2024 Integrated Resource Plan

Final community presentation

Introduction

Javier Camacho, director of public and external affairs, strategic communications and social marketing

Meeting logistics

- Safety and housekeeping
- Accessibility services
  - Spanish translation available via Zoom
  - Hearing-impaired headsets
- Q&A portion will follow the presentation
  - Virtual: submit questions via PollEV.com/prpa (link available in the Zoom chat)
  - In-person: cards are available to submit written questions

Unase via Zoom para la traducción al español

- Traducción en español está disponible. En su computadora, haga clic en el ícono del mundo etiquetado como "Interpretación" y seleccione "Español." Si está en una tableta o teléfono inteligente, haga clic en los tres puntos que dicen "más" y seleccione "Interpretación de idioma" y luego "Español."
- Puede encontrar instrucciones adicionales aquí: prpa.org/espanol.pdf
- Audifonos con un adaptador para iPhone o Android están disponibles para su conveniencia.

Para llamar por teléfono:
US: 1 719 359 4580
Webinar ID: 896 3032 7905

Agenda

- IRP presentation
  - Introduction: Javier Camacho, director of public and external affairs, strategic communications and social marketing
  - IRP results: Masood Ahmad, senior manager, resource planning
  - Virtual power plant update: Paul Davis, manager, distributed energy resources
- 10-minute break
- Q&A

Platte River Power Authority

- Reliability
- Environmental responsibility
- Financial sustainability

4 municipalities
350K+ residents

Community owned, public power utility

~300 employees

Community engagement recap

- Between June 2023-August 2024, 36 unique engagement events reaching hundreds of people across our service region
  - Community listening session on June 1, 2023
  - Community engagement session on November 2, 2023
- Dedicated IRP microsite with Q&A repository, IRP studies and IRP updates
- Dedicated email address for people to submit questions and from which people received answers and updates
- Public education and media

2024 IRP results

Masood Ahmad PhD, senior manager, resource planning

Addressing customer needs for today and beyond

Platte River is leading the **clean energy** transition – in line with its Resource Diversification Policy

Reliability

Environmental responsibility

Financial sustainability

Add renewables

Continue to add even more sources of reliable, renewable energy

Monitor

Monitor emerging technologies for inclusion in future planning

IRP introduction

- An IRP is a planning process that integrates our customers' demand and resources (Distributed Energy Resources or **DERs** and Virtual Power Plant or **VPP**) with utility resources to provide reliable, economical and environmentally desirable electricity to customers in the coming years.
- Plan is developed over 18-24 months including public engagements and help from external consultants.
- Plan is developed for the next 10-20 years. Our business is capital intensive and requires long lead times.
- IRP is repeated every 3-5 years to assists with industry changes including:
  - Technological progress
  - Consumer preferences
  - Regulatory mandates
- The Western Area Power Administration (WAPA) requires Platte River to file an IRP every five years, but we are expediting our IRPs due to Resource Diversification Policy (RDP) implementation.
  - We filed 2020 IRP a year early and are now filing the 2024 IRP a year early; we will likely file our next IRP in 2028.
  - IRP includes an action plan and an annual follow up on plan execution.

IRP timeline

Access our previous engagement Q&As at
www.prpa.org/2024irp/faq

Platte River Power Authority

What we said in prior engagements

June 1, 2023

- What is an IRP?
- Continuation of the work since 2018 including the 2020 IRP
- Timeline and plan
- Talked about external studies (slide 13)
- Renewable integration challenges (slide 14)
  - Dark calms
  - Evening peak
  - Rising costs

Nov. 2, 2023

- Modeling process (slide 16)
- Results of external studies (slide 17-19)
- How are we dealing with renewable integration challenges?
- We can’t solve this puzzle without dispatchable resources! (slide 20)
- Some preliminary portfolios

Studies

Access our external studies and previous presentations at ***www.prpa.org/2024irp/information***

Complex modeling of an uncertain future

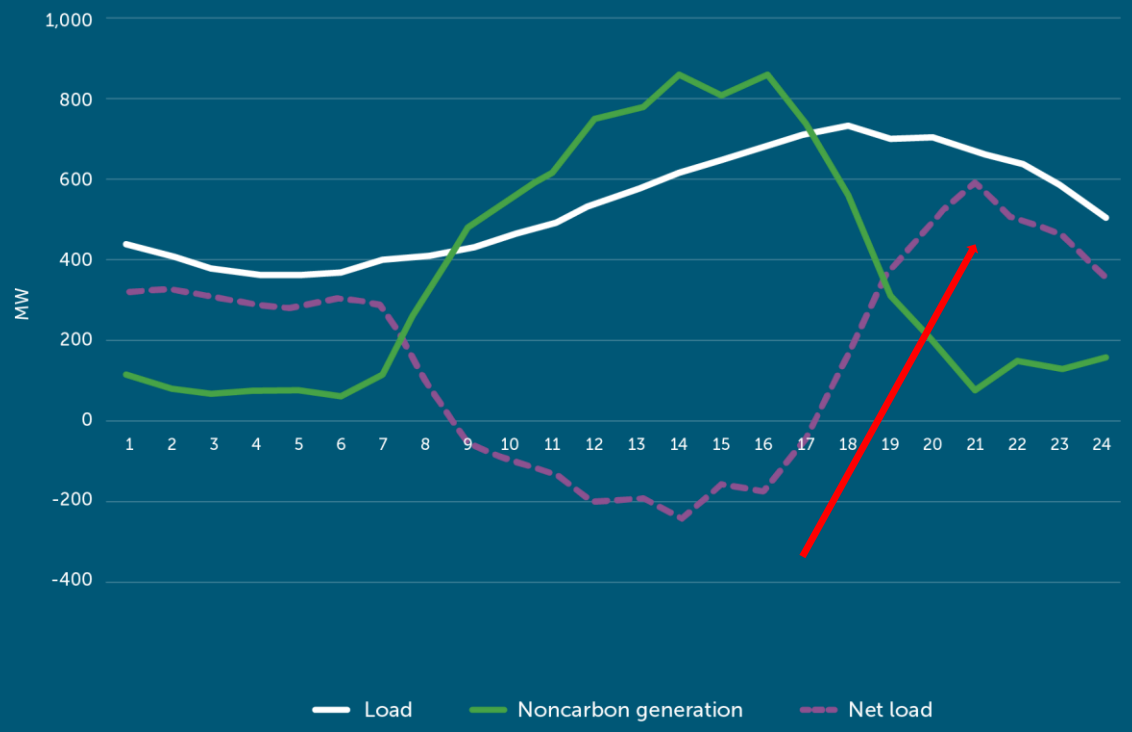
- Extreme weather modeling
- Load forecast, customer load contributions/flexibility
- Market prices, volatility and congestion
- Required reserve margin and ELCC
- Beneficial electrification assessment

Technology evaluation

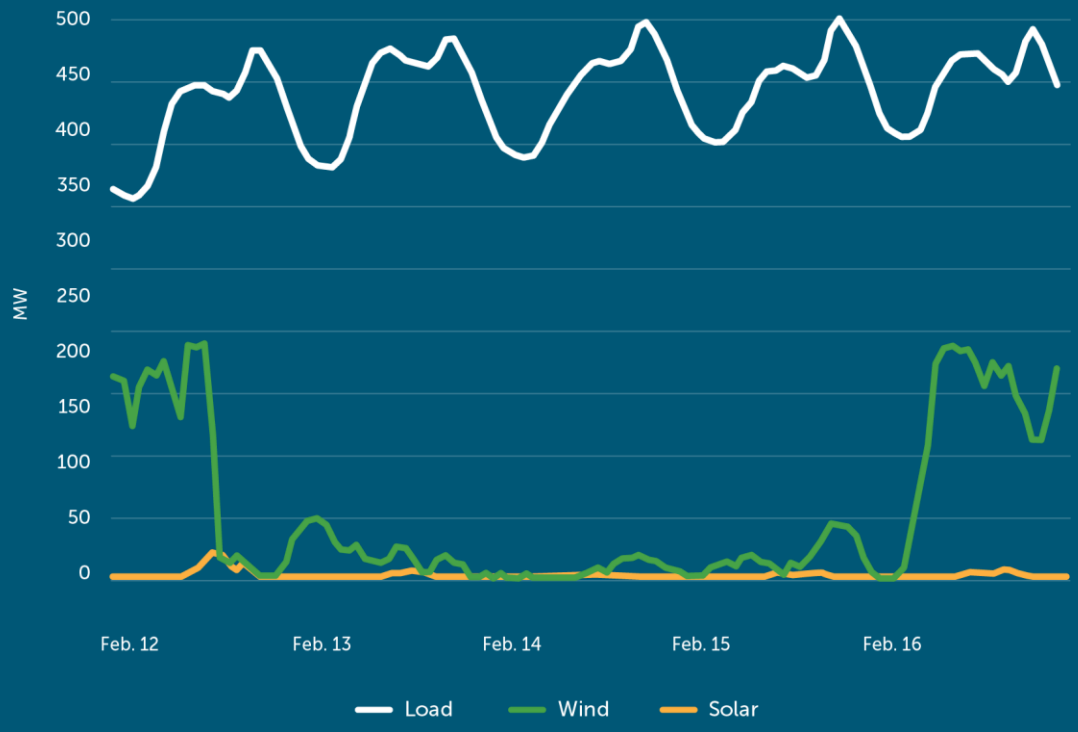
- Emerging technology screening
  - Cost curves
  - Time to maturity
- Dispatchable technology evaluation
  - High flexibility
  - Low carbon
  - Proven technology
- Distributed energy resource assessment
  - Customer adoption rate
  - Usage profiles

Renewable intermittency challenges

Hourly (Summer 2030 forecast)

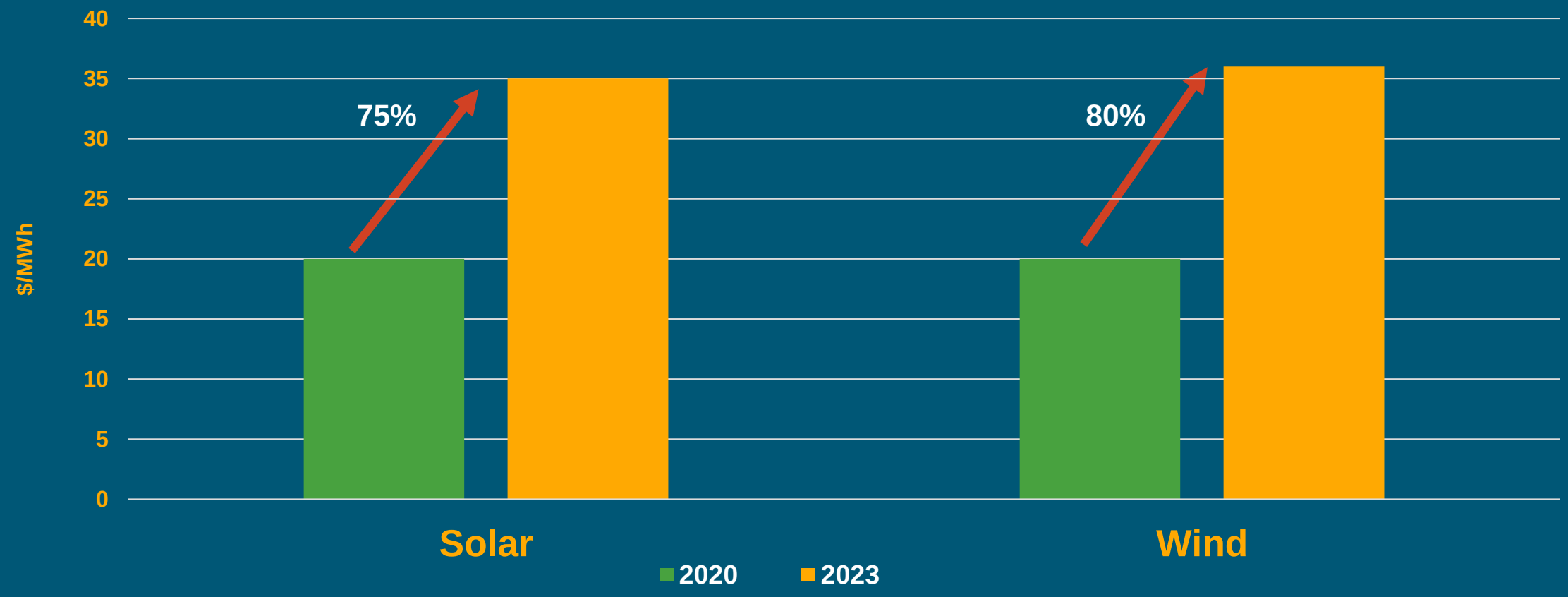


Platte River generation during winter storm Uri, February 2021



Coal generation played a key role - will need similarly reliable supply in the future

Trends in renewable costs



IRP process overview

External Studies

- Power and Commodity Price Forecast
- Extreme weather and Dark calm analysis
- Reliability – PRM and Effective Load Carrying Capability (ELCC analysis)
- Emerging technologies screening
- Dispatchable capacity requirements

Renewable Resource Costs

- All Renewable RFP issued
- Research Institute – National Renewable Energy Lab (NREL) & Electric Power Research Institute (EPRI)

Distributed Energy Resources

- Building electrification
- Assess Electric Vehicle (EV) and Distributed Generation (DG) impacts
- Load shapes

Load Forecast

- Base, high and low scenarios
- IRP model peak and energy demand

Core IRP modeling and evaluation

When, how much and what technology?

Portfolio Development

- **Lowest cost**
- **Lowest CO2**

Reliability Testing

- Resource portfolio testing with
  - Dark Calms
  - Extreme weather
  - Wind & solar profiles

500+ runs to test

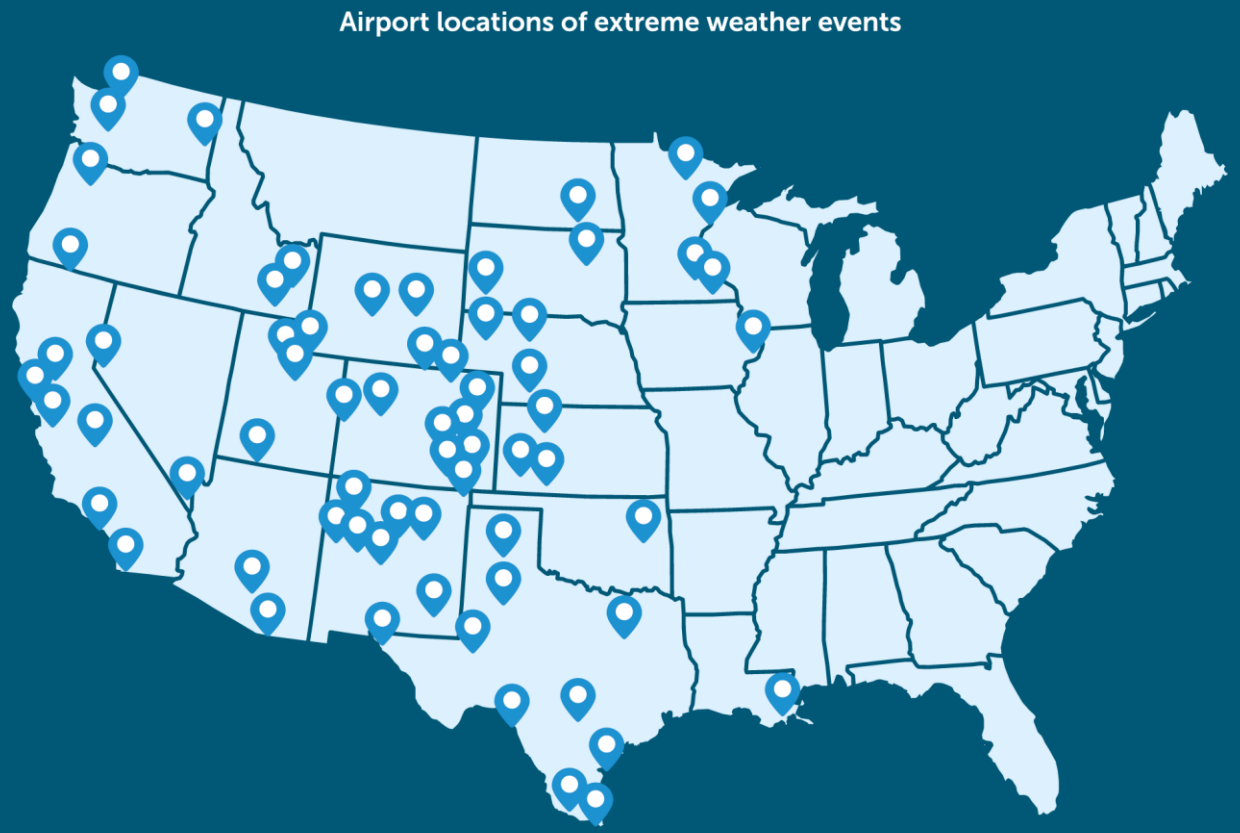
IRP 2024 Filings

- WAPA Filing
- Clean Energy Plan

Plexos Model

- Model Parameters and Constraints
- Existing Resources

Extreme weather and dark calm study scope

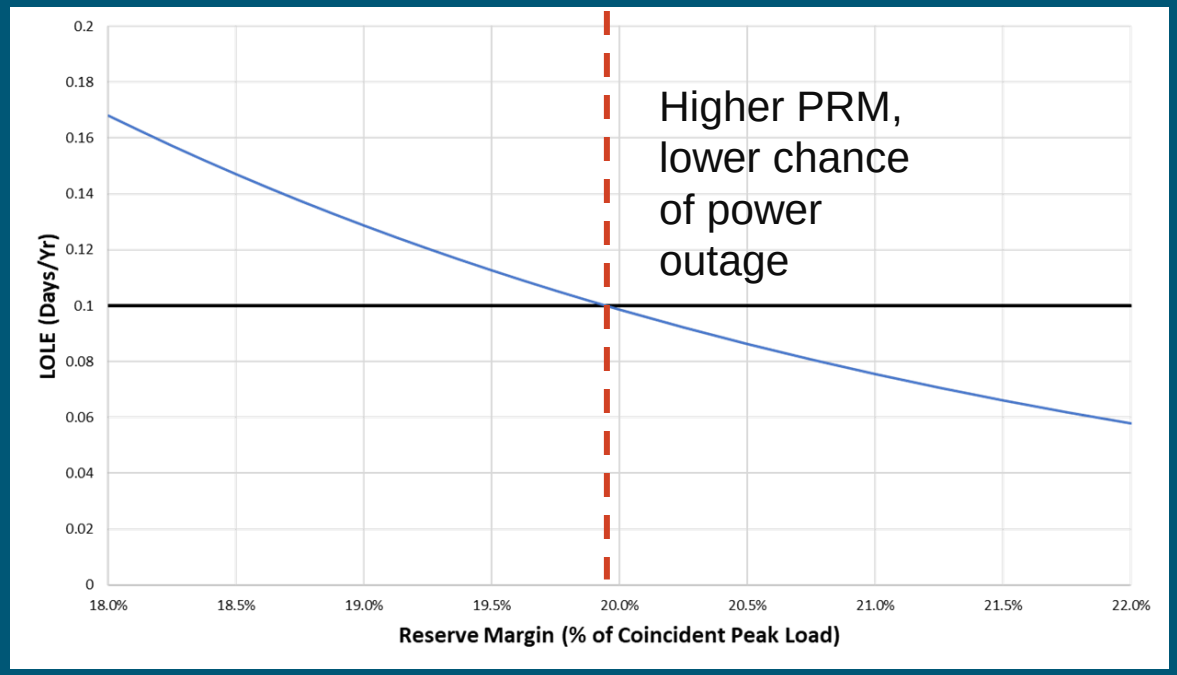


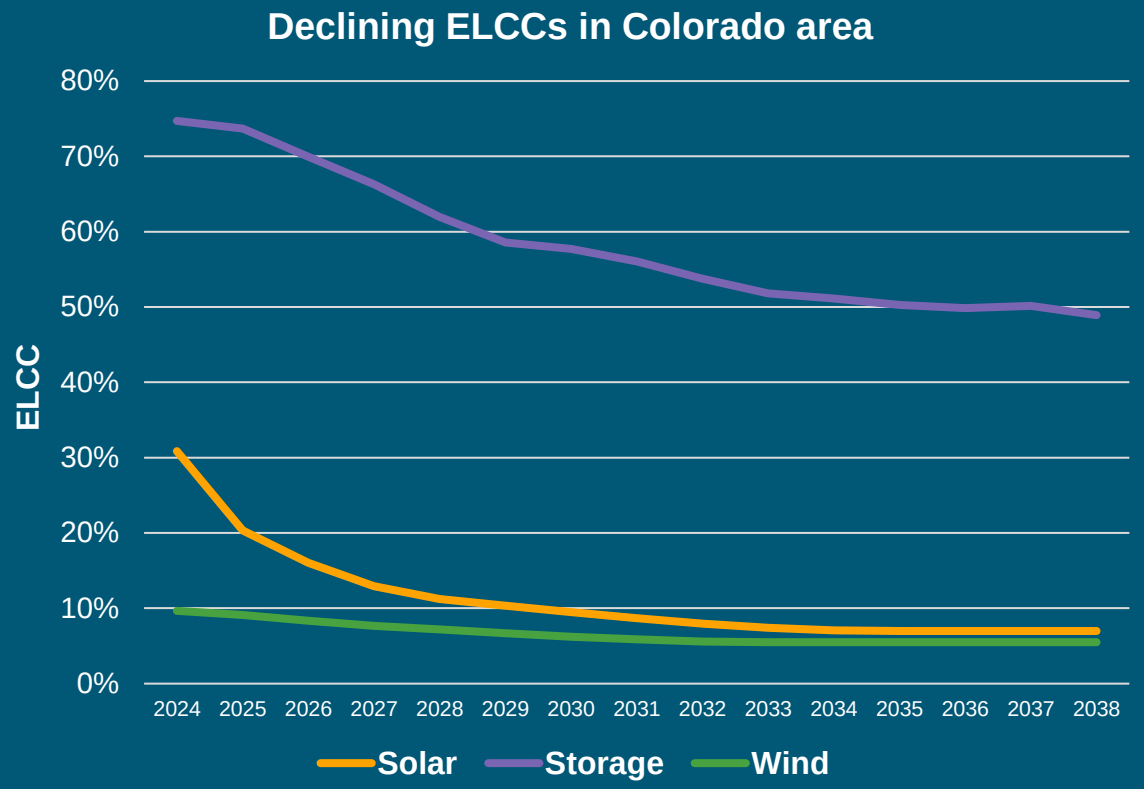
Dark Calm Events by Location

Breakdown of Events/Year by Renewable Output & Duration

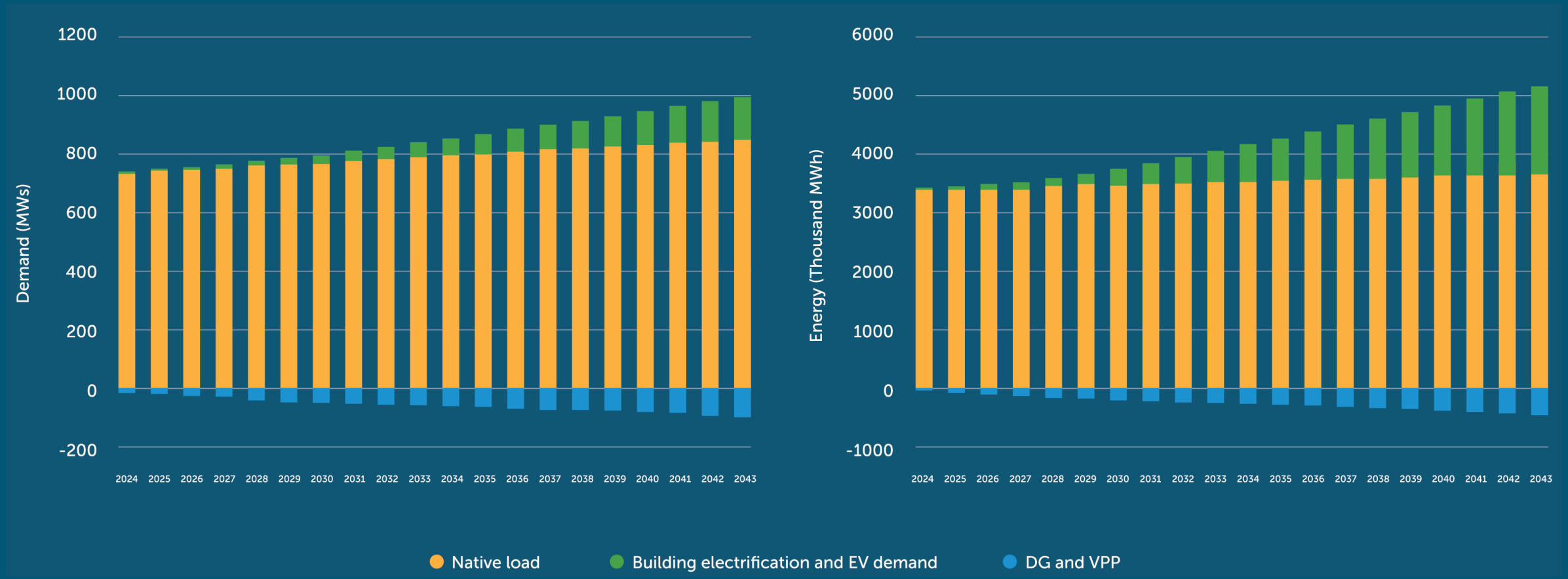
% of Full Output	48 hrs	72 hrs	96 hrs	120 hrs
MISO Central				
5%	3.00	1.25	0.50	0.25
10%	11.20	5.60	2.40	2.00
15%	6.20	11.40	3.80	4.80
MISO North				
5%	1.00	1.00	0.67	0.00
10%	5.00	1.75	0.50	1.00
15%	2.20	3.00	1.20	2.00
Northwest ERCOT				
10%	3.80	1.00	0.20	0.20
15%	3.20	3.40	3.00	1.20

Planning Reserve Margin and Effective Load Carrying Capability





Our customers will add new demand and resources through DERs



Portfolio selection criteria

Requirements

Three foundational pillars:

- **Reliability** – PRM and loss of load hours (LOLH)
- **Environmental responsibility** – CO_2 emissions (tons emitted)
- **Financial sustainability** – capital and operating costs

Regulatory requirements:

- State Clean Energy Plan (requires 80% CO_2 reduction by 2030 from 2005 actual emissions)

Considerations

Technology:

- Proven and cost effective
- Diversification – balanced combination of all
- Optimal longevity of power purchase agreements
- Avoiding stranded investments

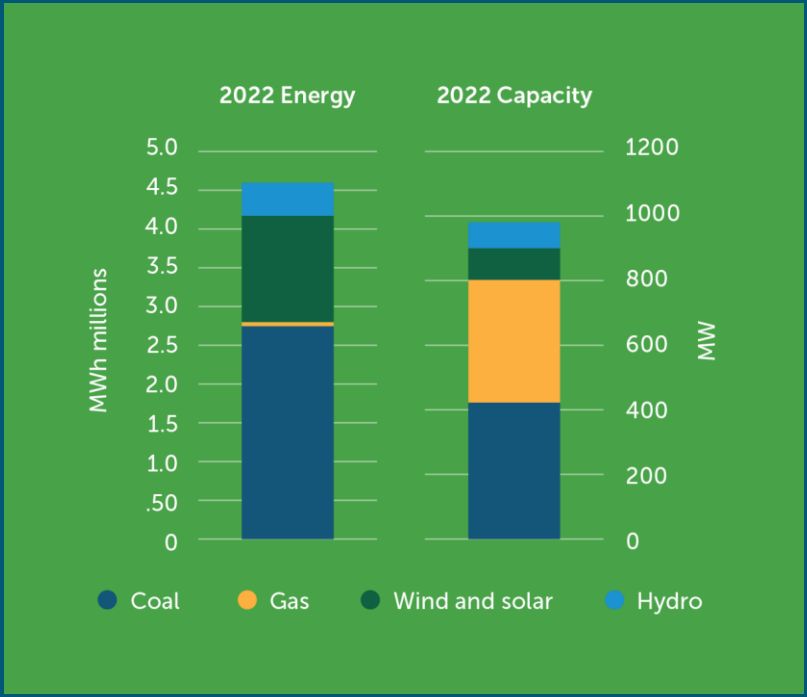
Other:

- How much energy we will export and import?

Dispatchable capacity is required in all portfolios to complement renewables and ensure reliability.

IRP challenge

Create a transition plan to retire 431 MW of coal, currently providing over half of the low-cost energy and reliable capacity. Replace this with low or no-carbon energy and capacity within six years.



Replace more than 2 million MWh of energy and equivalent capacity

Focus mostly on energy – but capacity or reliability is also critical

Solar

Battery storage

Wind

VPP

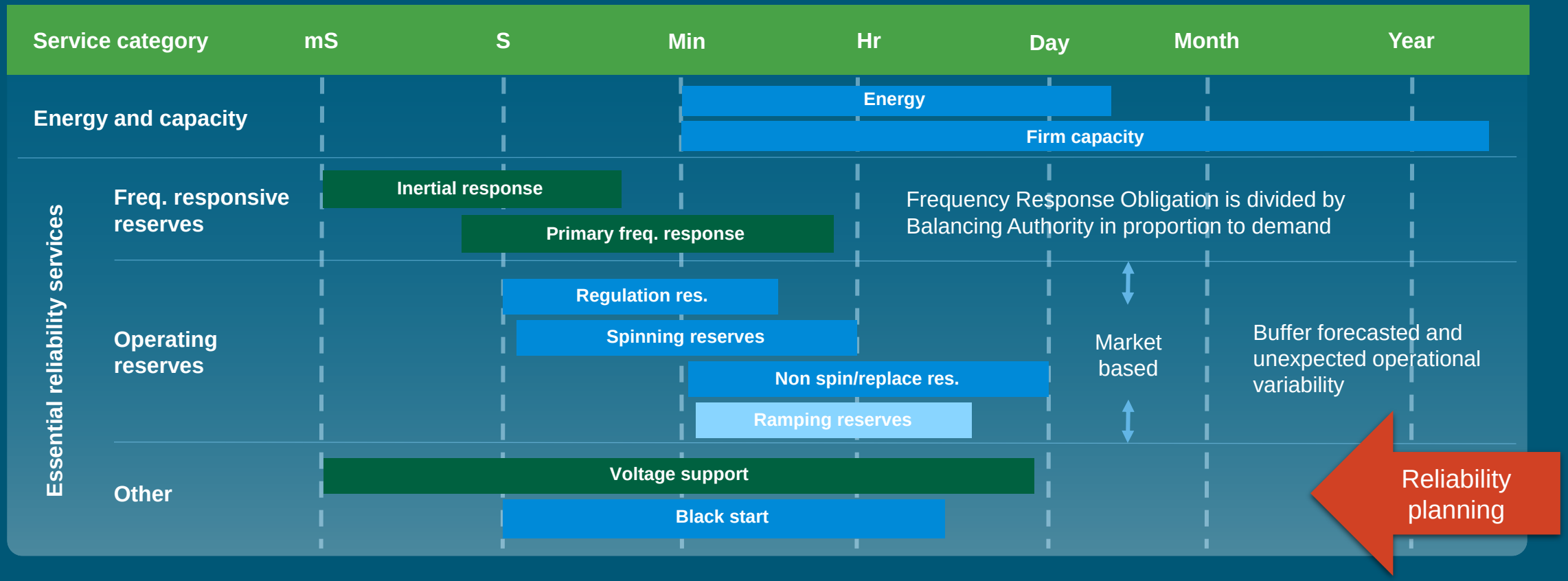
Energy, capacity and flexibility planning

- Reliable grid operation requires **energy**, **capacity** and **flexibility**. The IRP must plan for all three attributes.
- While wind and solar are excellent sources of energy, they are not able to provide capacity and flexibility. These two vital attributes must be procured from other sources for successful grid operation.

Resource type	Energy	Power/capacity	Flexibility	Feasibility for Platte River
Nuclear	✓	✓	Limited	
Coal	✓	✓	✓	
Gas	✓	✓	✓	✓
Hydro with storage	✓	✓	✓	
Wind	✓			✓
Solar	✓			✓
Storage	✓	✓	Limited	✓
Geothermal	✓	✓	Limited	
VPP	✓	✓	Limited	✓

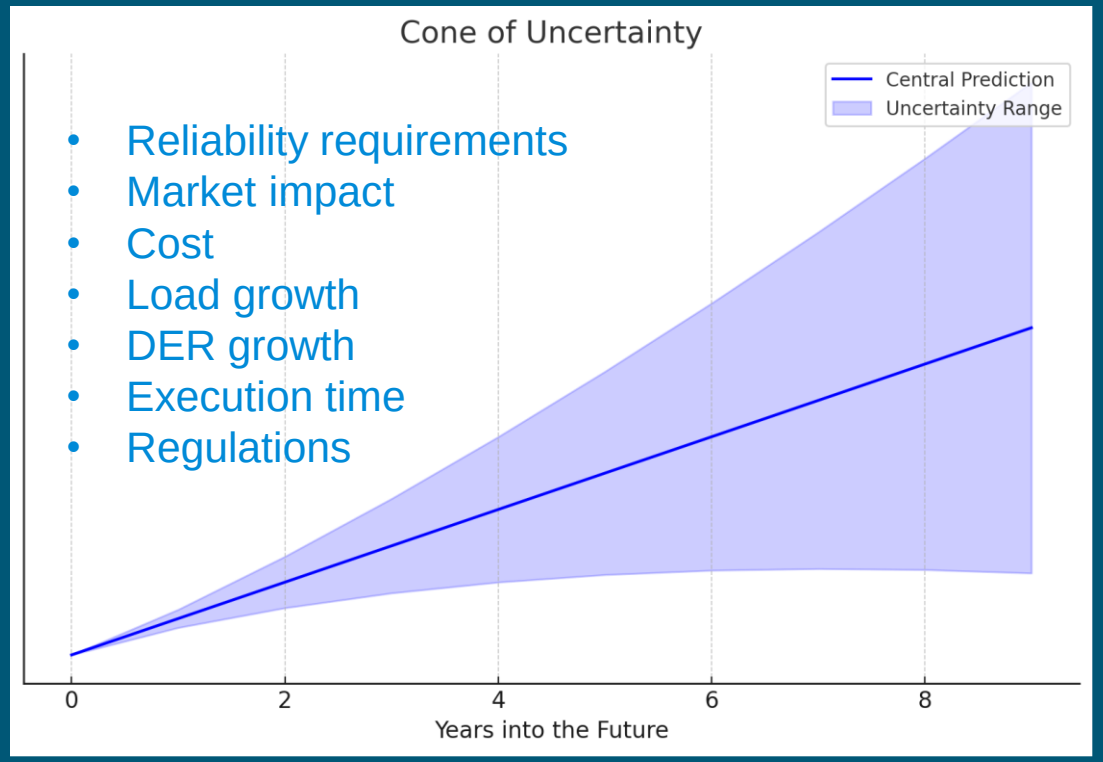
Energy – ability to do the work. Push electrons through the wires that do all the work.
Power/capacity – instantaneous energy. Energy at a fixed predictable rate.
Flexibility – Ability to change the power output on demand.

Electric reliability attributes and timeline



Real time reliability can only be achieved if we plan for the right resources and infrastructure

Multiple portfolios were developed to cover future uncertainties

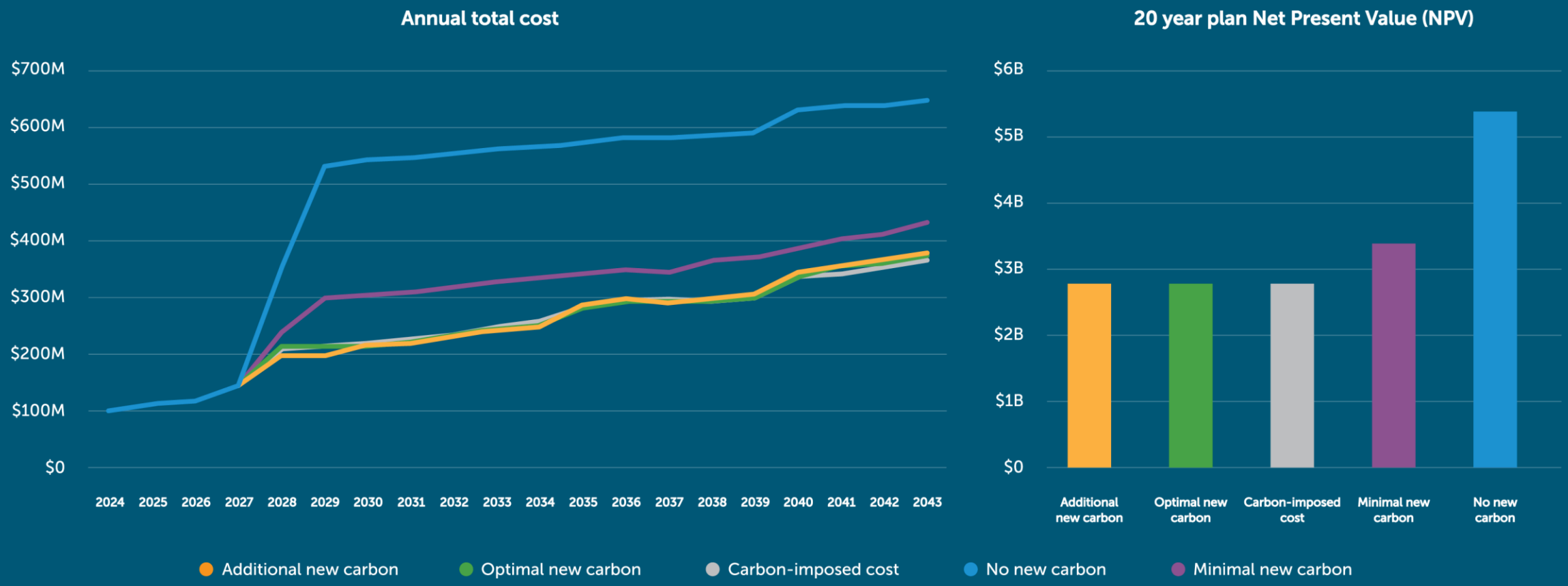


- What we heard from you, our internal discussions and advice from our consultations, we developed 20+portfolios.
- After stress testing with a lot of "what if" scenarios, we selected the following five as good representatives:
  - No new carbon
  - Minimal new carbon
  - Carbon-imposed cost
  - Optimal new carbon
  - Additional new carbon

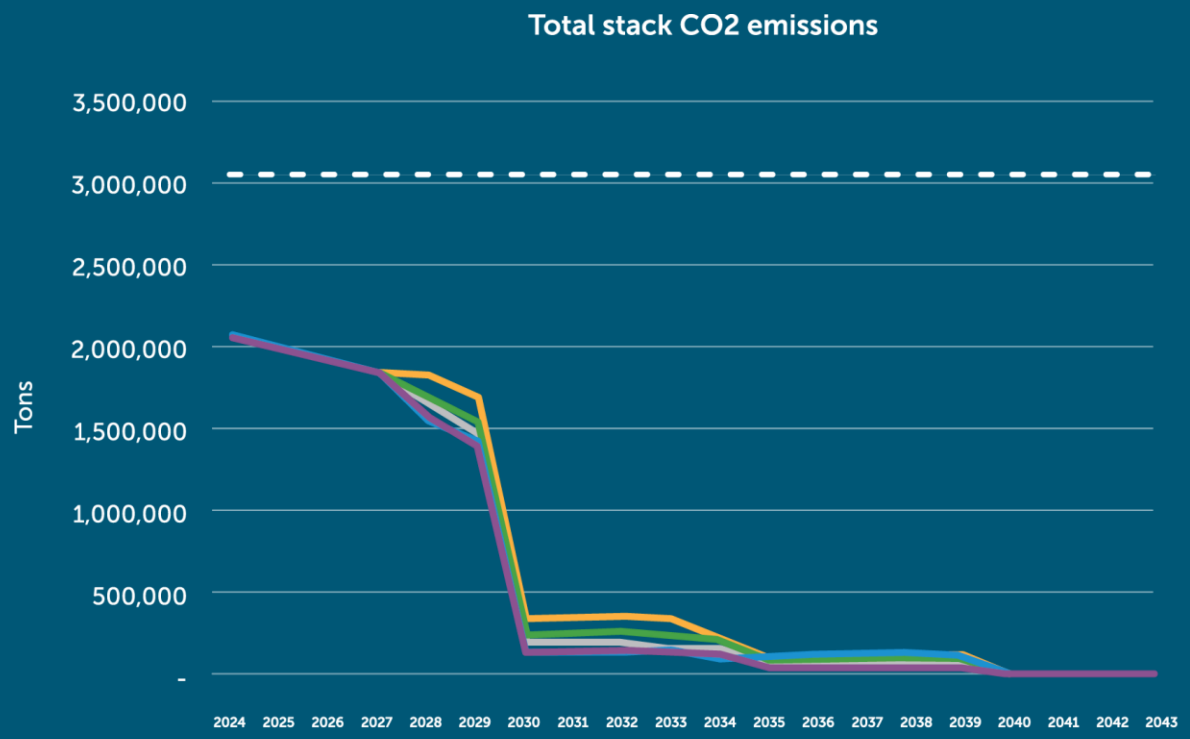
Summary of five portfolios

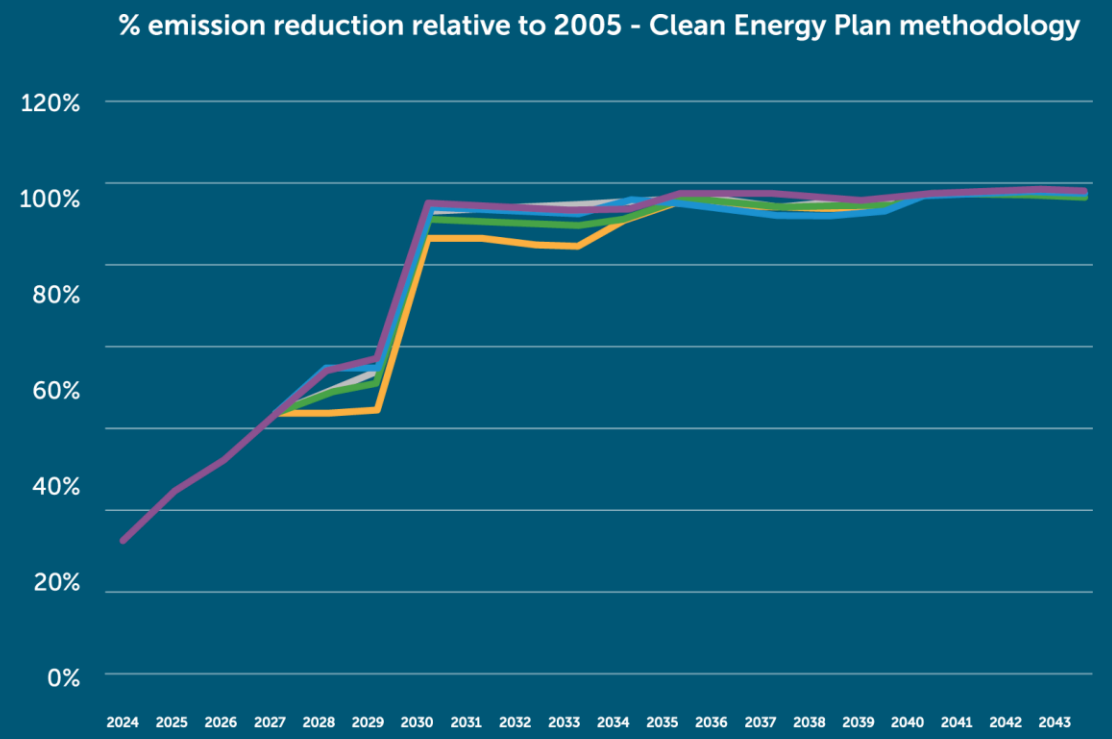
Portfolio	Total resource addition in 20 years, MWs								Cost	2030	2035
	Solar	Wind	4-Hr Storage	LDES	Thermal	Distributed Solar	Distributed Storage	Total renewable + storage	NPV, $ billion	CO2 tons x000	CO2 tons x000
No new carbon	600	885	2850	10	0	337	123	**4,805**	**$5.34**	126	104
Minimal carbon	600	885	1100	110	80	337	123	**3,155**	**$3.37**	127	36
Carbon-imposed cost	550	985	400	160	160	337	123	**2,555**	**$2.78**	196	54
Optimal new carbon	600	885	275	160	200	337	123	**2,180**	**$2.77**	241	74
Additional new carbon	450	985	175	110	280	337	123	**2,380**	**$2.76**	329	98

Comparative portfolio costs



Comparative CO2 emissions and % reduction vs. 2005





Additional new carbon | Optimal new carbon | Carbon-imposed cost | No new carbon | Minimal new carbon | 2005 emissions

Recommended portfolio

Optimal new carbon is the recommended portfolio

- ✓ **Reliability**
- ✓ **Environmental responsibility**
- ✓ **Financial sustainability**
- ✓ **Flexibility**
- ✓ **Proven technology**
- ✓ **Future adaptability**
- ✓ **Capable of achieving 100% noncarbon goal when clean fuel is available**

Recommended portfolio details

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	Total
Coal (MW)	-77			-74	-280															-431
Solar (MW)	150	150								100					50			100	50	600
Wind (MW)			200	200		60					100			100					225	885
Storage 4-hr (MW)		25	25	50	75		25	25	25										25	275
Storage Long Duration (MW)				10							50					50	50			160
Solar DER (MW)	16	21	22	21	15	14	13	12	10	10	10	13	14	14	15	16	17	18	19	291
Storage DER (MW)	3	5	7	7	8	7	8	8	8	7	6	5	4	4	5	6	7	7	7	120
Thermal (MW)				200																200

Transition: generation assets 2018 to 2030

Noncarbon resources and lower carbon emitting natural gas replacing coal

	2018	2030
Natural gas	67	362
Purchased power	507	249
Noncarbon	970	3,507
Coal	2,576	-
Total	4,120	4,118

Generation

- Coal is retired
- Noncarbon expands from 24% to 85%
- Natural gas generation less than 10%
- CO2 reduction of 2.75 million tons

Expense

- Platte River's power supply costs increase of about 87% due to general inflation and portfolio remaking

Next steps

IRP

- Finalize the IRP document with board input
- IRP approval in July board meeting and then file with WAPA
- Continue IRP public engagement through August
- Start planning for the 2028 IRP

Execution

- New resource additions:
  - Integrate 257 MW of solar in the next two years
  - Integrate 20 MW of distributed storage
  - Finalize next wind project from the RFP
  - Finalize next storage project from the RFP
- DER, DERMS and VPP implementation
- Public engagement and education
- Just transition at Rawhide

Virtual power plant update

Paul Davis, manager, distributed energy resources

Efficiency Works™

Efficiency Works is a **regional utility collaboration** that provides guidance and resources to enable **customers** to **use energy effectively**, work toward a noncarbon energy future and build strong, resilient communities for customers served by Platte River Power Authority and its owner communities of Estes Park, Fort Collins, Longmont and Loveland.

Providing distributed energy solutions:

- ✓ Energy advising
- ✓ Product information and education
- ✓ Facility and home assessments
- ✓ Targeted incentives
- ✓ Income qualified programs
- ✓ Electrification and efficiency (EVs and buildings)
- ✓ Enrollment in virtual power plant (VPP) programs





Distributed energy resources

Modeled in load forecast

Energy efficiency

Save energy and save money by using energy more efficiently

Electrification

Reduce green-house gases by replacing fossil fuel use with increasingly decarbonized electricity

Flexible DER as part of a VPP

Distributed generation

On site noncarbon generation

Solar generation

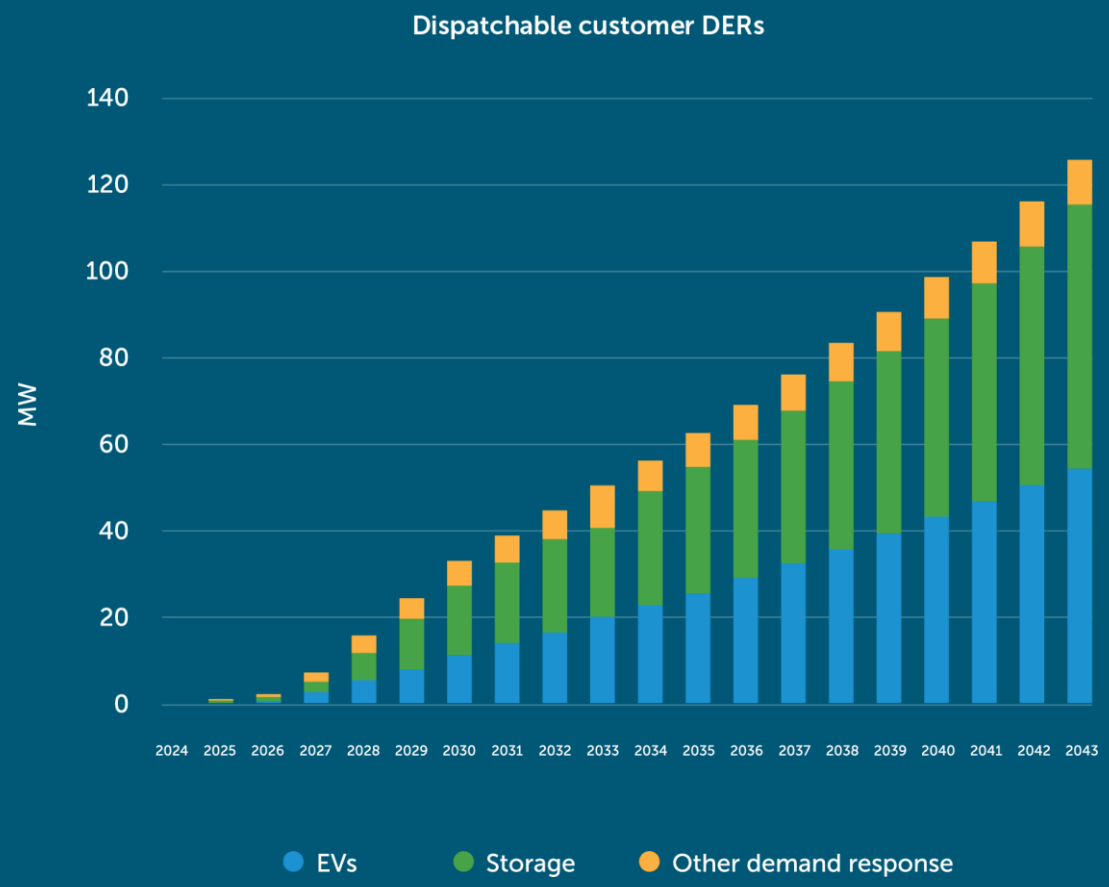
Demand response

Shift energy to align electric use to renewable availability and to decarbonize the electric system in a cost effective and reliable manner

Electric vehicles, batteries and traditional demand response

Distributed energy storage

Virtual power plant capacity from customer DERs



Platte River and owner community role

- Invest in new systems
  - DER management systems
  - Advanced distribution management systems
  - Data management systems
- Invest in VPP programs
  - Customer engagement and support
  - Incentives for participation
- Operate the VPP to achieve system benefits

Customer role

- Adopt DERs like EVs, storage, and smart devices
- Enroll and participate in the VPP

Additional DERs in VPP (not shown in graph)

- Customer solar (155 MW in 2030)
- Distribution scale storage (20 MW in 2027)

Distribution-scale energy storage project

2022

Request for proposal

Of nine total “distributed” storage bids, three developers were shortlisted

2023

Final vendor selection

Collaboration on use cases, storage locations and a preferred vendor was completed

2024

Development

Initial site visits are complete, and Platte River and the owner communities have started the interconnection planning process

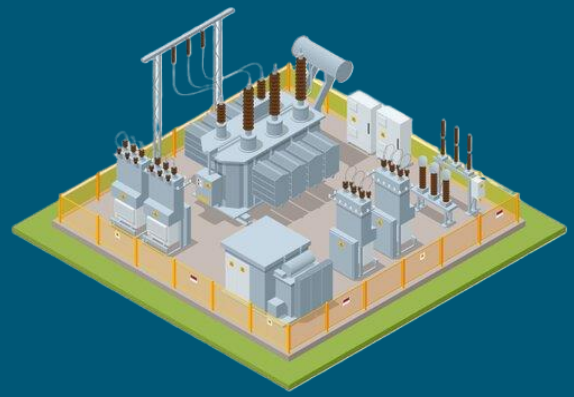
2025 2026

Construction

Once the permitting, interconnection, and land development are complete, construction will begin

Energy storage use cases

- Distribution reliability
- Bulk system reliability
- Resource adequacy
- Market benefits



Next steps for DER and VPP development

- Continue collaboration with owner communities
- Complete vendor selection and contracting from open solicitation (request for proposals issued May 29, 2024)
  - Scope A: distributed energy resource management system (DERMS)
  - Scope B: VPP customer program design and implementation
- Work with vendors to establish timeline for DERMS and customer program implementation
- Execute agreements needed to support utility distribution-scale storage projects

Questions

Platte River Power Authority

Estes Park • Fort Collins • Longmont • Loveland

Scan the QR code to submit your questions or visit **pollev.com/prpa2024**