2023 IRP Stakeholder Meeting

September 27th, 2023

Meeting Agenda

01	**Welcome / Meeting Objectives** Matt Lind, 1898 & Co.
02	**Keynote** Justin Joiner, APS
03	**IRP Terms, Concepts, and Process** Todd Komaromy, APS
04	**Regulatory / Western Market Exploratory Group Update** Brian Cole, APS
05	**Transmission Timelines** Nick Schlag, E3
06	**Break**
07	**Inflation Reduction Act Overview** Nick Schlag, E3
08	**APS Customer Programs** Izzy Lawrence, APS
09	**Stakeholder Engagement** Matt Lind, 1898 & Co.
10	**IRP Reference Case Results** Mike Eugenis, APS
11	**Closing Remarks** Matt Lind, 1898 & Co.

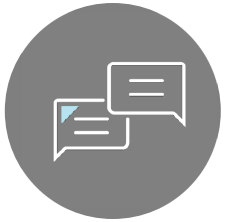
Meeting Guidelines

Questions

Clarifying questions are welcome at any time. There will be time allotted following each presentation to answer.

Meeting Materials

Meeting slides will be posted to the APS website along with meeting minutes.



Following Up

We will attempt to answer all questions today. Some questions may require additional information and follow up after the meeting.

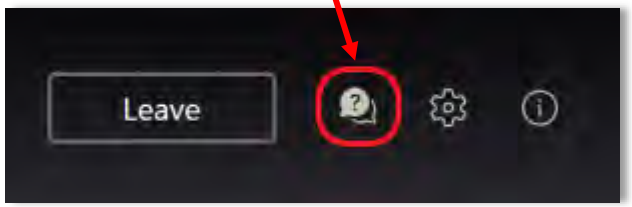
Disclaimer

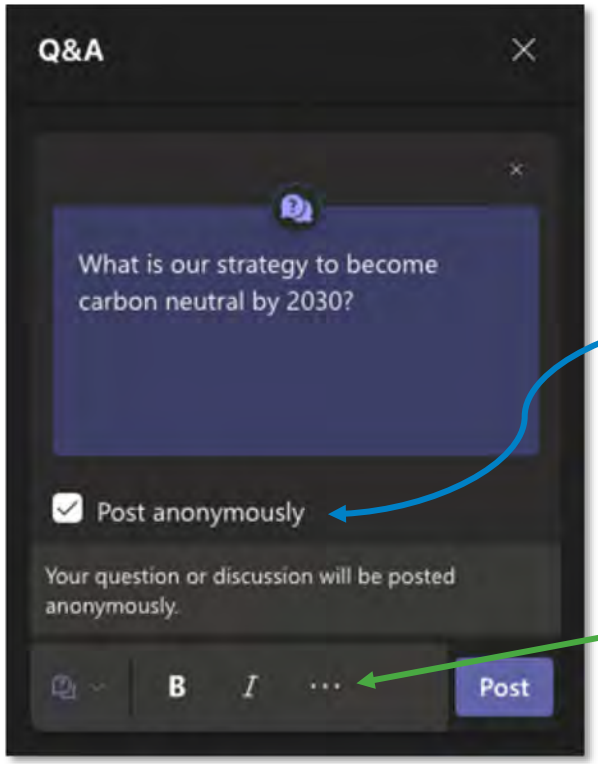
Meetings and content are preliminary in nature and prepared for stakeholder discussion purposes only.

Participate in a Q&A in a Live Event

- As an Attendee, you can ask questions in the Q&A as soon as you join the event.

Navigate to the “Question” icon to submit a comment or question.





Questions and Comments can be submitted anonymously.

Web links can be added into the Q&A chat.


aps
Keynote
Justin Joiner, APS

Keynote Introduction

APS is experiencing large growth that requires strategic infrastructure build out

Diligent planning has and will continue to be paramount in reliability planning

APS understands the importance of stakeholder engagement in planning process

Justin Joiner
Vice President, Resource Management


aps
IRP Terms, Concepts, and Process
Todd Komaromy, APS
aps
110161
aps
SILVERADO
310K EP SUNSTATE EQUIPMENT
DEERE
SUNSTATE EQUIPMENT

Integrated Resource Plan

The APS Integrated Resource Plan (IRP) is a **comprehensive study** filed with the ACC approximately every three years. The IRP forecasts future resource needs, based on expected customer demand.

Reliability

Providing safe and reliable power to our customers is a top priority for APS. Energy resource adequacy and grid security are cornerstones of reliability.

Affordability

The goal of the 2023 Integrated Resource Plan is to provide reliable electric service to customers at the lowest reasonable cost.

Sustainability

The 2023 Integrated Resource Plan resource options represent a clean, balanced supply, including energy efficiency programs, distributed generation, battery storage, and utility-scale solar and wind.

Evolution of Reliability Planning

Traditional Reliability Planning	Evolved Reliability Planning	Traditional Reliability Planning, **plus**:
Annual Peak Load + Reserve Margin		• Seasonal reliability considerations • Meeting increased ramping requirements resulting from increased renewable penetration • Determining peak load contribution of non-dispatchable and energy-limited resources

Reliability in the IRP

Customers count on APS to deliver reliable electric service

All portfolios provide a comparable level of reliability (LOLE = 1 day in 10 years)

The dependable capacity value of energy-limited resources is dependent on level of penetration

The lower the dependable capacity value a resource has, the more total resources required to meet the 1 in 10 reliability requirement

2023 IRP Load Forecast

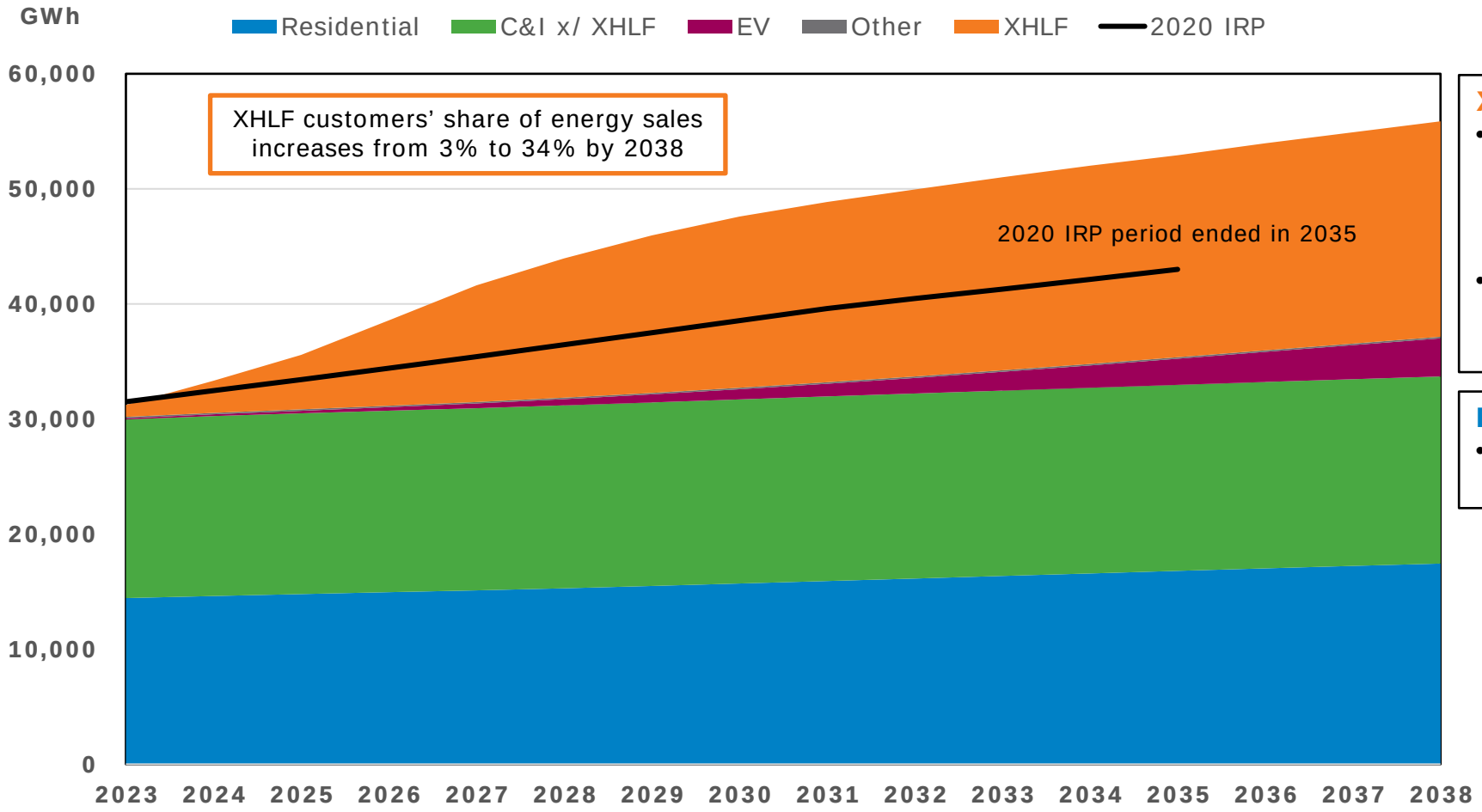
Data center and large manufacturing customers (Extra High Load Factor – “XHLF”) are expected to be the major source of load growth during 2023-2038

Electric vehicle (EV) charging also expected to drive sales and peak growth

Slower projected “core” load growth compared to 2020 IRP due to declining usage, increased solar generation, energy efficiency, and DSM savings

Residential C&I x/ XHLF EV XHLF

2023 IRP Sales Forecast (GWh)



XHLF

- Now projected at more than triple the amount of sales growth vs the 2020 IRP forecast
- 2020 IRP forecast had XHLF share of sales increasing to 12% in 2035

Residential and **C&I**

- Net decrease compared to 2020 IRP forecast

2023 IRP Timeline

File IRP	Public Stakeholder Meeting #3	Stakeholder Comments Due	Utility Responses Filed	ACC Assessment & Proposed Order
Wednesday		Wednesday	Friday	Friday
Nov. 1 2023	Early November	Jan. 31 2024	May 31 2024	Aug 30 2024

Regulatory/Western Market Exploratory Group Update

Brian Cole, APS

Western Market Exploratory Group (WMEG)

Production Cost Study Results Summary

September 2023

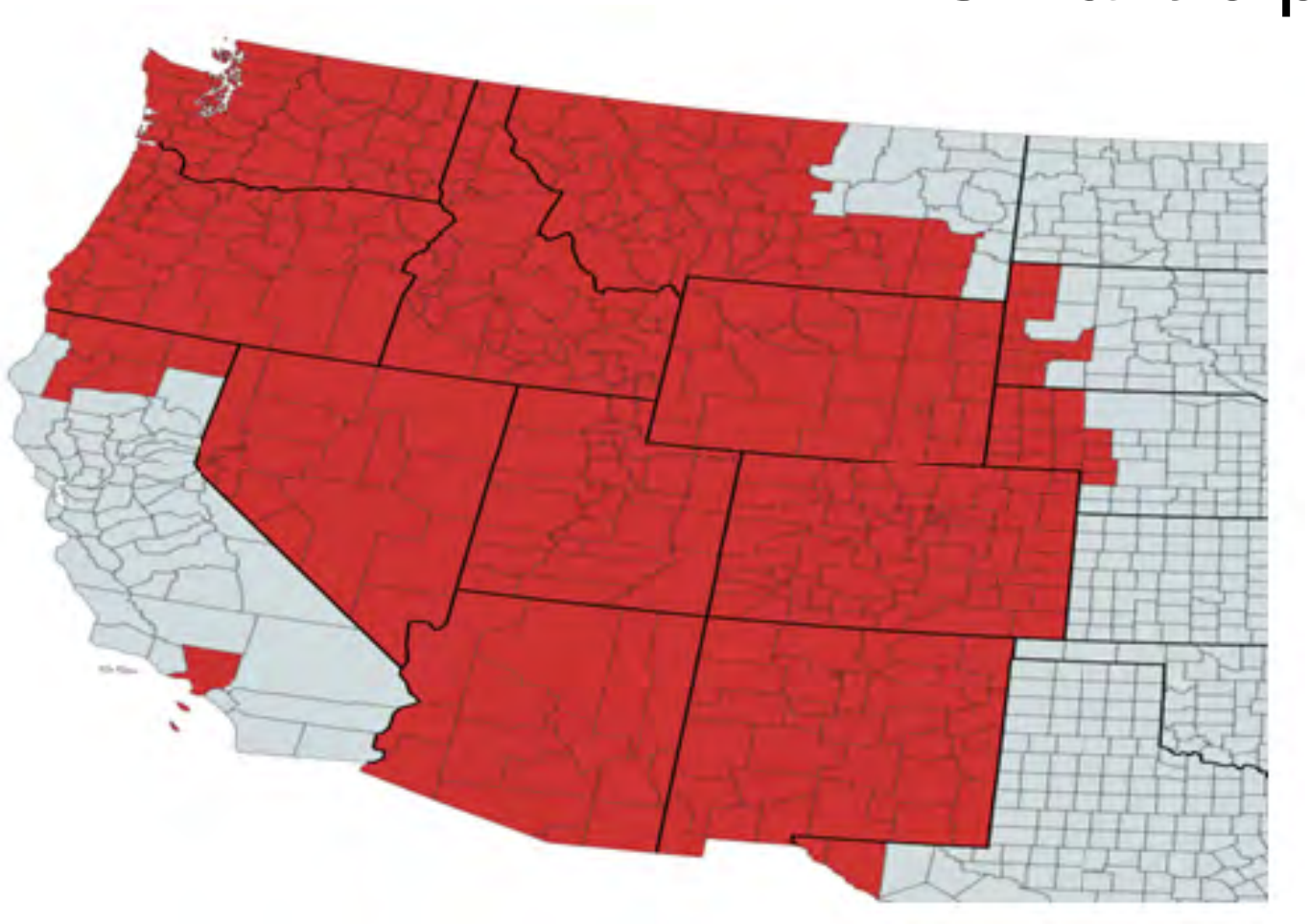
Goals of Market Participation

Reliability

Customer Cost Savings

Clean Energy Integration

WMEG Participation



Note: Map boundaries are approximate and for illustrative purposes only

APS	Puget Sound
SRP	Xcel
TEP	Avista
AEPCO	BANC
PNM	BPA
Black Hills	Chelan
LADWP	El Paso
Portland	Grant
Seattle	Northwestern
Platte River	Tacoma
NV Energy	Tri-State
PacifiCorp	WAPA
Idaho	

Overall Take-Away from Study Results

APS, SRP, and TEP are assessing both CAISO and SPP market options. This study suggests that SPP is a viable and potentially superior option from a cost production standpoint. As a result, **we will continue to pursue the build-out of the SPP market option** to ensure the best outcome for our market goals.

Overall, production cost differences between footprints are modest.

APS, SRP, and TEP showed slightly greater cost savings in SPP Markets+ footprints than in CASIO EDAM footprints.

Purpose of Study

This study assessed production costs only (generation dispatch) in various market footprints and scenarios.

The main report is limited to WECC-wide results and does not include individual company results.

Each entity has individual results.

Significance

The results demonstrate the potential production cost savings for different market scenarios and footprints.

These production cost results are one part of the overall assessment of market participation and are expected to be only a portion of the overall savings of a combined resource adequacy and day-ahead market scenario.

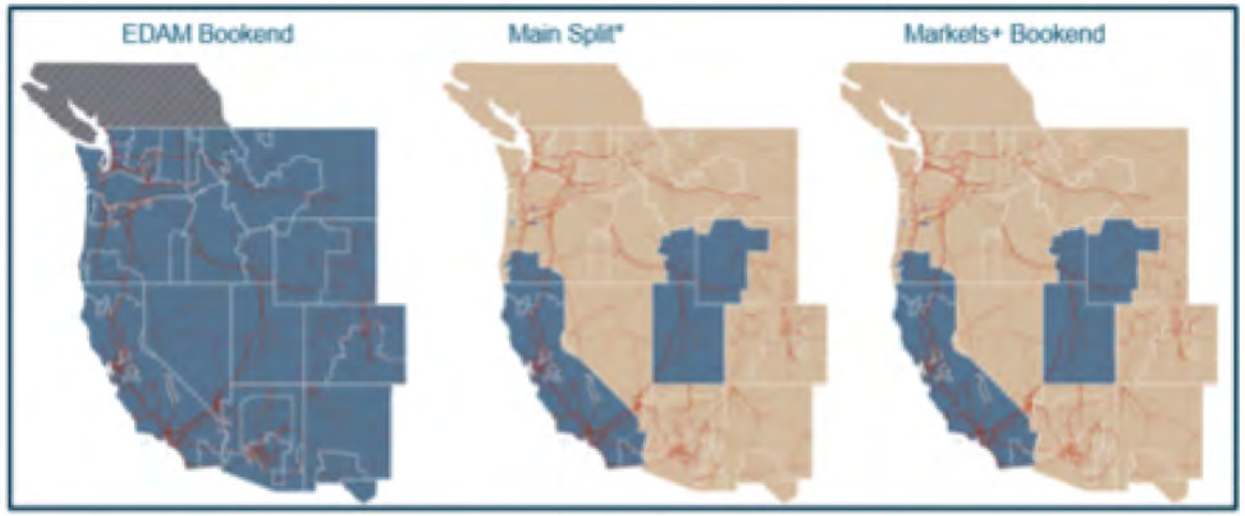
Footprints Studied

Market Footprints and Seam Treatment

CBS looked at various footprints as part of the **Core CBS Study**.

The Main Split footprint is uses as the base footprint in all Core Study modeling.

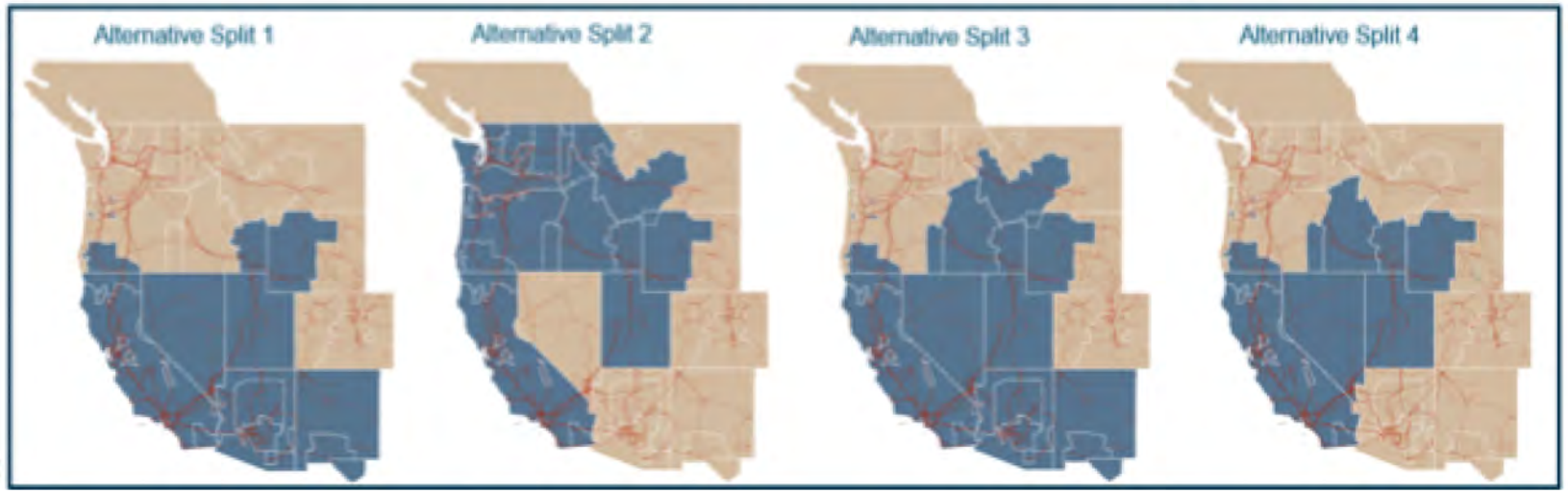
A subset of members opted for modeling extra market cases of **additional footprints**



Map Legend

- EDAM
- Markets+

**Not explicitly shown: The difference between Markets+ Bookend and Main Split is WAPA SNR sub-BA is part of EDAM in the Main Split*



Figures provided by Greg MacDonald from PSE

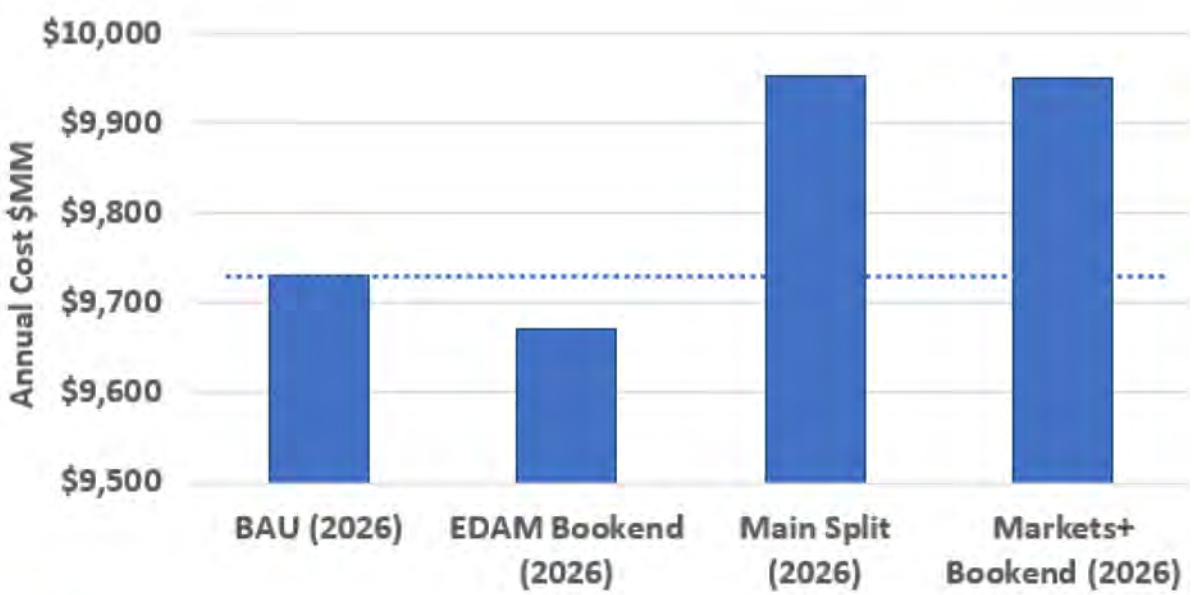
Main Study Results (WECC-wide)

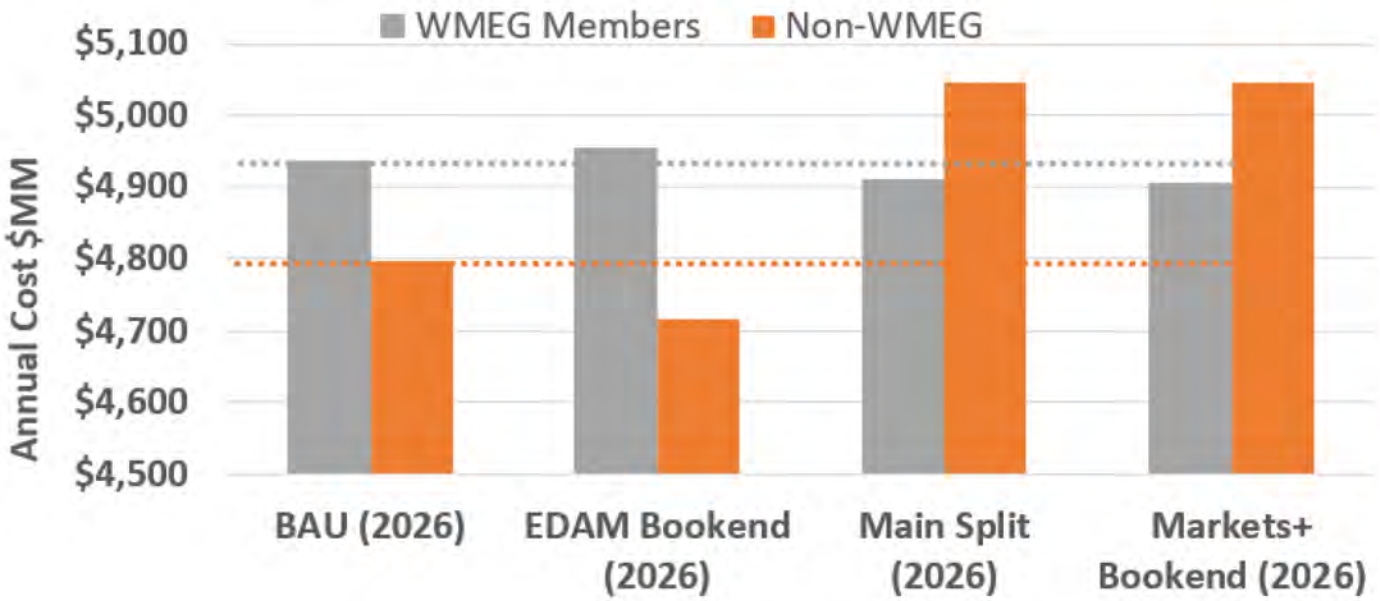
Results with a CAISO WECC-wide footprint (compared to BAU* case):	Results with split footprints (compared to BAU* case):
WMEG entities show an overall cost increase of $20M.	WMEG entities show a cost decrease of $26M.
Non-WMEG (mainly CA) entities show an overall cost decrease of $80M.	Non-WMEG (mainly CA) entities show a cost increase of $247M.
Overall cost decrease of $60M (0.6%) WECC-wide	Overall cost increase of $220M (2.3%) WECC-wide

*BAU means current participation in real time markets in both CAISO and SPP. The WECC total production costs are projected to be $9.732 Billion in 2026 in BAU Case.

Main Study Results

WECC-wide





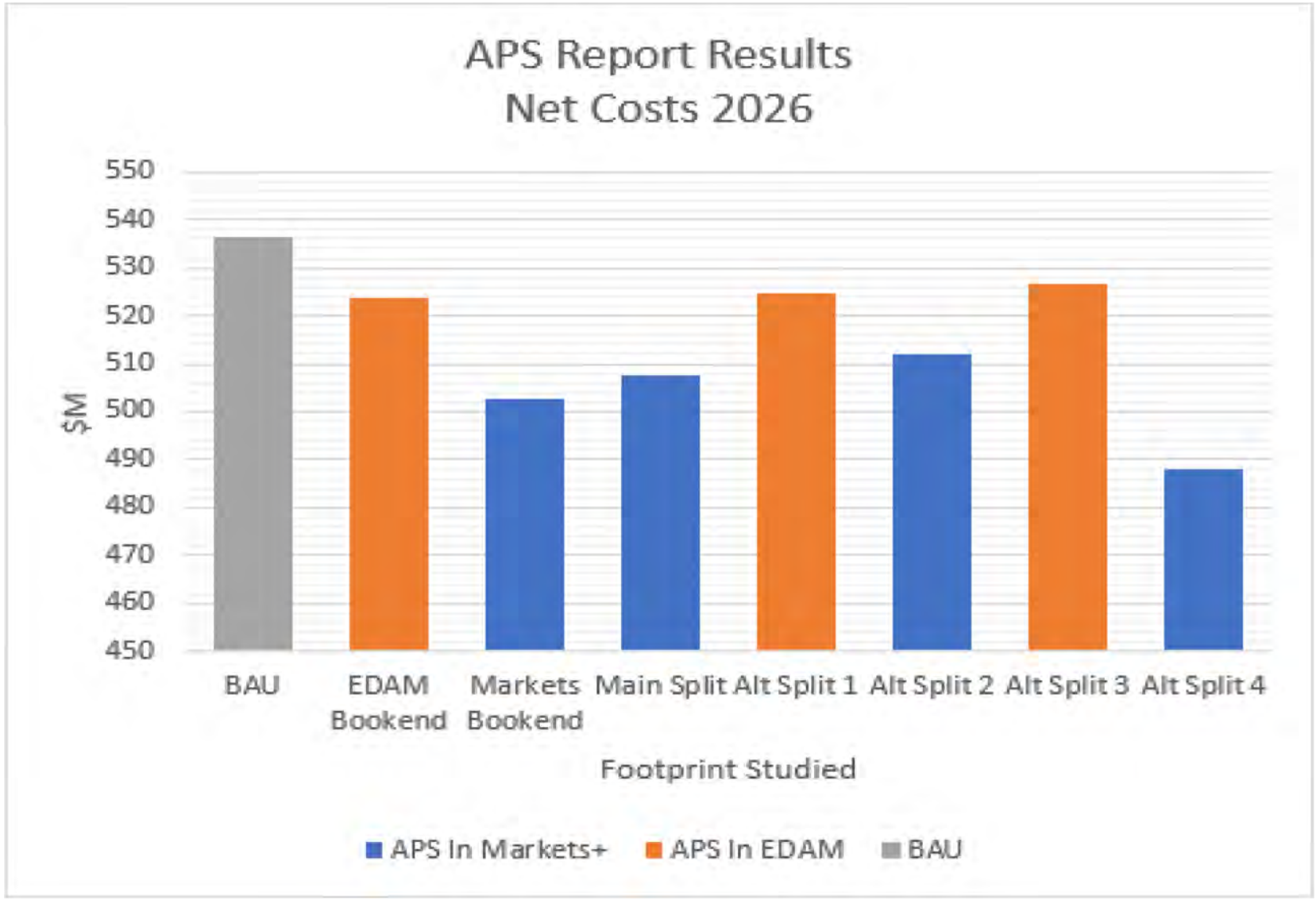
WMEG vs. Non-WMEG

APS Study Results

Case	Net Cost ($Millions)	% Savings
BAU (2026)	536.3	N/A
EDAM Bookend (2026)	523.5	2.4%
Main Split (2026)	507.5	5.7%
Markets+ Bookend (2026)	502.9	6.6%
Alt Split 1 (2026)	524.9	2.2%
Alt Split 2 (2026)	512.1	4.7%
Alt Split 3 (2026)	526.8	1.8%
Alt Split 4 (2026)	488.2	9.9%

- All day-ahead cases result in additional cost savings over current market participation (BAU).
- Cases with a split footprint and where APS is in SPP M+ have greater savings than cases where APS is in CAISO EDAM.

APS Study Results



Take-Aways for Arizona Entities

Arizona entities see benefits in day-ahead market participation from a production cost standpoint.

This holds true in single market and multiple footprint (market) scenarios.

It is important for Arizona entities to be aligned in our decision to maximize benefits.

There is a risk in not joining a day ahead market if others do.

Northwest – Southwest diversity is important and is an important factor in footprint selection.

Arizona entities see greater benefit when in the same market as NW entities.

Arizona entities also see greater benefit when in the same market as NW entities and are in a separate market from CA.

Summary

Recall: APS, SRP, and TEP are assessing both CAISO and SPP market options. This study suggests that SPP is a viable and potentially superior option from a cost production standpoint. As a result, we will continue to pursue the build-out of the SPP market option to ensure the best outcome for our market goals.

From a production cost study standpoint, APS, SRP, and TEP benefit most in a market footprint that includes the NW and SW but excludes CA due to load and resource diversity and the sharing of such. In addition, overall production cost savings are relatively modest as compared to the BAU case (real time market operations).

Market-to-market coordination (seams) is important for overall market efficiency. The cost-benefit study showed that by adding better market-to-market coordination, WECC-wide costs could be reduced by $150M (~1.5%) in a 2030 case. It indicates that since most of the savings can be realized by non-WMEG members (mostly CA), CA should have an incentive to negotiate those market-to-market agreements.

Production cost results are one part of the decision-making process of joining a market. The next focus of analysis will be around realizing the potential market benefits via transmission deliverability, assessing future long-term regional opportunities, and finalization of market tariffs and critical business practices.


aps
Transmission Timelines
Nick Schlag, E3
WRONG WAY
DEERE
SUNSTATE EQUIPMENT
310K EP SUNSTATE EQUIPMENT
110161
aps
SILVERADO

Multiple Studies Point to Importance of Transmission to Enable Access to High-Quality Renewable Resources

+ **Studies of interregional transmission often highlight a wide range of benefits:**
  - Reduced energy costs
  - Increased reliability & resilience
  - Improved operational efficiency
  - Increased competition and market liquidity
  - Reduced congestion
  - **Delivery of remote, high-quality renewable resources**

+ **A number of recent studies indicate that scaling clean energy will require significant future investments in transmission**

Transmission Buildouts Across a Range of 100% Clean Energy Scenarios

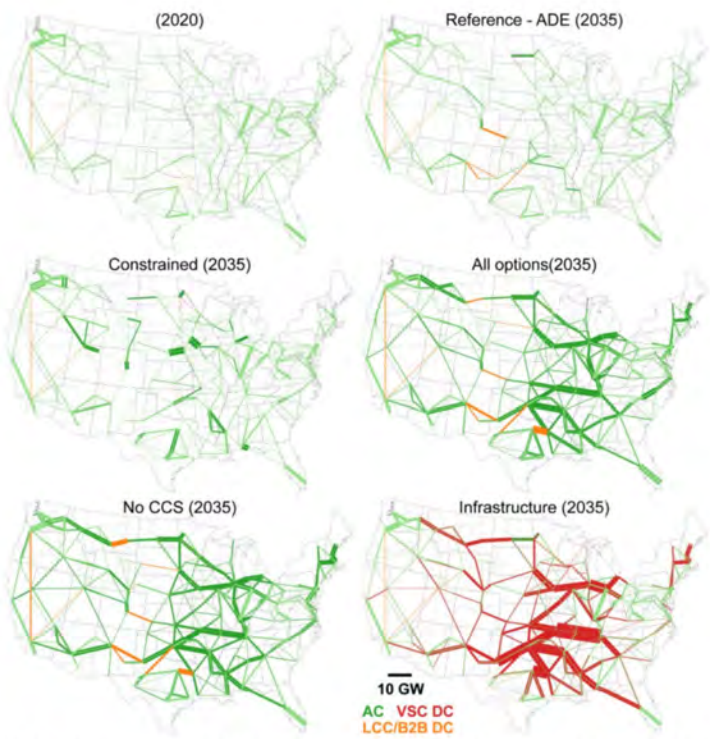


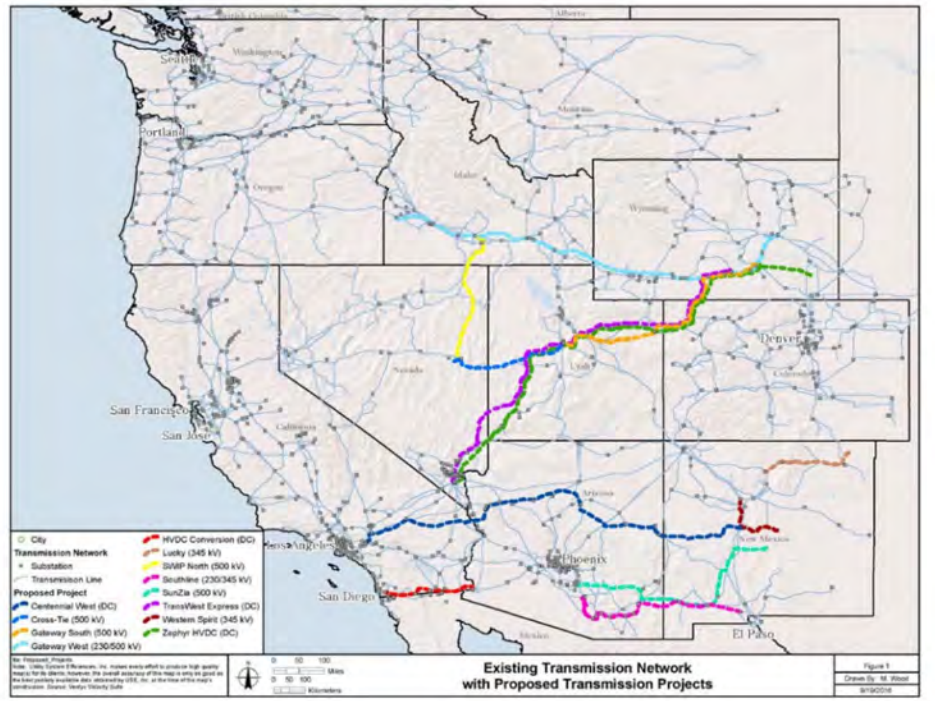
Figure 27. Maps of transmission capacity in 2020 and 2035 (ADE demand case) show substantial additions into wind-rich regions of the United States.

Source: NREL, Examining Supply-Side Options to Achieve 100% Clean Energy by 2035

While Need for Transmission is Well-Understood, Development to Date Has Been Limited

- **Over the past two decades, a large number of long-distance transmission projects have been proposed in the West**
- **Only a small number of those projects have reached construction or operations phase**
- **Most of those that have achieved operations have done so on timelines much longer than originally planned**

Proposed Interregional Transmission Projects as of 2016



Source: RETI 2.0 Western Outreach Project Report

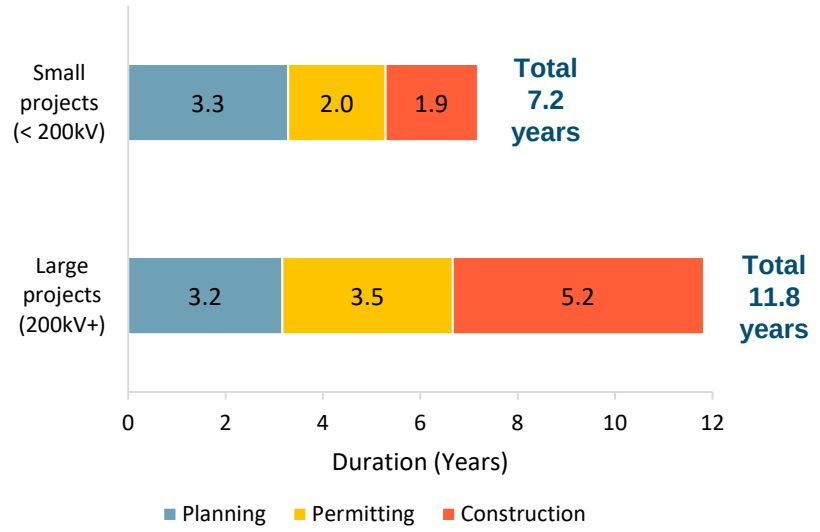
Key Steps to Developing New Transmission

Stage	Step	Description
Planning	Need determination	Utility/planning org/system operator determine need (reliability, economic, policy) for a new project
Siting & Permitting	Regulatory approvals	Compliance certification from state regulator to approve construction of a project (e.g., Certificate of Public Convenience and Necessity)
	Environmental permits	Permits from federal and state entities that ensure project addresses and mitigates environmental concerns
	Right of way (ROW) acquisition	Purchase land for project right of way
Commercial	Offtake agreements	Negotiate offtaker agreements transmission capacity
	Financing	Secure required equity and/or debt financing
Engineering & Construction	Design	Develop engineering plans for project
	Construction	Procure resources and labor and begin construction

Transmission Development Timelines

- **Transmission development timelines vary based many factors including project voltage, line length, and permitting requirements**
- **E3 analyzed data for transmission projects expected to come online from 2023 onwards across the United States and found that the average time to develop small (< 200 kV) projects and the average time to build large projects (>200 kV) is 12 years**
- **The tail ends of these timelines could be significantly longer – with small projects taking up to 11 years and large projects taking up to 18 years to get built**

Average Duration of US Transmission projects by Development Phases



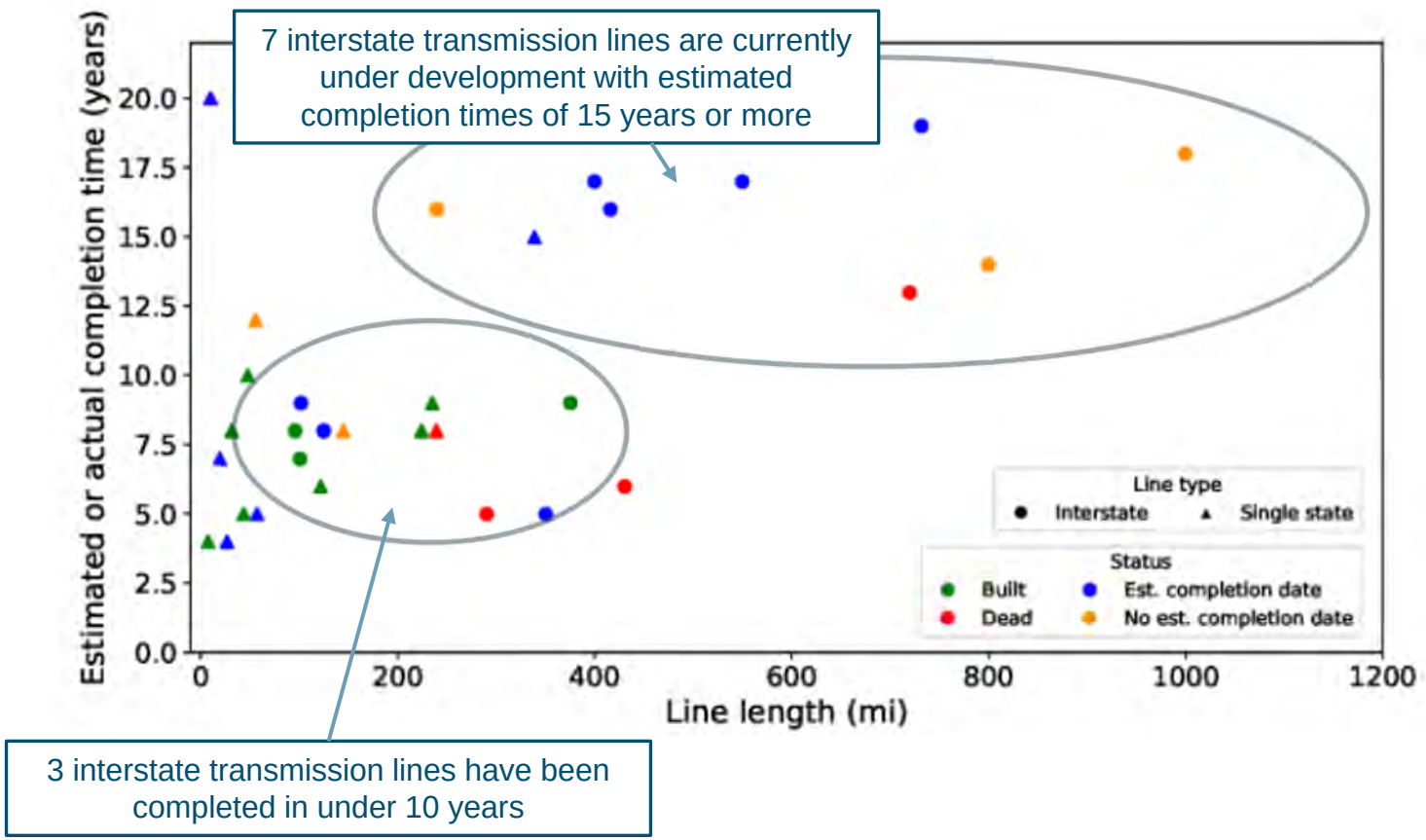
Source: S&P Global

Notes:
1. Planning timeline has been assumed to be the time between public announcement and initiating the permitting process
2. COD is assumed to mark the end of the construction period.
3. Average length of small projects analyzed is 18.2 miles. Longer pipelines could have higher construction times.
4. Average length of large projects analyzed is 190 miles

Interstate Transmission Development Time

- **A review of over 30 transmission projects initiated after the 2005 Energy Policy Act found that new transmission takes an average of over 10 years to complete**
  - The quickest line reviewed was sited and built in only four years, while the longest project has been ongoing for over 16 years
- **Interstate transmission lines generally take longer to site than lines that remain within a single jurisdiction**
  - Long distance interstate transmission lines will frequently take 15 years or more to site and construct

Transmission Line Length & Completion Time



Source(s):
Harvard Kennedy School Belfer Center: The Challenges of Decarbonizing the U.S. Electric Grid by 2035
Harvard Dataverse: Review of transmission lines since 2005

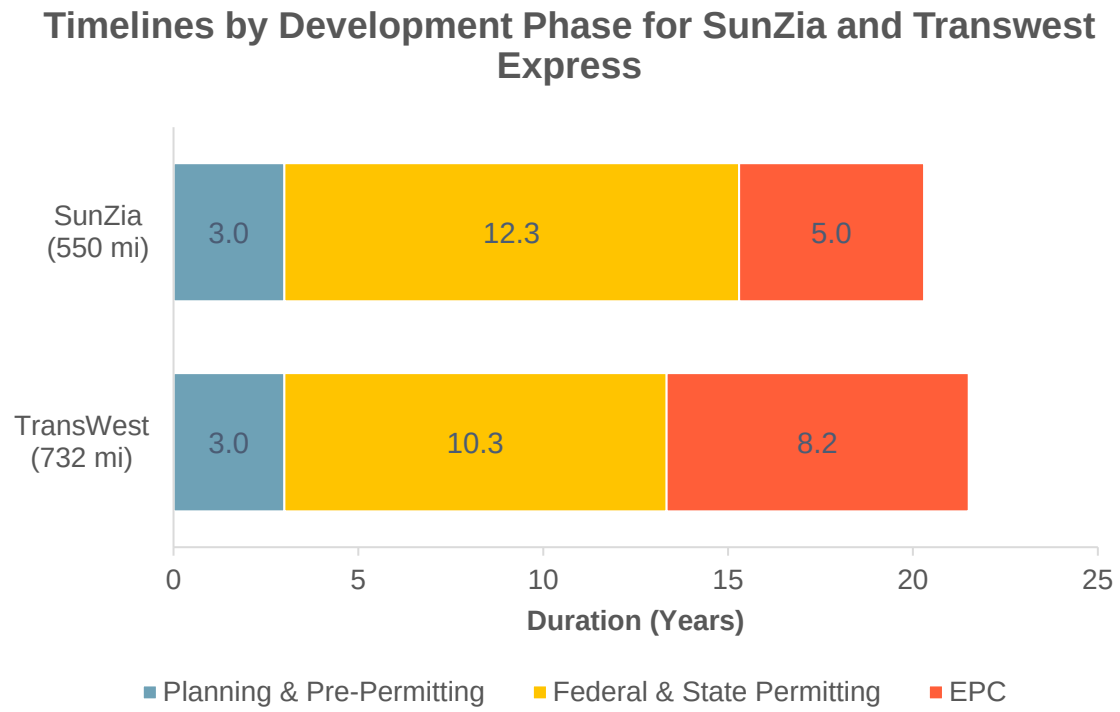
Permitting and Routing Can Cause Significant Delays

Sunzia Project

+ **Nearly 17 years was required to get full approval from the Bureau of Land Management (BLM)**
  - Project developers initially thought approvals would take 5 years
+ **Routes have changed several times throughout the project development**
  - Route needed to be revised to accommodate private lands, Department of Defense property, migratory bird patterns and opposition from stakeholder groups (San Carlos Apache Tribe and Archaeology Southwest).
  - Each adjustment delayed the approval of local, state and federal permits
  - In 2018, the New Mexico Public Regulation Commission voted unanimously to reject the SunZia project due to inadequate information on routing

TransWest Express Project

+ **10-year permitting process that involved securing approvals from 4 states, 14 local governments and many private landowners along the proposed route**
  - Massive delay in approval from the federal government which owns two-thirds of the land that the transmission line will cross.
  - Pushback from some environmental groups over potential impacts on natural resources and from private landowners contributed to delays
  - Unanimous approval from the Wyoming Industrial Siting Council in 2019, the last of the state and federal approvals needed to move forward with the project that was first proposed in 2005



Notes: overall project timelines sourced from a combination of public sources and re-categorized due to overlapping horizons

Sources: Harvard Dataverse: Review of transmission lines since 2005
Berkeley Lab: Queued Up: Characteristics of Power Plants Seeking Transmission Interconnection As of the End of 2022
Pattern Energy: https://patternenergy.com/projects/sunzia-wind/
Transwest Express: https://www.transwestexpress.net/
NM Political Report: During groundbreaking of SunZia transmission line, lawmakers discuss the future of New Mexico's electric grid
WSJ News: The U.S. 'Fast-Tracked' a Power Project. After 17 Years, It Just Got Approved.
US Department of the Interior: Bureau of Land Management: DOI-BLM-NM-0000-2021-0001-RMP-EIS
US Department of the Interior: Bureau of Land Management: DOI-BLM-WY-0000-2010-0001-EIS

Federal Action and Proposals to Accelerate Transmission Development

+ **Several federal actions and policy proposals are aimed at reducing the time to develop transmission**
  - *Westwide Energy Corridor Designation (BLM):* Designated 5,000 miles of energy corridors as preferred locations for energy transport including siting of transmission and distribution infrastructure
  - *Coordination of Federal Authorizations for Electric Transmission Facilities (DOE NOPR):* Proposes to develop a Coordinated Interagency Transmission Authorizations and Permits Program to streamline permitting and environmental reviews process, improve interagency communication, engage communities earlier in the review process, and provide more certainty to developers by creating a standard and transparent process
+ **Other proposals aim to address issues related to transmission planning and cost allocation**
  - *Building for the Future Through Electric Regional Transmission Planning and Cost Allocation and Generator Interconnection (FERC NOPR)*: aims to address shortcomings in current transmission planning practices by including a long-term assessment of transmission needs and considering a broader set of transmission benefits when assessing allocation of costs of regional transmission facilities

BLM Energy Corridors

Source(s):
BLM, USFS, DOE - Energy Policy Act of 2005 Section 368 Energy Corridor Review, Final Report: Regions 1-6 (April 2022)


aps
Break

Inflation Reduction Act Overview

Nick Schlag, E3

Tax Incentives

Production Tax Credits

Clean Electricity
Up to 1.5 cents/kWh of renewable or zero carbon electricity

Advanced Manufacturing
Credits for solar, wind, and battery components, inverters, & critical minerals

Clean Hydrogen
Up to $3/kg of clean hydrogen produced

Nuclear Power
Up to 1.5 cents/kWh of electricity produced from nuclear energy

Investment Tax Credits

Clean Electricity and Energy Projects
Up to 30% of investment in certain renewable or low-carbon energy projects including energy storage

Geothermal Heating
Up to 30% of investment in geothermal heat pump projects

Advanced Energy Projects
Up to 30% of investment in industrial heat, CC, recycling, waste reduction and energy efficiency and other projects

Tax Credit Bonuses

Domestic
Up to 10% bonus for meeting domestic manufacturing requirements

Energy Communities
Up to 10% bonus for projects located in brownfields or communities in fossil fuel industry

Low-Income communities
Up to 10% bonus projects located in low-income or tribal communities
Up to 20% for projects in low-income residential buildings

Carbon Capture Tax Credits

Industrial Facilities & Power Plants
Up to $85/tCO$_2$ captured and stored; up to $65/tCO$_2$ utilized

Direct Air Capture Facilities
Up to $180/tCO$_2$ captured and stored; up to $130/tCO$_2$ utilized

Fuel Tax Credits

Clean Fuels
Up to $1/gallon of low-carbon transportation fuel produced

Sustainable Aviation Fuel
Up to $1.75/gallon of SAF produced

Residential Tax Credits

Clean Energy
Up to 30% of investment in residential solar, wind, geothermal, biomass, and battery storage projects

Energy Efficiency
Up to 30% of investment in projects that improve energy efficiency

Clean Vehicle Tax Credits

Charging Stations
Up to 30% of cost of charging or alternative fuel station

Used Vehicles
Up to $4k for used EV or plug-in hybrid

Consumer Vehicles
Up to $7.5k for EV, hybrid, or HFCV

Commercial Vehicles
Up to $40k for purchase of clean vehicles over 14,000 lbs, up to $7.5k for anything less

Direct Investments

Electric Transmission

Financing
$2B to DOE for loans financing lines in national interest

Siting
$760M to DOE for grants to states to help w/ siting lines

Planning
$100M for planning & modeling interregional & OSW Tx

Other Spending

Advanced Industrial Projects
$5.8B to DOE for projects that reduce emissions of energy-intensive industries

GHG Reduction Fund
$27B in grants for seed capital for local projects to mitigate climate change

Rural Electricity
$9.7B to USDA for rural electric cooperative financial assistance

Oil and Gas

Methane Fee
$900/tonne fee on excess methane, increasing up to $1,500/tonne

Three Things to Know About IRA Tax Credits

1. **IRA expands tax credit eligibility to a broad range of clean energy technologies**

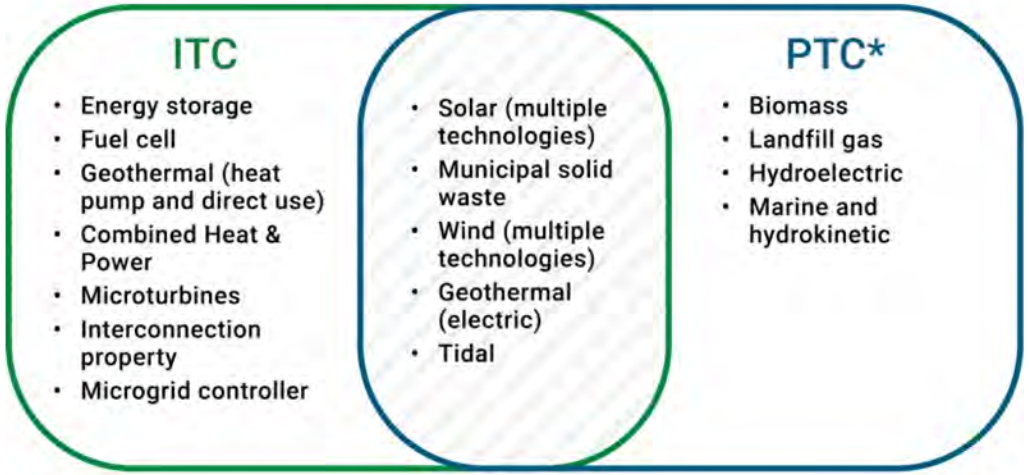
2. **The value of tax credits available to each project depends on project-specific factors, including location, labor, and materials sourcing**

3. **Sunset provisions for tax credits provide long-term stability to industry**

IRA Tax Credits Apply to a Broad Set of Clean Energy Technologies

+ **Prior to 2023, the ITC and PTC were limited**
  - Technology-specific, focused on renewable energy
  - Extended for relatively short horizons
+ **In 2025, the traditional ITC and PTC will be replaced by the "Clean Energy" ITC and PTC**
  - "Bonus" adders to incentivize desired attributes
  - Wider eligibility for clean tech, including standalone storage
+ **Additional tax credits established for specific technologies:**
  - Carbon capture and sequestration (45Q)
  - Hydrogen production (45V)
  - Existing nuclear generation (45U)

Technology Eligibility for ITC & PTC



Beginning 2025, tax credits apply to *any* zero greenhouse gas emitting technology

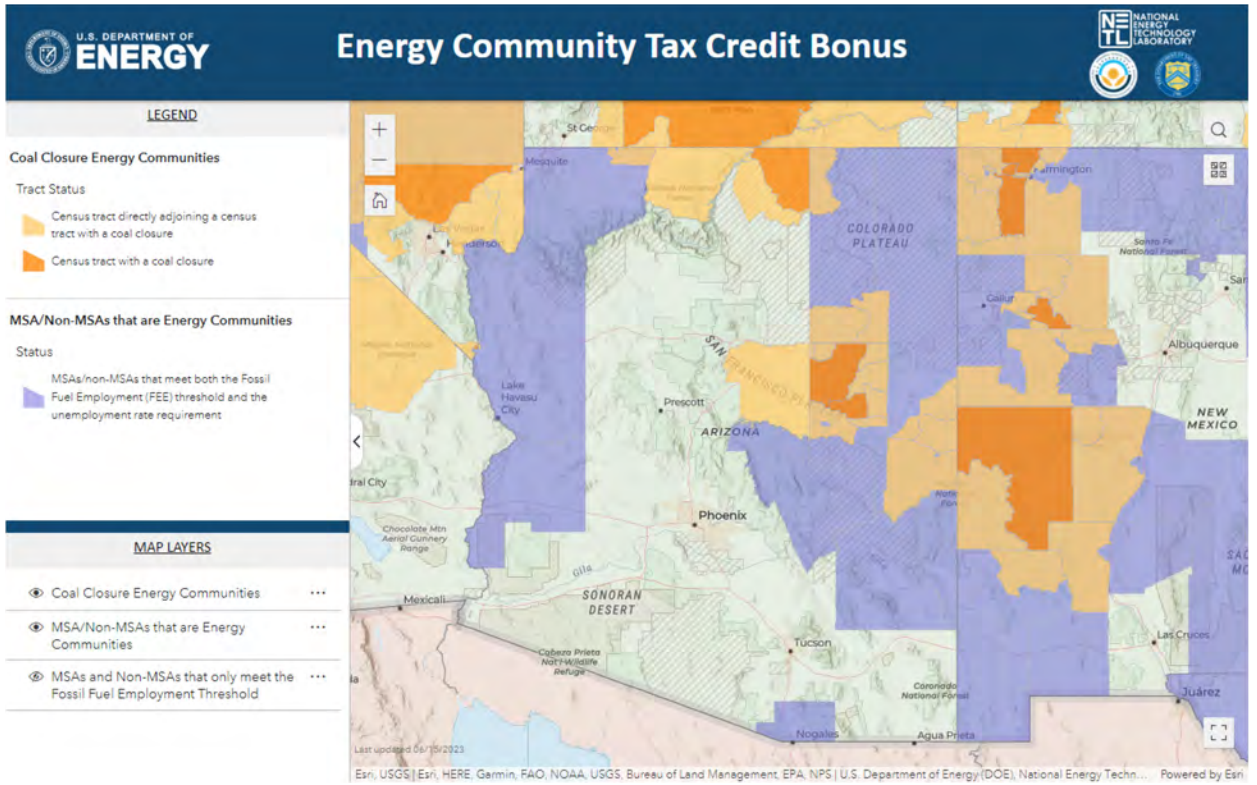
Source: US Department of Energy

Clean Energy Tax Credits Will Depend on Project Characteristics

+ **"Base" tax credit: $5.50/MWh (PTC), 6% of capex (ITC)**

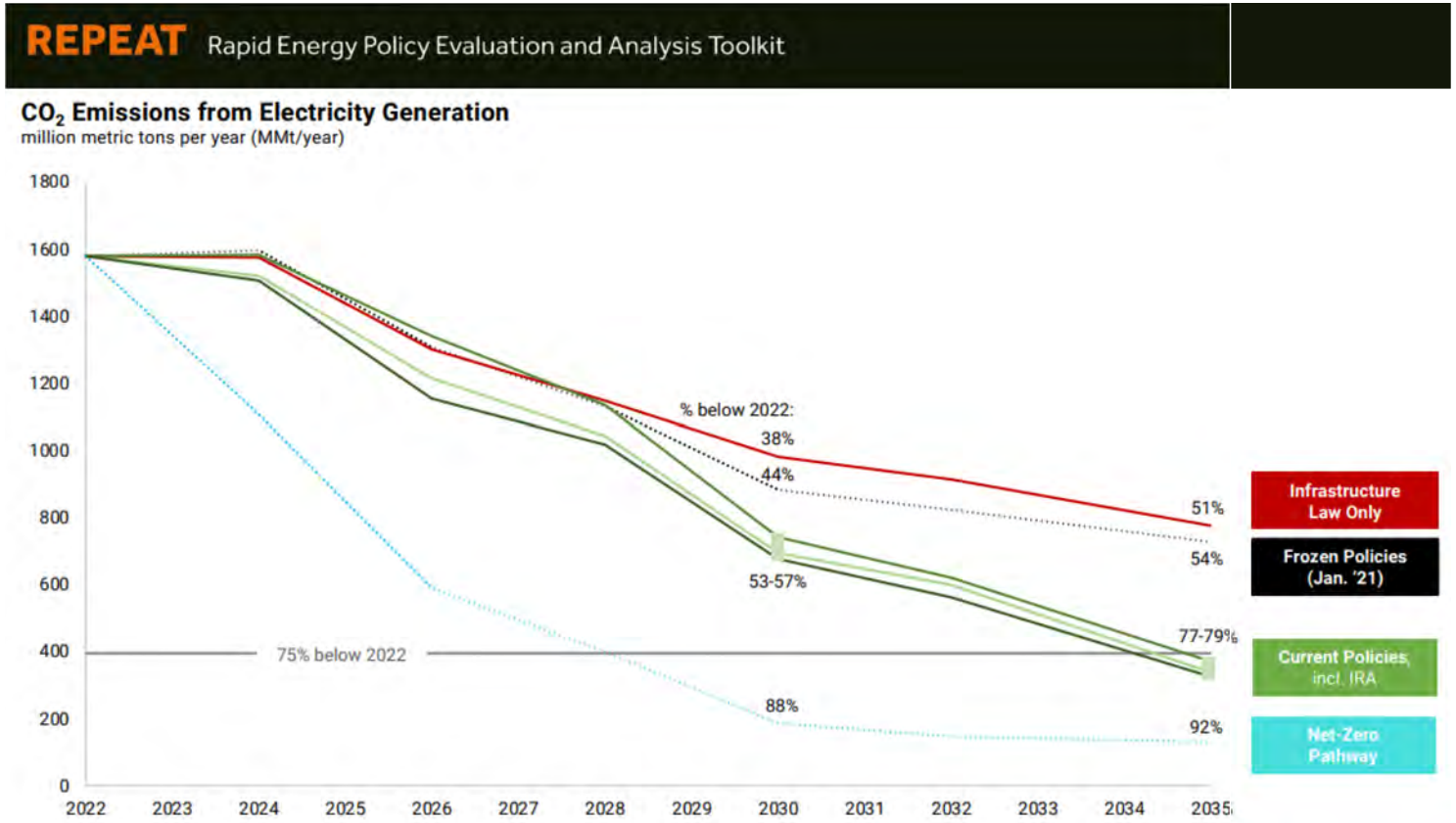
+ **Projects that meet <u>prevailing wage requirements</u> are eligible for 5x bonus: $27.50/MWh or 30% of capex**

+ **Additional bonuses for:**
  - Projects located in an **<u>energy community</u>** (+10%)
  - Projects utilizing **<u>domestically manufactured materials</u>** (+10%)
  - Small projects located in **<u>low-income communities</u>** (+10-20%)



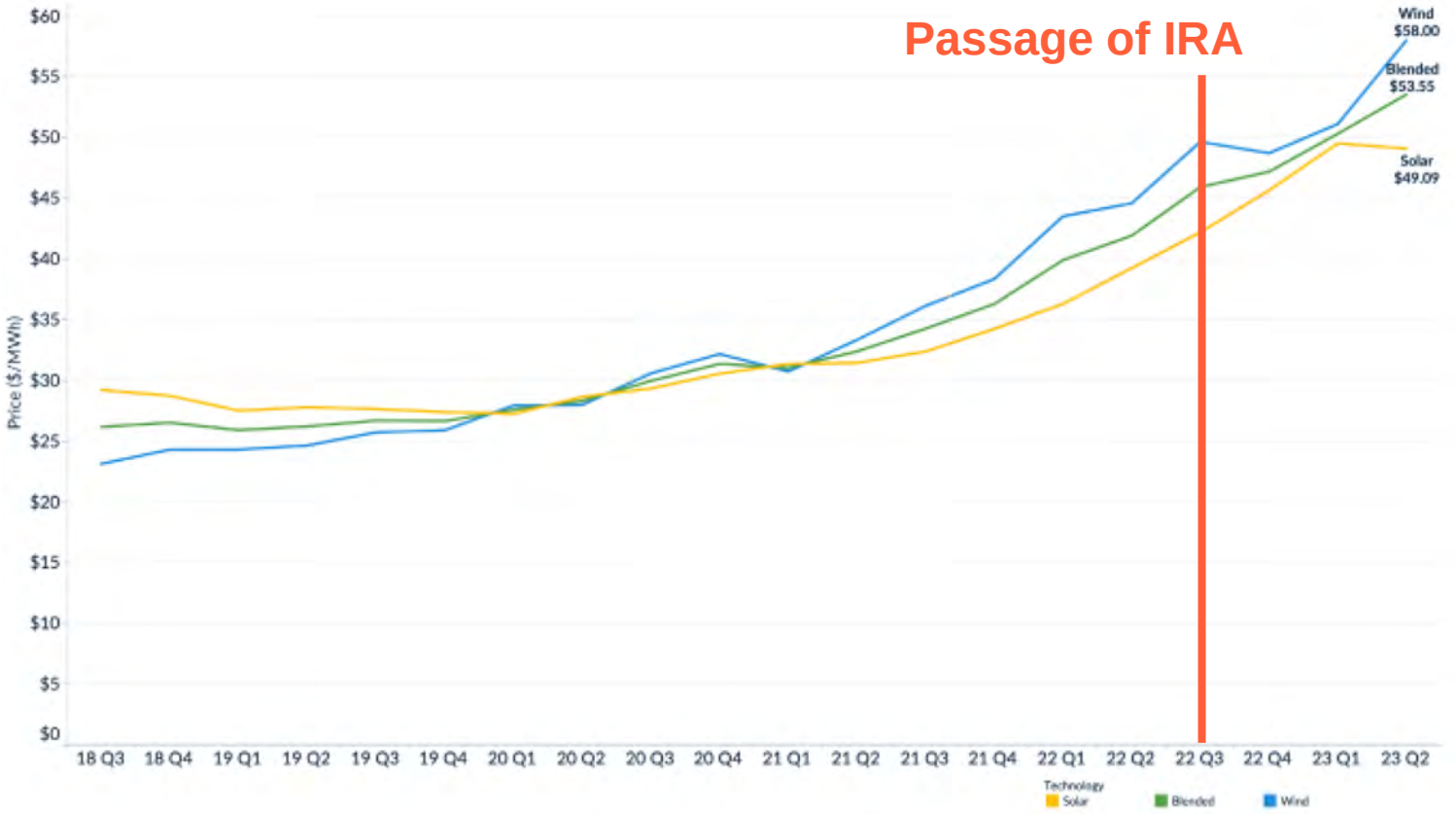
Expiration of Tax Credits Likely Decades in the Future

- **Most tax credits established in IRA are set to expire <u>the later of</u>**
  - End of 2032, or
  - When US electric sector greenhouse gas emissions are reduced by 75% relative to 2022 levels
- **While some analysis indicates this could occur by the mid 2030s, early consensus among experts is that this could mean tax credits will remain in effect into 2040s**
- **Allows long-term visibility and confidence for relevant investment planning**



Source: Princeton REPEAT Project

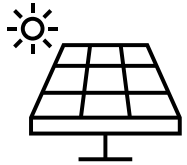
Renewable PPA Prices Have Continued to Rise Since Passage of IRA



Source: LevelTen Q2 2023 PPA Price Index Executive Summary

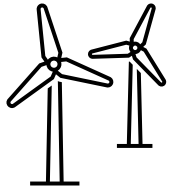
- **Supply chain disruptions & inflationary pressures have driven cost increases for renewables and storage in past few years**
- **IRA tax credits have not yet had a clear and visible impact on market prices**
- **Uncertainty remains as to how and when impacts of tax credits will affect technology pricing**

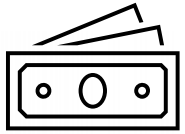
A Forward-Looking View of the Clean Energy Tax Credits



Near Term

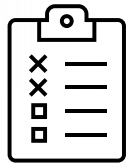
Renewable and storage projects get "back on track" as incentives offset near-term cost inflation and supply chain disruptions

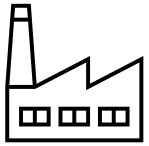




Medium Term

Funding and planning begin translating into significant innovation and project development



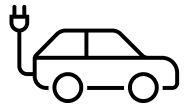


Long Term

Climate goals start to hit early milestones

H2 + CCUS opportunities prevalent

Strong electrification infrastructure



APS Customer Programs

Izzy Lawrence, APS

Demand Response | Program Capacity

- **Cool Rewards** – Residential Smart Thermostats
  - 80,000+ devices
  - 58,500+ customers
  - ~125 MWs

- **Peak Solutions** – Commercial & Industrial
  - 75 customers
  - ~50 MWs

- **Residential Battery Pilot** – Residential Batteries
  - 178 customers
  - 262 batteries
  - ~1 MW

Multifamily Energy Efficiency Program | Water Heater Controls Pilot

- Wi-Fi connected retrofit controls for electric water heaters
- Allow water heating to be timed around TOU rates
- Reduce peak demand, integrate carbon free midday solar
- **Equity effort to provide DER benefits for renters**

EV Managed Charging

Behavioral Managed Charging

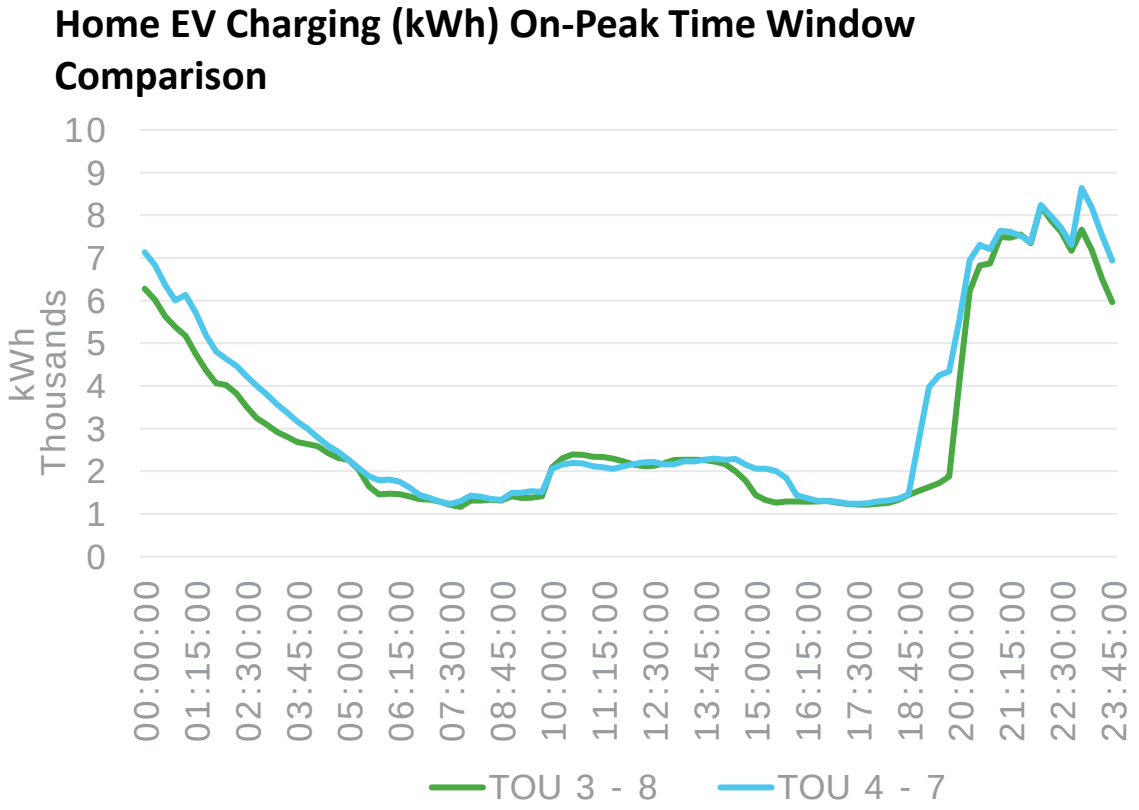
APS Smart Charge

Promoting beneficial charging behavior via price signals (i.e. TOU rates)

Active Managed Charging

APS Smart Charge +
(Name TBD, program pending approval)

Managing customer charging for beneficial load shapes



Fleet Electrification | Customer Support

Early Learning → Planning → Design & Construction → Operation & Optimization

- APS Fleet Marketplace - *(pictured below)*
- APS Fleet Advisory Service

- Future make-ready program

- APS TOU and EV Rates
- Future Managed Charging Program

Green Power Partners Program | Customer-Focused Renewable Energy Program

Commercial customers are adopting renewable and clean energy goals

- New Renewable Resources
- Additionality
- Renewable Energy Credits (RECs)
- Low Cost and Limited Complexity

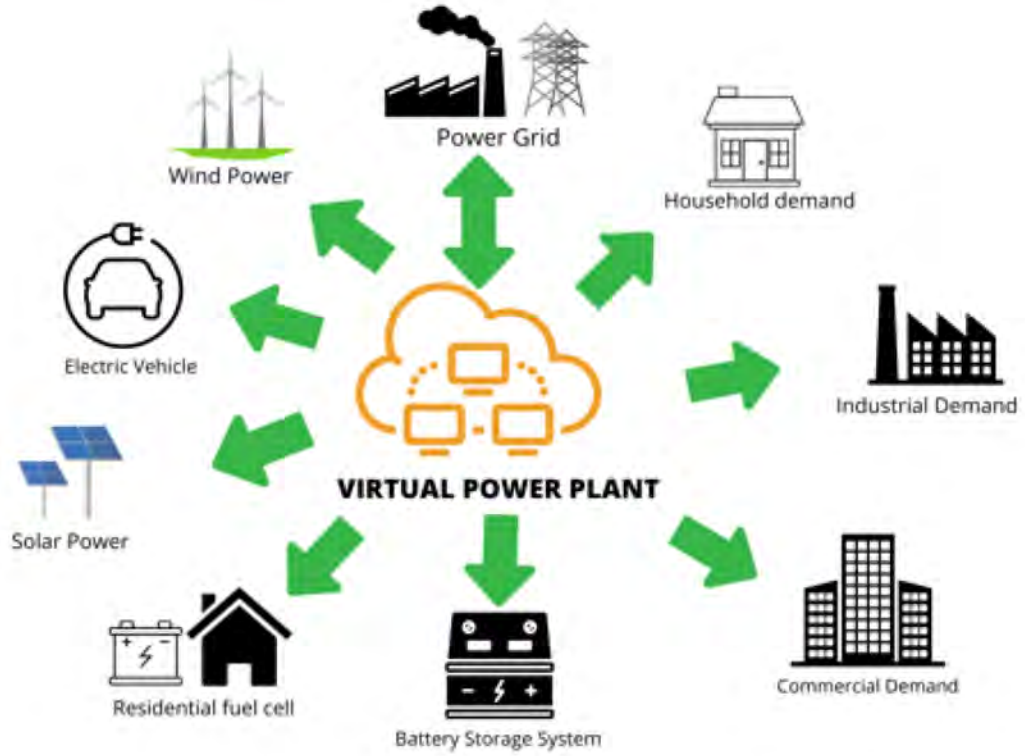
Continue to Innovate | Customer Program Offerings

- Expand program offerings to meet customer sustainability targets
- Engage with our customers to ensure customer needs are met
- Continued partnership

- Develop a Clean Energy Programs – technologies could include nuclear, batteries and green hydrogen
- 24/7 hourly load matching with clean energy
- Other customer flexibility options

Scaling APS's Virtual Power Plant

- Existing portfolio ~175+ MWs
- Working to scale our VPP in the next decade with various technologies
  - Battery Storage
  - EV Managed Charging
  - C&I DR
  - Residential DR
  - New technology




aps
Stakeholder Engagement
Matt Lind, 1898 & Co.
WRONG WAY
DEERE
SUNSTATE EQUIPMENT
310K EP SUNSTATE EQUIPMENT
110161
aps
SILVERADO
4X4

Stakeholder Communications

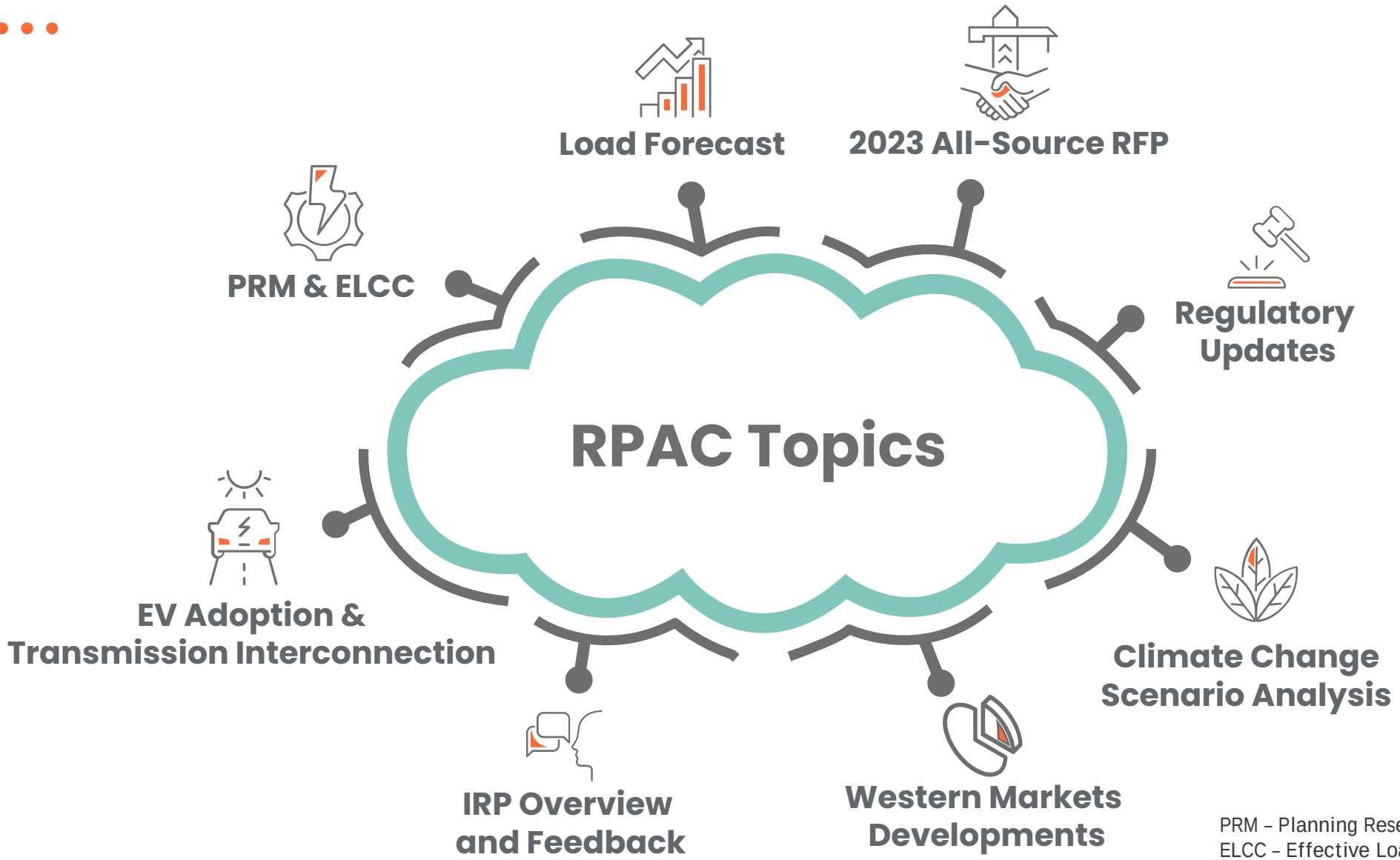
Monthly RPAC meetings allow APS an opportunity to provide planning progress updates. This also allows stakeholders to provide input and feedback that can inform the development of the IRP plan.

Meeting minutes and presentation slide decks are publicly available on the APS website

aps.com/resources

APS provides opportunities for stakeholder feedback, such as workshops, public comment periods, and online surveys.

Resource Planning Advisory Council (RPAC) Meeting Topics



PRM – Planning Reserve Margin
ELCC – Effective Load Carrying Capability

Stakeholder Feedback

RPAC Modeling Group has access to Aurora software - IRP database

Feedback on scoring criteria and evaluation metrics incorporated in the 2023 All-Source Request for Proposal (ASRFP).

Monthly meeting cadence allows APS to hear what stakeholders prioritize, identify ways to incorporate feedback into its planning processes, and follow up on questions.

IRP Reference Case Results

Mike Eugenis, APS

IRP Reference case identifies an optimal portfolio under various constraints and a base set of assumptions on uncertain variables

Portfolio selected in reference case is **NOT** the preferred portfolio. APS will evaluate portfolios selected across each of the cases before determining a preferred portfolio.

External environment

Load growth	Capital costs
Peak load growth of ~3.5% p.a. from 2023-2032 *(23Q1 w/ probability-weighting)*	Reflect 2022 ASRFP baseline pricing & utilize NREL ATB for price curves

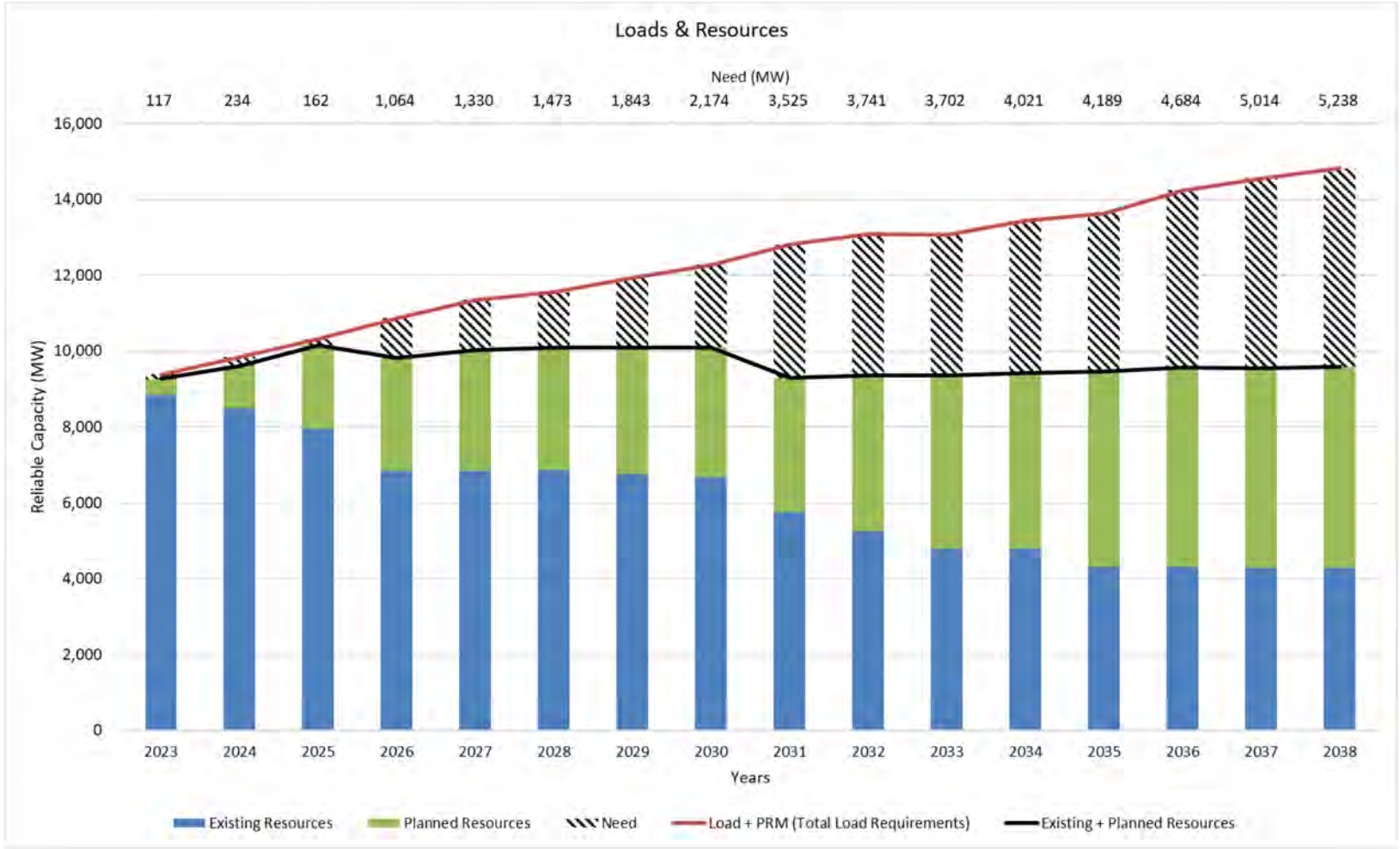
Natural gas prices	Market prices
Base Forecast	E3 revised 2023 prices

APS-specific assumptions

Financial	EE and DSM	Four Corners Exit
2.5% Inflation 6.74% WACC	In accordance with most recent DSM Implementation Plan	Exit in 2031

Carbon Price	Clean Energy Commitment
$20.72/ton CO2e *(internal assumption)*	45% Renewable / 65% Clean by 2030

IRP Reference case – “Need” identification



New Resource Alternatives – LTCE Runs

National Renewable Energy Laboratory (NREL)
Advanced Nuclear
Small Modular Reactor
Large-Frame Combustion Turbine
Combined Cycle (CCGT)
CCGT w/ Carbon Sequestration 90%
Concentrated Solar Power
Geothermal
Biomass

Energy Information Administration (EIA)
Aeroderivative Combustion Turbine

APS RFP
Battery Energy Storage System (BESS) – 4hr
BESS – 5hr
Utility Solar – Single-Axis Tracking
Solar + BESS – 4hr (PVS-4hr)
Solar + BESS – 5hr (PVS-5hr)
Southwest Wind
Microgrid
Pumped Storage Hydro
Compressed Air Energy Storage (CAES)

Guidehouse
Energy Efficiency Portfolios

Key Model Considerations

Liquidated Damages modeling for coal plant operations

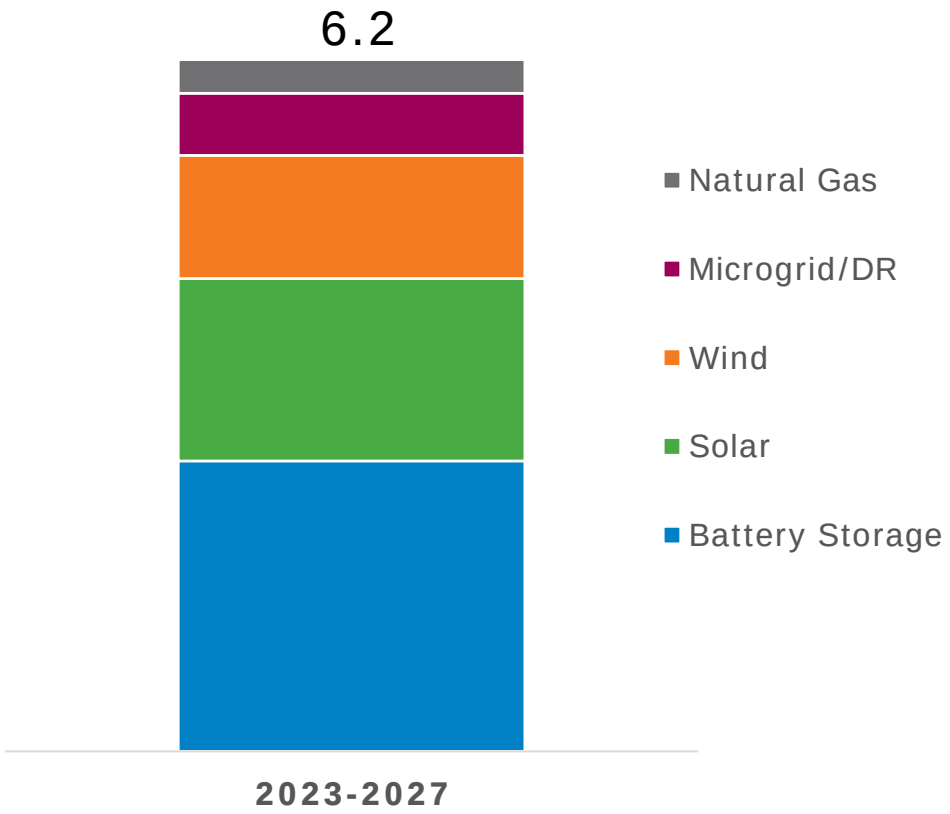
Updated resource contribution to reliability navigating the loop between capacity expansion and resource adequacy considerations

Co-optimization of transmission expansion along with resource expansion

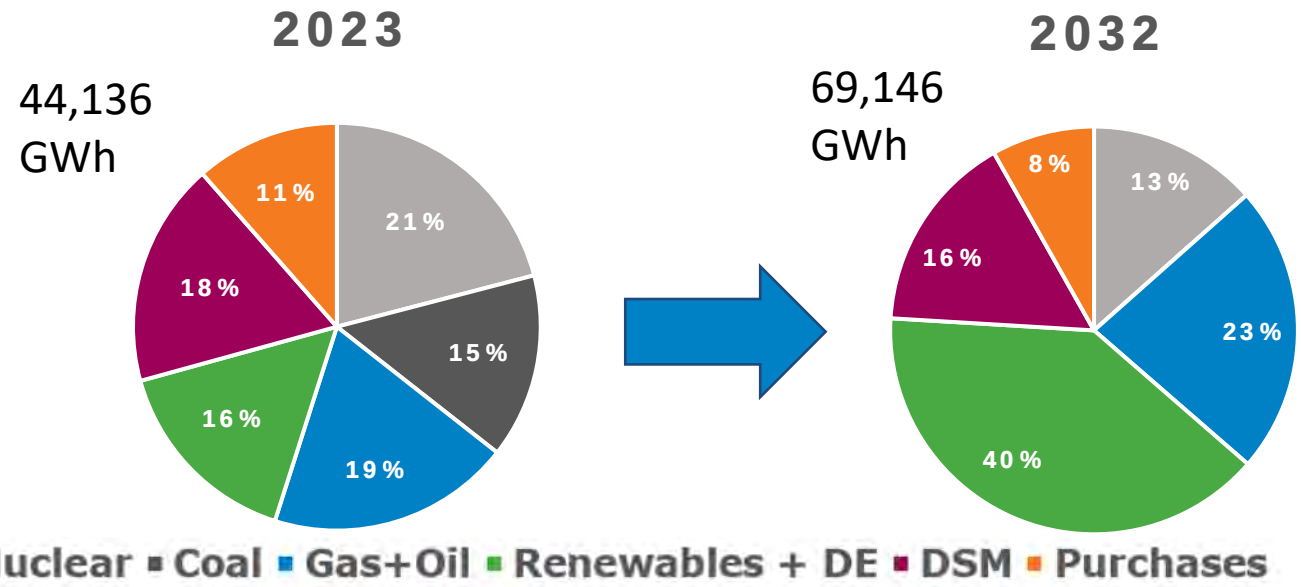
Monthly Gas Transport Limitations modeling

Early Results Show Durability of Near-Term Resource Selections

Nameplate capacity additions (in GW)

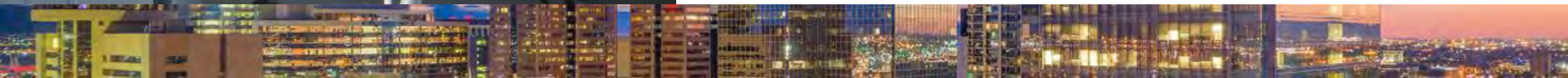


- Continued investment in renewables as most cost effective option
  - Impacts of IRA > $2B
- Natural gas & demand side resources key for capacity and transmission efficiency



Key Themes & Development Strategy

Reliability	**Renewables availability**
	Four Corners replacement
Risk mitigation	**Transmission & nat. gas constraints**
	Durability of resource decisions



Transmission Development Critical

Wind Access

Market Connectivity

Customer Demand

Optionality

Closing Remarks

Matt Lind, 1898 & Co.

Closing Remarks

Presentation Material

Presentation slides, meeting minutes, and a summary of question/answers will be available on the APS website.
www.aps.com/resources

Upcoming Events

- IRP Filing: 11/01/2023
- Public Stakeholder Meeting #3: Early November 2023

Thank You

APS wants to thank the public for the involvement in the IRP process. Participation and feedback continue to be instrumental in the planning process.