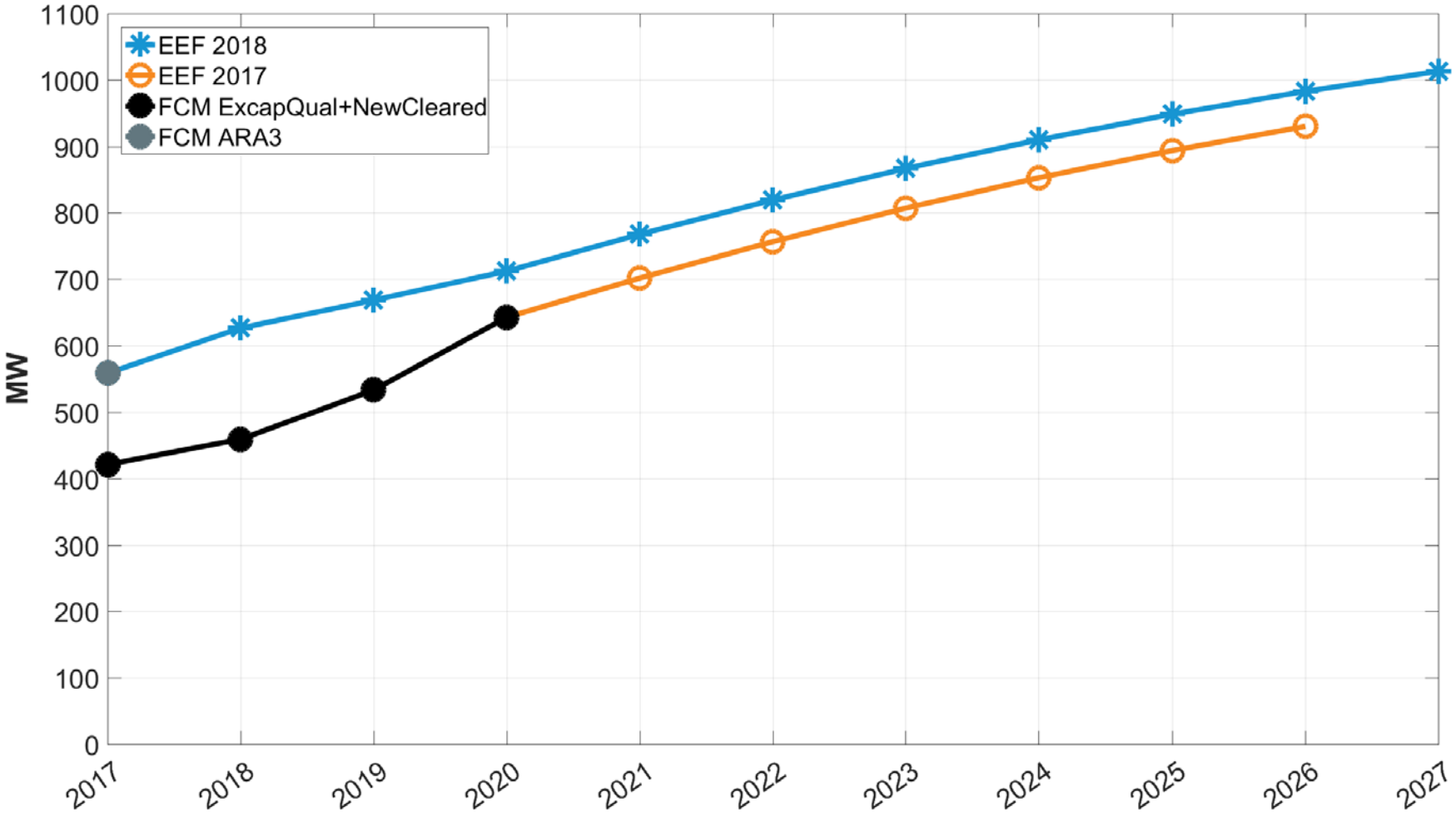
Massachusetts

Energy Efficiency on Annual Energy



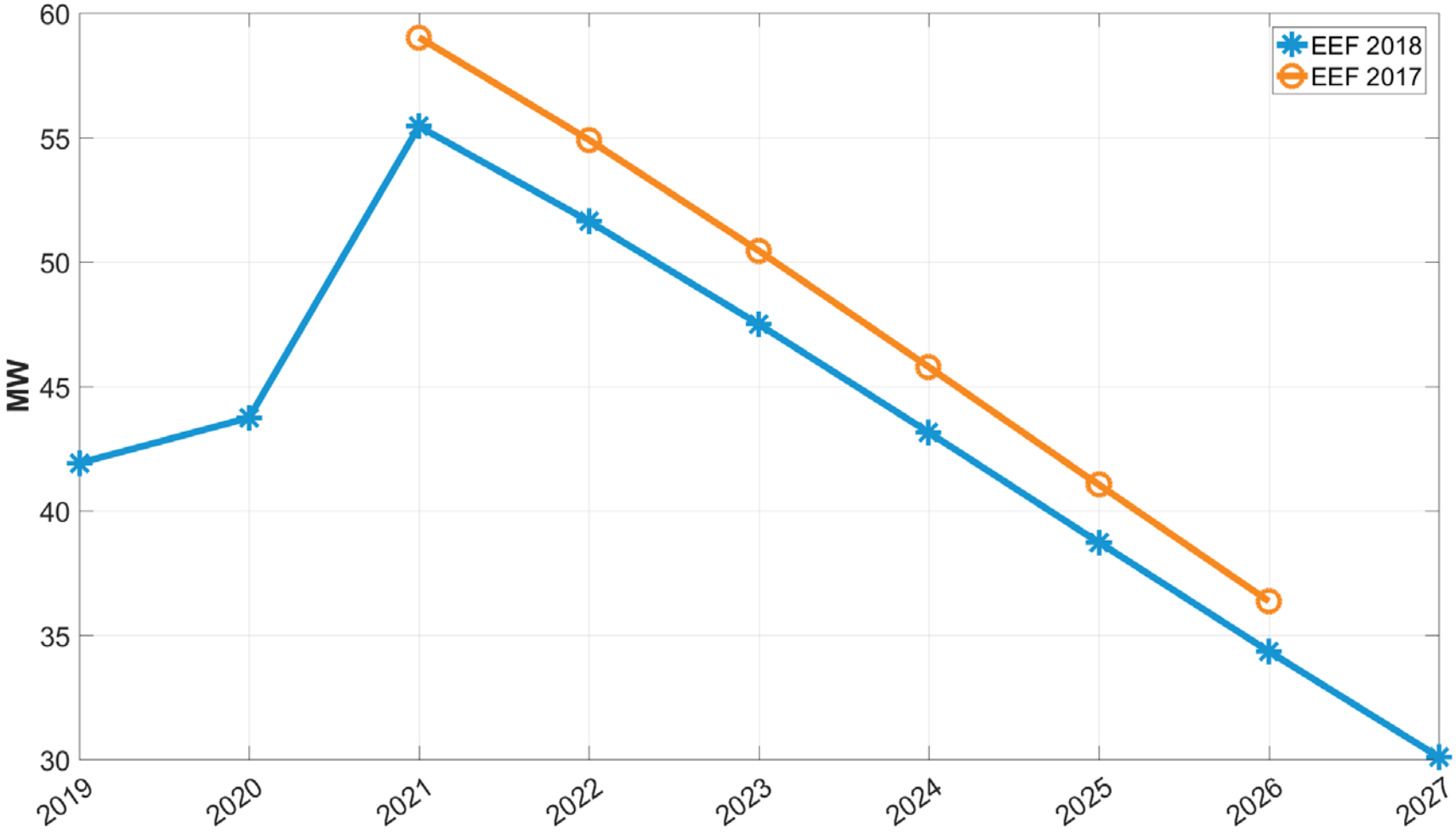
Connecticut

Energy Efficiency on Summer Peak



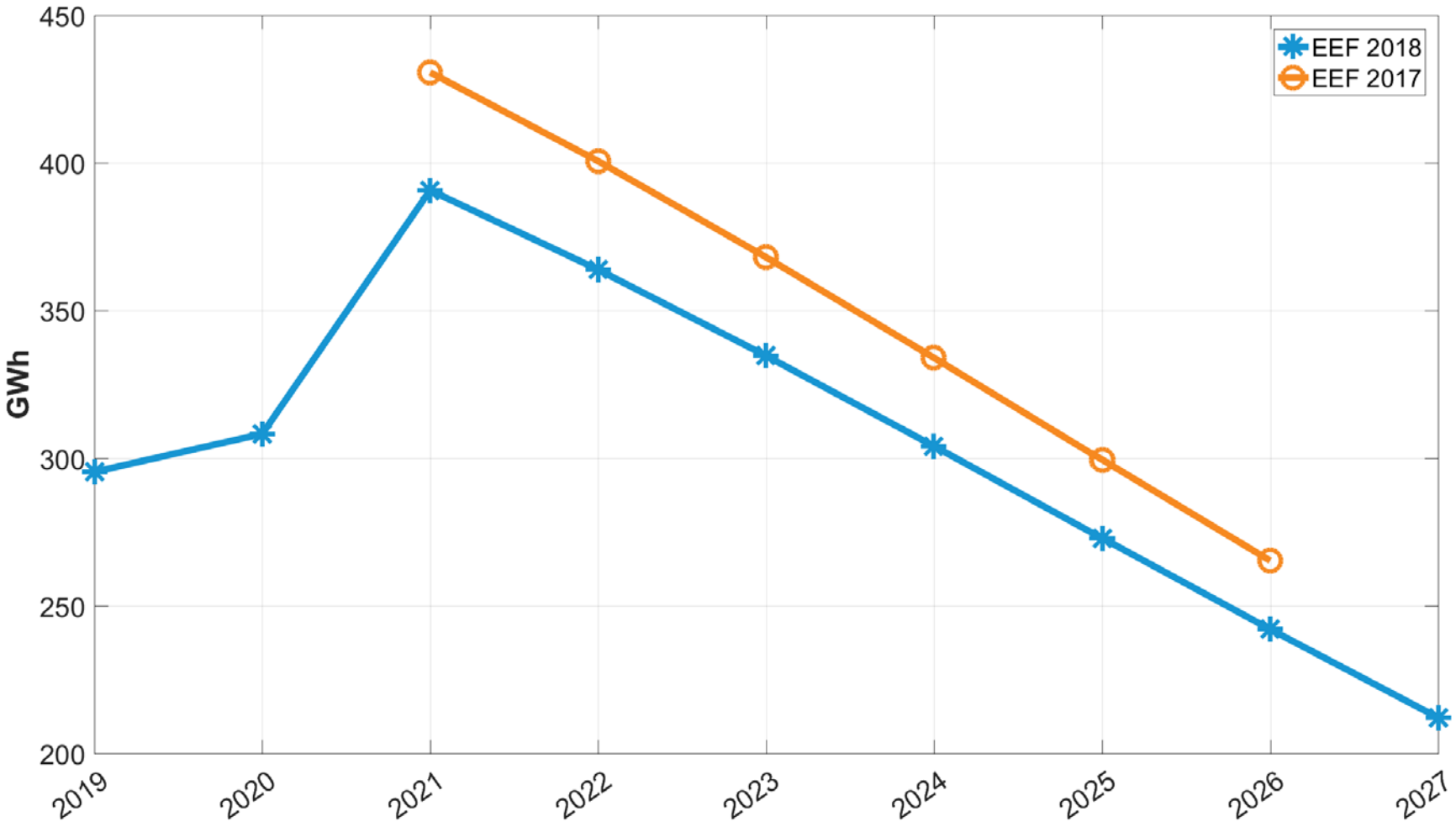
Connecticut

Energy Efficiency on Summer Peak



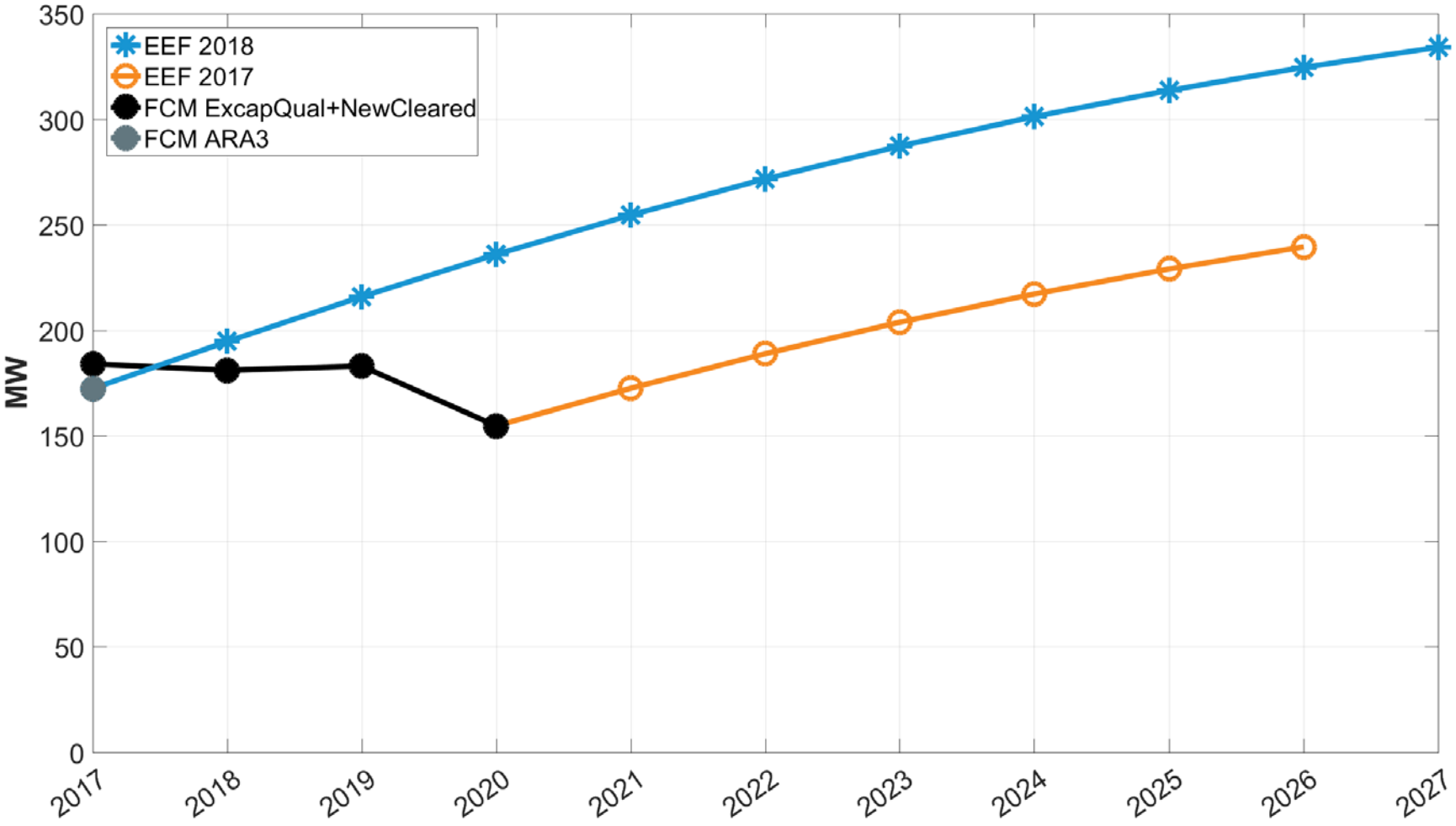
Connecticut

Energy Efficiency on Annual Energy



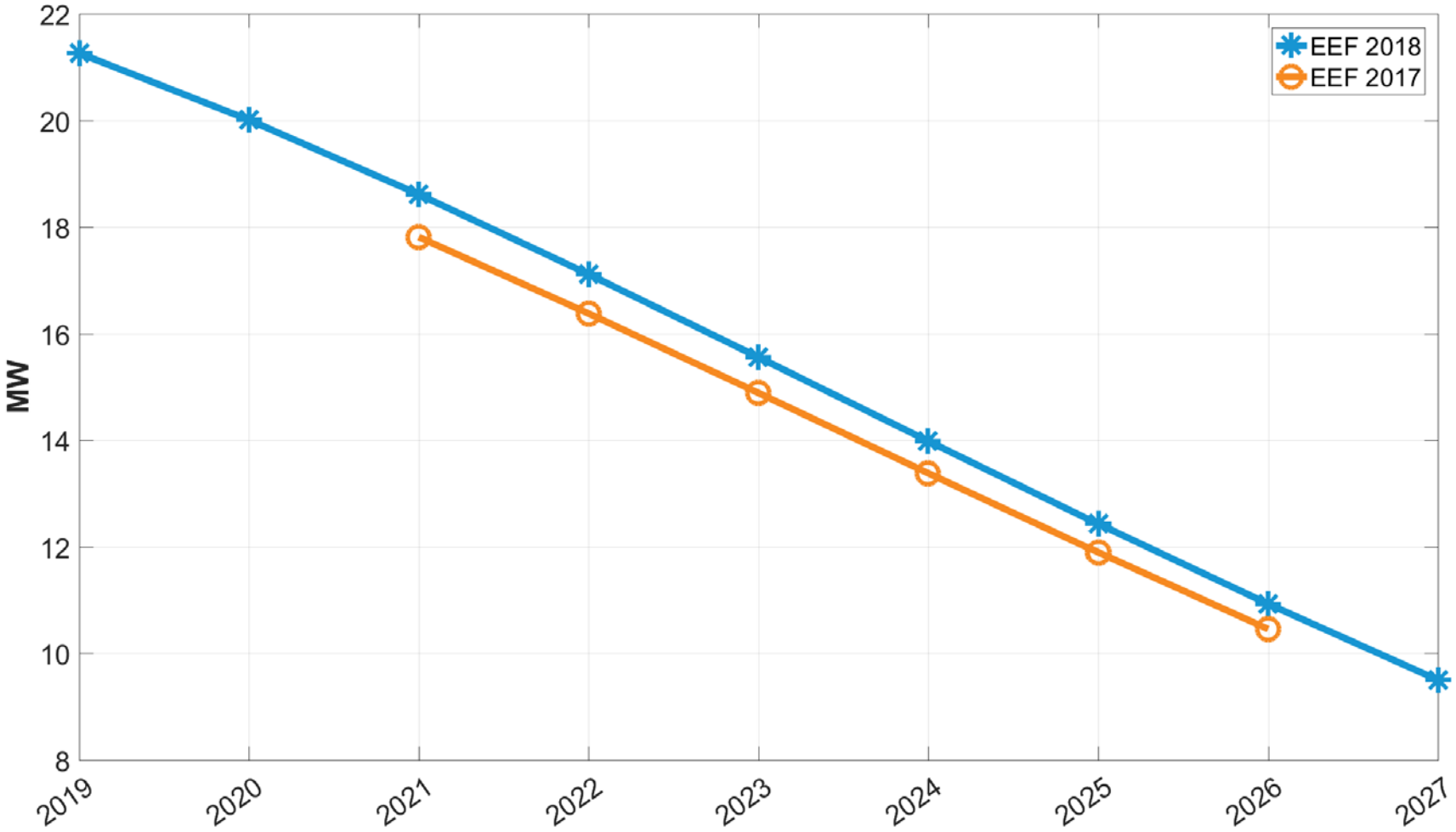
Maine

Energy Efficiency on Summer Peak



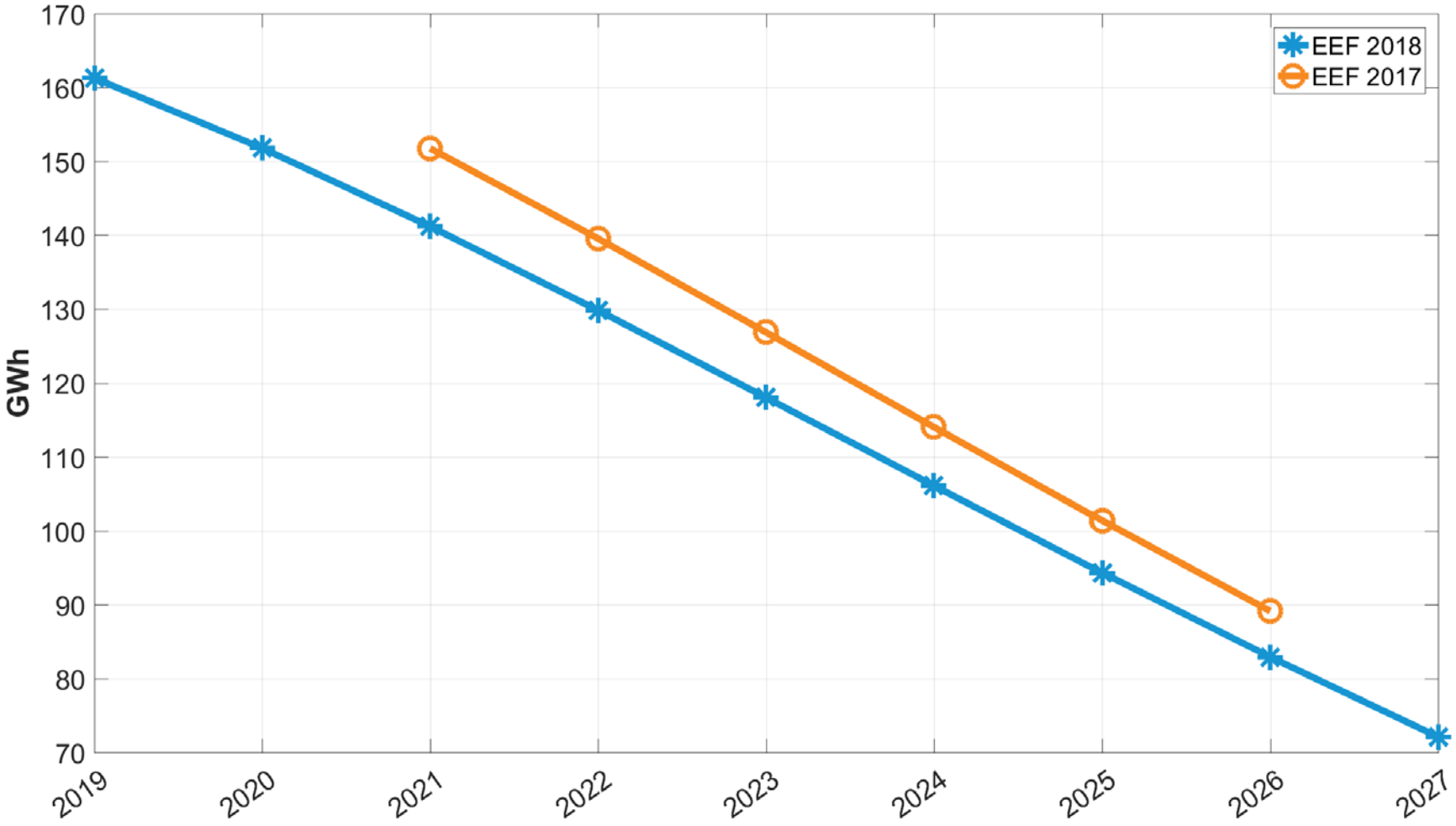
Maine

Energy Efficiency on Summer Peak



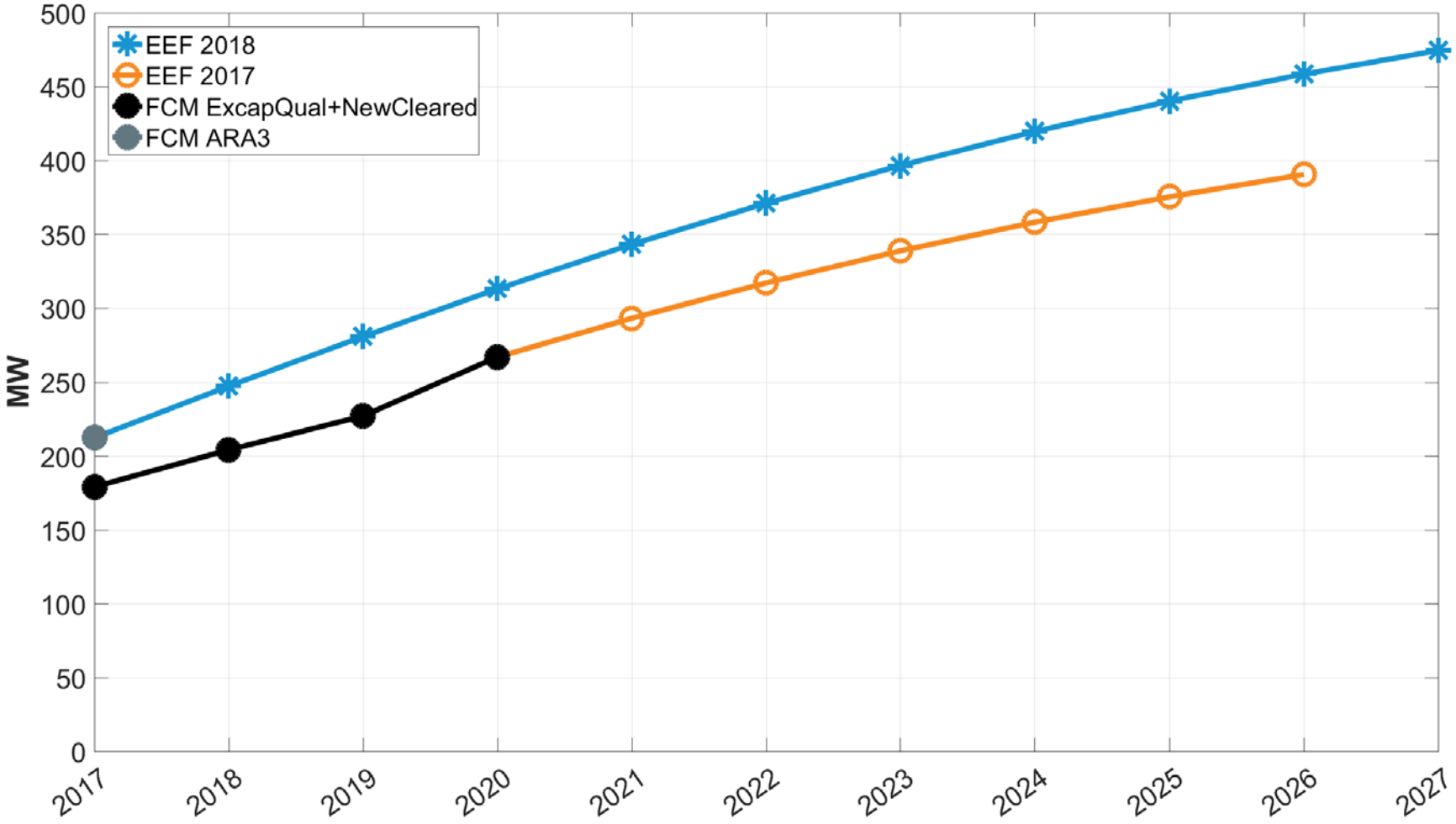
Maine

Energy Efficiency on Annual Energy



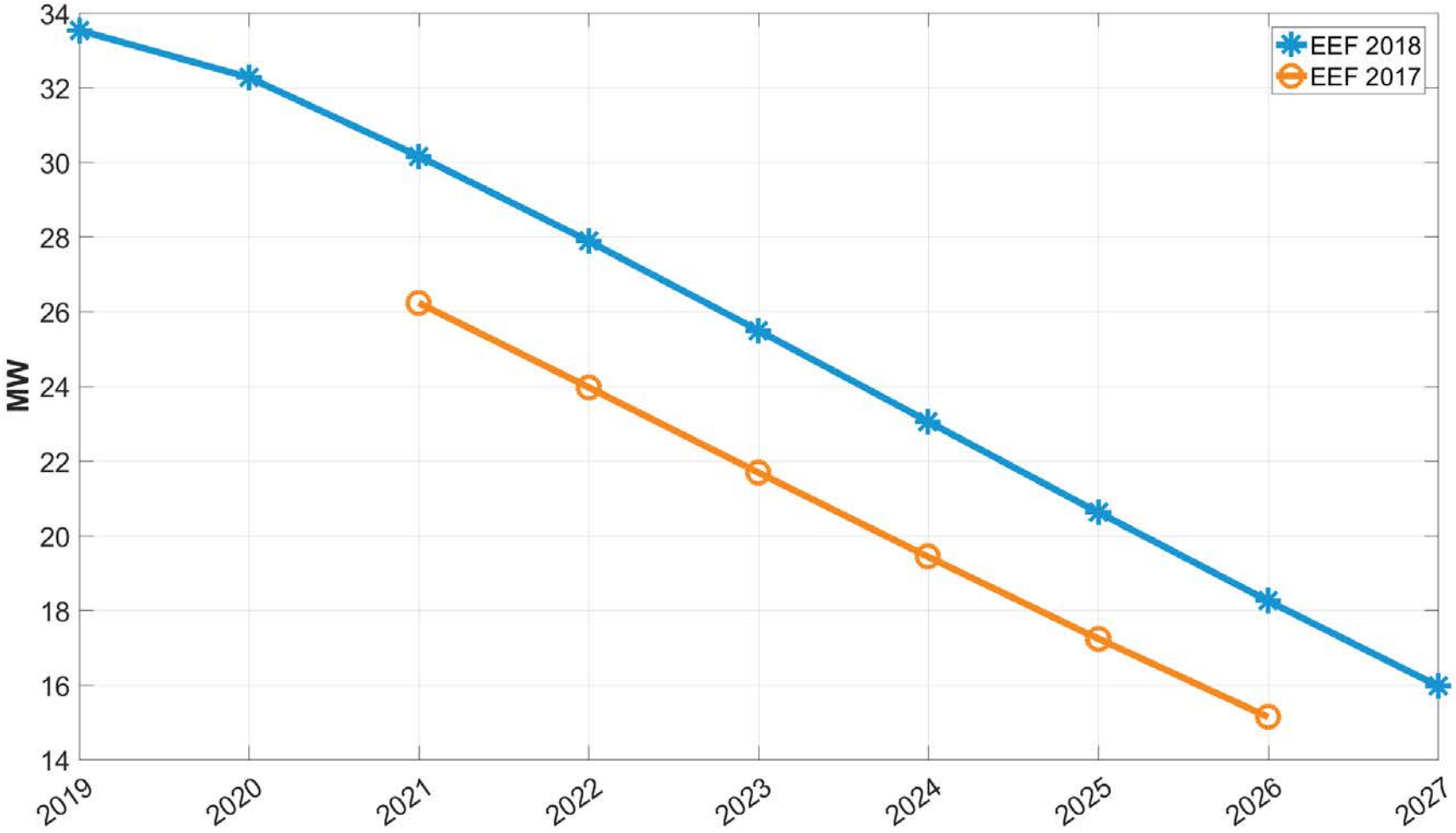
Rhode Island

Energy Efficiency on Summer Peak



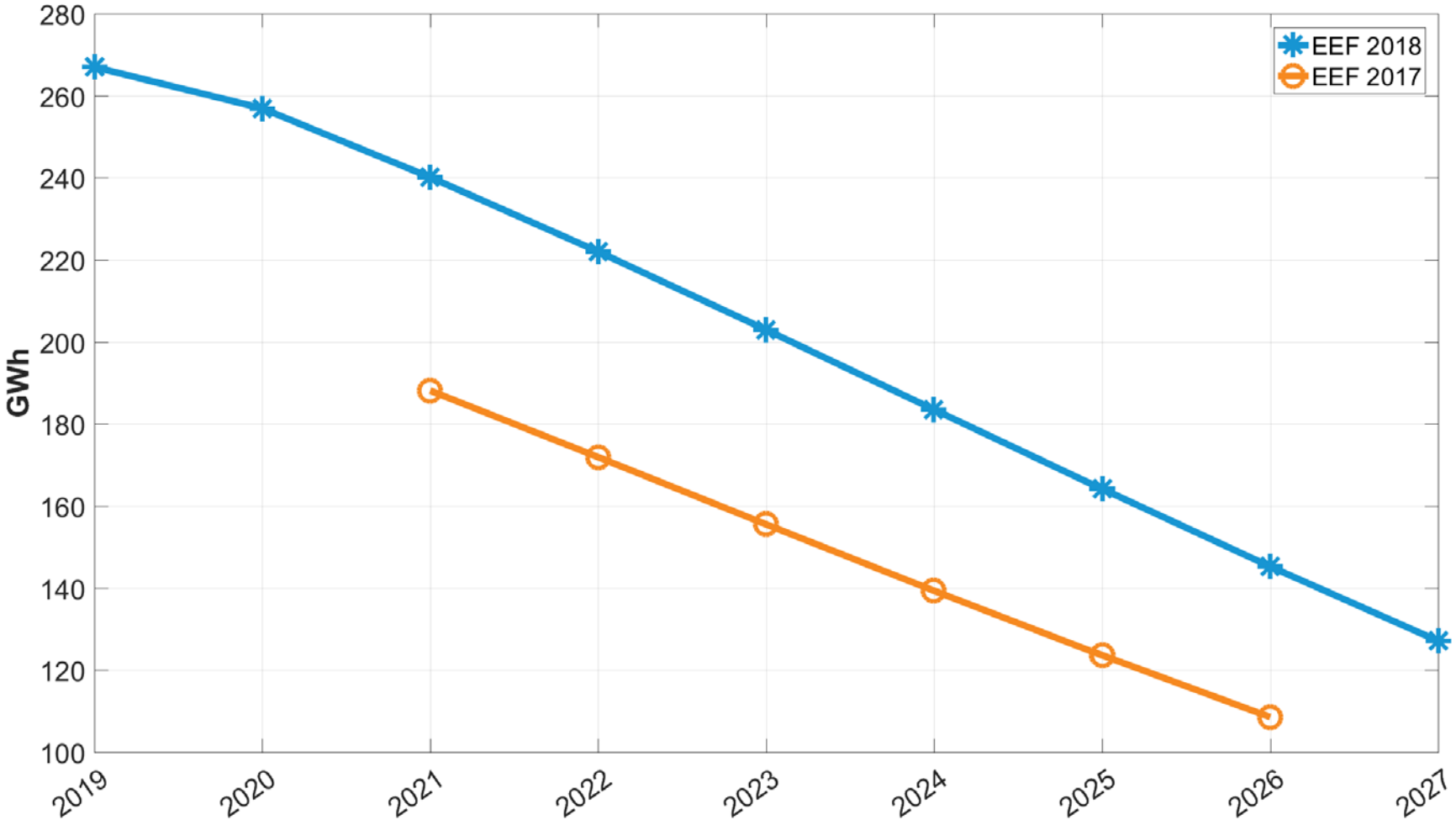
Rhode Island

Energy Efficiency on Summer Peak



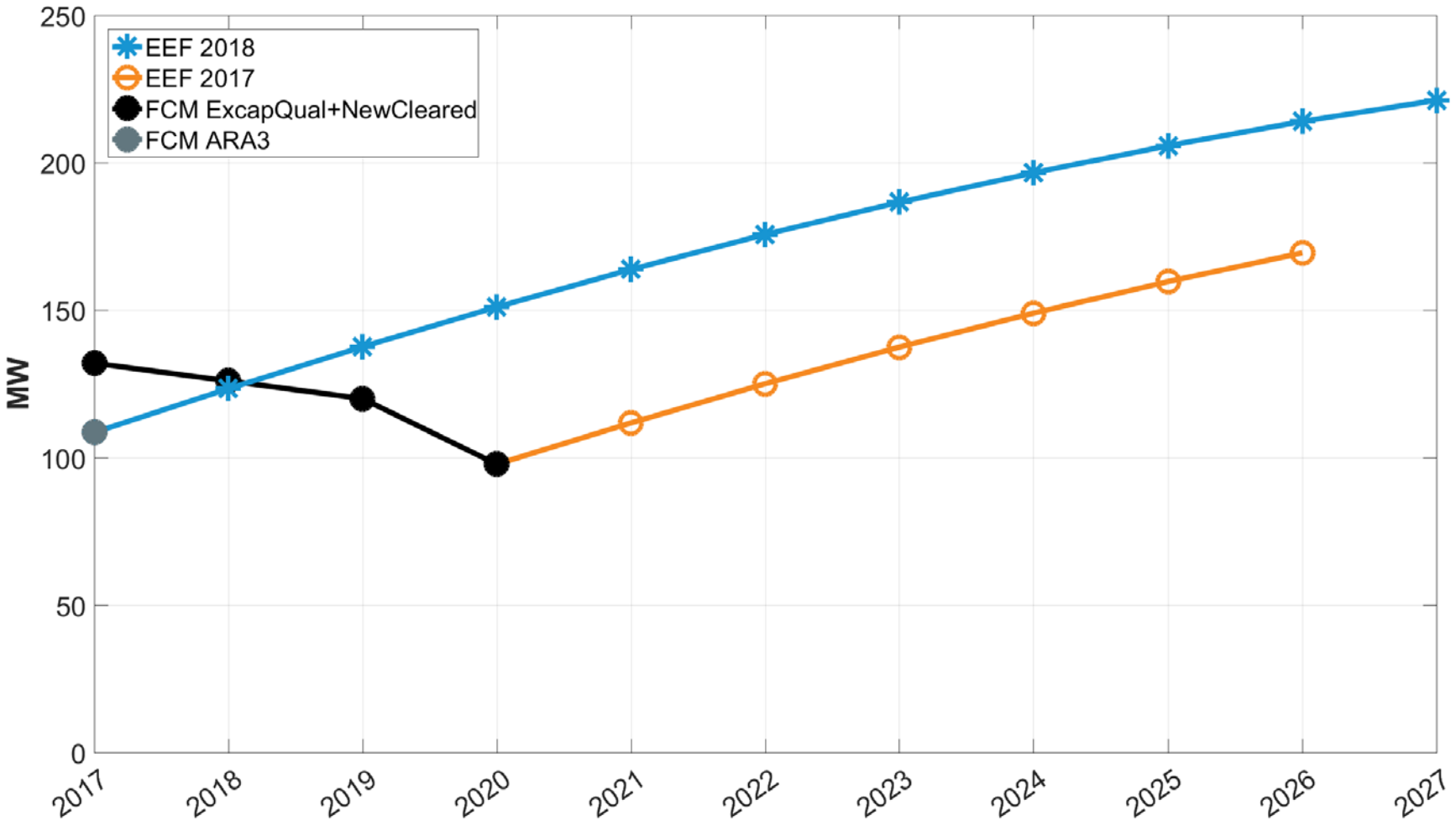
Rhode Island

Energy Efficiency on Annual Energy



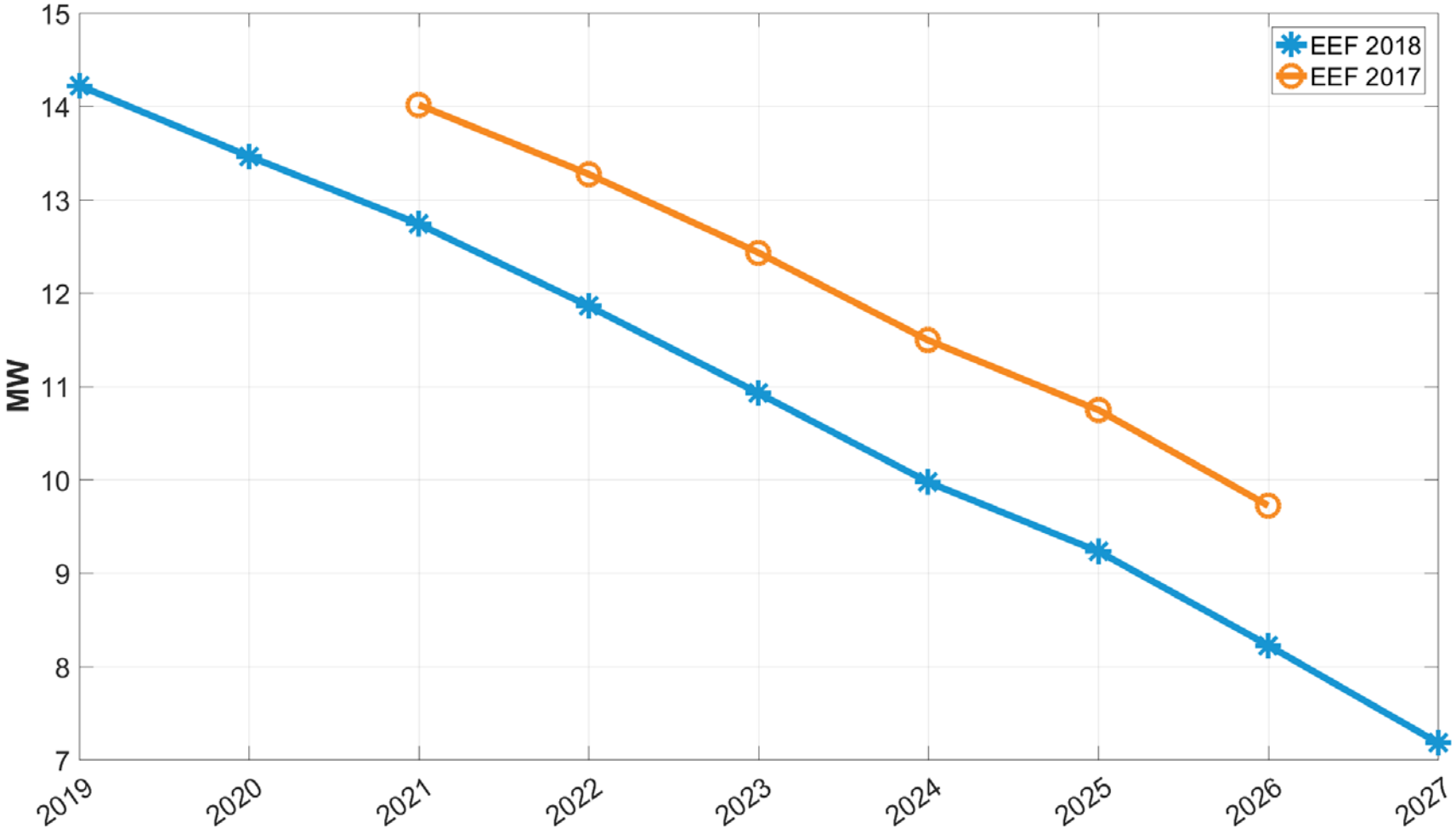
Vermont

Energy Efficiency on Summer Peak



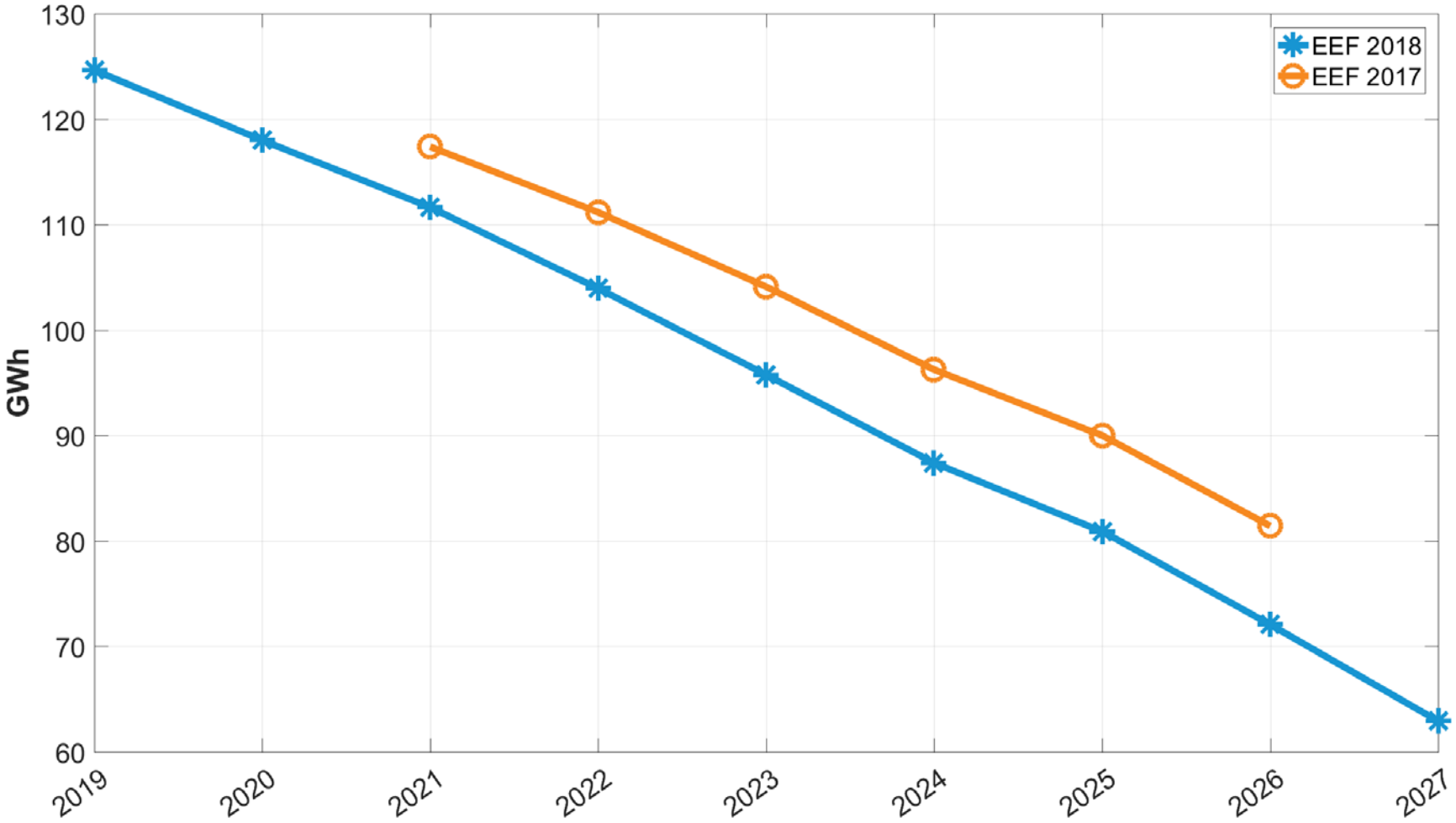
Vermont

Energy Efficiency on Summer Peak



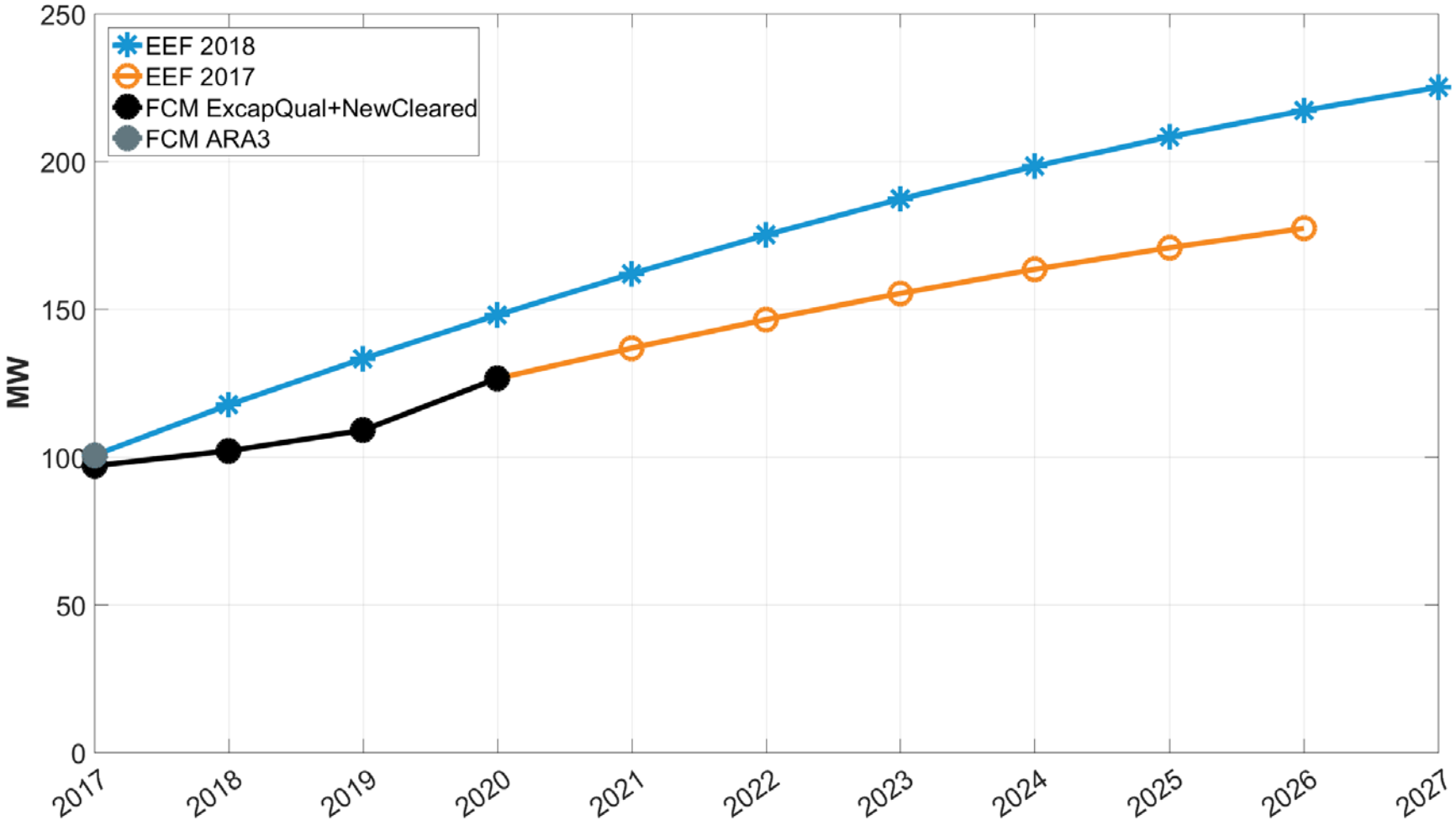
Vermont

Energy Efficiency on Annual Energy



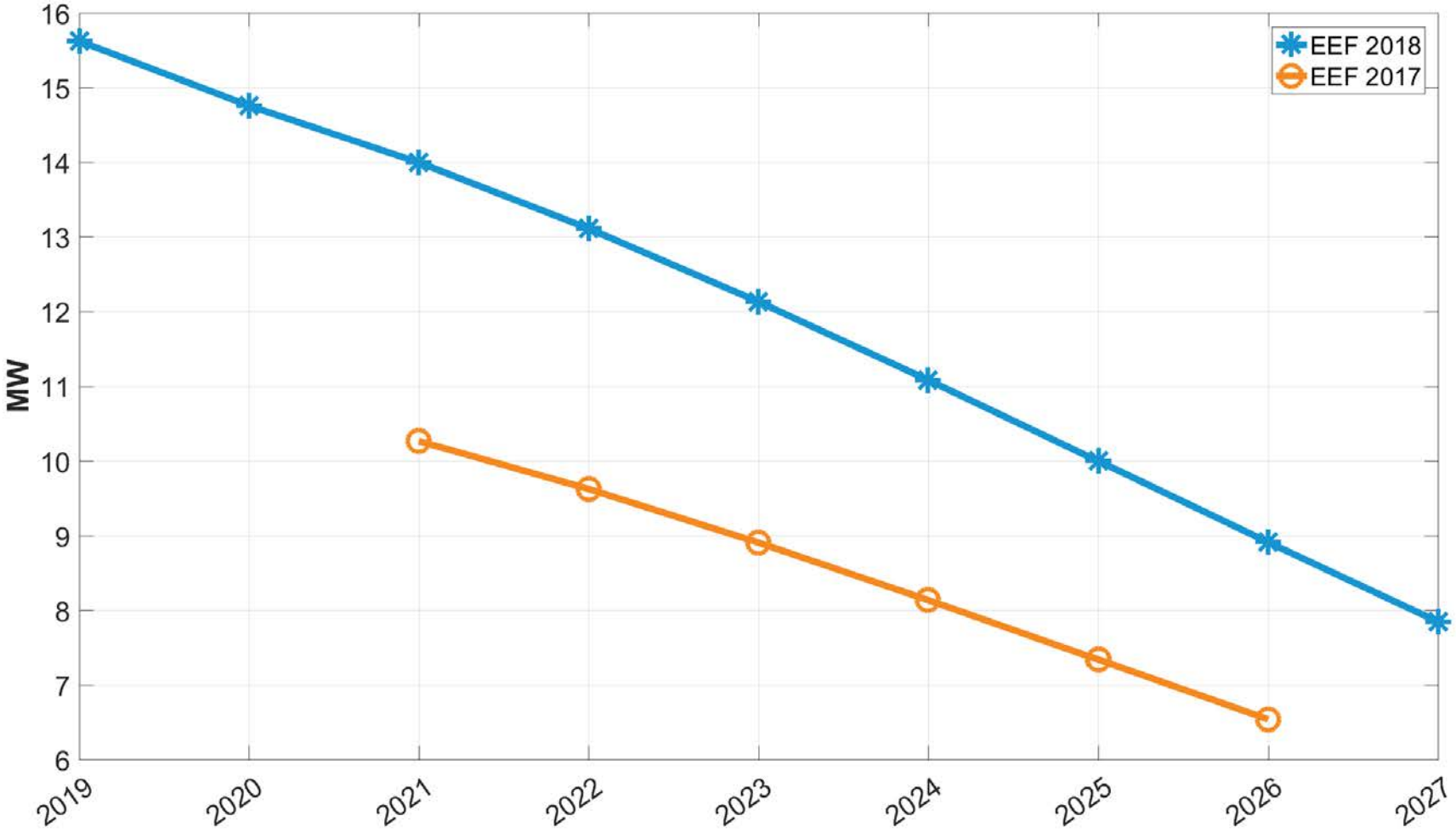
New Hampshire

Energy Efficiency on Summer Peak



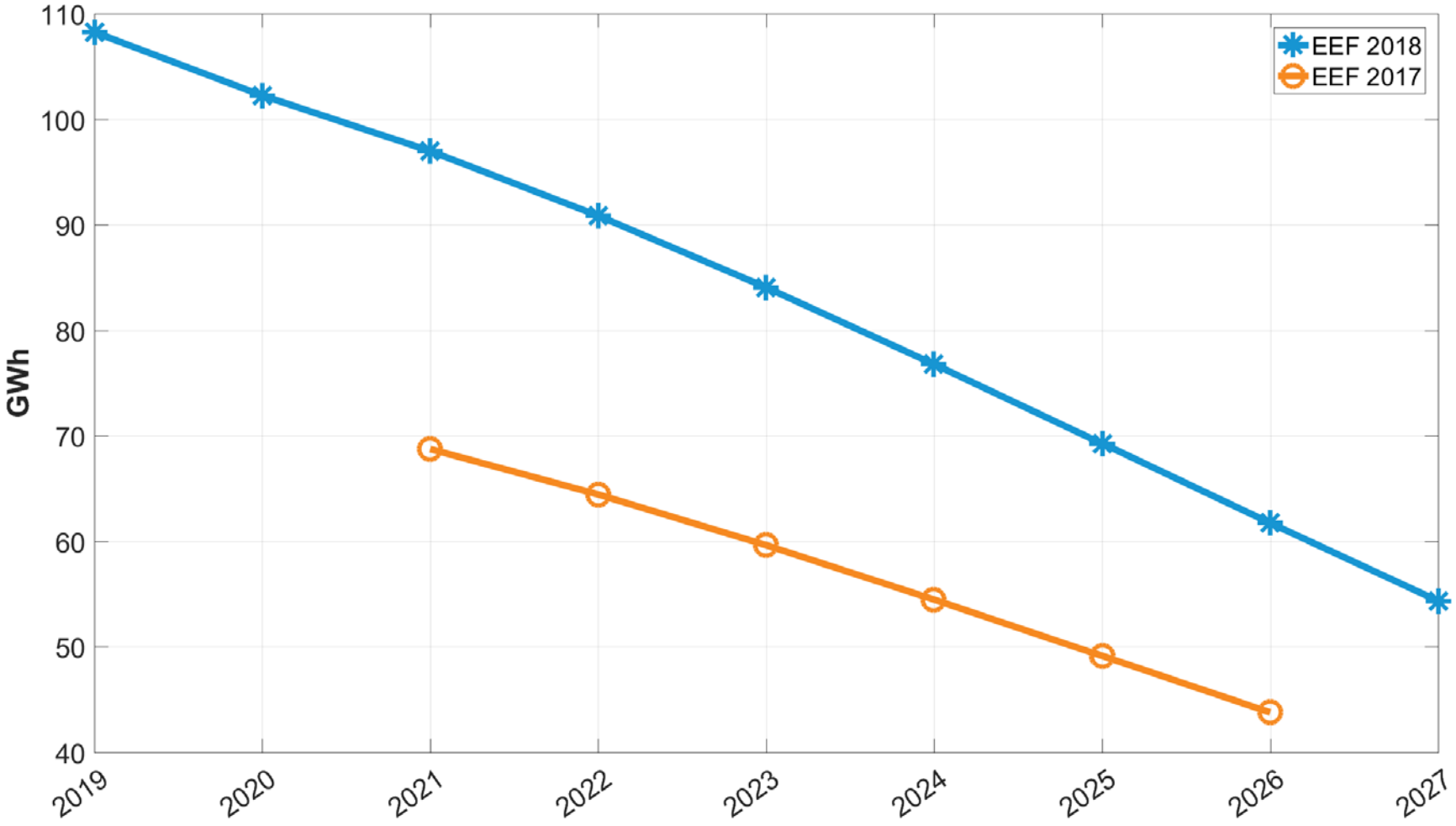
New Hampshire

Energy Efficiency on Summer Peak



New Hampshire

Energy Efficiency on Annual Energy

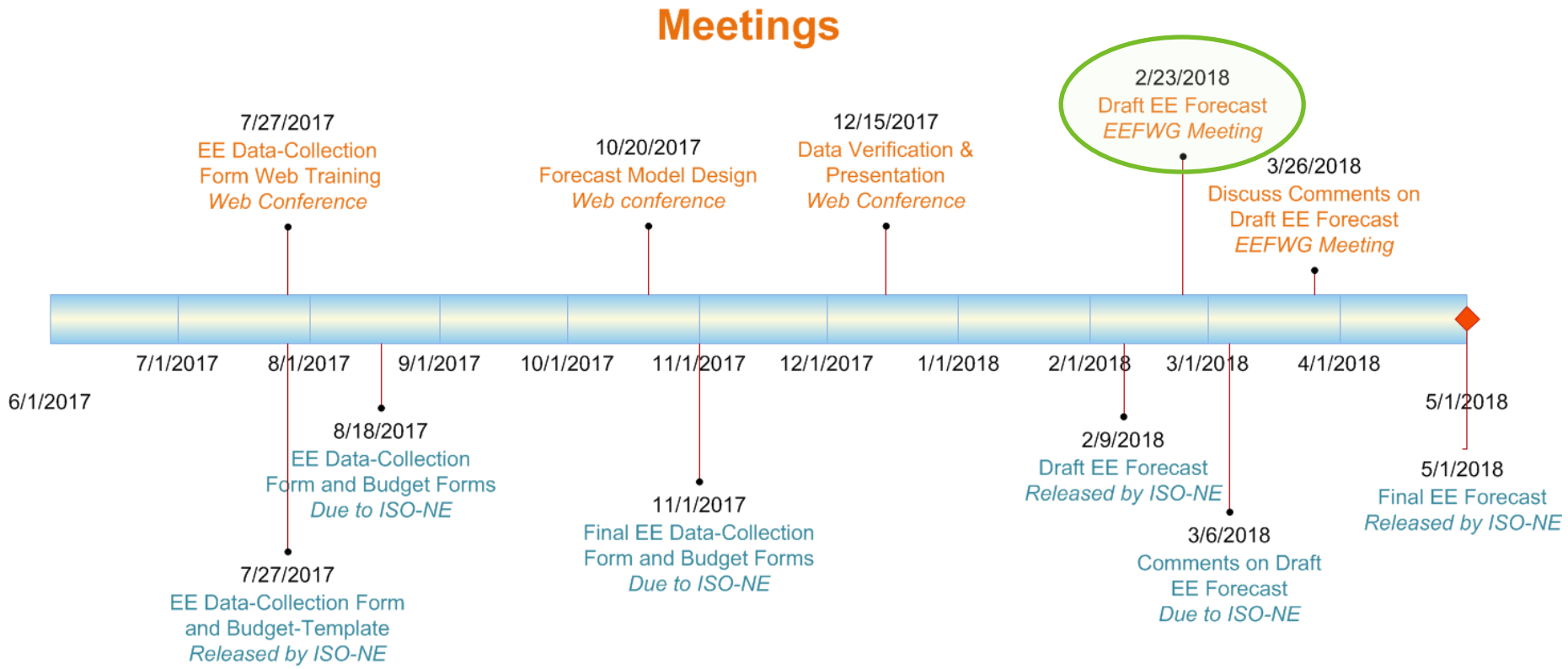


NEXT STEPS

Looking Ahead

- **March 6, 2018** – Comments on the Draft EE Forecast due to ISO New England (eeforecast@iso-ne.com)
- **March 26, 2018** – Energy Efficiency Forecast Working Group (EEFWG) meeting to discuss comments on the Draft EE Forecast
- **March 14, 2018** – Presentation of the Draft EE Forecast to the Planning Advisory Committee
- **May 1, 2018** – Final EE Forecast released by ISO New England

2018 Energy Efficiency Forecast Schedule



Effective: 02-19-2018
(Schedule subject to change)

Questions