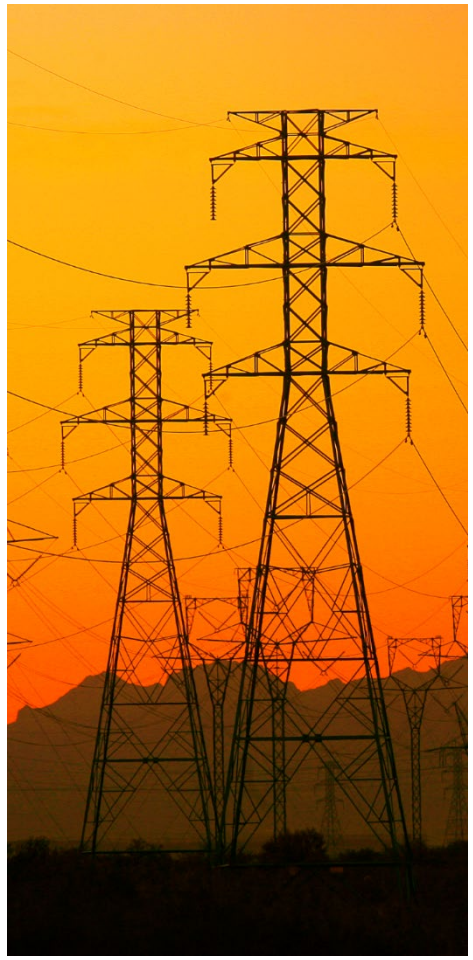
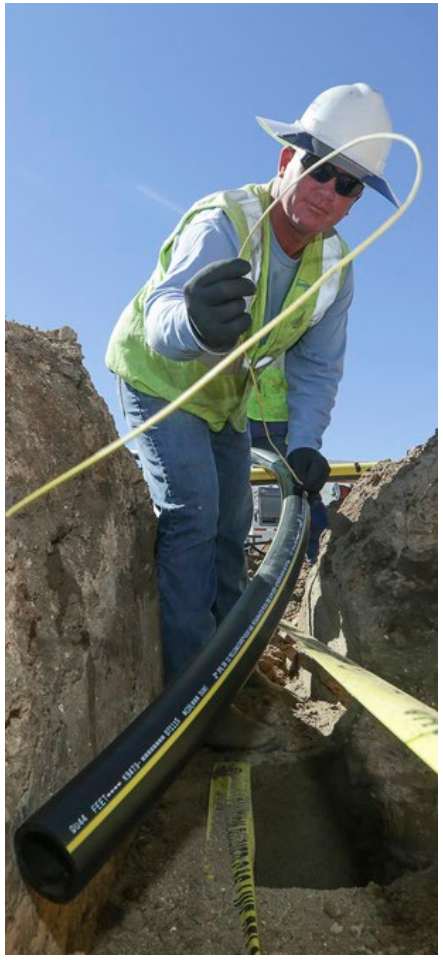
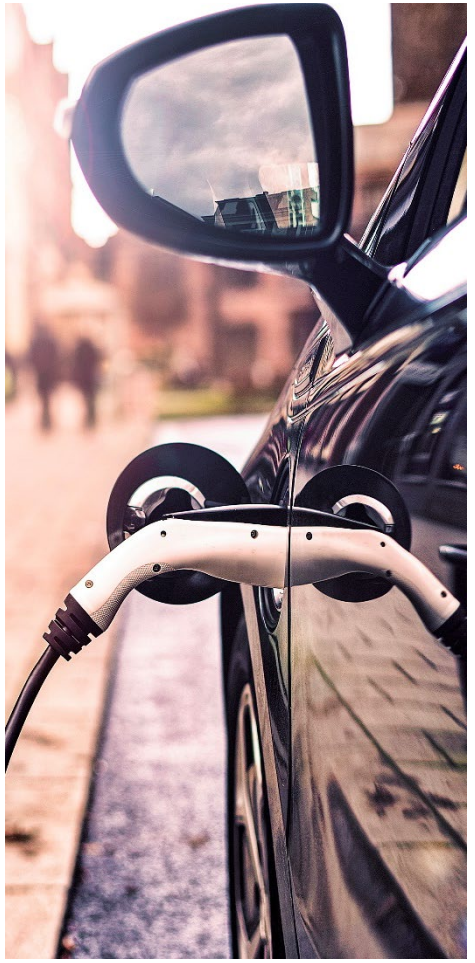





TEP Tucson Electric Power

UniSourceEnergy SERVICES

Resource Planning Advisory Council Meeting

January 25, 2023

Logistics & Introductions

- Presenters will pause occasionally for clarifying questions
- Save in-depth comments and questions for discussion periods
- If joining remotely, raise your “hand” to provide comments or ask questions
- Only use chat box to report technical difficulties

Today's Agenda

- Follow-up on some of last meeting's topics
- All-Source RFP update
- RPAC survey results
- Major cost assumptions and methodology
- Continued discussion of portfolios and scenarios to model

Follow-up Items from Last Meeting

- TEP has retained E3 to develop TEP/UNSE-specific ELCCs (capacity credits) for solar, wind, 4h storage, and 8h storage. These will be used to help ensure the long-term plans are resource-adequate.
- Two RPAC member have expressed interest in obtaining an Aurora license. Are any others interested? Need to know by Jan 31.

All-Source Request for Proposals (ASRFP)

VICTOR AGUIRRE

LEAD RESOURCE PLANNER

ASRFP Overview

- Product Requests
- Updated Schedule
- Evaluation Factors
- Next Steps

TEP / UNSE All Source Request for Proposals

April 2022 | Press Releases

Tucson, Arizona - Tucson Electric Power and UNS Electric will seek new wind and solar generation, energy storage systems and other resources such as energy efficiency with an All-Source Request for Proposals (ASRFP) it plans to issue on Tuesday, April 19, 2022. The due date for proposals is expected to be July 1, 2022.

	TEP	UNSE
Renewable Energy (MW)	250 MW	170 MW
Firm Capacity (MW)	300 MW	150 MW
Energy Efficiency & Demand Response Programs	Based on Customer Participation	
Requested In-Service Dates	2024 - 2025	

ASRFP Updated Schedule

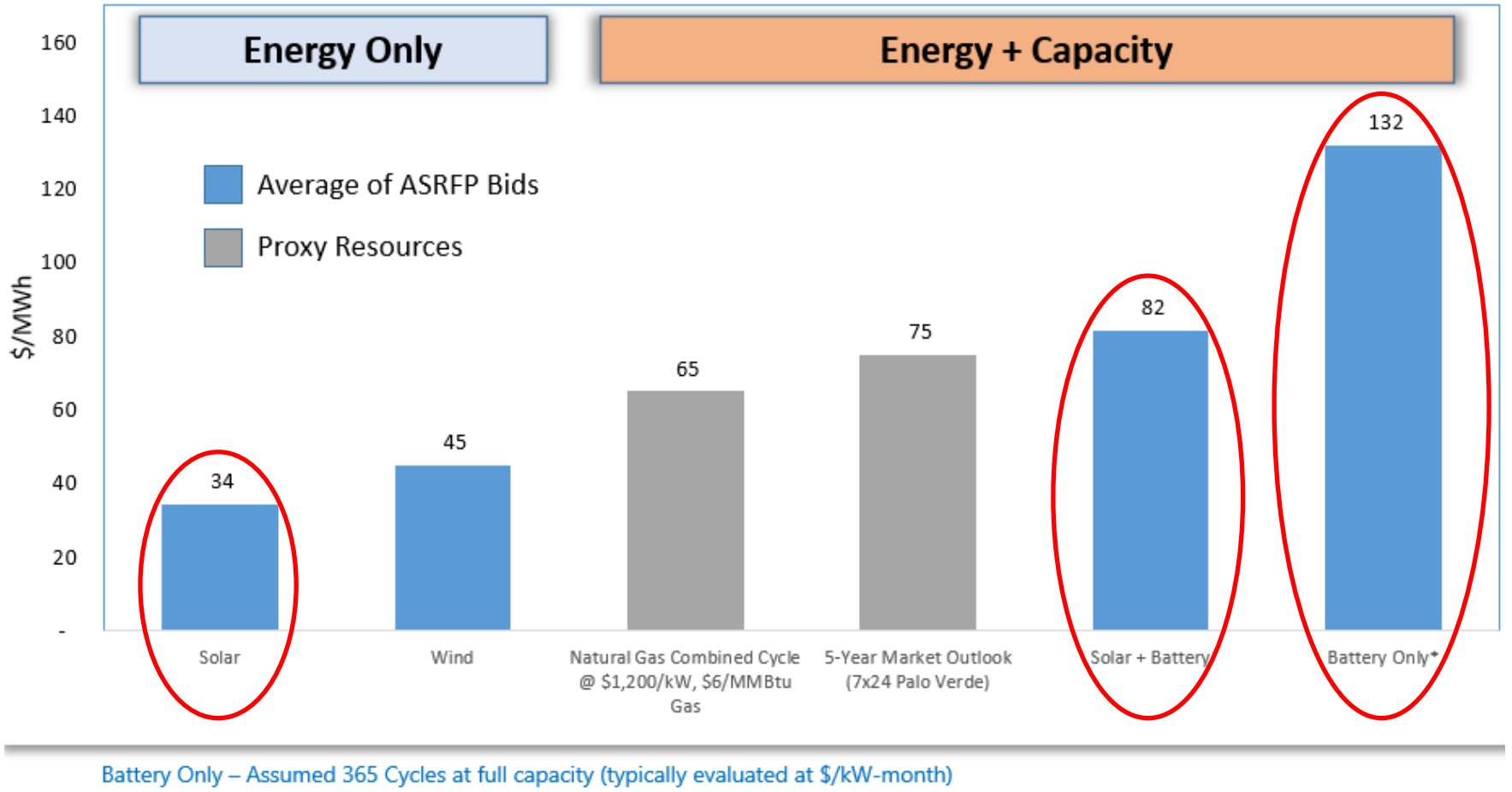
Milestone	
Issue ASRFP	April 19, 2022
Proposals Due	July 1, 2022
Short-List Determination	September – December 2022
Contract Negotiations	January 2023 – February 2023
Notice of Final Awards	March 2023

Key Decision Drivers

- Interconnection Timeline
  - Feasibility Study
  - System Impact Study
  - Facilities Study
  - Interconnection Agreement
- CEC Process
- Available Transmission Capability (ATC)
- Construction Timeline/Supply Chain
- Price

Proposal Pricing

Range of Resource Costs bid into the 2022 All Source Request for Proposal



Battery Only – Assumed 365 Cycles at full capacity (typically evaluated at $/kW-month)

Current Status of ASRFP

	Total Requested	Contract Negotiations
Renewable Energy (MW)		4 Projects
Firm Capacity (MW)		6 Projects
Energy Efficiency & Demand Response Programs	Program Evaluations In-Progress	
Estimated In-Service Dates	**Prior to Summer 2025 - 2026**	

- *TEP and UNSE will disclose the final project determination as part of the 2023 IRP filing*

ASRFP Short-List Timeline

October - November 2022 – Short List Notification and Bid Refresh

- On-going work to analyze Inflation Reduction Act implications
- Conduct bid refresh meetings with key developers

December 2022 – Complete Project Evaluations

- Confirm contract terms and update price assumptions
- Complete evaluations and move projects to negotiation phase

January 2023 – February 2023 - Contract Negotiation Phase

- Finalize all contract terms and conditions

March 2023 – Contract Execution

- Notice of final awards to bidders

Results and Discussion of RPAC Member Survey

ILSE MORALES

RESOURCE PLANNER

TEP/UNSE RPAC Engagement Survey

Provide at least two reasons why you agreed to join TEP's resource planning advisory council.

Learn/Understand

- "Increased understanding of utility planning"
- "To remain educated about renewable resource transition trends"
- "To learn more about the key drivers in the IRP decision making "
- "Better understanding of TEP constraints in moving to carbon neutrality "
- "The outputs are not meaningful unless you know about the inputs and assumptions"
- "Want to ensure model input assumptions are reasonable"
- "Inquiry into TEP efforts for power affordability"

Interests

- "Interest in resource costs [and reliability]"
- "Have a vested interest in the long-term low-cost ops"
- "IRP is the only window into long term utility clean commitments"
- "Monitor technology advances"
- "IRP is the most important utility stakeholder process"
- "To ensure I am knowledgeable about the stakeholder's interests"

Contribution

- "Push for commitment to eliminating carbon dioxide emissions"
- "I would like to support the increased adoption of solar and storage systems in TEP's planning "
- "Input into future resources portfolio"
- "to help plan future electrical power needs"
- "Reliability, affordability, and sustainability are not mutually exclusive"
- "Local jobs and resources leveraged to supply local power"
- "to provide input on the benefits of DERs and electric vehicles"

Representation/Connections

- "To help represent the business community"
- "to build connections with local community "
- "To better know stakeholders and their points of view."
- "To establish contacts within TEP with which to work."
- "I'm an energy policy and management professional"
- "as a long time former utility employee i understand how important it is to have outside voice in the planning process"
- "If you aren't at the table, you are on the menu"

TEP/UNSE RPAC Engagement Survey

Provide at least two accomplishments or outcomes you'd like see in the resource plan and/or planning process.

Emissions/Coal

- "Trying to reduce carbon emissions"
- "Commitment to eliminating carbon dioxide emissions"
- "100% decarbonization commitment"
- "Strategy to move toward carbon neutrality"
- "I'd like to see the plan aggressively pursue carbon reduction."
- "Exit coal as soon as possible"
- "I'd like to hear the voices of participants and TEP about obstacles to a faster transition to carbon free energy."
- "Analysis of earlier coal plant closures"

Assessments

- "Comprehensive resource assessments"
- "Serious analysis of firm capacity clean technologies"
- "A more robust EV goal in TEP territory"
- "How to align government resources to maximize overall electric utilization"
- "Ensure a transparent process for resource acquisition"

Affordability/Reliability

- "TEP evidences significant and effective plans to keep power affordable."
- "Ensure reliability and affordability during resource transition"
- "Improve the overall security of the network to failures"
- "TEP continues to move towards sustainable and affordable power."
- "Less concerns over cybersecurity [and over open-market instability]"
- "Commitment to joining a regional market in the near term"
- "to provide a good outlook for future electrical power needs"

IRP Report

- "I'd like for the plan to clearly articulate underlying assumptions"
- "I'd like for the plan to be understandable for the general public"
- "An IRP that is robust against a number of scenarios"
- "An IRP that is balanced across key mission objectives of TEP"
- "An IRP that includes prudent and effective opportunities for innovation"

Involvement

- "TEP includes ongoing efforts to involve stakeholders."
- "RPAC participation in future RFPs before they are sent"
- "Allow for all interests to have a voice"
- "to build lasting relationships with local community partners"

Major Cost Assumptions

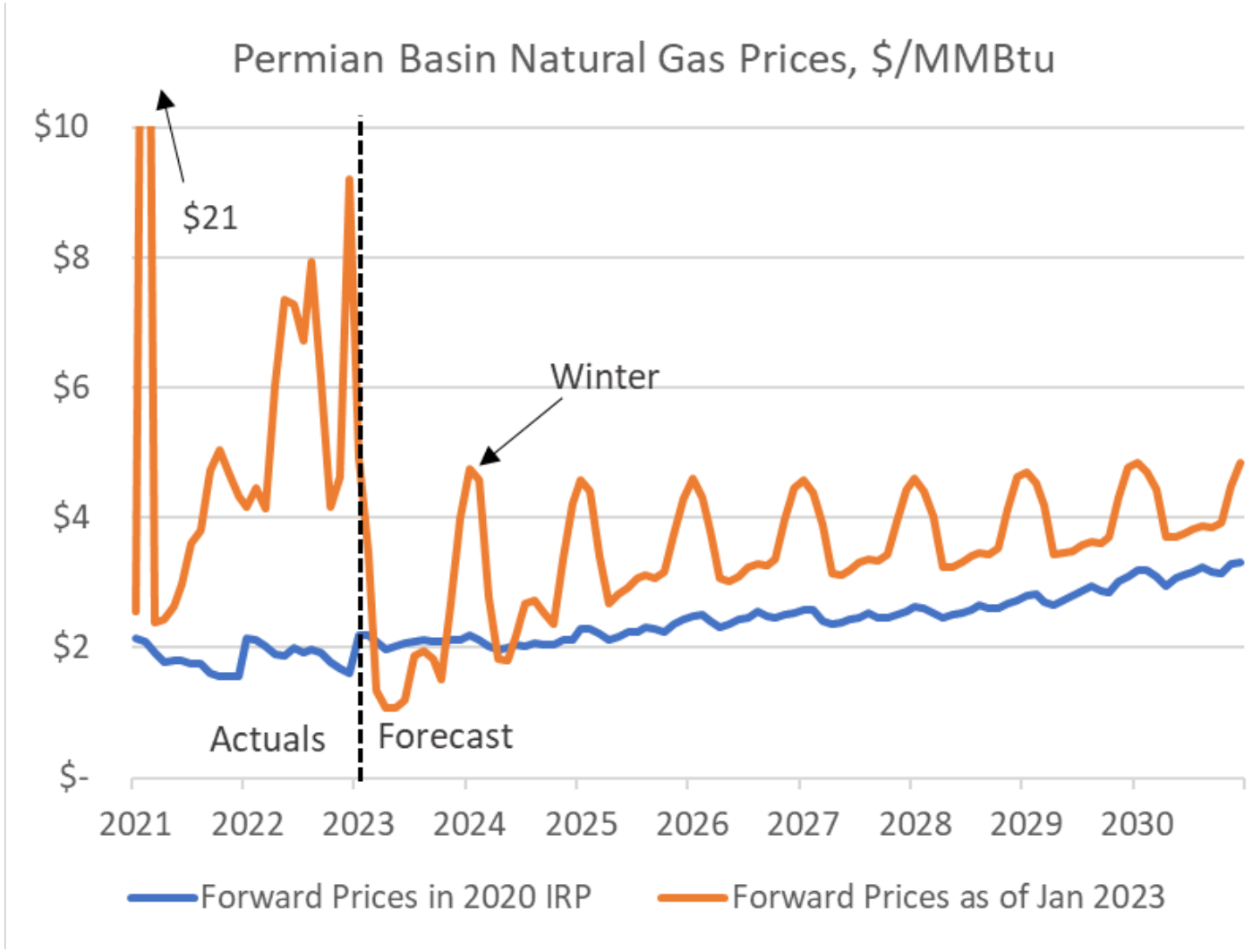
NONSO EMORDI, PH.D.

LEAD RESOURCE PLANNER

Natural Gas Price Assumptions

Data Source for 2023 IRP:

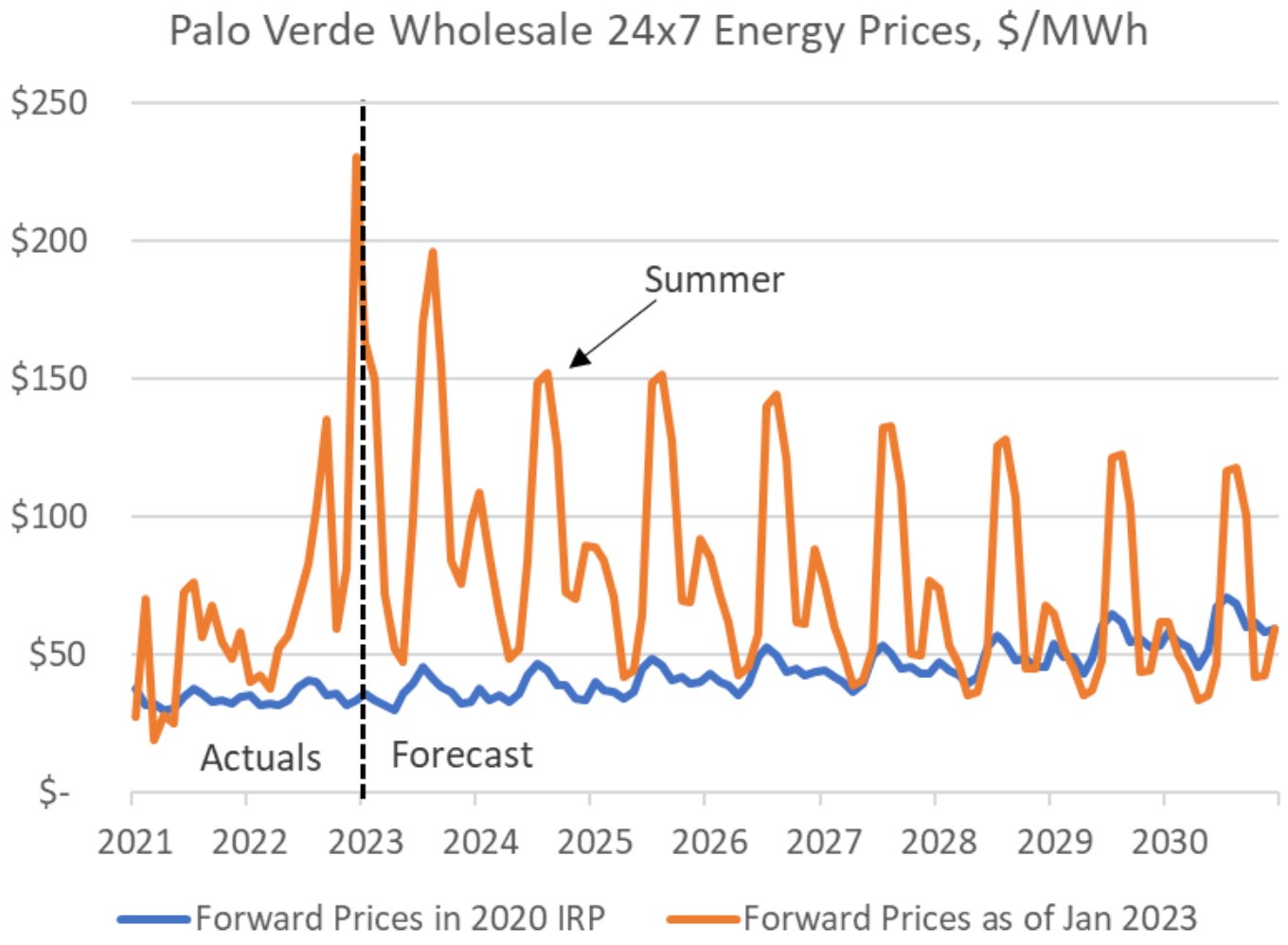
- Monthly futures traded on ICE via S&P Global subscription



Wholesale Market Price Assumptions

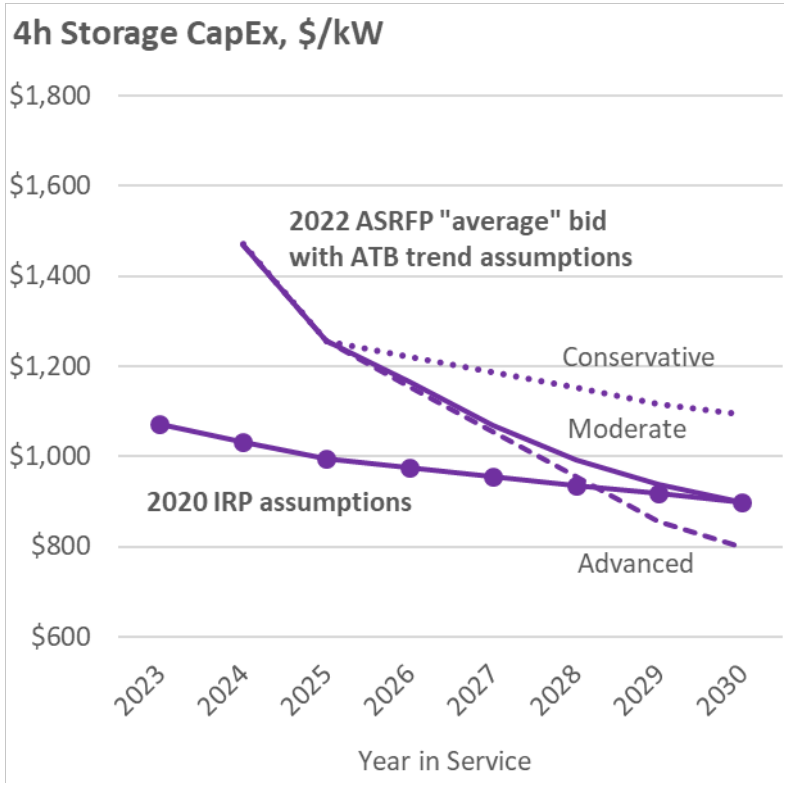
Data Source for 2023 IRP:

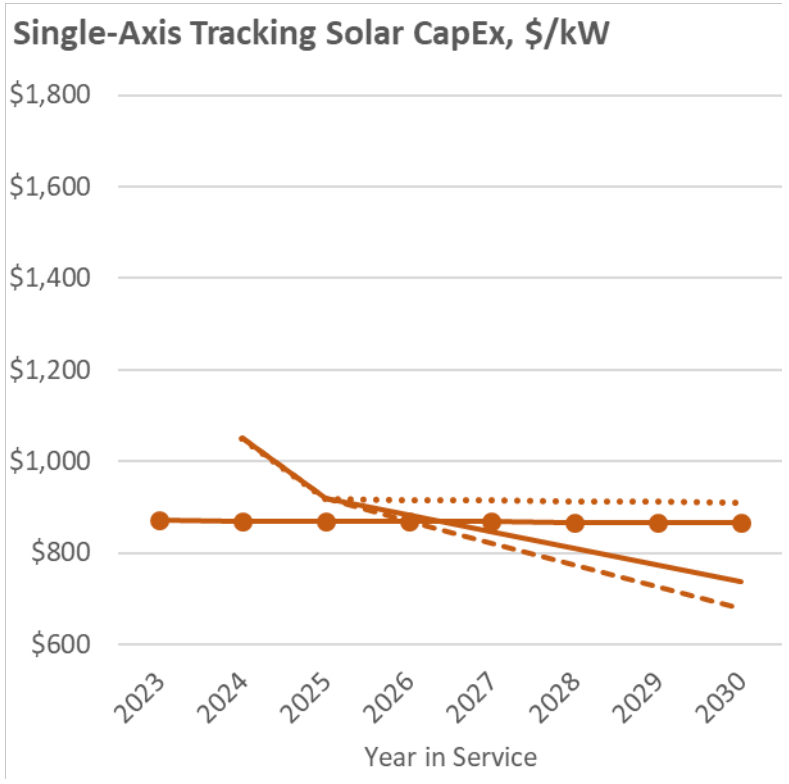
- Monthly futures traded on ICE via S&P Global subscription
- Tullet Prebon

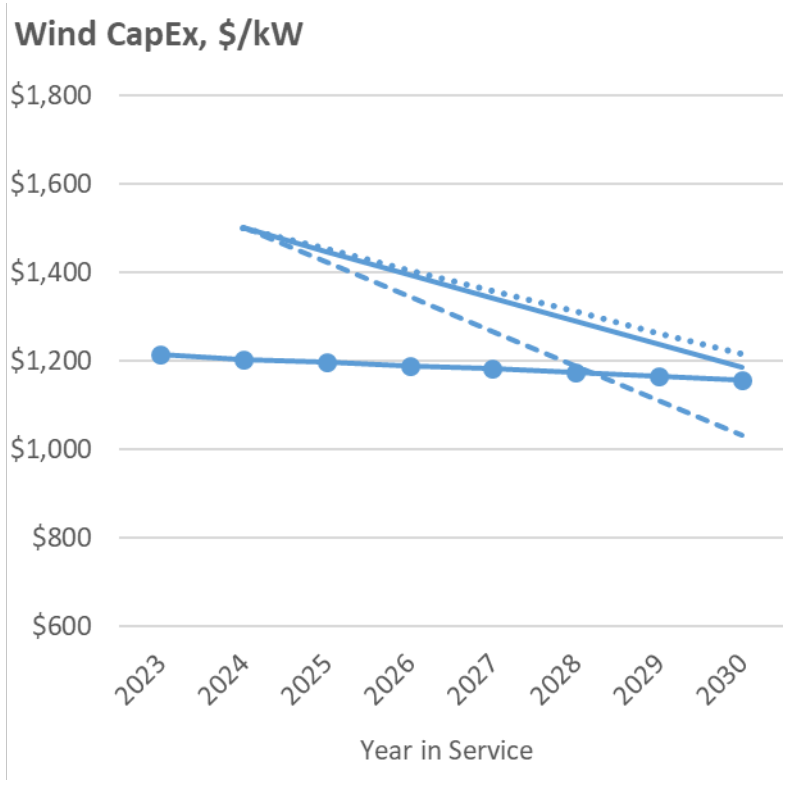


Capital Cost Assumptions for Select Resources, Option 1:

Establish a 2024 baseline according to 2022 ASRFP, assume all projects qualify for bonus credit, and apply year-over-year relative cost changes from DOE's Annual Technology Baseline





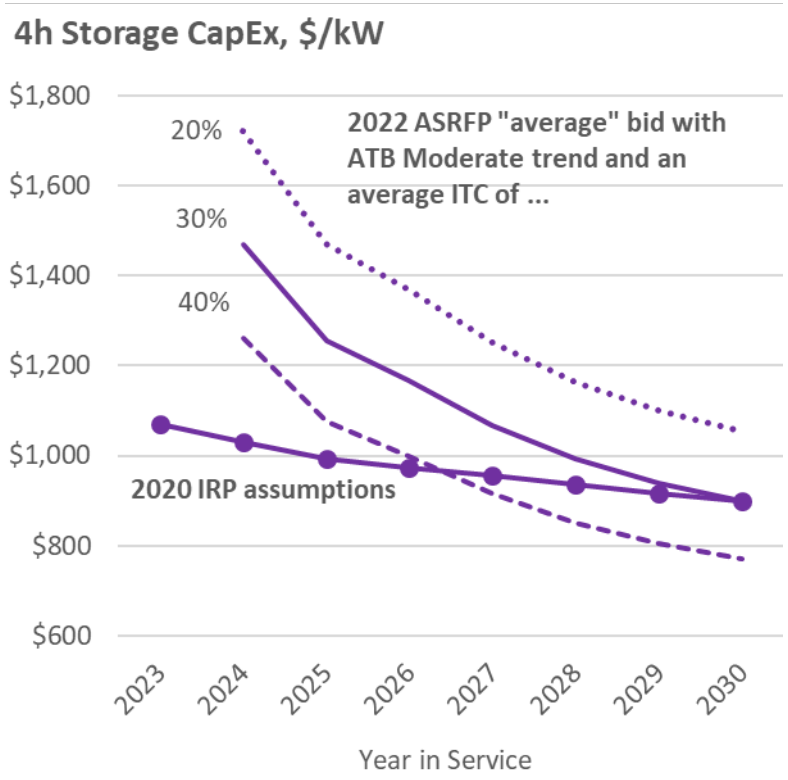


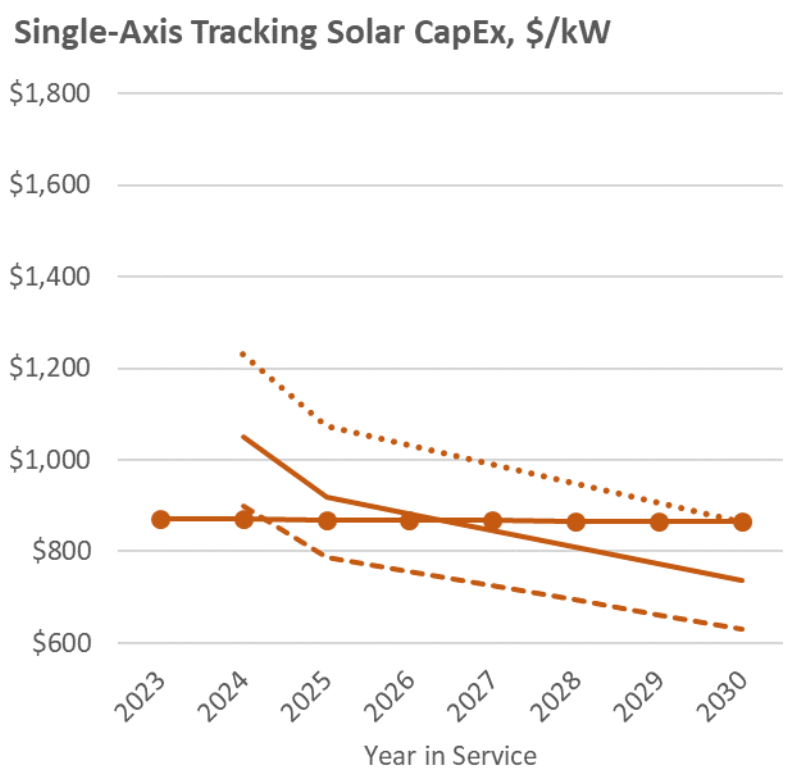
Cost assumptions for other fuels and resources (hydrogen, energy efficiency, transmission, etc.) will continue to be developed according to the needs defined by the portfolio analyses.

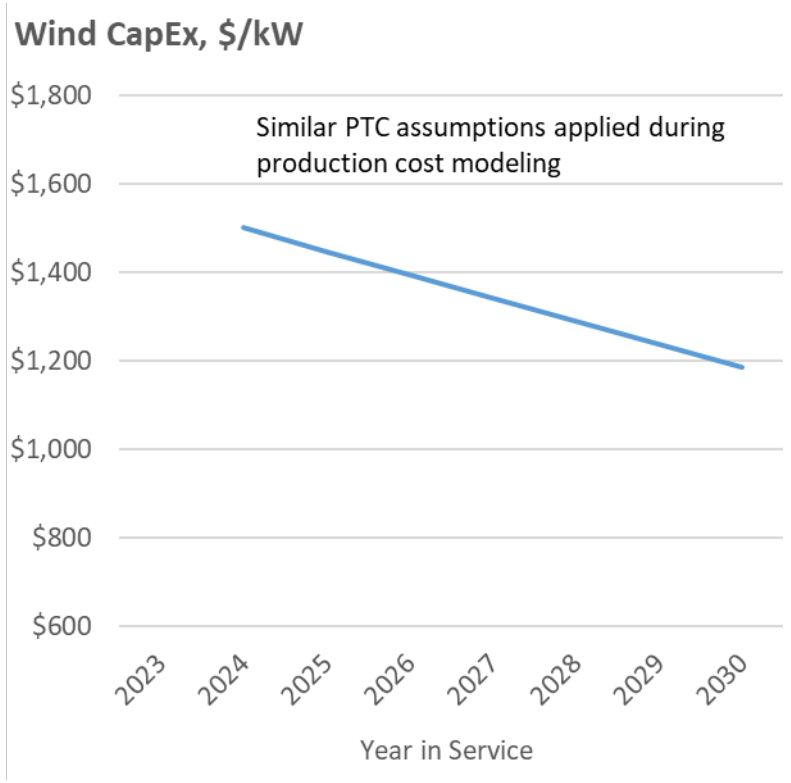
*All forward prices are indicative and will be finalized based on data from the ASRFP and the IRA.

Capital Cost Assumptions for Select Resources, Option 2:

Establish a 2024 baseline, use only the Moderate ATB scenario for year-over-year relative cost changes, and then apply a range of tax credits







High cost assumes half the new capacity qualifies for the 30% bonus credit and half qualifies for only the 6% base credit.
Low cost assumes half the new capacity qualifies for the 30% bonus credit and half qualifies for adders as well (50% credit).

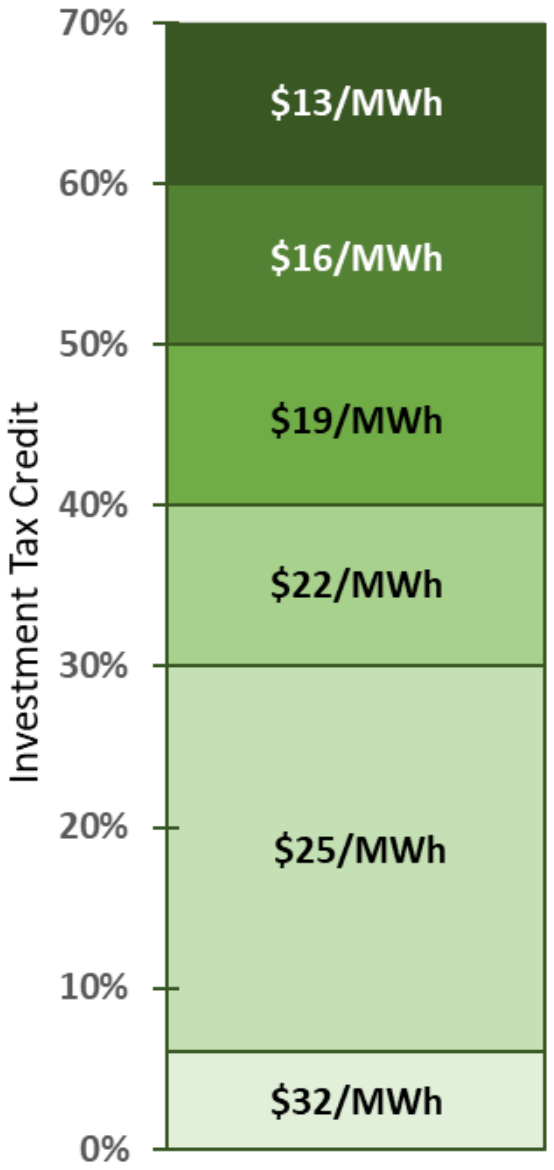
*All forward prices are indicative and will be finalized based on data from the ASRFP and the IRA.

Investment Tax Credit Impact on Utility-Scale Solar Generation Cost (Levelized Cost of Energy)

Assumptions:

- In service in 2028
- $1,200/kW capital cost
- $16/kW-y fixed O&M cost
- 30 year finance
- Utility-owned

The range of possible price impacts of the IRA is greater than the range of DOE's "conservative" and "advanced" progress assumptions ($16-$28/MWh)



20% Adder
If project is part of low-income residential building and < 5 MW.
OR
10% Adder
If project is in low-income community or on American Indian land and < 5 MW.

10% Adder
If project is on a brownfield or in/near an energy community.

10% Adder
If project meets domestic content requirements.

30% Bonus credit
If project meets prevailing wage and apprenticeship requirements.
Credits between 6% and 30% are possible if bonus not obtained but some adders are obtained.

6% Base credit

Note on Option 2

- IRA investment and production tax credits for storage, solar, and wind can lead to a range of costs that exceed the range expected strictly from techno-economic trends, even over the long run. Moreover, rather than being somewhat speculative, IRA tax credits are in effect for at least 10 years and actions can be taken to capitalize on those that are most advantageous.

Portfolio Modeling

LEE ALTER

LEAD RESOURCE PLANNER

ACC Requirements for Portfolio Modeling

- TEP and UNSE shall include in future IRPs:
  1. "an analysis of at minimum, **10 resource portfolios that are designed to evaluate the range of resource procurement actions, and their respective costs and benefits, that can be taken to achieve the emissions reductions goals** specified by each in its 2020 Integrated Resource Plan. The analysis and presentation of these resource portfolios should be used to support [TEP and UNSE's] desire to achieve significant emissions reductions."
  2. "include one or more ***portfolios*** which achieve **at least 40 percent cumulative energy savings by 2030** from a broad portfolio of energy efficiency measures and using a 2010 baseline."
  3. "an analysis of a technology agnostic resource ***portfolio***, which is the **least-cost method** of safely and reliably meeting customers' energy needs without regard for their emissions reduction goals or any renewable or carbon emissions standards."
  4. "include one or more ***portfolios*** which **eliminate coal unit must-run designations**."
  5. "one or more ***portfolios*** which **remove modeling restrictions** that limit the amount of energy efficiency that can be selected as a resource option."
  6. "one or more ***portfolios*** which **remove modeling restrictions** on the economic cycling and economic retirement of coal units."
- By January 1, 2030, TEP's resource ***portfolio*** shall, "include a demand-side resource capacity equal to at least 35 percent of TEP's 2020 peak demand. The portfolio for demand-side management measures shall include rate-enabled, load-shifting technologies, including, but no limited to, demand response, energy storage, and smart thermostats, that provide customer bill savings and clean energy benefits."

* Perhaps include the blue requirements in all portfolios, so they effectively create no need for portfolios of their own.

ACC Requirements *That Can Be Addressed* Through Portfolio Modeling

- TEP and UNSE shall include in future IRPs, "***a comprehensive analysis*** that presents the **costs and benefits of their emissions reduction commitments, compared to an approach absent these commitments**, to their ratepayers."
  - Satisfy with portfolio requirement #3 on previous slide
- TEP and UNSE shall in future IRPs, "***study and report upon*** the **value of distribution grid-connected resources as compared to transmission-connected**, to determine the optimal mix of renewable energy and energy storage interconnected to distribution versus resources interconnected to transmission. Factors to consider include constraints in the transmission grid, the cost and process of siting and building new transmission, and the benefits of distribution connected resources such as reduced line loss and resiliency."
- TEP shall, "demonstrate **1.3 percent annual energy efficiency** measured by megawatt-hour savings over its next three-year planning period and shall report its annual energy efficiency savings in its 2023 Integrated Resource Plan.

Notes on Portfolio Modeling

- Provides costs, but completely dependent upon assumptions. True cost will depend largely on rapidly evolving industry and global trends, the ability to capitalize on IRA tax credits, and competitive procurement outcomes.
- Portfolio modeling can inform the procurement process by highlighting resource needs, especially those that could go unaddressed if procuring projects primarily on the basis of costs and their expected capacity and energy contributions.
- Allows resource adequacy to be evaluated under multiple weather and operational conditions.
- Useful for evaluating certain types of risk, such as:
  - Fuel price uncertainty
  - Unmanaged EV charging
  - Availability of transmission

Portfolios to Consider in IRP

Portfolios	Conditions That Could Lead to This Portfolio	Primary Risk / Basis for Further Analysis
01 Reference Case	Same resource expansion/retirement schedule as 2020 IRP but with updated fuel and power prices, capital costs, and modeling improvements. Use as basis for evaluating and comparing alternative portfolios.	• The price of clean energy and natural gas relative to each other changes substantially. • 100% clean energy is required by 2035. • 4h battery storage not available or performing as expected.
02 Heavy Solar	For any number of reasons, solar comprises a larger portion of the resource mix than determined in the 2020 IRP. For example, the manufacturing costs of solar relative to other options could decrease, solar projects may obtain more tax credits than wind, solar may be quicker to deploy than wind, distributed generation may exceed expectations, and/or transmission may be more available in high solar areas than in high wind areas.	• More storage, other resources might be needed • EV charging not well managed, occurs at night
03 Heavy Wind	For similar reasons as above, wind comprises a larger portion of the resource mix than determined in the 2020 IRP.	• •
04 Heavy DSM	Per the ACC's IRP order, this portfolio achieves at least 40 percent cumulative energy savings by 2030 from a broad portfolio of energy efficiency measures and using a 2010 baseline	• Procurement of resources in excess of what is necessary, or in excess of what can be recouped from participating in the wholesale market.

Portfolios to Consider in IRP

Portfolios	Conditions That Could Lead to This Portfolio	Primary Risk / Basis for Further Analysis
05 MDS Pursued *Medium duration storage of 8-12 hours*	Technolgies such as pumped hydro and compressed air become attractive or necessary for achieving deep decarbonization (e.g., 80% or greater reduction).	• Performance and/or lead times are significantly worse than expected.
06 CFP Available *Clean firm power*	Technologies such as hydrogen, small modular nuclear reactors, and geothermal become attractive or necessary for deep decarbonization. This case differs from the one above in that lead times may be greater and the resources are not energy-limited.	• Performance and/or lead times are significantly worse than expected.
07 More Tx Available	Through improved system management, upgrading of existing facilities, addition of new transmission, and/or creation of an RTO, more and/or cheaper transmission is available to and from other regions with complementary load or renewable energy generation patterns.	
08 Rapid Electrification	Rapid adoption of electric vehicles, electrification of buildings, and new large customers, combined with poorly managed EV charging, drive up peak demand, total energy use, and load volatility.	
09 Thermal Extension	Due to unavoidable delays in clean energy implementation, excessively high clean energy costs, lack of regional capacity, and/or orders from state or federal authorities, Springerville 1 retirement is postponed by two years, the companies enter into a gas plant tolling agreement, or gas turbines are procured. The companies take mitigating actions to offset any cumulative emissions increase, such as investing in hydrogen-ready CTs, changing dispatch procedures, and further shortening seasonal coal operations.	• High natural gas prices • Stranded assets
10 ???		

2030

Portfolios	Capacity Mix								Energy Mix							
	Coal	Gas	Solar	Wind	SDS	MDS	CFP	DSM	Coal	Gas	Solar	Wind	SDS	MDS	CFP	DSM
01 Reference Case																
02 Hevy Solar																
03 Heavy Wind																
04 Heavy DSM																
05 MDS Pursued																
06 CFP Available																
07 More Tx Available																
08 Rapid Electrification																
09 Thermal Extention																
10 ???																

2038

Portfolios	Capacity Mix								Energy Mix							
	Coal	Gas	Solar	Wind	SDS	MDS	CFP	DSM	Coal	Gas	Solar	Wind	SDS	MDS	CFP	DSM
01 Reference Case																
02 Hevy Solar																
03 Heavy Wind																
04 Heavy DSM																
05 MDS Pursued																
06 CFP Available																
07 More Tx Available																
08 Rapid Electrification																
09 Thermal Extention																
10 ???																

Next Steps and Topics for Next Meeting

- Possible topics include:
  - Review additional cost assumptions
  - Further discussions/decisions on portfolios/scenarios to examine
  - Consideration of scorecards/dashboards for comparing portfolios
  - Possible Reference Case for review
  - Providing for a just and equitable clean energy transition
  - Pursuit and use of Inflation Reduction Act funding and tax incentives
  - Other?