SOUTHWESTERN ELECTRIC POWER COMPANY

An AEP Company

2023 SWEPCO Integrated Resource Plan

IRP Input Stakeholder Meeting

March 29, 2022

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Meeting Guidelines

1. Participants joining today's meeting will be in a "listen-only" mode by default.
2. During the presentation, please enter questions at any time into the Teams Chat feature.
3. Time will be taken to answer questions related to the materials presented after each section although time may not allow all questions to be addressed. Unanswered questions will be addressed after the presentation as time permits and/or provided after the Stakeholder meeting.
4. At the end of the presentation, we will provide an opportunity for additional questions, thoughts, ideas, and suggestions.

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Agenda

Time	Agenda Topic	Presenter
9:00 - 9:20 am	Welcome and Introductions • Regulatory Update • Company Overview • Action Plan review • Stakeholder Process	Lynn Ferry-Nelson
9:20 – 9:40 am	IRP Summary & Overview • IRP Process and Objectives • Going In Position review	Greg Soller
9:40 – 10:45 am	Modeling Assumptions • Scenarios • Key Inputs	Jonathan Reignley Chad Burnett
10:45-11:00 am	Break	
11:00-11:45 am	IRP Development - Continued • Scenario Analysis insights • Portfolio Development & Analysis • Scorecard	Robert Kaineg
11:45-12:00 pm	Closing Remarks	Lynn Ferry-Nelson

Meeting Facilitator: Greg Soller

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Welcome & Introductions

SWEPCO Leadership Team

Tom Brice | Vice President, Regulatory and Finance
Lynn Ferry-Nelson | Director, Regulatory Services
Kayne Martin| Regulatory Consultant Staff
Emile Cordaro | State Govt. Affairs Manager
Jonathan McCartney | Sr. Counsel

SWEPCO IRP Leadership Team

Kelly Pearce | Managing Director, Resource Planning & Strategy
Mark Becker | Managing Director, Resource Planning & Grid Solutions
Akarsh Sheilendranath | Director, Resource Planning Strategy
Scott Fisher | Manager, Resource Planning
Greg Soller | Manager, Resource Planning
Chad Burnett | Managing Director, Economic & Supply Forecasting
Connie Trecazzi | Economic Forecasting Staff

Charles River Associates (CRA) Team

James McMahon | Vice President
Patrick Augustine | Vice President
Robert Kaineg | Principal
Jonathan Reignley | Senior Associate
Abigail Sah | Consulting Associate

SWEPCO Regulatory Update

Regulatory Filings planned for 1st Half of 2022

- January 2022 – Solar PPA Resource certification in Louisiana and Arkansas Rocking R solar resource
- Q2-2022 – June 2021 RFP Wind and Solar and contract capacity applications for approval in LA, AR, TX

- Trinity Pilot Project Status

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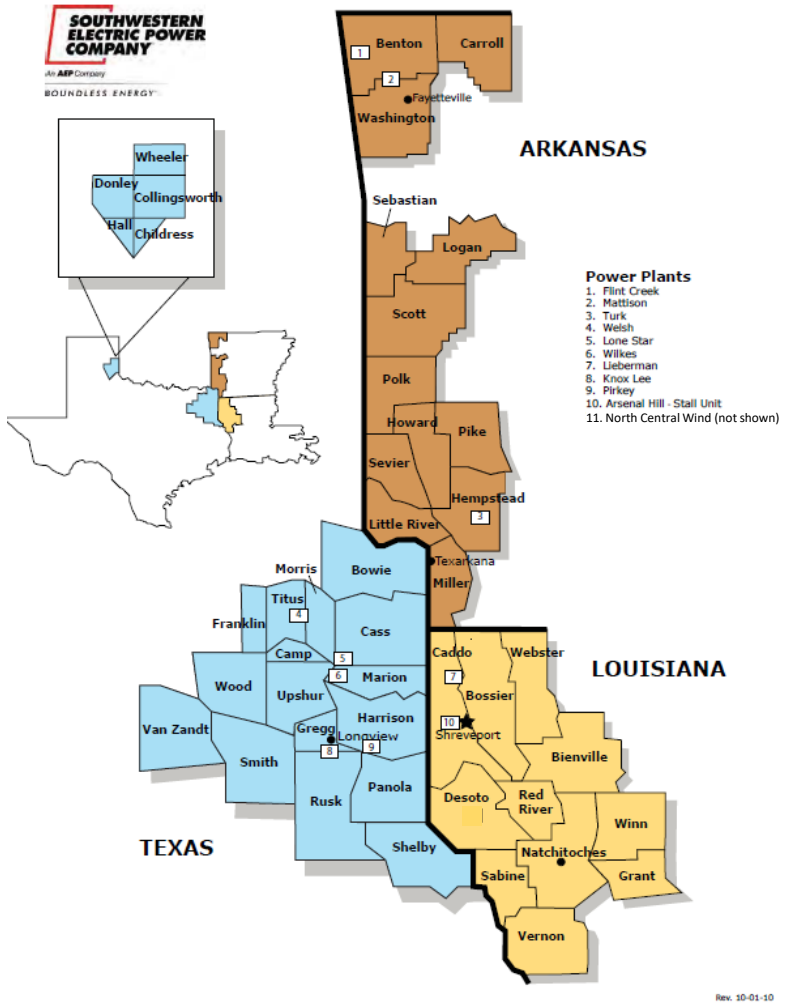
LPSC IRP Regulatory Timeline

Event	Description	Number of Months from IRP Filing Date	Estimated Date
1	Utility submits its request to initiate the IRP process, which should specify dates in accordance with this schedule of events, and a non-disclosure agreement.	At filing date	December 29, 2021
2	Utility files data assumptions to be used in the IRP and a description of studies to be performed.	1	January 31, 2022
3	Utility holds first Stakeholder Meeting.	2	*March 29, 2022*
4	Stakeholders may file written comments.	4	*May 27, 2022*
5	Draft IRP Report published.	12	December 2022
6	Utility holds second Stakeholder Meeting.	13	January 2023
7	Stakeholders may file comments about the draft IRP Report.	15	March 2023
8	Staff files comments about draft IRP Report.	16	April 2023
9	Final IRP Report filed by the utility.	19	July 2023
10	Stakeholders submit list of disputed issues and alternative recommendations.	21	September 2023
11	Staff submits recommendations to the Commission including whether or not a proceeding is necessary for the resolution of disputed issues.	22	October 2023
12	Commission Order acknowledging the IRP or setting disputed issues for hearing.	24	December 2023

About Southwestern Electric Power (SWEPCO)

- Southwestern Electric Power Company (SWEPCO) is headquartered in Shreveport, LA
- More than 543,000 customers in Louisiana, Arkansas and Texas.
  - 233,000 customers - LA
  - 187,000 customers - TX
  - 123,000 customers - AR
- SWEPCO also serves wholesale customers which represent about 12% of its load; additionally SWEPCO provides scheduling service for ~500MW
- SWEPCO participates in the Southwest Power Pool Regional Transmission Organization which establishes system reliability criteria

SWEPCO is a unit of American Electric Power (NYSE: AEP), which is one of the largest electric utilities in the United States, delivering electricity to more than 5 million customers in 11 states.



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SWEPCO's Five Year Action Plan from the 2019 IRP

- Proceed with necessary regulatory filings consistent with commission rules around plant retirements including the Lone-Star 1, Lieberman 2 (12/31/2019) and Knox Lee Units 2 and 3 retirements (1/1/2020).
  - These units were retired in 2020 and the appropriate filings were made with the LPSC and the SPP.
- Wind Resource Integration: Continue with the recently released Request for Proposal (RFP) to explore opportunities to add cost-effective wind generation in the near future to take advantage of the Federal Production Tax Credit.
  - SWEPCO issued a RFP in 2019, which led to the development and purchase of the North Central Wind Facilities. Sundance, Maverick and Traverse are operational.
  - A 2nd RFP was issued in July 2021 requesting bids for up to 300 MW of solar and 3,000 MW of wind.
- Solar Resource Integration: Continue efforts related to the notice filed with the commission to proceed with an RFP process in support of adding cost effective utility–scale solar resources.
  - An RFP was issued in July 2021 which included a request of up to 300 MW of solar. Additionally, SWEPCO signed a contract for 73.5 MW of solar through a PPA in December 2021 and requested approval at the LPSC on January 31.

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SWEPCO's Five Year Action Plan from the 2019 IRP (continued)

- Environmental Impacts: SWEPCO remains committed to closely following developments related to environmental regulations and updating our analysis of compliance options and timelines when sufficient information becomes available.
  - SWEPCO filed its environmental compliance plan with the EPA in November 2020 outlining its CCR/ELG compliance at the Pirkey, Flint Creek, and Welsh power plants.
- SWEPCO will continue to work with the Commissioners related to the Quick Start Phase of energy efficiency programs scheduled to continue through December 31, 2019 and any potential extensions beyond 2019.
  - The Company continues to work with the Commission on Energy Efficiency Programs and in anticipation of a more expansive plan being developed, has worked with the LPSC to approve more funding in 2022 than in the past Quick Start phases.
- SWEPCO will continue with the seasonal operation of Dolet Hills and continue to evaluate its viability.
  - SWEPCO and Cleco Power LLC retired the plant on December 31, 2021, after the exhaustion of economic lignite reserves at the mines.

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2021 AR IRP Preferred Plan

Utility-Scale New Build Additions by Year (Nameplate MW)

Year	New Solar	New Wind	New Gas CT	Welsh 1 Gas Conv.	New Storage	Capacity Purchases
2022						
2023						271
2024	450*	950*				279
2025	100*	1,500*				
2026						
2027	400					
2028	450			525		
2029	450					
2030	450					
2031	300					
2032	250					
2033	450					
2034						
2035						
2036	50		480			
2037			480			
2038	100		480			
2039	250		480			
2040			240			
2041	300					
Total	**4,000**	**2,450**	**2,160**	**525**	**0**	

Demand Side Additions by Year (Peak Credit MW)

Year	Energy Efficiency	Distributed Generation	Total + 12%
2022		1.8	2.02
2023	7.9	3.0	12.19
2024	17.9	3.6	24.14
2025	27.7	5.1	36.74
2026	36.1	6.2	47.41
2027	44.3	8.0	58.47
2028	44.2	8.6	59.08
2029	39.7	9.4	55.00
2030	35.1	9.4	49.89
2031	30.2	10.3	45.34
2032	28.5	10.6	43.78
2033	23.7	10.8	38.67
2034	18.6	11.0	33.19
2035	14.8	10.9	28.71
2036	12.6	11.2	26.66
2037	11.0	11.1	24.74
2038	7.9	11.7	22.00
2039	5.4	12.0	19.46
2040	3.3	12.5	17.63
2041	2.3	12.9	17.01

SWEPCO selected the "**No Early CT**" portfolio as the Preferred Plan for the 2021 Arkansas IRP.

This plan was an optimal solution under the Reference Scenario when early gas additions were disallowed in response to Stakeholder feedback.

**Resources are added 12/31 of given year due to tax incentive deadlines*

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Stakeholder Feedback Process

Stakeholders are an important part of the IRP process. SWEPCO identified three main objectives for stakeholder engagement:

- ❑ **Inform:** Increase stakeholders' understanding of the IRP process, key assumptions used in the IRP, and challenges that SWEPCO faces.
- ❑ **Listen:** Understand our stakeholders' resource planning concerns and objectives.
- ❑ **Consider:** Provide a forum for productive stakeholder feedback on specific topics at key points in the IRP process to inform SWEPCO's decision-making.

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

- ➢ Fundamental Pricing Assumptions
- ➢ Load Forecast
- ➢ Cost of technology options
- ➢ DSM/Energy Efficiency assumptions
- ➢ Sensitivity cases
- ➢ Portfolio selection
- ➢ Other

Timeline (tentative)

January 2022	Mar 2022	May 2022	July 2022	December 2022	January 2023	March 2023	July 2023
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 submit comments on Draft IRP	SWEPCO files final IRP, incorporating staff and stakeholder comments

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2023 IRP Process

Overview of 2023 IRP Responsibilities

SWEPCO & AEP

- Set Objectives & Performance Criteria
- Provided Load & Fundamental Forecasts
- Provide Demand-side Assumptions

CRA

- Develop Supply-side Assumptions
- Model Market Scenarios
- Develop Optimal Resour Portfolios
- Populate Scorecard

SWEPCO

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

IRP Stakeholders

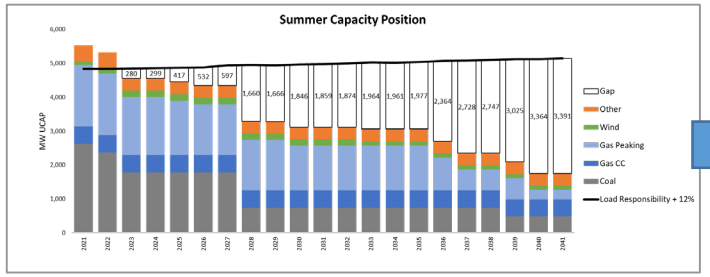
- Share Key Concerns & Considerations
- Provide Feedback on IRP Inputs & Draft Results

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

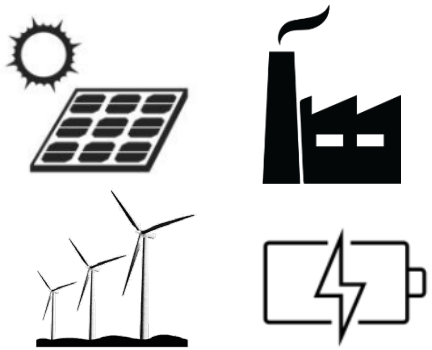
Selection of the Preferred Plan

Going in View



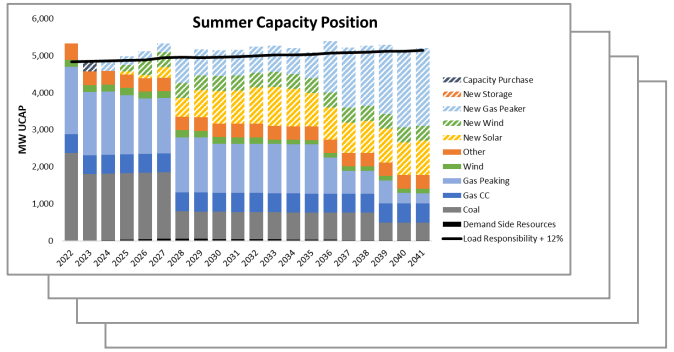
The going in positions shows a need for new capacity to meet SWEPCO customer requirements

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 will evaluate candidate portfolios against the IRP Objectives before selecting a Preferred Plan.

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

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2023 IRP Objectives

SWEPCO identified four objectives for the Preferred 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.

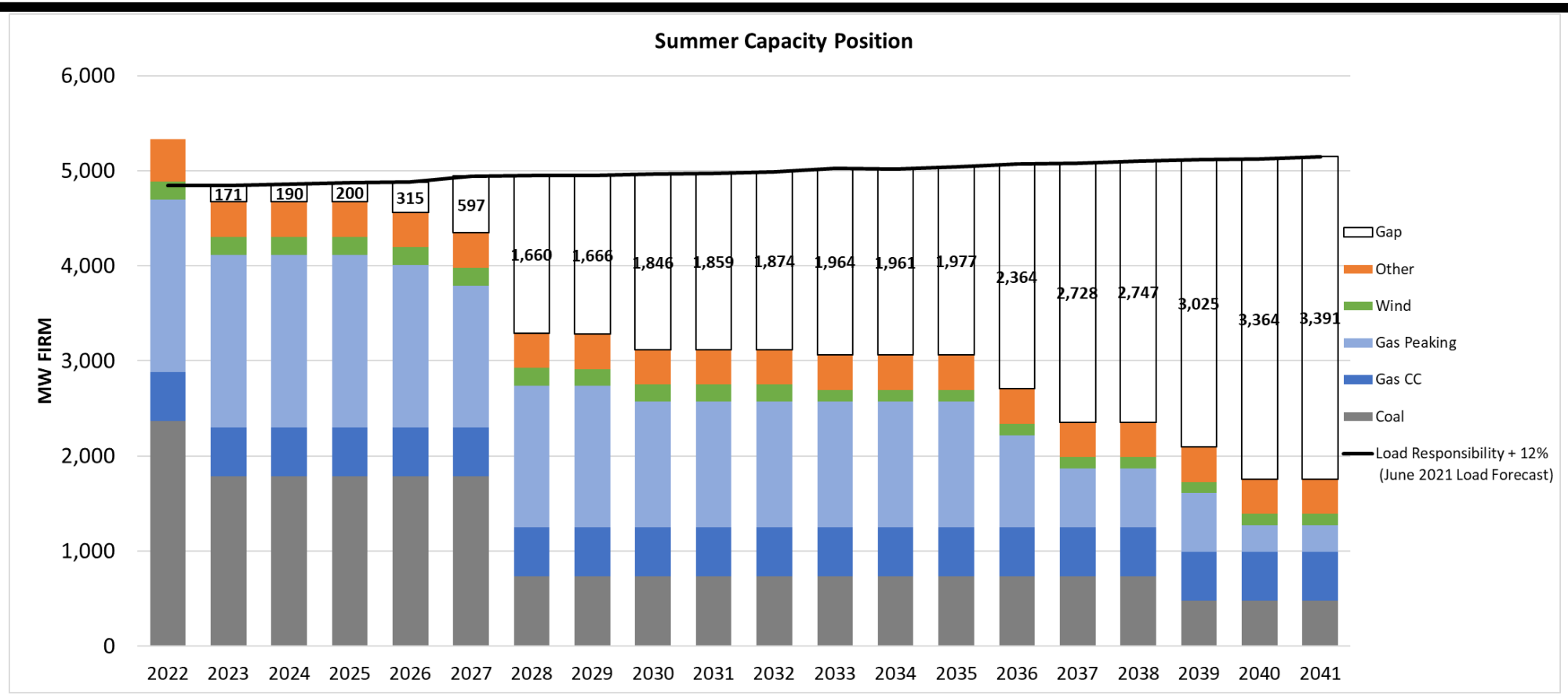
IRP Objectives

Customer Affordability	Rate Stability
Maintaining Reliability	Local Impacts & Sustainability

These objectives will inform 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.

Going in Position (preliminary)



- 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.
- Preliminary Load Responsibility Line will be updated for SWEPCO-LA IRP in June 2022.
- Going-In resources do not include a Welsh Unit 1 conversion to gas or the 73MW (nameplate) Rocking R Solar project under review with LPSC.

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SWEPCO Current Resources

Unit Name	Primary Fuel Type	C.O.D.[1]	Rating (MW) [2]
Arsenal Hill 5	Gas Steam	1960	108
Flint Creek 1	Coal	1978	258
Harry D. Mattison 1	Gas (CT)	2007	70
Harry D. Mattison 2	Gas (CT)	2007	71
Harry D. Mattison 3	Gas (CT)	2007	71
Harry D. Mattison 4	Gas (CT)	2007	71
J Lamar Stall	Gas (CC)	2010	511
John W. Turk, Jr. 1	Coal	2012	477
Knox Lee 5	Gas Steam	1974	338
Lieberman 3	Gas Steam	1957	109
Lieberman 4	Gas Steam	1959	108
Pirkey 1	Lignite	1985	580
Welsh 1	Coal	1977	525
Welsh 3	Coal	1982	528
Wilkes 1	Gas Steam	1964	164
Wilkes 2	Gas Steam	1964	360
Wilkes 3	Gas Steam	1964	353
Sundance	Wind	2021	109 (A)
Maverick	Wind	2021	156 (A)
Traverse	Wind	2022	544 (A)

Existing Wind PPA's (Renewable Resources)

- Canadian Hills (201MW) Canadian County, OK
- High Majestic Wind II (159MW) Carson & Potter Counties, TX
- Flat Ridge Wind Energy (109MW) Wichita, KS
- **Total SPP Capacity Value = 70MW**

Demand Side Resources:

- Demand Response - 36MW
- Energy Efficiency – 5MW

Other Resources:

- Purchases w/out Reserves - 445MW

(1) Commercial operation date
(2) Peak net dependable capability (Summer) as of filing.
(A) Installed capacity; Represents SWEPCO's 54.5% ownership stake

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Questions?

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Modeling Assumptions

The initial assumptions presented below reflect the inputs used in SWEPCO's 2021 IRP filed in Arkansas on December 15, 2021.

The inputs are informed by company estimates and public sources that will be updated prior to the Draft IRP filing expected in December 2022.

SWEPCO intends to revise these assumptions around mid-2022 to reflect of updated data from the following sources as the 2023 IRP process advances:

1. AEP's fundamentals forecast of commodity prices
2. Market data collected through ongoing SWEPCO RFPs
3. SWPECO's forecast of customer energy and peak demand
4. EIA's Annual Energy Outlook report
5. NREL's Annual Technology Baseline report
6. Announced additions and retirements in the SPP market

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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

- Extension of federal renewable tax credits (and expansion to storage) and 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

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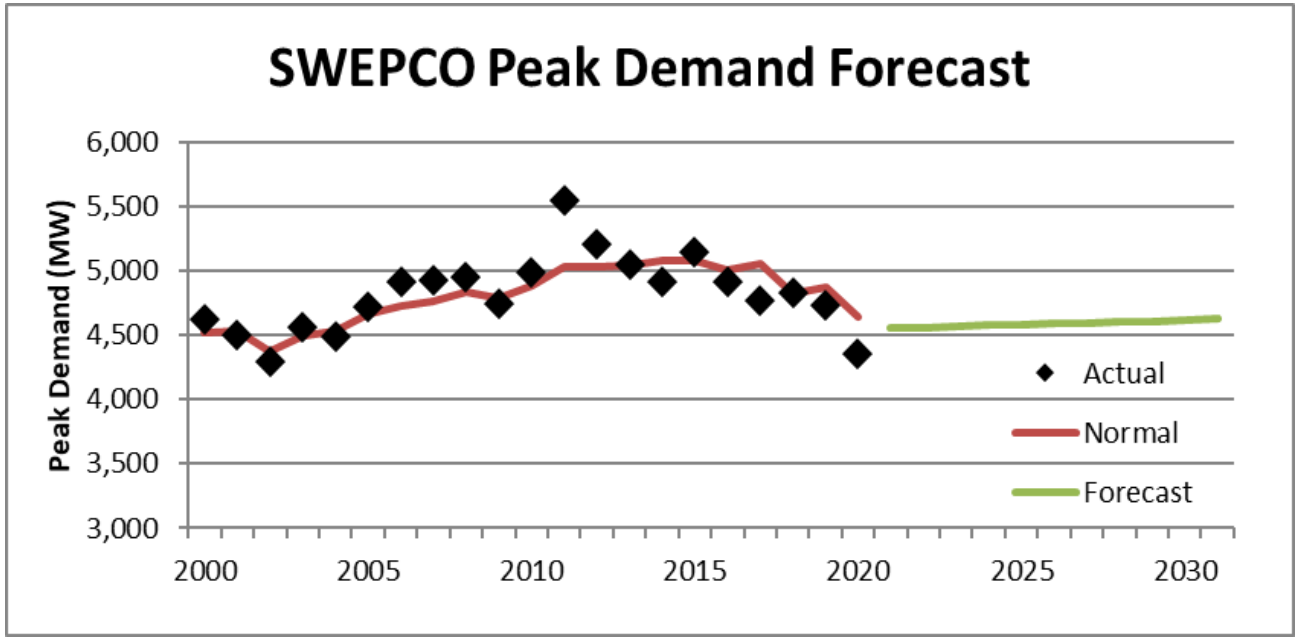
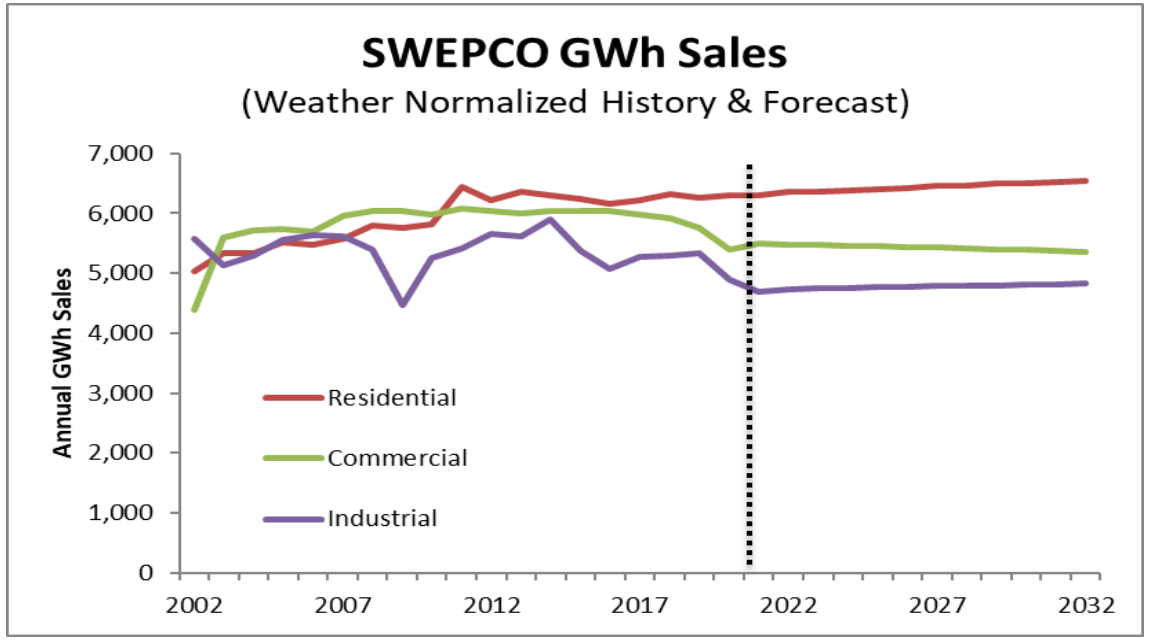
Scenario Inputs

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	Renewable Peak Credit
1	Reference Scenario (REF)	Base	Base	Moderate	Base	Base	Base
2	Clean Energy Technology Advancement (CETA)	High	Base	Moderate	Base	Faster Decline w/ 10-yr PTC/ITC ext.	Base
3	Enhanced Carbon Regulation (ECR)	Low	High	High	Base	Faster Decline w/ higher congestion	Base
4	Focus on Resiliency (FOR)	Base	Base	Moderate	Summer & Winter Requirements	Base	Low
5	No Carbon Regulation (NCR)	Base	Low	No Price	Base	Base	Base

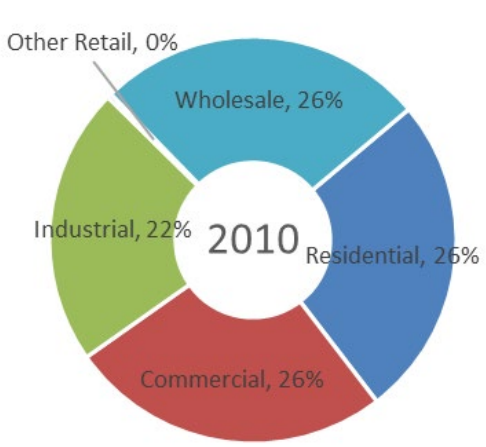
Load Forecast (Preliminary*)

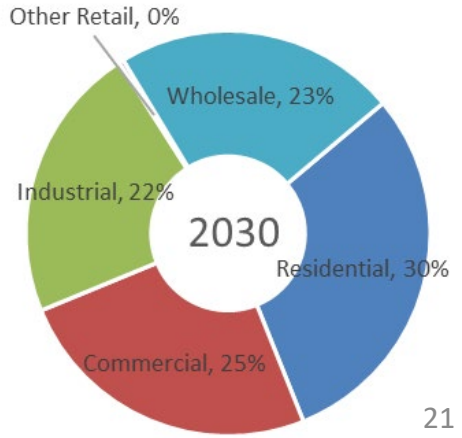




SWEPCO's peak demand forecast is relatively flat over the next decade. (CAGR +0.2% from 2021-2031.)

The growth in Industrial sales (+0.3%) is being offset by projected declines in the Commercial (-0.2%) class sales over the next decade. Residential sales are projected to be essentially flat (+0.1%).





*As indicated on slide 18, SWEPCO intends to update the load forecasts prior to filing the December 2022 Draft IRP.

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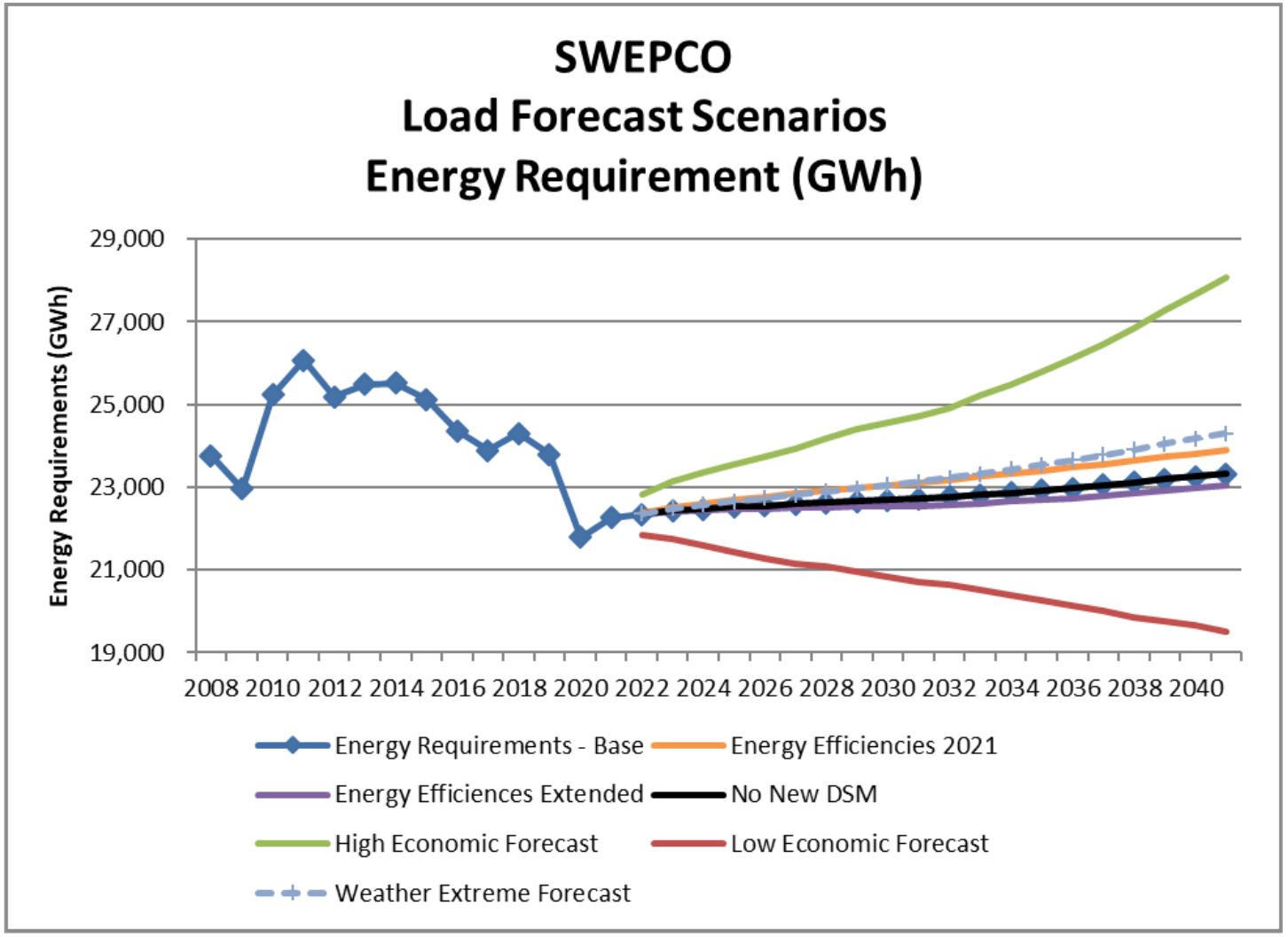
Load Scenarios (Preliminary*)



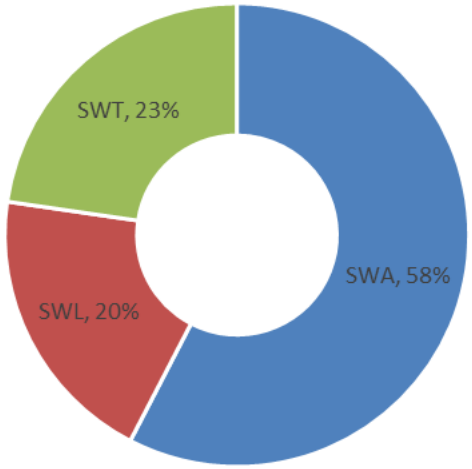
Scenario	CAGR 2021-2031
High Economic	**1.1%**
Frozen Efficiencies 2020	0.4%
Extreme Weather	0.4%
No New DSM	0.2%
Base Forecast	**0.2%**
Extended Efficiencies	0.1%
Low Economic	**-0.7%**

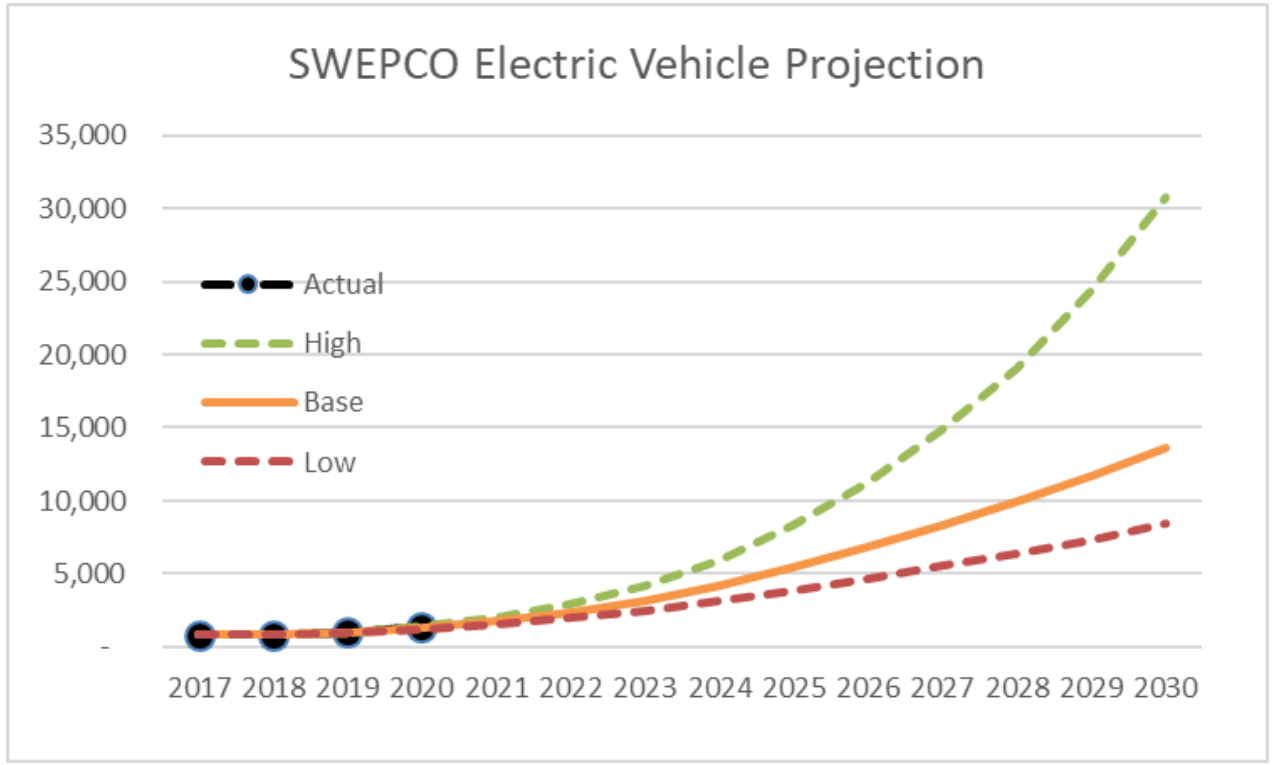
*As indicated on slide 18, SWEPCO intends to update the load forecasts prior to filing the December 2022 Draft IRP.

EV Projections (Preliminary*)

As of Q1-21, there are just over 1,500 electric vehicles (EVs) registered in SWEPCO's service territory, which is 0.1% of all vehicles registered.

SWEPCO's base projection for EVs assumes an average of 30% per year growth in EVs through 2030.



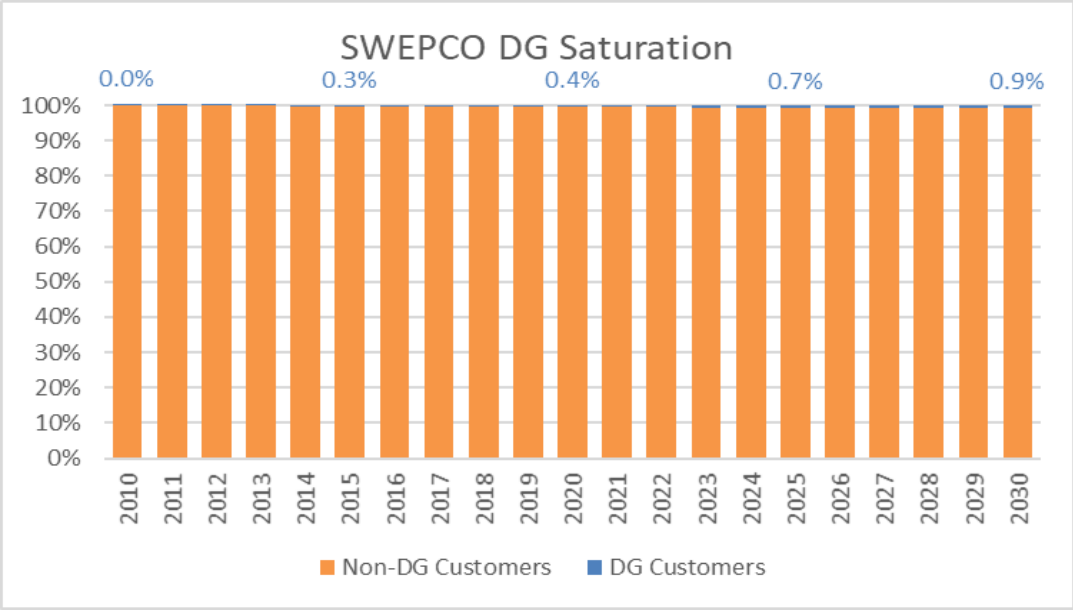


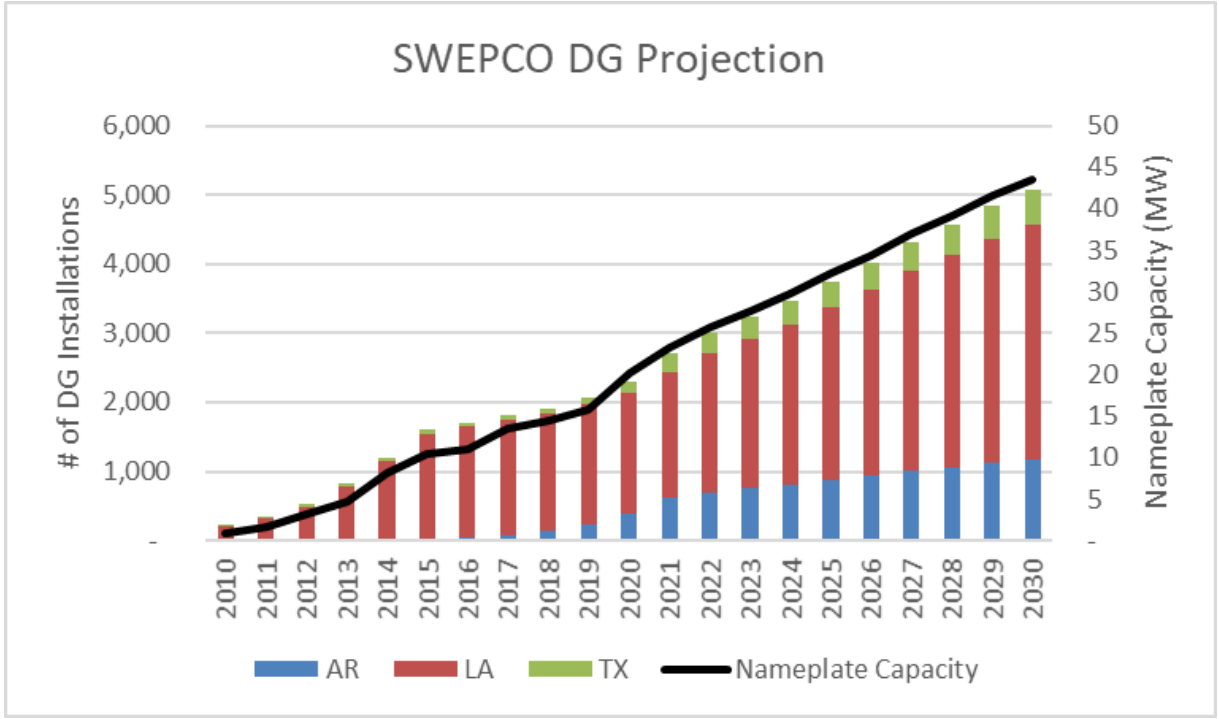
*As indicated on slide 18, SWEPCO intends to update the load forecasts prior to filing the December 2022 Draft IRP.

DG Projections*

At the end of 2020, there were just under 2,300 customers with DG installations (0.4% of all customers).

By 2030, SWEPCO projects 0.9% of customers will have installed DG at their premise.





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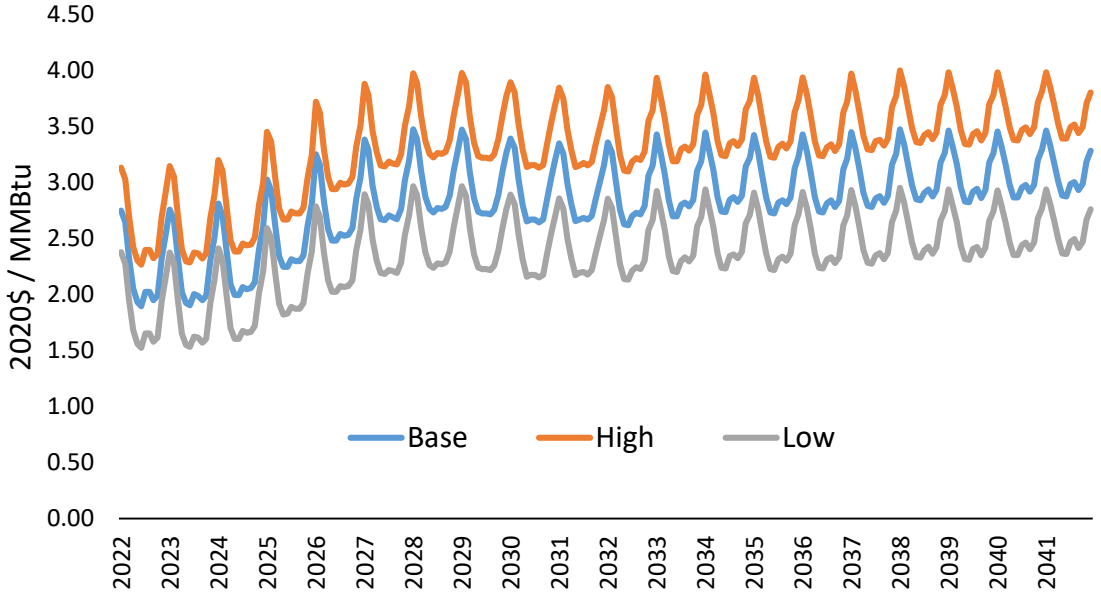
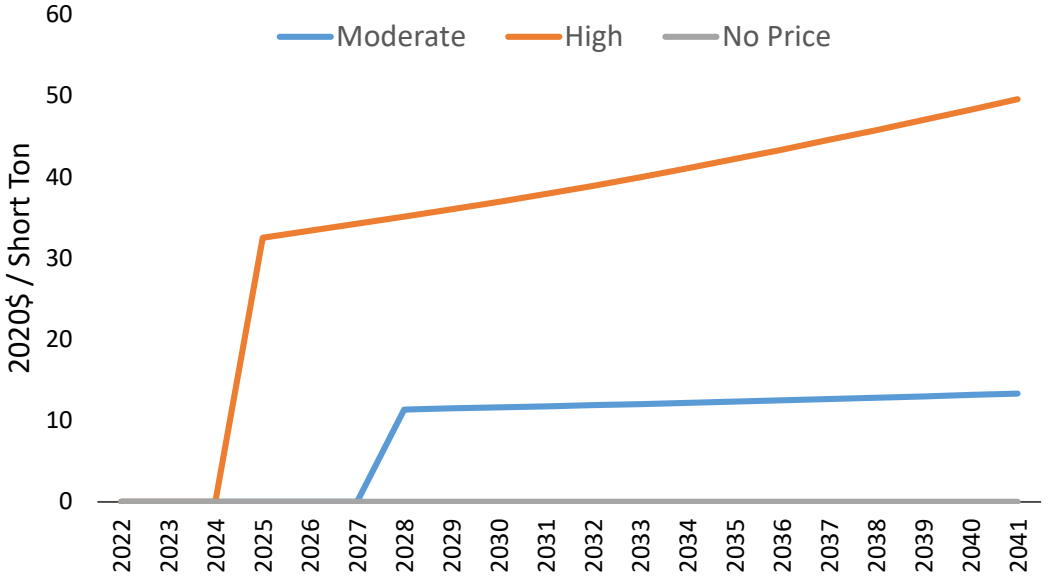
Natural Gas & Carbon Inputs (Preliminary*)

Eastern TX-OK Natural Gas Price



- Under the REF, FOR, and CETA scenarios, SWEPCO relies on the base trajectory from AEP's fundamental forecast, which is aligned to the AEO 2020 Reference Case*
- Under the ECR scenario, a high trajectory is used to reflect additional regulatory pressure and limits on new drilling
- Under the NCR scenario, a low trajectory is used as regulators continue to support exploration and production of new resource

CO_2 Emissions Price



- Under the REF, FOR, and CETA scenarios, SWEPCO relies on the Moderate trajectory from AEP's fundamental forecast
- 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

*As indicated on slide 18, SWEPCO intends to update the commodity price forecasts prior to filing the December 2022 Draft IRP and these values are expected to change.

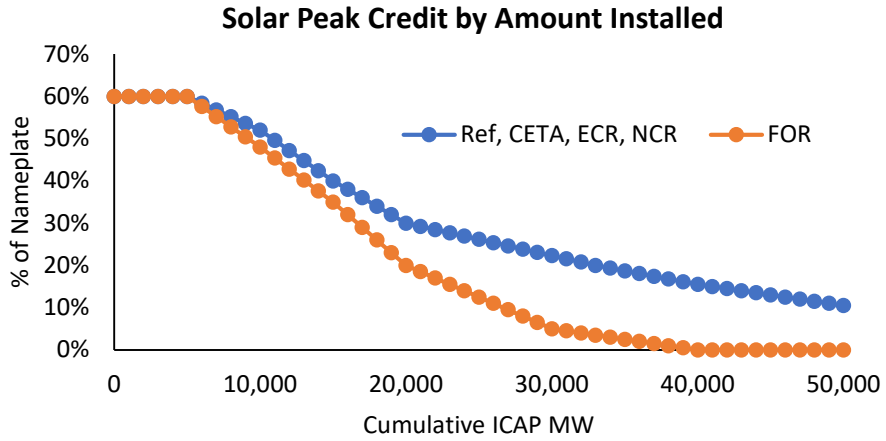
Reserve & Peak Credit Inputs

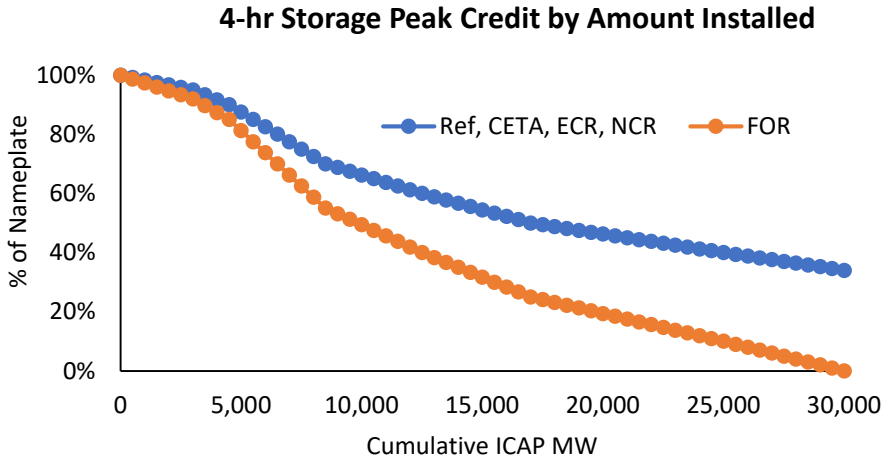
Summer Peak Credit

- Summer peak credit of incremental solar and storage additions in the SPP market is based on the total amount installed [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 12%
- 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. August 2019. SWEPCO may update these inputs as part of the 2023 IRP to reflect changes in SPP's treatment of these resource types.

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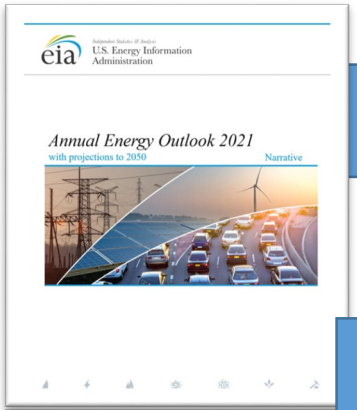
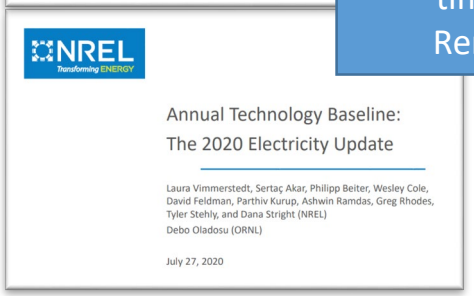
Assumption Development

Supply-side resources assumptions were developed based on authoritative third-party sources.

Intermediate & Peaking Options





Step 1: Sourcing baseline technology costs and performance assumptions from EIA Annual Energy Outlook*

Step 2: Applying changes to technology cost and performance over time based on the Moderate Case projection by the National Renewable Energy Laboratory's Annual Technology Baseline*

Renewable Options

Step 3: Applying investment tax credit for wind project entering service before the end of 2025, and 30% production tax credit for solar project entering service before the end of 2023, 26% before the end of 2025 and 10% thereafter

Advanced Generation Options

Step 1: Collate projections of technology costs and performance from various third-party sources

Step 2: Analyze projections, identify outliers and form central estimates of technology costs and performance over time

*As indicated on slide 18, SWEPCO intends to update the new resource parameters prior to filing the December 2022 Draft IRP to reflect market data received through ongoing RFPs and updated estimates provided by EIA and NREL.

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Supply Side Resources

SWEPCO will evaluate 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
- Utility-scale paired solar + storage†

Advanced Generation Options

- Small modular nuclear reactors
- 90% carbon capture retrofits to existing coal or NGCC units
- 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

† In response to stakeholder feedback provided as part of the 2021 IRP, SWPECO intends to model paired solar + storage resources as a distinct resource option in the 2023 SWEPCO IRP

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Baseline Assumptions
(Preliminary*)

SWEPCO developed baseline technology cost and performance assumptions before applying learning rates that improve costs over time.

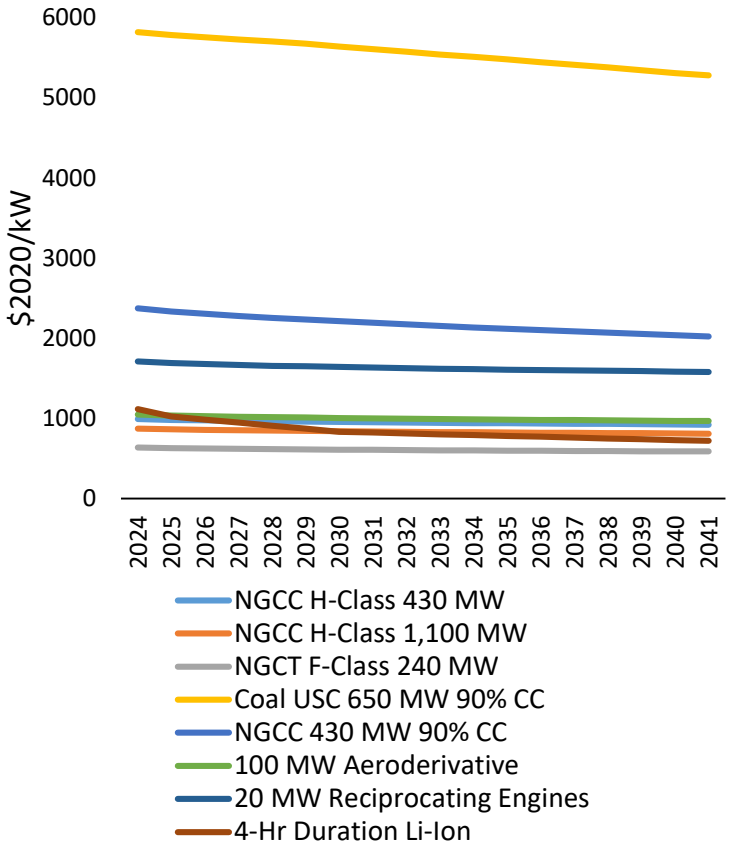
Technology	Fuel	Overnight CAPEX ($2020/kW)†	VOM ($2020/MWh) †	FOM ($2020/kW-Year) †	Heat Rate (Btu/kWh) †
NGCC H-Class Single-Shaft 430 MW	Natural Gas	1,004	2.6	14.2	6,431
NGCC H-Class Multi-Shaft 1,100 MW	Natural Gas	882	1.9	12.3	6,370
NGCT F-Class 240 MW	Natural Gas	654	0.6	7.0	9,905
Coal USC 650 MW with 90% Carbon Capture	Coal	5,821	11.0*	59.9	12,507
NGCC H-Class Single-shaft 430 MW with 90% Carbon Capture	Natural Gas	2,428	5.9*	27.8	7,124
100 MW Aeroderivative	Natural Gas	1,079	4.7	16.4	9,124
20 MW Reciprocating Engines	Natural Gas	1,763	5.7	35.3	8,295
4-Hour Duration Lithium-Ion Battery	N/A	1,389	0.0	25.4	N/A
Utility-scale Onshore Wind	N/A	1,395	0.0	26.5	N/A
Utility-scale Solar + Storage (150MW Solar & 50MW 4-hr Storage)	N/A	1,577	0.0	32.0	N/A
Utility-scale Solar Photovoltaic	N/A	1,190	0.0	14.7	N/A
Small Modular Reactor	Uranium	6,485	3.0	95.5	10,455
Hydrogen Electrolyzer + Hydrogen Gas Combusting Turbine	Electricity	3,291	1.1	53.4	9,655
Hydrogen Gas Combusting Turbine	Hydrogen	1,576	0.6	7.0	9,655
20-Hour Duration Pumped Thermal Energy Storage	N/A	3,295	0.0	51.2	N/A
20-Hour Duration Vanadium Flow Battery Storage	N/A	3,798	0.0	11.3	N/A
20-Hour Duration Compressed Air Energy Storage	N/A	1,771	0.0	17.2	N/A

Note: *The passage of Section 45Q legislation provides a tax credit of $50/tCO$_2$ sequestered. This is implemented as a negative VOM adder.
†As indicated on slide 18, SWEPCO intends to update the new resource parameters prior to filing the December 2022 Draft IRP to reflect market data received through ongoing RFPs and updated estimates provided by EIA and NREL.

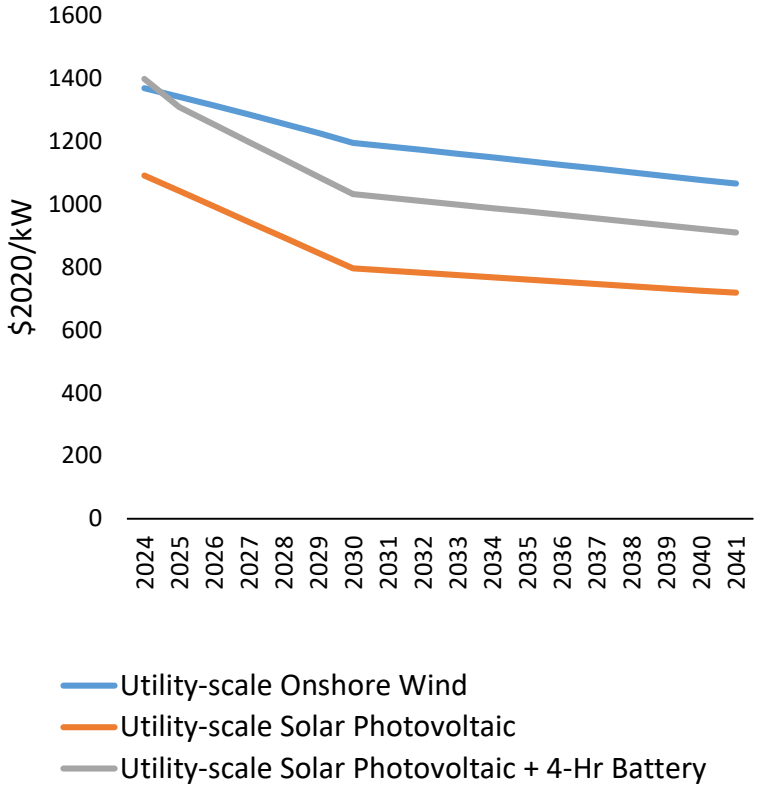
Cost Improvements*

The result is an evolution of overnight capital costs over time for the supply side resources.

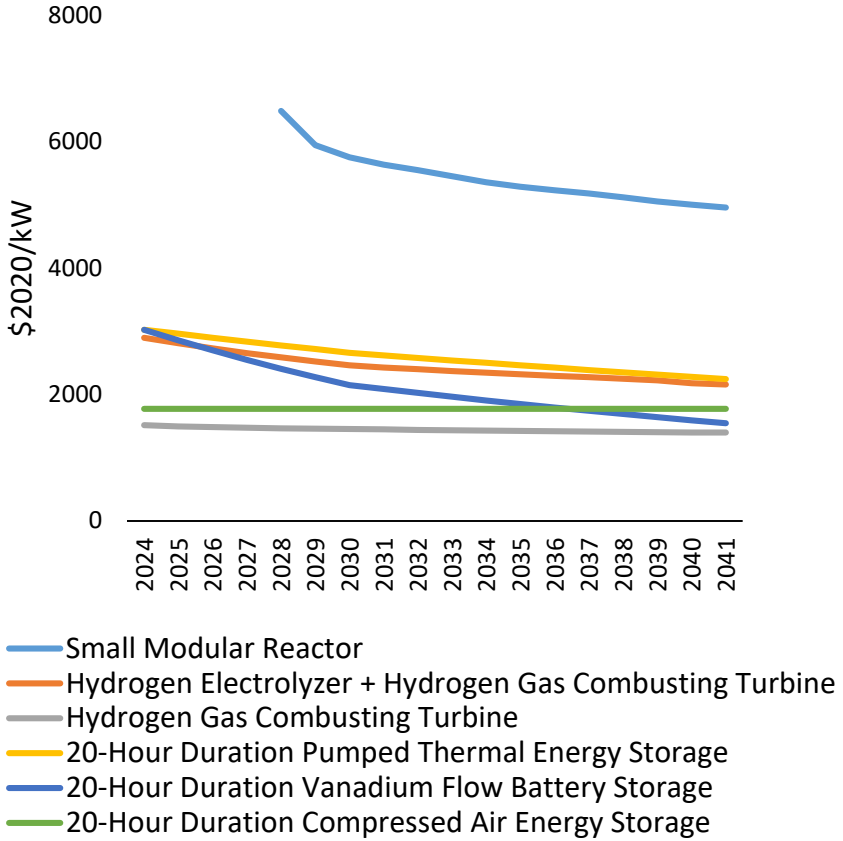
Intermediate & Peaking Options



Renewable Options



Advanced Generation Options



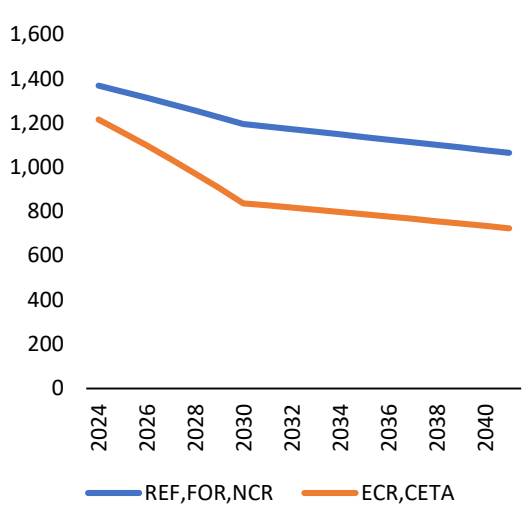
* As indicated on slide 18, SWEPCO intends to update the new resource parameters prior to filing the December 2022 Draft IRP to reflect market data received through ongoing RFPs and updated estimates provided by EIA and NREL.

Technology Cost Ranges (Preliminary*)

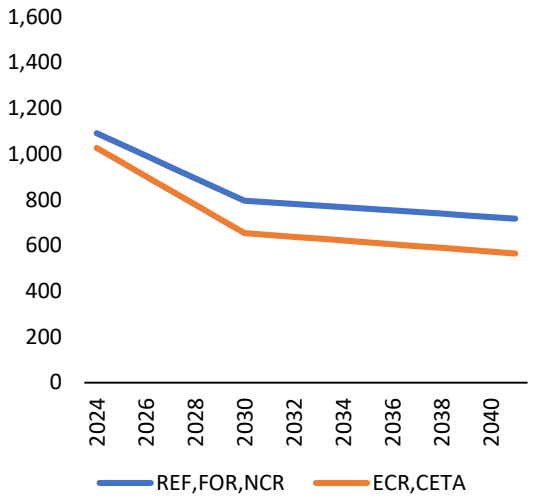
Technology Cost Assumptions

- The Reference, FOR, and NCR scenarios assume new technology costs based on EIA AEO 2021 and NREL ATB 2020 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 2020 advanced cost scenario)
- Under the CETA scenario, SWEPCO also assumes that federal tax credits for new renewables are extended for 10 years

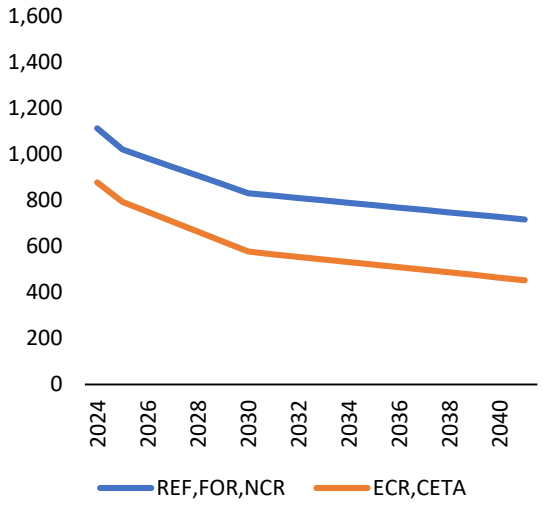
Wind Capital Costs
($2020/kW)



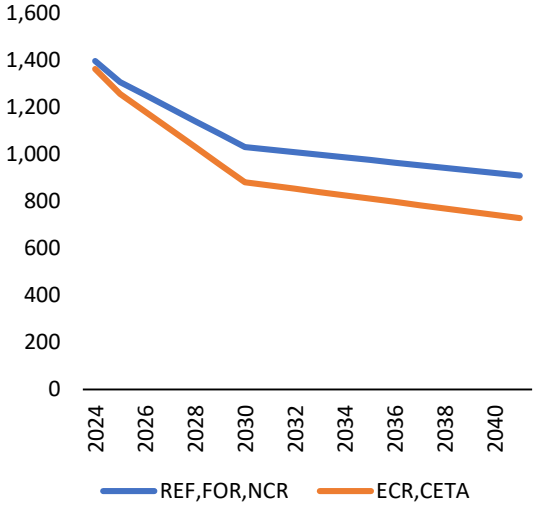
Solar Capital Costs
($2020/kW, Pre-ITC)



4-Hr Storage Capital Costs
($2020/kW)



Paired Storage Capital Costs
($2020/kW, Pre-ITC)



* As indicated on slide 18, SWEPCO intends to update the new resource parameters prior to filing the December 2022 Draft IRP to reflect market data received through ongoing RFPs and updated estimates provided by EIA and NREL.

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Demand Side Resources (Preliminary*)

Energy Efficiency Bundles

Residential Bundles		Time Periods		
Bundle		2023-2027	2028-2032	2033-2037
Low (10 yrs)	Energy Savings (MWh)	37,668	4,748	5,993
	LCOE ($/MWh)	13.94	19.53	19.46
Medium (15 yrs)	Energy Savings (MWh)	52,114	12,472	6,826
	LCOE ($/MWh)	49.88	53.35	48.66
High (17 yrs)	Energy Savings (MWh)	52,938	11,359	6,333
	LCOE ($/MWh)	81.32	77.65	77.61

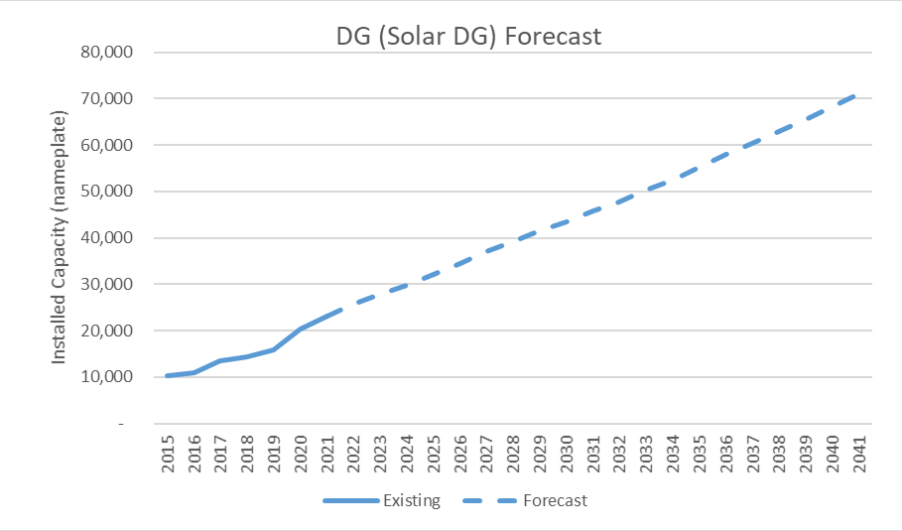
Commercial Bundles		Time Periods		
Bundle		2023-2027	2028-2032	2033-2037
Low (13 yrs)	Energy Savings (MWh)	33,880	2,622	0
	LCOE ($/MWh)	8.79	10.09	NA
Medium (15 yrs)	Energy Savings (MWh)	11,115	0	0
	LCOE ($/MWh)	22.52	NA	NA

Bundle Method

- EE Measures* are bundled by Levelized Costs
- EE Bundles are made available as resource options

* 2014 U.S. Energy Efficiency Potential Through 2035" report with updates from the 2019 Technical Update

Demand Side Resources



Sector	Participants	Demand Savings (kW)	Energy Savings (kWh)	Annual Cost	Total First Year Cost	Service Life (Years)
Residential	1,000	900	21,500	$ 30,000	$ 30,000	7

Distributed Energy Resources

- All new DG resources are considered to be rooftop solar
- Forecast based on AEO 2021 Residential and Commercial DG
- New DG resources included in each portfolio with a 5.5% CAGR through 2041
- Modeled as a generation resource, energy inclusive of system losses

Demand Response

- A proxy resource is modeled for a DSM program
- Available for the model as a selectable resource

*As indicated on slide 18, SWEPCO intends to update forecasts prior to filing the December 2022 Draft IRP.

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Questions & Break

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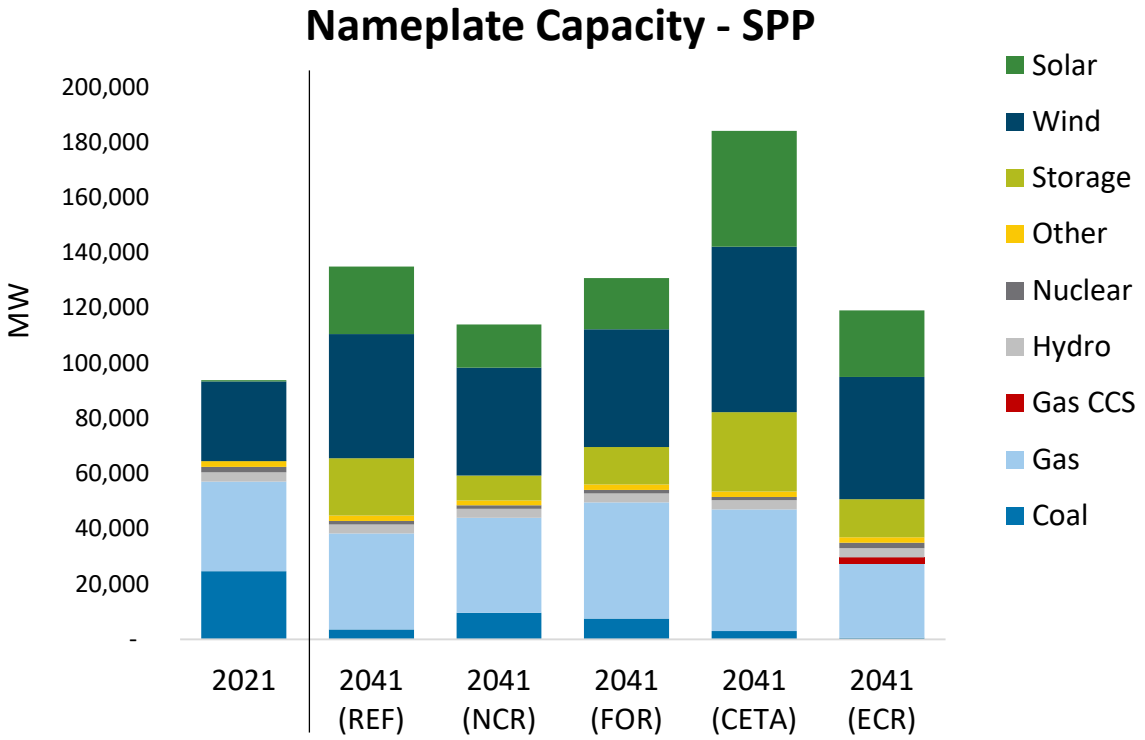
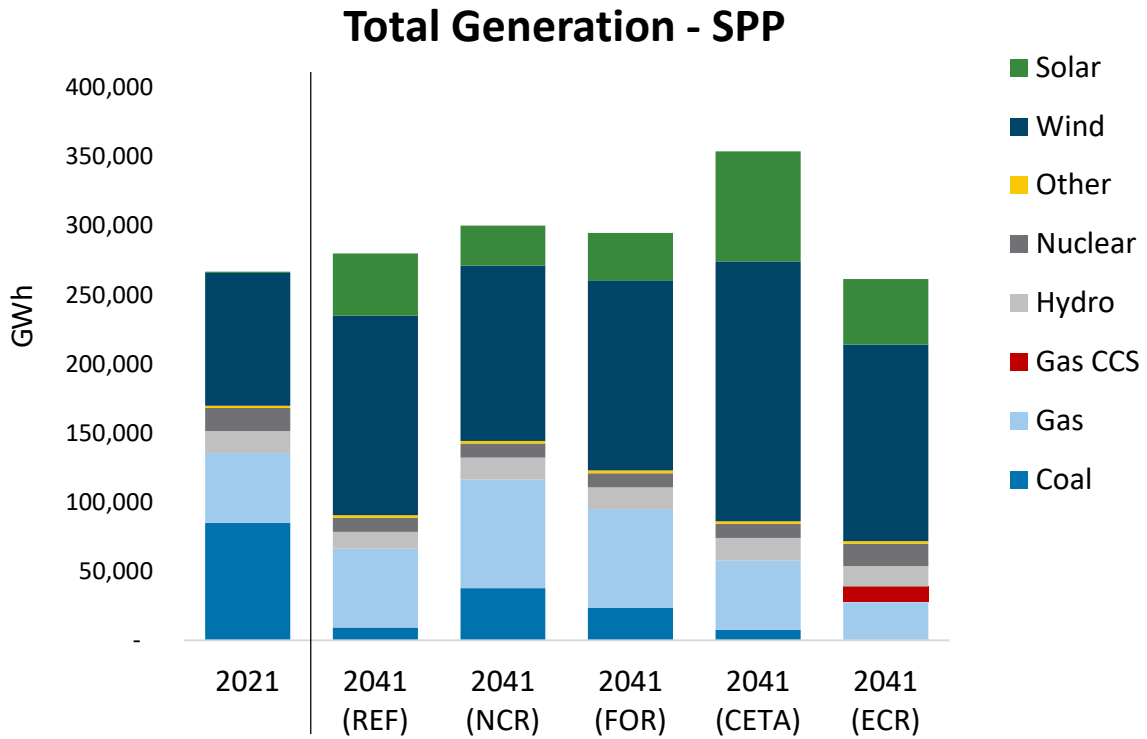
Scenario Outputs

Each market scenario results in a fundamentally different view of SPP-wide resource additions and retirements.

Scenario outputs are important for comprehending possible future states of the world. Some of the scenario outputs (electricity prices, peak credit of solar and storage) are also key inputs for SWEPCO portfolio modeling.

SPP Supply Mix Changes (Preliminary)





- Under all scenarios, coal capacity declines between 2022-2041 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 2041, 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 2041 across all scenarios, even those with low gas prices and no new CO_2 pressure

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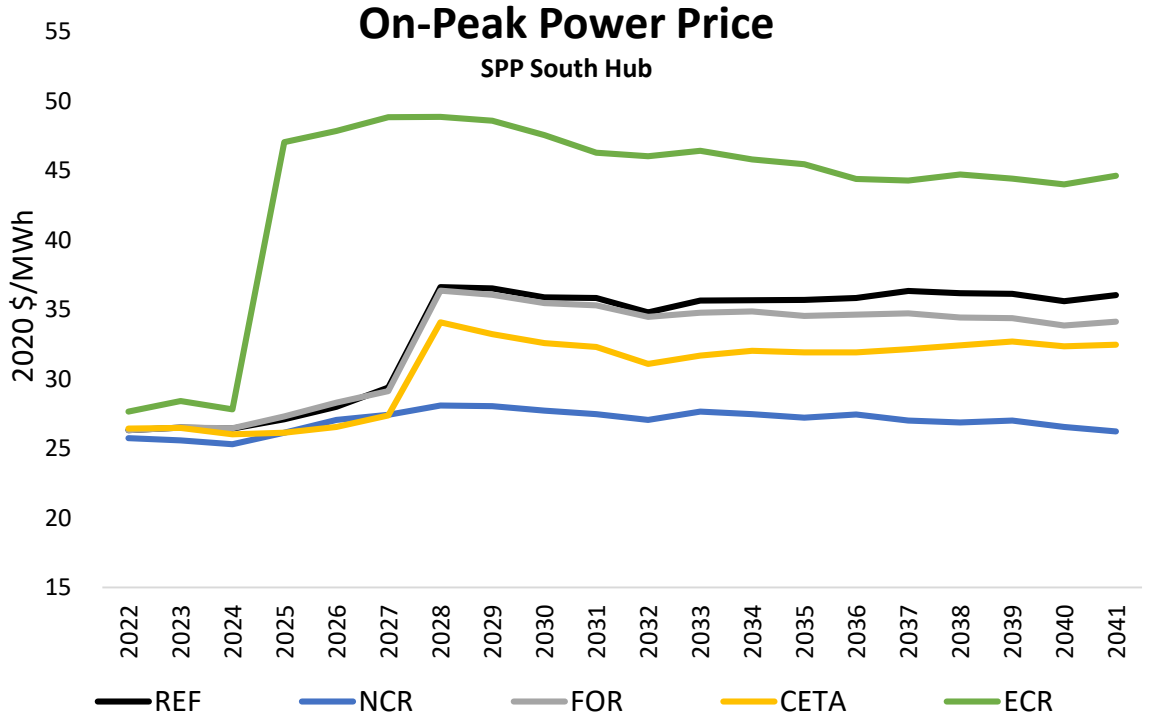
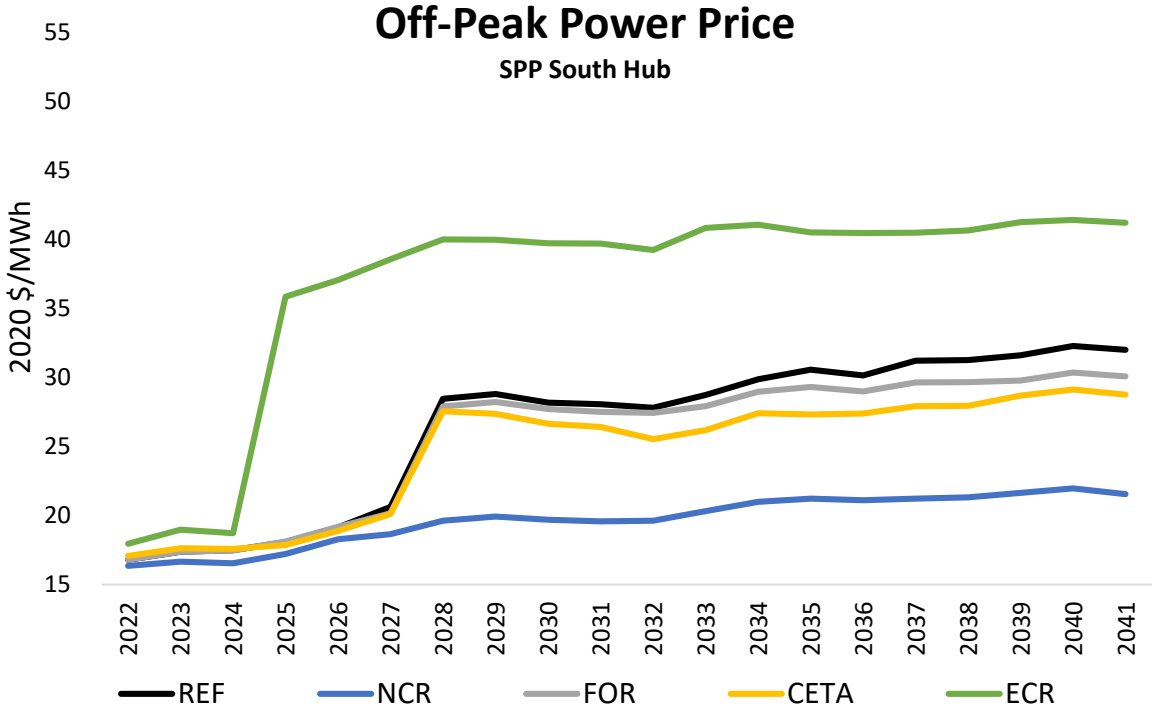
SPP Market Prices (Preliminary)

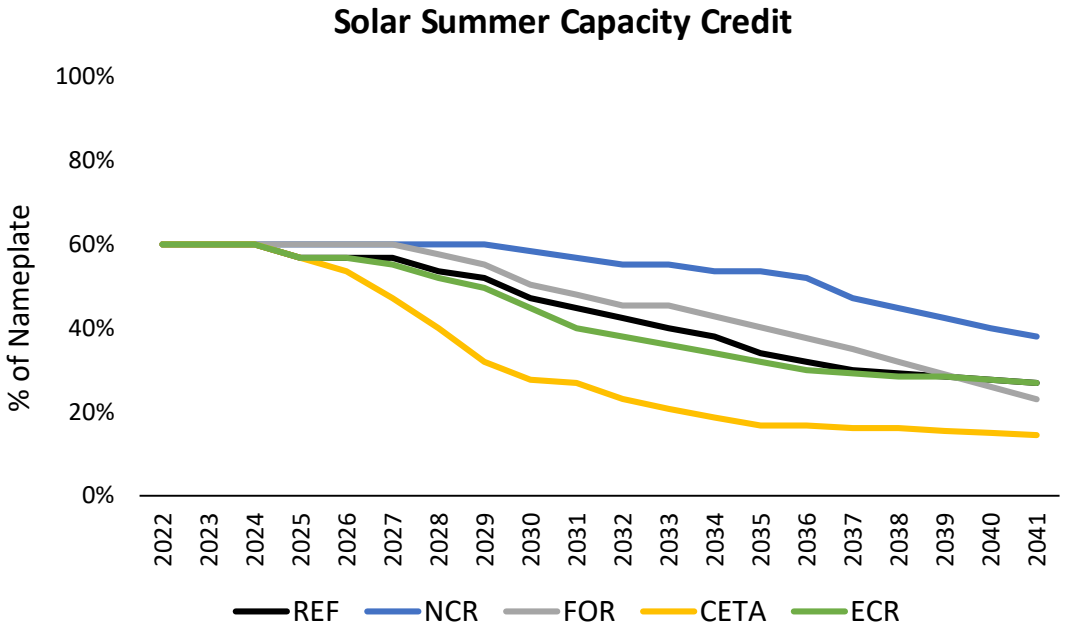


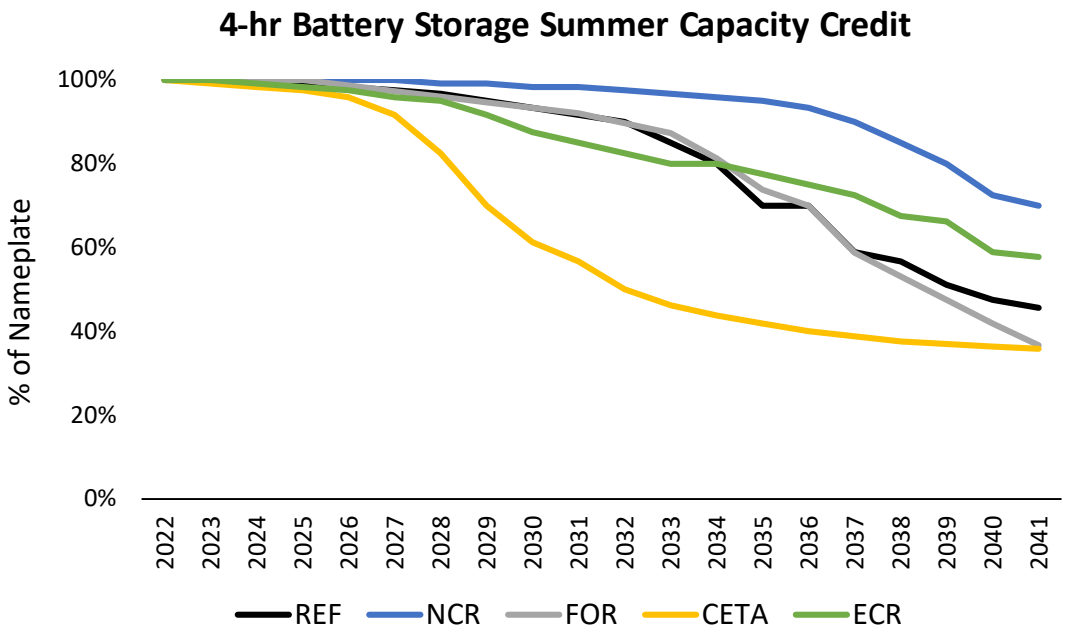


- Under the REF scenario, On-Peak prices grow modestly from current levels until the CO_2 price is introduced in 2028, leading to a step-up in prices that hold steady around $37/MWh
- On-Peak prices are lowest in the NCR scenario due to the combination of low gas prices and zero CO_2 price
- On-Peak 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 $9/MWh in 2022, but tightens to around $4/MWh by 2041
- 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





- Under the REF, ECR, and FOR cases, solar peak credit declines from 60% to around 25% over the 2022-2041 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

- 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 NCR & ECR scenarios, 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 14.7%

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Expected Future Updates to IRP Inputs

SWEPCO intends to revise these assumptions around mid-2022 to reflect of updated data from the following sources as the 2023 IRP process advances:

1. AEP's fundamentals forecast of commodity prices
2. Market data collected through ongoing SWEPCO RFPs
3. SWEPCO's forecast of customer energy and peak demand
4. EIA's Annual Energy Outlook report
5. NREL's Annual Technology Baseline report
6. Announced additions and retirements in the SPP market

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

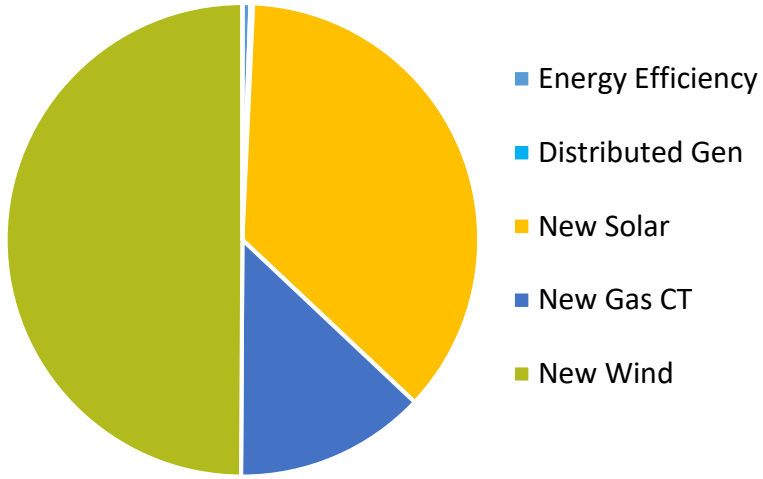
AURORA Evaluates Expected Resource Performance Under Scenario Conditions

Demand-Side Options:
- Energy Efficiency
- Distributed Generation

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

AURORA Selects the Least-Cost Combination of New Resources

2031 Cumulative Additions - Reference Scenario



… Repeated for other scenarios

SWEPCO will use 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.

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Portfolio Analysis

The resulting set of five candidate portfolios will be stress-tested to evaluate performance under adverse or unexpected conditions and the results populated in a Balanced Scorecard. This process has 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

A stochastic analysis to test each candidate resource plan under 250 random combinations of market conditions will be done and compared customer exposure to higher costs during periods of volatility.

IRP Stochastic Variables

Power Prices

- Hourly power prices may vary significantly during periods of extreme weather, peak conditions, or system 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

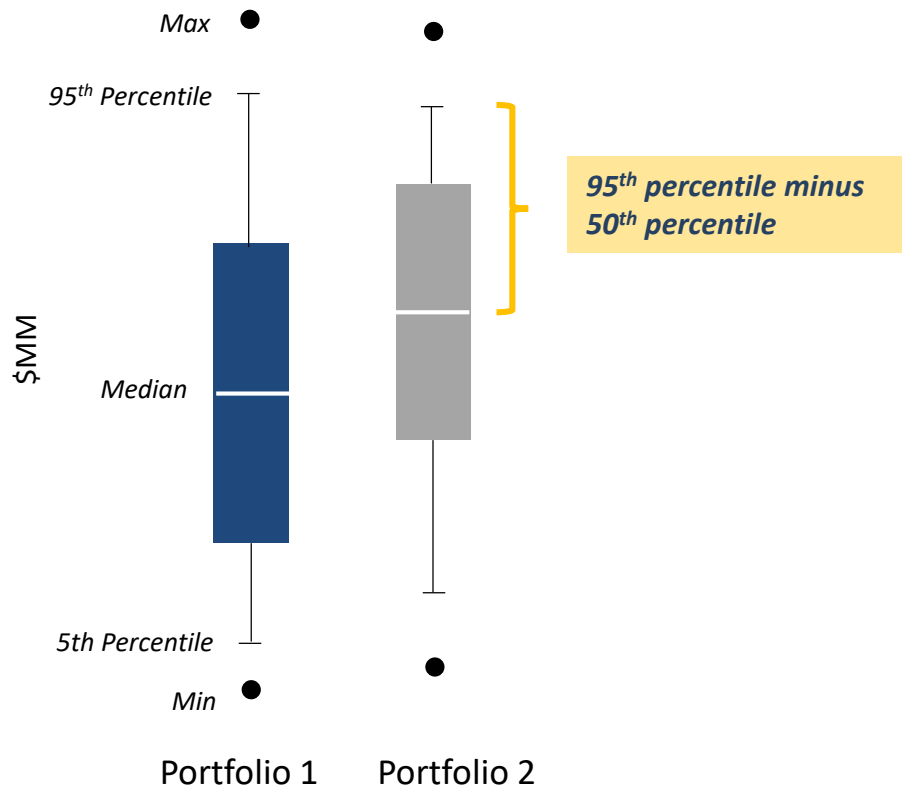
Natural Gas Prices

- Daily natural gas prices are highly variable depending on weather and broader system conditions that tighten in peak periods
- Natural gas fuel costs are expected to be an important component of total system costs under certain candidate resource strategies

Wind & Solar Output

- Hourly output from renewable generators can be highly variable and may fail to generate when customer demands are high or deliver too much energy when customer demands are low
- Certain candidate resource strategies select new renewable generation and evaluating variability in unit outputs allows SWEPCO to ensure rate stability and affordability are maintained for customers even as corporate sustainability targets are met

Measuring Cost Risk on the IRP Scorecard



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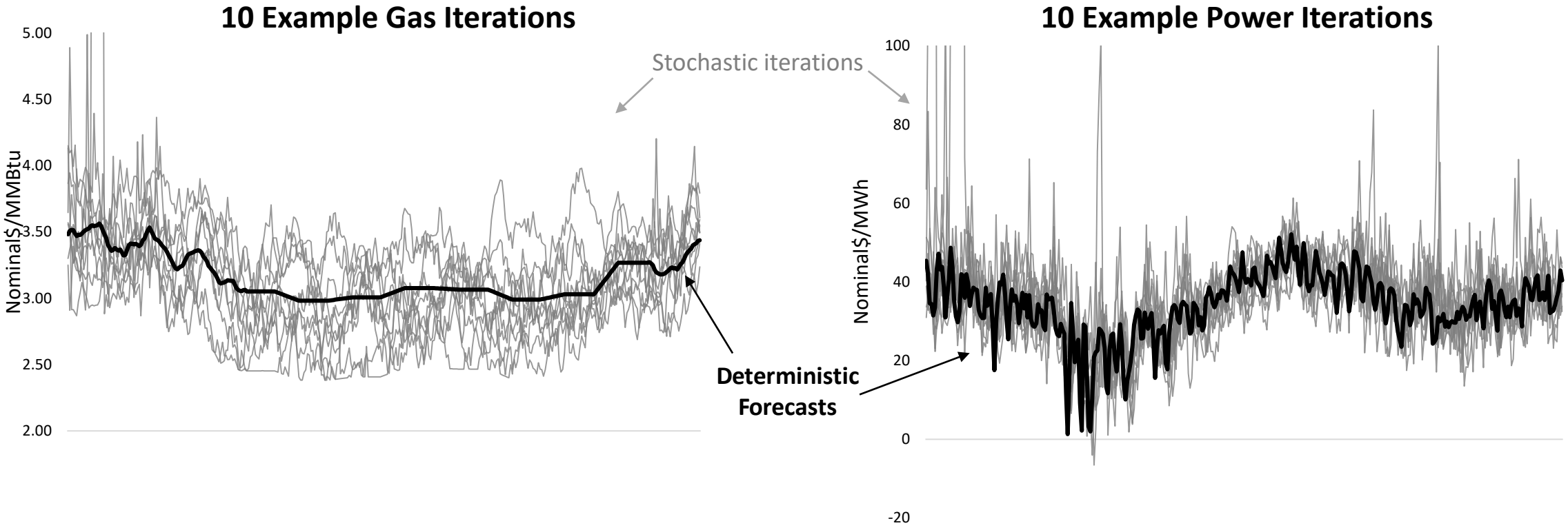
Commodity Price Volatility

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.

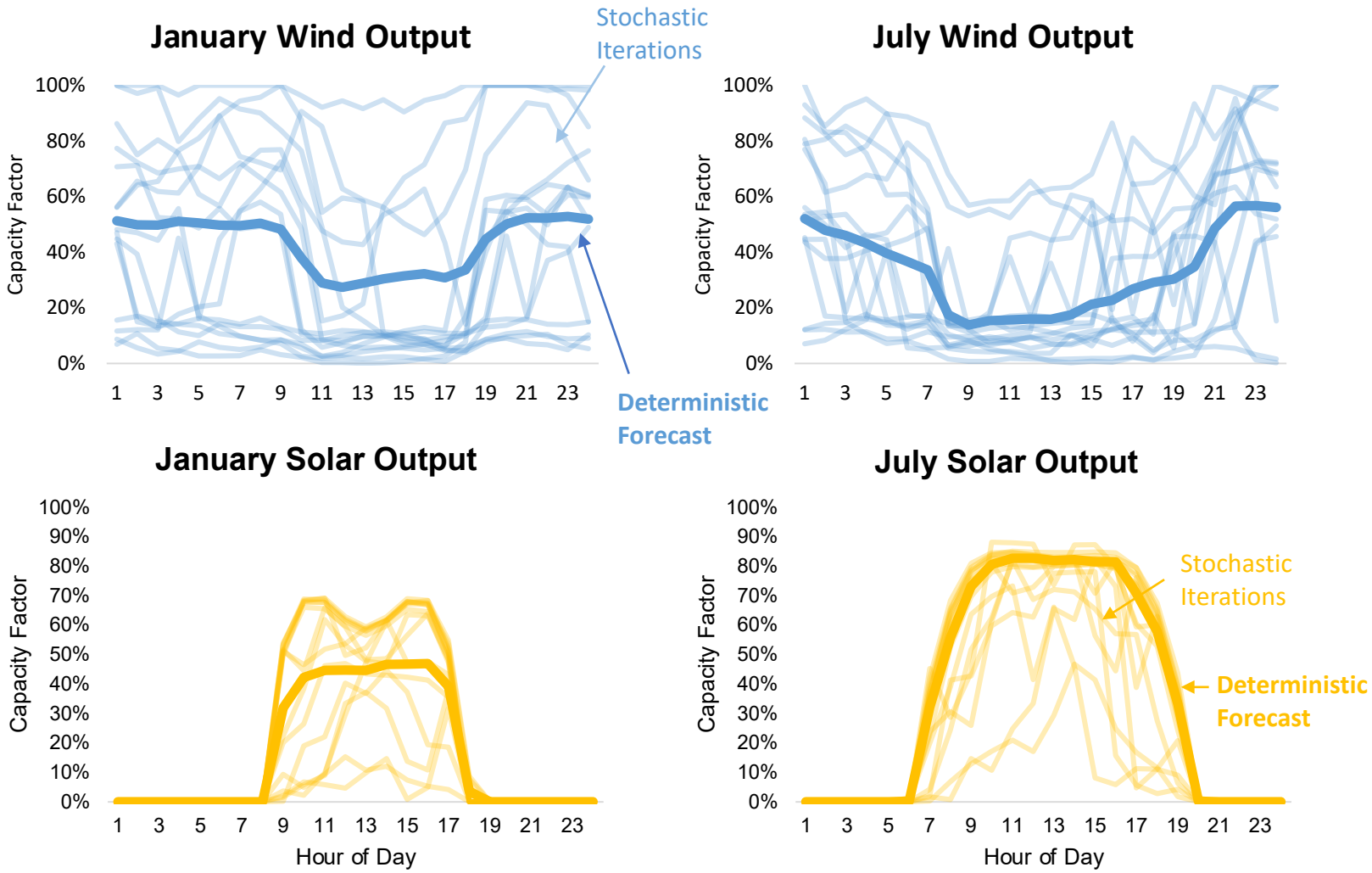


Renewable Output Volatility

SWEPCO evaluated uncertainty in the output of wind and solar units as part of the 2023 IRP analysis.

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

The results is a wider sample of production profiles that allow SWEPCO to test periods of low output that coincide with high market prices (or vice versa).



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2023 IRP Scorecard

The IRP Scorecard compares the performance candidate portfolios under each of the four IRP Objectives. The Scorecard does not select the 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*	***Local Impacts:*** *New Nameplate MW & Total CAPEX Installed Inside SWEPCO Territory*	***CO2 Emissions:*** *Percent Reduction from 2000 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

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

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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.

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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

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.

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 2000 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 2000. • **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.

Closing Remarks

Thank you for participating

Stakeholder written feedback May 27, 2022

Further questions and feedback should be provided to Emile Cordaro
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https://www.swepco.com/community/projects/louisianairp/

Timeline (tentative)