

# Final 2018 Energy Efficiency Forecast

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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 final EE forecast for the period 2018 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



# 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 EE forecast is updated annually and is incorporated into the CELT report
- 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](https://www.iso-ne.com/static-assets/documents/2016/05/Final_EEF_Background_Report_050116.pdf)

# 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)



# 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 #12 clearing price used for calculating budgets
- Starting 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 (beginning in year 1)
- No Budget Spend Rate deduction



# Forecast Model

## *Assumptions Regarding the Forward Capacity Market*

- FCM clearing price was held constant at the FCA #12 clearing price of \$4.63/kW-month<sup>†</sup>
- ISO assumes that all achieved EE capacity will be bid into and clear in future FCA's<sup>‡</sup>

<sup>†</sup> FCA clearing price used is for modeling purposes only and should not be considered an indication of future clearing prices.

<sup>‡</sup> 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

$$\text{Annual Energy Savings} = \frac{(1 - \text{Budget Spend Rate Modifier}) * (\text{Budget})}{(\text{Production Cost}) * (\text{Production Cost Escalator})}$$

- Compute Annual Demand Savings

$$\text{Annual Demand Savings} = (\text{Annual Energy Savings}) * (\text{Peak-to-Energy Ratio})$$

- Where:

- Budget Spend Rate Modifier (%) = % to reduce state budgets
- Budget (\$) = \$SBC + \$RGGI + \$FCM + \$Policy
- Production Cost (\$/MWh) = 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)



# 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
<b>New England</b>												
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
<b>Massachusetts</b>												
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
<b>Connecticut</b>												
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
<b>Rhode Island</b>												
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
<b>Maine</b>												
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
<b>Vermont</b>												
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
<b>New Hampshire</b>												
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

<b>RGGI Dollars (\$1000's) Applied to EE Annually</b>							
	New England	MA	CT*	ME	RI	VT	NH
	76,513	64,757	7,192	-	2,009	-	2,555
<b>FCM MW</b>							
	New England	MA	CT	ME	RI	VT	NH
2021	2,975	1,609	681	165	280	120	121
<b>FCM Dollars (\$1000's, clearing price of \$4.63*)</b>							
	New England	MA	CT	ME	RI	VT	NH
2021	149,549	89,439	37,862	-	15,544	-	6,704
<b>FCM Dollars for EE (\$1000's)</b>							
	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	149,549	89,439	37,862	-	15,544	-	6,704
2022	149,549	89,439	37,862	-	15,544	-	6,704
2023	149,549	89,439	37,862	-	15,544	-	6,704
2024	149,549	89,439	37,862	-	15,544	-	6,704
2025	149,549	89,439	37,862	-	15,544	-	6,704
2026	149,549	89,439	37,862	-	15,544	-	6,704
2027	149,549	89,439	37,862	-	15,544	-	6,704

\* 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

<b>SBC Eligible</b>							
		MA	CT	ME	RI	VT	NH
		85.9%	94.7%	98.7%	100.0%	100.0%	100.0%
<b>SBC Eligible 2017 Energy Forecast - FCM Passive Demand Resources (GWh)</b>							
	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	14,808	6,854	2,212	-	5,247	-	494	
2023	21,297	9,850	3,180	-	7,556	-	712	
2024	27,154	12,548	4,052	-	9,645	-	908	
2025	32,382	14,953	4,829	-	11,516	-	1,084	
2026	36,997	17,071	5,515	-	13,172	-	1,239	
2027	41,028	18,918	6,112	-	14,623	-	1,375	
New FCM Dollars (\$1000's)								
	New England	MA	CT	ME	RI	VT	NH	
2022	31,662	21,141	5,814	-	3,265	-	1,442	
2023	45,514	30,380	8,357	-	4,701	-	2,076	
2024	58,003	38,704	10,650	-	6,001	-	2,649	
2025	69,138	46,120	12,693	-	7,165	-	3,161	
2026	78,958	52,654	14,494	-	8,195	-	3,614	
2027	87,522	58,350	16,064	-	9,097	-	4,010	

# 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	610,803	434,205	86,877	39,494	-	55,156	-	
2022	603,128	425,839	86,877	39,494	-	55,847	-	
2023	596,073	418,032	86,877	39,494	-	56,598	-	
2024	589,755	410,844	86,877	39,494	-	57,470	-	
2025	585,577	404,288	86,877	39,494	-	59,847	-	
2026	580,384	398,303	86,877	39,494	-	60,639	-	
2027	575,211	392,885	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	1,173,606	715,631	212,771	39,494	109,308	55,156	41,246	
2022	1,177,892	715,631	215,086	39,494	109,905	55,847	41,928	
2023	1,182,103	715,631	217,281	39,494	110,508	56,598	42,591	
2024	1,186,280	715,631	219,308	39,494	111,165	57,470	43,212	
2025	1,191,773	715,631	221,153	39,494	111,858	59,847	43,790	
2026	1,195,513	715,631	222,847	39,494	112,566	60,639	44,336	
2027	1,198,538	715,631	224,399	39,494	113,286	60,885	44,844	

\* 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

<b>Production Cost Multiplier (includes inflation)</b>							
	MA	CT	ME	RI	VT	NH	
2017	1.0250	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	1.0375
2019	1.0500	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	1.0625
2021	1.0750	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	1.0875
2023	1.1000	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	1.1125
2025	1.1250	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	1.1375
2027	1.1500	1.1500	1.1500	1.1500	1.1500	1.1500	1.1500
<b>Production Cost (\$/MWh)</b>							
	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	
<b>Peak-to-Energy Ratio (MW/GWh)</b>							
	MA	CT	ME	RI	VT	NH	
	0.139	0.142	0.132	0.126	0.114	0.144	

# FINAL FORECAST

*New England*

# Energy and Summer Peak EE Forecast

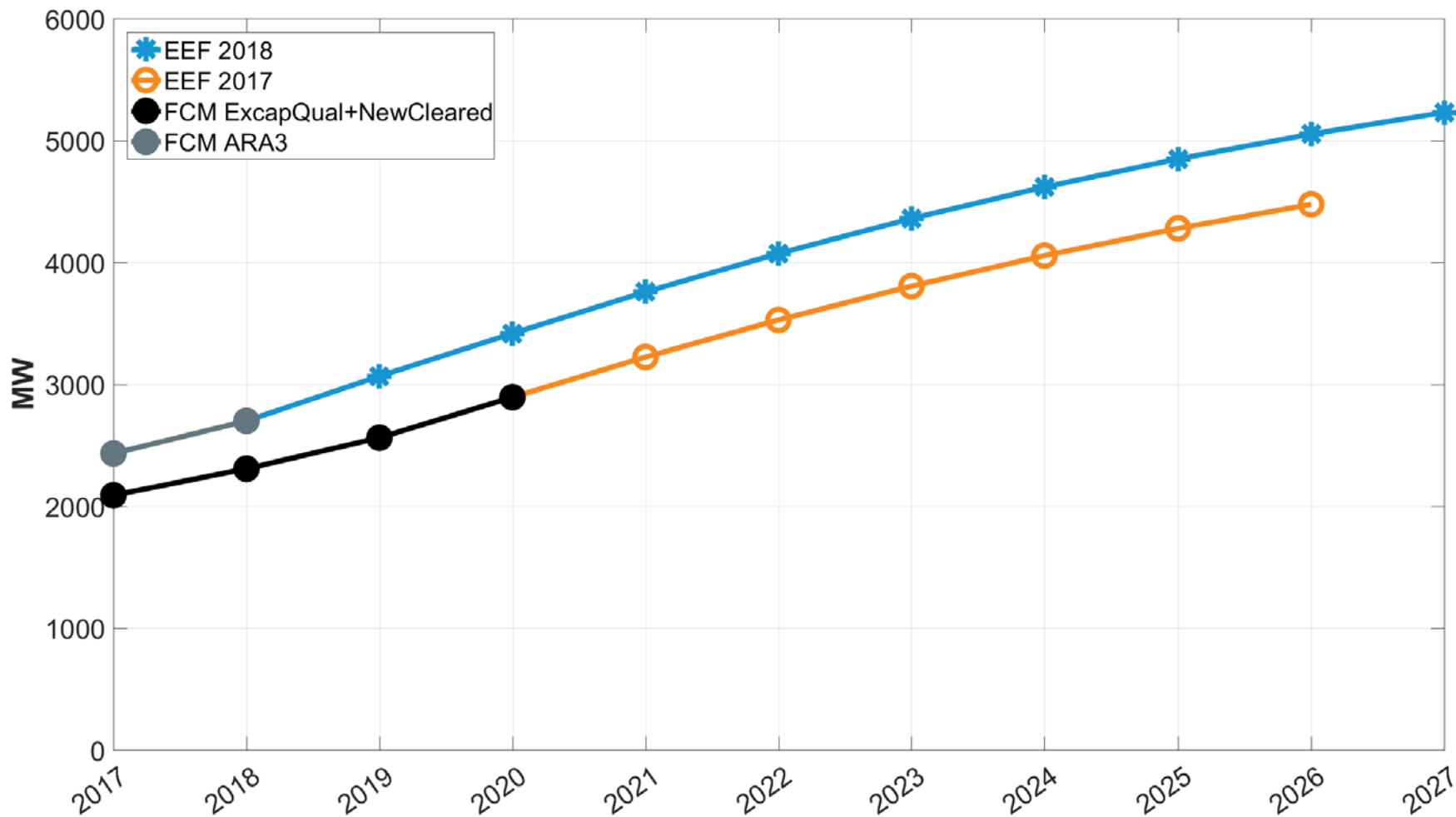
Energy Savings (GWh)									
	New England	MA	CT	ME	RI	VT	NH		
2019	2,690	1,733	295	161	267	125	108		
2020	2,568	1,631	308	152	257	118	102		
2021	2,494	1,517	387	141	243	112	95		
2022	2,302	1,395	360	130	224	104	88		
2023	2,099	1,269	330	118	205	96	82		
2024	1,893	1,140	300	106	185	87	74		
2025	1,690	1,014	269	94	166	81	67		
2026	1,490	891	238	83	147	72	60		
2027	1,299	775	208	72	128	63	52		
Total 2019-2027	18,527	11,366	2,696	1,058	1,822	857	729		
Average	2,059	1,263	300	118	202	95	81		
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	341	211	55	19	30	13	14		
2022	315	194	51	17	28	12	13		
2023	287	176	47	16	26	11	12		
2024	259	158	43	14	23	10	11		
2025	231	141	38	12	21	9	10		
2026	204	124	34	11	18	8	9		
2027	177	108	30	10	16	7	8		
Total 2019-2027	2,531	1,577	382	139	229	98	105		
Average	281	175	42	15	25	11	12		

# EE Forecast Comparison

<b>PA Average Production Cost (\$/MWh)</b>							
	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
<b>PA Average Peak-to-Energy Ratio (MW/GWh)</b>							
	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
<b>Total EE Dollars (1000s)</b>							
	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	10,519,771	6,440,682	1,832,627	355,446	991,660	514,582	384,774
Average	1,168,863	715,631	203,625	39,494	110,184	57,176	42,753
<b>Summer Peak Impacts (MW)</b>							
	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	2,531	1,577	382	139	229	98	105
Average	281	175	42	15	25	11	12

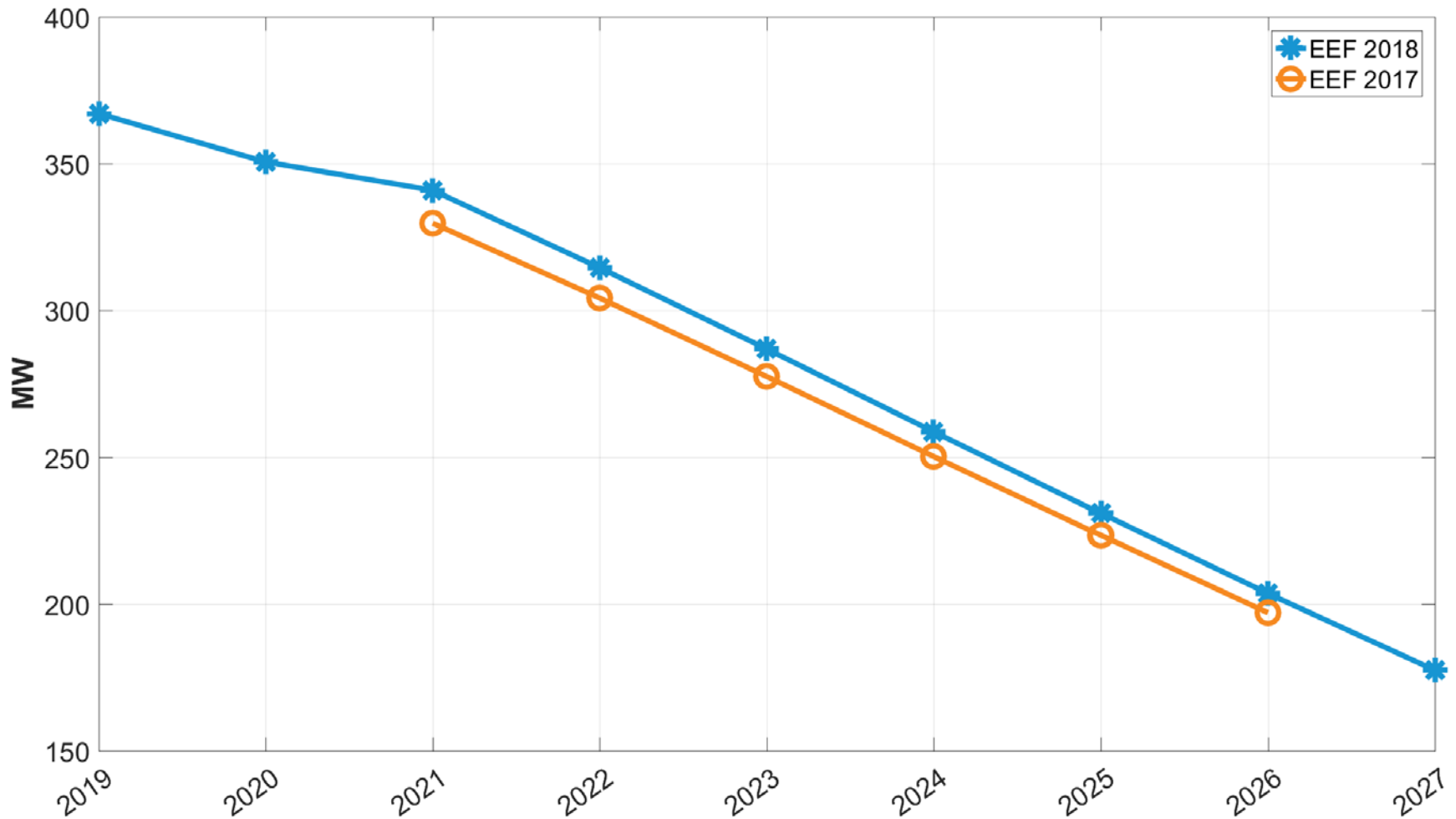
# New England

## *Energy Efficiency on Summer Peak*



# New England

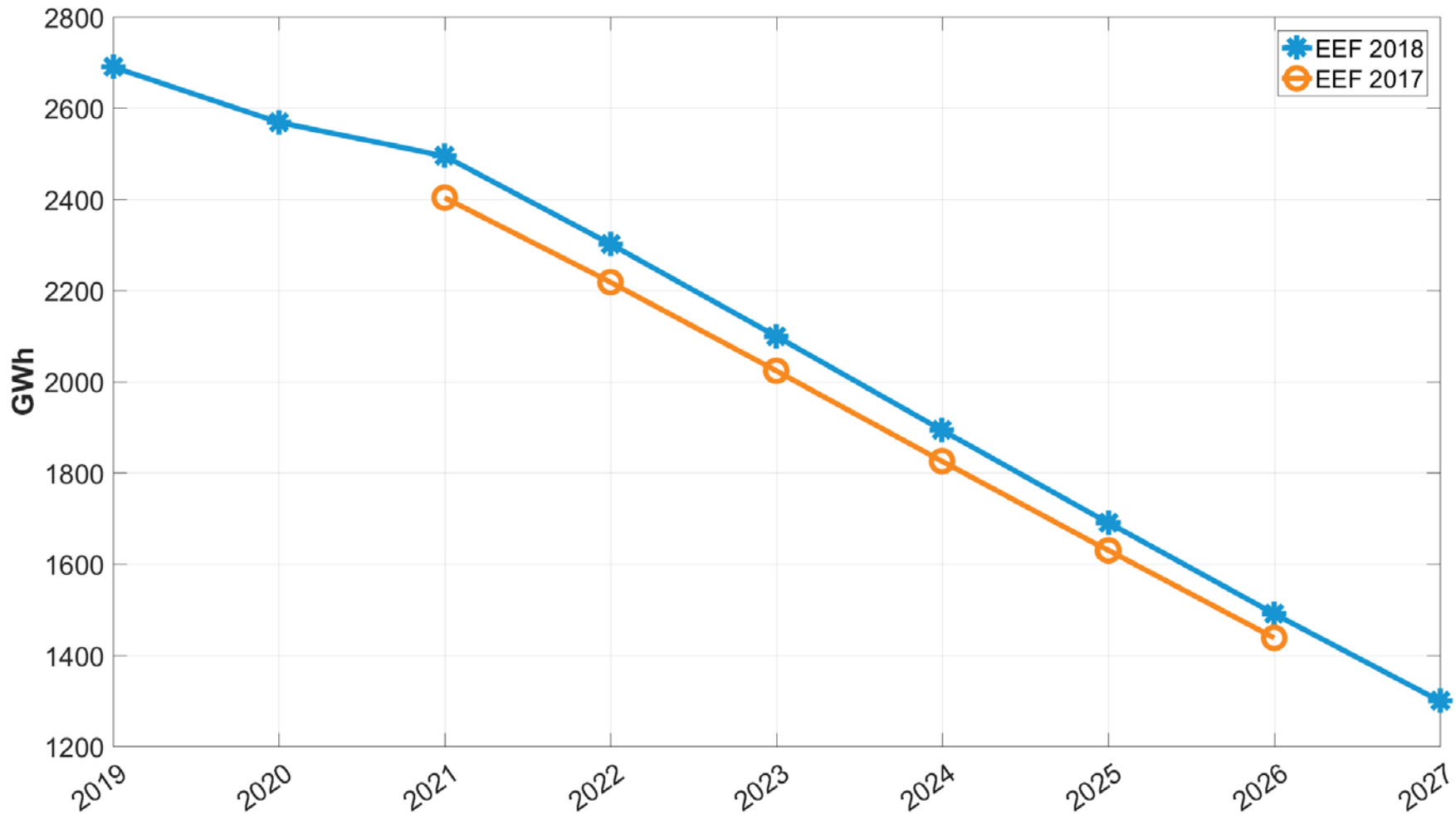
## *Energy Efficiency on Summer Peak*





# New England

## *Energy Efficiency on Annual Energy*



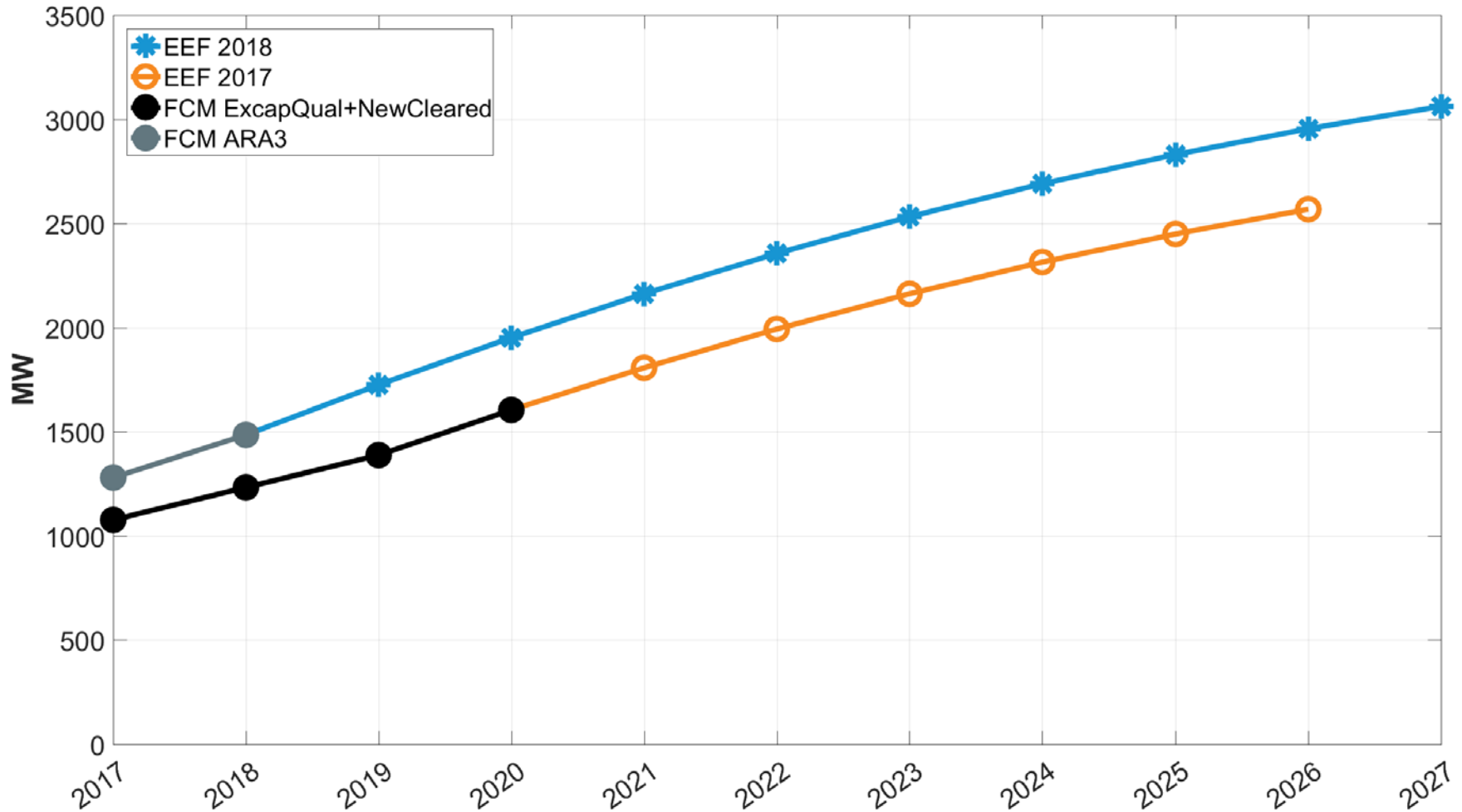
# FINAL FORECAST

*States*



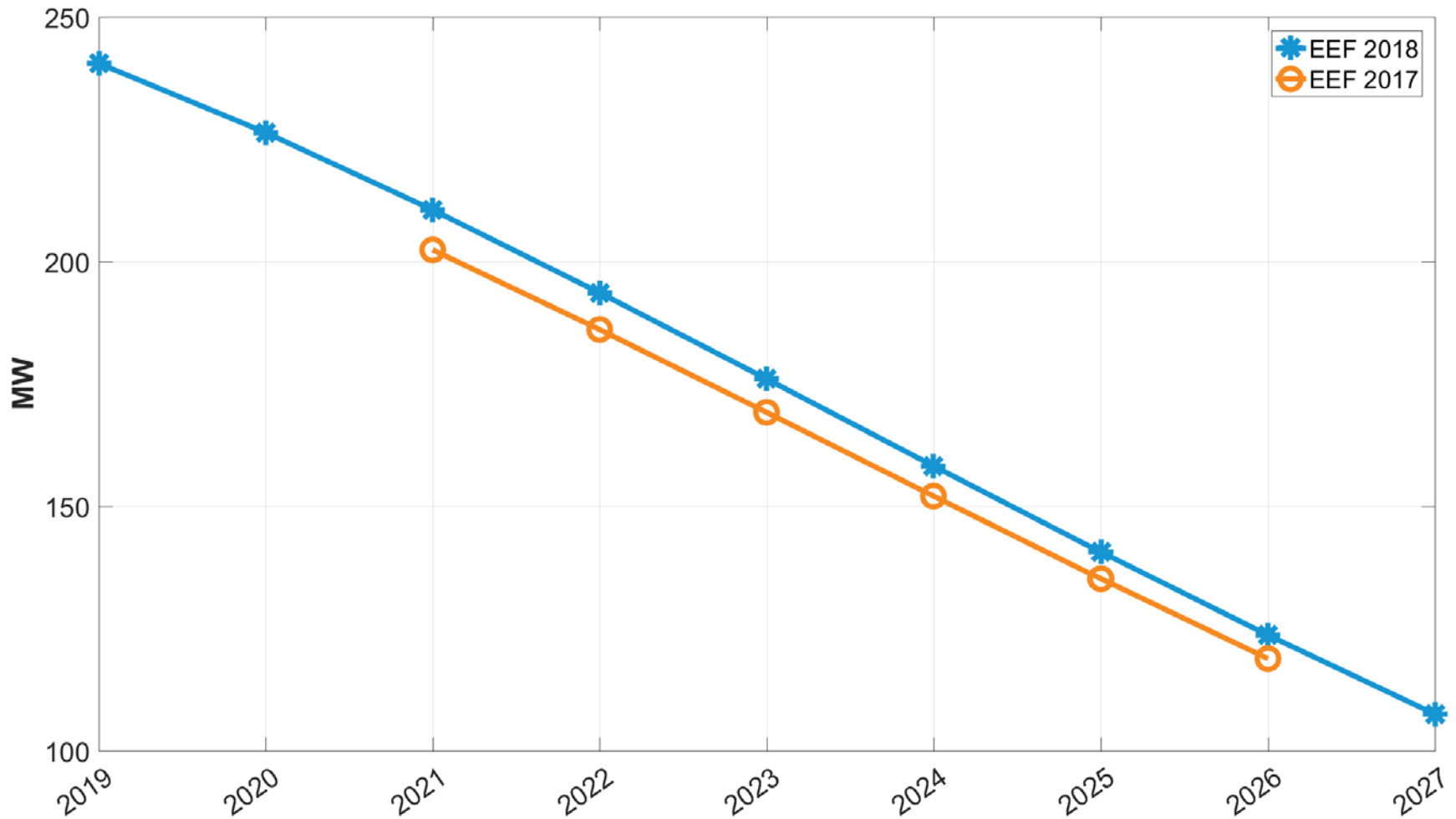
# Massachusetts

## *Energy Efficiency on Summer Peak*



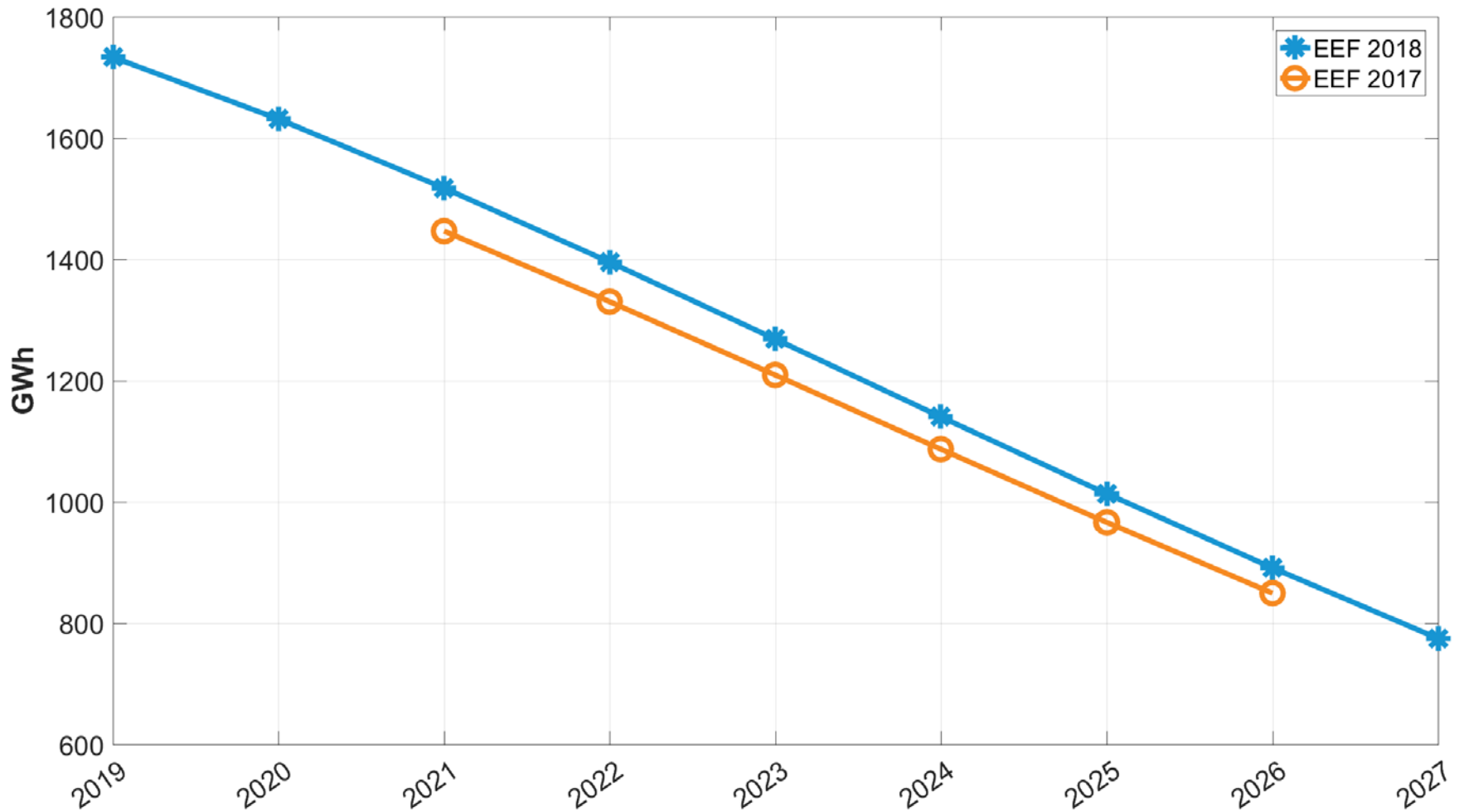
# Massachusetts

## *Energy Efficiency on Summer Peak*



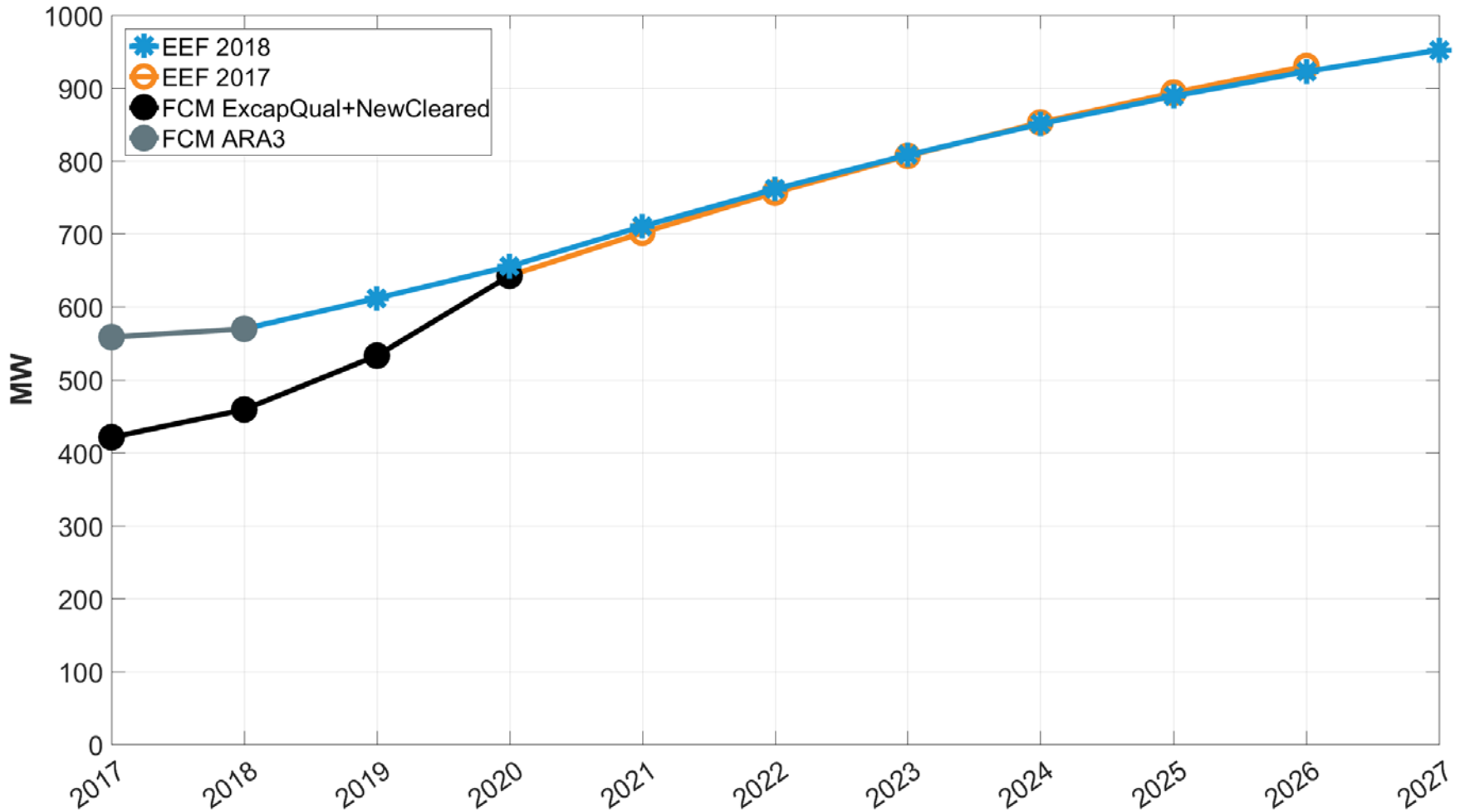
# Massachusetts

## *Energy Efficiency on Annual Energy*



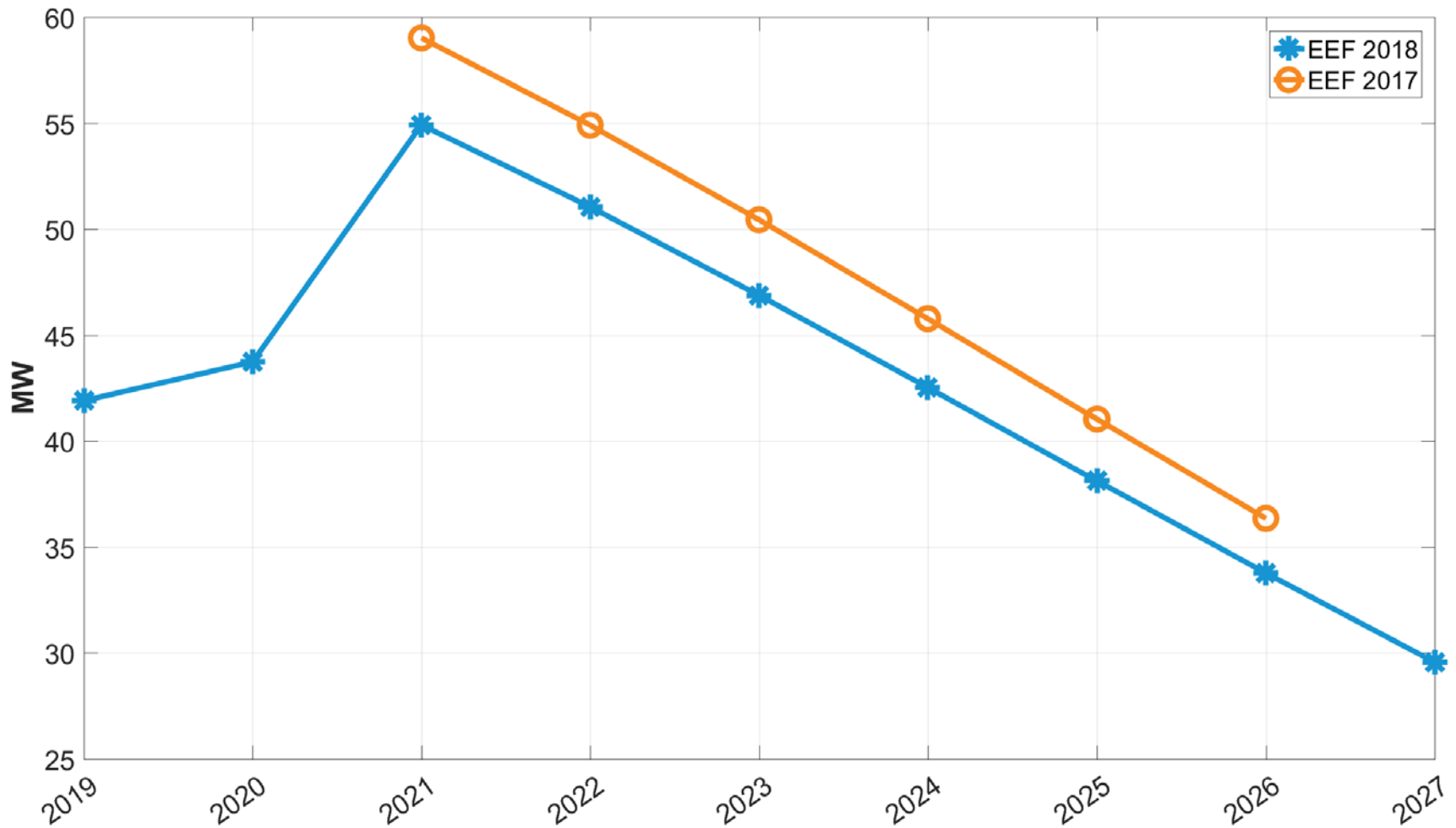
# Connecticut

## *Energy Efficiency on Summer Peak*



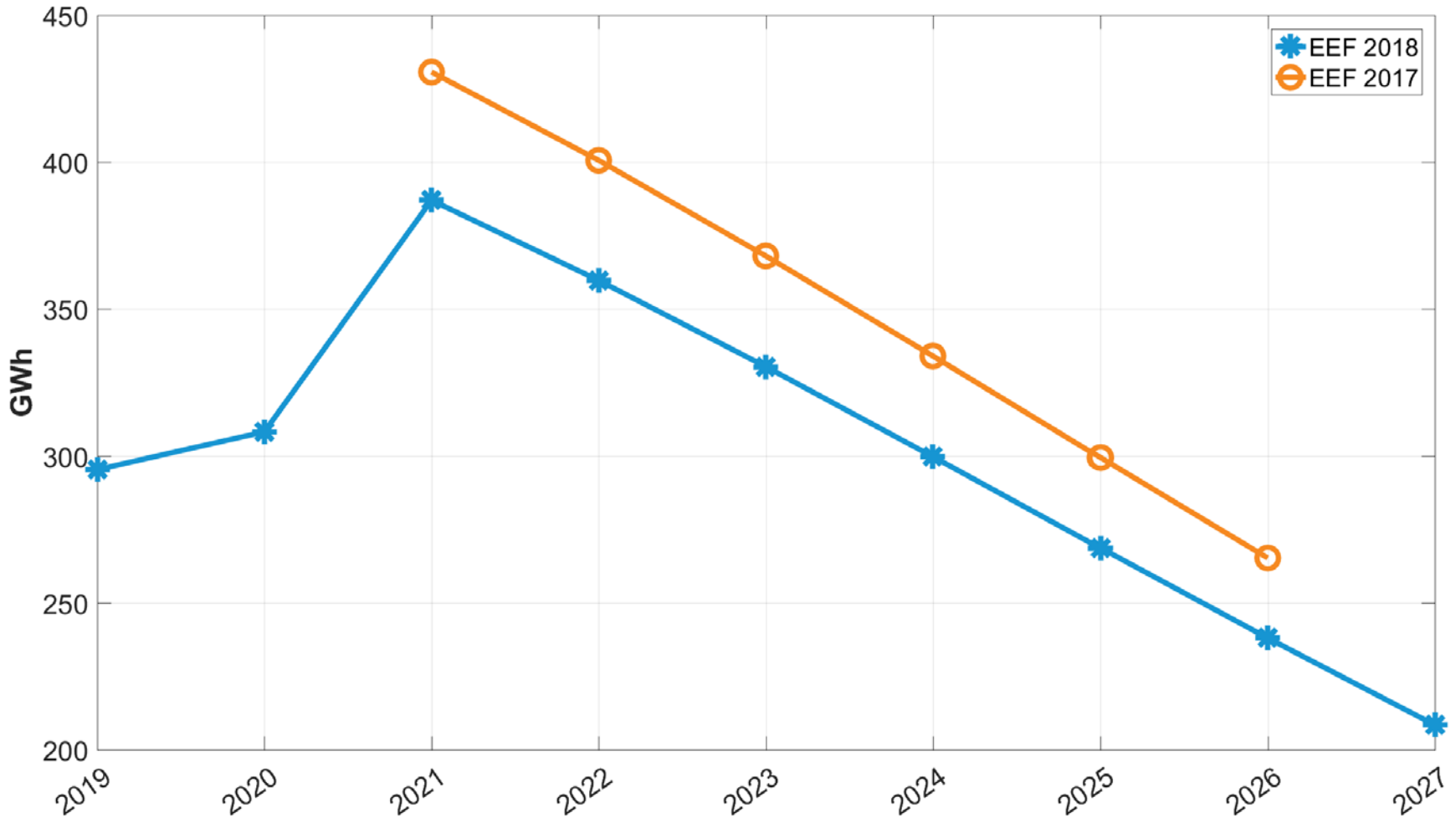
# Connecticut

## *Energy Efficiency on Summer Peak*



# Connecticut

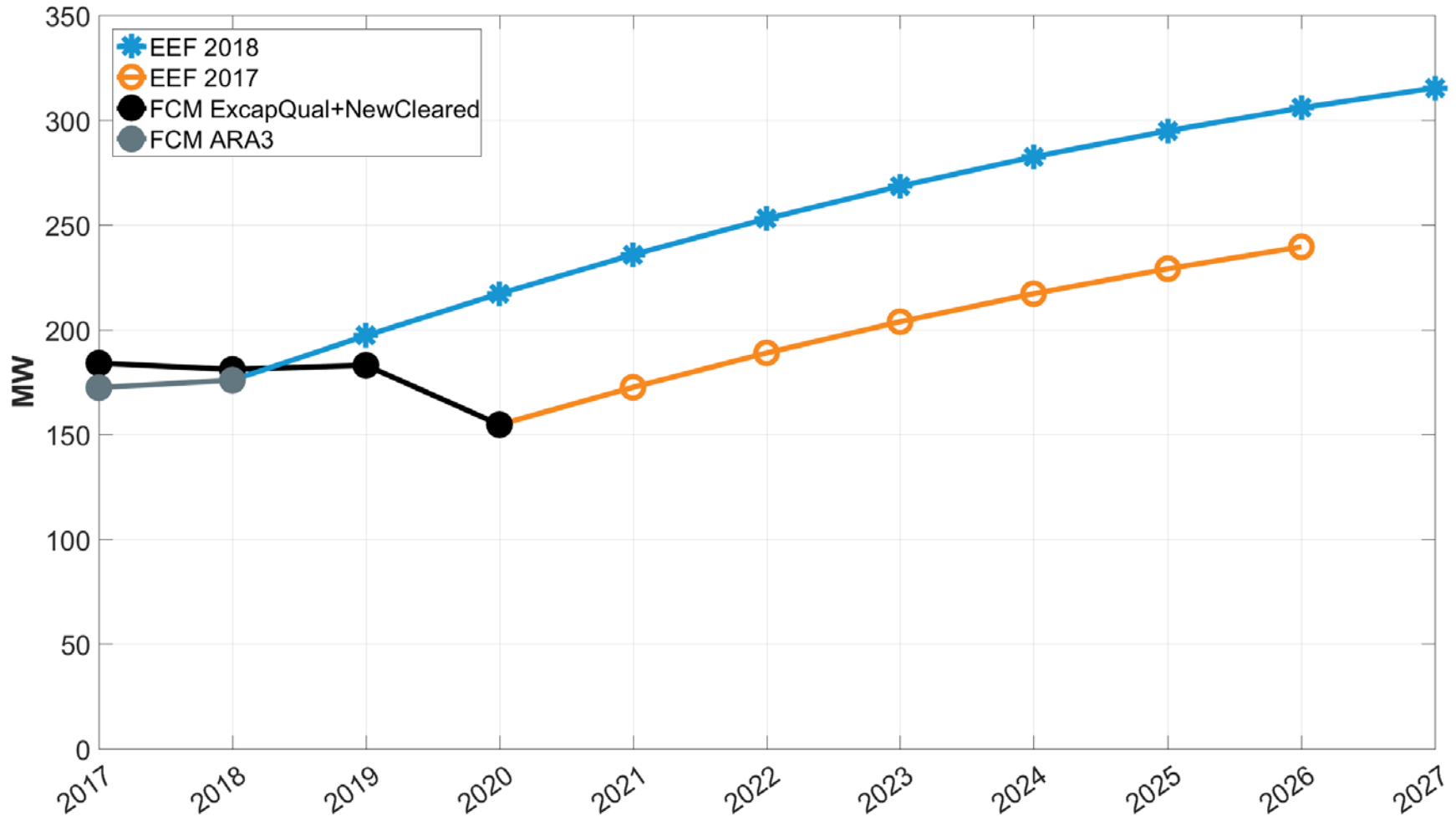
## *Energy Efficiency on Summer Peak*





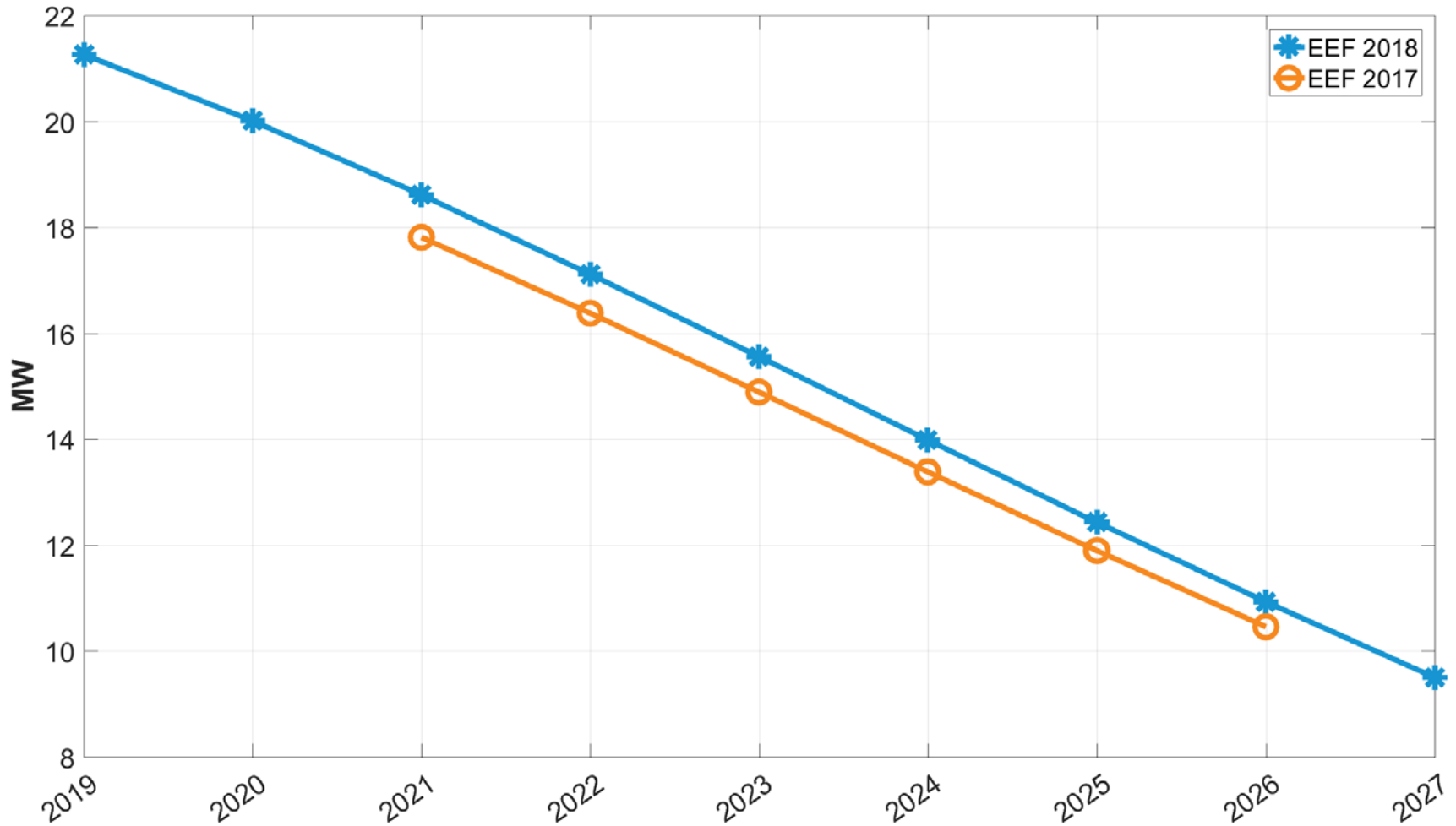
# Maine

## *Energy Efficiency on Summer Peak*



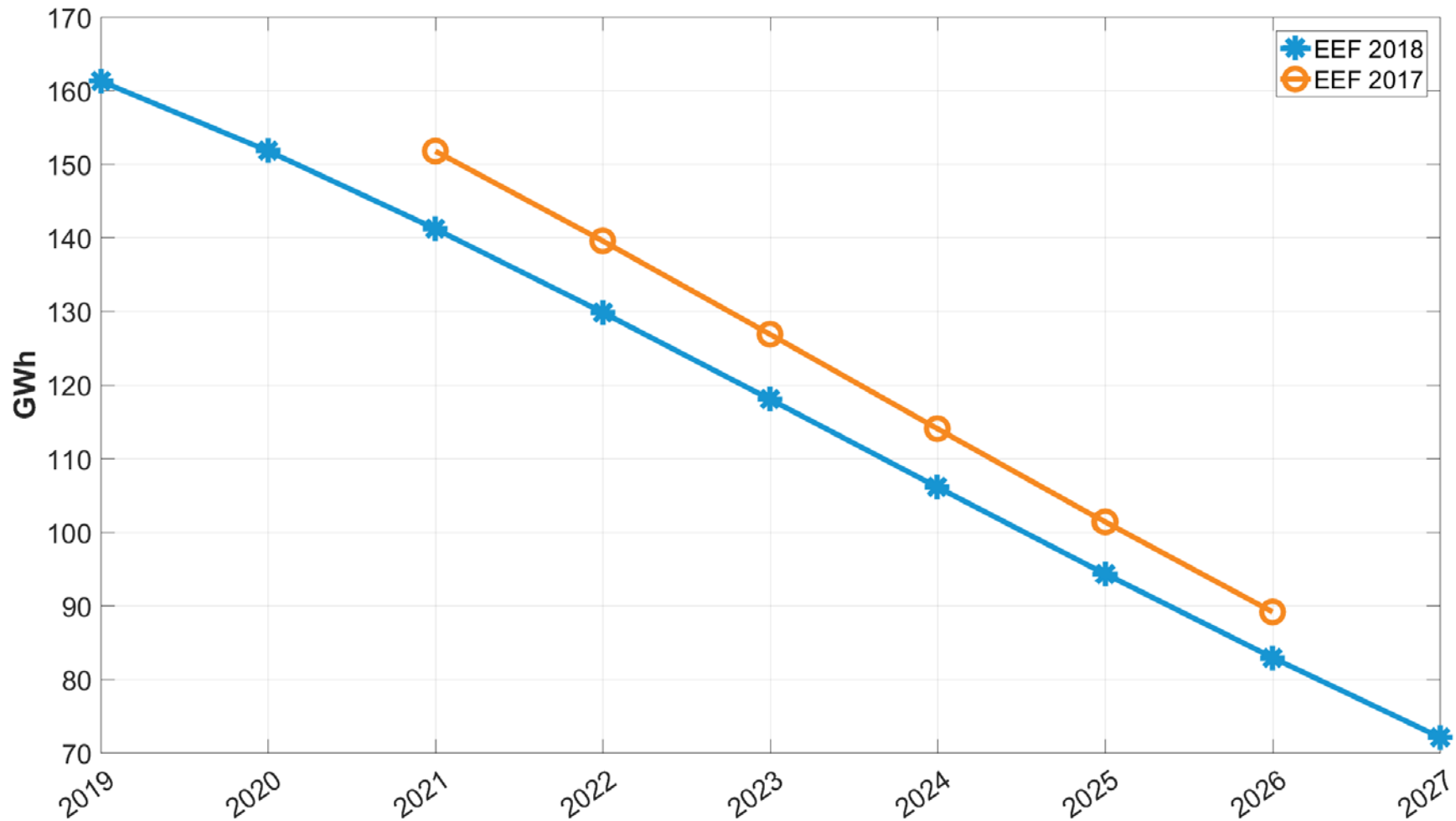
# Maine

## *Energy Efficiency on Summer Peak*



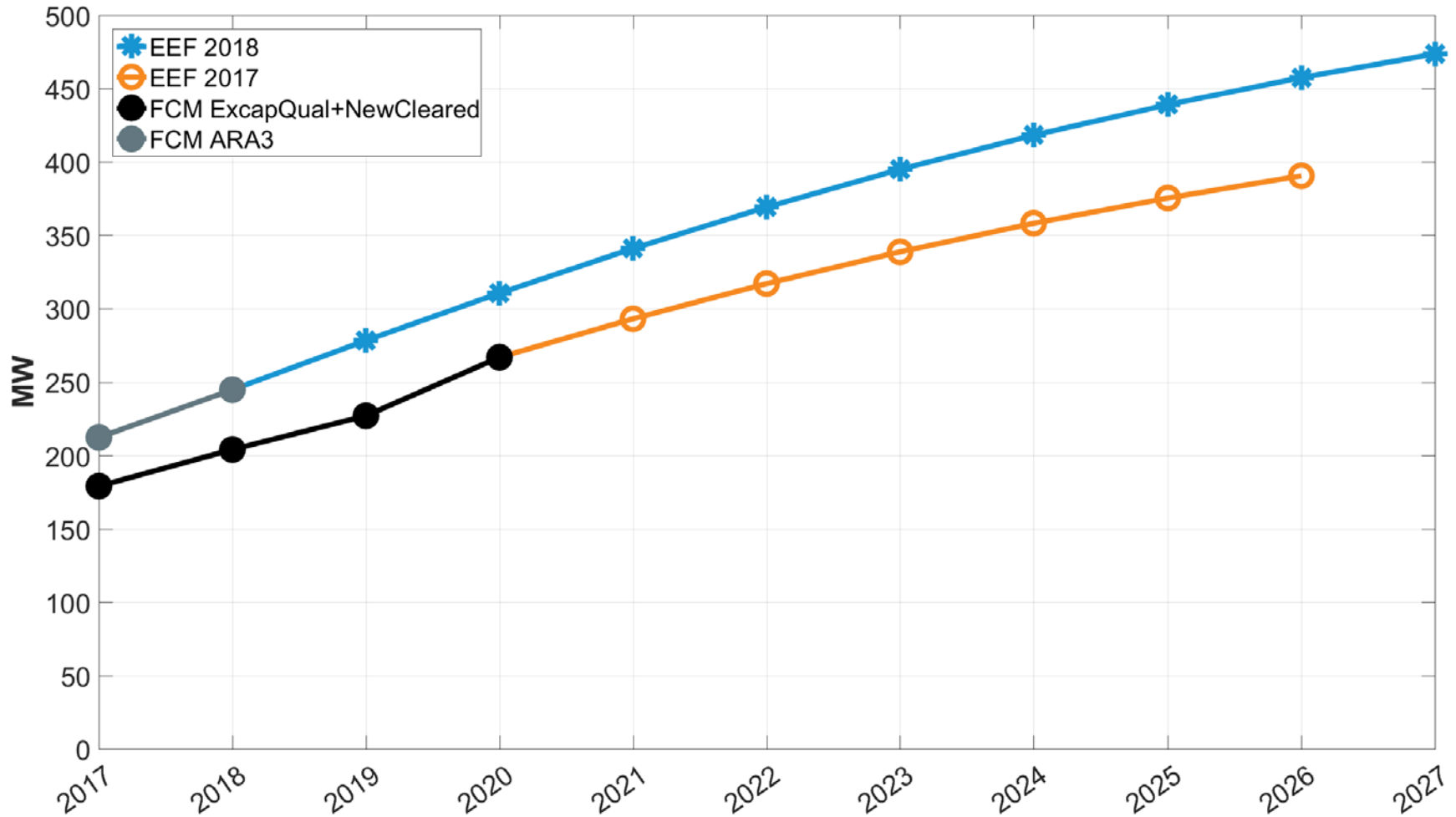
# Maine

## *Energy Efficiency on Annual Energy*



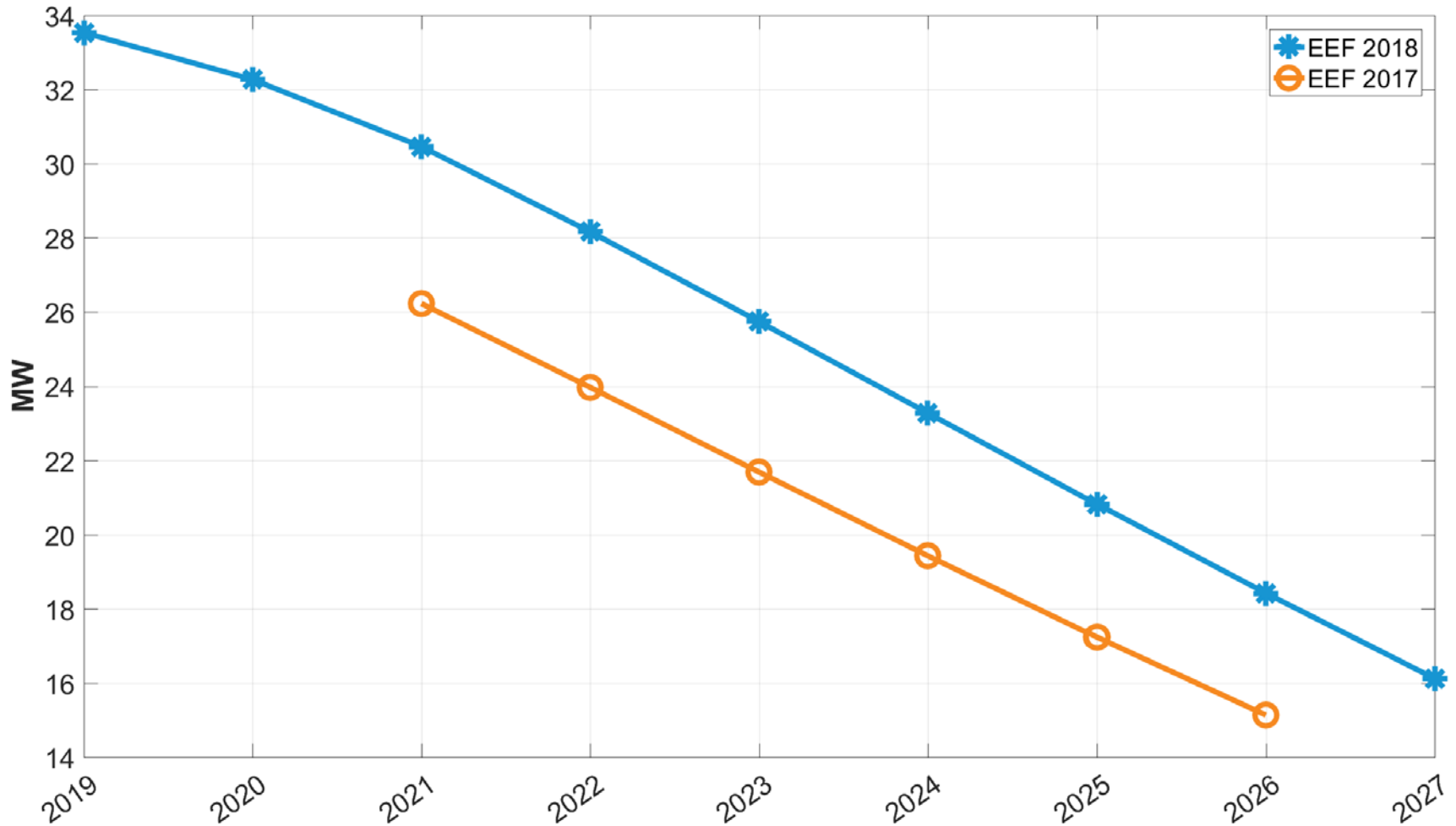
# Rhode Island

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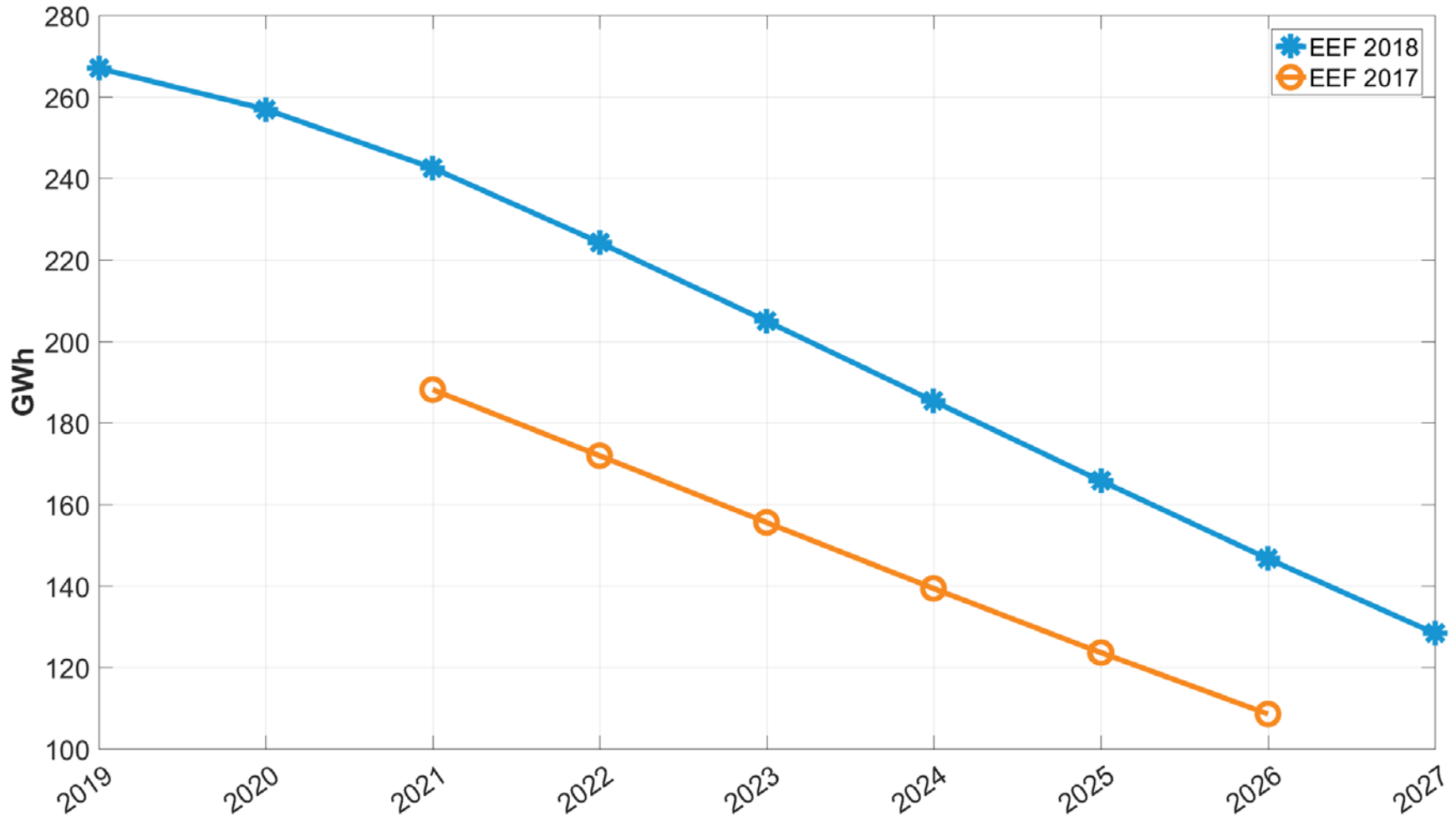
# Rhode Island

## *Energy Efficiency on Summer Peak*



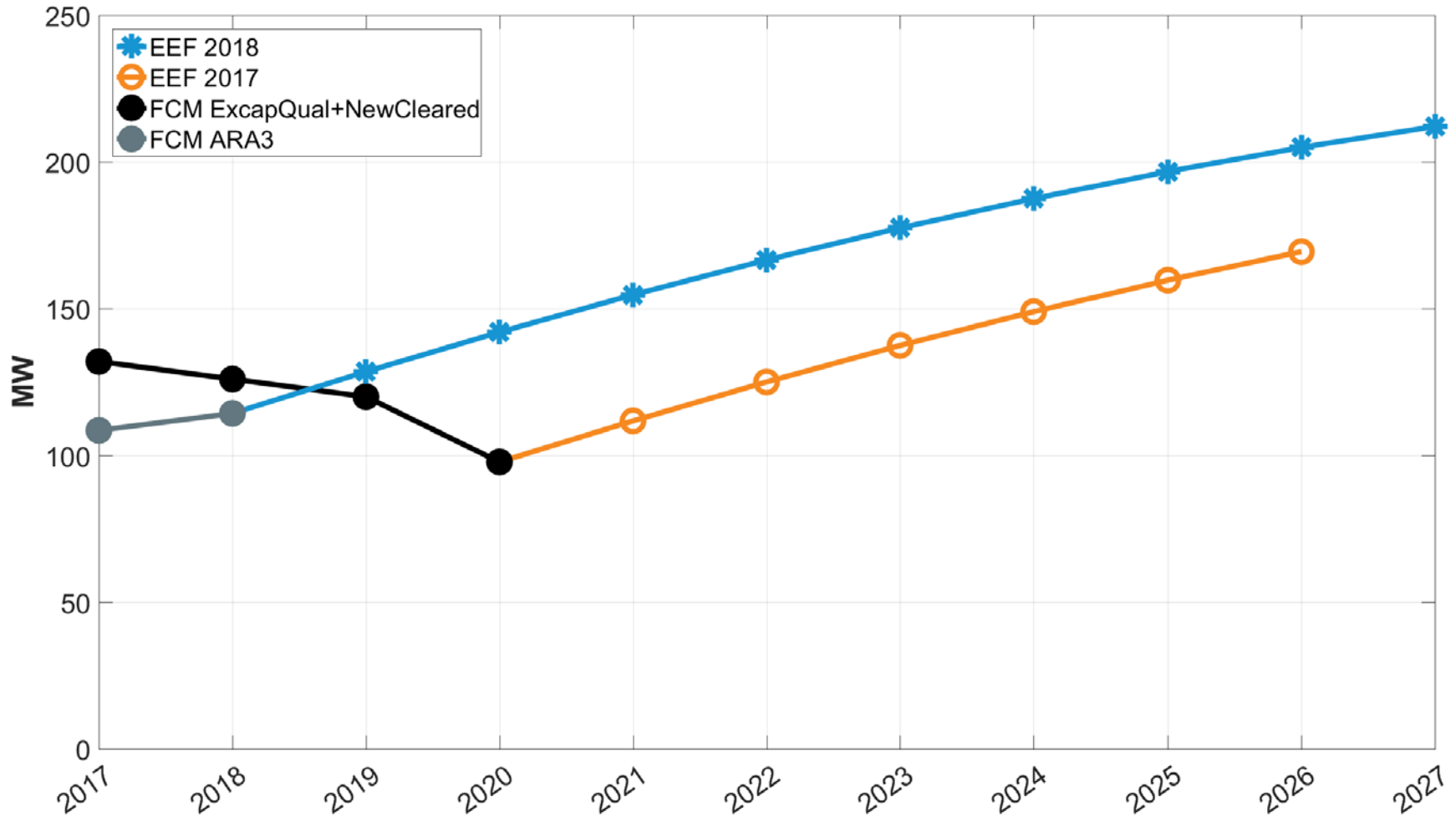
# Rhode Island

## *Energy Efficiency on Annual Energy*



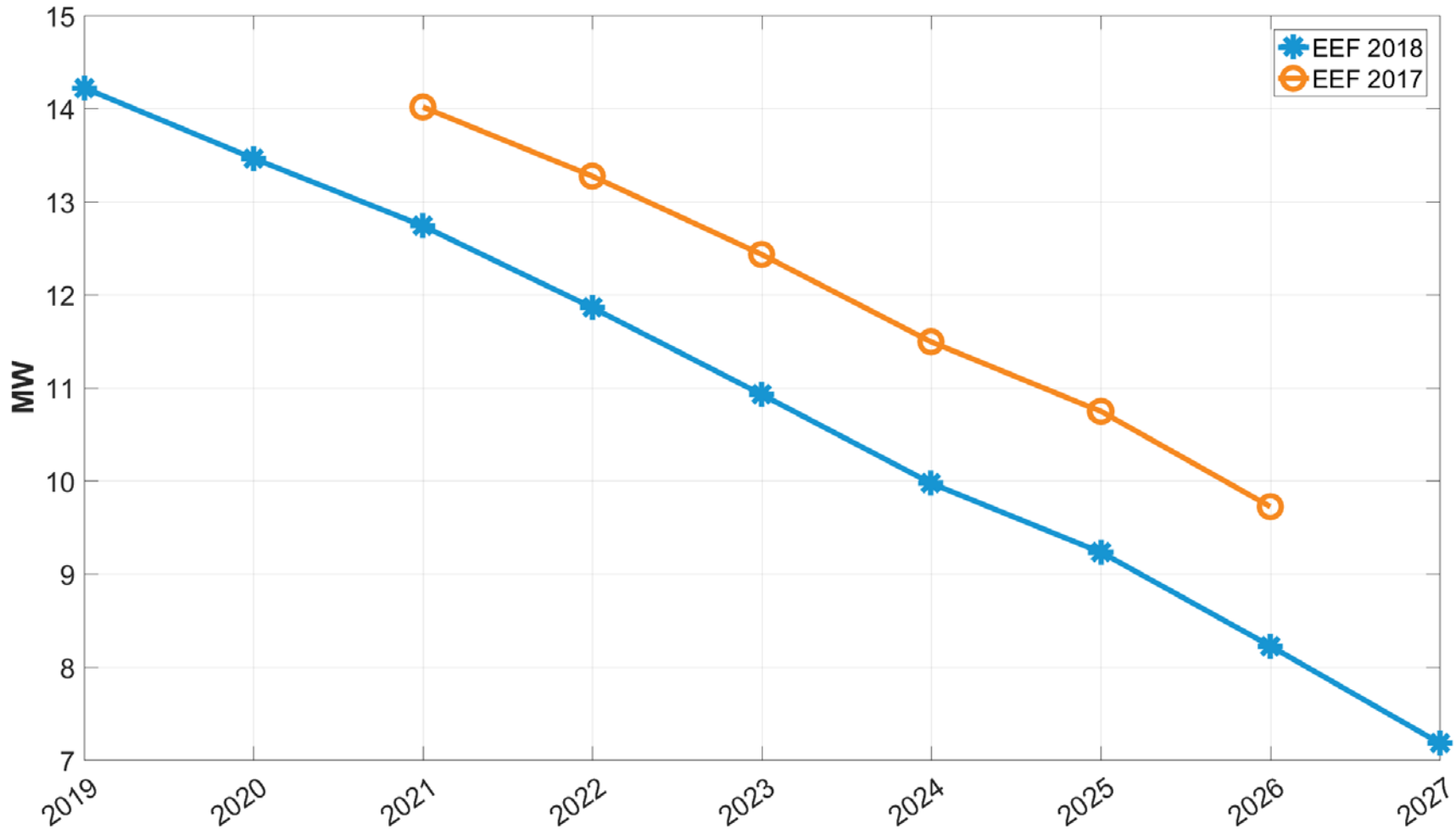
# Vermont

## *Energy Efficiency on Summer Peak*



# Vermont

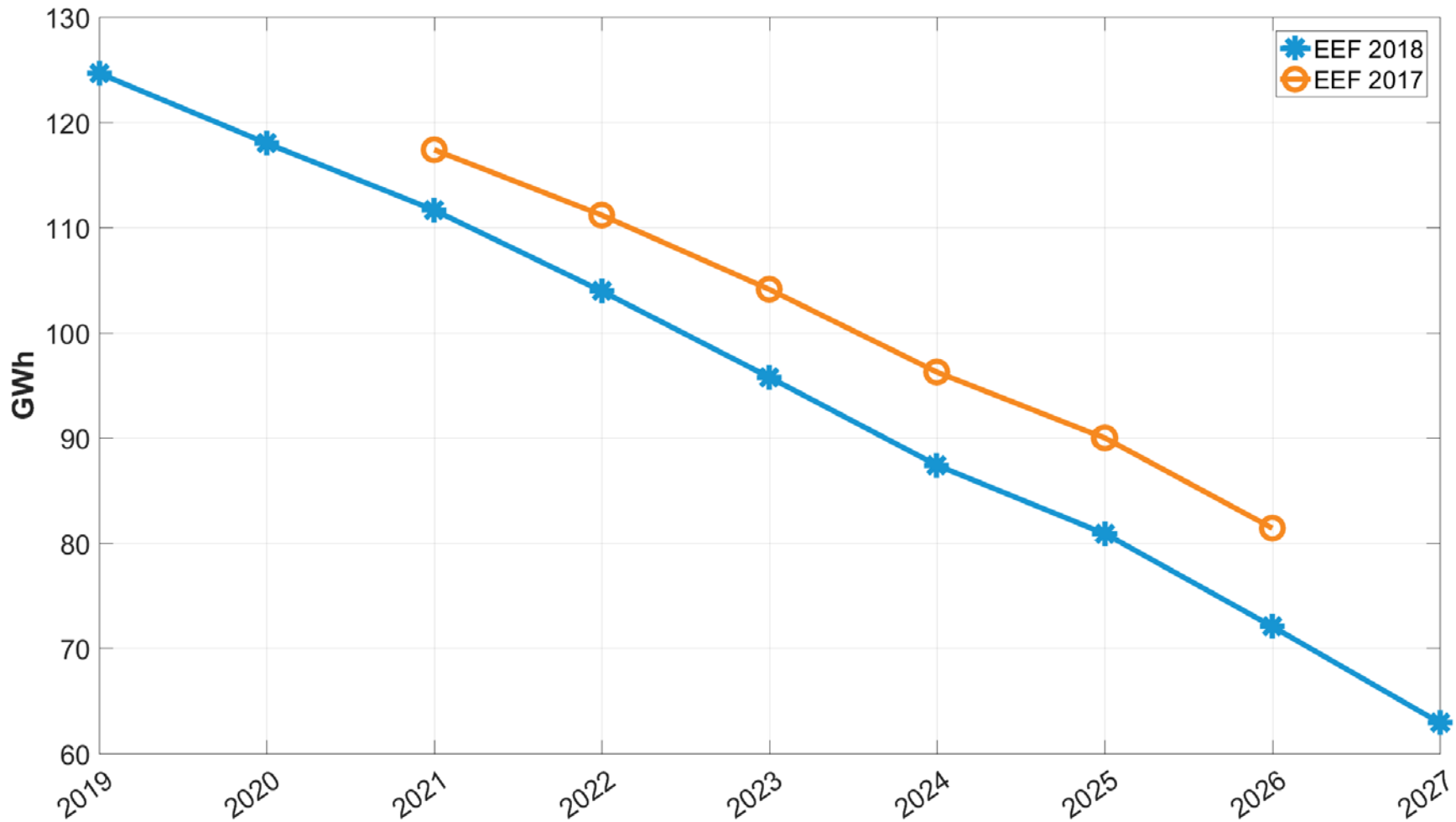
## *Energy Efficiency on Summer Peak*





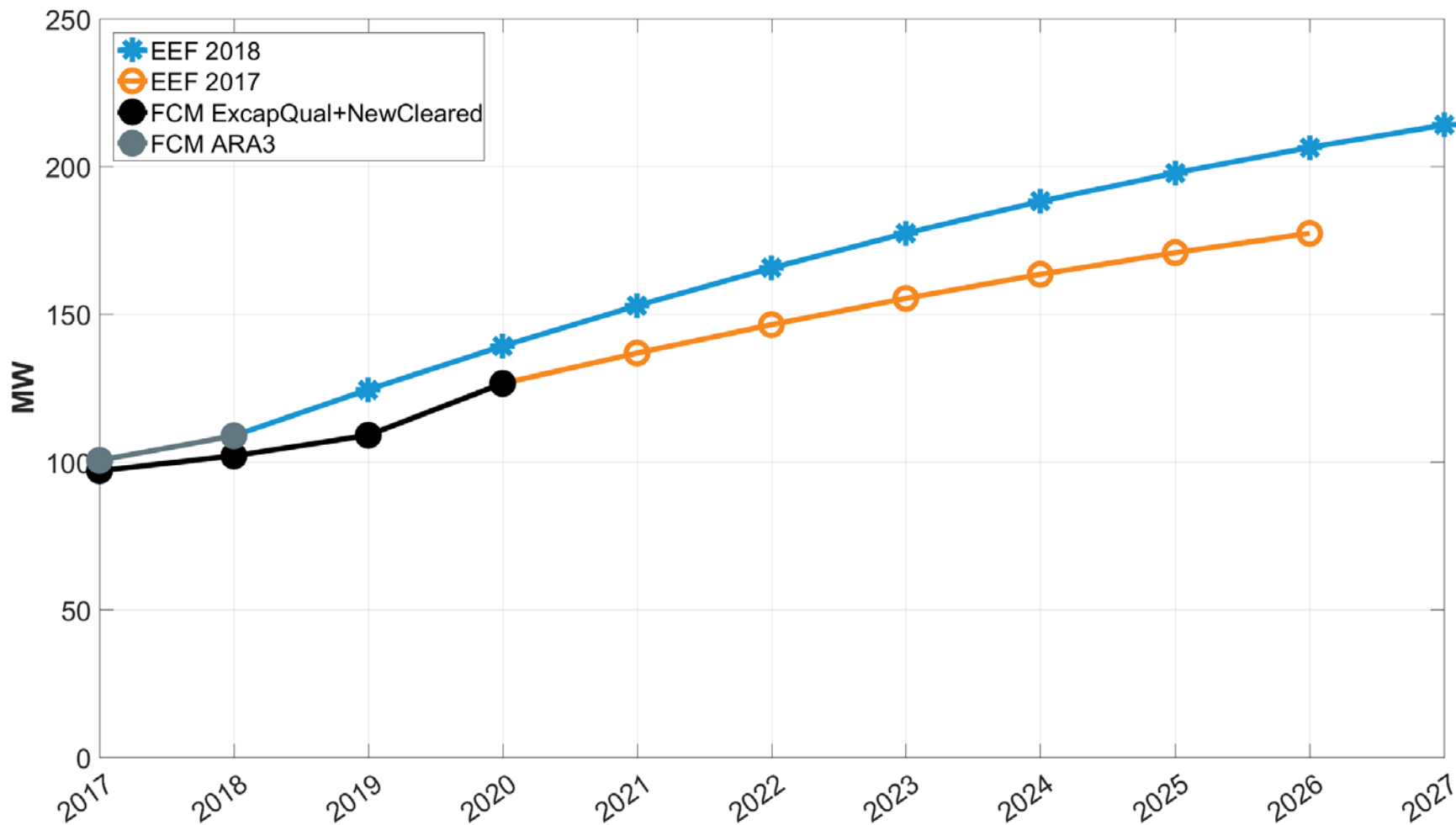
# Vermont

## *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*

