

DEMAND RESPONSE POTENTIAL ASSESSMENT RESULTS

WORK COMPLETED IN SUMMER OF 2024



Agenda

Project Overview

Demand Response Potential Assessment (DRPA) Results

Next Steps

Questions



PROJECT OVERVIEW

Project Background

Since 2018, BPA assesses demand response 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.

Demand Response (DR) is selected based on BPA's need, availability, and cost.

DRPAs develop estimates of EE and DR resources for Resource Program.

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

2024 Resource Program Update

2022 Resource Program

2024-2043
(2021 DRPA)

2024 Resource Program

2026-2045
(2023 DRPA)

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

Types of Potential



DRPA Project Goals

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

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

Importance of DR

NW Power Council

- DR selected to offset regional system needs during peaking and ramping periods.
- 520 MW of DVR, 200 MW of residential Time of Use selected to be acquired across the region by 2027.

BPA

- Since 1985, collaborated on regional pilots and demonstrations.
- Readied organization for commercial roll-out.
- BPA would rely on customer involvement in DR.

Methodology Overview

Resource
Program Timeline

Updated Stock
Data

Updated BPA
Load Forecasts

Ramp Rates

Interaction with
Energy Efficiency

Frequent Use
Products

Geographic Split

Overall Goal: Update 2021 supply curves to align with BPA's Resource Program, while updating impacts of frequent use products.

DR Products

Product Category	Product	Summer	Winter
Direct Load Control (DLC)	Residential DLC - Electric Vehicle Service Equipment	✓	✓
	Residential DLC - Electric Resistance Water Heater (ERWH) Switch	✓	✓
	Residential DLC - ERWH Grid-Enabled	✓	✓
	Residential DLC - Heat Pump Water Heater (HPWH) Switch	✓	✓
	Residential DLC - HPWH Grid-Enabled	✓	✓
	Residential DLC - BYOT	✓	✓
	Residential DLC – HVAC Switch	✓	✓
	Commercial DLC – Medium HVAC Switch	✓	✓
	Commercial DLC - Small HVAC Switch	✓	✓
	Agricultural DLC - Irrigation District DR	✓	
	Agricultural DLC - Irrigation Central Control DR	✓	
	Agricultural DLC - Irrigation Standard DR	✓	
Demand Curtailment	Industrial Demand Curtailment	✓	✓
	Commercial Demand Curtailment	✓	✓
DVR	Utility DVR	✓	✓
Rate-Driven Demand Response via Time-Varying Prices	Residential Rate-Driven DR - TOU	✓	✓
	Residential Rate-Driven DR - CPP	✓	✓
	Commercial Rate-Driven DR - CPP	✓	✓
	Industrial Rate-Driven DR - CPP	✓	✓

How to Understand DR Potential



Capacity (MW) reduction for a DR event in given year, averaged across hours and events



Differentiated by season



Participation and results are cumulative across years



Include interaction with energy efficiency adoption



Results are additive across products



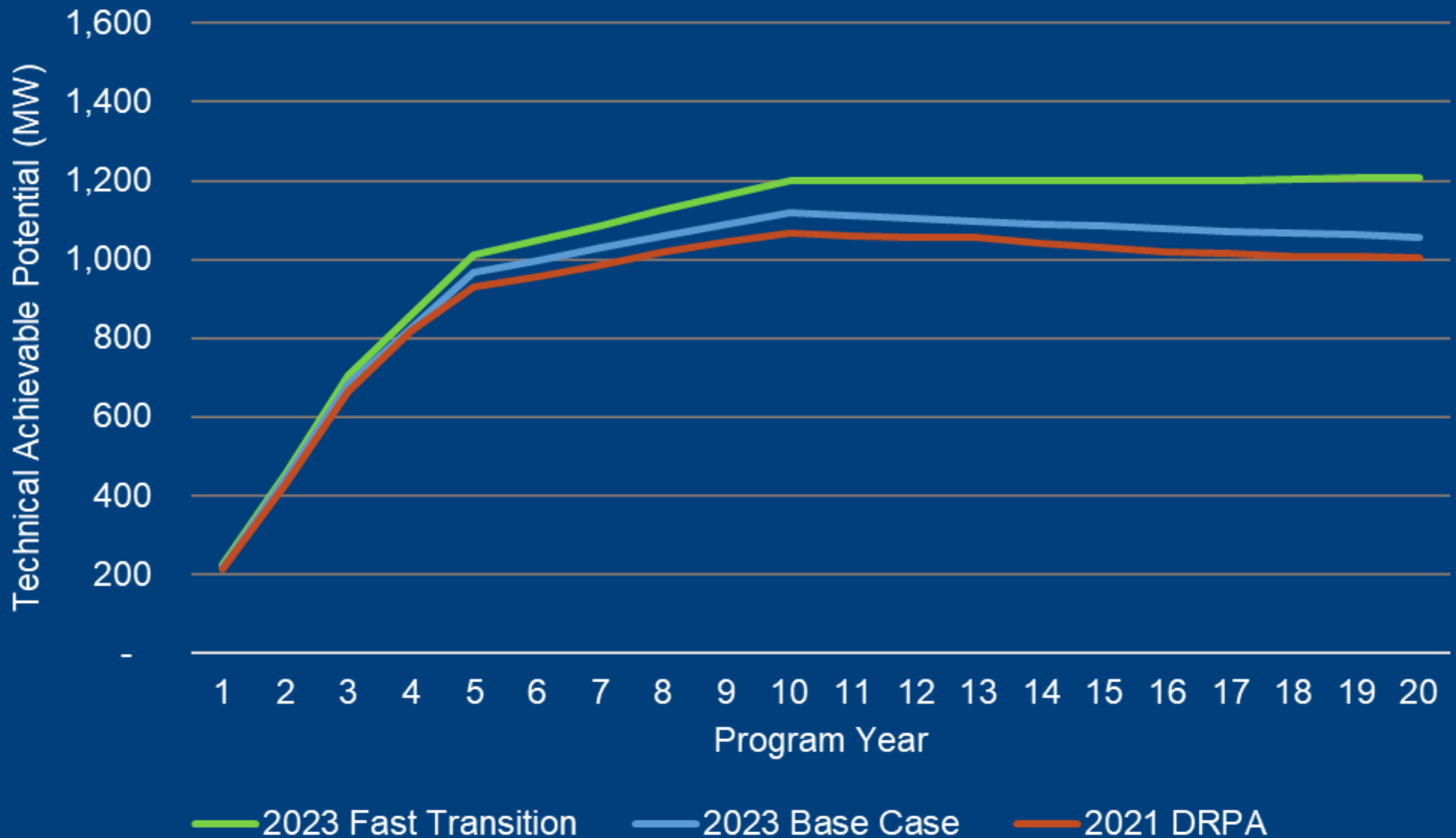
OVERALL RESULTS

2023 DRPA Results Summary

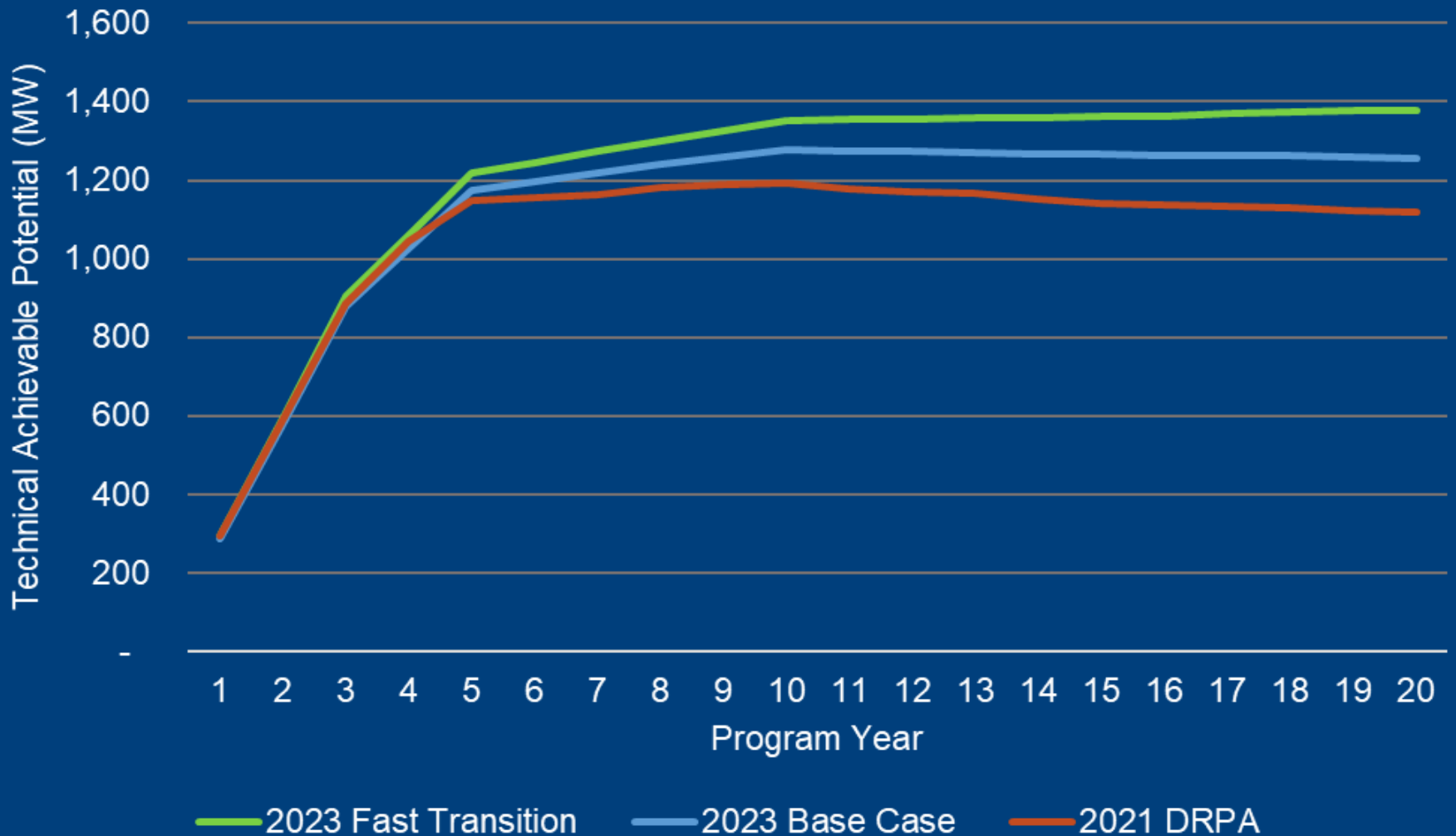
	Cumulative Winter Achievable Technical Potential (MW)		
	5-Year	10-Year	20-Year
2021 DRPA	929	1,066	1,005
2023 Base Case	967	1,117	1,056
2023 Fast Transition	1,011	1,200	1,206

	Cumulative Summer Achievable Technical Potential (MW)		
	5-Year	10-Year	20-Year
2021 DRPA	1,150	1,193	1,117
2023 Base Case	1,176	1,278	1,256
2023 Fast Transition	1,218	1,351	1,379

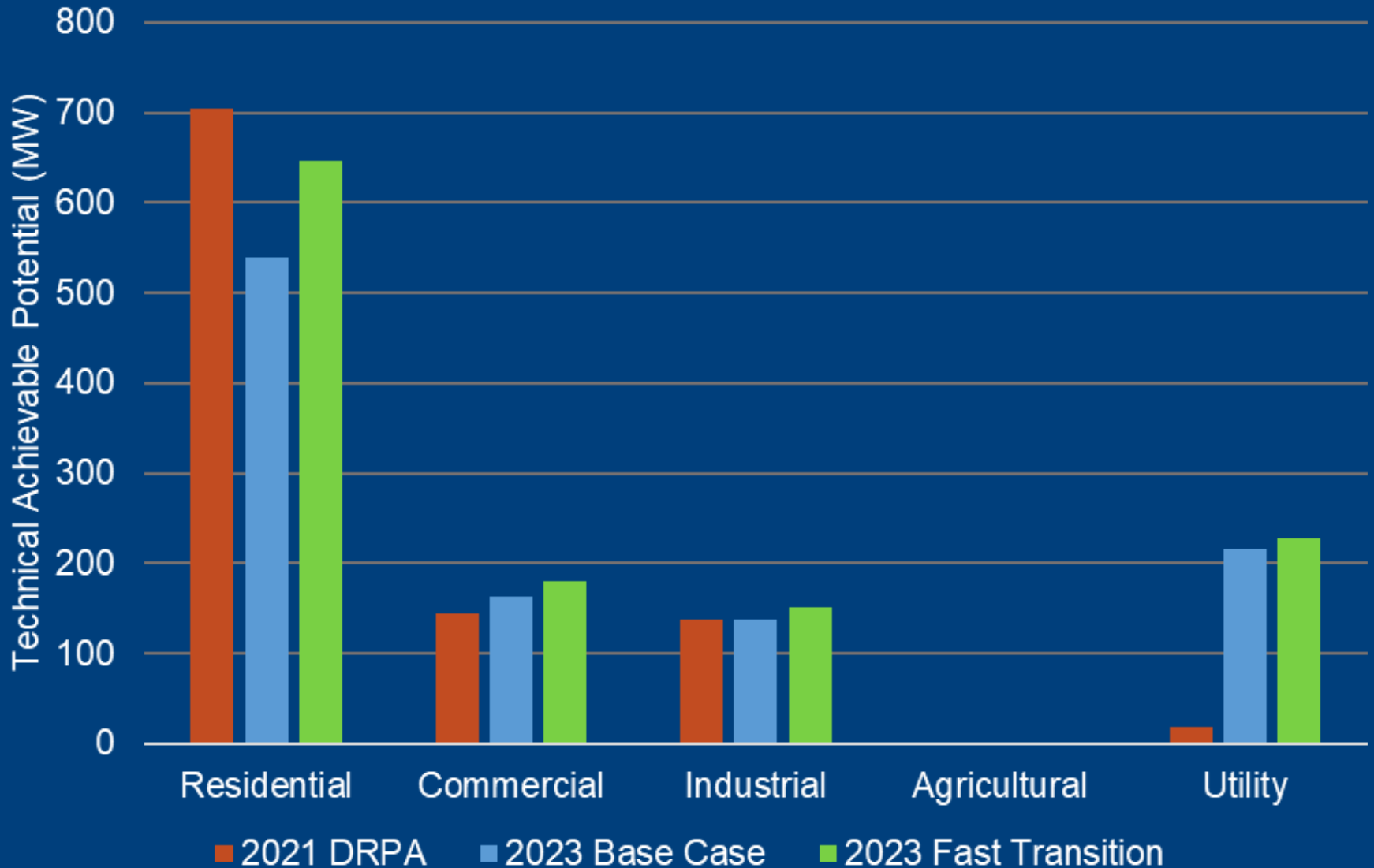
Annual Winter Potential Summary



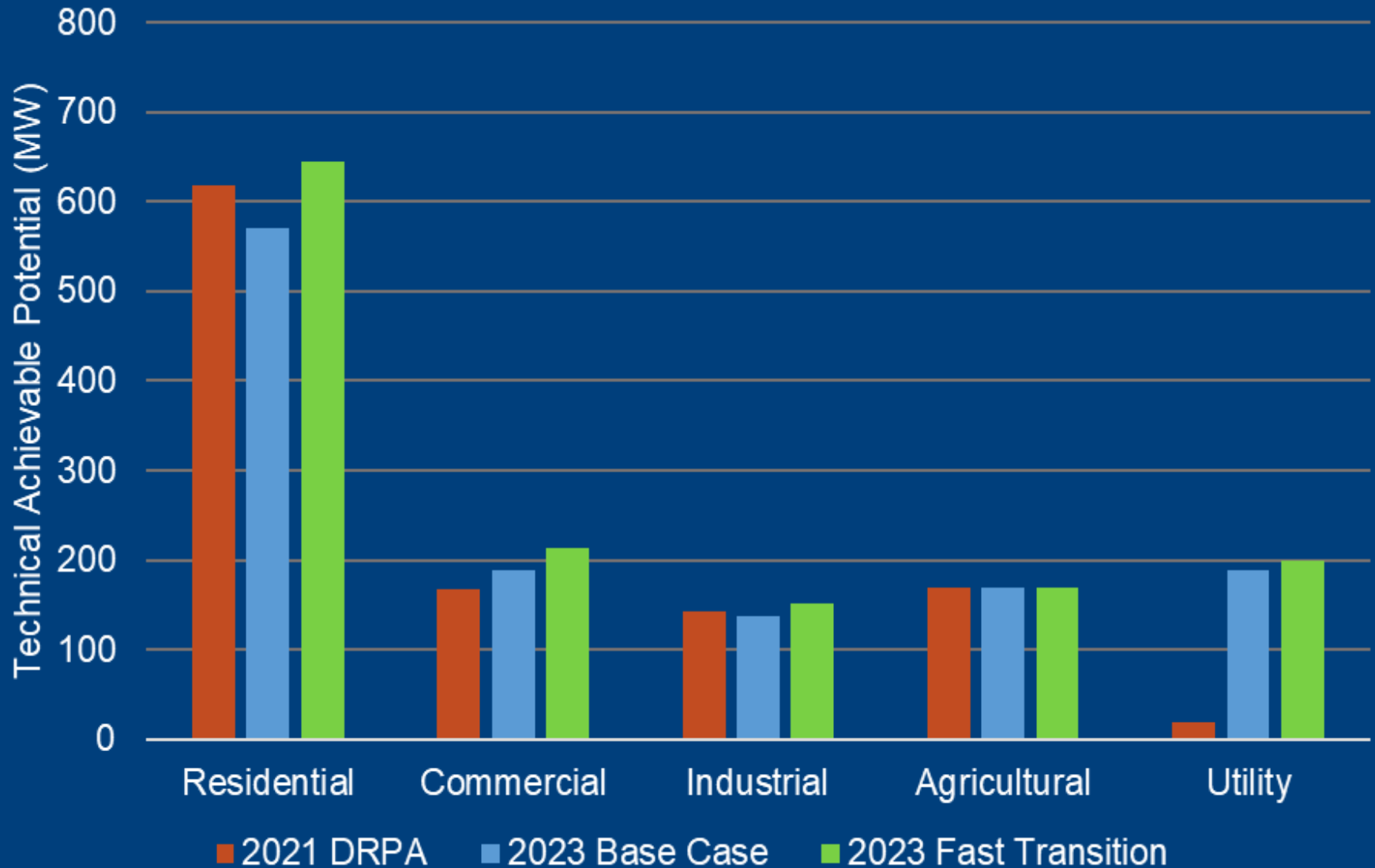
Annual Summer Potential Summary



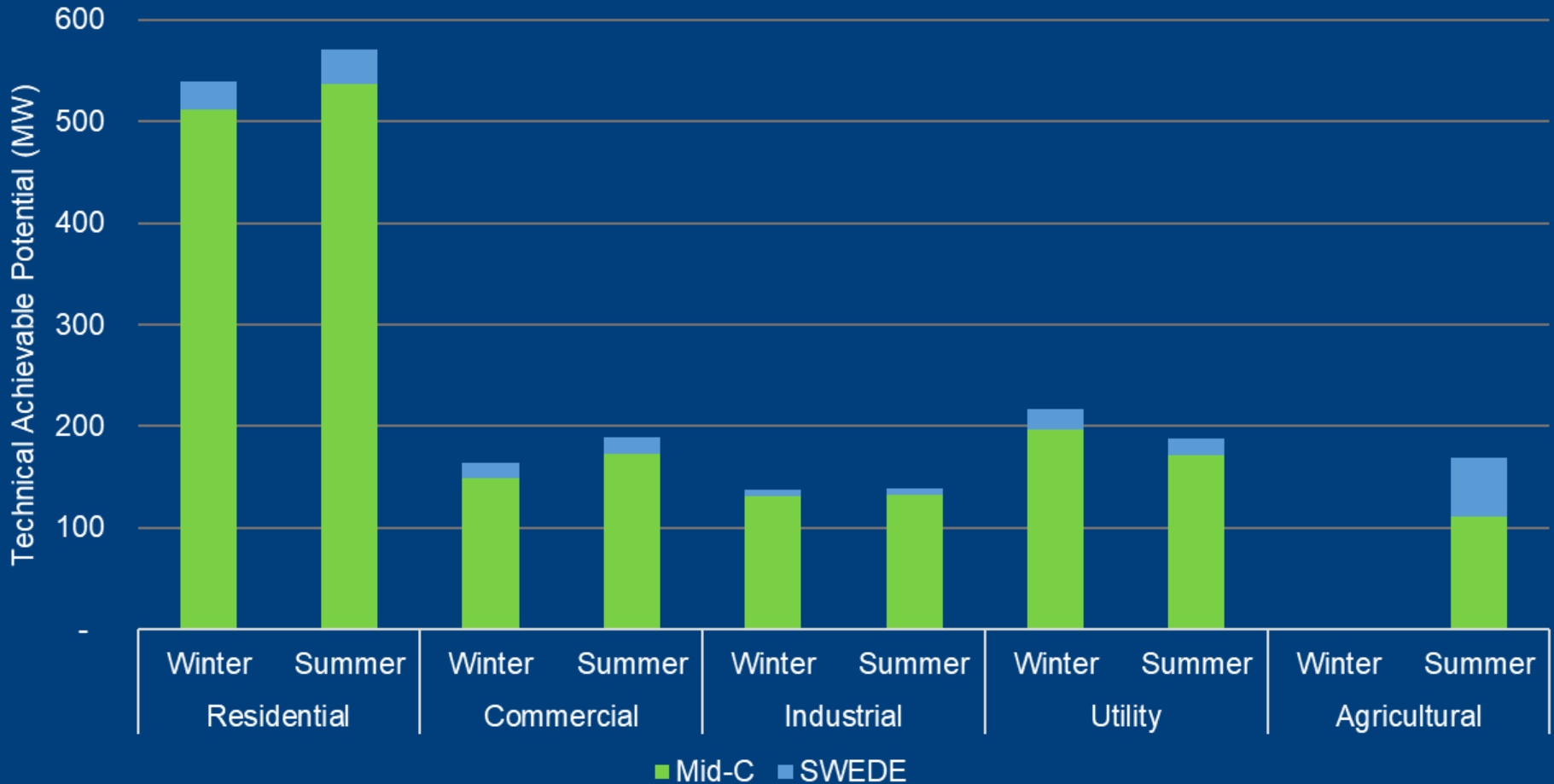
Winter Achievable Potential by Sector



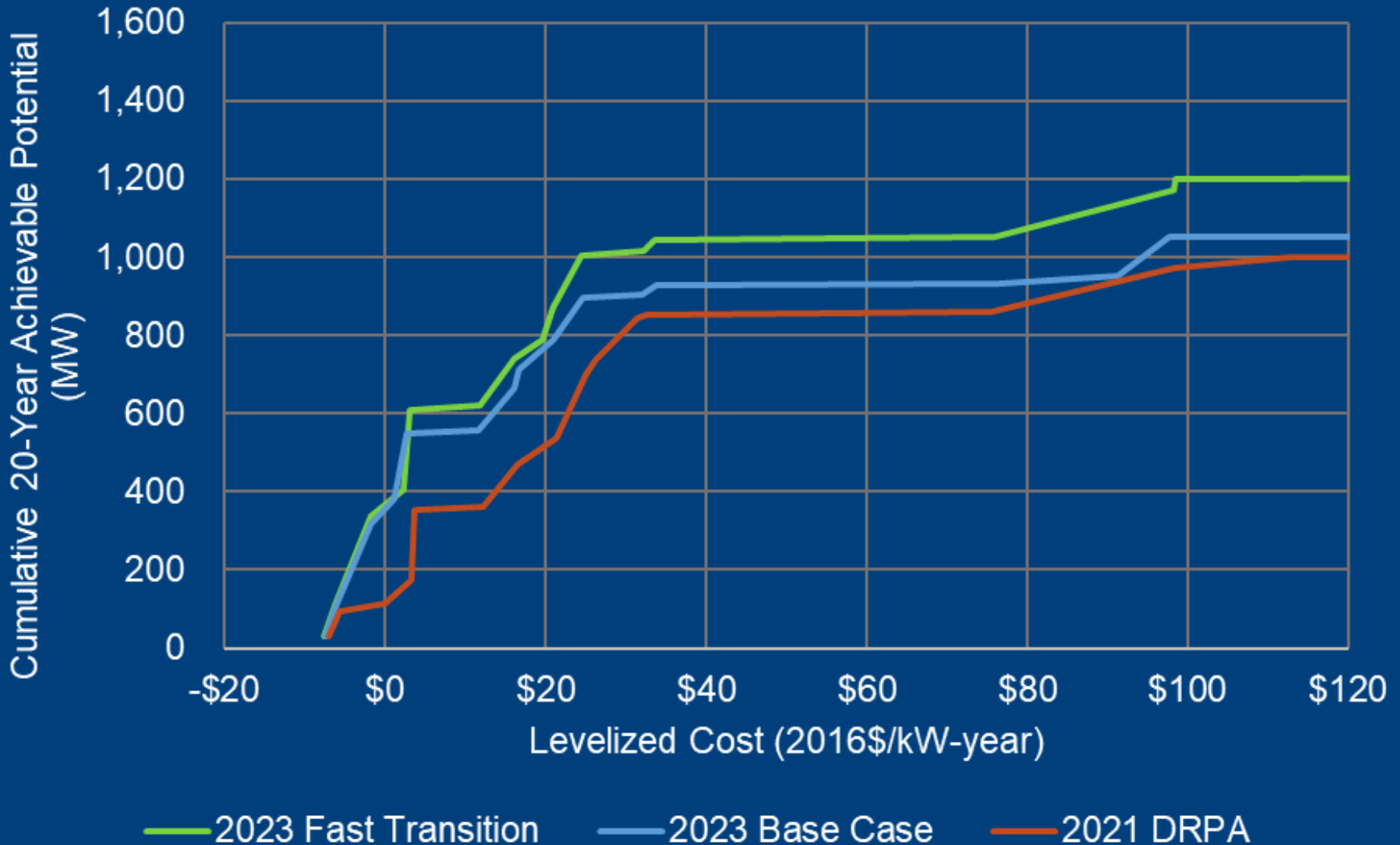
Summer Achievable Potential by Sector



Achievable Potential by Sector, Season, & Geography



Winter Supply Curve



Summer Supply Curve



Frequent Use Products

Demand Response Product	Winter Event Timing	Summer Event Timing	Energy Shifts
DVR	5 a.m. to 10 a.m. 4 p.m. to 10 p.m. July to April		None
Time-of-Use Rates	7 a.m. to 10 a.m. 5 p.m. to 8 p.m. Weekdays	5 p.m. to 8 p.m. Weekdays	Throughout the day based on typical residential load shape
Electric Vehicle (EV) Supply Equipment	4 p.m. to 8 p.m. Daily	4 p.m. to 8 p.m. Daily	Throughout the day based on typical EV charging load shape
Electric Resistance Water Heater Switch (ERWH-Switch)	6 a.m. to 9 a.m. 5 p.m. to 9 p.m.	4 p.m. to 8 p.m.	Over the hour following events
Heat Pump Water Heater Switch (HPWH-Switch)	6 a.m. to 9 a.m. 5 p.m. to 9 p.m.	4 p.m. to 8 p.m.	Over the two hours following events
Grid-Enabled Electric Resistance Water Heater (ERWH-Grid)	6 a.m. to 9 a.m. 5 p.m. to 9 p.m.	5 p.m. to 9 p.m.	Over the hour before and after events
Grid-Enabled Heat Pump Water Heater (HPWH-Grid)	6 a.m. to 9 a.m. 5 p.m. to 9 p.m.	5 p.m. to 9 p.m.	Over the two hours before and after events





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

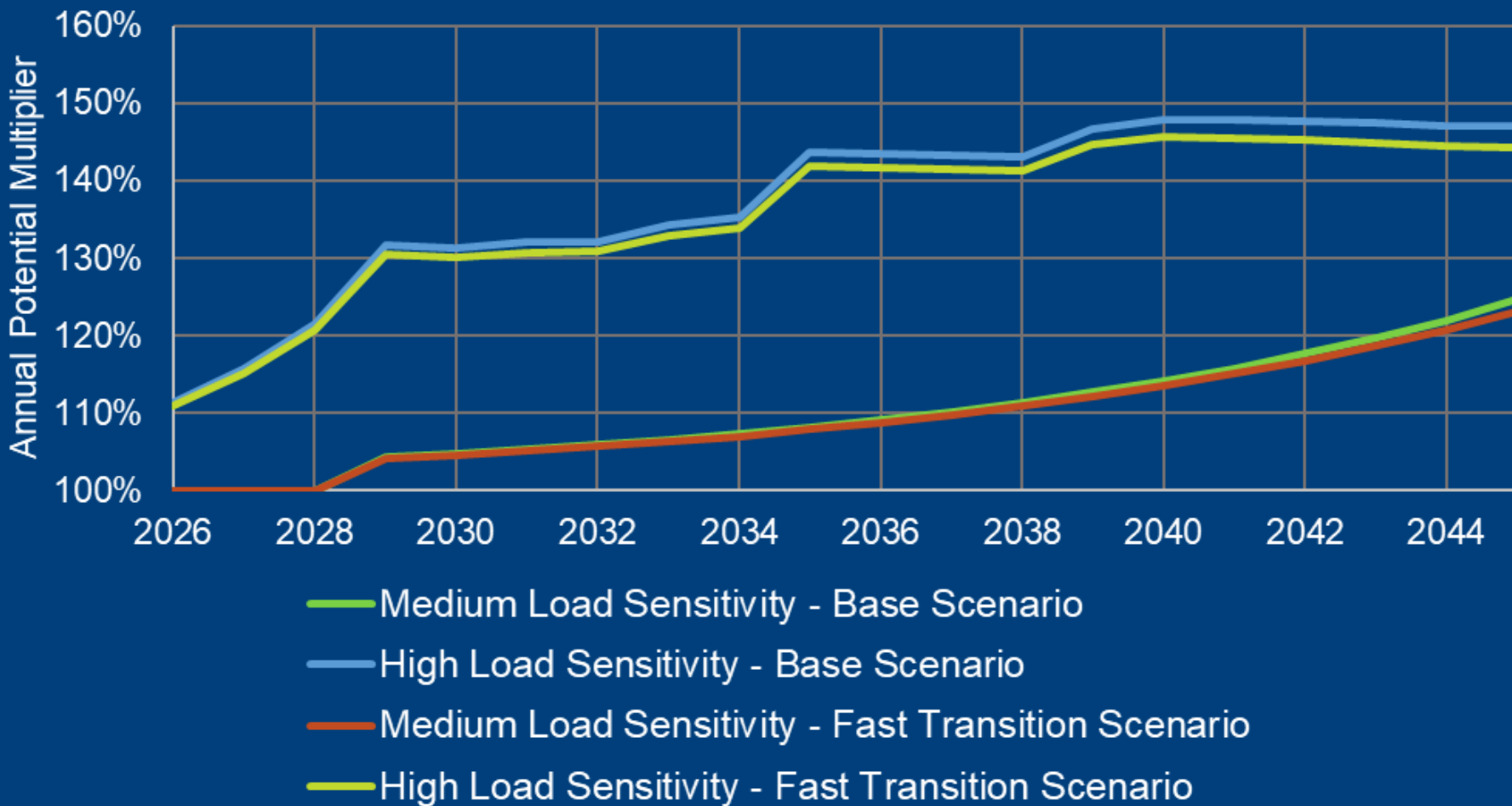
Fast Transition
Medium Load Adder

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 DRPA Results – Load Sensitivity

Sensitivity Scenario	Six-Year Cumulative Achievable Technical Potential - aMW	
	BPA 2023 DRPA Base Case 2026 to 2031	BPA 2023 DRPA Fast Transition 2026 to 2031
No Load Adder	2,195	2,293
Medium Load Adder	2,311	2,410
High Load Adder	2,899	3,000

20-Year DRPA Results – Load Sensitivity

Sensitivity Scenario	20-Year Cumulative Achievable Technical Potential - aMW	
	BPA 2023 DRPA Base Case 2026 to 2045	BPA 2023 DRPA Fast Transition 2026 to 2045
No Load Adder	2,312	2,586
Medium Load Adder	2,884	3,188
High Load Adder	3,404	3,735



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@lighthouseenergy.com

Alex West, Cadmus
alexander.west@cadmusgroup.com