SOUTHWESTERN ELECTRIC POWER COMPANY
An AEP Company

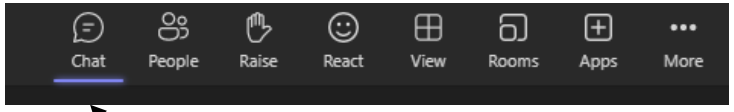
CRA Charles River Associates

SWEPCO IRP Stakeholder Conference

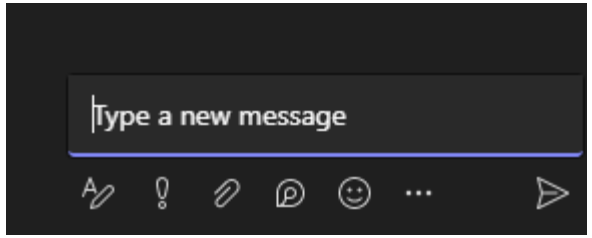
August 29, 2023

Guidelines

1. Participants joining today's meeting will be in a "listen-only" mode.
2. During the presentation, please enter questions at any time into the Teams Q&A feature. Questions will be addressed after each section.



Click the Chat feature at the top of the Teams screen



Agenda

Time	Agenda Topic	Presenter
9:00-9:10	Welcome and Introductions • Stakeholder Meeting Objectives • Company Updates	Lynn Ferry-Nelson/Greg Soller
9:10-9:35	Executive Summary • IRP Process and updates • Draft IRP scorecard results and take-ways	Pat Augustine/Dimitri Kordonis
9:35-10:20	Draft IRP Scenarios Review • Inputs and Assumptions • Scenario Results Key Takeaways	Dimitri Kordonis/CRA
10:20 – 10:30	Break	
10:30-11:50	Draft IRP Portfolios Review • Portfolio Results • Final IRP Portfolio Sensitivities	Dimitri Kordonis/Greg Soller
11:50 – 12:00	Closing Remarks	Lynn Ferry-Nelson

Meeting Facilitator: Greg Soller

Company Updates

- 2021 Renewables Request for Proposal (Mooringsport, Diversion, Wagon Wheel) / PPA Updates:
  - Arkansas: Settlement reached, Notice to Proceed approved by order, currently awaiting a decision from the APSC on MFN
  - Louisiana: Settlement reached
    - Motion for rehearing filed May 5
    - Approved by Commissioners on June 29, 2023—Order issued July 14,2023
  - Remaining PPAs (2023/2024 Planning Year) approved for recovery, effective June 1—included in the July 14, 2023 Order
  - Texas (Renewables only): Favorable Proposal for Decision issued by ALJ.
    - Despite the Favorable PFD by the ALJ, proposal was not approved by the PUCT. Rehearing request denied at August 24 PUCT open meeting.
- Other RFP Updates
  - April 11, 2023 Short-Term Capacity PPA Request for Proposals underway
    - Bids received May 9, currently under review
  - 2022 Wind and Solar RFP responses under review
  - Planned issuance of a 2023 All Source RFP including PPAs

Stakeholder Meeting Objectives

Objectives for meeting include:

- ❑ **Draft IRP results review:** Discuss the results of the Company's Draft IRP
- ❑ **IRP Update plans:** Review key data inputs and assumptions updates for the Final IRP
- ❑ **Gather Feedback:** Provide a forum for productive stakeholder feedback on the Company's draft IRP

SWEPCO welcomes stakeholder comments and input on any aspect of the IRP process, including:

- ➢ Fundamental Pricing Assumptions
- ➢ SWEPCO Load Forecast
- ➢ Cost of technology options
- ➢ Sensitivity cases
- ➢ Preferred Portfolio selection

Timeline (Revised)

January 2022	Feb / Mar 2022	April 2022	July 2022	March 2023	Aug 2023	Oct/Nov 2023	Feb 2024
Initial IRP Inputs Shared with Commission and Stakeholders	Stakeholder meeting to discuss initial IRP inputs and assumptions	Stakeholders submit comments on IRP inputs	Optional Stakeholder meeting to discuss load, resource, and fundamentals updates	SWEPCO files Draft IRP with LPSC	Stakeholder meeting to discuss Draft IRP	Stakeholders/Staff submit comments on Draft IRP	SWEPCO files final IRP, incorporating staff and stakeholder comments

2023 IRP Process

Overview of 2023 IRP Responsibilities

SWEPCO & AEP

- Set Objectives & Performance Criteria
- Provided Load and RFP based Supply-side assumptions
- Provided Demand-side Assumptions

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- Developed Supply-side Assumptions
- Modeled Market Scenarios
- Developed Optimal Resource Portfolios
- Populated Scorecard

SWEPCO

- Evaluate Resource Alternatives
- Select Preferred Plan for 2023 IRP
- Develop Short-term Action Plan

IRP Stakeholders

- Share Key Concerns & Considerations
- Provide Feedback on IRP Inputs & Draft Results

2023 IRP Analysis Steps

1. Define IRP Objectives Aligned to Customer Needs
2. Model SPP Market Scenarios to Test Future Risks
3. Optimize DSM & New Supply, Define Candidate Portfolios
4. Test Portfolios across Scenarios & Stochastic Risks
5. Compare Results on the Scorecard & Select the Preferred Plan

2023 IRP Objectives

SWEPCO set four objectives for the 2023 IRP Portfolio to achieve its mission of providing safe, reliable, affordable energy for customers and having a positive local impact on the communities it serves.

2023 IRP Objectives

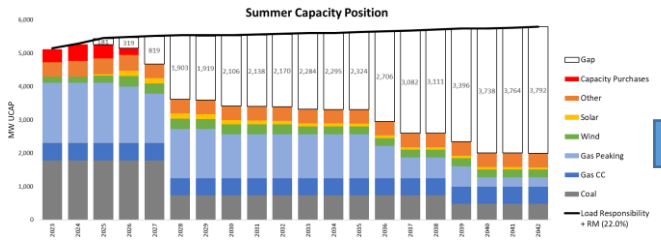
Customer Affordability	Rate Stability
Maintaining Reliability	Local Impacts & Sustainability

These objectives informed each step of the 2023 IRP analysis, including the development of SPP market scenarios, the evaluation of resource alternatives, and kinds of risks evaluated in the stochastic analysis.

These objectives also manifest in the IRP scorecard, used by SWEPCO to measure the performance of different resource plans and compare trade-offs between alternatives when selecting the Preferred Plan for the 2023 IRP.

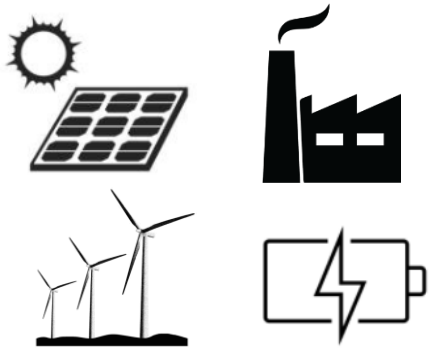
Selection of the Preferred Plan

Going in View



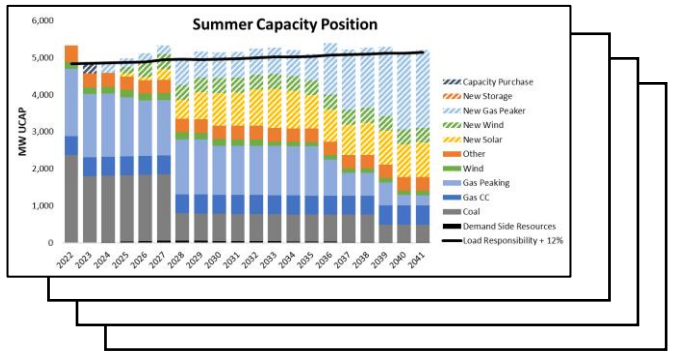
The going in positions shows a need for new capacity to meet SWEPCO customer requirements

Resource Options



SWEPCO used AURORA to evaluate resource options under different market conditions and test specific strategies

Candidate Portfolios

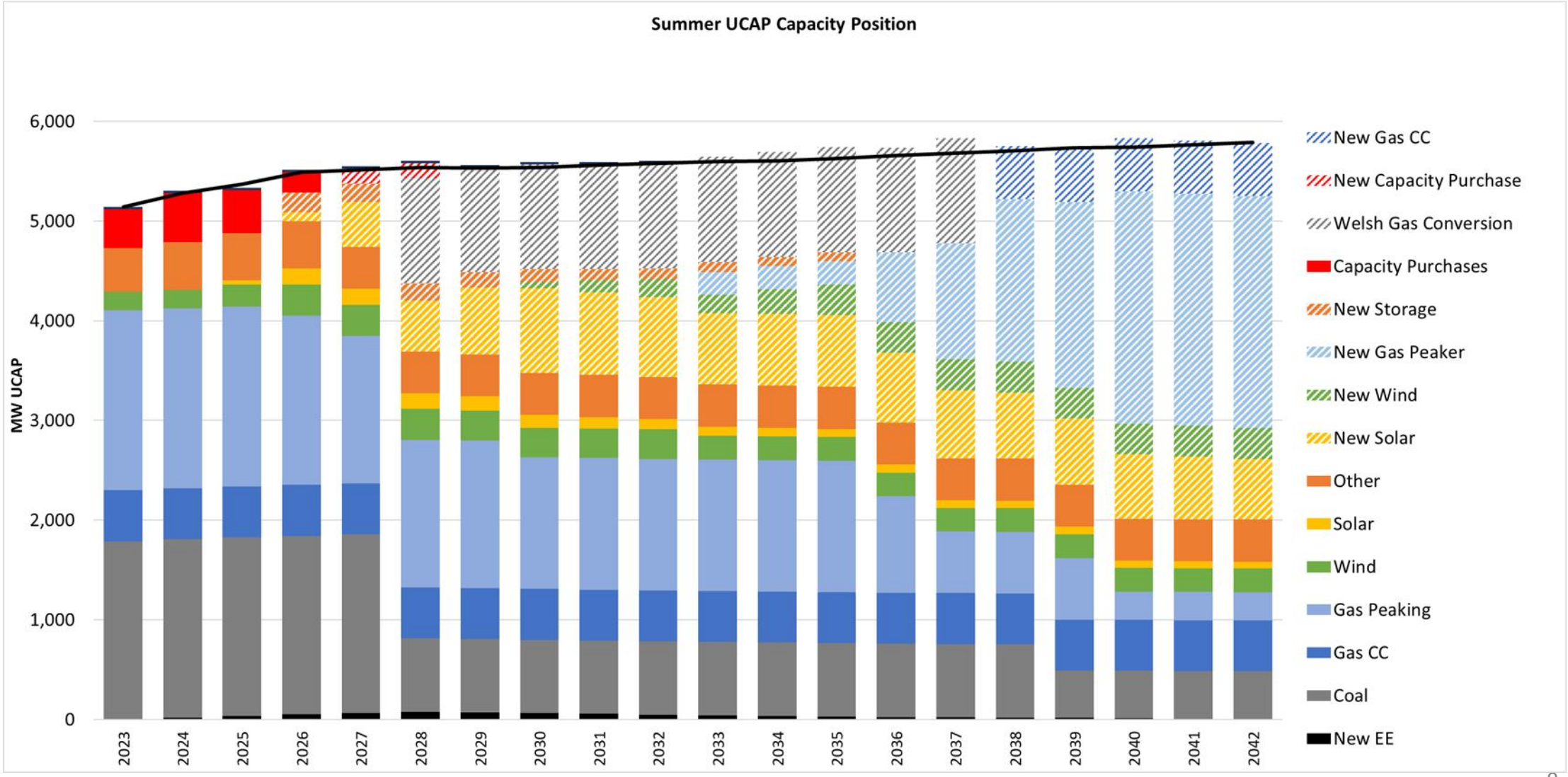


The resulting set of portfolios is evaluated against the IRP Scorecard to identify a preferred plan that maintains reliability and best maintains affordable and stable rates while also achieve emissions reduction targets

SWEPCO evaluated six candidate portfolios against the IRP Objectives but has **not yet** selected a Preferred Plan.

Following this Stakeholder Conference and additional Stakeholder feedback, SWEPCO will select the best combination of supply- and demand-side resources that meet customer needs and satisfy the IRP Objectives.

Reference Portfolio Balance



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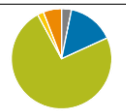
Draft IRP Scorecard Results

	Customer Affordability		Rate Stability			Maintaining Reliability			Local Impacts & Sustainability	
Portfolio	***Short Term:*** *5-yr Rate CAGR, Reference Case*	***Long Term:*** *30-yr NPVRR, Reference Case*	***Scenario Range:*** *High Minus Low Scenario Range, 30-yr NPVRR*	***Cost Risk:*** *RR Increase in Reference Case (95th minus 50th Percentile)*	***Market Exposure:*** *Net Sales as % of Portfolio Load, Scenario Average*	***Planning Reserves:*** *% Reserve Margin, Scenario Average*	***Operational Flexibility:*** *Dispatchable Capacity*	***Resource Diversity:*** *Generation Mix (MWh) by Technology Type - Reference Case*	***Locational Diversity:*** *Nameplate MW Installed Inside SWEPCO Territory*	***CO2 Emissions:*** *Percent Reduction from 2005 Baseline - Reference Case*
Year Ref.	2023-2028	2023-2052	2023-2052	2032 | 2042	2032	2023-2042	2032 | 2042	2042	2023-2032	2032 | 2042
Units	%	$MM Levelized Rate	$MM Levelized Rate	$MM Levelized Rate	Summer | Winter	Summer | Winter	MW	%	MW | $MM	% Reduction
Reference Portfolio	4.32	19,217 $71.1	1,257 $4.51	92.5 | 85.1	15% | 12%	21% | 19%	3,748|4,133		1,988 | $10,564	84% | 83%
CETA Portfolio	4.97	20,991 $77.5	2,804 $6.11	117.3 | 102.4	25% | 28%	32% | 28%	4,315|5,047		2,778 | $11,712	83% | 82%
ECR Portfolio	3.79	19,880 $73.4	1,742 $5.97	83.1 | 67.8	13% | 16%	20% | 20%	3,942|3,893		1,868 | $10,211	84% | 89%
FOR Portfolio	4.18	19,260 $71.2	1,338 $4.54	92.5| 84.3	15% | 12%	22% | 20%	3,758|4,365		1,988 | $10,553	84% | 83%
FOR-Wint Portfolio	12.49	25,799 $95.3	2,678 $6.84	110.6 | 68.6	30% | 50%	33% | 27%	4,034|4,203		2,453 | $17,088	84% | 87%
NCR Portfolio	4.29	19,439 $71.8	2,731 $15.40	55.9 | 42.1	6% | -2%	18% | 17%	3,769|4,234		1,968 | $10,360	84% | 83%

*Levelized Rates and NPVRR metrics are for generation component only. Metrics are for comparison only and do not represent the final costs which will apply to ratepayers.

Portfolio Key Takeaways

Affordability:

- ***Short Term costs are influenced by load assumptions.*** Low loads in the near-term result in fewer resource needs through 2028.
- ***Resource additions in FOR-Winter and CETA Portfolios drive long term costs higher.*** *T*he Reference Scenario was the Least Cost Portfolio over 30 years and had the smallest range of estimated results in the risk analysis.

Rate Stability:

- ***The Reference and FOR-Summer Portfolios show the smallest variability across market scenarios***. The NCR Portfolio, FOR-Winter and CETA Portfolios resulted in a wider range of potential cost risks.
- *From a Market Exposure perspective, the* ***NCR Portfolio showed the least risk in 2032 (+10 years)*** *relying the least on the market.* The FOR-Winter and CETA Portfolios exhibited the greatest exposure due to increased deployment of new renewable resources.

Reliability:

- Aggressive resource builds in the CETA and FOR-Winter Portfolios resulted in the **greatest amount of planning reserves** while the Reference, ECR and NCR Portfolios resulted in planning reserves closes to the minimum modeled requirement.
- **ECR Portfolio resulted in the lower Operational Flexibility** metric relative to the dispatchable capacity resources in the Portfolio with the Reference, FOR and NCR Portfolios reflecting the next favorable scores.
- **Resource diversity** representing a view of the proportions of energy from different resources in the Portfolio resulted in the Reference and FOR-Summer Portfolios illustrating comparable results. **The NCR Portfolio resulted in the most balanced** score for this metric.

Local Impacts and Sustainability:

- ***Low wind resource availability in the SWEPCO region impacts this metric for several portfolios***. The CETA and FOR-Winter Portfolios score the best with a bigger proportion of solar and storage resources available to build in SWEPCO.
- All resource plans result in a consistent and **reduction in CO2 emissions of over 80%** compared to 2005 levels by 2032.

Planned Updates

Planned modeling updates for the Final IRP include:

- Commodity prices – natural gas
- Company/Regional Load Forecast
- Technology Costs from latest EIA AEO 2023
- Capacity accreditation – include latest SPP study
- Timing of new resources (Existing sites consideration)
- Additional Portfolio sensitivities

Modeling Scenarios

SWEPCO evaluated an integrated set of scenarios to study plausible ranges of key market uncertainties.

Reference Scenario

- The SPP market continues to evolve based on the current outlook for load growth, commodity prices, technology development, and regulatory pressure.

Clean Energy Technology Advancement

- Continued technology improvements result in low technology costs for new wind, solar, and storage. Widespread adoption of EVs and electrification results in high load growth.

Enhanced Carbon Regulation

- Carbon emissions are regulated through a federal carbon cap and trade program that results in a significant CO_2 price and a long-term power sector net zero trajectory. Higher natural gas prices due to production restrictions.

Focus on Resiliency

- Reference case conditions but with summer and winter reserve margin enforcement. Low peak credit for solar and storage resources in winter result in more fully-dispatchable capacity across SPP.

No Carbon Regulation

- Natural gas prices remain low and no federal carbon regulation provide more favorable market conditions for gas and coal resources vs. renewables relative to the Reference Case

Scenario Inputs

Each IRP Scenario combines a different view of fundamental market drivers. SWEPCO used AURORA's long-term capacity expansion function to develop 20-year (2023-2042) forecasts of SPP market outcomes.

Scenario Concept	Load	Natural Gas	Carbon	Reserve Margin	Technology Costs	Peak Credit
Reference Scenario (REF)	Base	Base	Moderate	Base	Base	Base
Clean Energy Technology Advancement (CETA)	High	Base	Moderate	Base	Faster Decline	Base
Enhanced Carbon Regulation (ECR)	Low	High	High	Base	Faster Decline w/ higher congestion	Base
Focus on Resiliency (FOR)	Base	Base	Moderate	Summer & Winter Requirements	Base	Low
No Carbon Regulation (NCR)	Base	Low	No Price	Base	Base	Base

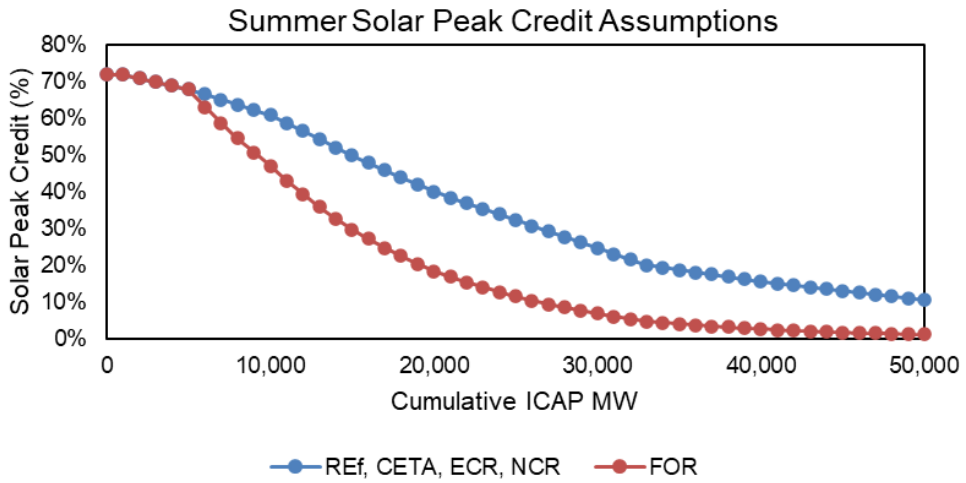
Reserve & Peak Credit Inputs

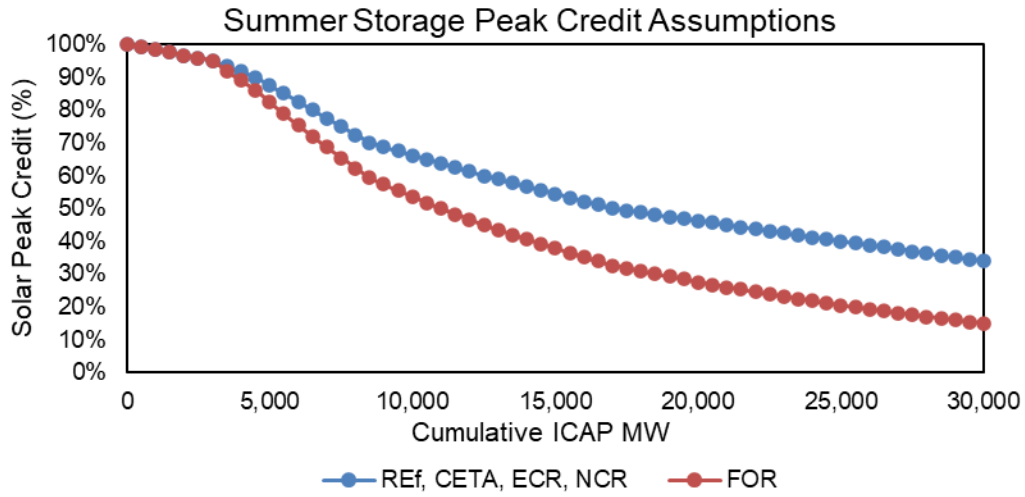
Summer Peak Credit

- Summer peak credit of incremental solar and storage additions in the SPP market is based on the total amount installed informed by ELCC studies for SPP [1]
- Under the FOR Scenario, SWEPCO tests a case where the summer peak credit of incremental solar and 4-hr battery storage is lower

Winter Capacity Requirements

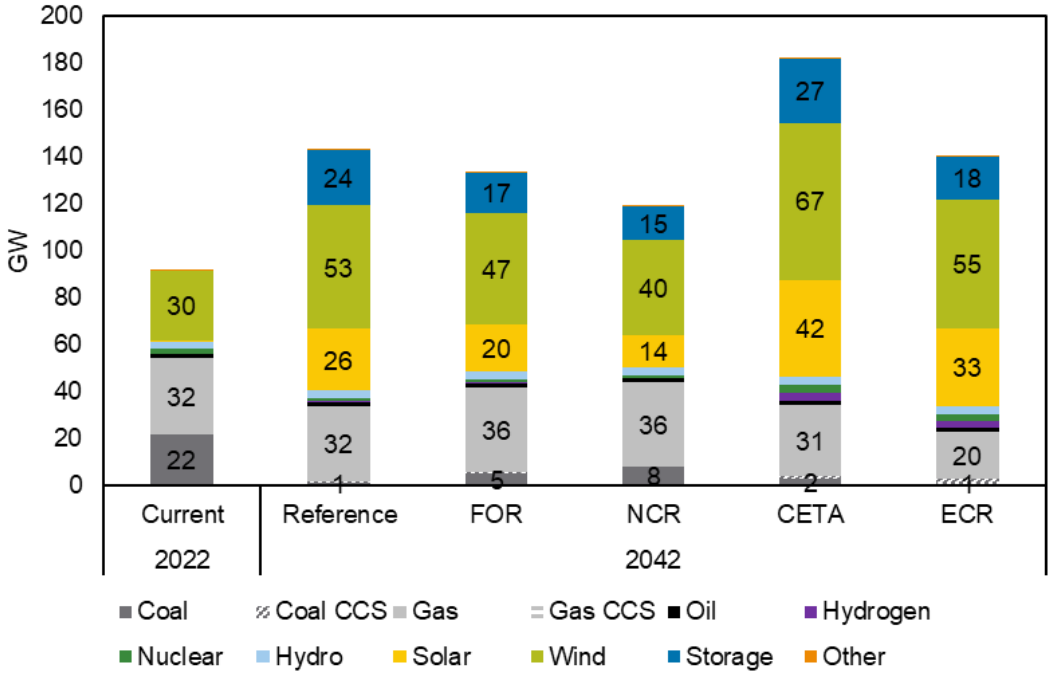
- Under the FOR Scenario, SWEPCO assumed that SPP implements a winter planning reserve margin of 22% for the draft IRP
- Generators are also rated differently in Winter. Solar PV, for example, provides less contribution towards meeting winter peaks

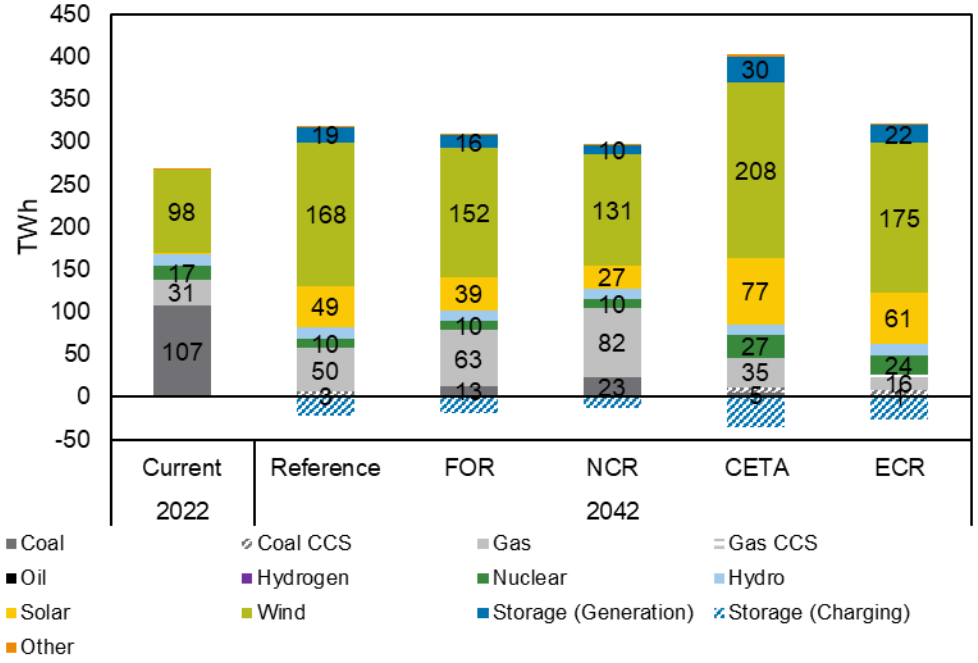




[1] 2019 SPP Solar & Wind ELCC Accreditation. SPP

SPP Supply Mix Changes



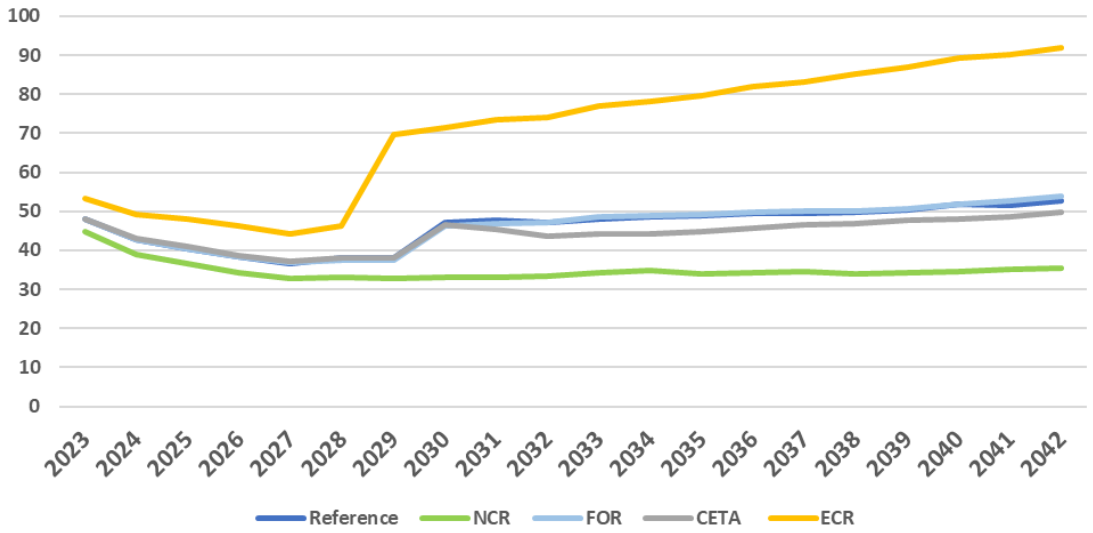


- Under all scenarios, coal capacity declines between 2023-2042 while the share of gas capacity remains steady in all but the highest CO_2 price view
- New additions are focused on wind, solar PV, and 4-hr battery storage, with small amounts of gas CCS retrofits selected under the ECR Scenario

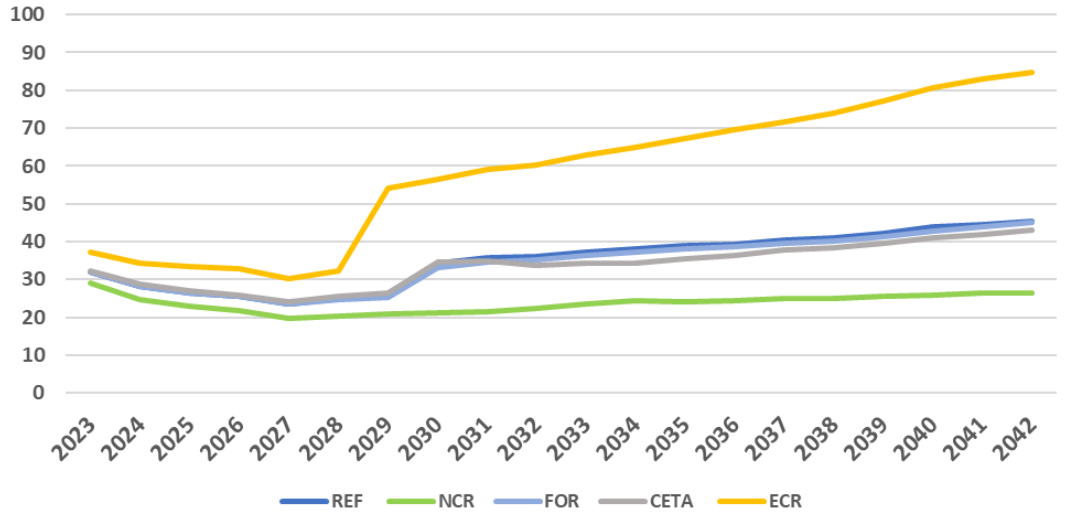
- By 2042, renewable resources provide roughly 70% of total SPP generation in the REF scenario
- Solar PV and wind provide at least 50% of total SPP generation by 2042 across all scenarios, even those with low gas prices and no new CO_2 pressure

SPP Market Prices

Annual ON- Peak SPP South Hub Price ($Nom/MWh)



Annual OFF- Peak SPP South Hub Price ($Nom/MWh)

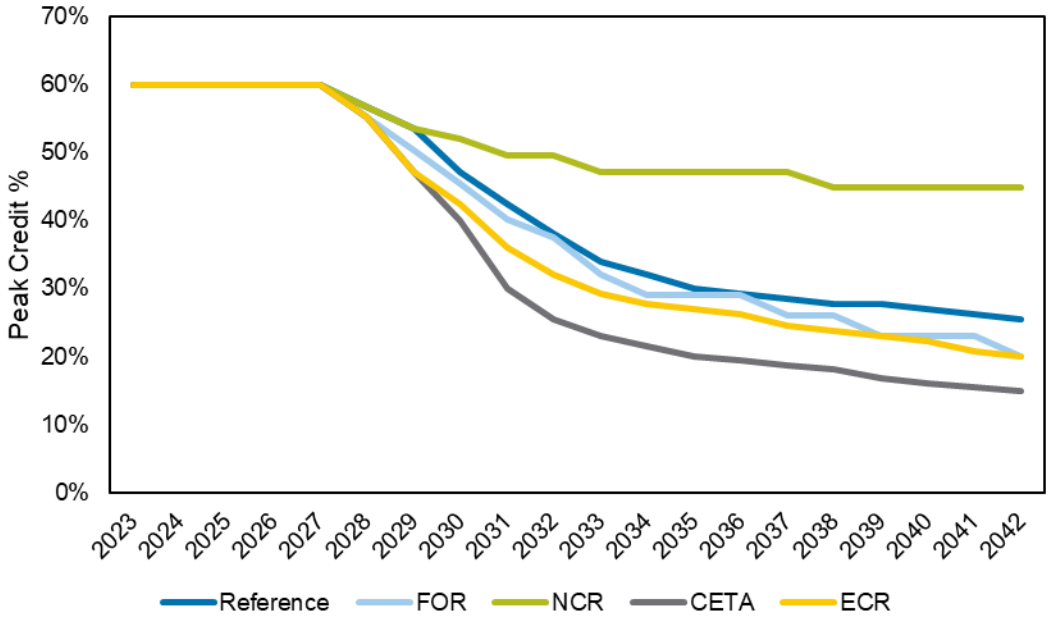


- Under the REF scenario, On-Peak prices decline from current levels until the CO_2 price is introduced in 2030, leading to a step-up in prices that hold steady around $48-55/MWh
- On-Peak prices are lowest in the NCR scenario due to the combination of low gas prices and zero CO_2 price
- On-Peak prices are highest in ECR scenario, reflecting higher gas commodity prices and the higher CO_2 price view

- The spread between On- and Off-Peak prices in the REF scenario starts around $16/MWh in 2023, but tightens to around $8/MWh by 2042
- Similar results are observed in the remaining scenarios, with the addition of new renewable resource and storage tending to drive the convergence between On- and Off-Peak prices

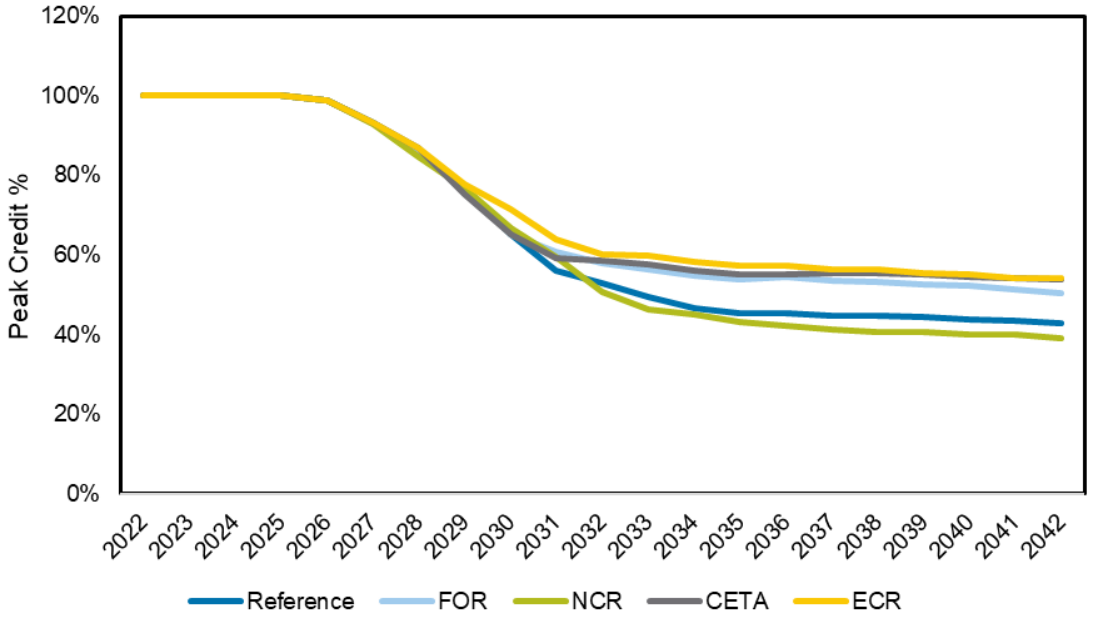
Solar & Storage Capacity Credit

Comparison of Solar Summer Peak Credits by Scenario



- Under the REF, ECR, and FOR cases, solar peak credit declines from 60% to around 25-30% over the 2023-2042 period
- Under the CETA Scenario, rapid deployment of new renewables results lower solar peak credit values starting in the 2020s
- Under the NCR Scenario, lower gas prices and lack of CO2 pressure reduce SPP-wide installations, resulting in higher solar peak credit values in this scenario

Comparison of 4-hr storage Summer Peak Credits by Scenario



- In the REF scenario, the peak credit of 4-hr Battery Storage falls from full credit to about 50% from 2022-2041
- Under the CETA scenario, rapid deployment of 4-hr battery storage units results in a faster peak credit decline
- In the ECR scenario, less 4-hr battery storage is deployed across SPP resulting in higher peak credit than the REF scenario

Note: Wind peak credit is assumed to stay constant at 15.7%

Planned Scenario Updated Assumptions

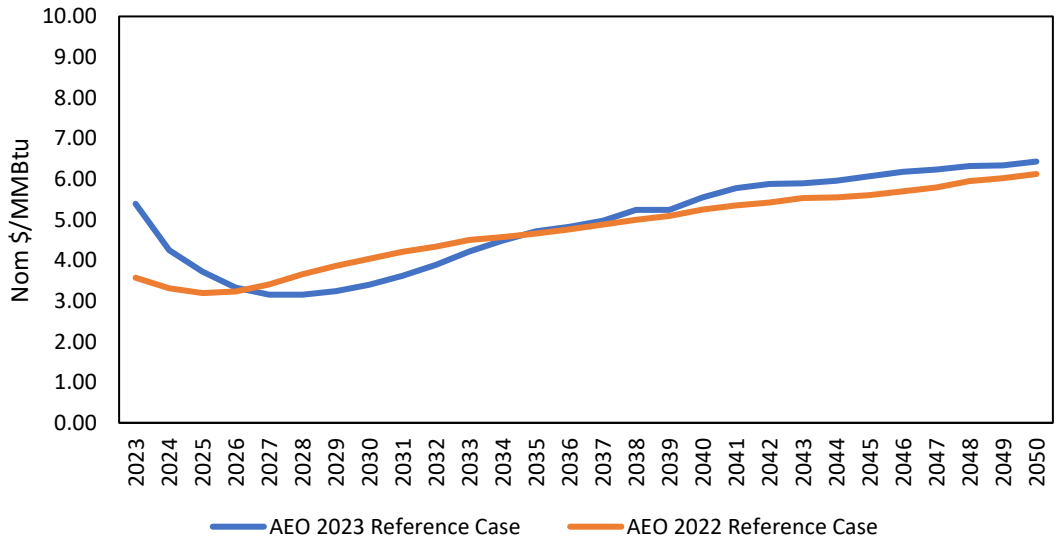
SWEPCO provided initial assumptions in March 2022 and then an updated version in July 2022 for stakeholder review.

IRP Scenarios will be updated with recent inputs including:

1. Fundamentals forecast of commodity prices
2. Regional Load Forecast
3. Assumed additions and retirements in the SPP market
4. EIA's Annual Energy Outlook report – Technology Costs – EIA AEO 2023
5. Capacity Accreditation for renewables, storage and thermal resources (SPP's newest ELCC report, November 2022)
6. Pending EPA regulations are under review but not currently planned for model updates

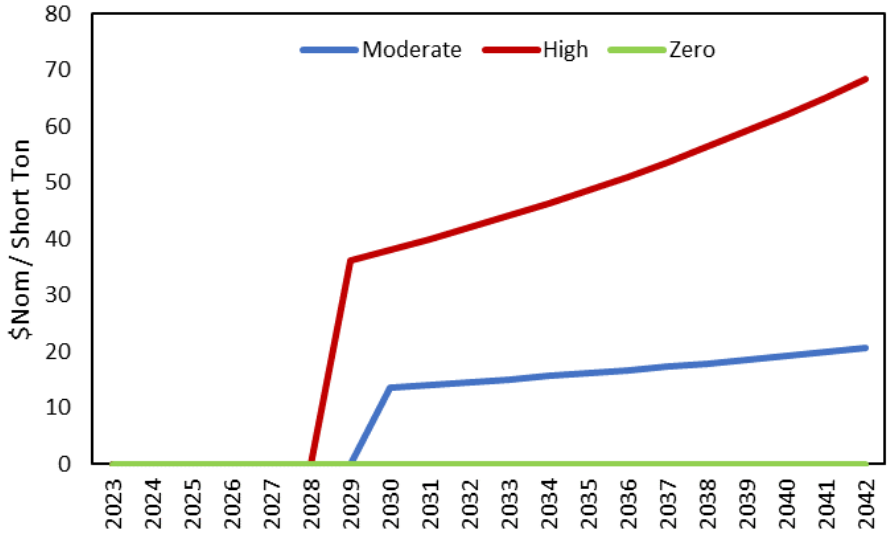
Natural Gas & Carbon Inputs

Henry Hub Natural Gas Price ($Nom/MMBtu)



- Prices are expected to decrease in the short term due to recent increases in US production.
- Expected increase in LNG exports drives price increase in the mid/late 2020s.
- Policy-driven demand destruction is expected to flatten prices in the long-term.

CO_2 Emissions Price



- Under the REF, FOR, and CETA scenarios, SWEPCO relies on the Moderate trajectory from CRA's analysis.
- Under the ECR scenario, a high trajectory is used to reflect additional regulatory pressure to accelerate GHG reductions
- Under the NCR scenario, a low trajectory is used as regulators take no further actions to reduce GHG emissions

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Technology Cost Assumptions-AEO 2023

Technology	First Year Available	Block Size (MW)	Annual Limit (MW)	Cumulative Technology Total [MW]	First Year Cost* (nom$/kW)
NGCC H-Class Single-Shaft**	2031	418	Unconstrained	Unconstrained	1,200
NGCC H-Class Multi-Shaft**	2031	1100			1,100
NGCT F-Class 240 MW**	2031	240	720	2400	800
Coal USC 650 MW with 90% Carbon Capture	2033	650	Unconstrained	Unconstrained	7,200
NGCC H-Class Single-shaft with 90% Carbon Capture**	2031	377			2,700
100 MW Aeroderivative**	2031	105	210		1,300
20 MW Reciprocating Engines**	2031	21	105		2,200
4-Hour Duration Lithium-Ion Battery	2026	50	200	3000	1,200
Utility-scale Onshore Wind Tier 1	2026	100	400	1600	2,000
Utility-scale Onshore Wind Tier 2	2026	100	400		2,200
Utility-scale Solar Photovoltaic Tier 1	2026	50	600	3600	1,900
Utility-scale Solar Photovoltaic Tier 2	2026	50	600		2,100
Utility-scale Solar + Storage (3:1)	2026	150	300	1500	2,700
Small Modular Reactor	2035	600	600	2400	7,800
Hydrogen Electrolyzer + Hydrogen Gas Combusting Turbine	2034	240	Unconstrained	Unconstrained	3,200
Hydrogen Gas Combusting Turbine	2034	240			1,800
20-Hour Duration Pumped Thermal Energy Storage	2033	25			3,400
20-Hour Duration Vanadium Flow Battery Storage	2033	25			2,900
20-Hour Duration Compressed Air Energy Storage	2033	25			3,400
Short Term Market Purchases	2024	1	150		SPP CONE

Note: *Total Plant overnight cost including interconnection cost estimate.

****Natural Gas resources to include a firm gas reservation fee as part of FO&M.**

Existing Site Technology Assumptions

Technology	First Year Available	Block Size (MW)	Annual Limit (MW)	Cumulative Technology Total [MW]	First Year Cost* (nom$/kW)
Welsh 1 (&3) Unit Fuel Conversion	2028	525	525	525	250
Pirkey Site NGCC F-Class Multi-Shaft**	2029	600	600	600	$1,100
Pirkey Site NGCT F-Class 240 MW**	2029	240	480	480	800
Pirkey Site 100 MW Aeroderivative**	2029	105	210	210	1,300
Pirkey Site 20 MW Reciprocating Engines**	2029	21	105	105	2,200

Note: Pirkey Site re-use

***Total Plant overnight cost including interconnection cost estimate**.

****Natural Gas resources to include a firm gas reservation fee as part of FO&M.**

Stakeholder Feedback

Feedback and Discussion

Break

Portfolio Development

IRP Scenarios Determine Market Prices, Tech Costs, Load & ELCC Inputs


Reference Scenario


Clean Energy Technology Advancement


Enhanced Carbon Regulation


Focus on Resiliency


No Carbon Regulation

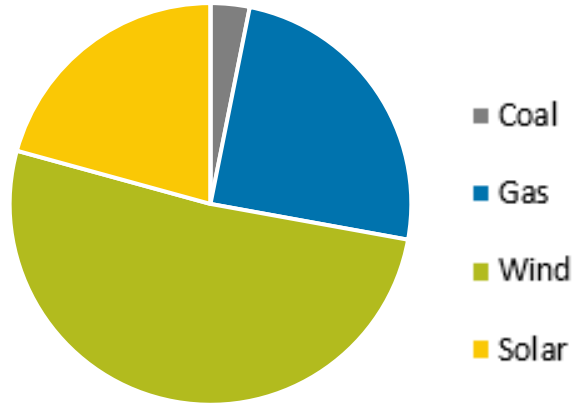
AURORA Evaluates Expected Resource Performance Under Scenario Conditions

Demand-Side Options:
- Energy Efficiency

Supply-Side Options such as:
- Wind and Solar PV
- Gas-fired CTs and CCs
- 4hr-Battery Storage
- Hydrogen-fired CTs
- Advanced Nuclear & Storage

AURORA Selects the Least-Cost Combination of New Resources

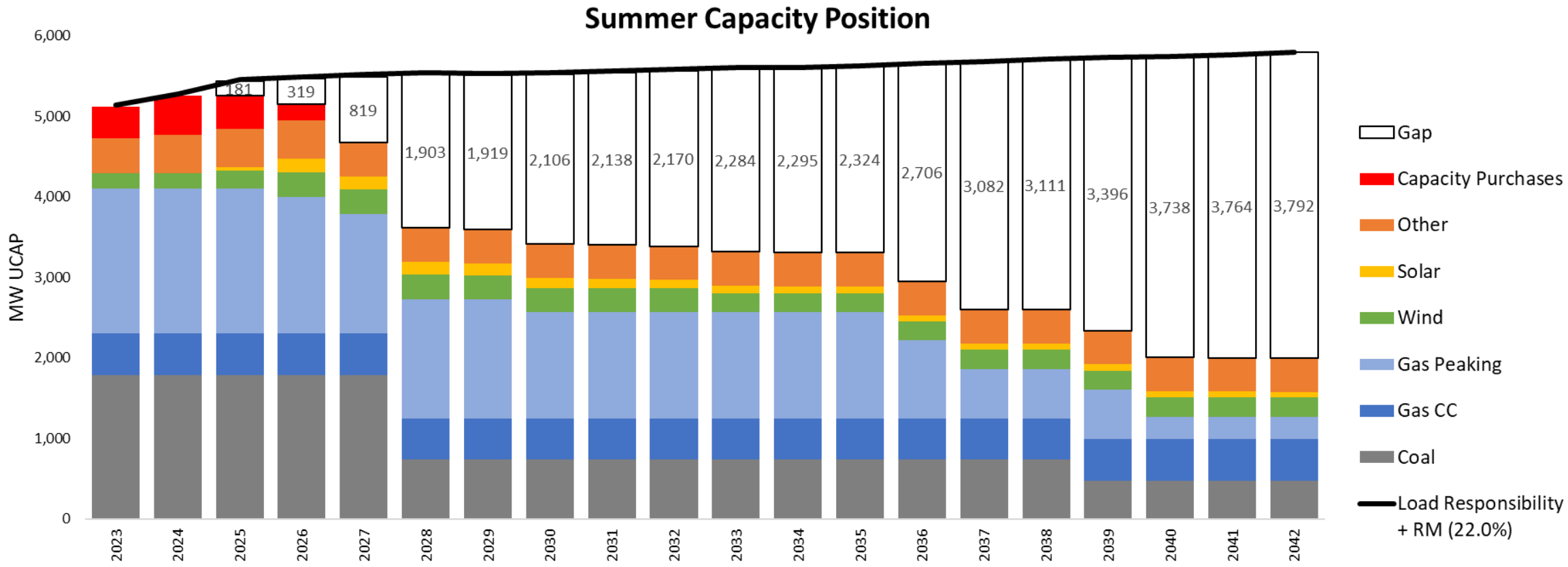
2042 Generation Mix - Reference Scenario



… Repeated for other scenarios

SWEPCO used AURORA to determine the least-cost combination of demand- and supply-side resources needed to meet future customer energy and capacity needs under each SPP Market Scenario.

Going in Position (Draft IRP)



Load growth forecast in the service territory combines with near-term coal retirements to create a need for new capacity in the mid-2020s in order to meet SPP reserve margin requirements.

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Reference Portfolio Detail

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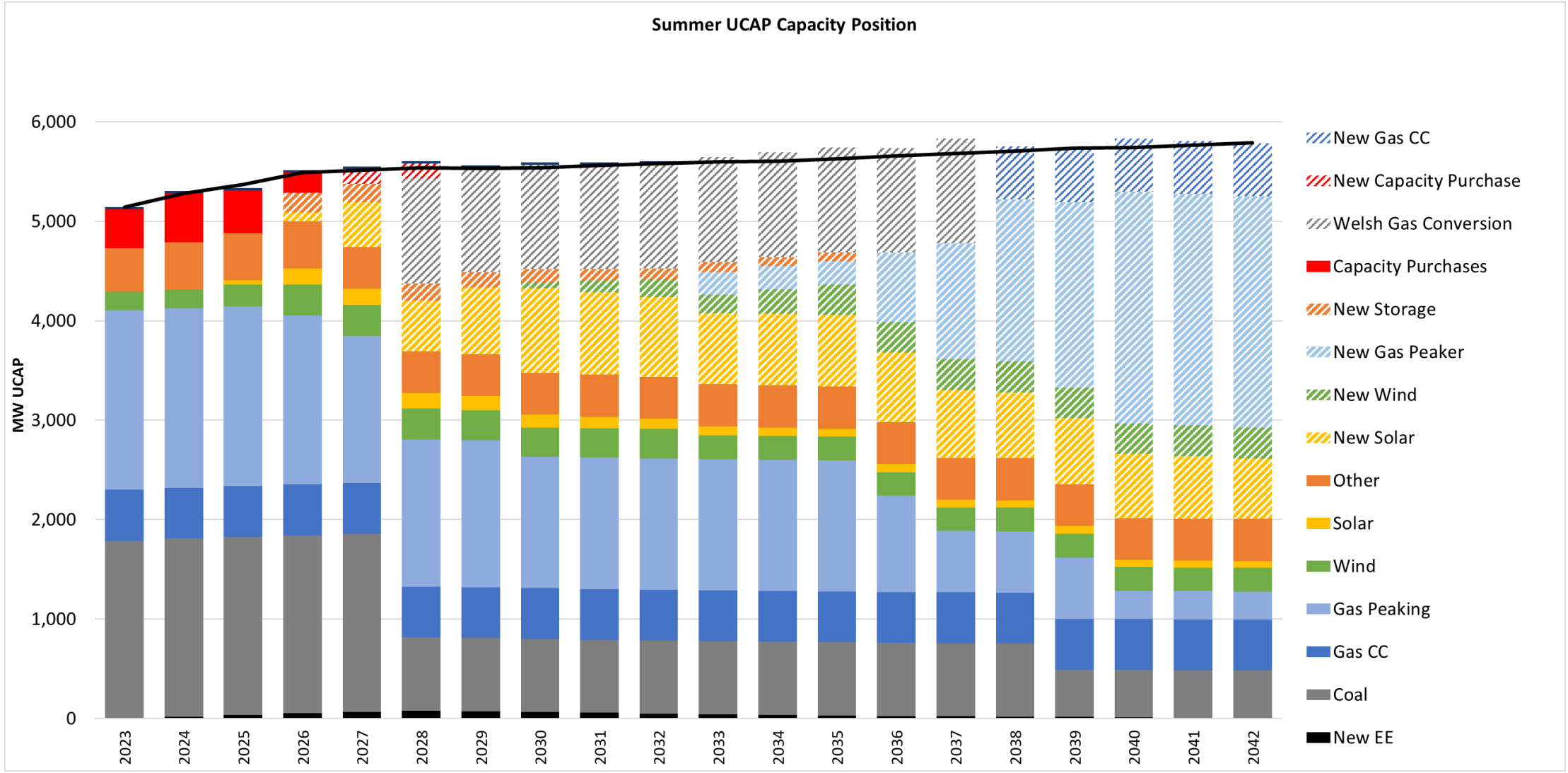
Utility-Scale New Build Additions by Year (Nameplate MW)							
Year	New Solar (T1/T2)	New Wind (T1/T2)	New Gas CT	New Gas CC (2x1)	New Storage	Welsh 1&3 Gas Conversions	Optional Capacity Purchases
2023							
2024							
2025	*72.5	**200					
2026	*200/150	**600			200		
2027	150/450						150
2028	150					1053	150
2029	150/200						
2030	150/400	400					
2031	150	400					
2032	150	400					
2033			240				
2034	150	400					
2035	150	400					
2036			480				
2037			480				
2038			480	550			
2039			240				
2040			480				
2041							
2042							
Total	2,672.5	2,800.0	2,400.0	550.0	200.0	1053.0	300.0

Demand Side Additions by Year (Peak Credit MW)		
Year	Energy Efficiency	Total + 22%
2023		
2024	19.9	24.32
2025	38.3	46.75
2026	53.7	65.47
2027	67.2	82.01
2028	78.8	96.09
2029	71.6	87.41
2030	63.6	77.63
2031	56.7	69.18
2032	49.7	60.65
2033	43.3	52.79
2034	36.3	44.33
2035	30.6	37.36
2036	25.7	31.39
2037	21.9	26.67
2038	18.8	22.92
2039	14.6	17.76
2040	11.1	13.51
2041	8.4	10.22
2042	6.2	7.61

***Diversion, Wagon Wheel *Rocking R, Mooringsport*

Reference Portfolio Balance



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NCR Portfolio Detail

CRA Charles River Associates

Utility-Scale New Build Additions by Year (Nameplate MW)							
Year	New Solar T1/T2	New Wind T1/T2	New Gas (CT/Aero)	New Gas CC (2X1)	New Storage	Welsh 1&3 Gas Conversions	Optional Capacity Purchases
2023							
2024							
2025	*72.5	**200					
2026	*200/150	**600			200		
2027	150/350						200
2028	150				50	1053	150
2029	150/250						
2030	150/300						
2031	150						
2032	100						
2033			240				
2034							
2035							
2036			480				
2037			480				
2038			720	550			
2039			240				
2040			240				
2041							
2042			105				
Total	**2,172.5**	**800.0**	**2,505.0**	**550.0**	**250.0**	**1053.0**	**350.0**

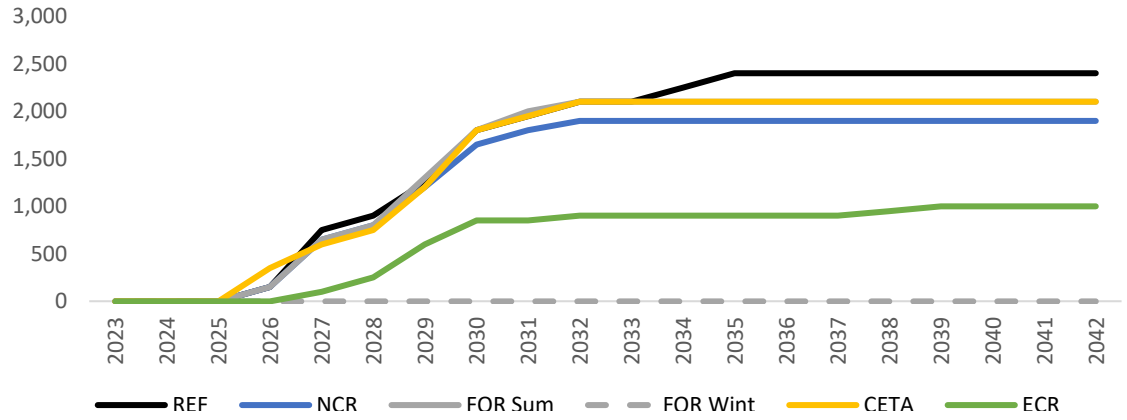
Demand Side Additions by Year (Peak Credit MW)		
Year	Energy Efficiency	Total + 22%
2023		
2024	19.9	24.3
2025	38.3	46.7
2026	53.7	65.5
2027	67.2	82.0
2028	78.8	96.1
2029	70.3	85.8
2030	61.1	74.5
2031	53.0	64.7
2032	45.0	54.9
2033	37.7	45.9
2034	29.1	35.5
2035	22.0	26.8
2036	16.0	19.5
2037	11.1	13.5
2038	7.3	8.9
2039	4.6	5.6
2040	2.7	3.3
2041	1.5	1.8
2042	0.8	1.0

***Diversion, Wagon Wheel *Rocking R, Mooringsport*

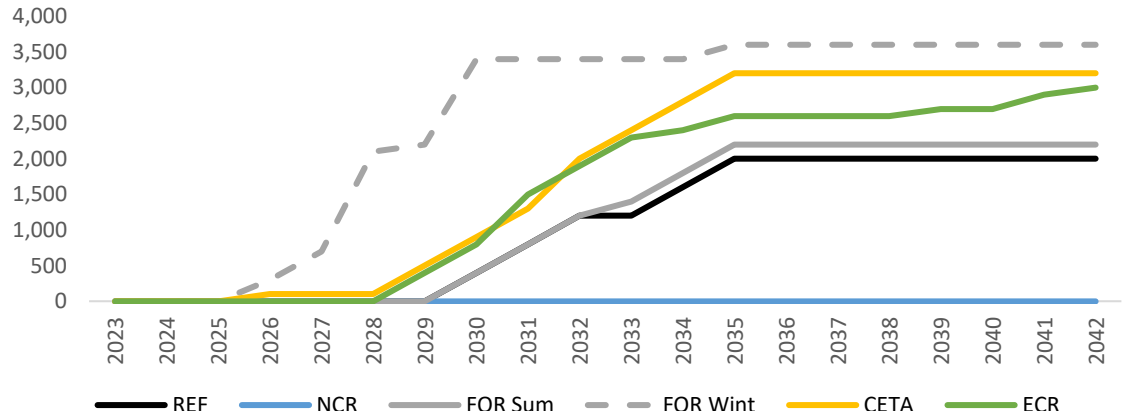
Comparison of New Resource Additions

Capacity additions across each candidate reflect the cost and market conditions used to develop the portfolio.

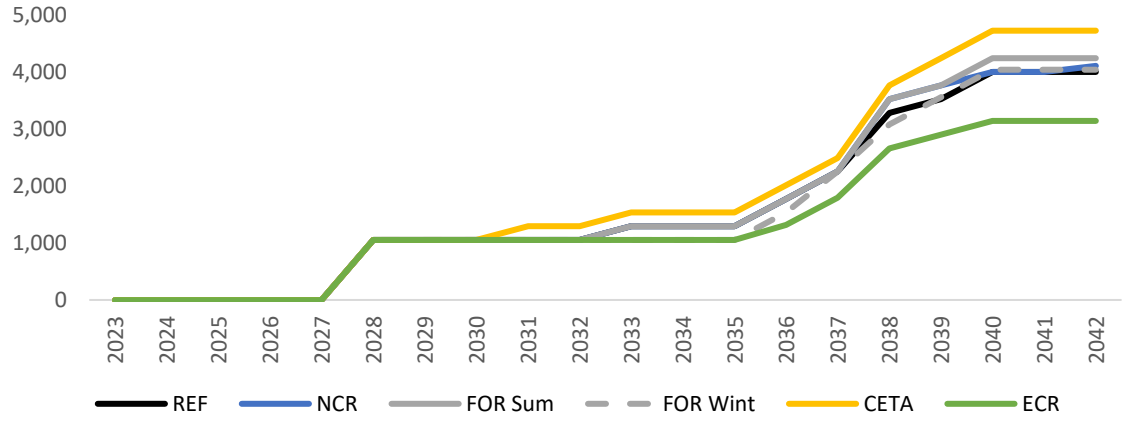
Solar - Cummulative MW



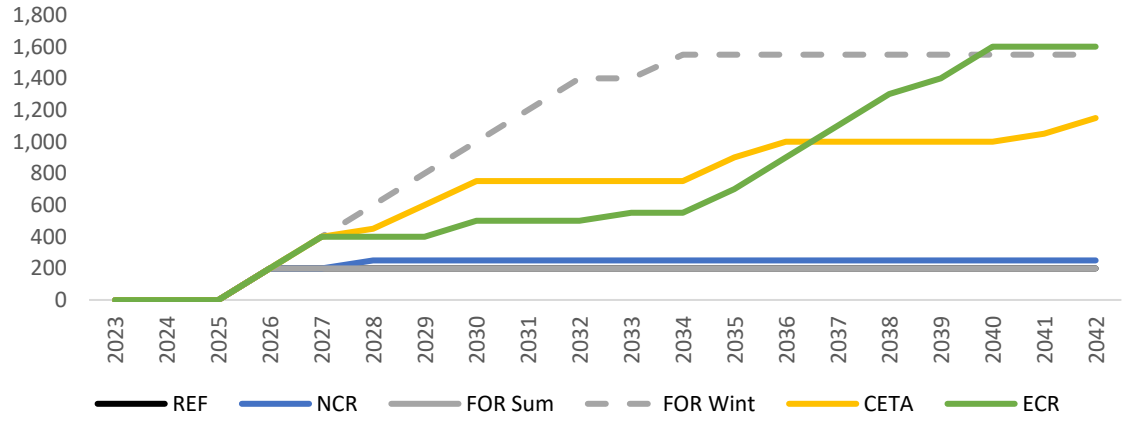
Wind - Cummulative MW



Gas - Cummulative MW

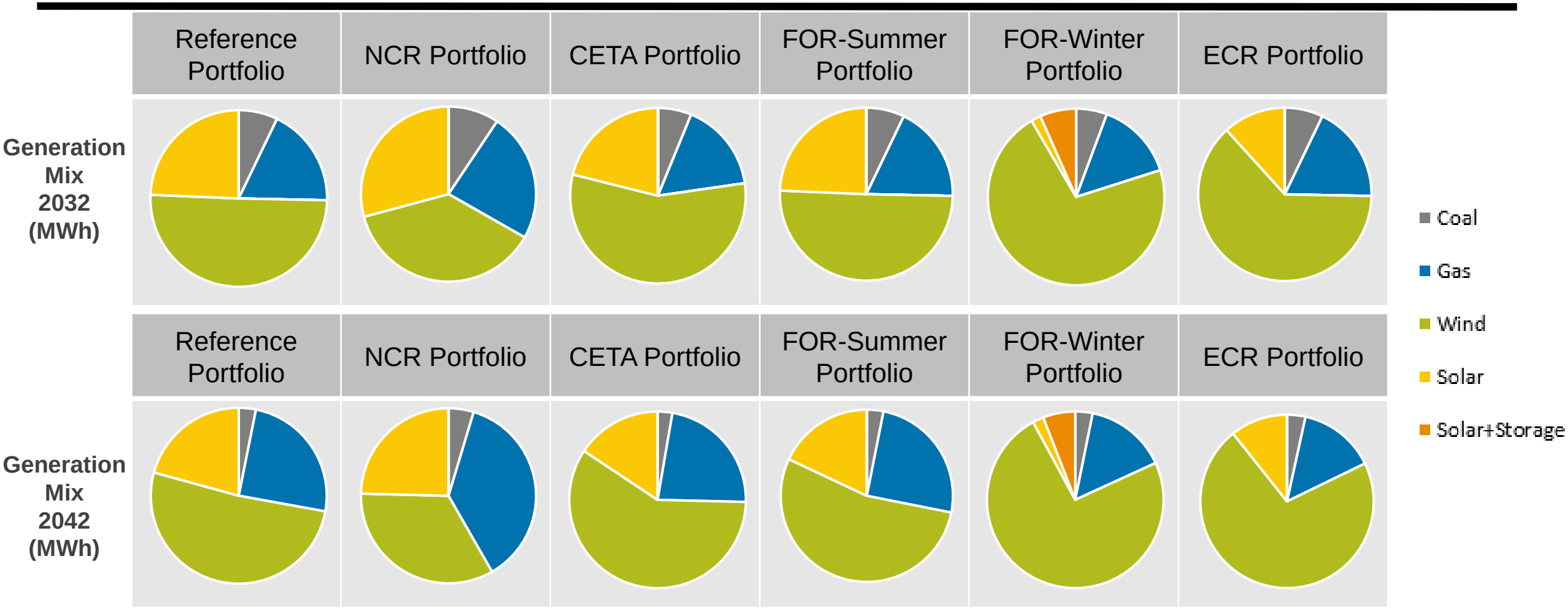


4-hour Storage - Cummulative MW



* Candidate Portfolio Resource additions by year are shown in the Appendix

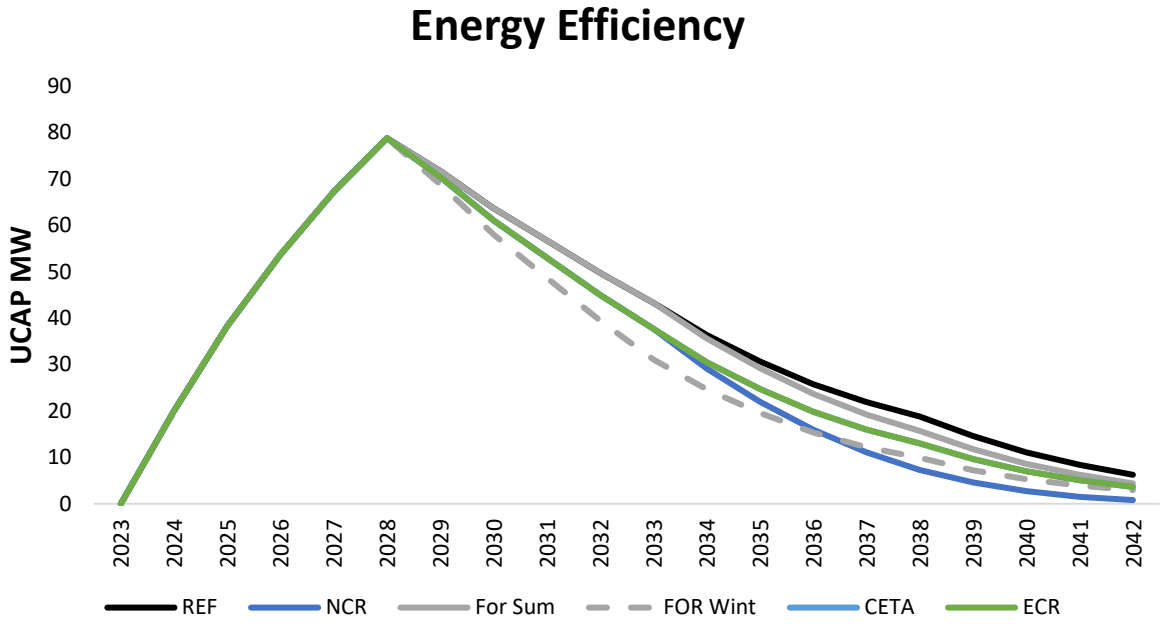
Candidate Portfolios



SWEPCO used four of the five least-cost plans as candidate portfolios in the 2023 IRP, the FOR-portfolio was considered under both summer and winter conditions.

Comparison of Energy Efficiency

Demand-side additions also vary across portfolios to reflect resource competitiveness under different conditions.



- The peak contribution of energy efficiency measures tend to decline over time as technologies included in the efficiency bundles become more widely adopted and included in the load forecast
- Overall, all portfolios add significant amount of EE – FOR Winter adds less beyond 2028 due to the amount of resources already in the portfolio

Additional Portfolio Sensitivities

Portfolio Sensitivity	Sensitivity Variable	Scenario	Sensitivity Parameter Adjustment
S1a	Technology Costs	Reference	Tech Costs +25%
S1b		Reference	Tech Costs -25%
S1c		NCR	Tech Costs +25%
S1d		NCR	Tech Costs -25%
S2a	Exclude Existing Site Natural Gas	Reference	Exclude Pirkey site development
S2b		NCR	Nat Gas Resource options (2029)

Stakeholder Feedback

Feedback and Discussion

Closing Remarks

Thank you for participating

Responses submitted in the Q&A that were unable to be addressed during the call will be provided within 2 weeks.

Further questions and feedback should be provided to Emile Cordaro ebcordaro@aep.com

https://www.swepco.com/community/projects/louisianairp/

Timeline (tentative)

January 2022	Feb / Mar 2022	April 2022	July 2022	March 2023	Aug 2023	Oct/Nov 2023	Feb 2024
Initial IRP Inputs Shared with Commission and Stakeholders	Stakeholder meeting to discuss initial IRP inputs and assumptions	Stakeholders submit comments on IRP inputs	Optional Stakeholder meeting to discuss load, resource, and fundamentals updates	SWEPCO files Draft IRP with LPSC	Stakeholder meeting to discuss Draft IRP	Stakeholders/Staff submit comments on Draft IRP	SWEPCO files final IRP, incorporating staff and stakeholder comments

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Appendix

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Supply Side Resources

SWEPCO evaluated three categories of supply side resources to identify the optimal resource mix that is resilient to future uncertainties.

Intermediate & Peaking Options

- H-Class 430 MW single-shaft natural gas combined cycle (NGCC)*
- H-Class 1,100 MW multi-shaft NGCC*
- F-Class 240 MW natural gas combustion turbine (NGCT*)
- 650 MW ultra-supercritical coal (USC) unit with 90% carbon capture
- 430 MW H-class single shaft NGCC with 90% carbon capture
- 100 MW aeroderivative unit
- 20 MW reciprocating engine
- 4-hour duration lithium-ion battery

Renewable Options

- Utility-scale onshore Wind
- Utility-scale solar photovoltaic

Advanced Generation Options

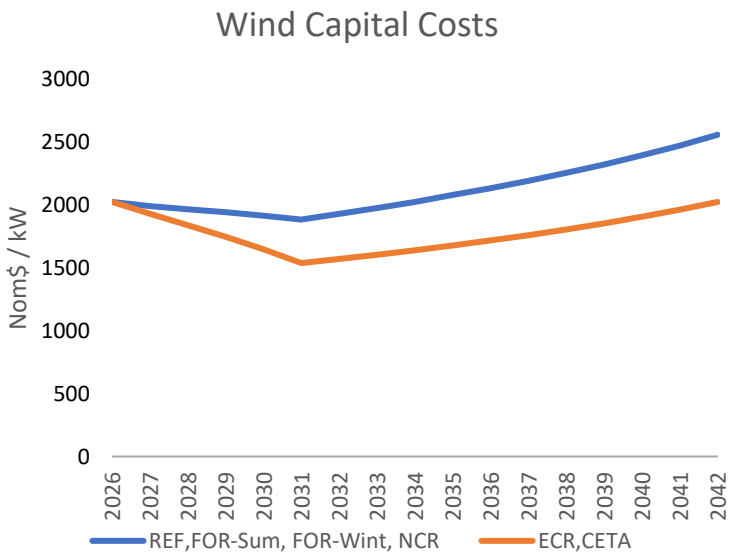
- Small modular nuclear reactors
- Hydrogen electrolyzer + hydrogen gas combustion turbine
- Hydrogen gas combustion turbine
- 20-hour duration pumped thermal energy storage
- 20-hour vanadium flow battery storage
- 20-hour compressed air energy storage

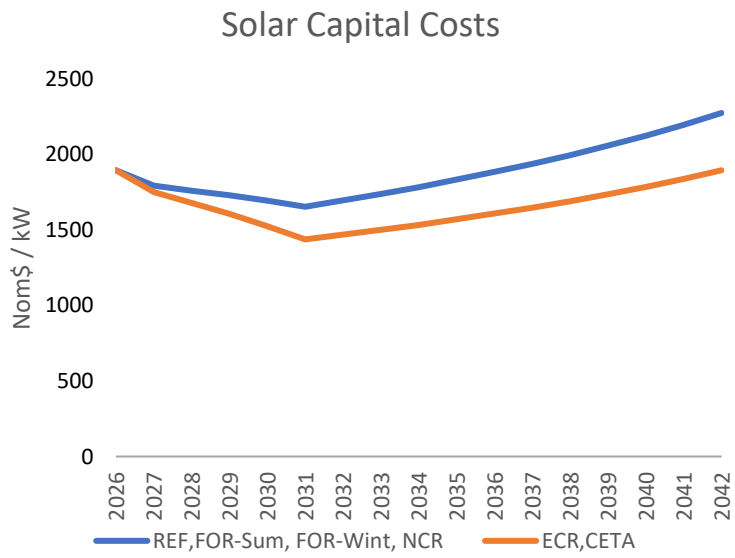
Note: *New NGCC/CT units are assumed to be retrofittable to burn 100% hydrogen

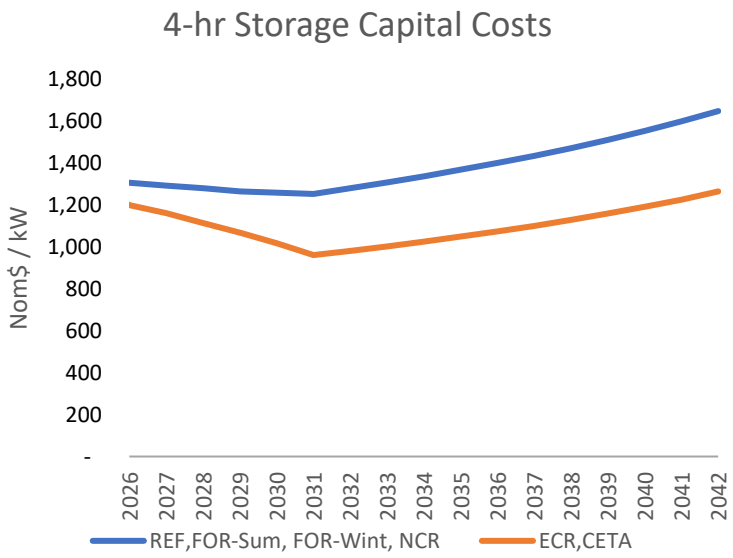
Technology Cost Ranges

Technology Cost Assumptions

- The Reference, FOR, and NCR scenarios assume new technology costs based on EIA AEO 2022 (to be updated with EIA AEO 2023) and NREL ATB 2021 moderate cost scenario
- Under the ECR and CETA scenarios, SWEPCO assumes that capital costs for renewable and storage technologies improve more quickly over time (NREL ATB 2021 advanced cost scenario)







Additional technology cost detail provided in Appendix

CETA Portfolio Detail

Utility-Scale New Build Additions by Year (Nameplate MW)							
Year	New Solar (T1/T2)	New Wind (T1/T2)	New Gas CT	New Gas CC (2x1)	New Storage	Welsh 1&3 Gas Conversions	Optional Capacity Purchases
2023							
2024							
2025	*72.5	**200					
2026	*200/150/200	**600/100			200		
2027	150/100				200		200
2028	150				50	1053	200
2029	150/300	400			150		
2030	150/450	400			150		
2031	150	400	240				
2032	150	400/300					
2033		400	240				
2034		400					
2035		400			150		
2036			480		100		
2037			480				
2038			720	550			
2039			480				
2040			480				
2041					50		
2042					100		
Total	**2,372.5**	**4,000.0**	**3,120.0**	**550.0**	**1,150.0**	**1053.0**	**400.0**

Demand Side Additions by Year (Peak Credit MW)		
Year	Energy Efficiency	Total + 22%
2023		
2024	19.9	24.3
2025	38.3	46.7
2026	53.7	65.5
2027	67.2	82.0
2028	78.8	96.1
2029	70.3	85.8
2030	61.1	74.5
2031	53.0	64.7
2032	45.0	54.9
2033	37.7	45.9
2034	30.5	37.2
2035	24.7	30.2
2036	19.8	24.2
2037	16.0	19.5
2038	13.0	15.8
2039	9.6	11.7
2040	7.0	8.5
2041	5.1	6.2
2042	3.7	4.5

***Diversion, Wagon Wheel *Rocking R, Mooringsport*

ECR Portfolio Detail

Utility-Scale New Build Additions by Year (Nameplate MW)							
Year	New Solar T1/T2	New Wind T1/T2	New Gas (CT/Aero)	New Gas ICE	New Storage	Welsh 1&3 Gas Conversions	Optional Capacity Purchases
2023							
2024							
2025	*72.5	**200					
2026	*200	**600			200		
2027	100				200		200
2028	150					1053	150
2029	150/200	400					
2030	150/100	400			100		
2031		400/300					
2032	50	400					
2033		400			50		
2034		100					
2035		200			150		
2036			240	21	200		
2037			480		200		
2038	50		720/105	42	200		
2039	50	100	240		100		
2040			240		200		
2041		200					
2042		100					
Total	**1,272.5**	**3,800.0**	**2,025.0**	**63.0**	**1,600.0**	**1053.0**	**350.0**

Demand Side Additions by Year (Peak Credit MW)		
Year	Energy Efficiency	Total + 22%
2023		
2024	19.9	24.3
2025	38.3	46.7
2026	53.7	65.5
2027	67.2	82.0
2028	78.8	96.1
2029	70.3	85.8
2030	61.1	74.5
2031	53.0	64.7
2032	45.0	54.9
2033	37.7	45.9
2034	30.5	37.2
2035	24.7	30.2
2036	19.8	24.2
2037	16.0	19.5
2038	13.0	15.8
2039	9.6	11.7
2040	7.0	8.5
2041	5.1	6.2
2042	3.7	4.5

***Diversion, Wagon Wheel *Rocking R, Mooringsport*

FOR-Summer Portfolio Detail

Utility-Scale New Build Additions by Year (Nameplate MW)							
Year	New Solar T1/T2	New Wind T1/T2	New Gas CT	New Gas CC (2X1)	New Storage	Welsh 1&3 Gas Conversions	Optional Capacity Purchases
2023							
2024							
2025	*72.5	**200					
2026	*200/150	**600			200		
2027	150/350						200
2028	150					1053	200
2029	150/350						
2030	150/350	400					
2031	150/50	400					
2032	100	400					
2033		200	240				
2034		400					
2035		400					
2036			480				
2037			480				
2038			720	550			
2039			240				
2040			480				
2041							
2042							
Total	**2,372.5**	**3,000.0**	**2,640.0**	**550.0**	**200.0**	**1053.0**	**400.0**

Demand Side Additions by Year (Peak Credit MW)		
Year	Energy Efficiency	Total + 22%
2023		
2024	19.9	24.3
2025	38.3	46.7
2026	53.7	65.5
2027	67.2	82.0
2028	78.8	96.1
2029	71.6	87.4
2030	63.6	77.6
2031	56.7	69.2
2032	49.7	60.7
2033	43.3	52.8
2034	35.6	43.4
2035	29.2	35.6
2036	23.7	28.9
2037	19.2	23.5
2038	15.7	19.1
2039	11.7	14.3
2040	8.6	10.5
2041	6.2	7.6
2042	4.4	5.4

***Diversion, Wagon Wheel *Rocking R, Mooringsport*

FOR-Winter Portfolio Detail

Utility-Scale New Build Additions by Year (Nameplate MW)							
Year	New Solar T1/T2	New Wind T1/T2	New Gas (CT/Aero)	New Hybrid (Solar + Storage)	New Storage	Welsh 1&3 Gas Conversions	Optional Capacity Purchases
2023							
2024							
2025	*72.5	**200					
2026	*200	**600/300		400	200		
2027		400		400	200		200
2028		400/1000		400	200	1053	
2029		100		400	200		
2030		400/800		400	200		
2031					200		
2032					200		
2033							
2034					150		
2035		200					
2036			480				
2037			720				
2038			720/105				
2039			480				
2040			480				
2041							
2042							
Total	272.5	4,400.0	2,985.0	2000.0	1,550.0	1053.0	200.0

Demand Side Additions by Year (Peak Credit MW)		
Year	Energy Efficiency	Total + 22%
2023		
2024	19.9	24.3
2025	38.3	46.7
2026	53.7	65.5
2027	67.2	82.0
2028	78.8	96.1
2029	68.7	83.9
2030	58.0	70.8
2031	48.6	59.3
2032	39.5	48.2
2033	31.1	37.9
2034	24.6	30.0
2035	19.5	23.8
2036	15.3	18.7
2037	12.2	14.8
2038	9.9	12.0
2039	7.2	8.8
2040	5.3	6.4
2041	3.9	4.8
2042	2.9	3.6

***Diversion, Wagon Wheel *Rocking R, Mooringsport*

Portfolio Analysis

The resulting set of five candidate portfolios was stress-tested to evaluate performance under adverse or unexpected conditions and to populate elements of the Scorecard. This process had two steps:

Scenario Analysis
Tests Performance Under Integrated Set of Assumptions

- Each candidate portfolio is dispatched in every IRP Market Scenario to evaluate the level of customer exposure to higher costs under unexpected conditions
- This approach answers "what if…" questions and tests outcomes where major events change fundamental outlooks for key drivers after investments are made, altering portfolio performance

Stochastic Analysis
Tests Performance Under a Distribution of Inputs

- The stochastic analysis incorporates hourly volatility into energy prices, natural gas prices, and hourly renewable generation to test the impacts of extreme weather and high-cost market events
- Stochastics evaluate volatility and "tail risk" impacts
  - Market price volatility and resource output uncertainty are more complex than what can be assessed under "expected" or "weather normal" conditions
  - Commodity price exposure risk is broader than any single scenario range (i.e., February 2021 winter storm)

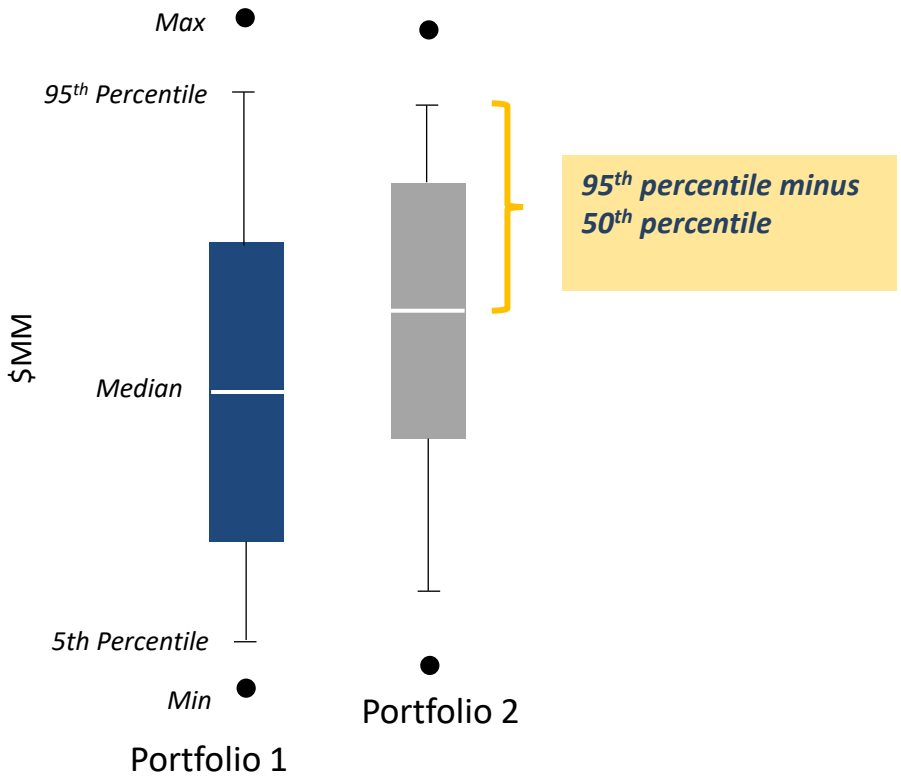
Stochastic Analysis

The stochastic analysis evaluates each candidate portfolio, for two sample years 2032 and 2042, across 250 random combinations of market conditions to evaluate exposure to higher costs during periods of volatility.

IRP Stochastic Variables

Electricity Prices	• Hourly power prices may vary significantly during periods of extreme weather or plant outages • Evaluating random draws of power prices – in combination with other variables – allows SWEPCO to test the robustness of candidate portfolios under volatile market conditions
Natural Gas Prices	• Daily natural gas prices can be highly variable depending on weather and broader system conditions • Natural gas fuel costs are expected to be an important component of total system costs under various candidate portfolios
Wind & Solar Output	• Evaluating variability of renewable generation through unit output uncertainty allows SWEPCO to assess rate stability and affordability metrics as corporate sustainability targets are met

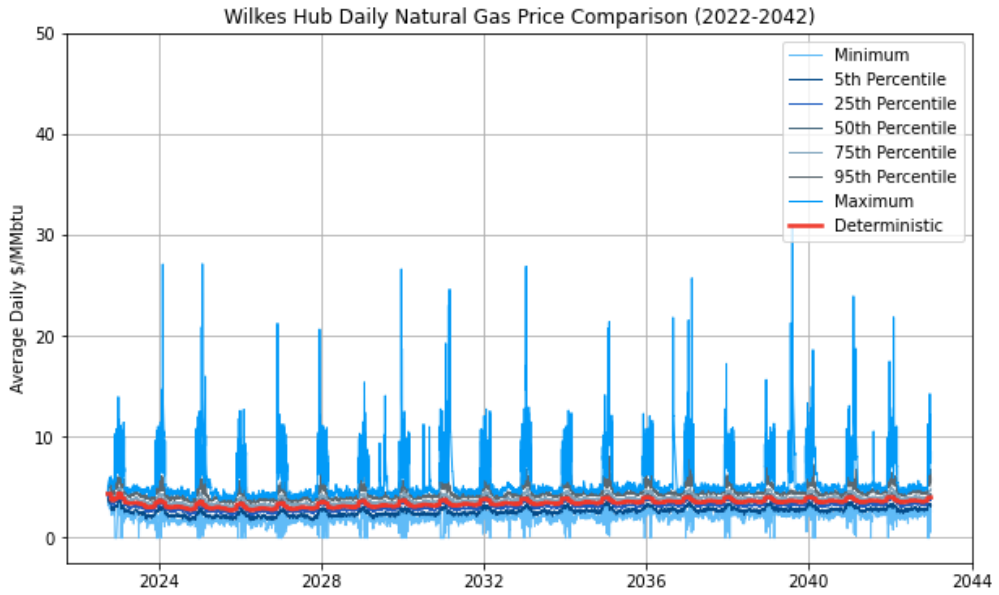
Measuring Cost Risk



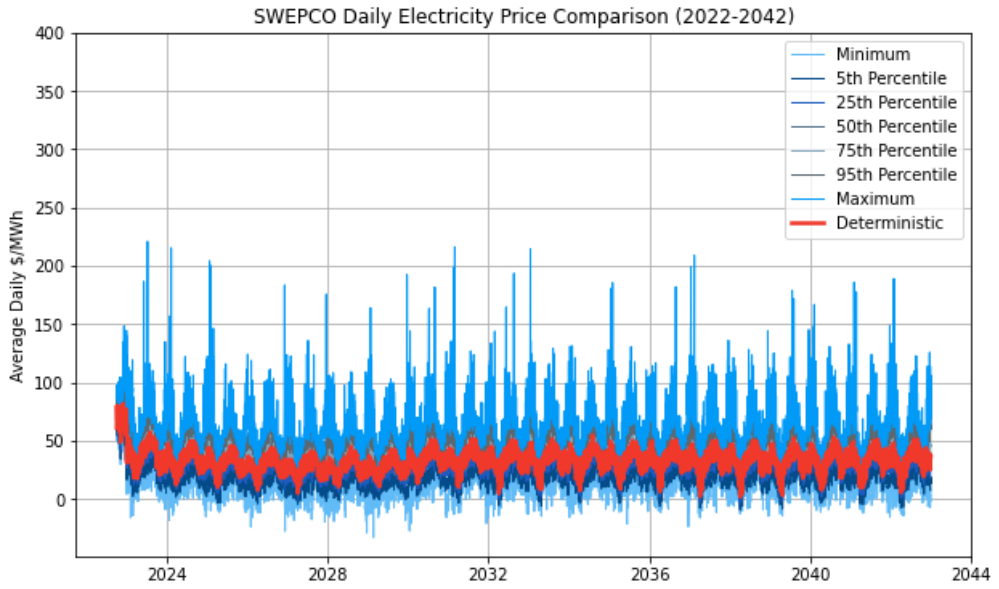
Commodity Price Volatility

The stochastic commodity price iterations test a wider range of commodity price conditions than are considered in the deterministic scenarios, explicitly testing high-impact short-duration events that expose customers to costs.

Gas Iterations Distribution



Power Iterations Distribution

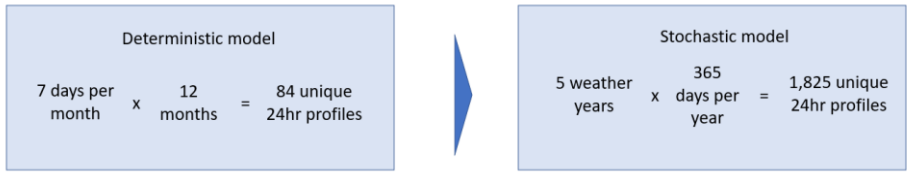


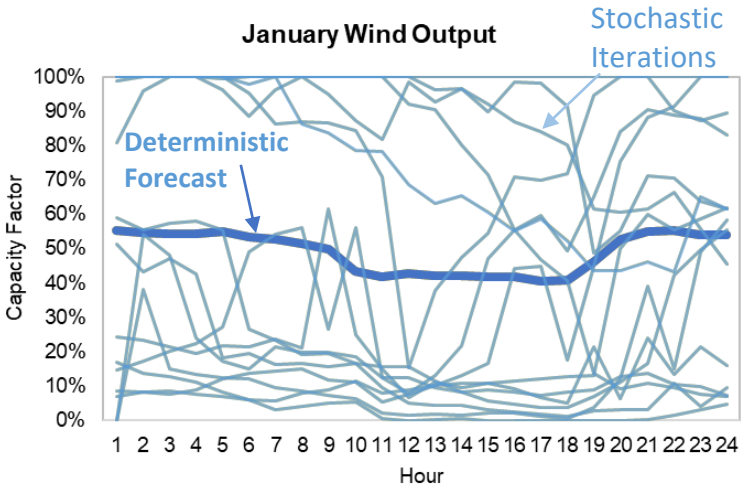
Renewable Output Volatility

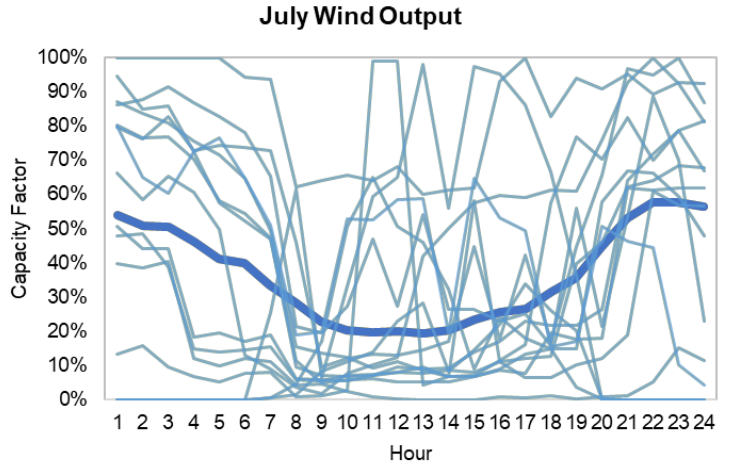
Representative hourly capacity factor shapes for wind and solar resources were developed using NREL's NSRBD and Wind Toolkit Databases.

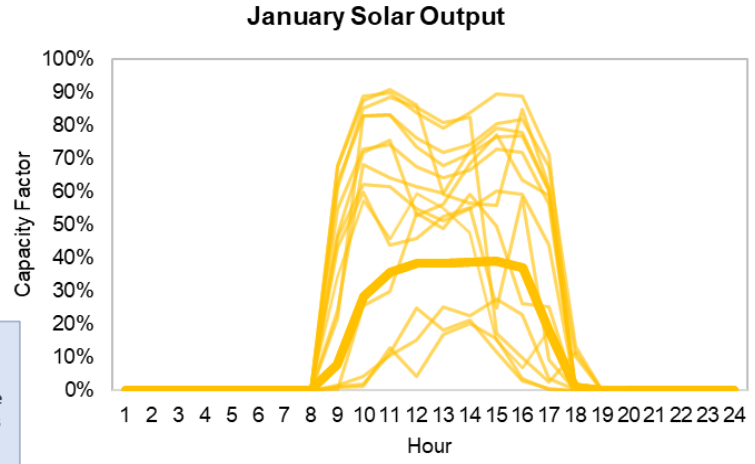
Historical data is averaged across five sites in Oklahoma to reflect some site diversity across SWEPCO portfolios. Solar historical data taken from one central Oklahoma county.

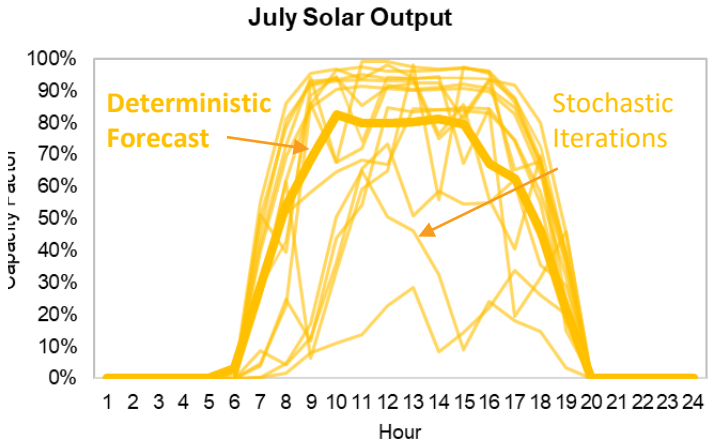
Solar and wind profiles were adjusted as necessary to ensure portfolios are robust to more extreme possible weather outcomes.











2023 IRP Scorecard

The IRP Scorecard compares the performance candidate portfolios under each of the four IRP Objectives. The Scorecard does not select the 2023 Preferred Plan by itself, rather it illustrates the trade-offs between alternative resource strategies across performance indicators and metrics defined under each objective.

	Customer Affordability		Rate Stability			Maintaining Reliability			Local Impacts & Sustainability	
Portfolio	***Short Term:*** *5-yr Rate CAGR, Reference Case*	***Long Term:*** *30-yr NPVRR, Reference Case*	***Scenario Range:*** *High Minus Low Scenario Range, 30-yr NPVRR*	***Cost Risk:*** *RR Increase in Reference Case (95th minus 50th Percentile)*	***Market Exposure:*** *Net Sales as % of Portfolio Load, Scenario Average*	***Planning Reserves:*** *% Reserve Margin, Scenario Average*	***Operational Flexibility:*** *Dispatchable Capacity*	***Resource Diversity:*** *Generation Mix (MWh) by Technology Type - Reference Case*	***Locational Diversity:*** *Nameplate MW Installed Inside SWEPCO Territory*	***CO2 Emissions:*** *Percent Reduction from 2005 Baseline - Reference Case*
Year Ref.	2023-2028	2023-2052	2023-2052	2032 | 2042	2032	2023-2042	2032 | 2042	2042	2023-2032	2032 | 2042
Units	%	$MM Levelized Rate	$MM Levelized Rate	$MM Levelized Rate	Summer | Winter	Summer | Winter	MW	%	MW | $MM	% Reduction
Reference Portfolio										
CETA Portfolio										
ECR Portfo										
FOR Portfo										
FOR-W Portfo										
NCR Portfolio										

Performance Indicators on the Scorecard are aligned to the IRP objectives and used to compare the candidate resource plans

Metrics on the Scorecard are developed from the IRP modeling results and used to quantify performance an populate the Scorecard

Customer Affordability

The Customer Affordability indicators compare the cost to customers under Reference Scenario conditions over the short- and long-term. These metrics illustrate differences in performance under the expected case.

Performance Indicator	Metric	Description
Short-term	5-year Rate CAGR under the Reference Scenario (2023-2028)	• SWEPCO measures and considers the expected Compound Annual Growth Rate ("CAGR") of expected system costs for the years 2023-2028 as the metrics for the short-term performance indicator. • **A lower number is better**, indicating slower growth in customer rates.
Long-term	30-yr NPVRR under the Reference Scenario (2023-2052)	• SWEPCO measures and considers the growth in Net Present Value Revenue Requirement ("NPVRR") over 30 years as the long-term metric. • NPVRR represents total long-term cost paid by SWEPCO related to power supply. This includes plant O&M costs, fuel costs, environmental costs, net purchases and sales of energy and capacity, property and income taxes, and the return on capital. • SWEPCO also evaluates the levelized rate for this indicator, which is the fixed charge needed on a per MWh basis to recover the 30-yr NPVRR. • **A lower number is better**, indicating lower costs to supply customers with power.

Customer Affordability

	Customer Affordability	
Portfolio	***Short Term:*** *5-yr Rate CAGR, Reference Case*	***Long Term:*** *30-yr NPVRR, Reference Case*
Year Ref.	2023-2028	2023-2052
Units	%	$MM Levelized Rate
Reference Portfolio	4.32	19,217 $71.1
CETA Portfolio	4.97	20,991 $77.5
ECR Portfolio	3.79	19,880 $73.4
FOR - Summer Portfolio	4.18	19,260 $71.2
FOR-Winter Portfolio	12.49	25,799 $95.3
NCR Portfolio	4.29	19,439 $71.8

In the **Short Term**, customer rates rise the least under the ECR portfolio because the resource additions in this portfolio tend to occur later in the forecast due to the low load growth. The Reference, FOR-Summer, and NCR portfolio are next best and score similarly when costs are compared over the next five years. The CETA and FOR-Winter portfolios score worst by this metric, with FOR-Winter being a clear outlier on the high side due to the greater number of resources needed to meet the winter capacity requirements

In the **Long Term**, the Reference, FOR-Summer, NCR and ECR portfolio have the lowest expected cost to customers, owing the lower level of new capacity additions in these portfolios relative to the other candidate resource plans. The FOR-Winter and CETA portfolios are the most expensive for customers over the longer term due to the higher number of new builds in both portfolios needed to meet customer loads.

Rate Stability

The Rate Stability indicators compare the risk that cost to customers will be higher than expected, either due to a change in fundamental market conditions or due to short-duration high-impact events, like extreme weather.

Performance Indicator	Metric	Description
Scenario Range	High Minus Low Scenario Range 30-yr NPVRR (2023-2052)	• SWEPCO measures and considers the range of 30-yr NPVRR reported by each portfolio across all SPP market Scenarios. This metric reports the difference between the highest and lowest cost scenarios reported by the candidate portfolio on an NPVRR and levelized rate basis. • **A lower number is better**, indicating a tighter grouping of expected customer costs across a wide range of long-term market conditions.
Cost Risk	NPVRR Increase in Reference Scenario – 2032 and 2042 (95th minus 50th Percentile)	• SWEPCO measures and considers the potential for customer costs to increase beyond expected levels due to market volatility or extreme weather in 2032 and 2042. • This metric compares the difference between annual portfolio costs under expected market conditions and annual portfolio costs under stochastically generated market conditions that reflect high-cost market events. (see slide 36 for more detail on this metric) • **A lower number is better**, indicating that the costs of the candidate portfolio rise less when short-term market conditions are erratic or unfavorable.
Market Exposure	2032 Purchases / Sales as % of Total Portfolio Demand in Summer and Winter	• SWEPCO measures and considers the reliance of each candidate portfolio on market sales or purchases to balance seasonal generation with customer load. • The metric reports net purchases or sales in 2032, distinguishing between market activity in the summer (June-Aug) and winter (Dec-Feb) seasons. • **Closer to zero** indicates less reliance on the market to meet customer needs

Rate Stability

	Rate Stability		
Portfolio	***Scenario Range:*** *High Minus Low Scenario Range, 30-yr NPVRR*	***Cost Risk:*** *RR Increase in Reference Case (95th minus 50th Percentile)*	***Market Exposure:*** *Net Sales as % of Portfolio Load, Scenario Average*
Year Ref.	2023-2052	2032 | 2042	2032
Units	$MM Levelized Rate	$MM Levelized Rate	Summer | Winter
Reference Portfolio	1,257 $4.51	92.5 | 85.1	15% | 12%
CETA Portfolio	2,804 $6.11	117.3 | 102.4	25% | 28%
ECR Portfolio	1,742 $5.97	83.1 | 67.8	13% | 16%
FOR - Summer Portfolio	1,338 $4.54	92.5| 84.3	15% | 12%
FOR-Winter Portfolio	2,678 $6.84	110.6 | 68.6	30% | 50%
NCR Portfolio	2,731 $15.40	55.9 | 42.1	6% | -2%

The **Scenario Resilience** indicator shows that expected costs under the Reference and FOR-Summer portfolios had the least variability across the fundamental market scenarios. The ECR portfolios is the next best, while the FOR-Winter, NCR and CETA portfolios show the greatest variability in customer costs across the different market conditions.

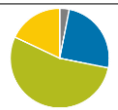
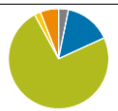
The NCR portfolio shows the lowest level of **Market Exposure** across the candidate portfolios, relying the least on net purchases or sales to meet customer requirements. The ECR, Reference and FOR-Summer portfolios are middle-of-the-pack by this metric. The FOR-Winter and CETA portfolio exhibit the greatest exposure due to the increased deployment of new renewable resources in these portfolios that require significant net sales to balance with customer loads.

Maintaining Reliability

The Maintaining Reliability indicators compare the amount of excess reserves, the amount of dispatchable capacity in the fleet, and the technology diversity of the SWEPCO generating mix across candidate plans.

Performance Indicator	Metric	Description
Planning Reserves	Avg. Seasonal Reserve Margin % 2023-2042	• SWEPCO measures and considers the amount of average amount of firm capacity in each candidate portfolio over the next 20 years on a seasonal basis. • This metric is a composite calculated by averaging the winter and summer capacity position of each portfolio across all five market scenarios for years 2023-2042. • **A higher number is better**, indicating more reserves are available to meet SPP requirements.
Operational Flexibility	Nameplate MW of dispatchable units in 2032 and 2042	• SWEPCO measures and considers the total amount of dispatchable units added to the portfolio by years 2032 and 2042 to compare candidate resource plans. • The metric for this indicator is the total Nameplate MW of fast-ramping technologies included in the candidate resource plan. • **A higher number is better,** indicating greater ability to ramp generation up or down to react to market conditions and follow load.
Resource Diversity	Generation by technology type, % of total portfolio in 2042	• SWEPCO measures and considers the diversity of new technologies added to its portfolio when comparing candidate portfolios. • This metric is a pie-chart showing total generation by each technology type in year 2042. • **A less concentrated portfolio is better**, overreliance on a single technology exposes customers to performance risk when conditions for that technology are unfavorable.

Maintaining Reliability

Portfolio	Maintaining Reliability: *Planning Reserves:* % Reserve Margin, Scenario Average	*Operational Flexibility:* Dispatchable Capacity	*Resource Diversity:* Generation Mix (MWh) by Technology Type - Reference Case
Year Ref.	2023-2042	2032 | 2042	2042
Units	Summer | Winter	MW	%
Reference Portfolio	21% | 19%	3,748|4,133	
CETA Portfolio	32% | 28%	4,315|5,047	
ECR Portfolio	20% | 20%	3,942|3,893	
FOR - Summer Portfolio	22% | 20%	3,758|4,365	
FOR-Winter Portfolio	33% | 27%	4,034|4,203	
NCR Portfolio	18% | 17%	3,769|4,234	

The CETA and FOR-Winter portfolios have the greatest amount of **Planning Reserves** due the more aggressive resource build-out needed to meet faster load growth and winter capacity requirements. The FOR-Summer portfolio is the next best. The Reference, ECR, and NCR portfolios score worst by this metric and may expose SWEPCO's customers to capacity shortfalls in summer.

The CETA plan scores best on the **Operational Flexibility** metric, owing to the greater number of total units deployed under the CETA portfolio. The Reference, FOR-Summer, FOR-Winter, and NCR portfolios are next best, while the ECR portfolio scores worst on this indicator.

The NCR portfolio scores highest on the **Resource Diversity** metric, with approximately equal proportions of energy provided by gas, solar, and wind units. The Reference and FOR Summer portfolios score similarly on this metric but are slightly more wind-heavy than the NCR portfolios. Finally, the FOR-Winter, ECR, and CETA portfolios are the least diverse, with wind dominating total portfolio generation in 2042.

Local Impacts & Sustainability

SWEPCO also considered a Sustainability indicator to compare portfolio performance towards meeting corporate sustainability targets.

Performance Indicator	Metric	Description
Local Impacts	Nameplate MW & Total CAPEX Installed **Inside** SWEPCO Territory by 2032	• SWEPCO measures and considers the amount of new capacity that can be located inside customer communities when evaluating candidate portfolios. • This metric compares the nameplate MW installed and the total capital investment expected inside SWEPCO's service territory under each plan from 2023-2032. • **A higher number is better**, indicating more opportunities for customer-sited resources and additional investment in local communities.
CO_2 Emissions	2032 & 2042 % Reduction from 2005 Baseline - Reference Case	• SWEPCO measures and considers the total amount of expected CO2 emissions of each candidate portfolio on the Scorecard. • This metric compares the forecast emissions of candidate portfolios in 2032 and 2042 under Reference Case market conditions with SWEPCO's actual historical emissions from the year 2005. • **A higher number is better**, indicating greater levels of emissions reductions have been achieved and customers are less exposed to potential future CO_2 costs.

Local Impacts & Sustainability

	Local Impacts & Sustainability	
Portfolio	***Local Impacts:*** *New Nameplate MW & Total CAPEX Installed Inside SWEPCO Territory*	***CO2 Emissions:*** *Percent Reduction from 2005 Baseline - Reference Case*
Year Ref.	2023-2032	2032 | 2042
Units	MW | $MM	% Reduction
Reference Portfolio	1,988 | $10,564	84% | 83%
CETA Portfolio	2,778 | $11,712	83% | 82%
ECR Portfolio	1,868 | $10,211	84% | 89%
FOR Portfolio	1,988 | $10,553	84% | 83%
FOR-Wint Portfolio	2,453 | $17,088	84% | 87%
NCR Portfolio	1,968 | $10,360	84% | 83%

The FOR-Winter portfolio scores best by the dollar metric and second best by the MW metric due to its greater deployment of new resources to compensate for lower generation in the winter. The CETA portfolio scores best by the MW metric and second by the dollar metric, owing to the greater deployment of new resources under this case to meet faster growth in customer load. The Reference portfolio is third-best in capacity metric with 1,988 MW installed in the territory and a total expected investment of approximately $10.5 billion over the 10 years which ranks third across the portfolio options. The ECR and NCR portfolios score similarly by this measure.

All of the resource plans considered in the 2023 IRP put SWEPCO on a pathway to meet or nearly meet the 2030 **CO_2 Emissions** reduction targets announced by AEP. This result is consistent over the long term as well, with the CETA portfolio showing the highest level of emissions across the candidate resource plans.