BONNEVILLE POWER ADMINISTRATION

CONSERVATION POTENTIAL ASSESSMENT RESULTS

WORK COMPLETED IN SUMMER OF 2024

LIGHTHOUSE ENERGY CONSULTING

CADMUS

Agenda

Project Overview

CPA Results

DRPA Results

Next Steps

Questions

PROJECT OVERVIEW

Project Background

Since 2018, BPA assesses conservation with other supply side resources in the Resource Program.

The Resource Program examines uncertainty in loads and resources to develop a least-cost portfolio of resources that meet BPA's obligations.

Conservation is selected based on BPA’s need, availability, and cost.

Conservation develops estimates of EE and DR resources for Resource Program.

Ensures all potential conservation is included and evaluated against competing alternatives.

2024 Resource Program Update

2022 Resource Program

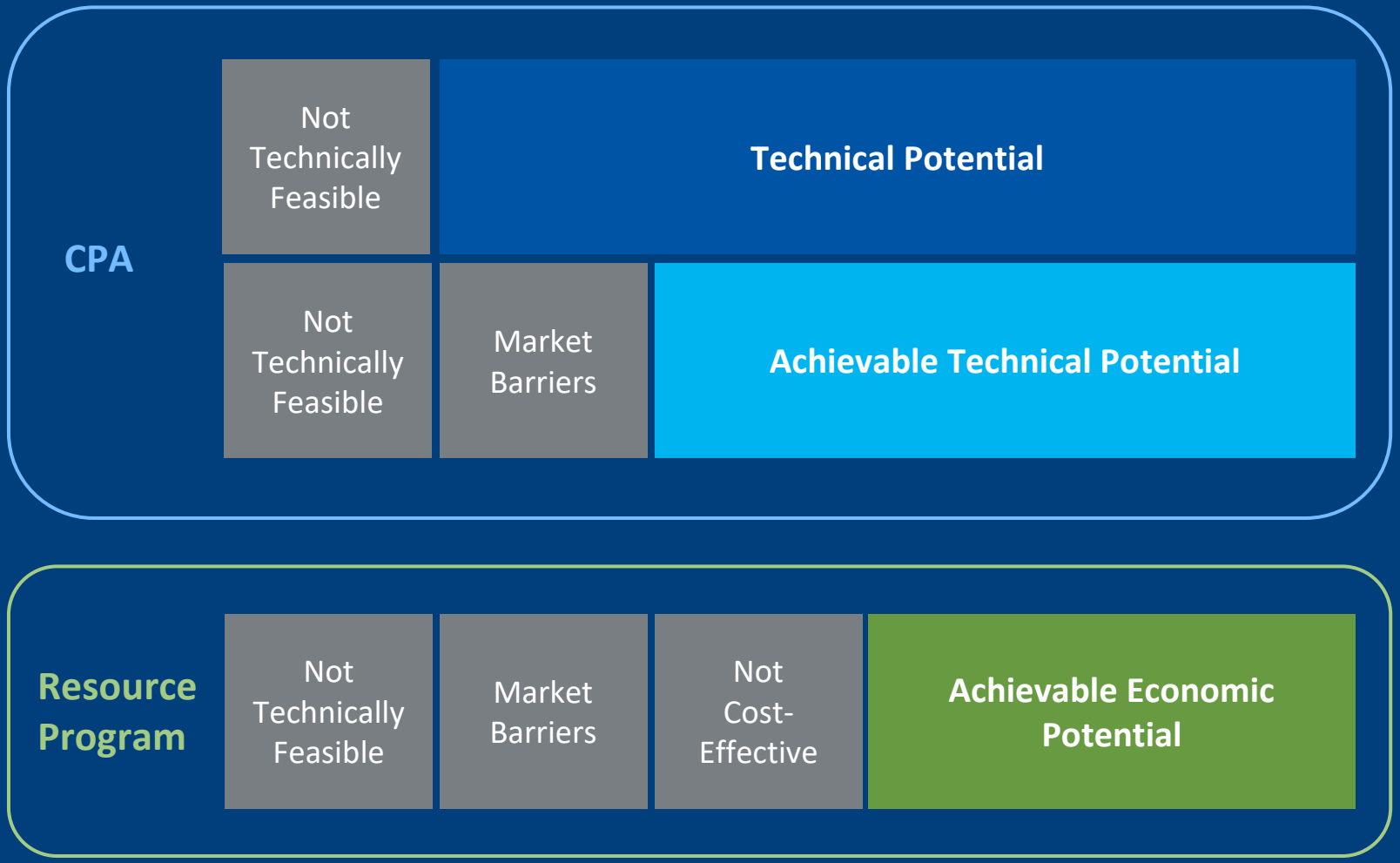
2024-2043
(2021 CPA)

2024 Resource Program

2026-2045
(2023 CPA)

Updated BPA Forecasts
New Climate Data Changes
Geographical Regions
Load Sensitivities
EE and DR Assumptions Updates

Types of Potential



Conservation Potential Assessment

CPA Project Goals

Develop **20-year estimates** of technical and achievable conservation potential in BPA's service territory **(2026 – 2045)**

Produce conservation **supply curves** for use in BPA's **Resource Program modeling**

Methodology Overview

Customizations for BPA Supply Curves

Timeline and Stock Data	Geographic Split Mid-C / SWEDE	RTF Measures
BPA Load Forecast	Overlap with Demand Response	Costs & Benefits Aligned with Resource Program

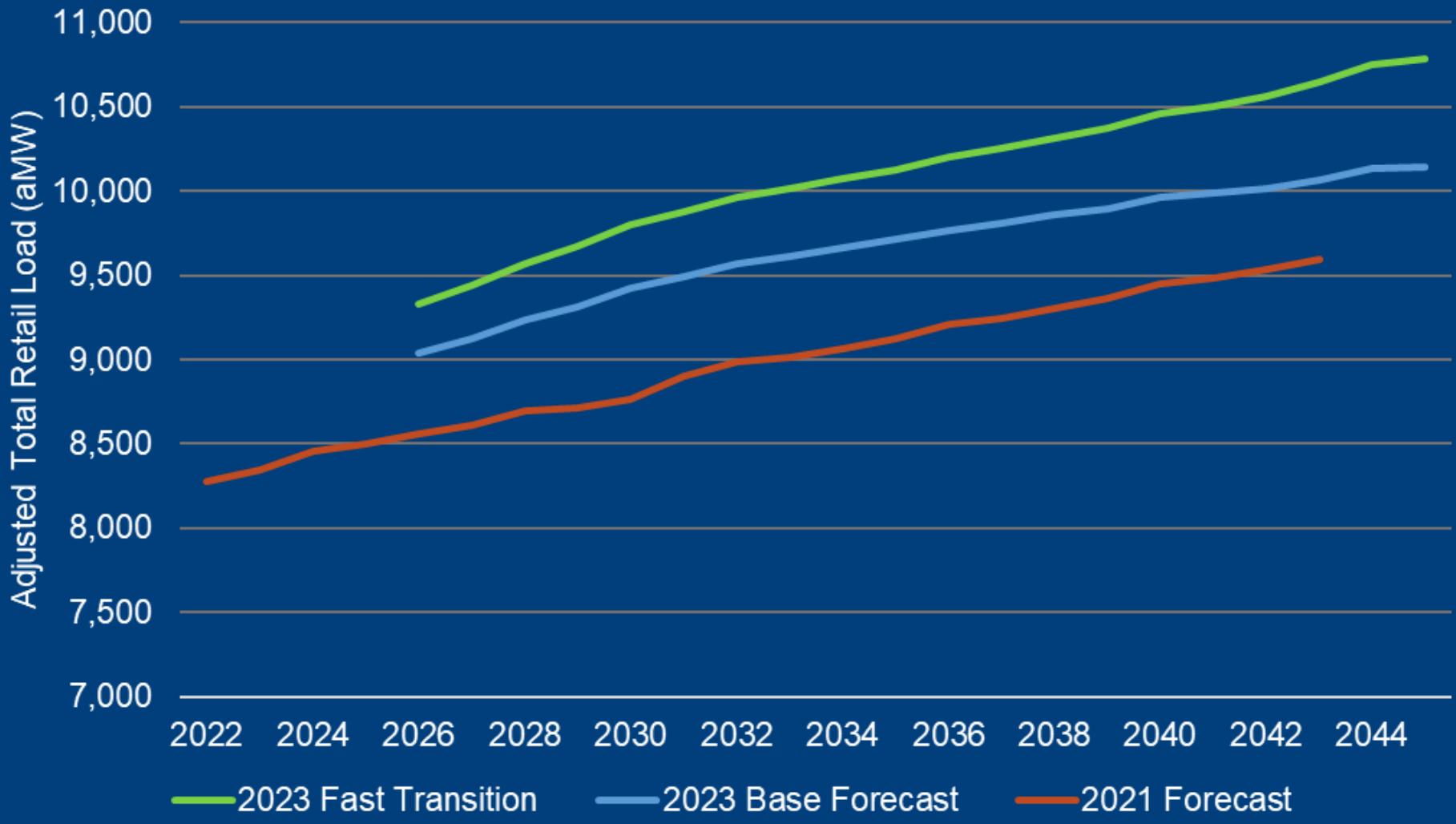
Overall Goal: Used the best available data to customize BPA 2021 CPA supply curve files for use in BPA's Resource Program process

Fundamental Differences with 2021 CPA

Timeline shifted two years forward	• Two years further up the ramp rates used in the 2021 CPA • Two years of load growth not in the 2021 CPA
Removed 2021 CPA Future Meteorological Year to Typical Meteorological Year adjustments from savings, converted to align with BPA climate forecast	
RTF measure updates	• Updated 24 measures with latest RTF workbooks • Updated pre-rinse spray valve baseline rather than deactivating the measure
Geographic split between Mid-C and SWEDE regions	
Used updated BPA forecast and sector growth rates	
Developed Fast Transition scenario	

These differences limit the usefulness of any direct comparison with the 2021 CPA results

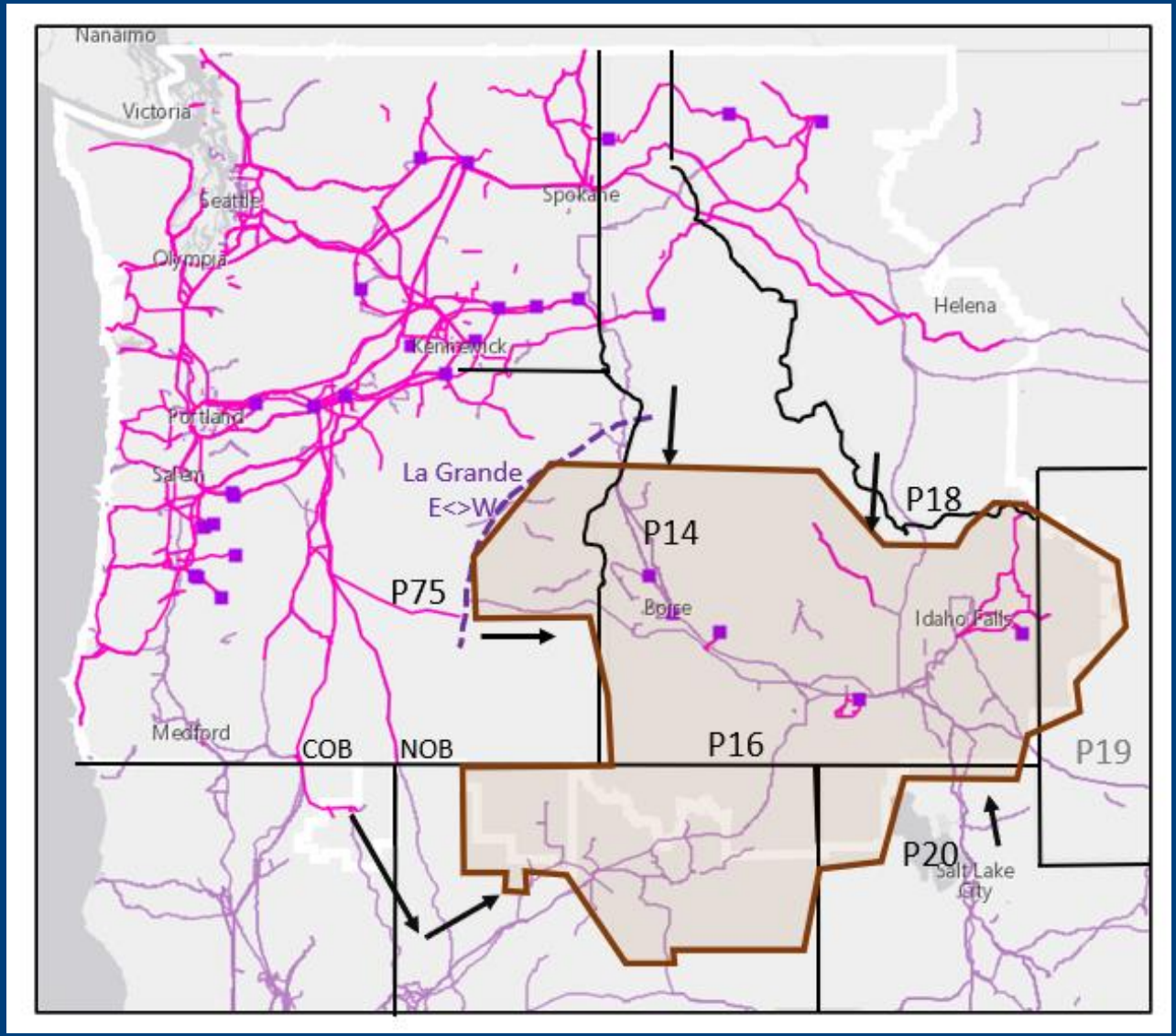
Load Forecast Comparison



Geographic Split

Brown outline:
South/West/East Diversity Exchange (SWEDE) area

Outside SWEDE area:
Mid-Columbia (Mid-C)



OVERALL CPA RESULTS

Cumulative Potential – Base Case

BPA Sector	Cumulative Achievable Technical Potential (aMW)	
	6-Year (2026 to 2031)	20-Year (2026 to 2045)
Residential	431	1,129
Commercial	263	613
Agricultural	10	24
Industrial	120	257
Utility System Efficiency	68	73
Total	**893**	**2,096**

20-Year potential is approximately 5% lower than BPA's 2021 CPA, but there are important differences in the cost and timing.

Cumulative Potential – Fast Transition

BPA Sector	Cumulative Achievable Technical Potential (aMW)	
	6-Year (2026 to 2031)	20-Year (2026 to 2045)
Residential	437	1,155
Commercial	267	630
Agricultural	10	24
Industrial	132	281
Utility System Efficiency	71	76
Total	**917**	**2,167**

Relative to Base Case
20-year potential increase of 3.4%

Comparison of 6-Year Potential

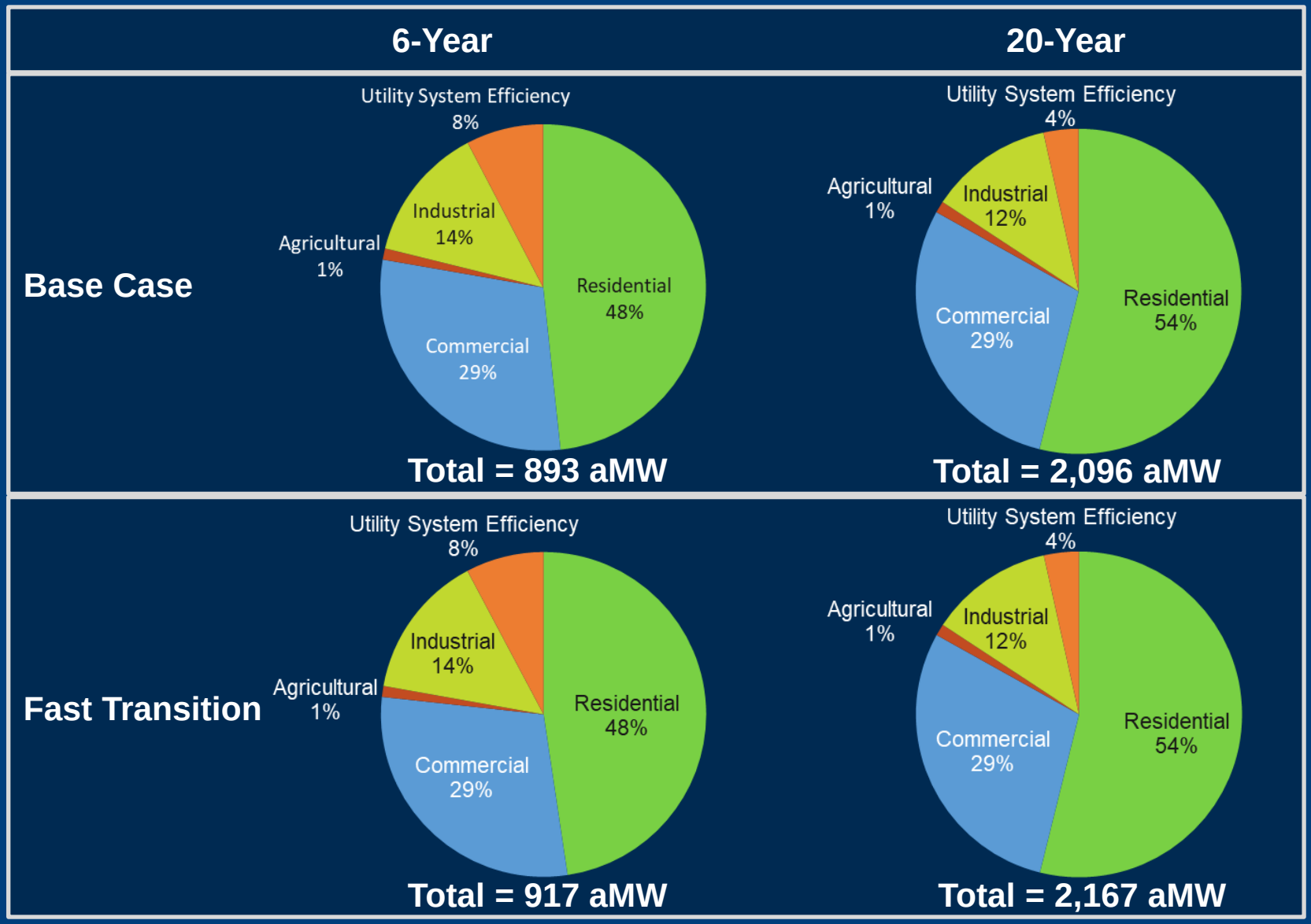
Sector	6-Year Cumulative Achievable Technical Potential - aMW		
	BPA 2021 CPA 2024 to 2029	BPA 2023 CPA Base Case 2026 to 2031	BPA 2023 CPA Fast Transition 2026 to 2031
Residential	345	431	437
Commercial	231	263	267
Agricultural	10	10	10
Industrial	117	120	132
Utility System Efficiency	15	68	71
Total	**717**	**893**	**917**

Comparison of 20-Year Potential

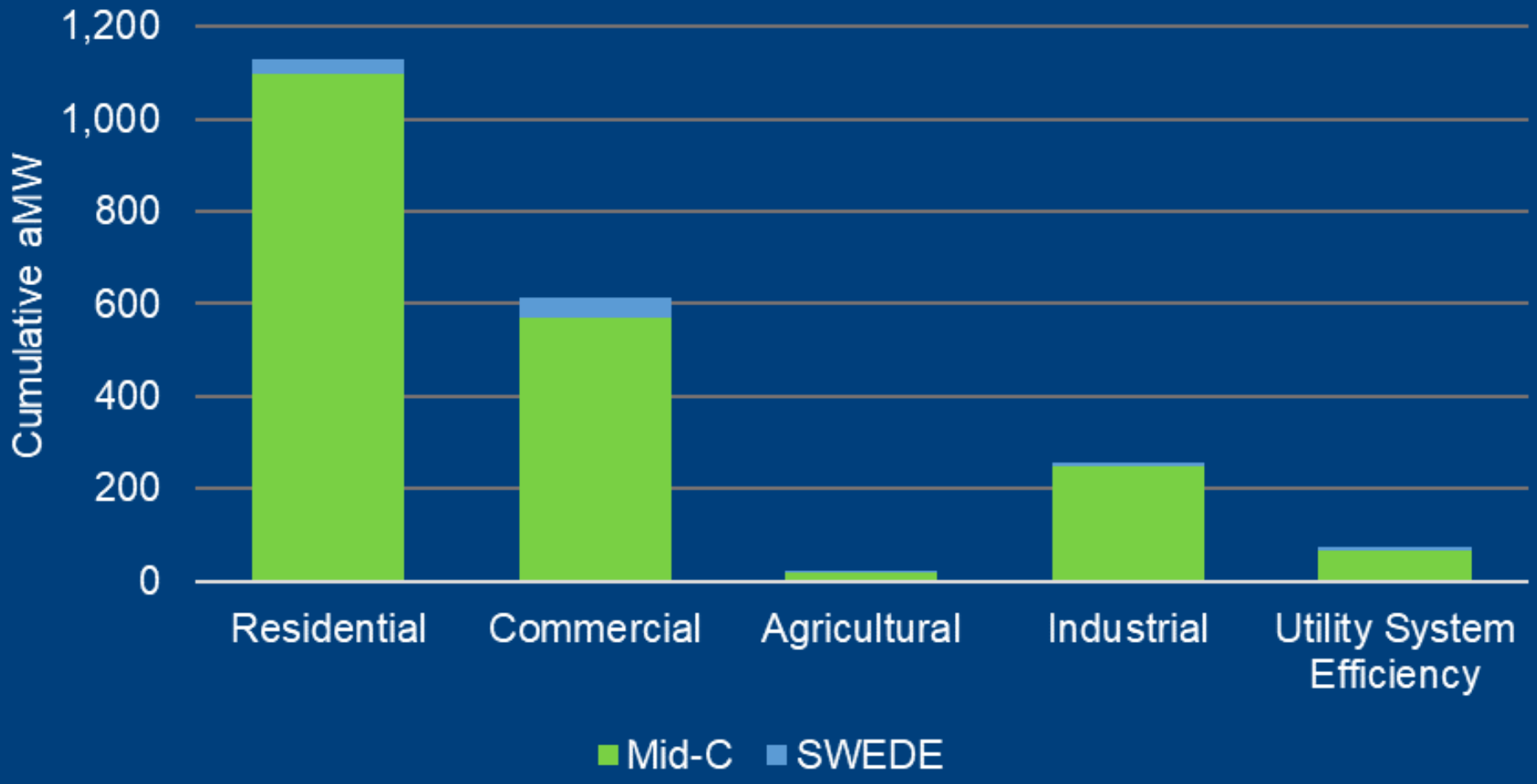
Sector	20-Year Cumulative Achievable Technical Potential - aMW		
	BPA 2021 CPA 2024 to 2043	BPA 2023 CPA Base Case 2026 to 2045	BPA 2023 CPA Fast Transition 2026 to 2045
Residential	1,155	1,129	1,155
Commercial	654	613	630
Agricultural	30	24	24
Industrial	288	257	281
Utility System Efficiency	80	73	76
Total	**2,207**	**2,096**	**2,167**

Relative to the 2021 CPA, the potential decreases due to captured accomplishments in 2024 and 2025.

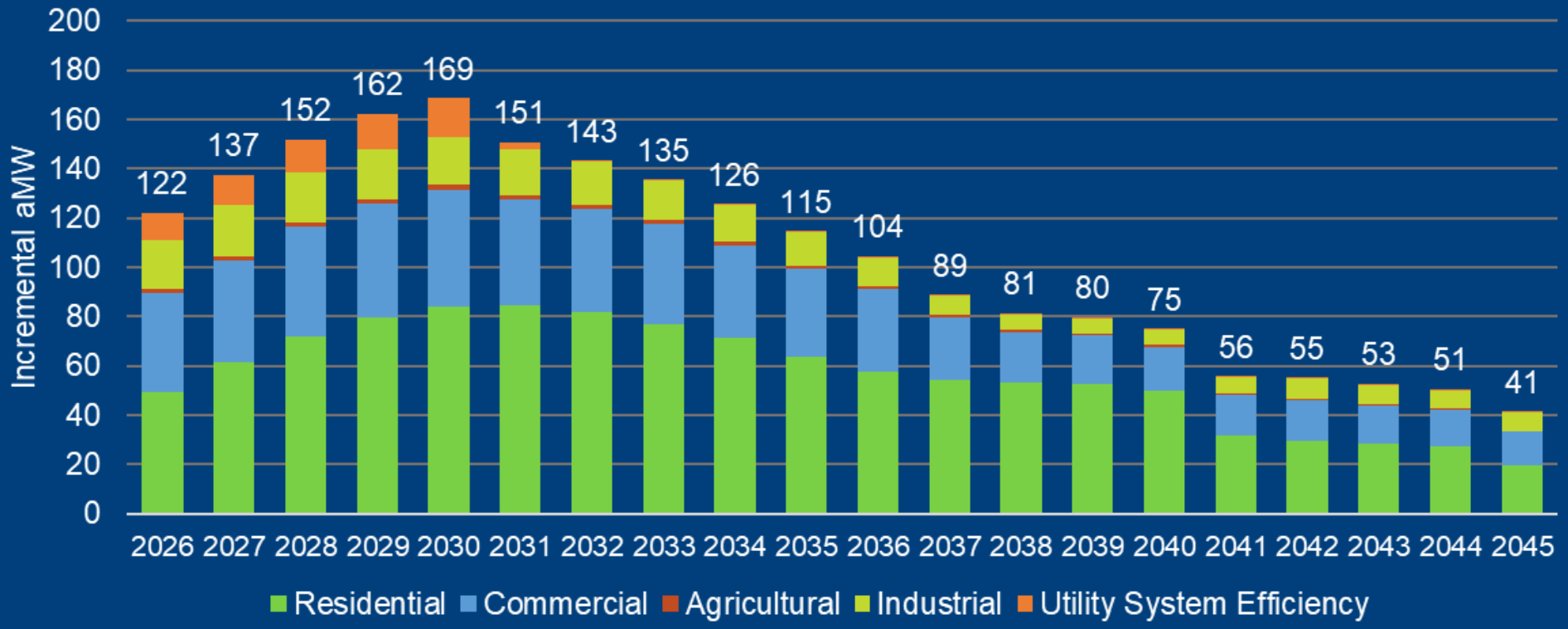
Share of Potential by Sector



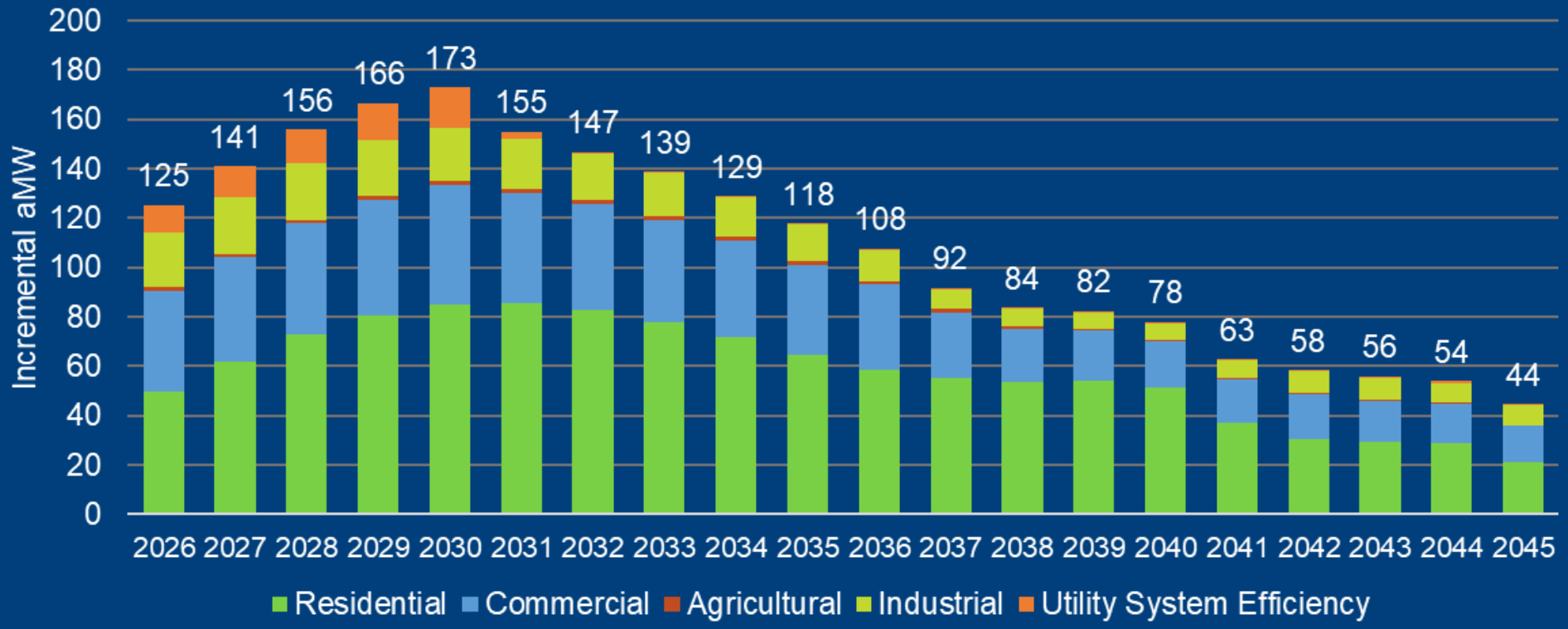
20-Year Technical Achievable Potential by Sector and Geography



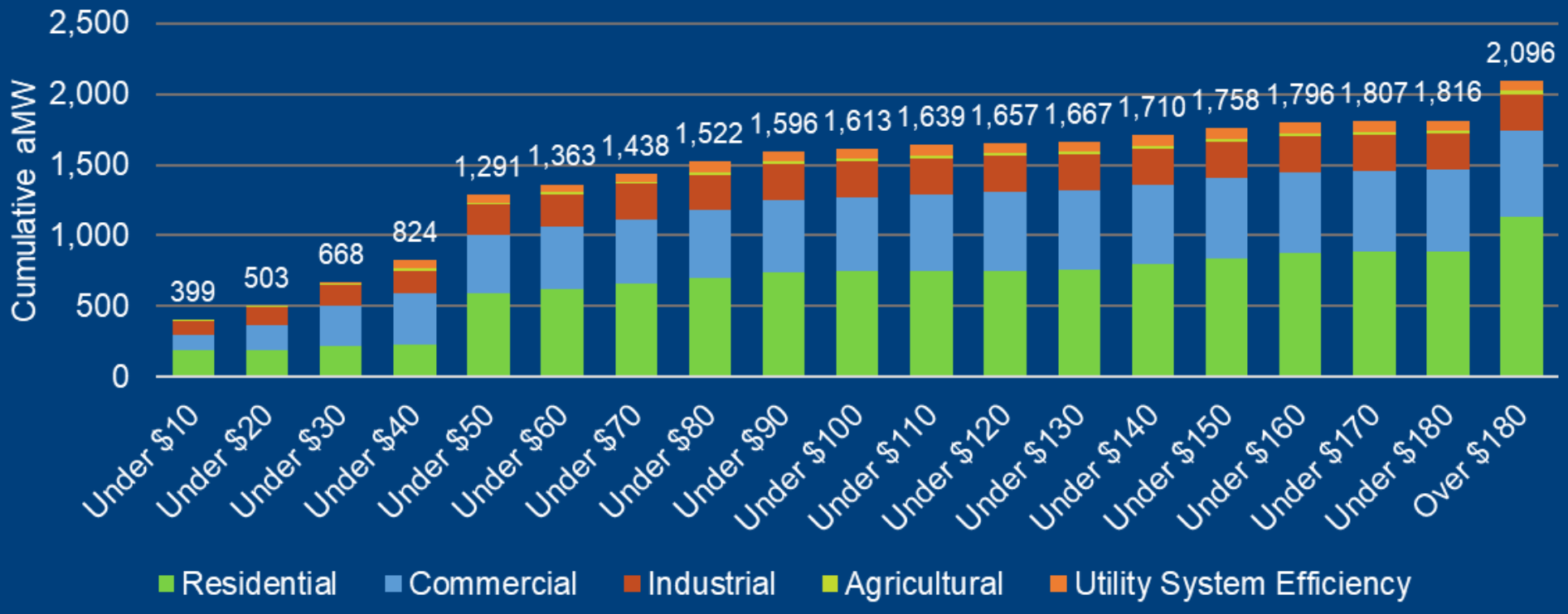
Incremental Technical Achievable Potential Base Case



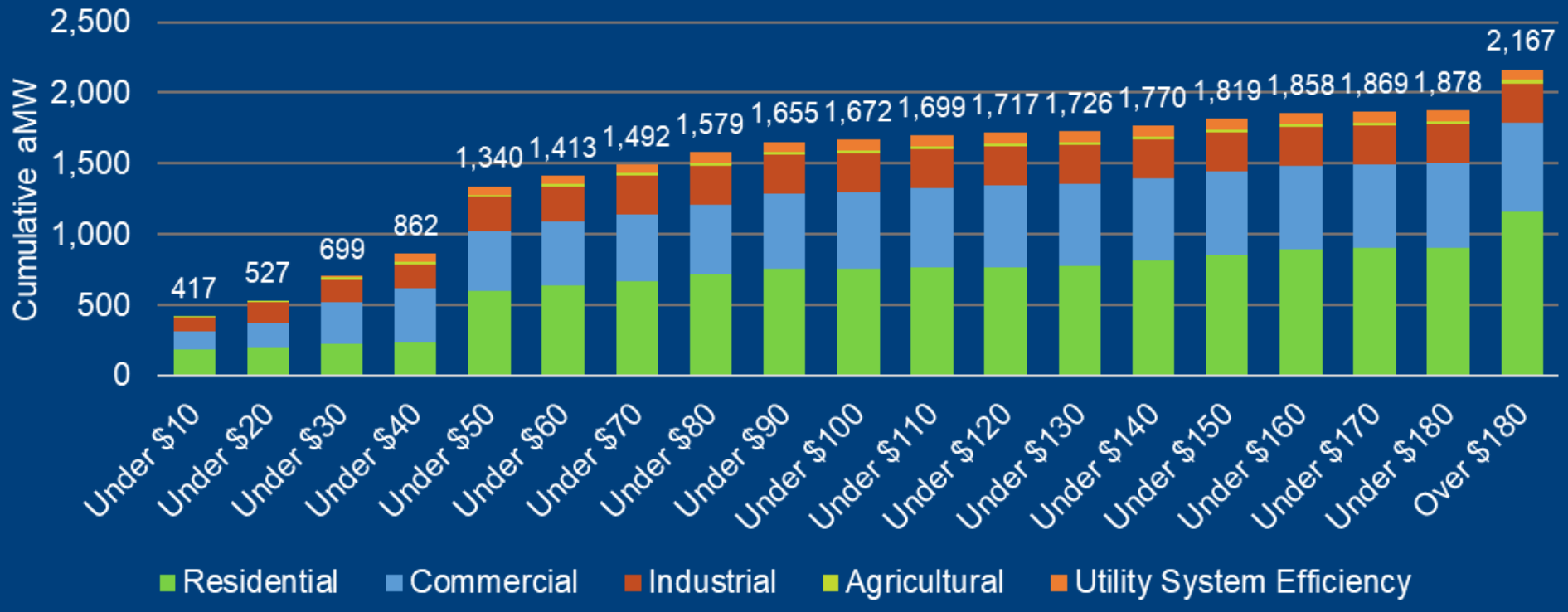
Incremental Technical Achievable Potential Fast Transition



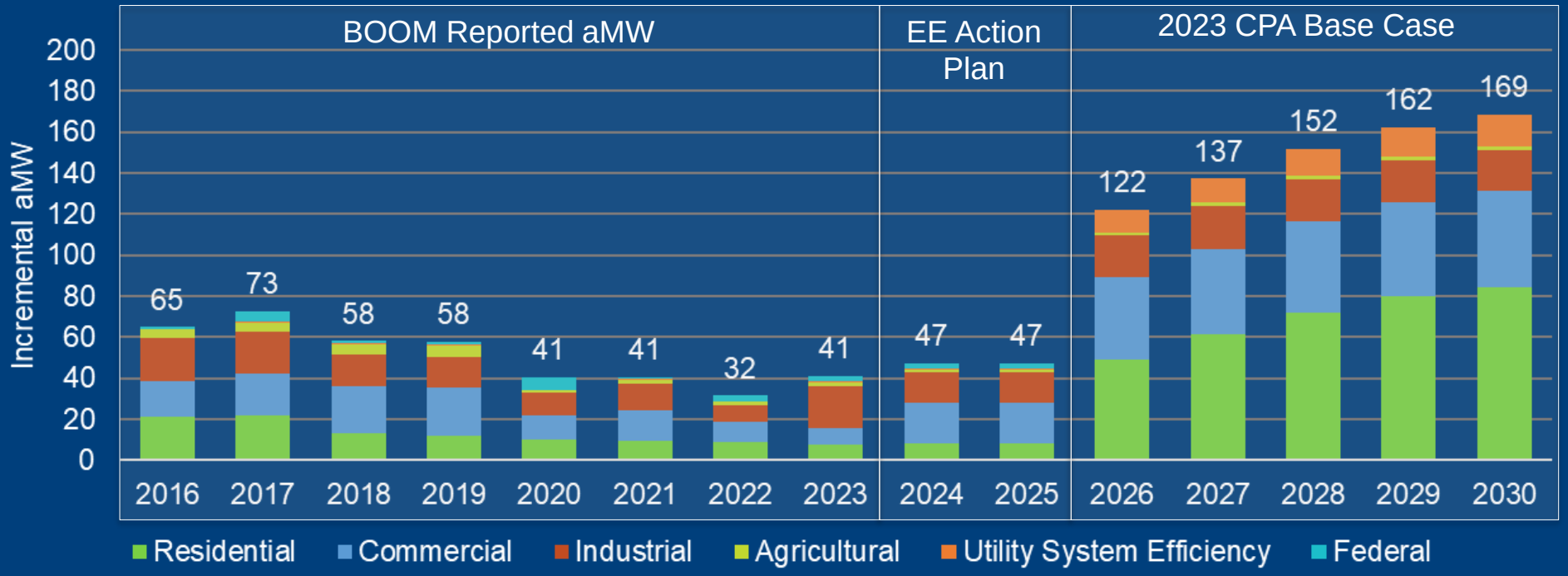
Supply Curve – Base Case



Supply Curve – Fast Transition

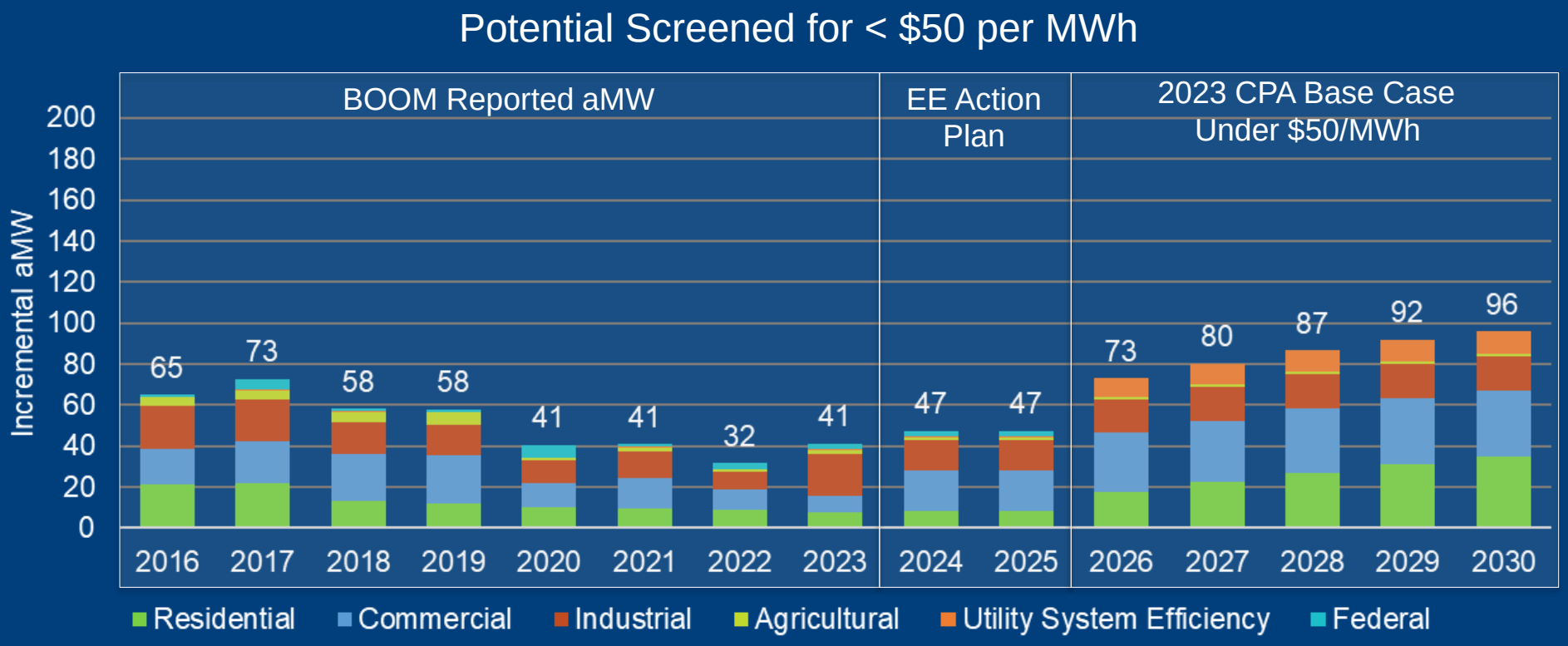


Past Achievement vs. All Potential – Base Case



Note: Historical savings from 2016 to 2023 are based on the BPA BOOM report program savings whereas savings from 2024 to 2025 represent BPA's projected savings from the recent EE action plan. These savings represent both BPA-funded and utility self-funded program savings.

Past Achievement vs. Screened Potential – Base Case



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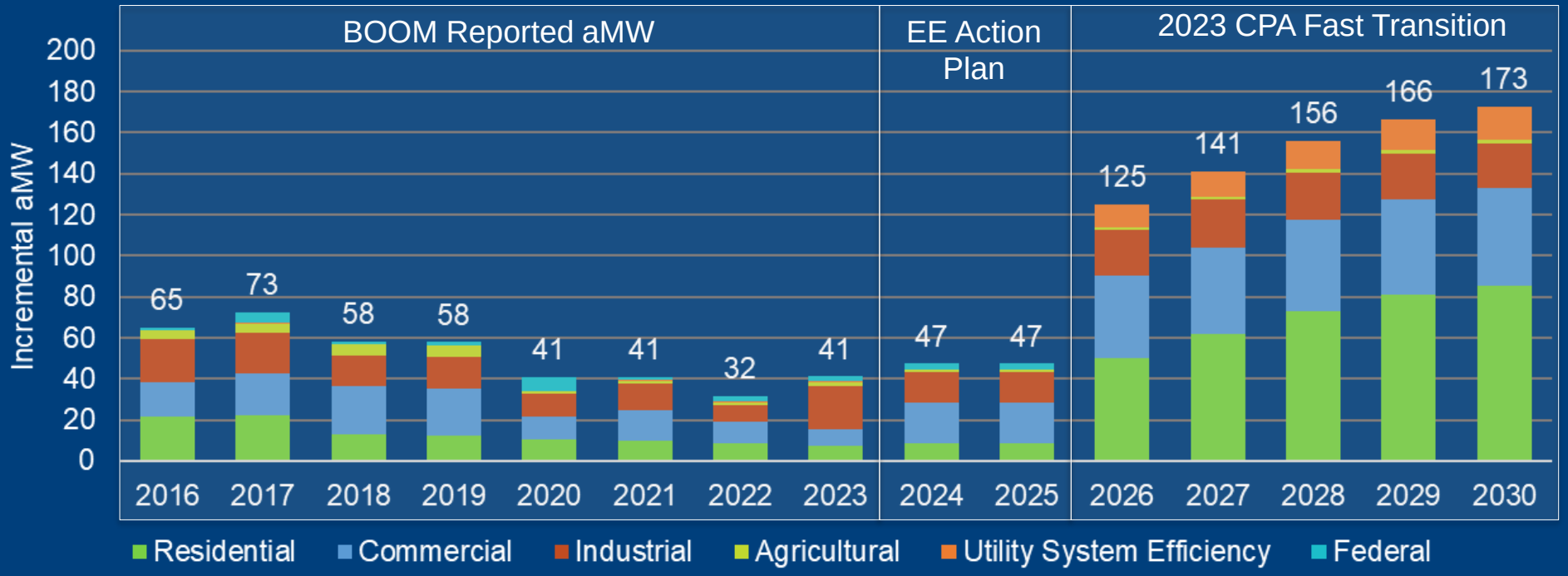
Past Achievement vs. All Potential – Fast Transition



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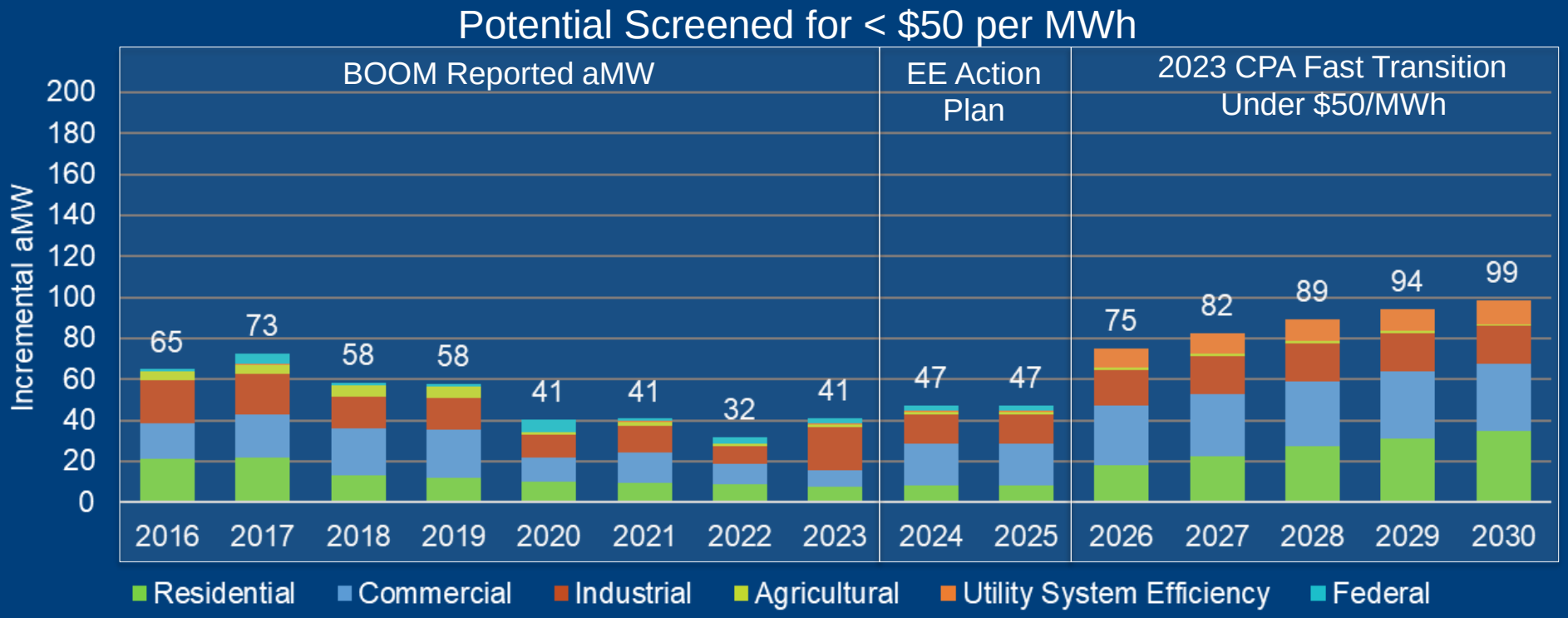
Past Achievement vs. Screened Potential – Fast Transition



Note: Historical savings from 2016 to 2023 are based on the BPA BOOM report program savings whereas savings from 2024 to 2025 represent BPA's projected savings from the recent EE action plan. These savings represent both BPA-funded and utility self-funded program savings.

Comparison of 20-Year Potential Lost Opportunity Only

Sector	20-Year Cumulative Achievable Technical Potential - aMW		
	BPA 2021 CPA 2024 to 2043	BPA 2023 CPA Base Case 2026 to 2045	BPA 2023 CPA Fast Transition 2026 to 2045
Residential	652	716	733
Commercial	466	454	471
Agricultural	5	5	5
Industrial	122	116	125
Utility System Efficiency	0	0	0
Total	**1,244**	**1,292**	**1,334**

Comparison of 20-Year Potential Discretionary Only

Sector	20-Year Cumulative Achievable Technical Potential - aMW		
	BPA 2021 CPA 2024 to 2043	BPA 2023 CPA Base Case 2026 to 2045	BPA 2023 CPA Fast Transition 2026 to 2045
Residential	503	413	422
Commercial	188	159	159
Agricultural	25	19	19
Industrial	166	141	156
Utility System Efficiency	80	73	76
Total	**963**	**804**	**833**

Key Findings

- Increased potential from RTF updates
- Decreased potential from BPA climate forecast

- Growth rate decreased new construction potential
- Motor-driven systems add potential from RTF updates

- Less irrigation potential
- SWEDE region comprises 25% of potential

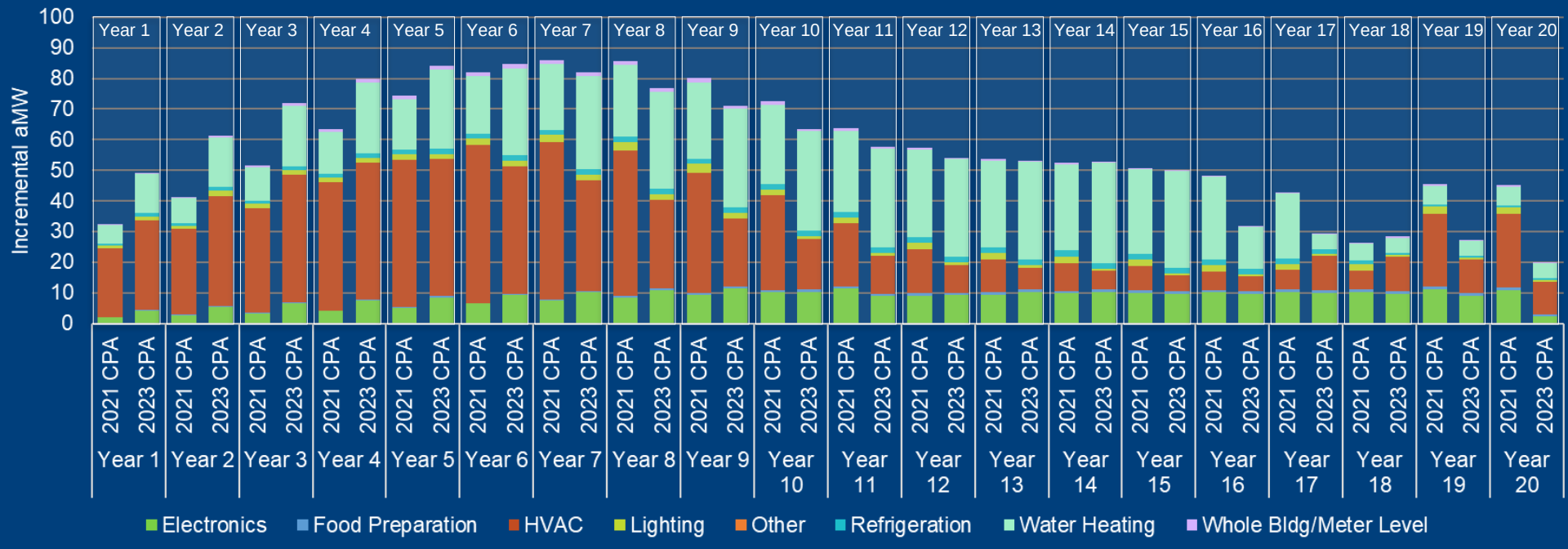
- Lower motor-driven systems potential from RTF updates

- 30% CVR market split with DVR
- Energy savings from DVR included

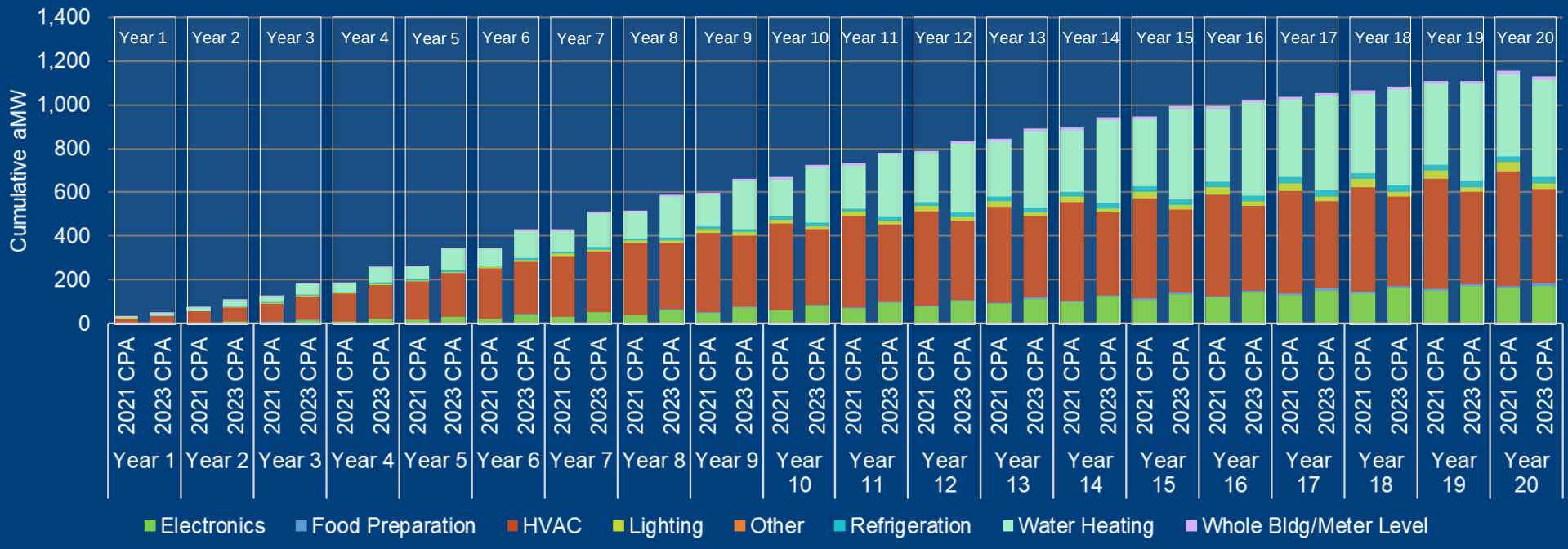
SECTOR-LEVEL CPA RESULTS

RESIDENTIAL SECTOR

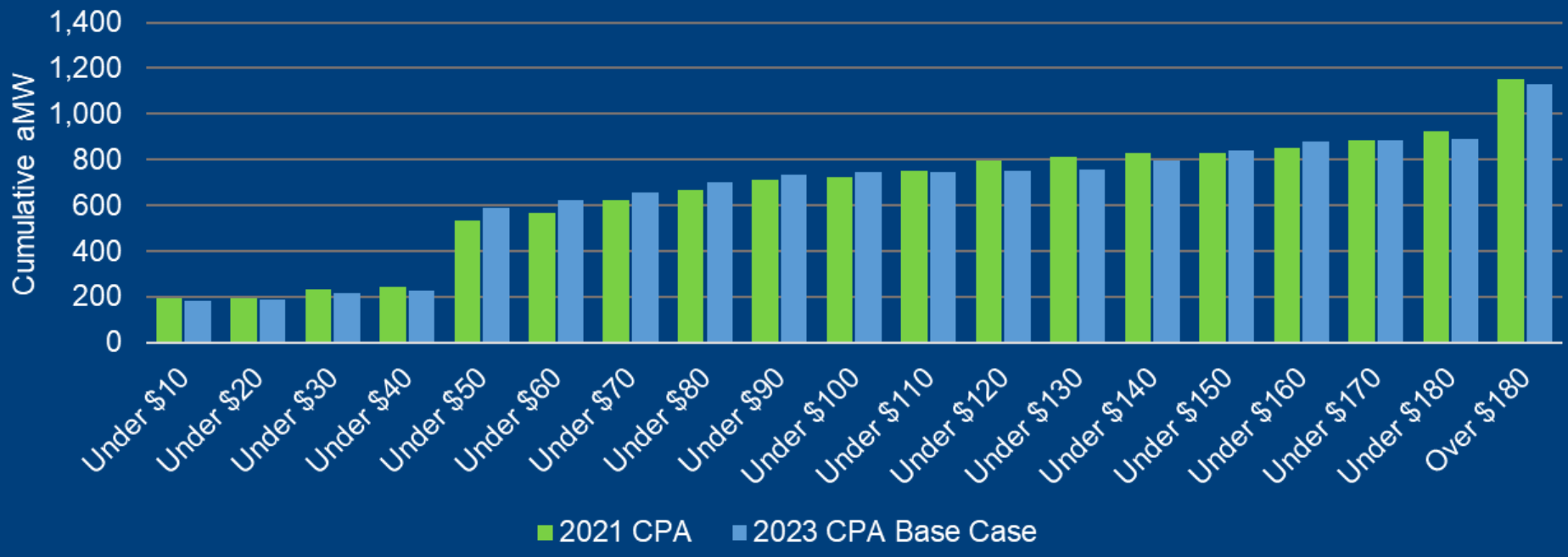
Residential Technical Achievable Incremental Potential by End Use Comparison



Residential Technical Achievable Cumulative Potential by End Use Comparison



Residential 20-Year Supply Curve Comparison



Residential Key Findings

Cost

HVAC equipment and weatherization measures are $$$

Potential

BPA climate forecasts decrease HVAC and weatherization potential

RTF updates mostly increased potential

Less lighting due to rising baselines and standards

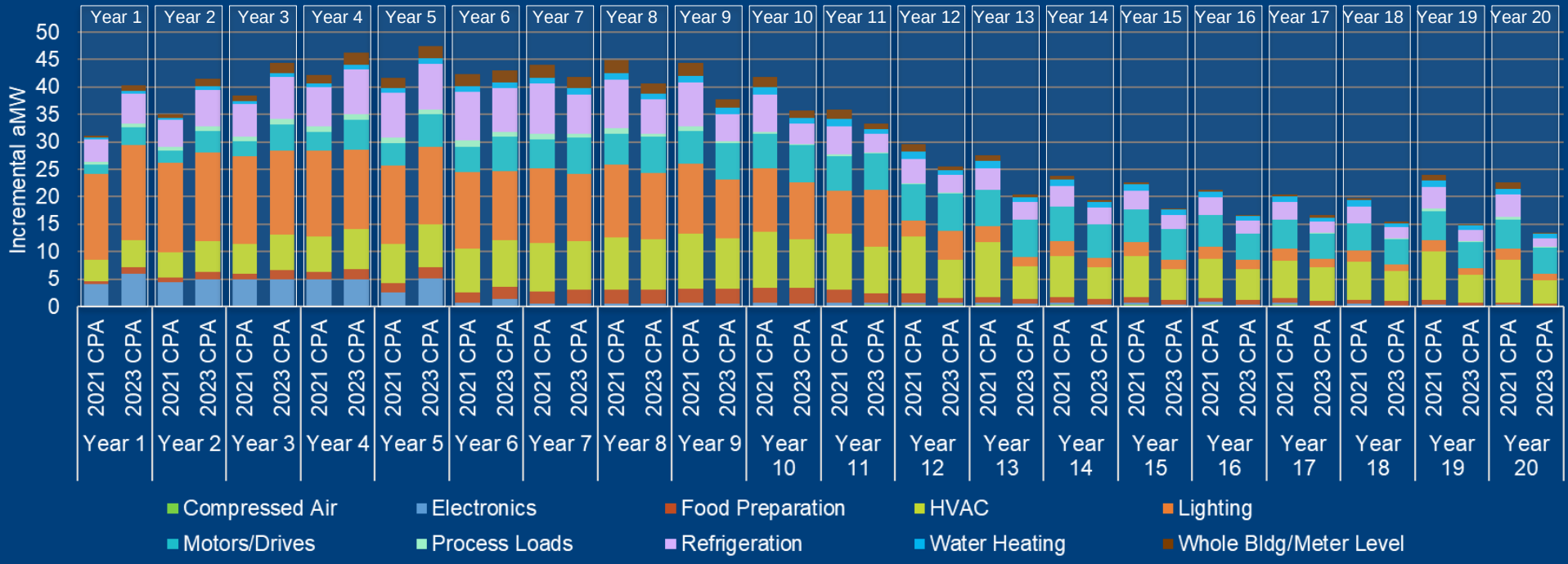
Pace

Less potential from high-volume measures

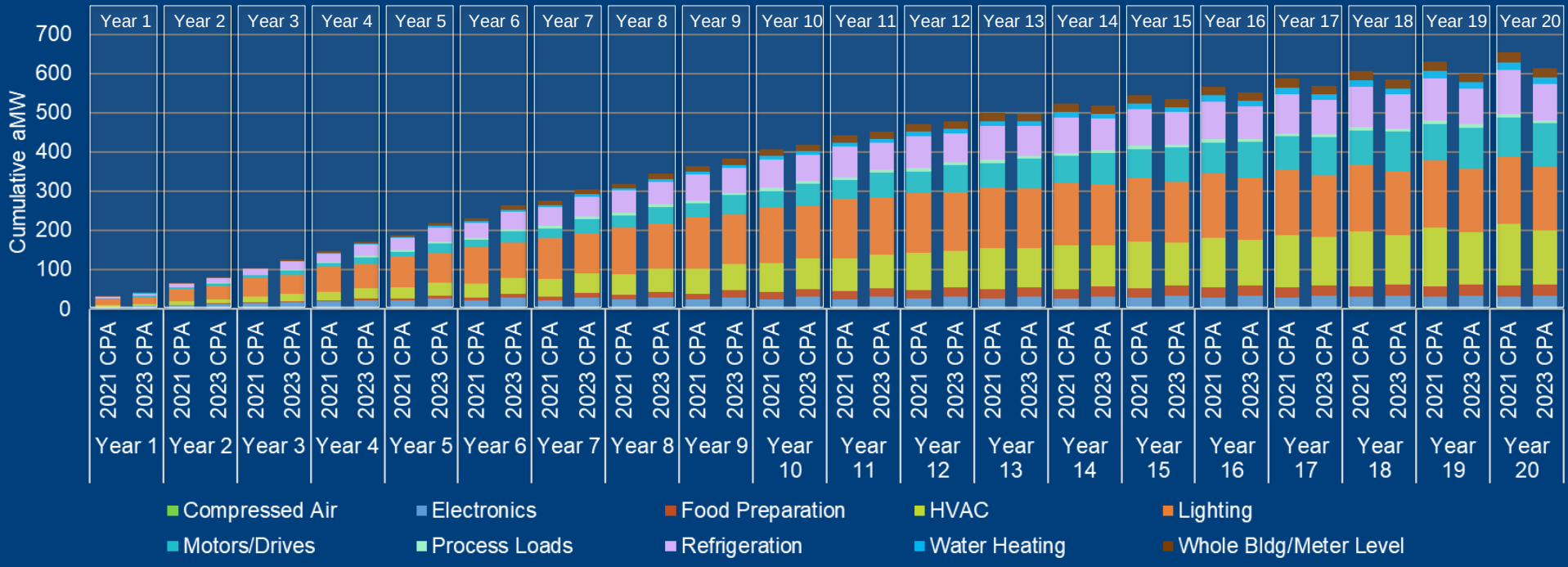
Discretionary measure potential decreased from 2-year ramp rate shift

COMMERCIAL SECTOR

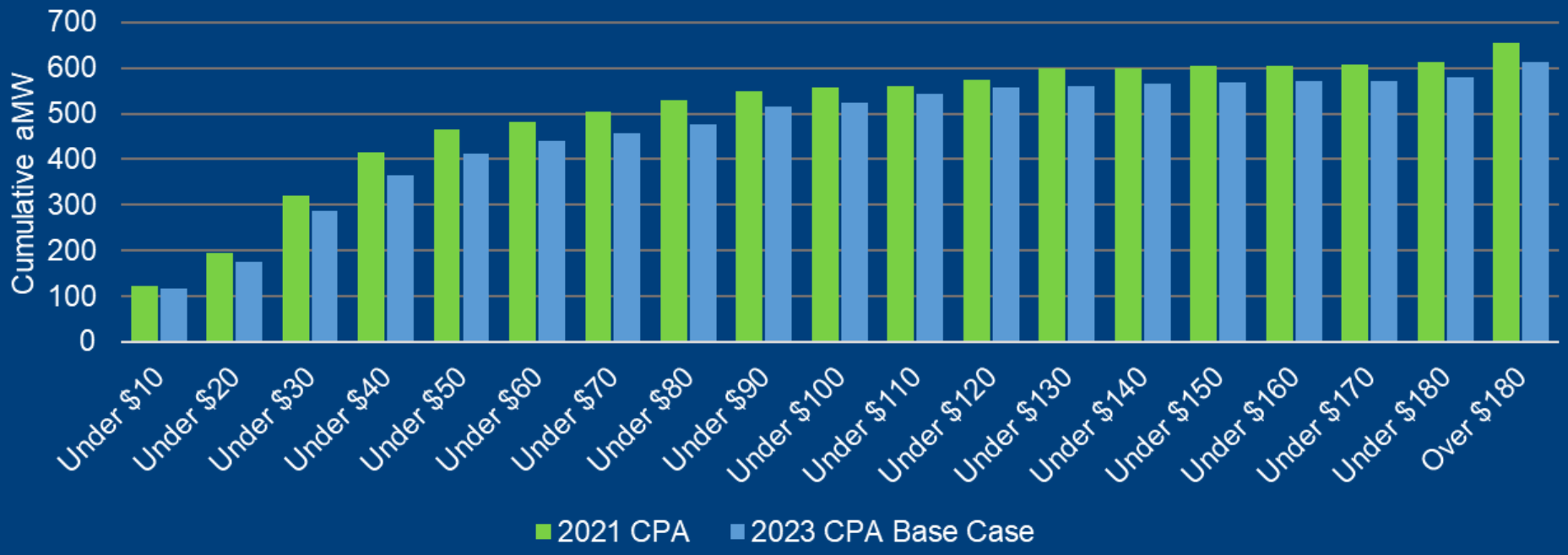
Commercial Technical Achievable Incremental Potential by End Use Comparison



Commercial Technical Achievable Cumulative Potential by End Use Comparison



Commercial 20-Year Supply Curve Comparison



Commercial Key Findings

Cost

Limited potential available under $20/MWh

Potential

Lighting still significant but less available due to rising baselines

New motor-driven system measures add significant potential

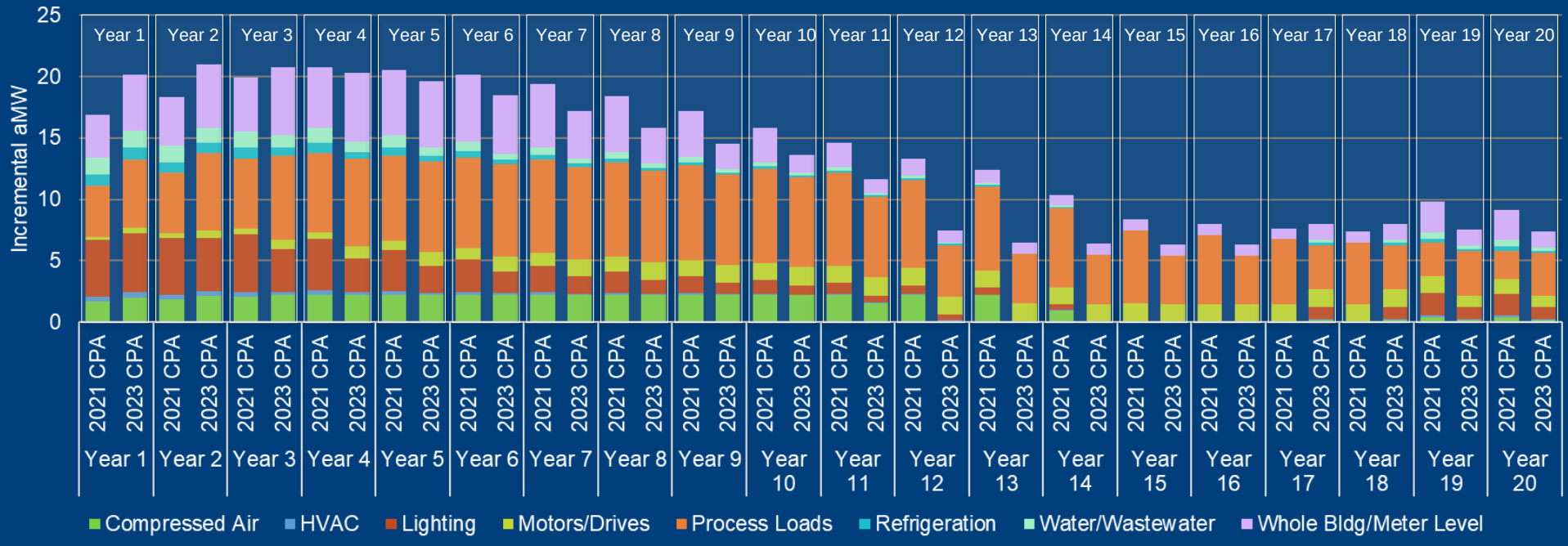
Lower growth rate decreased new construction potential

Pace

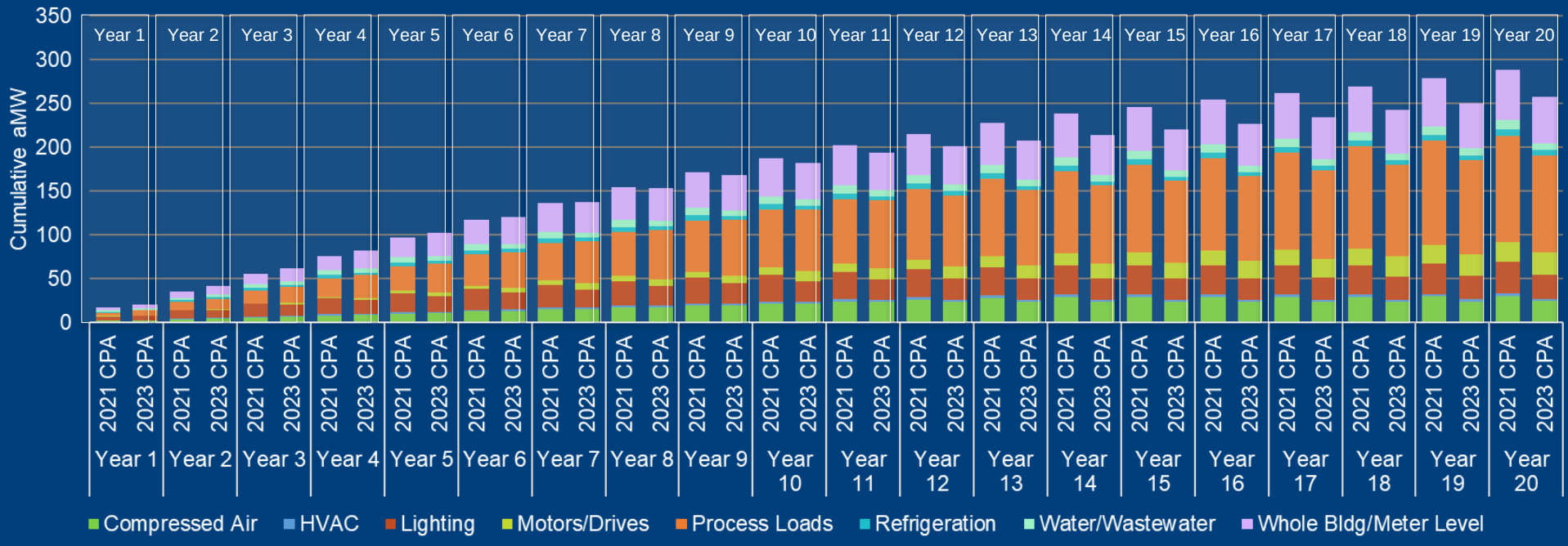
Discretionary measure potential decreased from 2-year ramp rate shift

INDUSTRIAL SECTOR

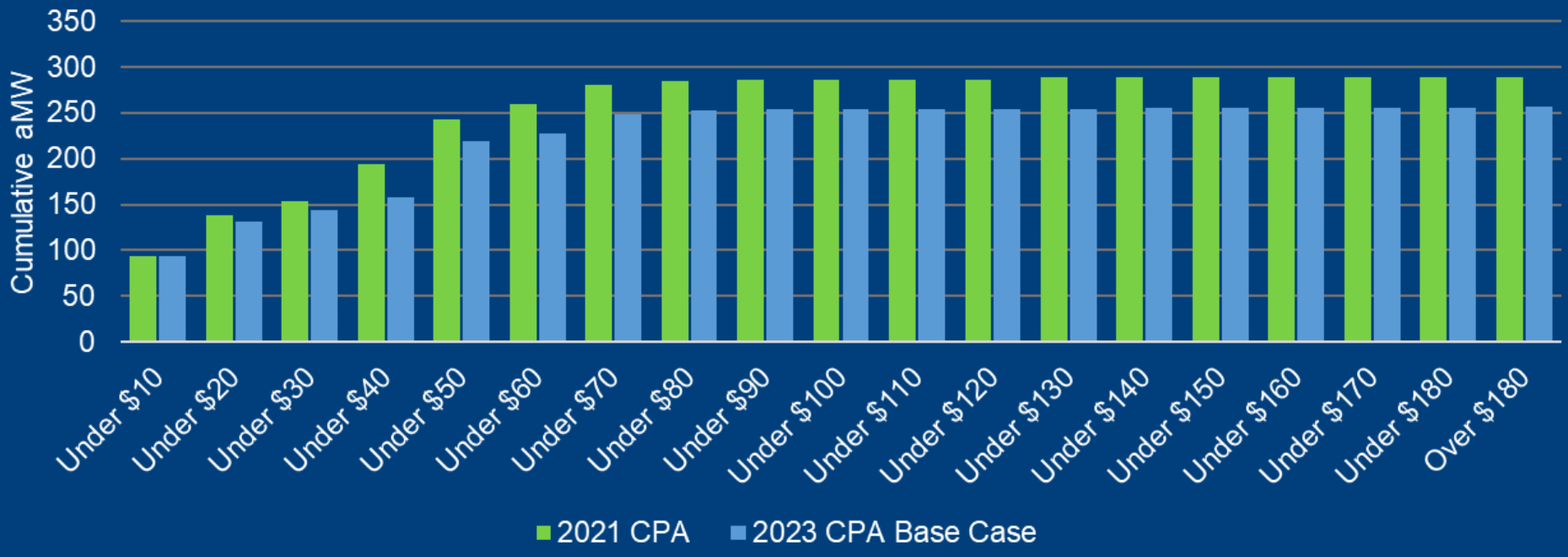
Industrial Technical Achievable Incremental Potential by End Use Comparison



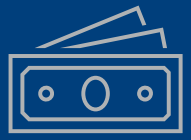
Industrial Technical Achievable Cumulative Potential by End Use Comparison



Industrial 20-Year Supply Curve Comparison



Industrial Key Findings



Cost

More than two-thirds of potential available under $40/MWh

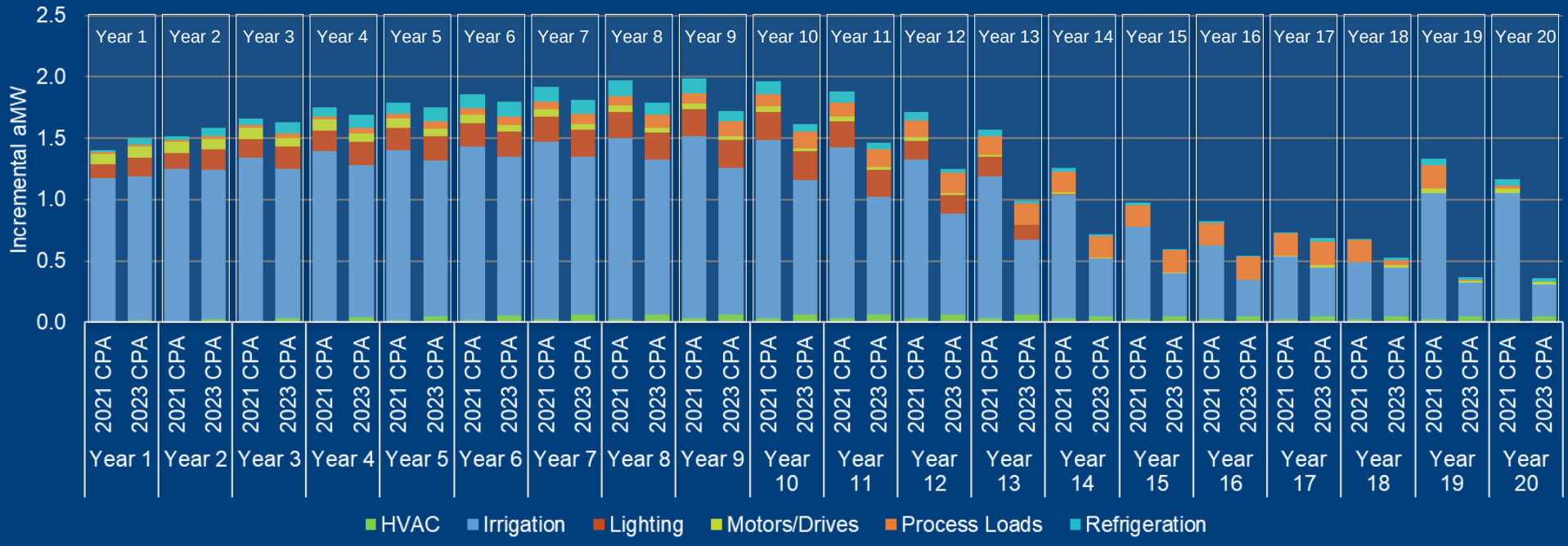
Potential

Updated RTF pump and fan savings increase potential

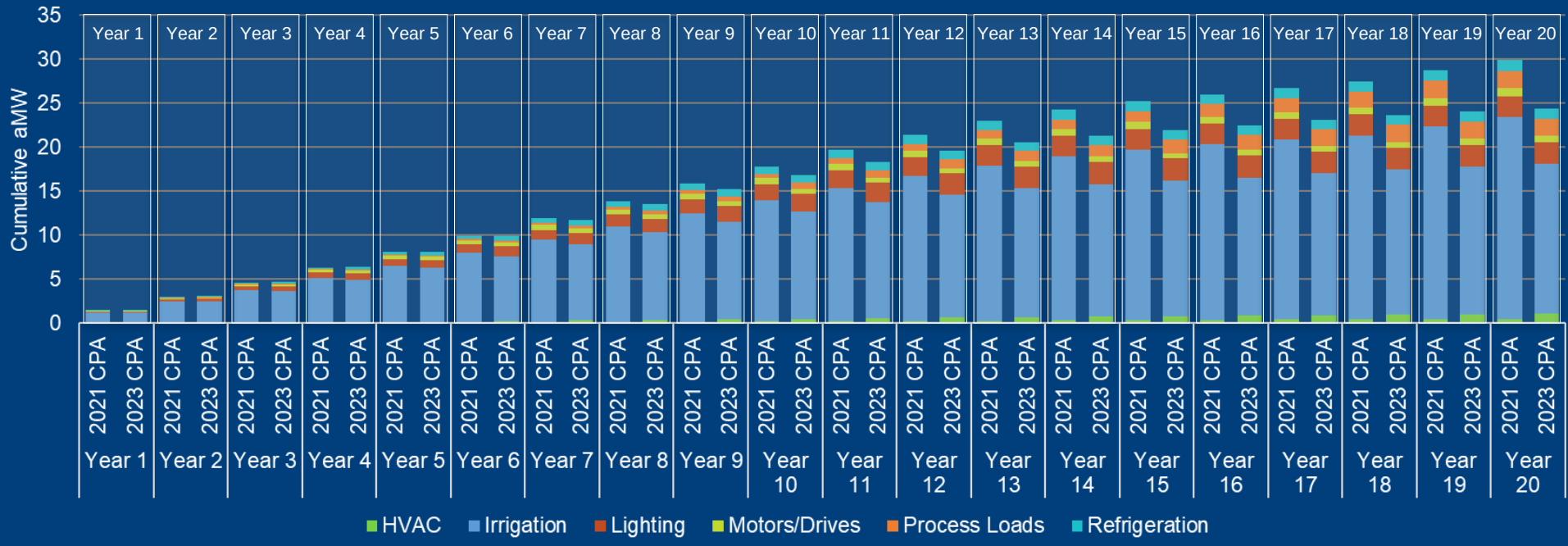
Updated growth rates and ramp rates impact amount and timing of potential

AGRICULTURAL SECTOR

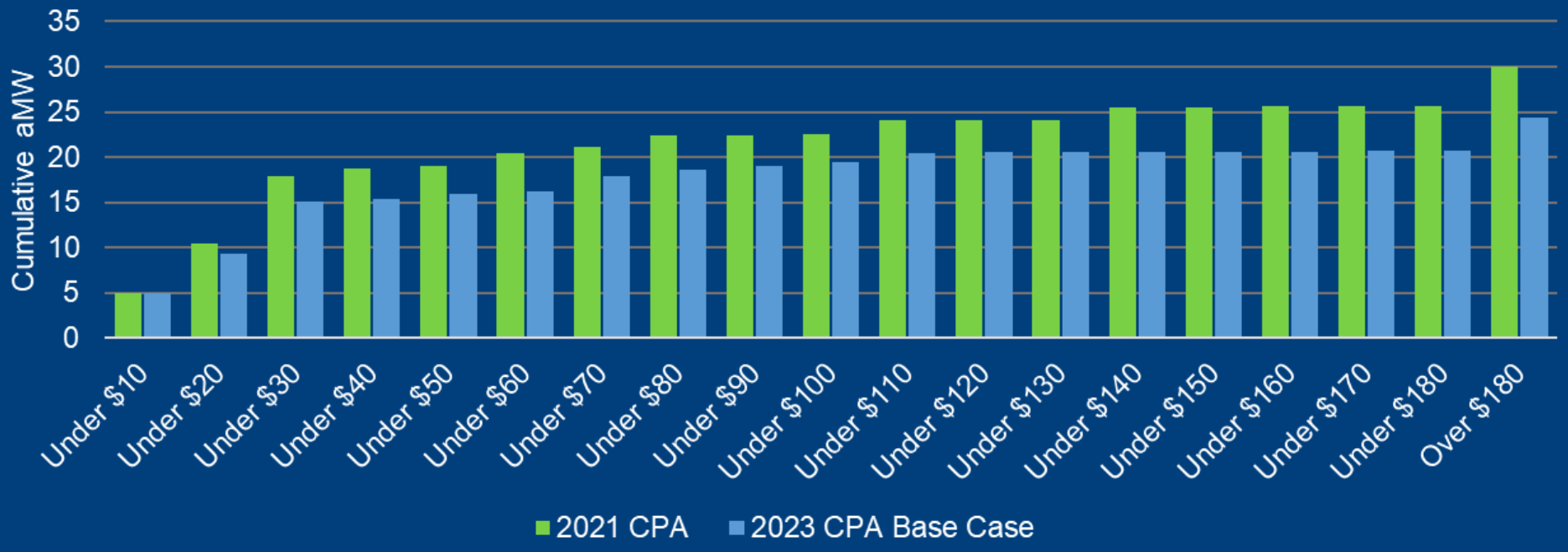
Agricultural Technical Achievable Incremental Potential by End Use Comparison



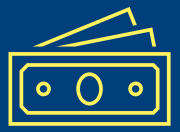
Agricultural Technical Achievable Cumulative Potential by End Use Comparison



Agricultural 20-Year Supply Curve Comparison



Agricultural Key Findings



Cost

Most of the potential available below $30/MWh

Potential

Irrigation is more than 75% of potential

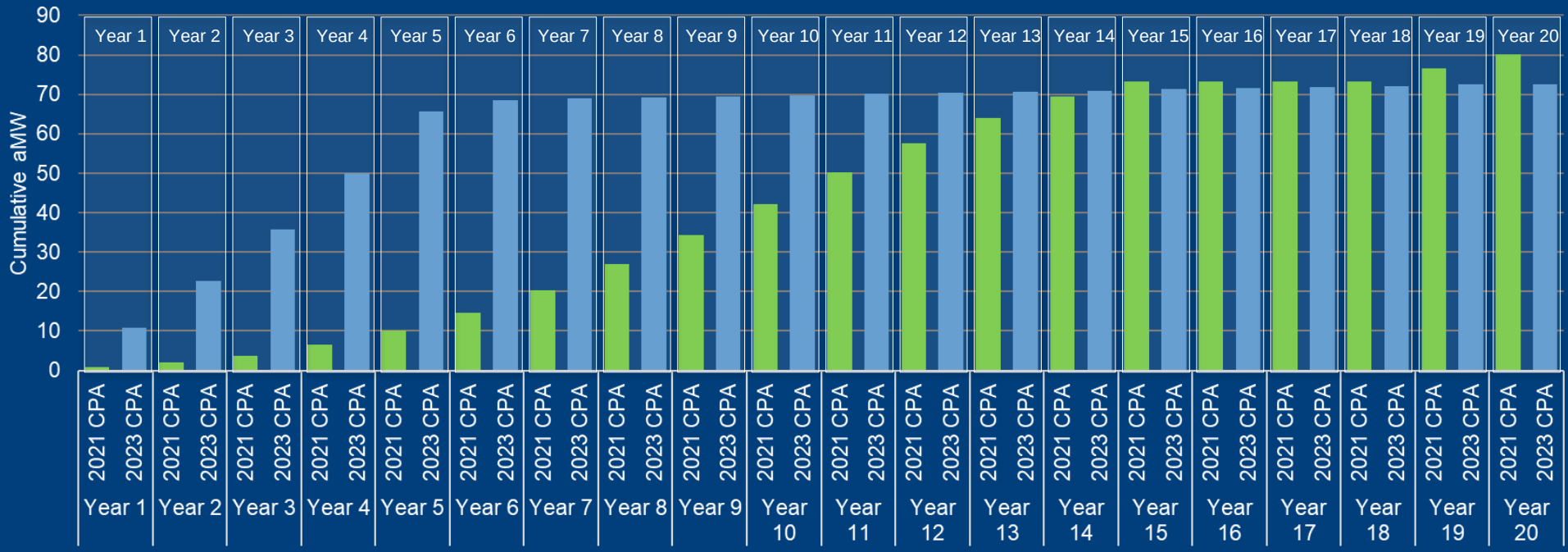
SWEDE region comprises 25% of agricultural potential

UTILITY SECTOR

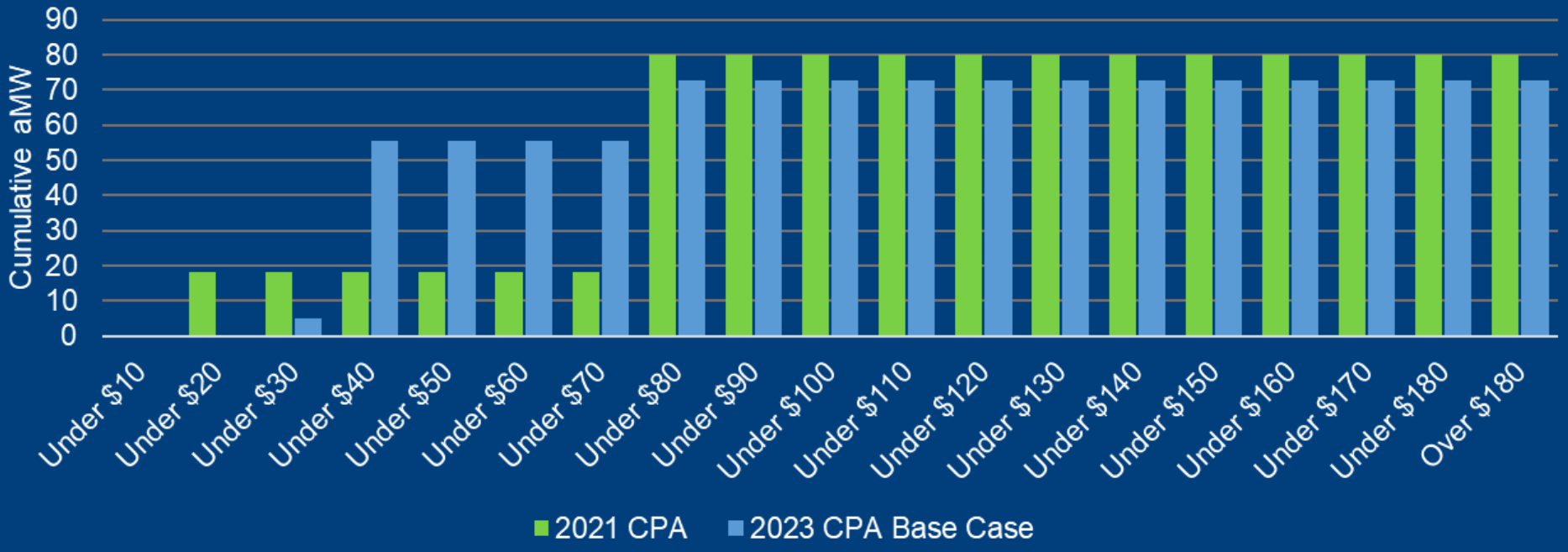
Utility Sector Technical Achievable Incremental Potential by End Use Comparison

Relative to the 2021 CPA, short term potential increases then declines after year 5 as DVR is introduced.

Utility Sector Technical Achievable Cumulative Potential by End Use Comparison



Utility Sector 20-Year Supply Curve Comparison



Utility Sector Key Findings

Cost

Low-cost potential split between on CVR measure and Daily DVR

Remaining potential is more than $70/MWh

Potential

Added market share split with DR product DVR

Increase in ramp rate and inclusion of DVR increases potential in the early years

Pace

Slow ramp rate assumed in 2021 and 2023 CPA

CONCLUSIONS

Conclusions

Higher potential from DVR and electrification, based on input assumptions.

Summer potential is higher due to air conditioning and irrigation loads.

Some products will realize less potential over time as certain EE measures are adopted.

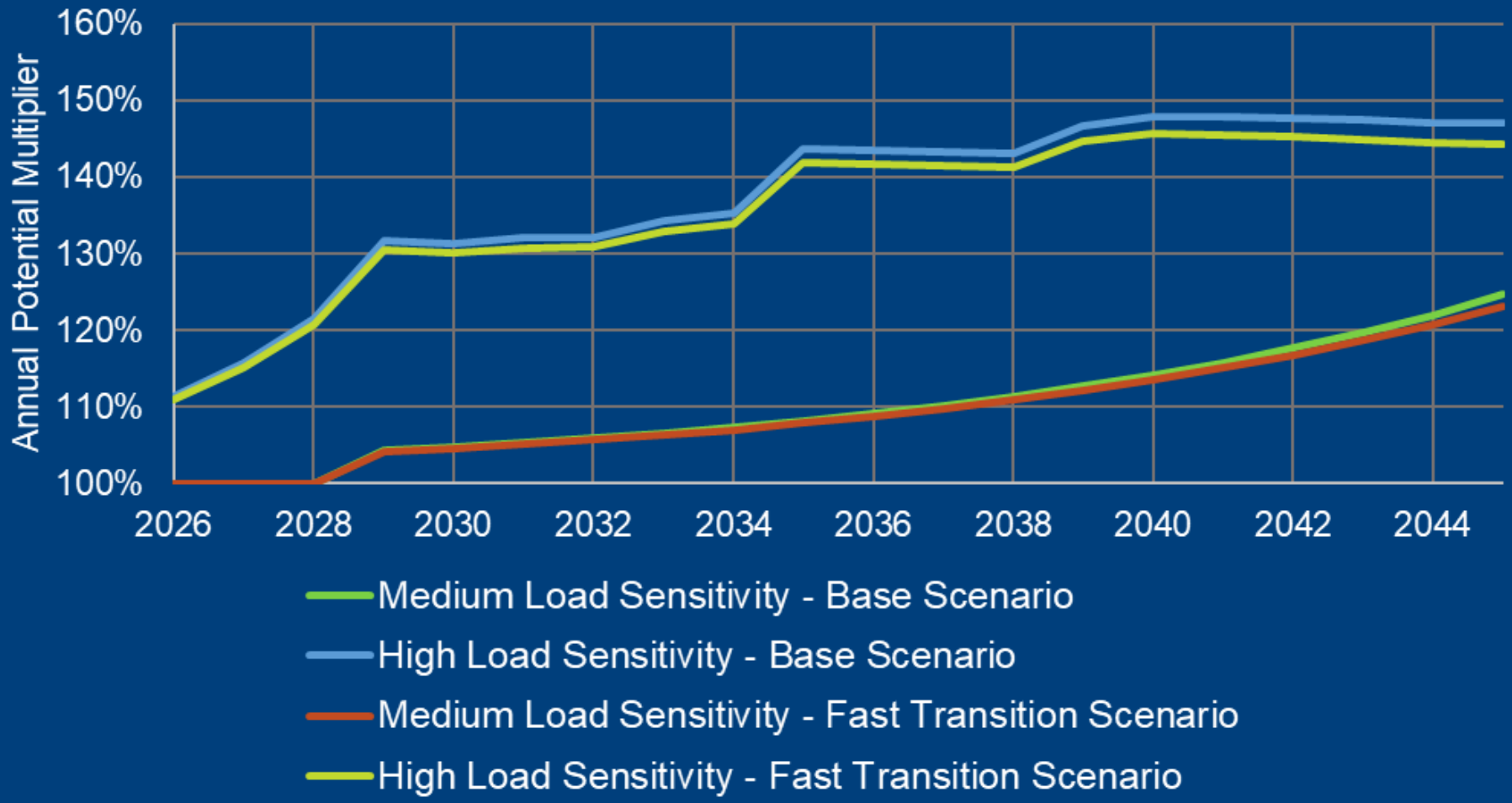
BPA's Resource Program will determine value of frequent use products based on new hourly inputs.

Load Sensitivity Analysis

Base Case Medium Load Adder	Fast Transition Medium Load Adder
Base Case High Load Adder	Fast Transition High Load Adder

Overall Goal: Allow BPA Resource Program team to determine impact to Resource Program results under different load scenarios.

Load Sensitivity – Annual Multiplying Factors



Six-Year CPA Results – Load Sensitivity

Sensitivity Scenario	Six-Year Cumulative Achievable Technical Potential - aMW	
	BPA 2023 CPA Base Case 2026 to 2031	BPA 2023 CPA Fast Transition 2026 to 2031
No Load Adder	893	917
Medium Load Adder	916	940
High Load Adder	1,117	1,138

20-Year CPA Results – Load Sensitivity

Sensitivity Scenario	20-Year Cumulative Achievable Technical Potential - aMW	
	BPA 2023 CPA Base Case 2026 to 2045	BPA 2023 CPA Fast Transition 2026 to 2045
No Load Adder	2,096	2,167
Medium Load Adder	2,257	2,327
High Load Adder	2,829	2,893

NEXT STEPS

Resource Program Modeling

Resource Program
Results in
Fall 2024

BPA-developed resources, including this presentation and the underlying data and workbooks will be made available.

QUESTIONS?

THANK YOU!

CONTACT INFO

Nolan Kelly, BPA
nbkelly@bpa.gov

Aquila Velonis, Cadmus
aquila.velonis@cadmusgroup.com

Andrew Grant, Cadmus
andrew.grant@cadmusgroup.com

Ted Light, Lighthouse
ted@lighthouseenergynw.com

Alex West, Cadmus
alexander.west@cadmusgroup.com