

DOCKETED

Docket Number:	23-IEPR-03
Project Title:	Electricity and Gas Demand Forecast
TN #:	253097
Document Title:	Presentation - Results from Incorporating the Zero-Emission Appliance Standards to AAFS
Description:	4B. Ethan Cooper, CEC
Filer:	Raquel Kravitz
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	11/14/2023 10:13:08 AM
Docketed Date:	11/14/2023



Results from Incorporating the Zero-Emission Appliance Standards to AAFS

IEPR Commissioner Workshop on Load Modifier Scenario Results

November 15, 2023

Ethan Cooper

Energy Assessments Division, Advanced Electrification Analysis Branch



Presentation Outline

1. Overall energy impacts of AAFS scenarios 3-6.
 - Gas and electricity impacts of AAFS scenarios.
 - Impact comparisons of AAFS scenarios.
2. Further analysis on the AAEE and AAFS load modifiers used in the demand forecast scenarios.
 - Gas and electricity impacts for the demand forecast scenarios.
 - Comparison of Zero Emission (ZE) standard results from 2022 and 2023 IEPR.
 - Added electric appliance impacts of AAFS scenarios.



AAFS Levers for the Modeling of the ZE Appliance Standard in FSSAT

	AAFS Levers	AAFS 3	AAFS 4	AAFS 5	AAFS 6
Programmatic Characterization	AAEE Gas/Elec Scenario	Scenario 3	Scenario 2	Scenario 2	Scenario 2
	Programmatic AAFS	Scenario 3	Scenario 4	Scenario 5	Scenario 6
ZE Appliance Technology Characterization (modeled via FSSAT)	Water Heater and Space Heating	Yes	Yes	Yes	Yes
	Other FSSAT end uses	No	No	Yes	Yes
	Residential Propane	No	No	Yes	Yes
	AQMDs	BAAQMD	BAAQMD	BAAQMD	BAAQMD & SCAQMD
	Technology Set	Mixed	Mixed	Mixed	<i>Mixed</i> *
	Technology Efficiency Weighting	Even	Even	Even	<i>High</i> **
	Ramp Adoption Rate	Linear Ramp (10% reduction in interim years)	Linear Ramp	Linear Ramp	Linear Ramp

*Revised from “single-best technology” **Revised from “NA”

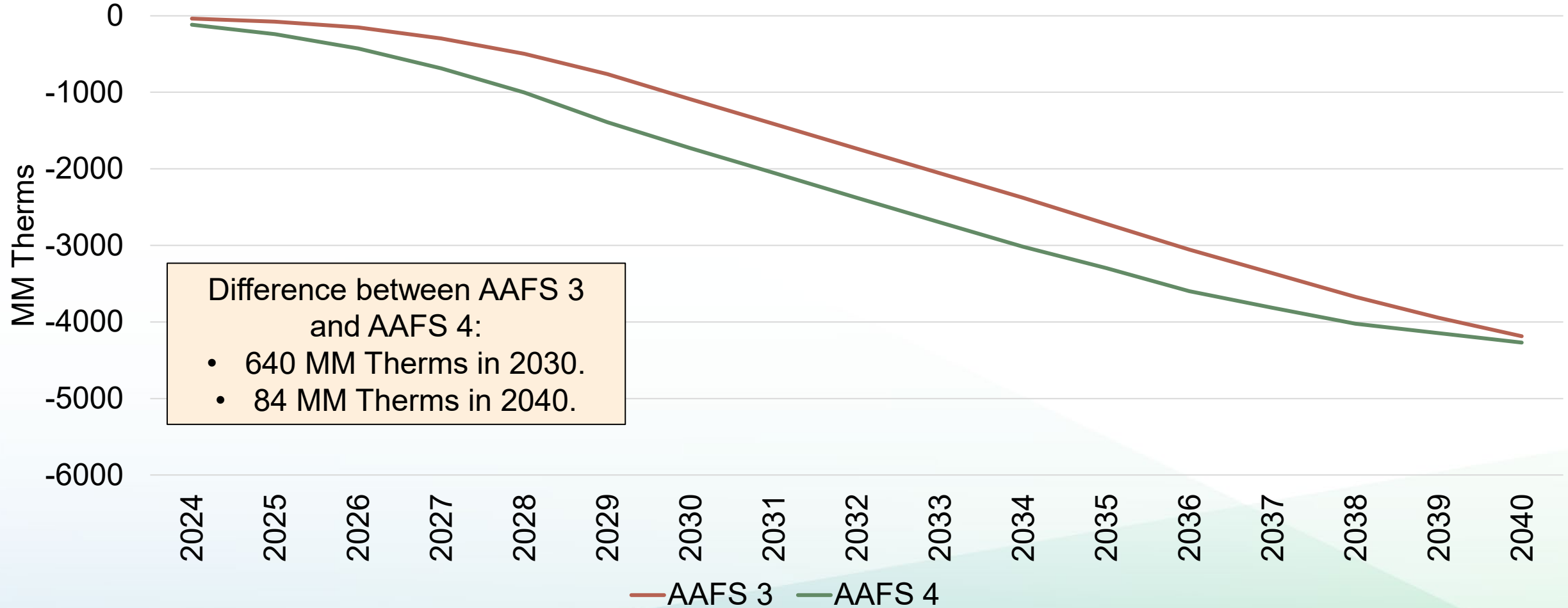


Energy Impacts – AAFS Scenario 3-6



AAFS Scenario 3-6 Gas Impacts

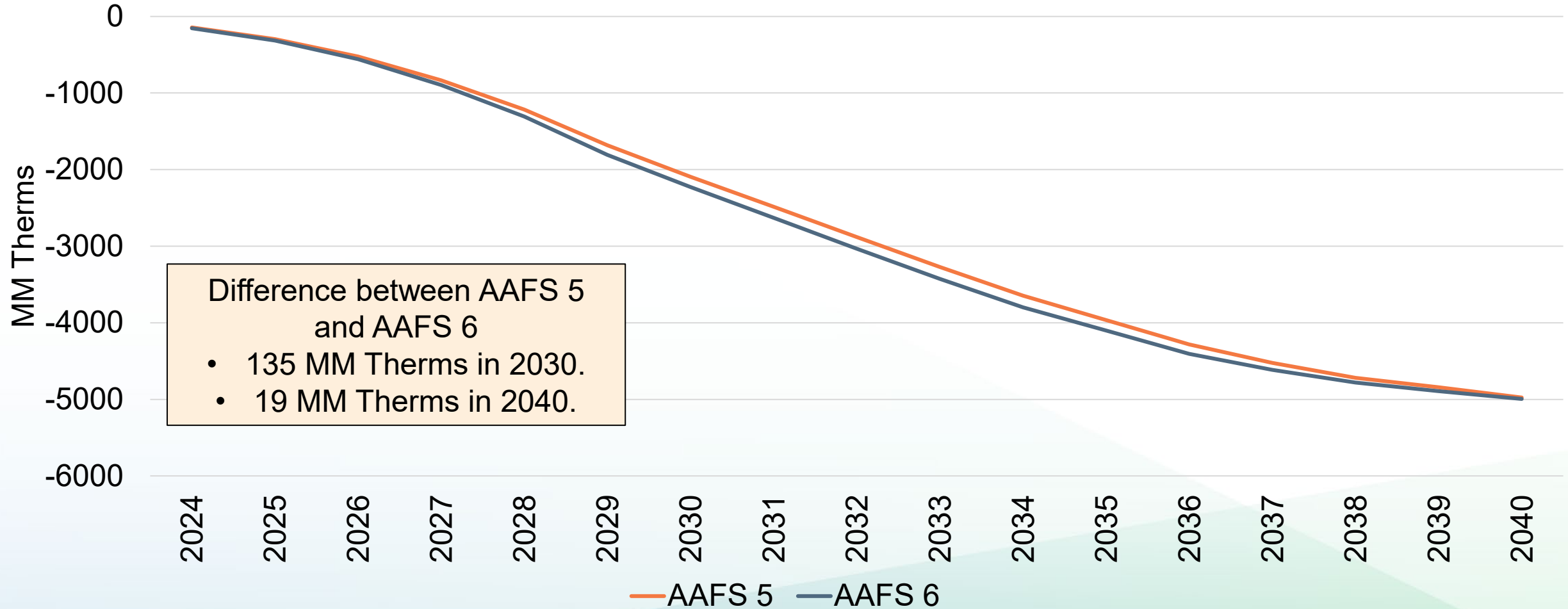
AAFS (Programmatic and ZE Standard) Gas Savings





AAFS Scenario 3-6 Gas Impacts

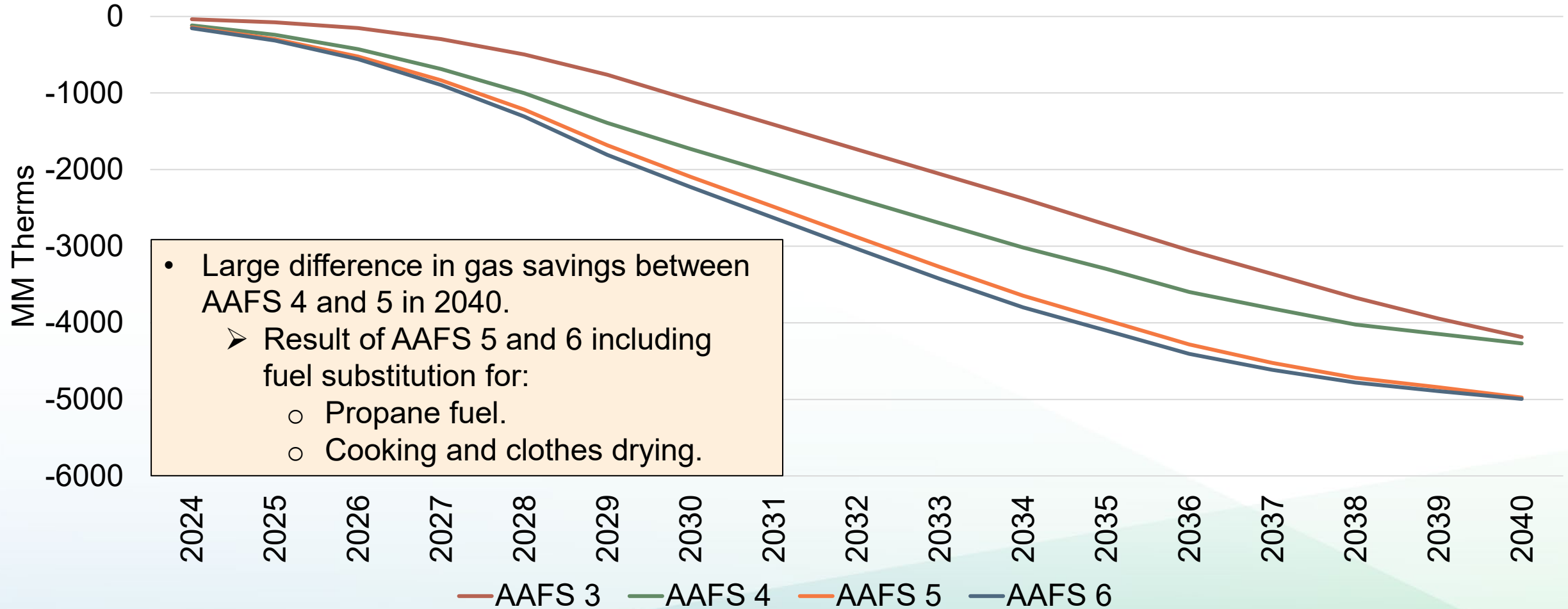
AAFS (Programmatic and ZE Standard) Gas Savings





AAFS Scenario 3-6 Gas Impacts

AAFS (Programmatic and ZE Standard) Gas Savings





AAFS Scenario 3-6 Electricity Impacts

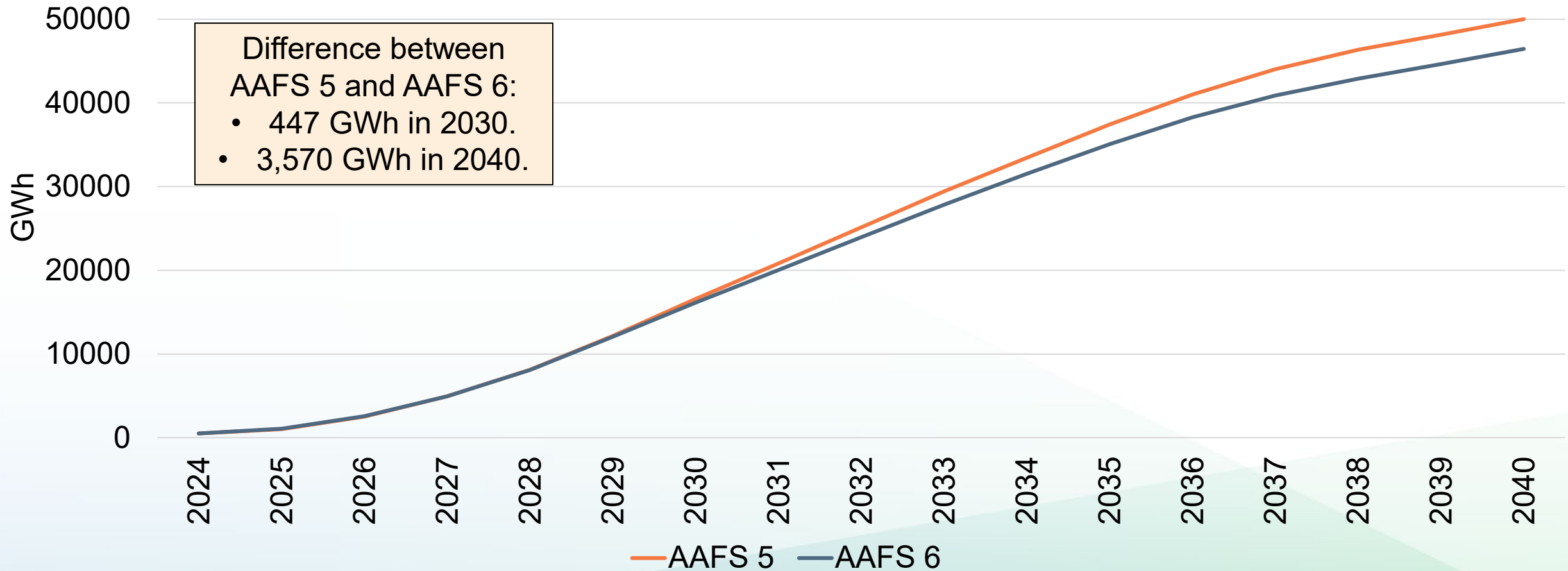
AAFS (Programmatic and ZE Standard) Electricity Impact





AAFS Scenario 3-6 Electricity Impacts

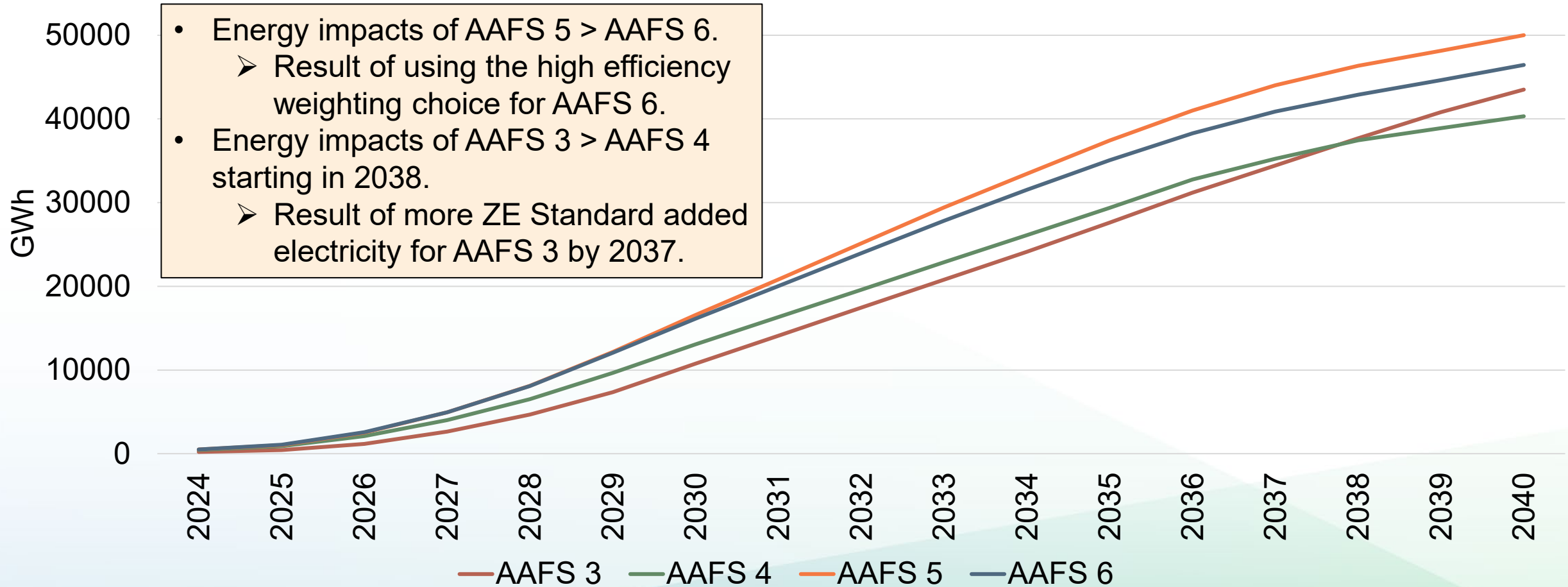
AAFS (Programmatic and ZE Standard) Electricity Impact





AAFS Scenario 3-6 Electricity Impacts

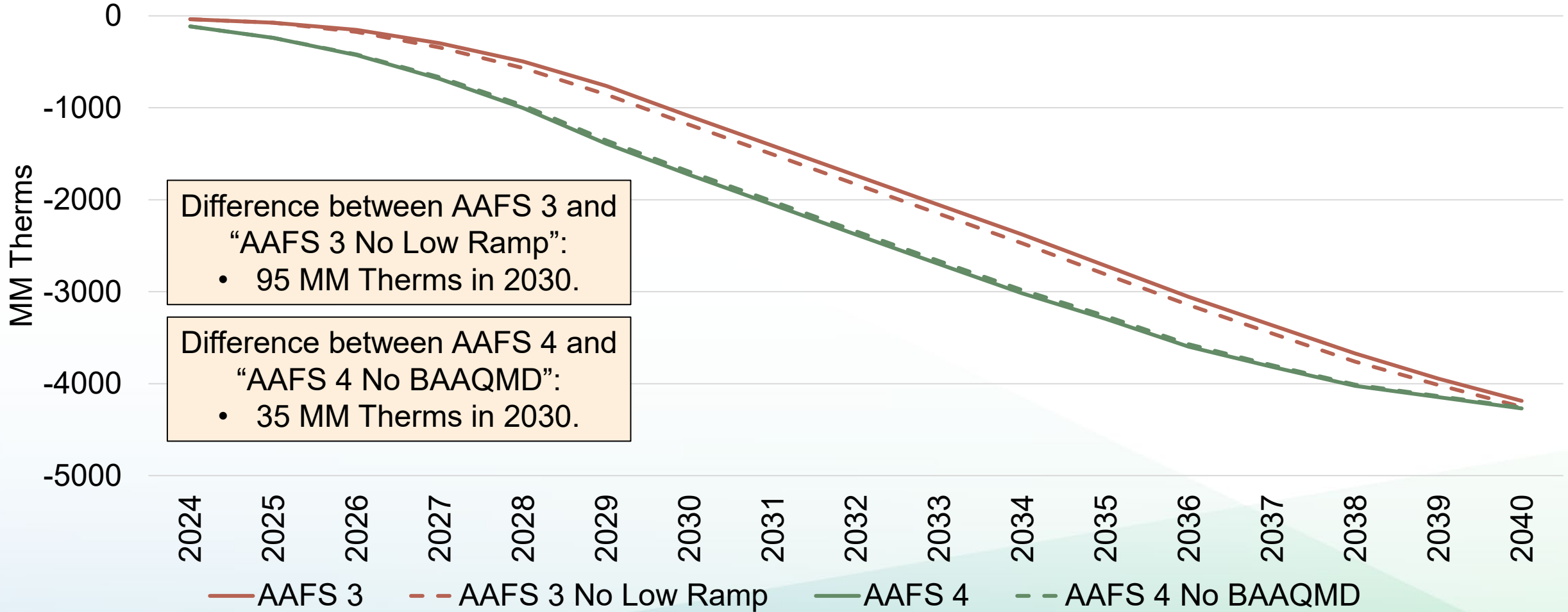
AAFS (Programmatic and ZE Standard) Electricity Impact





AAFS Comparison Scenarios 3-4 Gas Impact

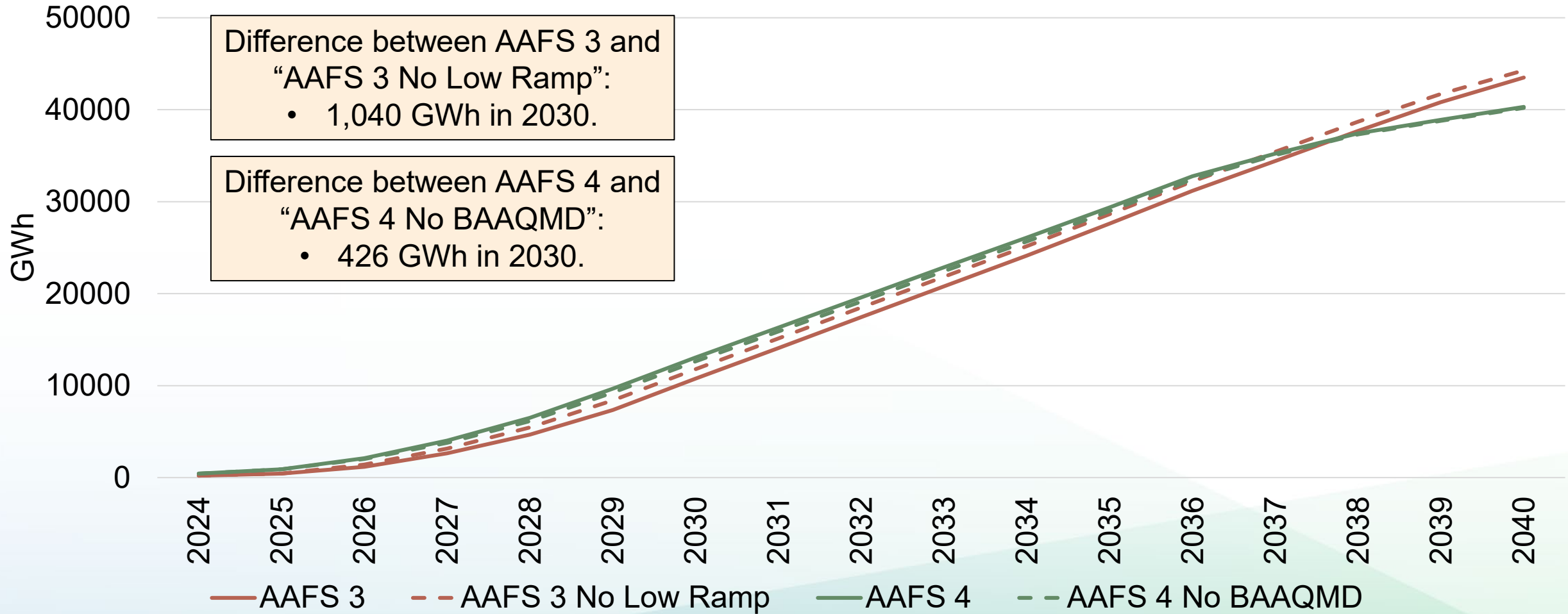
AAFS 3-4 (Programmatic and ZE Standard) Gas Savings - Comparison Scenarios





AAFS Comparison Scenarios 3-4 Electric Impact

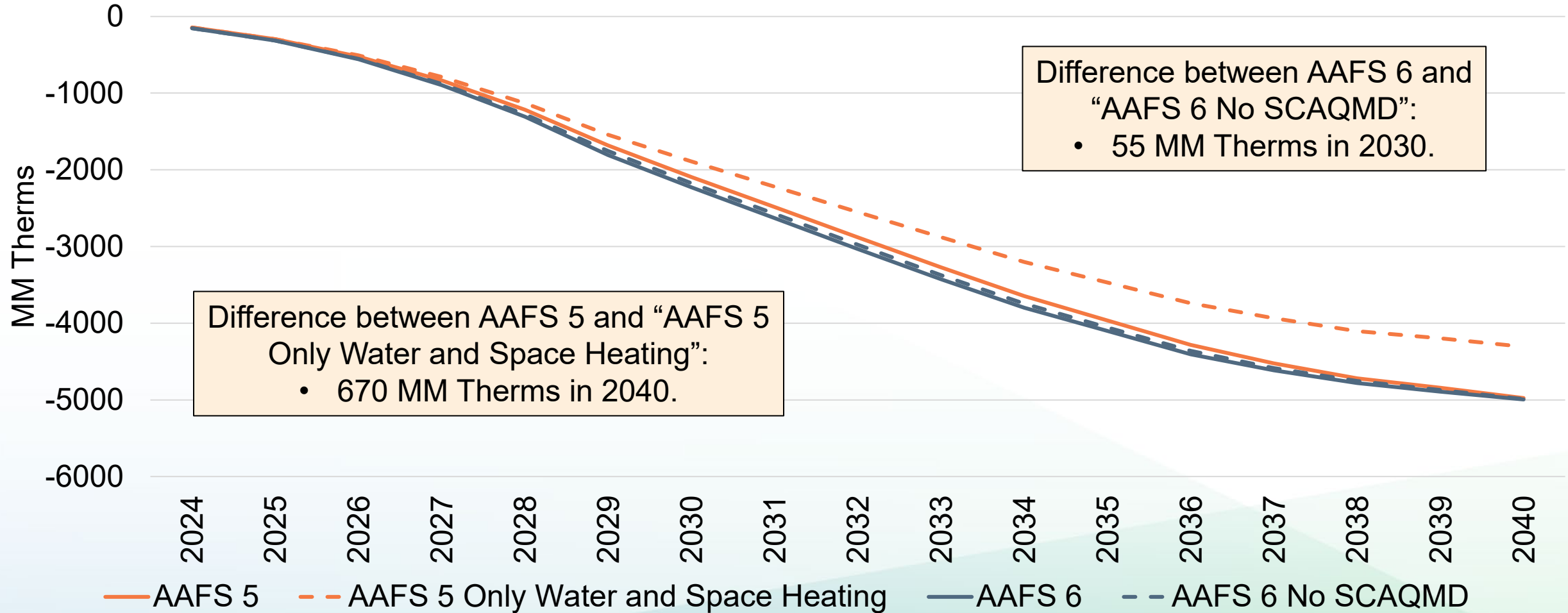
AAFS 3-4 (Programmatic and ZE Standard) Electricity Impact - Comparison Scenarios





AAFS Comparison Scenarios 5-6 Gas Impact

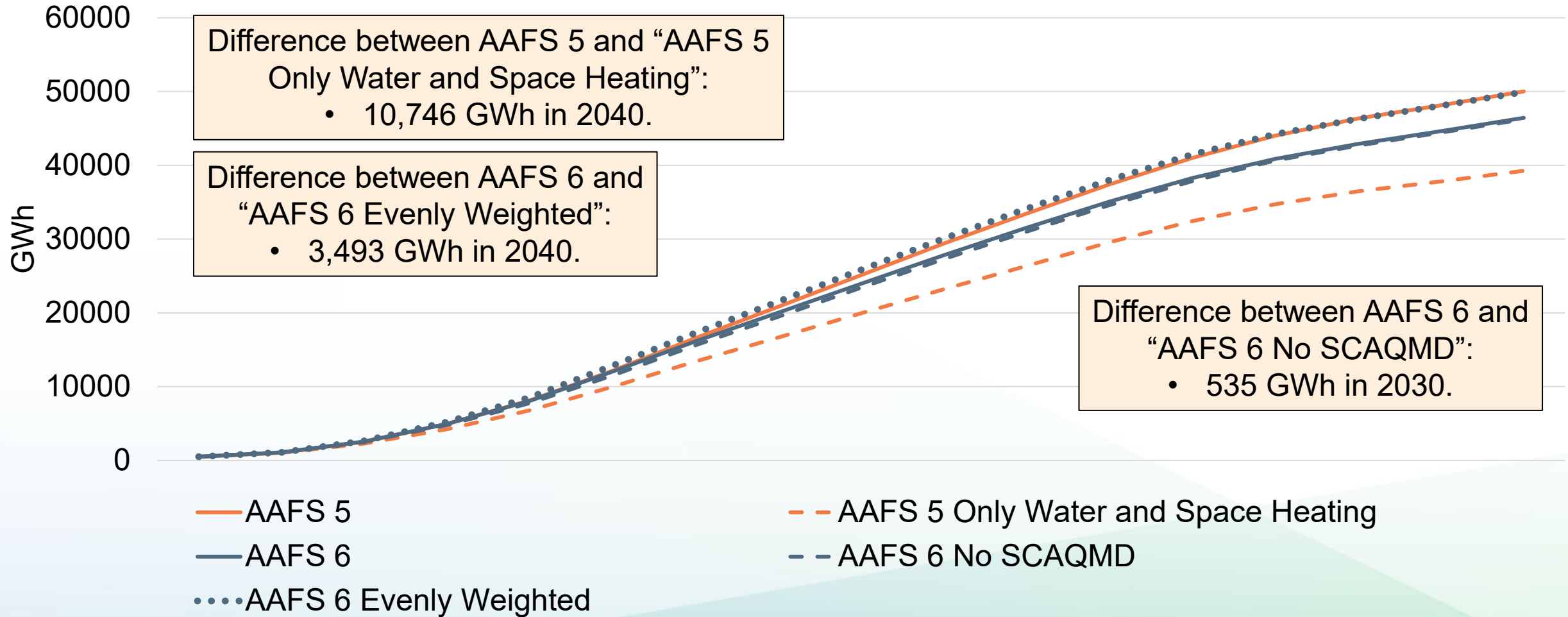
AAFS 5-6 (Programmatic and ZE Standard) Gas Savings - Comparison Scenarios





AAFS Comparison Scenarios 5-6 Electric Impact

AAFS 5-6 (Programmatic and ZE Standard) Electricity Impact - Comparison Scenarios



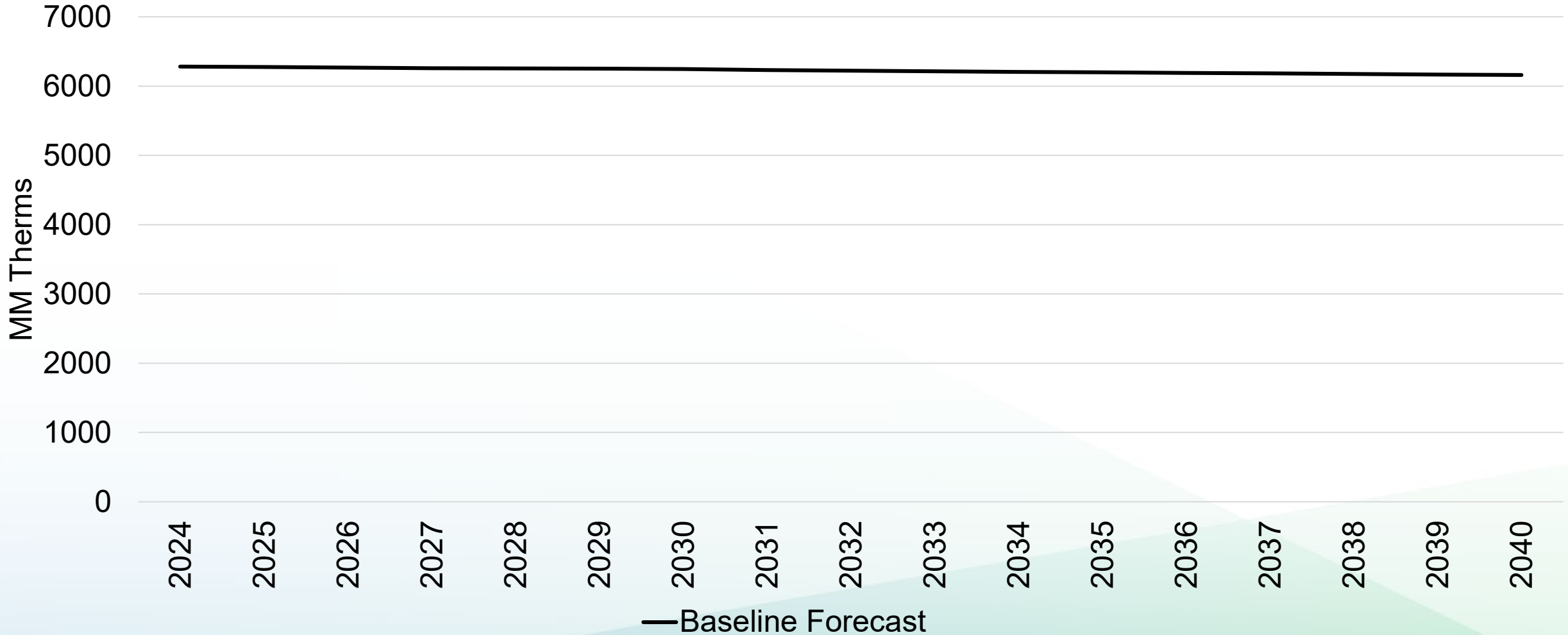


Detailed Energy Impacts – AAFS Scenario 3-4



AAEE and AAFS Gas Impacts – Planning Forecast

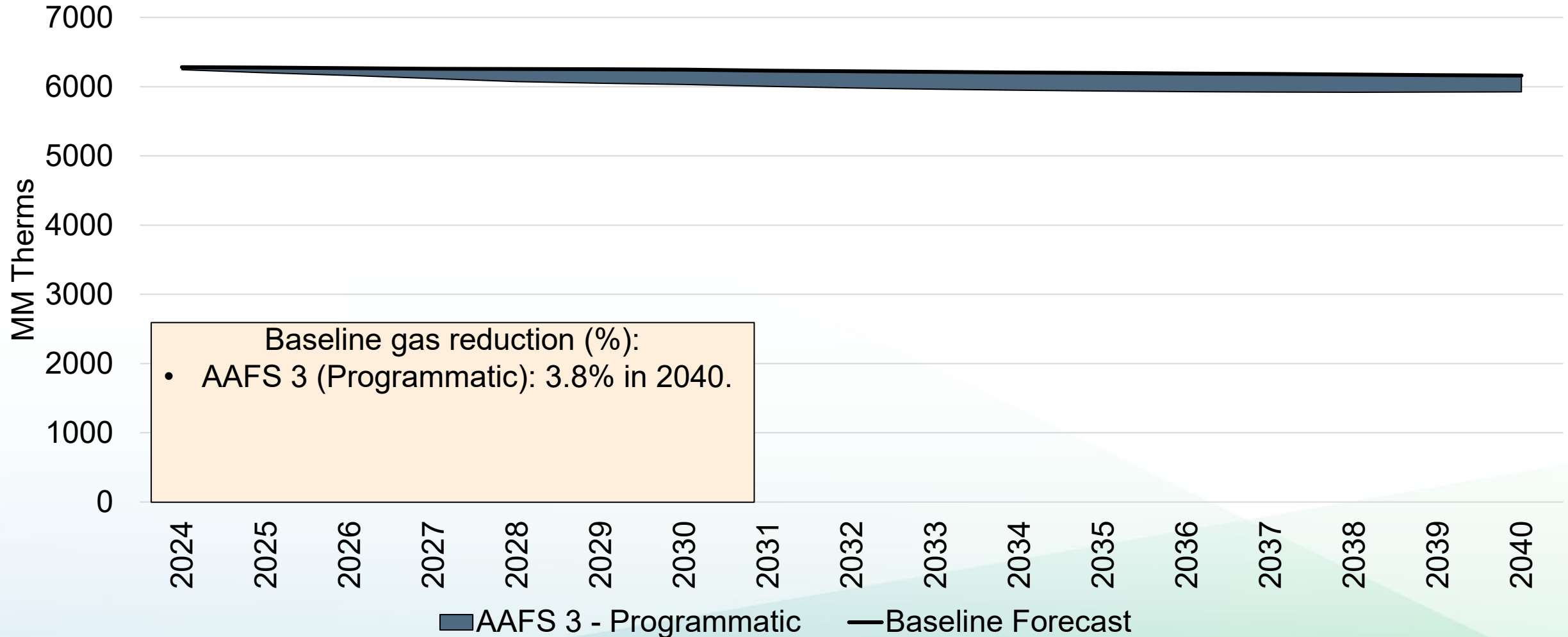
Planning Forecast - AAEE and AAFS Residential and Commercial Gas Savings





AAEE and AAFS Gas Impacts – Planning Forecast

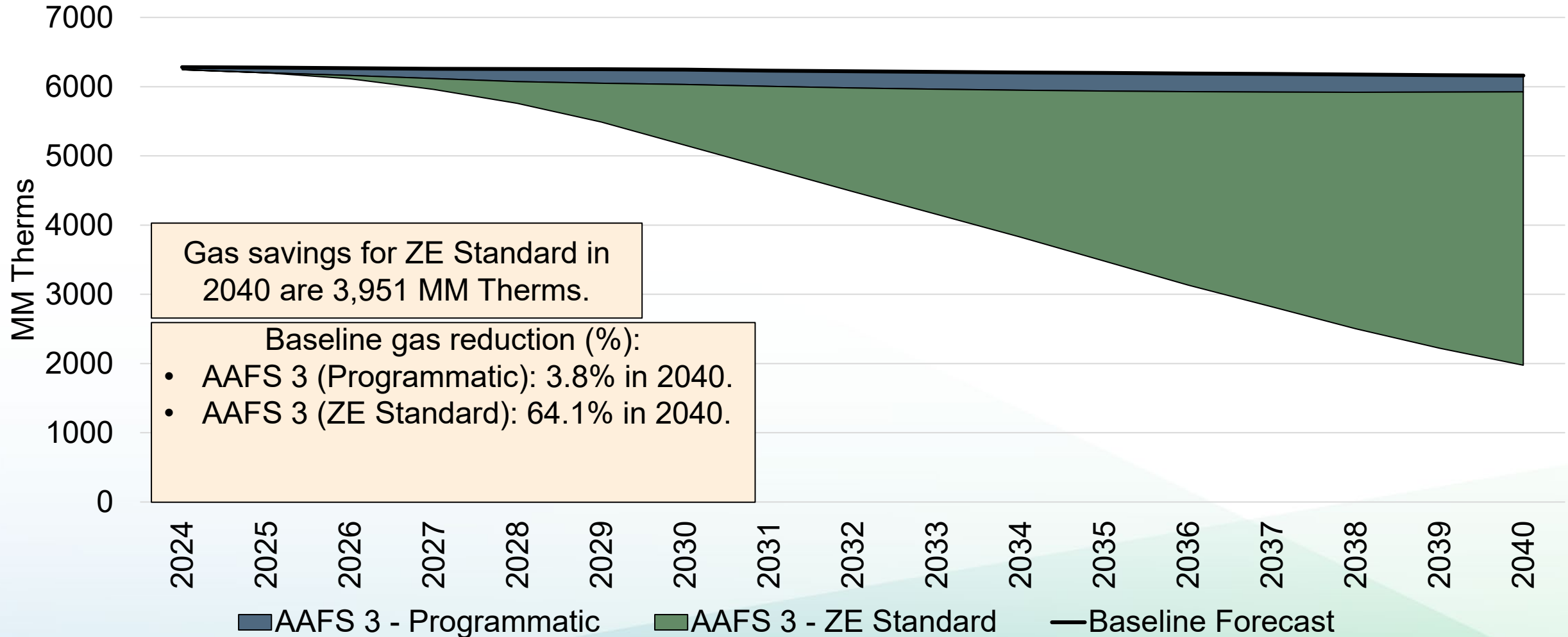
Planning Forecast - AAEE and AAFS Residential and Commercial Gas Savings





AAEE and AAFS Gas Impacts – Planning Forecast

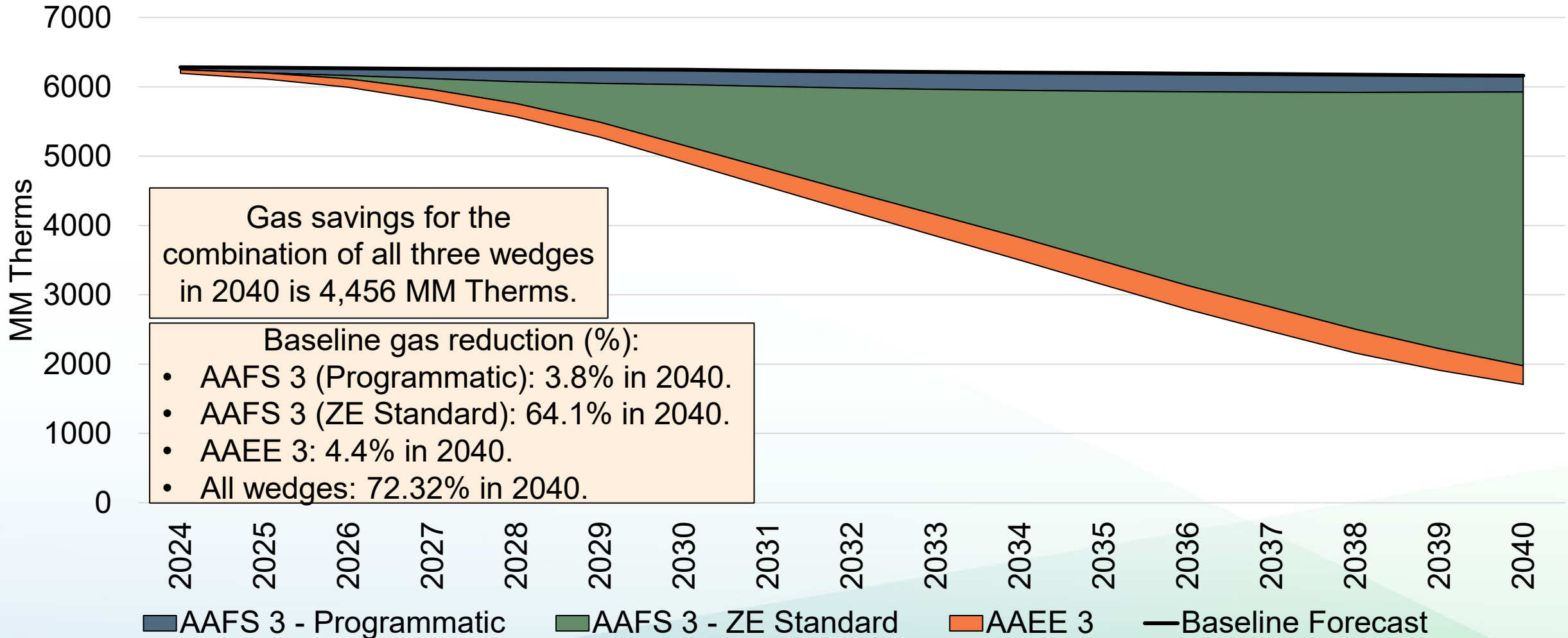
Planning Forecast - AAEE and AAFS Residential and Commercial Gas Savings





AAEE and AAFS Gas Impacts – Planning Forecast

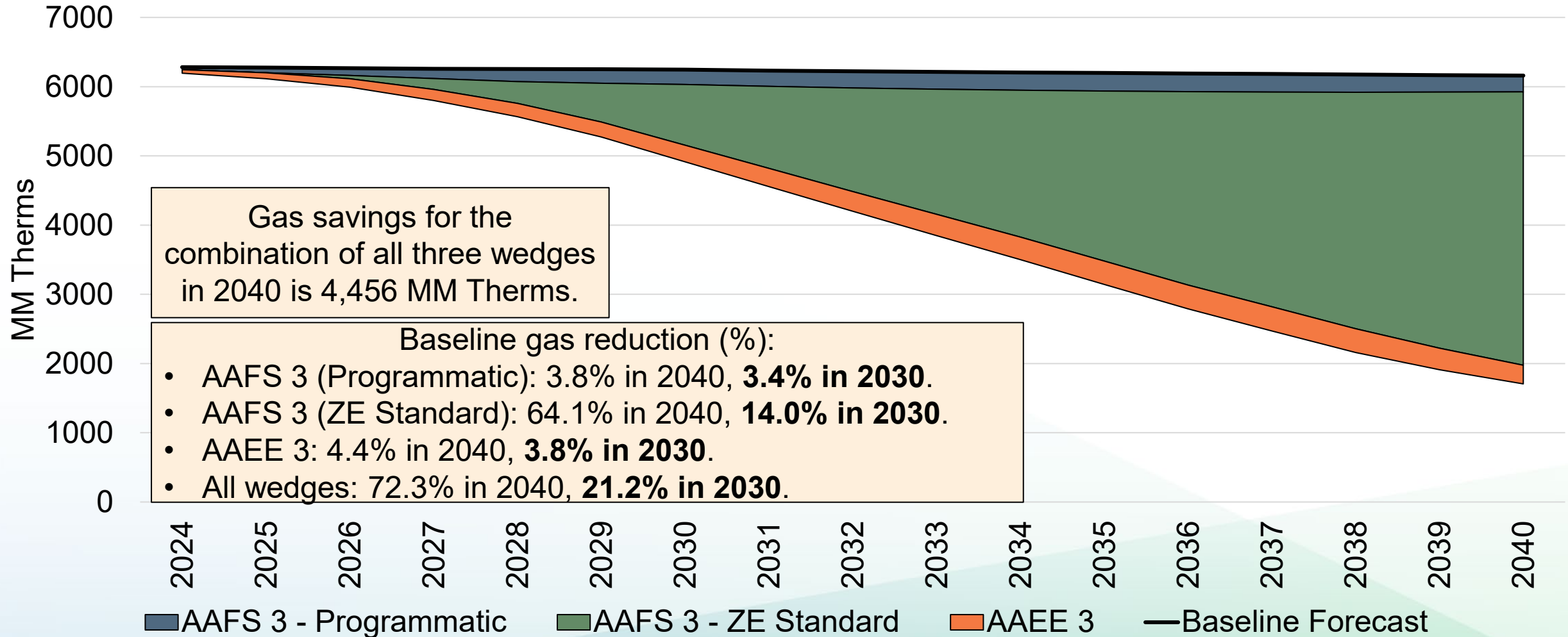
Planning Forecast - AAEE and AAFS Residential and Commercial Gas Savings





AAEE and AAFS Gas Impacts – Planning Forecast

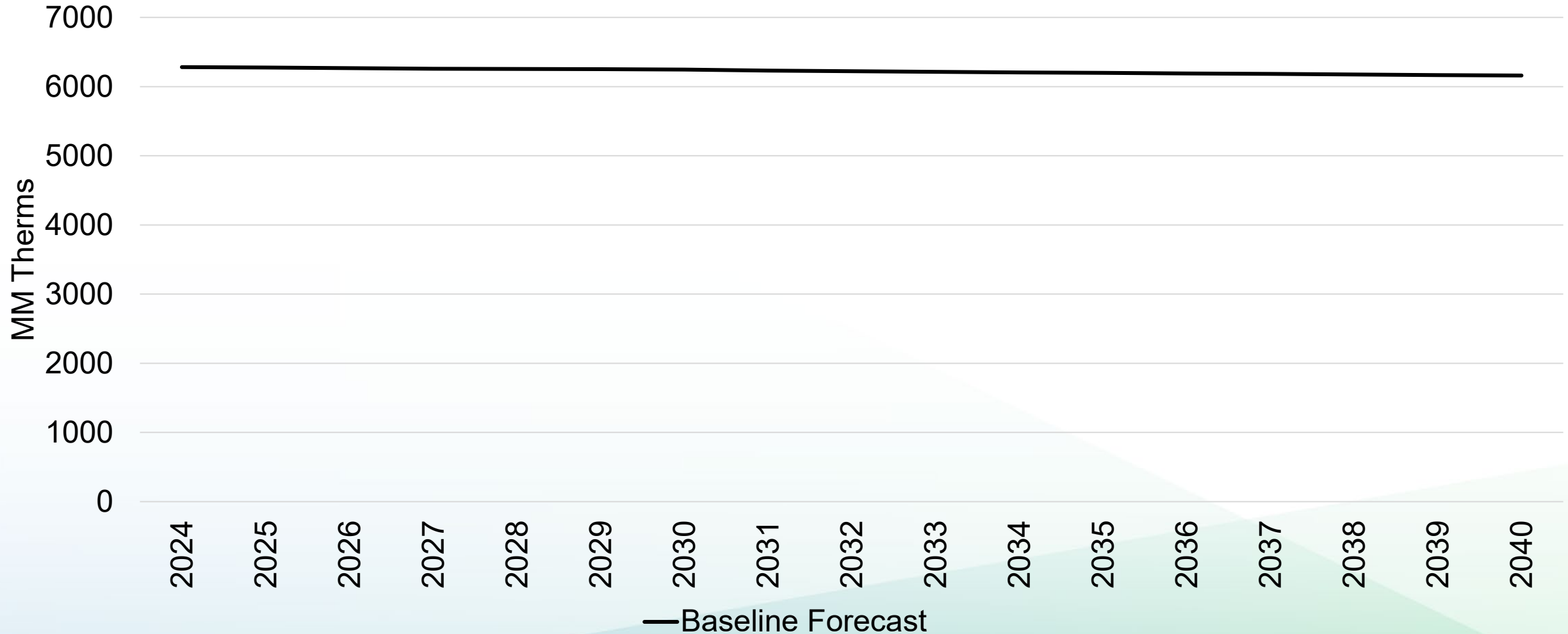
Planning Forecast - AAEE and AAFS Residential and Commercial Gas Savings





AAEE and AAFS Gas Impacts – Local Reliability

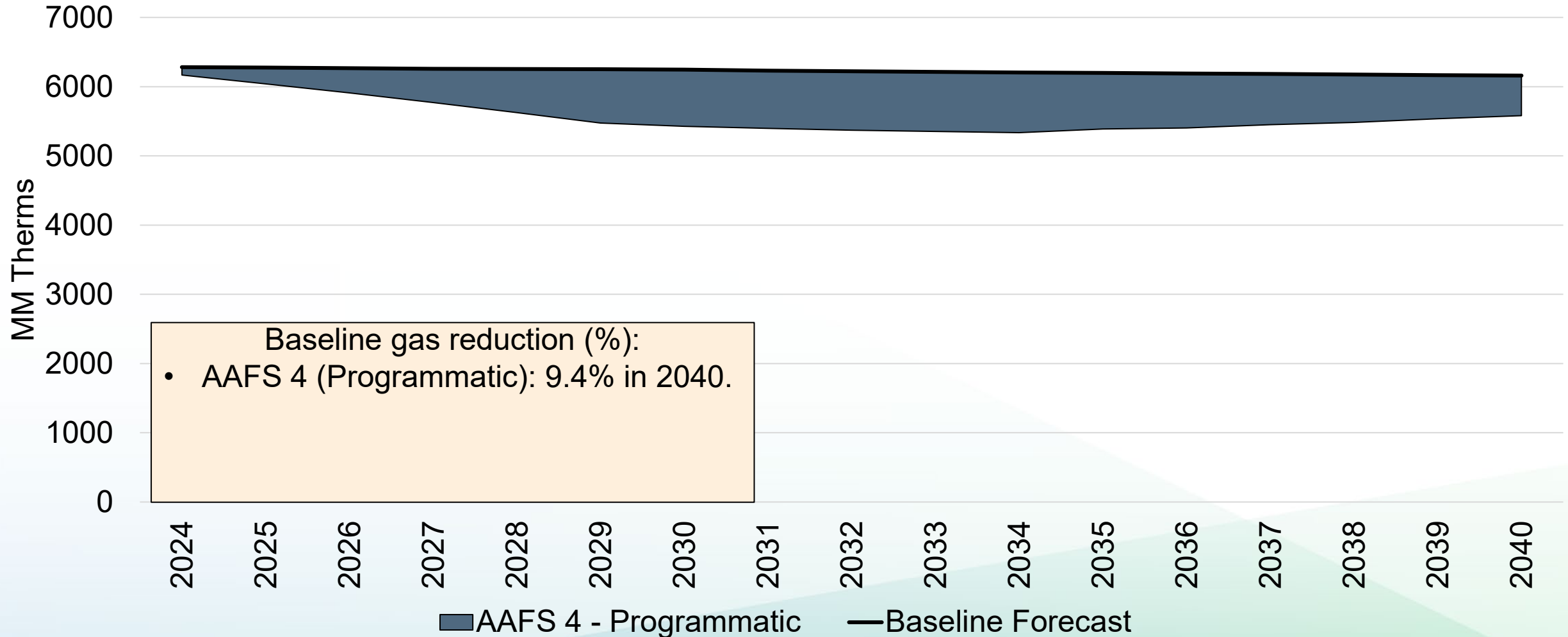
Local Reliability - AAEE and AAFS Residential and Commercial Gas Savings





AAEE and AAFS Gas Impacts – Local Reliability

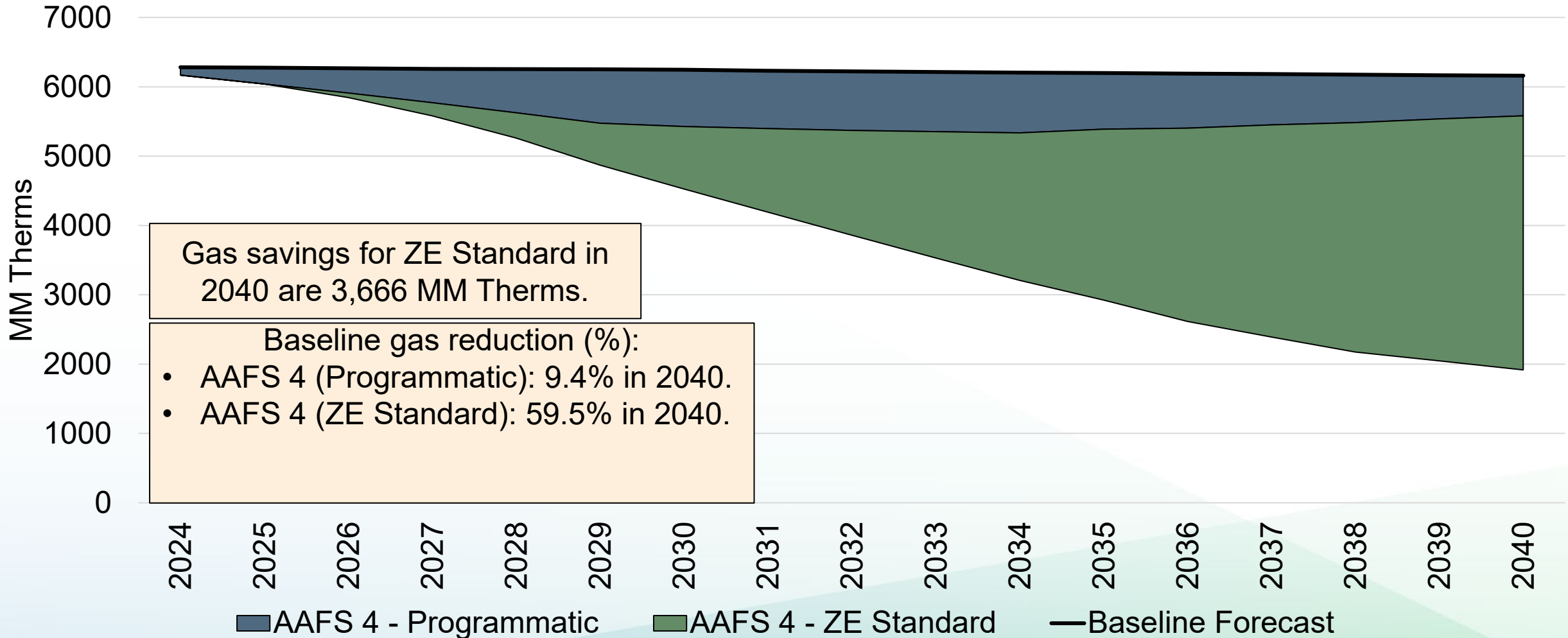
Local Reliability - AAEE and AAFS Residential and Commercial Gas Savings





AAEE and AAFS Gas Impacts – Local Reliability

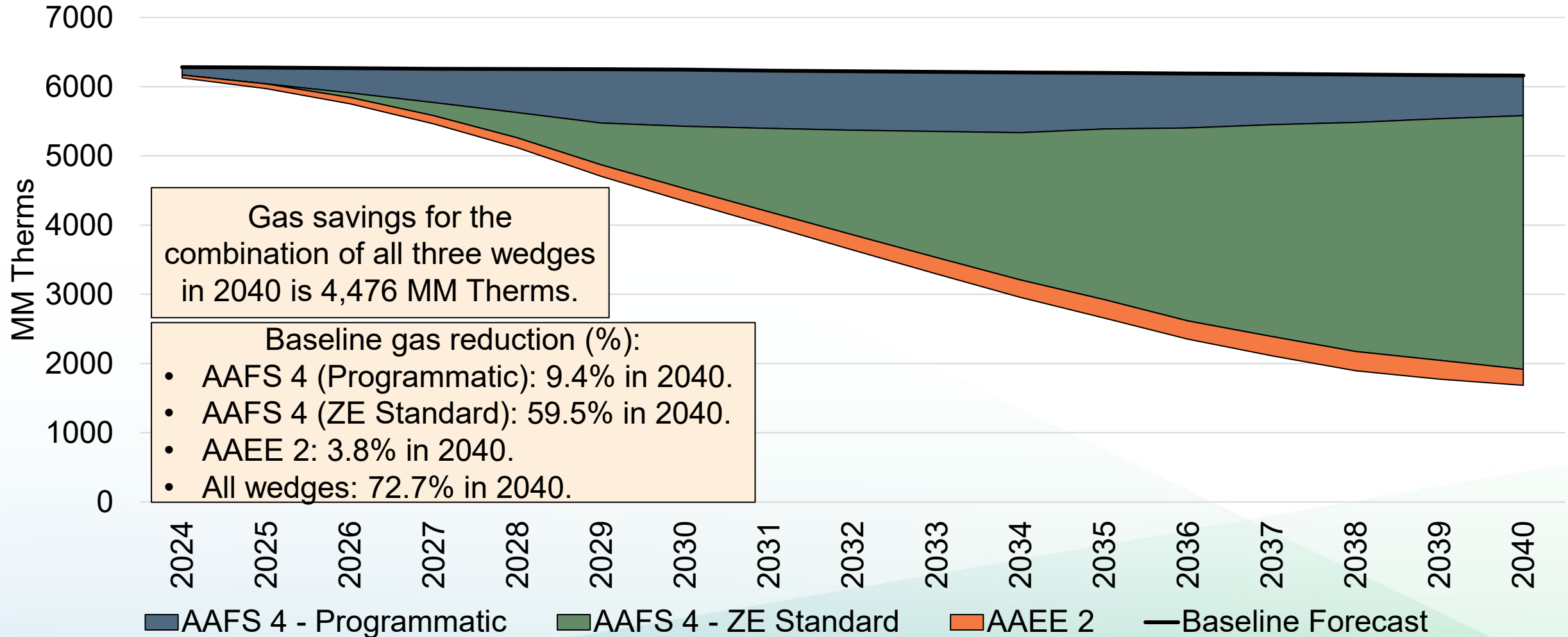
Local Reliability - AAEE and AAFS Residential and Commercial Gas Savings





AAEE and AAFS Gas Impacts – Local Reliability

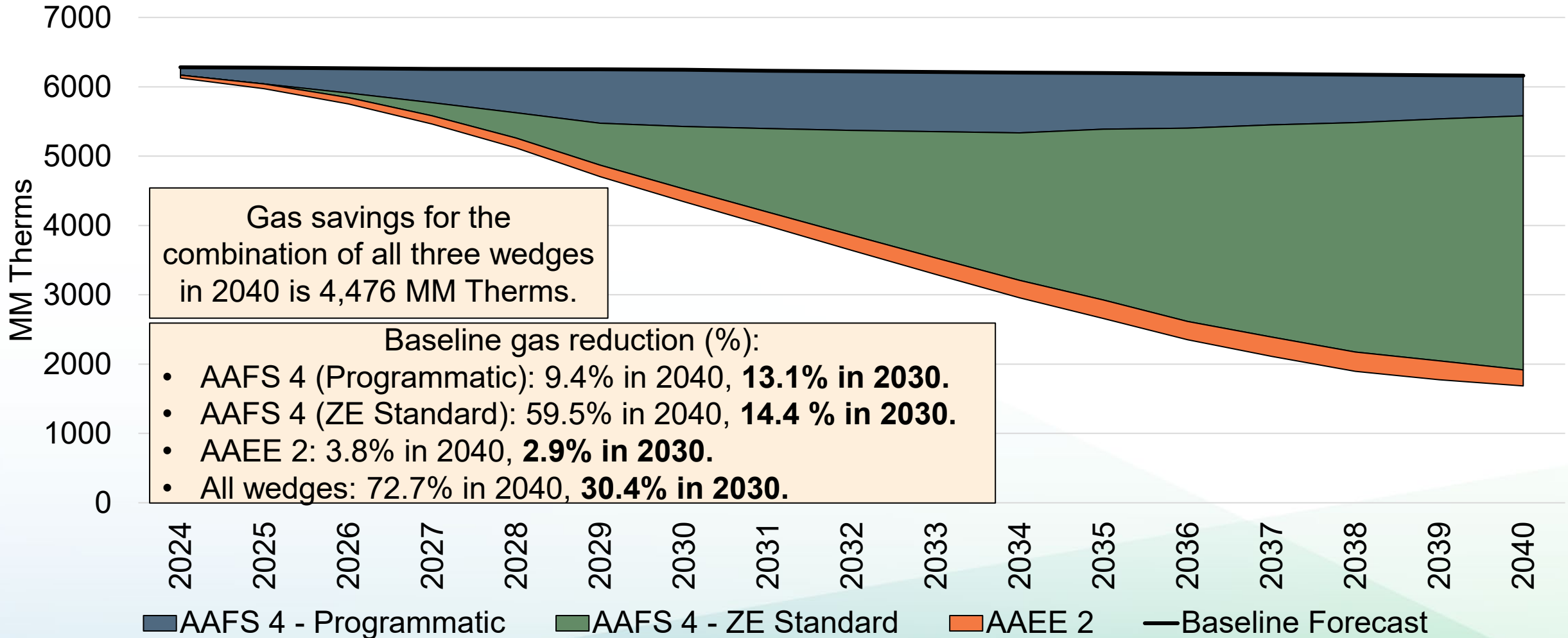
Local Reliability - AAEE and AAFS Residential and Commercial Gas Savings





AAEE and AAFS Gas Impacts – Local Reliability

Local Reliability - AAEE and AAFS Residential and Commercial Gas Savings





Summary of AAEE and AAFS Gas Impacts for Demand Forecast Scenarios --- MM Therms (% reduction from baseline)

Year →	2030	2030	2040	2040
Demand Forecast Scenario →	AAFS 3 & AAEE 3 (Planning Forecast)	AAFS 4 & AAEE 2 (Local Reliability Scenario)	AAFS 3 & AAEE 3 (Planning Forecast)	AAFS 4 & AAEE 2 (Local Reliability Scenario)
Baseline Forecast	6,246	6,246	6,161	6,161
AAFS (Programmatic)	215 (3.4%)	818 (13.1%)	235 (3.8%)	578 (9.4%)
AAFS (ZE Standard)	876 (14.0%)	900 (14.4%)	3,951 (64.1%)	3,666 (59.5%)
AAEE	240 (3.8%)	184 (2.9%)	270 (4.4%)	232 (3.8%)
Load Modifier Total	1,331 (21.2%)	1,902 (30.4%)	4,456 (72.3%)	4,476 (72.7%)



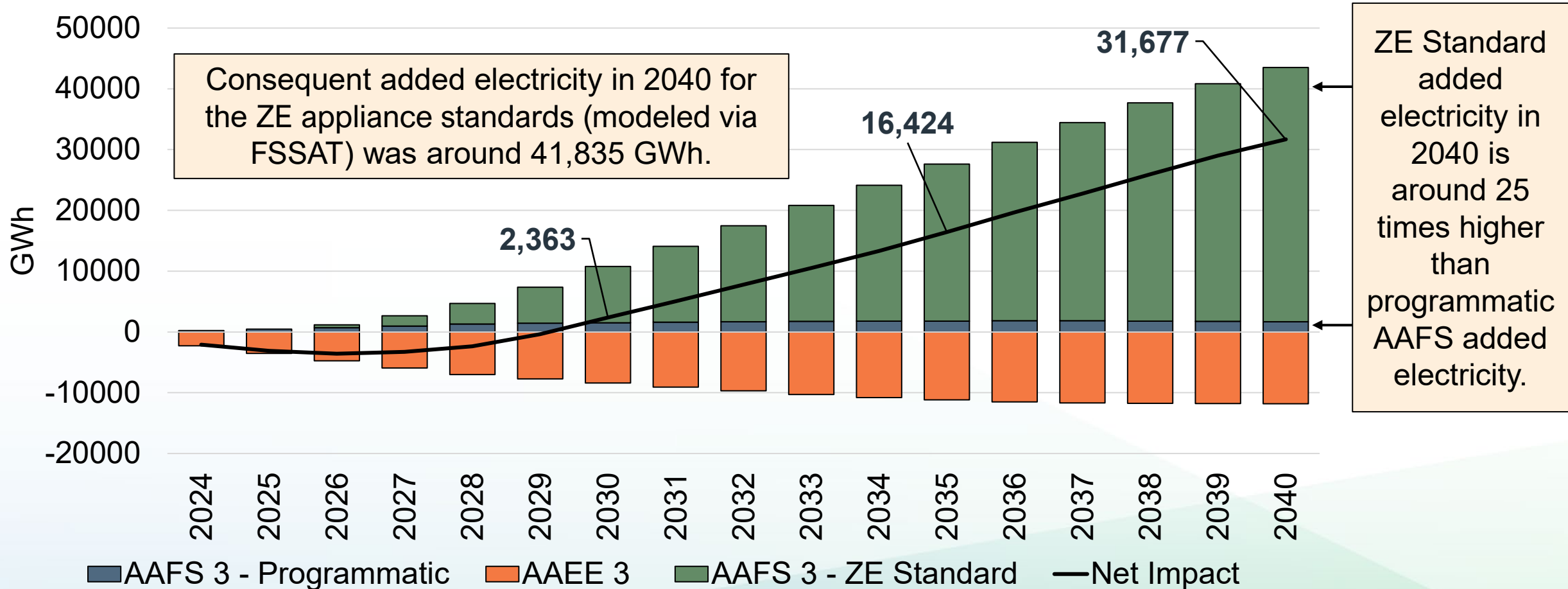
Summary of AAEE and AAFS Gas Impacts for Demand Forecast Scenarios --- MM Therms (% reduction from baseline)

Year →	2030	2030	2040	2040
Demand Forecast Scenario →	AAFS 3 & AAEE 3 (Planning Forecast)	AAFS 4 & AAEE 2 (Local Reliability Scenario)	AAFS 3 & AAEE 3 (Planning Forecast)	AAFS 4 & AAEE 2 (Local Reliability Scenario)
Baseline Forecast	6,246	6,246	6,161	6,161
AAFS (Programmatic)	215 (3.4%)	818 (13.1%)	235 (3.8%)	578 (9.4%)
AAFS (ZE Standard)	876 (14.0%)	900 (14.4%)	3,951 (64.1%)	3,666 (59.5%)
AAEE	240 (3.8%)	184 (2.9%)	270 (4.4%)	232 (3.8%)
Load Modifier Total	1,331 (21.2%)	1,902 (30.4%)	4,456 (72.3%)	4,476 (72.7%)



AAEE and AAFS Electricity Impacts – Planning Forecast

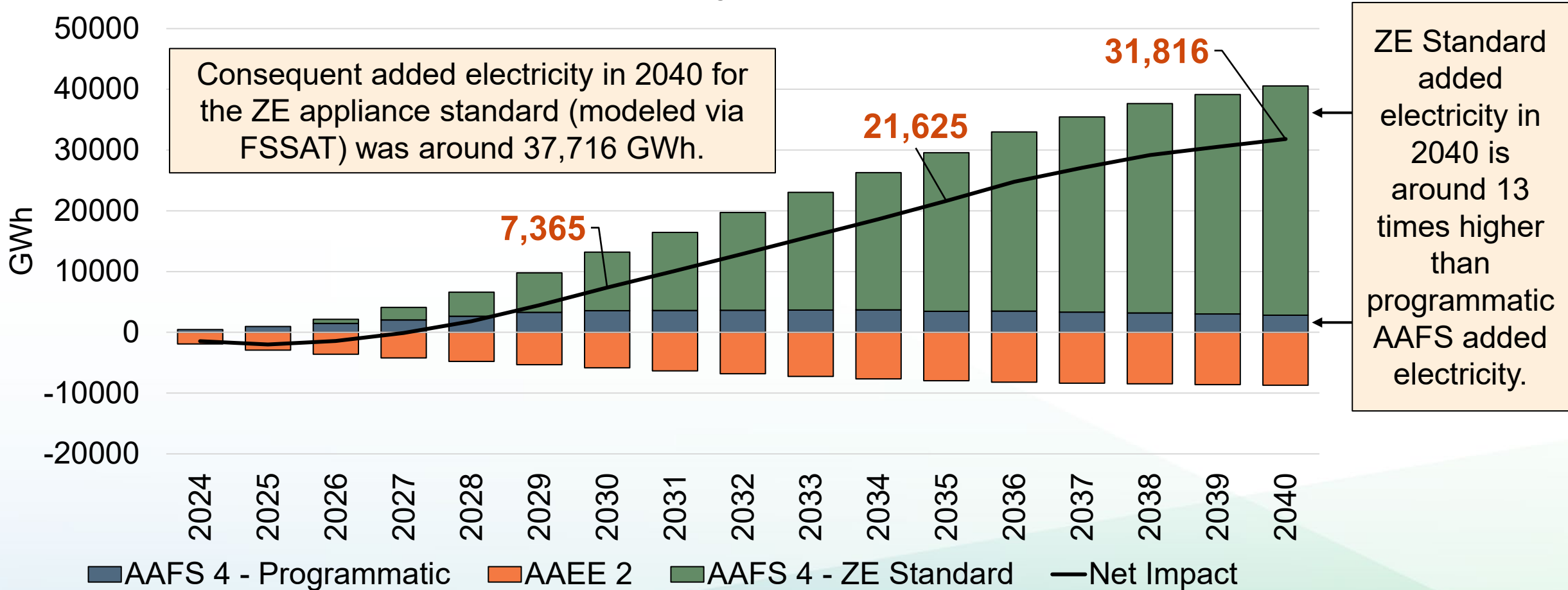
Planning Forecast – AAEE and AAFS Residential and Commercial Added Electricity





AAEE and AAFS Electricity Impacts – Local Reliability

Local Reliability – AAEE and AAFS Residential and Commercial Added Electricity





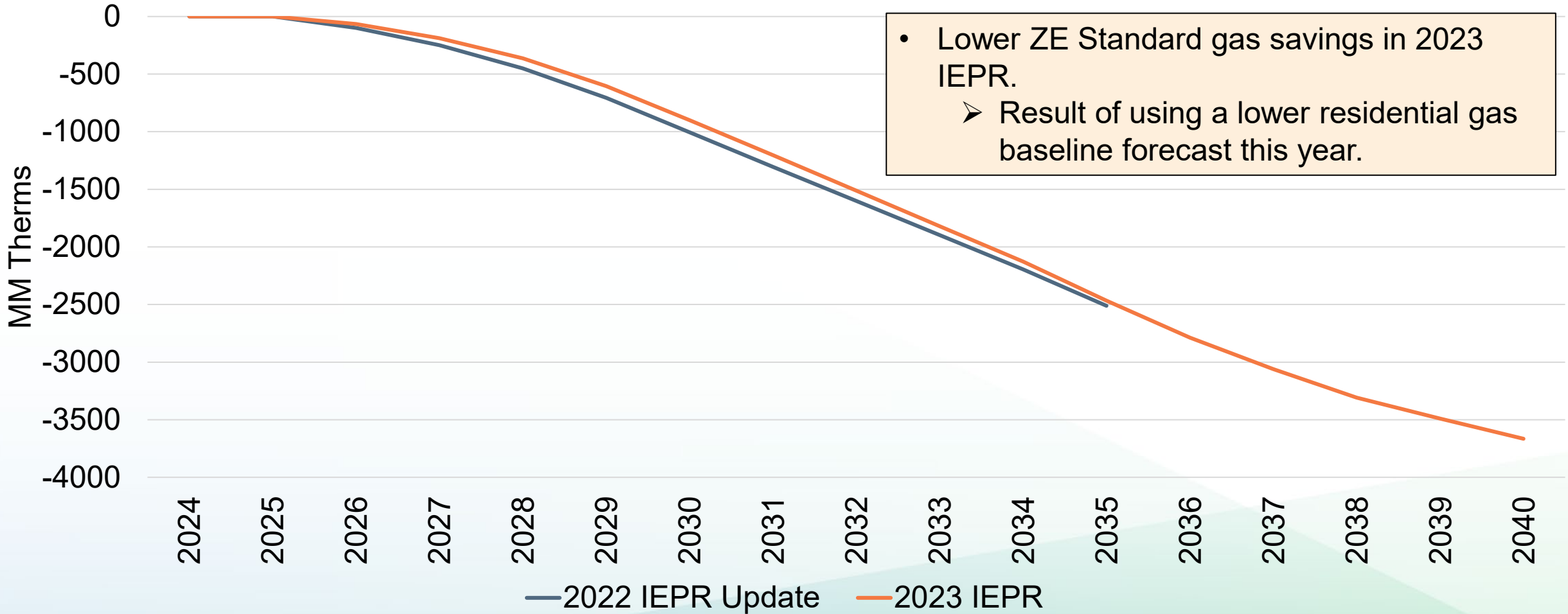
Summary of AAEE and AAFS Electric Impacts for Demand Forecast Scenarios --- Added or Removed GWh

Year →	2030	2030	2040	2040
Demand Forecast Scenario →	AAFS 3 & AAEE 3 (Planning Forecast)	AAFS 4 & AAEE 2 (Local Reliability Scenario)	AAFS 3 & AAEE 3 (Planning Forecast)	AAFS 4 & AAEE 2 (Local Reliability Scenario)
AAFS (Programmatic)	1,519	3,560	1,663	2,823
AAFS (ZE Standard)	9,239	9,631	41,835	37,716
AAEE	-8,395	-5,826	-11,821	-8,723
Load Modifier Total (GWh)	2,363	7,365	31,677	31,816
Gas Reduced Load Modifier Total (MM Therms)	1,331	1,902	4,456	4,476



Local Reliability ZE Standard Gas Impacts - 2022 IEPR Update vs 2023 IEPR

ZE Standard Local Reliability Gas Savings - 2022 IEPR Update vs 2023 IEPR

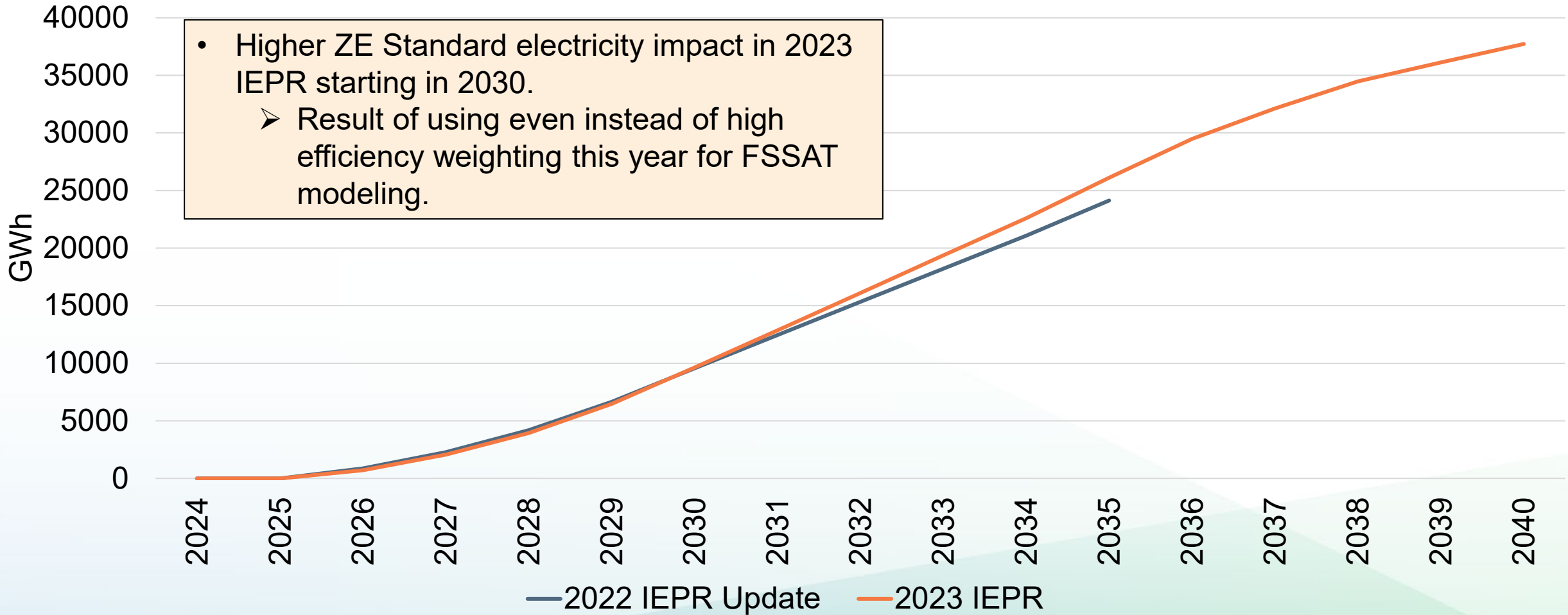


- Lower ZE Standard gas savings in 2023 IEPR.
 - Result of using a lower residential gas baseline forecast this year.



Local Reliability ZE Standard Electricity Impacts - 2022 IEPR Update vs 2023 IEPR

ZE Standard Local Reliability Added Electricity - 2022 IEPR Update vs 2023 IEPR

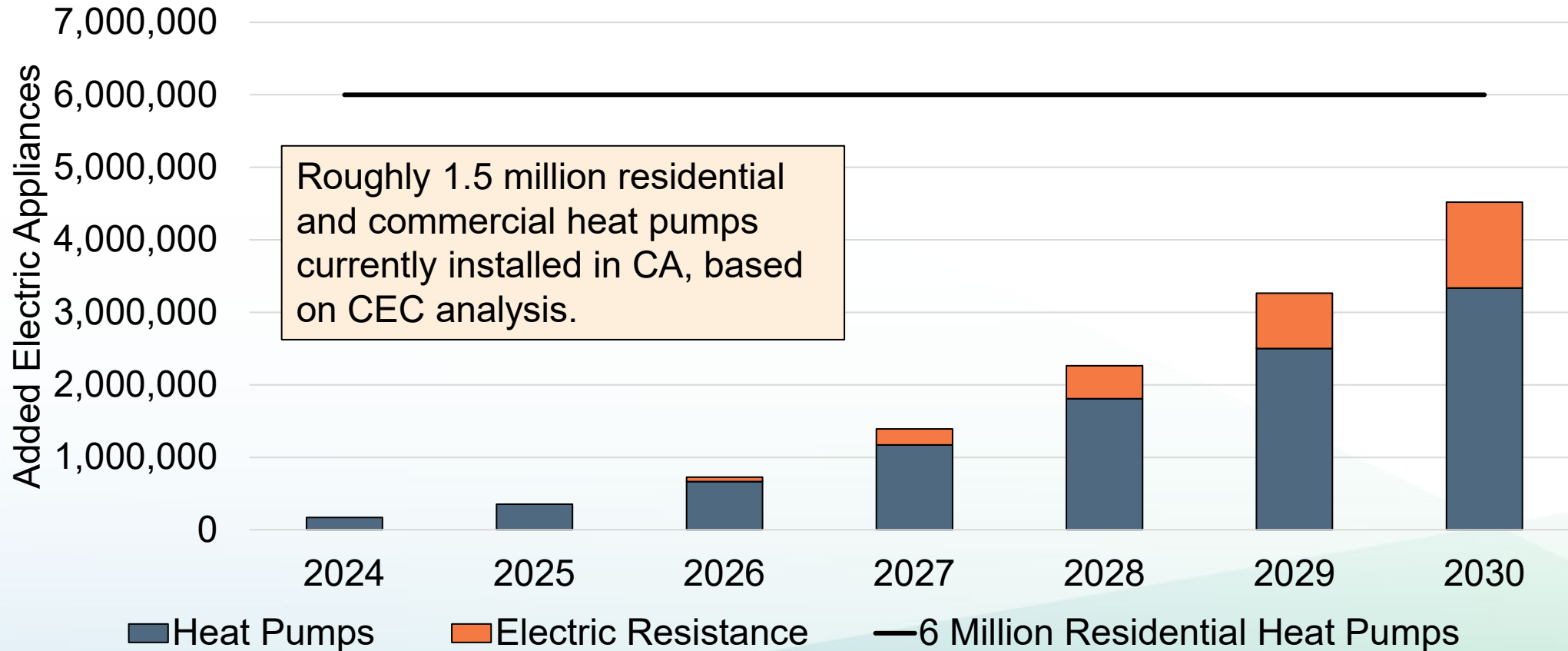


- Higher ZE Standard electricity impact in 2023 IEPR starting in 2030.
 - Result of using even instead of high efficiency weighting this year for FSSAT modeling.



Estimated Added Electric Appliances – Planning Forecast

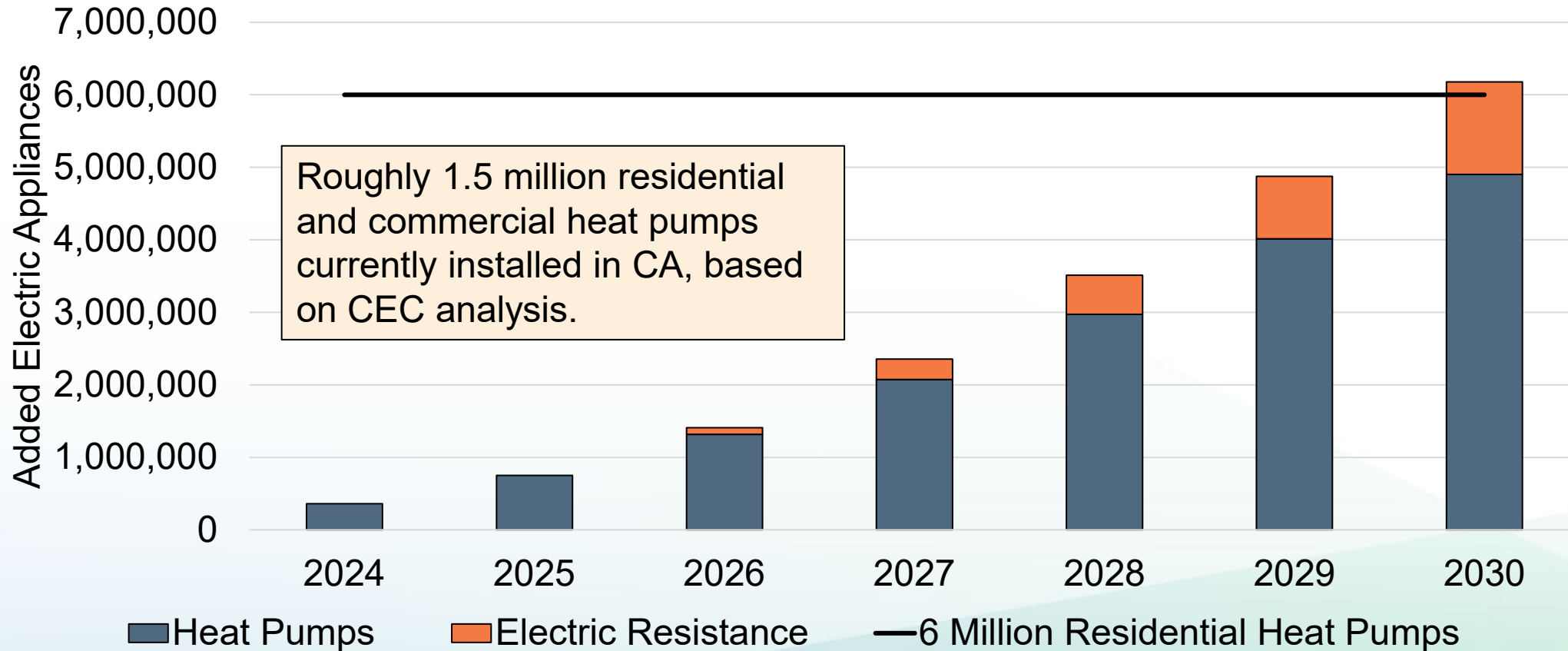
Added Residential Air and Water Heat Pump and Electric Resistance Stock from AAFS (Programmatic and ZE Standard) – Planning Forecast





Estimated Added Electric Appliances – Local Reliability Scenario

Added Residential Air and Water Heat Pump and Electric Resistance Stock from AAFS (Programmatic and ZE Standard) – Local Reliability





Thank you

Questions?

Ethan Cooper

ethan.cooper@energy.ca.gov

Nicholas Janusch, Ph.D.

nicholas.janusch@energy.ca.gov