

2021 POWER PLAN ENERGY EFFICIENCY SUPPLY CURVE REVIEW

PREPARED FOR BPA
AUGUST 2020



CADMUS



Agenda

Project Overview

Draft 2021 Plan Results

Next Steps & Resources

Questions



PROJECT OVERVIEW

Project Overview

BPA ENGAGEMENT

Supply curve technical review

Provide input through advisory committees and other meetings

Begin planning for targets

Provide comments from BPA's perspective

POWER COUNCIL PROCESS

Supply Curve Development

Modeling & Scenarios*

Draft Plan

Public Comment

Final Plan

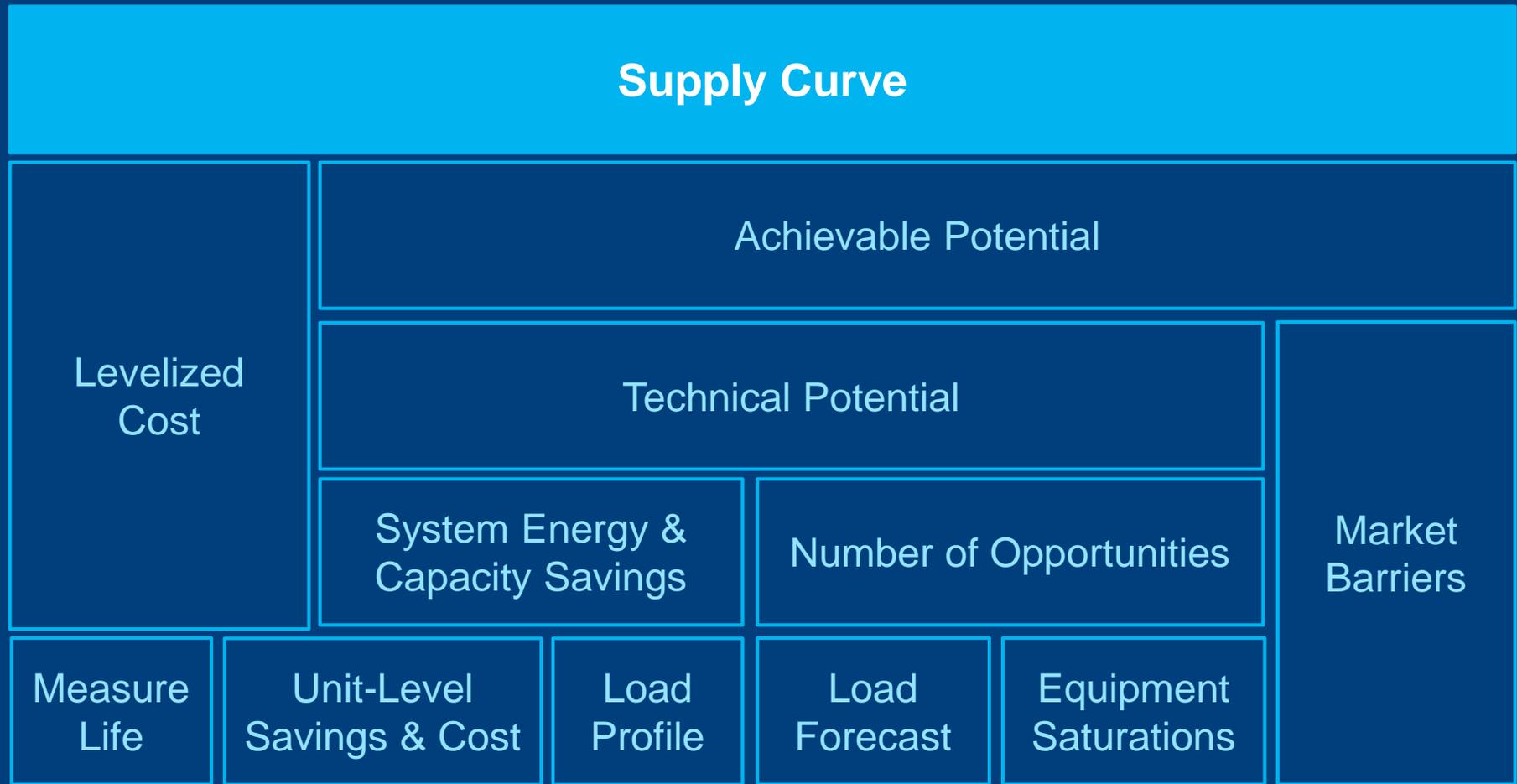
BPA PROCESS

CPA & DRPA

Resource Program

BPA EE Action Plan

What's in a supply curve file?



Types of Potential

Determined in Supply Curves	Not Technically Feasible	Technical Potential		
	Not Technically Feasible	Market Barriers	Achievable Technical Potential	
Council's RPM Model	Not Technically Feasible	Market Barriers	Not Cost- Effective	Achievable Economic Potential

BPA vs. Regional Scenario

The 2021 Power Plan will include several scenarios:



BPA's target will be set from the BPA scenario and other regional modelling. This presentation focuses on the potential quantified for regional scenario analyses.

New to the 2021 Plan



Climate change weather modelling



Increased adoption of air conditioning



New state-level efficiency standards



Shipment-based methods for quantifying potential

Disclaimer

This presentation is BPA's interpretation of the Council's work.

We used the DRAFT supply curve files published on Council's website as of June 12, 2020. We have done our own summaries and analysis of the data.

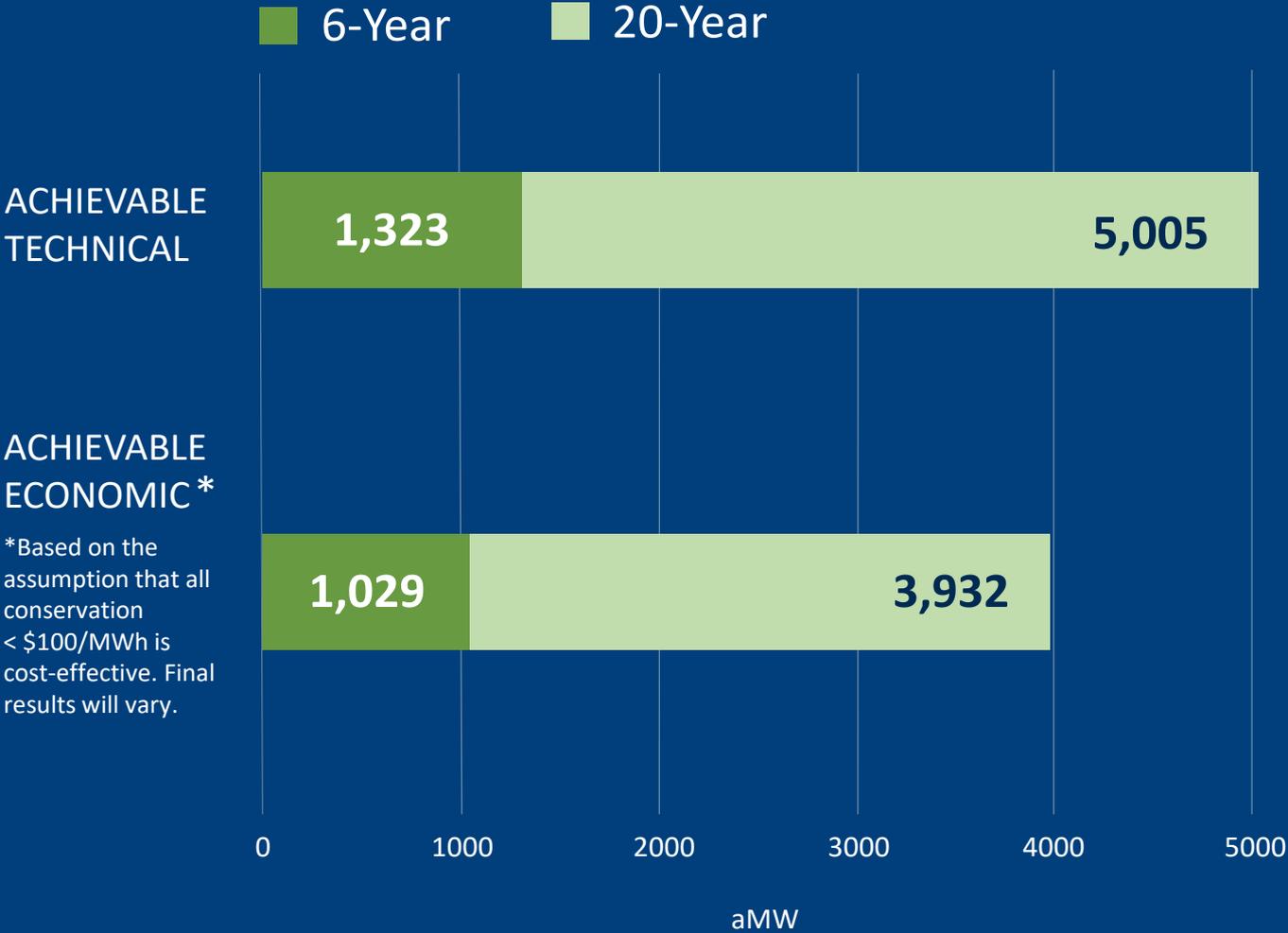
Council staff have shared many presentations on results at both the advisory committee and the full Council meetings – they can be found at the Council's website: <https://www.nwcouncil.org/2021-northwest-power-plan>.

The economic screen presented in these slides is provided for informational purposes only and is not intended to suggest outcomes of the 2021 Power Plan.



DRAFT 2021 PLAN RESULTS

Summary

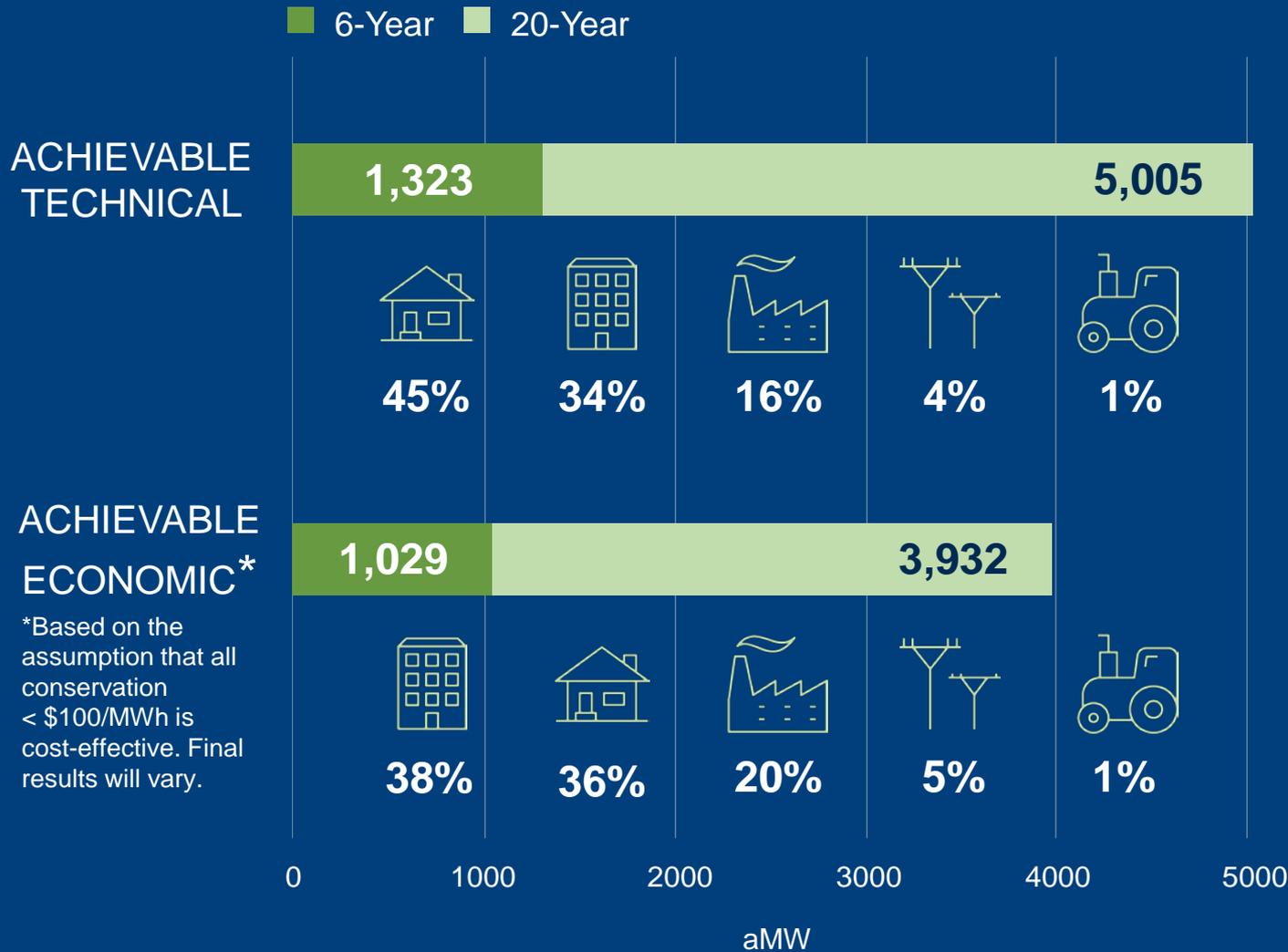


ACHIEVABLE ECONOMIC *

*Based on the assumption that all conservation < \$100/MWh is cost-effective. Final results will vary.

Overall, lower levels of potential relative to 7th Power Plan

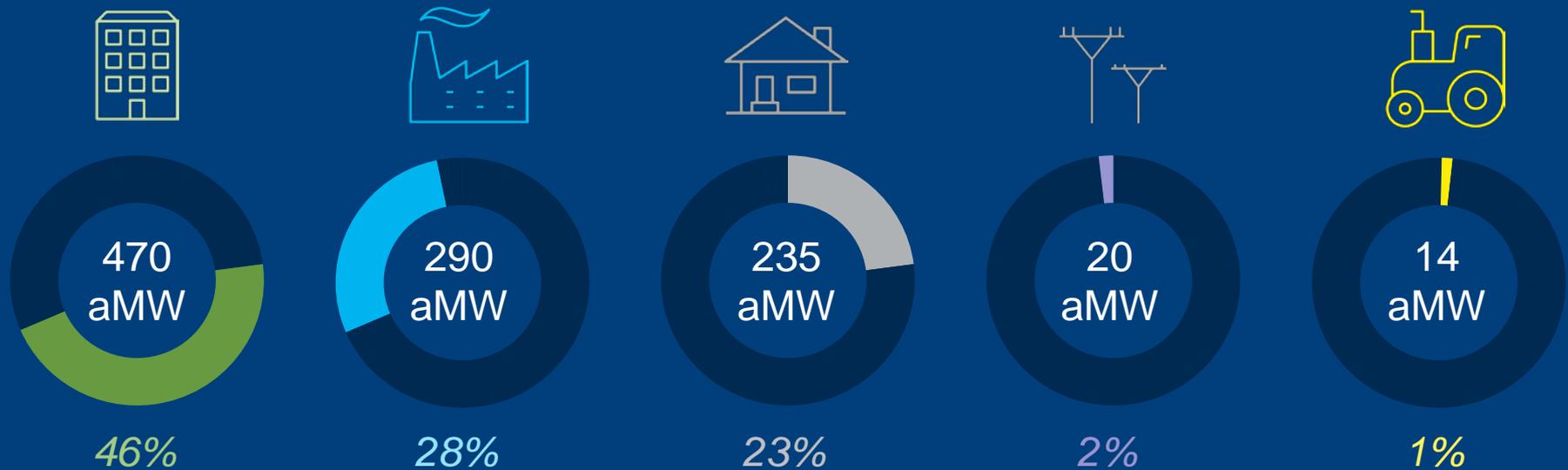
Regional Potential



Residential potential makes up a large share of the achievable technical potential, but much of it is expensive and does not pass the assumed economic screen.

Regional Draft Economic Achievable Potential by Sector

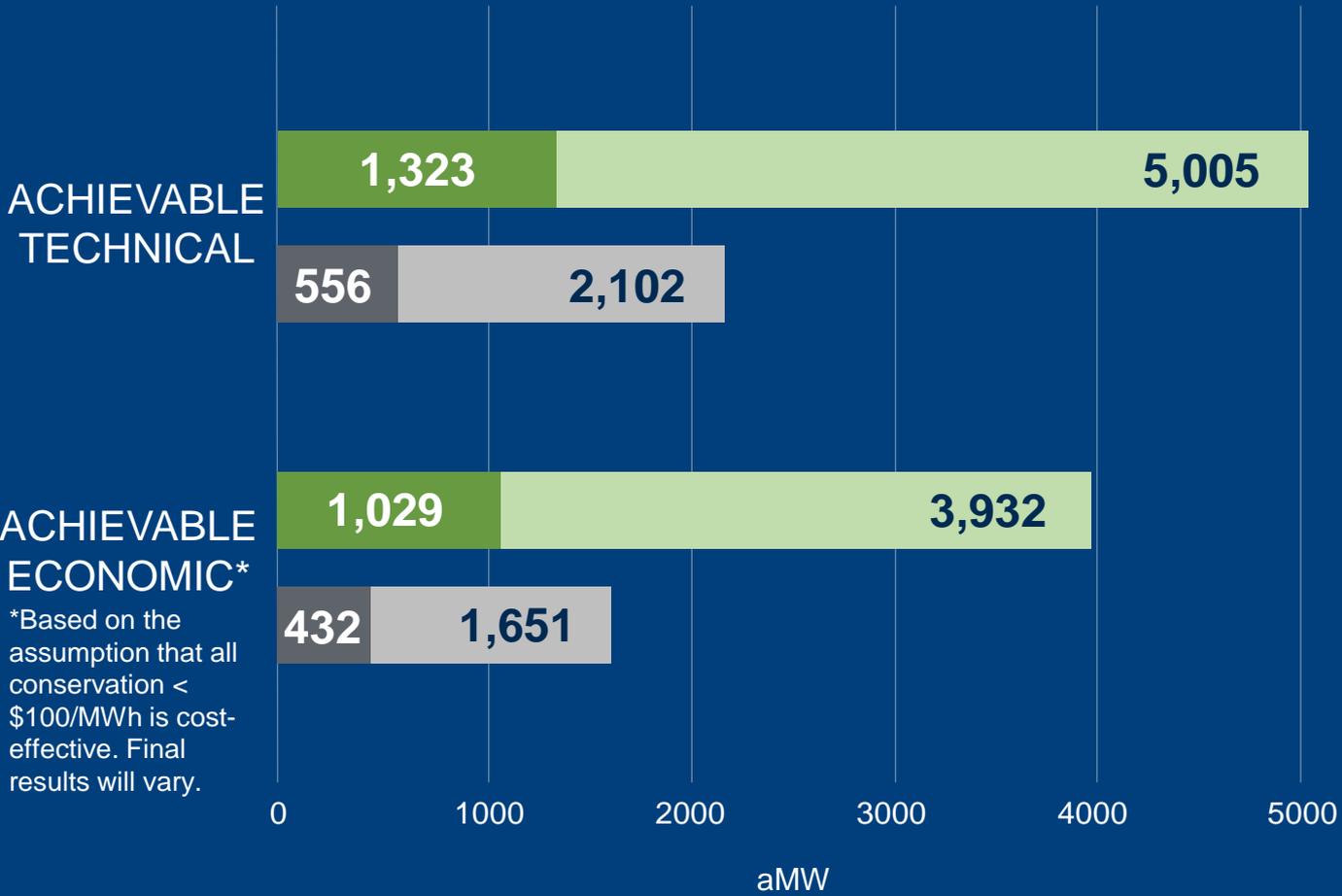
6-YEAR DRAFT ECONOMIC POTENTIAL



6-YEAR ECONOMIC POTENTIAL IS **78%**
OF 6-YEAR TECHNICAL POTENTIAL

42% Share of Regional Potential

■ Regional 6-Year ■ Regional 20-Year
■ 42% Share of 6-Year ■ 42% Share of 20-Year



*Based on the assumption that all conservation < \$100/MWh is cost-effective. Final results will vary.

COMPARED TO 7th POWER PLAN

21% decrease in 6-year achievable **technical** potential

32% decrease in 6-year achievable **economic** potential

Key Takeaways



Residential economic potential is now comprised of more expensive measures with slower ramp rates and shifts from making up **23%** of the overall potential in first 6 years to making up **36%** of potential in 20 years.



Even with declines in lighting, HVAC, and data center measures, the **Commercial** sector has the **greatest** economic potential throughout study horizon. In the long term, the potential has shifted from lighting to HVAC measures.



The economic potential in the **Industrial** sector is largely comprised to retrofit measures which can be achieved early. The potential is **greater in first years of study** than in later years.

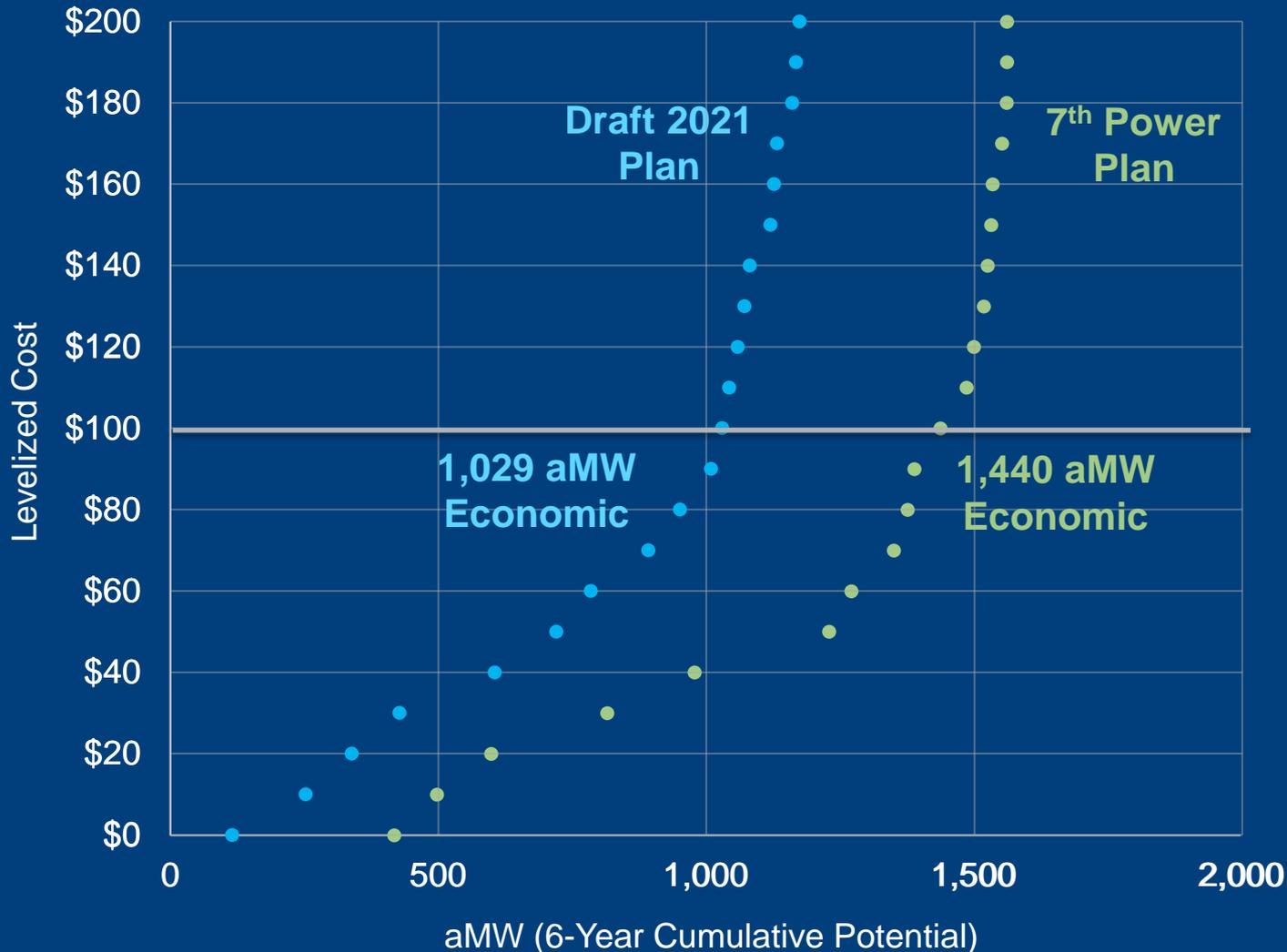


Agricultural economic potential is given slower ramp rates and remains **proportionally the same** throughout potential study.



Distribution efficiency measures were given a slow ramp rate. Most of the **Utility** economic potential is available **after the first 6 years** of the study.

6-Year Supply Curve



Overall, the Draft 2021 Plan has **less** 6-year potential at each levelized cost

Economic Levelized Cost Threshold (<100 \$/MWh)

RESIDENTIAL SECTOR

Residential Overview

- **11** new measure workbooks, including new cooling measures
- **2,262 aMW** of Technical Achievable potential
- Technical Achievable potential is **20% less** than 7th Power Plan Technical Achievable potential
- **HVAC** measures make up **nearly 50%** of residential potential due, in part, to new measures
- Greater than **80% decrease** in **lighting** potential compared to the 7th Power Plan over the 20-year period due to changing baseline and state standard in WA



New Residential Measures

- Efficient ultra-high definition televisions
 - Cooling only measures
 - Central AC
 - Room AC
 - Whole-house fans
 - Cellular shades
 - More efficient well pumps
 - Air cleaners
 - Domestic hot water circulator pumps
 - Hot water pipe insulation
 - Thermostatic shower restriction valves
 - Low-e storm windows
 - Well pumps
-

Regional Residential Economic Potential*



235 aMW

6-YEAR DRAFT ECONOMIC
POTENTIAL

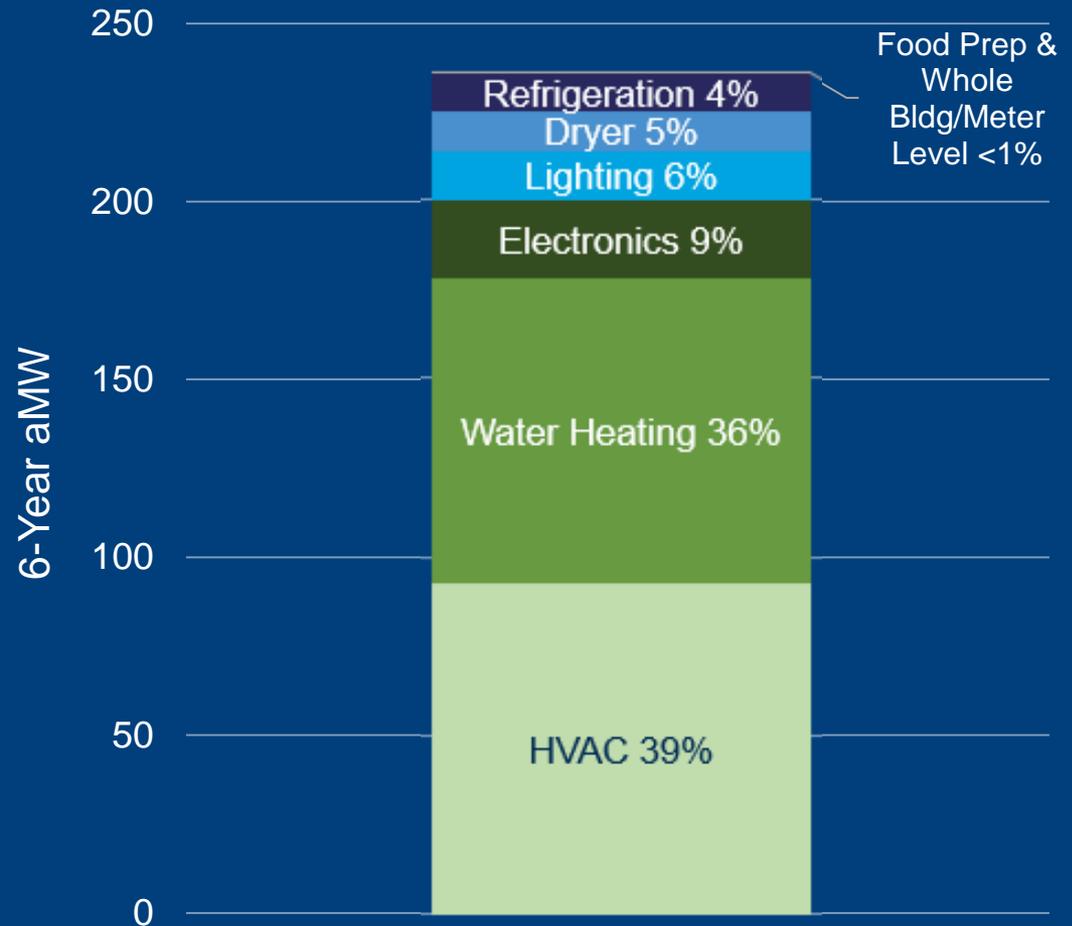
50% of Technical Potential (471 aMW)

1,411 aMW

TOTAL DRAFT ECONOMIC
POTENTIAL

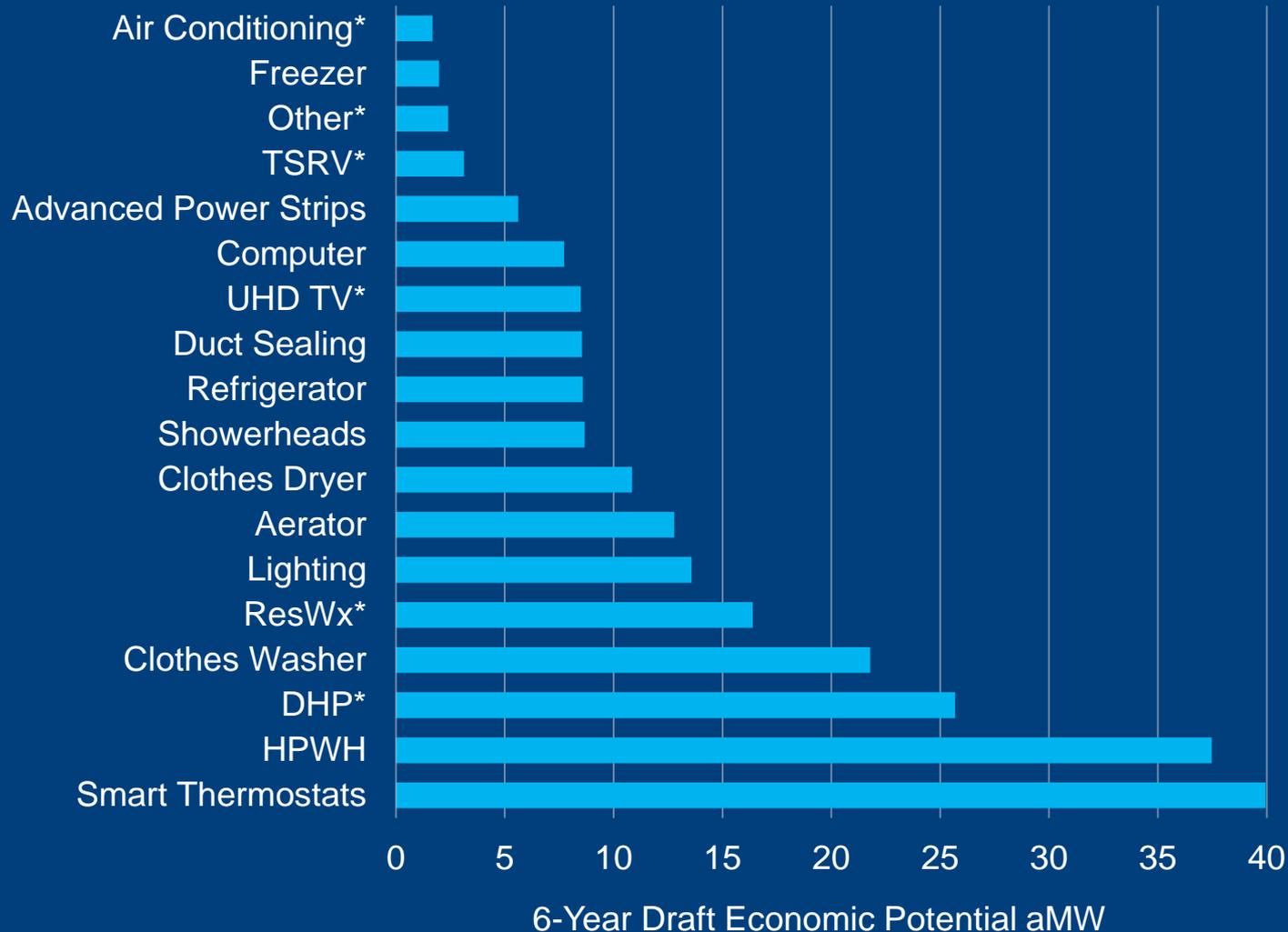
62% of Technical Potential (2,262 aMW)

HVAC measures new to
the Draft 2021 Plan
cause an increase in
overall HVAC savings



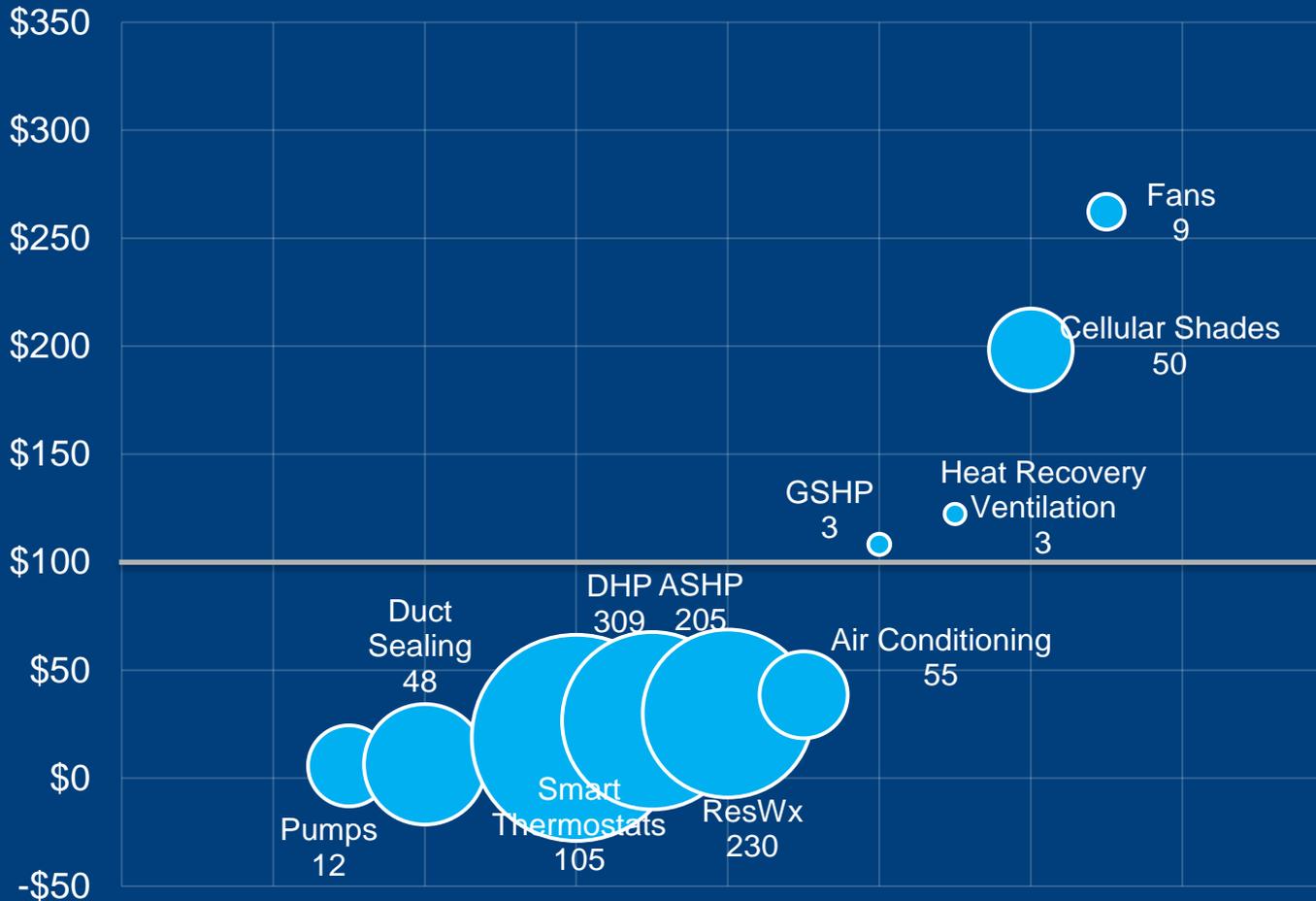
*Economic potential is based on the assumption that all conservation < \$100/MWh is cost-effective. Final results will vary.

Top Residential Measure Categories



Smart thermostat savings are 10x greater than in the 7th Power Plan

Cost Effectiveness of Residential HVAC Measures



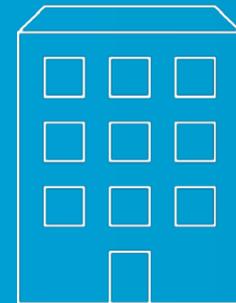
New measures such as **whole house fans** and **cellular shades** have **highest** levelized costs

Labels values are 20-Year Technical Achievable aMW

COMMERCIAL SECTOR

Commercial Overview

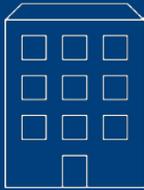
- **12** new measure workbooks
- **1,702 aMW** of Technical Achievable potential
- Technical Achievable potential is **37% less** than 7th Power Plan Technical Achievable potential
- **Lighting** measures potential decreased by **50%** compared to the 7th Power Plan
- Over a **90% decrease** in **electronics** potential compared to the 7th Power Plan



New Commercial Measures

- Fans
 - VHE-DOAS
 - VRF-DOAS
 - Chillers
 - Heat pumps
 - Package terminal heat pumps
 - Unitary air conditioning
 - Commercial efficient pumps
 - Engine block heaters
 - Elevator efficiency
 - Refrigeration door to display cases
 - Refrigeration auto door closers
 - Standalone refrigerators and freezers
 - Ice makers
 - Refrigerated vending machines
 - Circulation pump
 - Hot water controls
 - Thin triple pane windows
 - Applied film windows
 - Heat pump water heaters
 - Griddles
 - Overwrapper
-

Regional Commercial Economic Potential*



470 aMW

6-YEAR DRAFT ECONOMIC
POTENTIAL

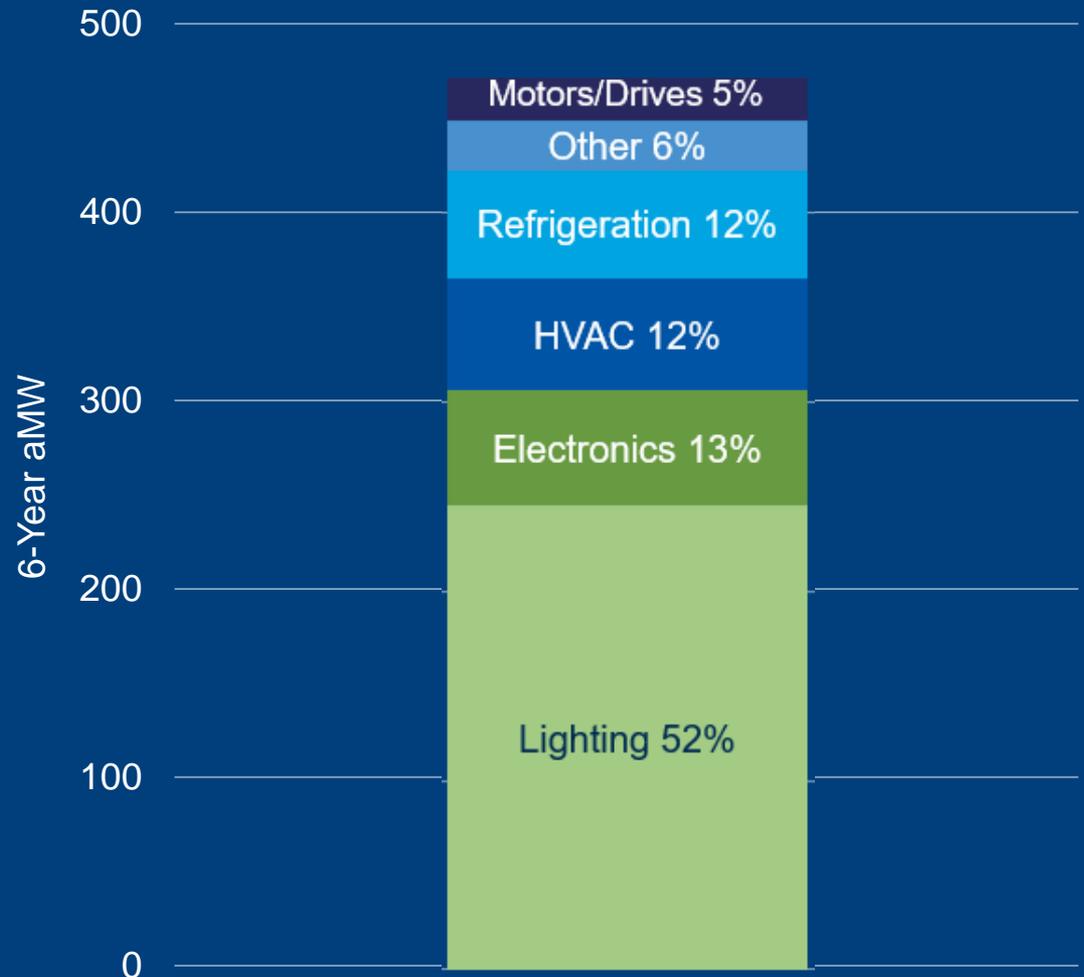
90% of Technical Potential (522 aMW)

1,503 aMW

TOTAL DRAFT ECONOMIC
POTENTIAL

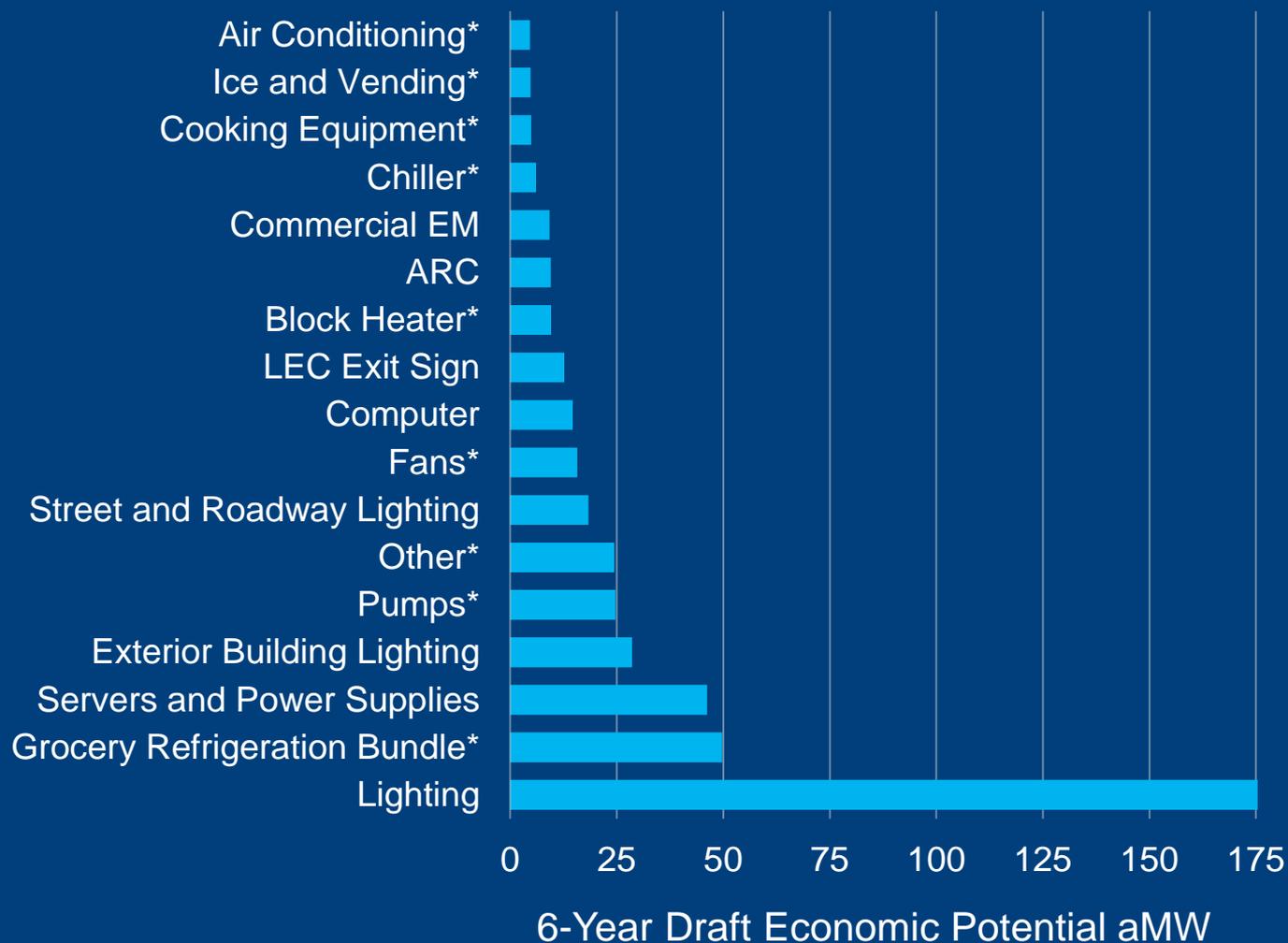
62% of Technical Potential (1,702 aMW)

Lighting and Electronics saw the **greatest declines** in 20-year potential compared to the 7th Power Plan but makeup **largest** portion of potential



*Economic potential is based on the assumption that all conservation < \$100/MWh is cost-effective. Final results will vary.

Top Commercial Measure Categories



Significant categories with new measures include **Grocery Refrigeration Bundle, Pumps, and Fans**

INDUSTRIAL SECTOR

Industrial Overview

- **783 aMW** of Technical Achievable potential
- Technical Achievable potential is **35% greater** than 7th Power Plan Technical Achievable potential
- **Increase** in potential is a result of **new methodology** for estimating some industrial measures and **additional lighting potential**



New Industrial Measures

- General HVAC measure
 - Wastewater and water supply (moved from commercial)
 - Forklift battery charger
 - Hydraulic power units for pulp mills
 - New methodology for compressors, fans, pumps, other motor-driven systems
-

Regional Industrial Economic Potential*



290 aMW

6-YEAR DRAFT ECONOMIC POTENTIAL

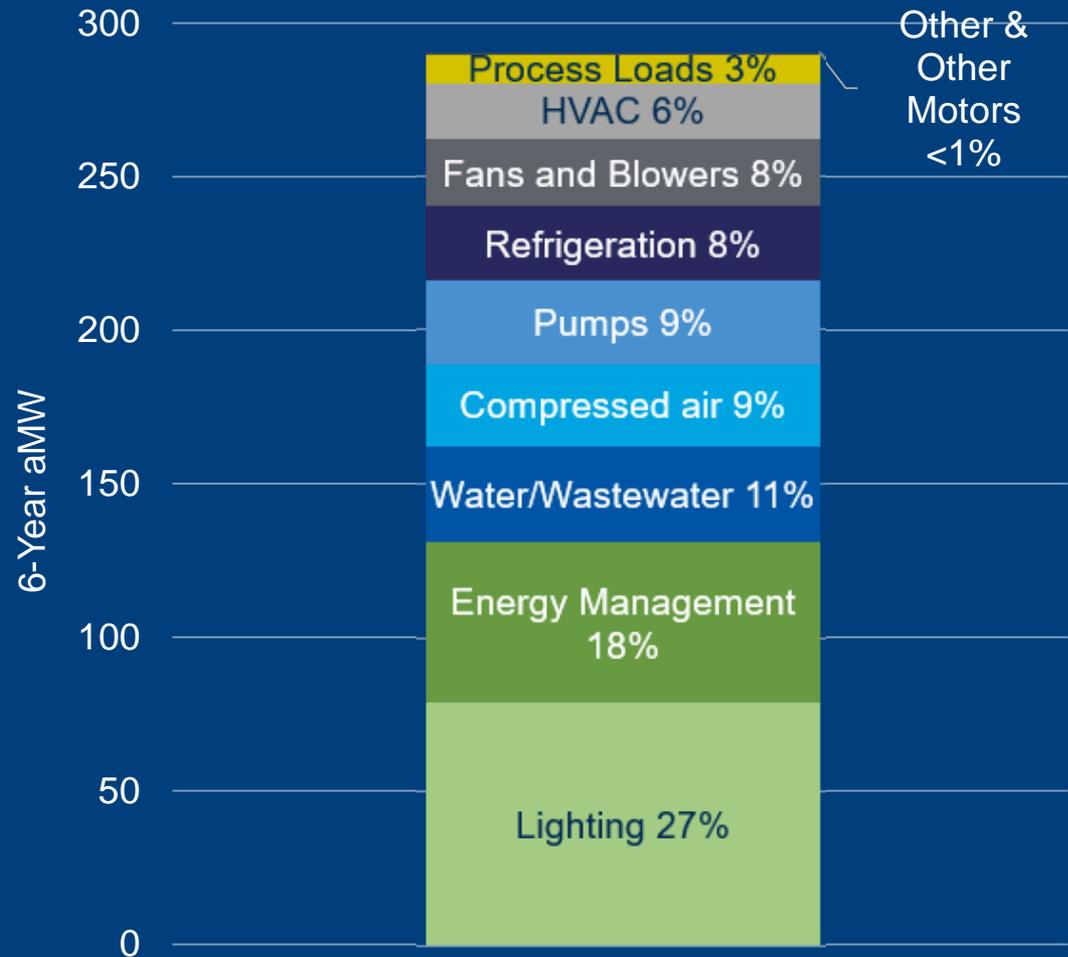
Almost 100% of Technical Potential (291 aMW)

778 aMW

TOTAL DRAFT ECONOMIC POTENTIAL

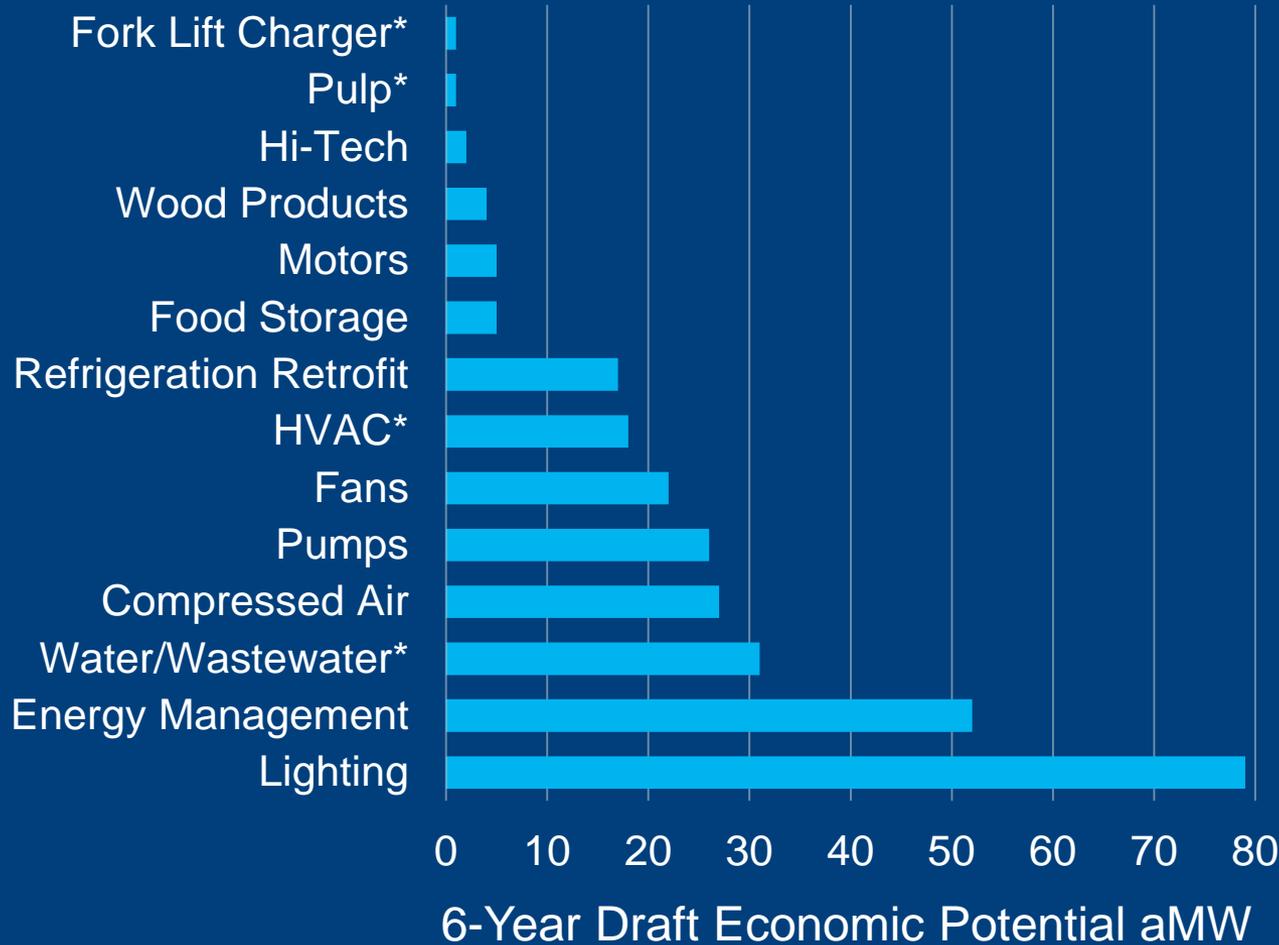
99% of Technical Potential (783 aMW)

Lighting potential is nearly **double** 7th Power Plan due to changes in assumptions



*Economic potential is based on the assumption that all conservation < \$100/MWh is cost-effective. Final results will vary.

Top Industrial Measure Categories

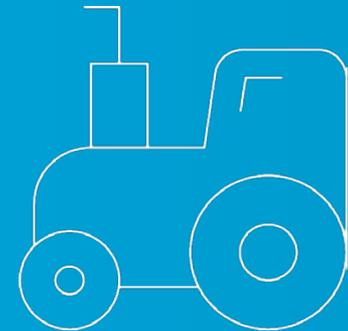


New measures with the **largest** impacts are **HVAC** measures and **water supply & wastewater**

AGRICULTURAL SECTOR

Agricultural Overview

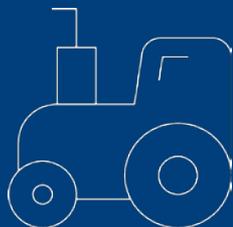
- **73 aMW** of Technical Achievable potential
- Technical Achievable potential was **82% less** than 7th Power Plan Technical Achievable potential
- **Decrease** in potential is a result of the **exclusion of Scientific Irrigation Scheduling (SIS)** due to recent program evaluation



New Agricultural Measures

- Freeze-resistant stock tanks
 - Generator block heaters
 - Variable rate irrigation
 - Fans
-

Regional Agricultural Economic Potential*



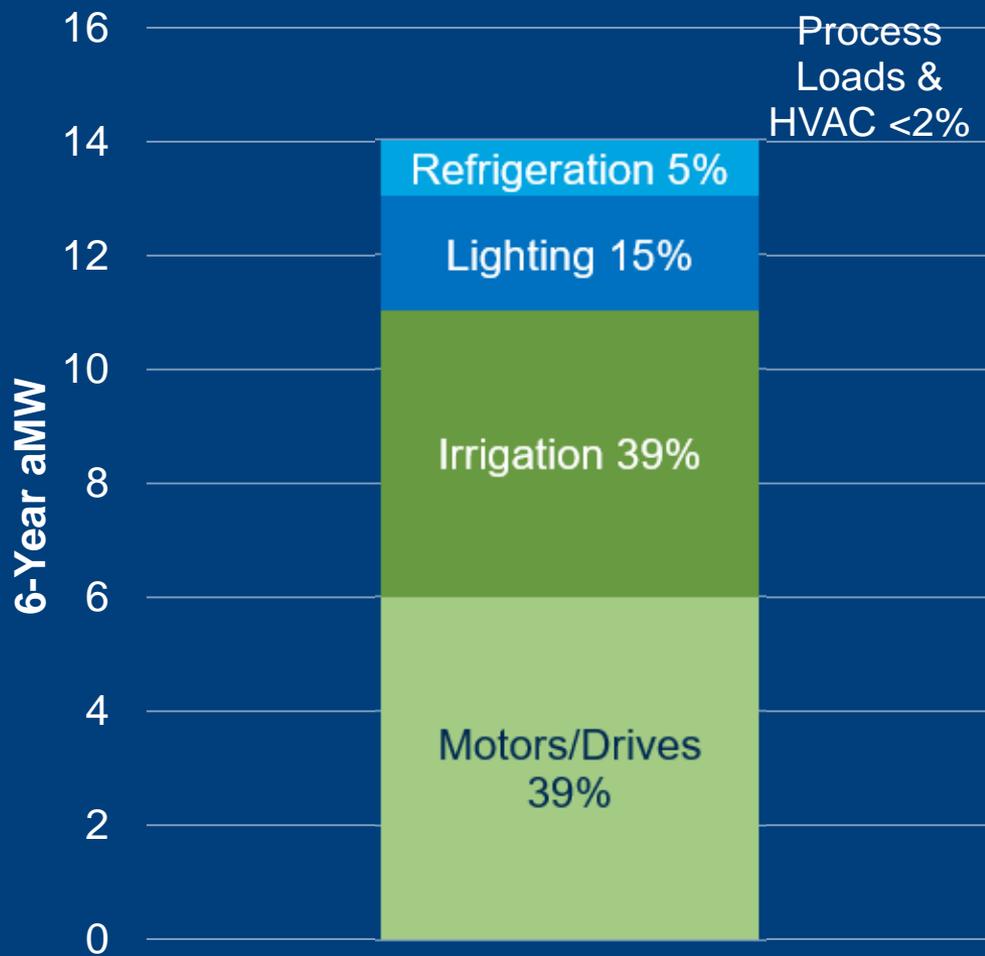
14 aMW

6-YEAR
DRAFT ECONOMIC POTENTIAL
79% of Technical Potential (18 aMW)

53 aMW

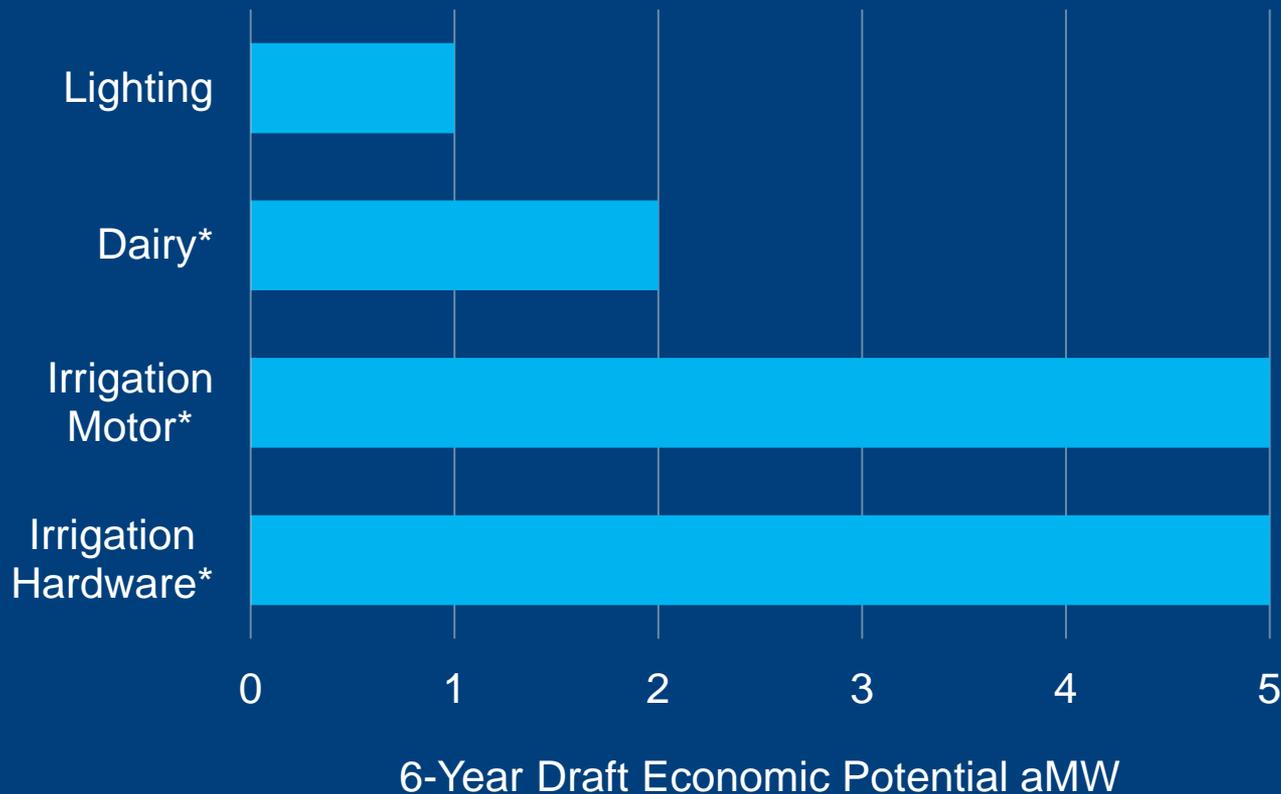
TOTAL
DRAFT ECONOMIC POTENTIAL
73% of Technical Potential (73 aMW)

**New measures added
for motors and
drives, HVAC**



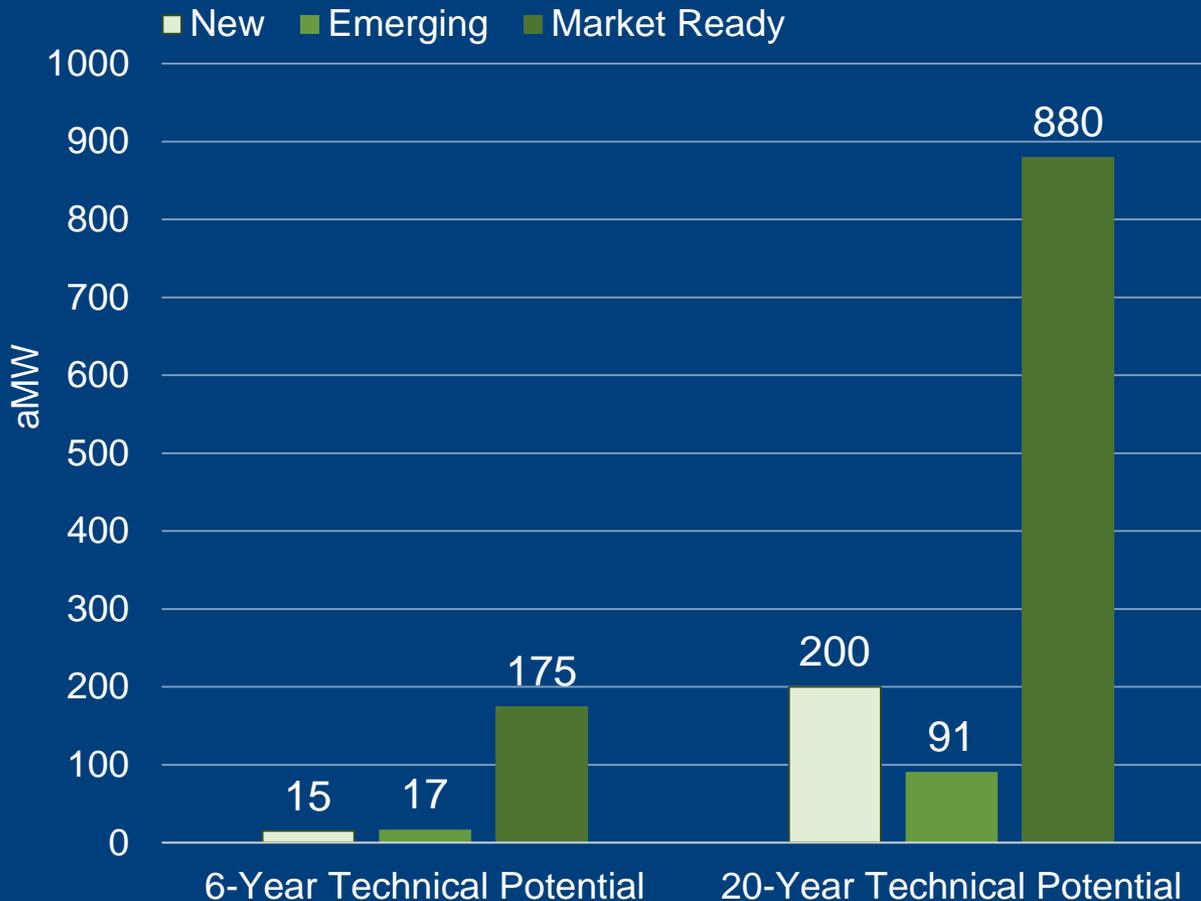
*Economic potential is based on the assumption that all conservation < \$100/MWh is cost-effective. Final results will vary.

Top Agricultural Measure Categories



Majority of measures are cost-effective, with Irrigation Hardware measures having the smallest percentage of cost-effective measures

New Measures in 2021 Plan



207 aMW

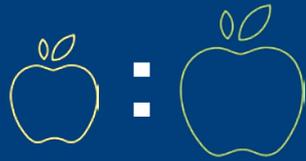
6-YEAR
TECHNICAL POTENTIAL
*16% of Measure Total 6-Year
Technical Potential (1,323 aMW)*

1,171 aMW

20-YEAR
TECHNICAL POTENTIAL
*23% of Measure Total 6-Year
Technical Potential (5,005 aMW)*

Most of the potential from new measures added to 2021 Plan is from measures that are market ready.

Major Takeaways: Part I



20-year technical achievable potential is 74% of the 7th Power Plan

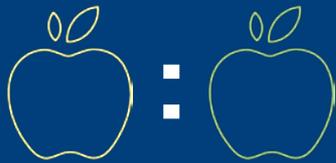


78% of the 6-year potential is economic at \$100/MWh. 90% of the 7th Power Plan potential was economic.

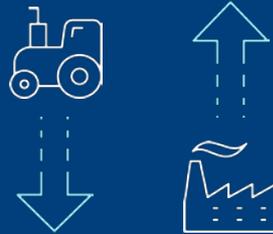


Total estimated 6-year economic potential is 1,029 aMW, compared to 1,400 aMW from the 7th Power Plan

Major Takeaways: Part II



Res 2021 Plan potential is 20% less than 7th Power Plan



Ag is down Industrial is up
compared to 7th Power Plan potential. Industrial was the only sector to increase.



Commercial 2/3 of 7th Power Plan potential

Major Takeaways: Part III



20% Less

Lighting Baselines | State Standards



33% Less

Lighting Baselines | Embedded data centers



35% More

New methodology for pumps, compressors, etc.

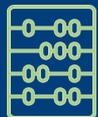


82% Less

No Scientific Irrigation Scheduling



Lower T&D Capacity Deferral Values



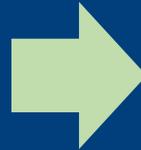
New 2021P measures contribute less to total savings than new measures in previous Power Plans



NEXT STEPS

Draft 2021 Plan Results

Draft results ready at the
end of September 2020



Draft Plan complete in
February 2021

BPA-developed Power Plan resources, including this presentation and a
workbook summarizing the energy-efficiency supply curves, are
available here:

www.bpa.gov/EE/Utility/toolkit/Pages/2021-Power-Plan-Engagement.aspx

QUESTIONS?

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