

2023 SWEPCO Integrated Resource Plan

Description of Studies

&

Study Assumptions

January 31, 2022

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SWEPSCO Regulatory Update

Regulatory Filings planned for 1st Half of 2022

- January 2022 – Solar PPA Resource CPCN 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

The Company will provide further updates in the upcoming Stakeholder meeting.

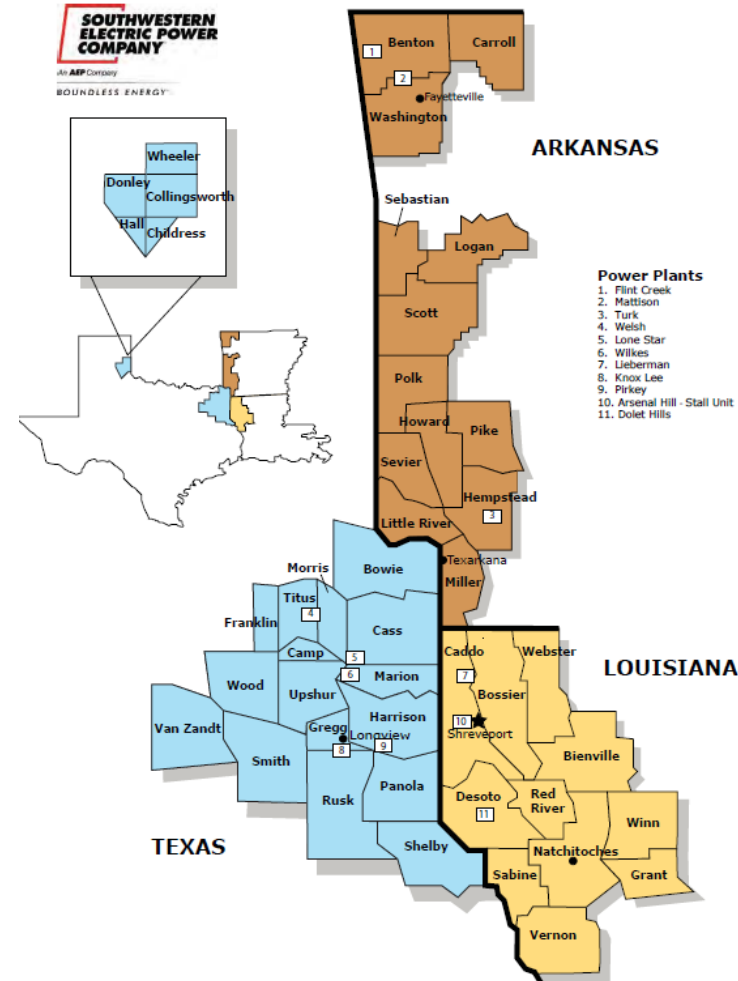
LPSC IRP Regulatory Timeline

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	Feb/Mar 2022
4	Stakeholders may file written comments.	4	April 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.



SWEPSCO'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 and Maverick are operational and SWEPCO expects the final facility, Traverse, to reach commercial operation in early 2022.
 - 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.

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.

As part of the Five Year Action Plan laid out in the 2021 Arkansas IRP, SWEPCO will:

- Continue the planning and regulatory actions to implement cost effective energy efficiency and demand response programs that reduce energy use and peak demand for SWEPCO customers.
- Continue to investigate opportunities to incorporate advanced technologies related to DER technology to provide both capacity relief and improved reliability.
- Develop more refined estimates about which technologies and what quantity of resources can be integrated into the SWEPCO territory.
- Seek to refine cost estimates and develop plans for the potential Welsh 1 gas conversion.
- Continue to evaluate and/or conduct Request for Proposals (RFP) to explore opportunities to add cost-effective renewable generation in the near future to take advantage of the Federal Tax Credit.
- Evaluate the Request for Proposals (RFP) to explore opportunities to add cost-effective capacity in the near future to meet capacity need in 2023-2024 as needed.
- Be ready to adjust this Action Plan and future IRPs to reflect changing circumstances.

Stakeholder Feedback Process

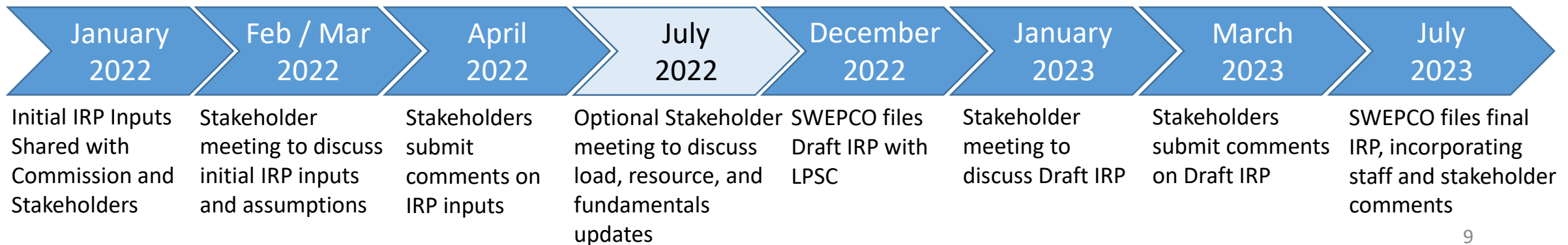
Stakeholders are an important part of the IRP process. SWEPCO identified three main objectives for stakeholder engagement:

- ❑ **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:

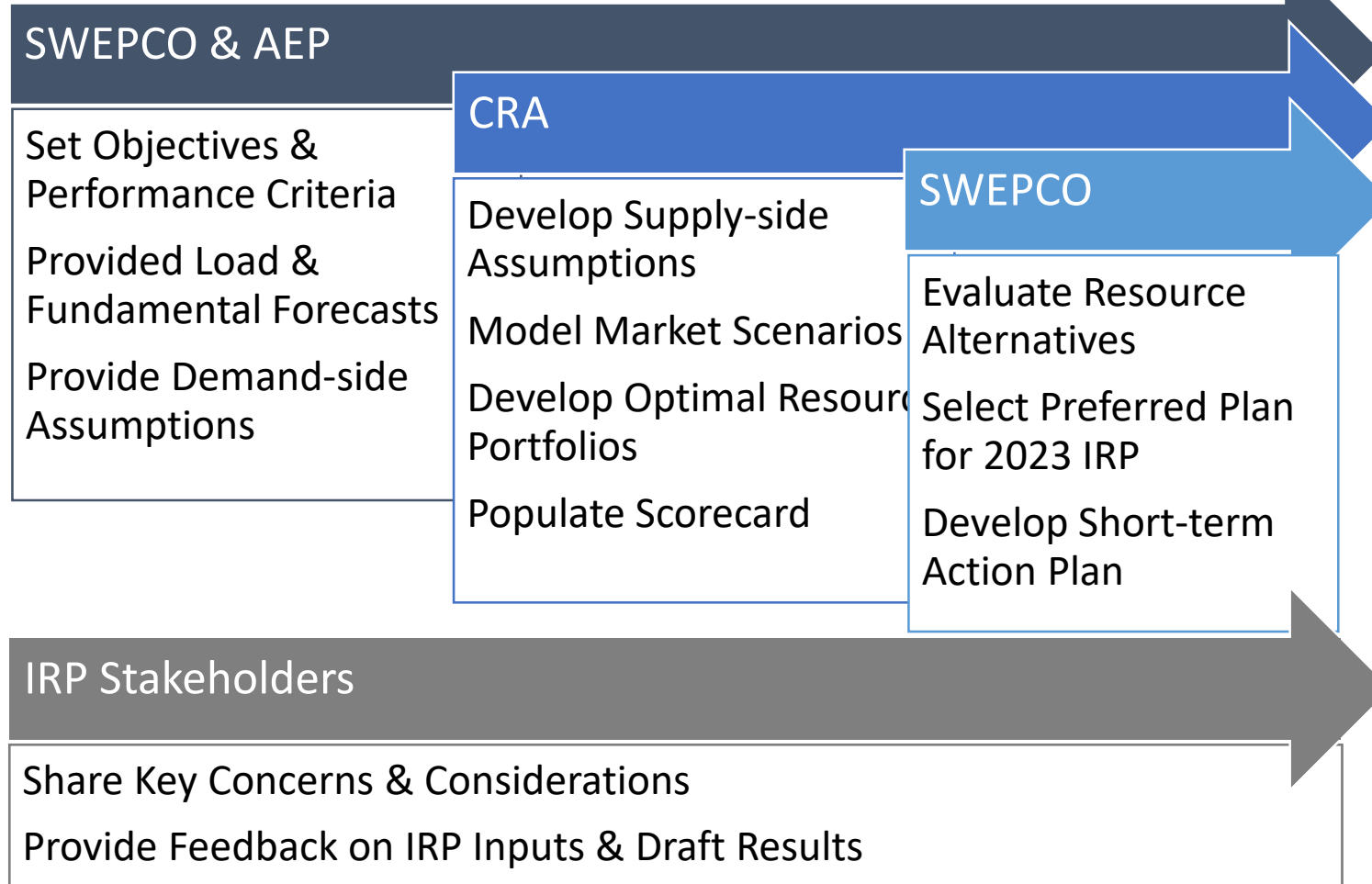
- Fundamental Pricing Assumptions
- Load Forecast
- Cost of technology options
- DSM/Energy Efficiency assumptions
- Sensitivity cases
- Portfolio selection
- Other

Timeline (tentative)



2023 IRP Process

Overview of 2023 IRP Responsibilities



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

SWEPSCO 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.

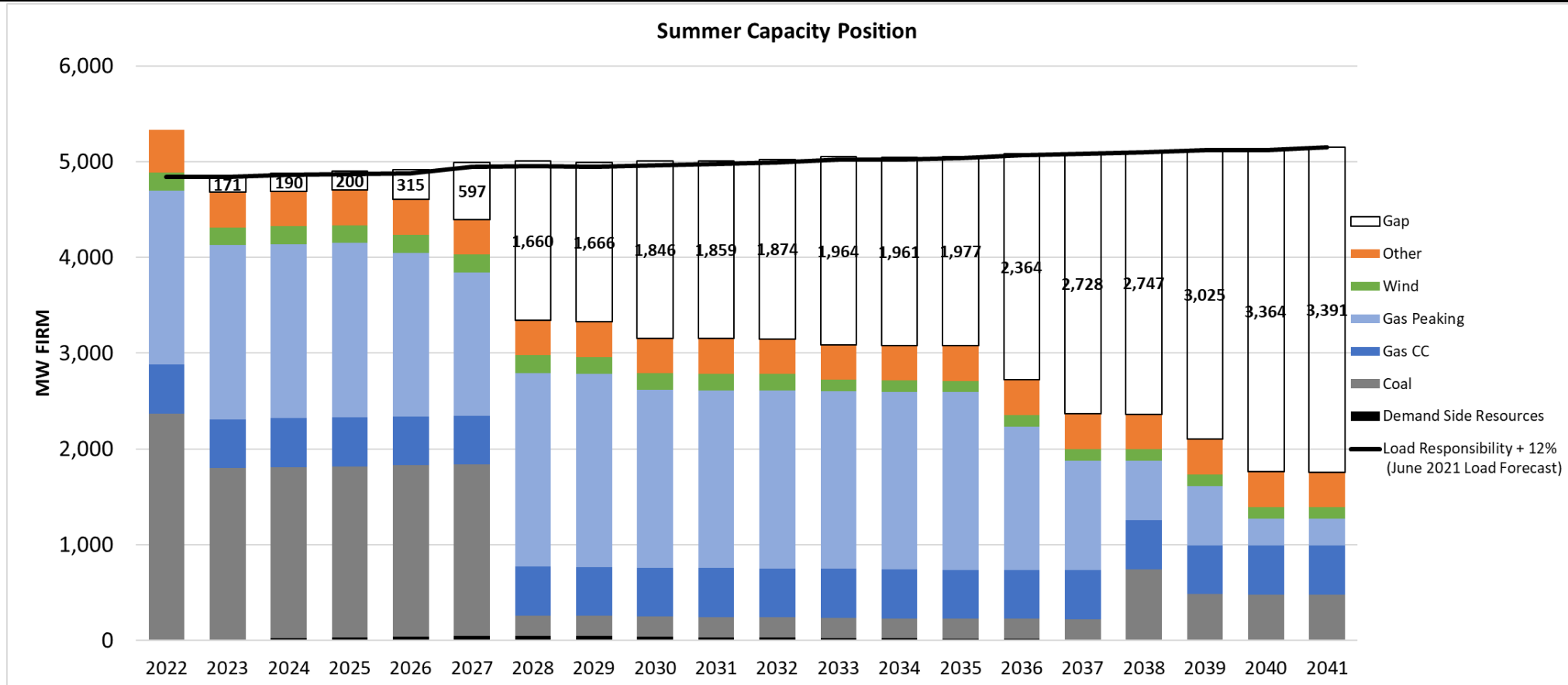
2023 IRP Objectives

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 SWEPSCO 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 a 73MW (nameplate) Solar PPA resource under review with LPSC.

SWEPSCO 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

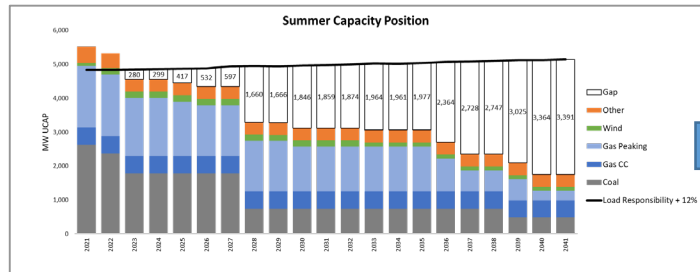
(1) Commercial operation date

(2) Peak net dependable capability (Summer) as of filing.

(A) Installed capacity; Represents SWEPCO's 54.5% ownership stake

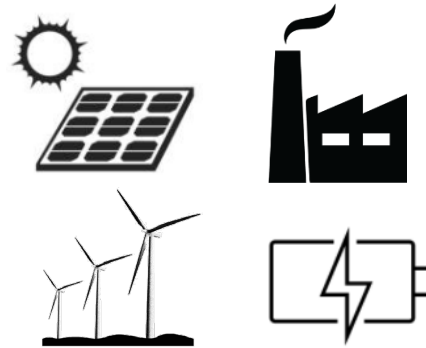
Selection of the Preferred Plan

Going in View



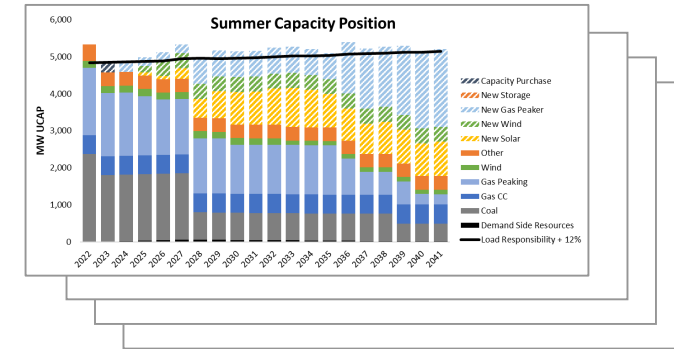
The going in positions shows a need for new capacity to meet SWEPCO customer requirements

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.

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. 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

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 CO₂ 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

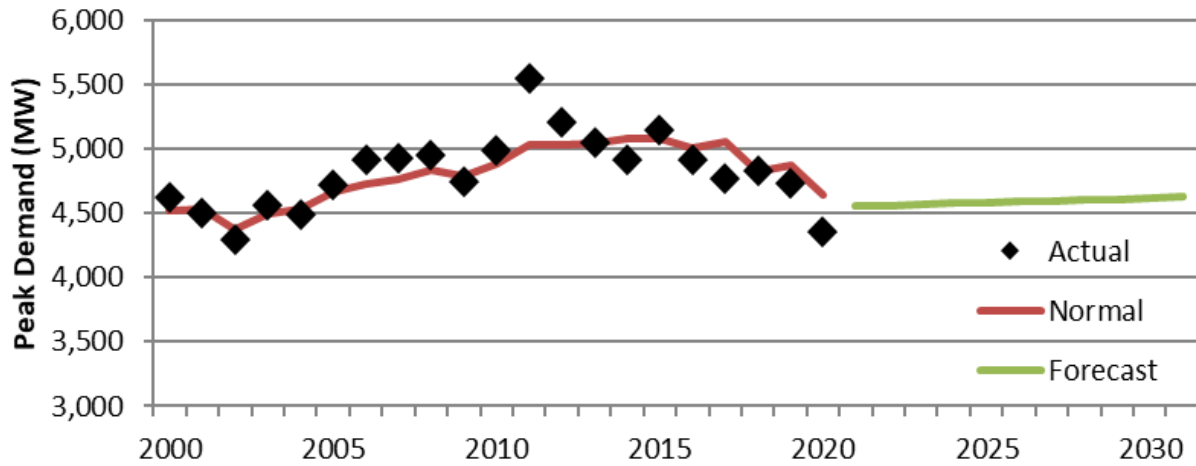
Scenario Inputs

Each IRP Scenario combines a different view of fundamental market drivers. SWEPCO used AURORA's long-term capacity expansion function to develop 20-year (2022-2041) forecasts of SPP market outcomes.

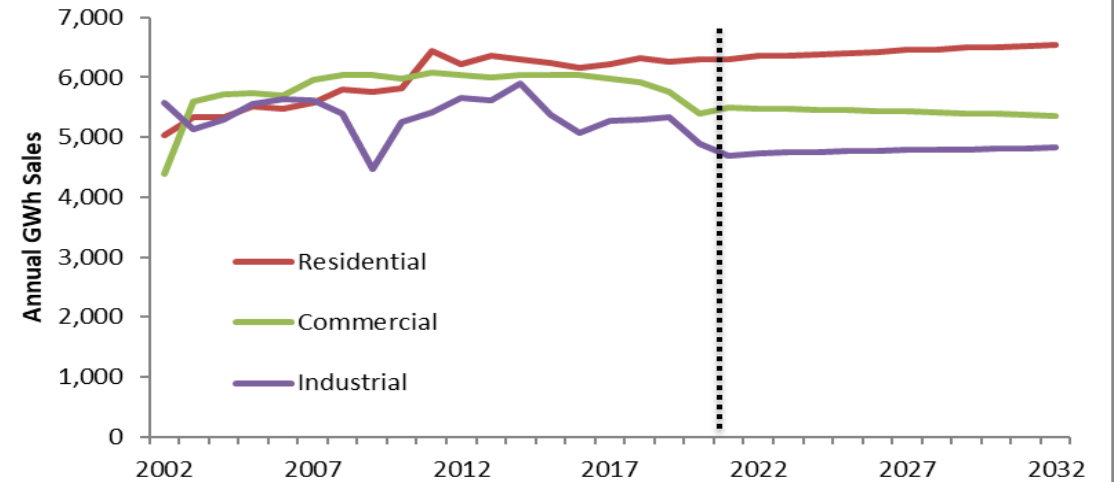
	Scenario Concept	Load	Natural Gas	Carbon	Reserve Margin	Technology Costs	Renewable Peak Credit
1	Reference Scenario (REF)	Base	Base	Moderate	Base	Base	Base
2	Clean Energy Technology Advancement (CETA)	High	Base	Moderate	Base	Faster Decline w/ 10-yr PTC/ITC ext.	Base
3	Enhanced Carbon Regulation (ECR)	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 (2021 SWEPCO AR IRP)

SWEPCO Peak Demand Forecast

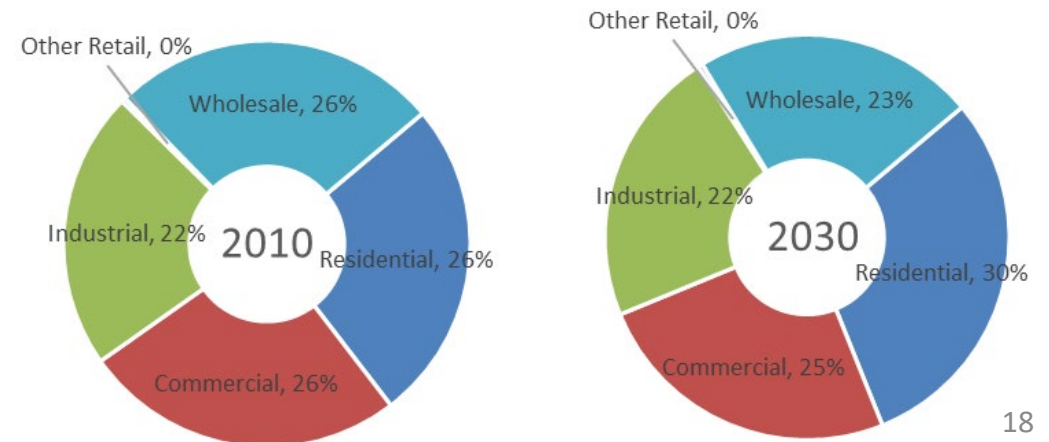


SWEPCO GWh Sales (Weather Normalized History & Forecast)



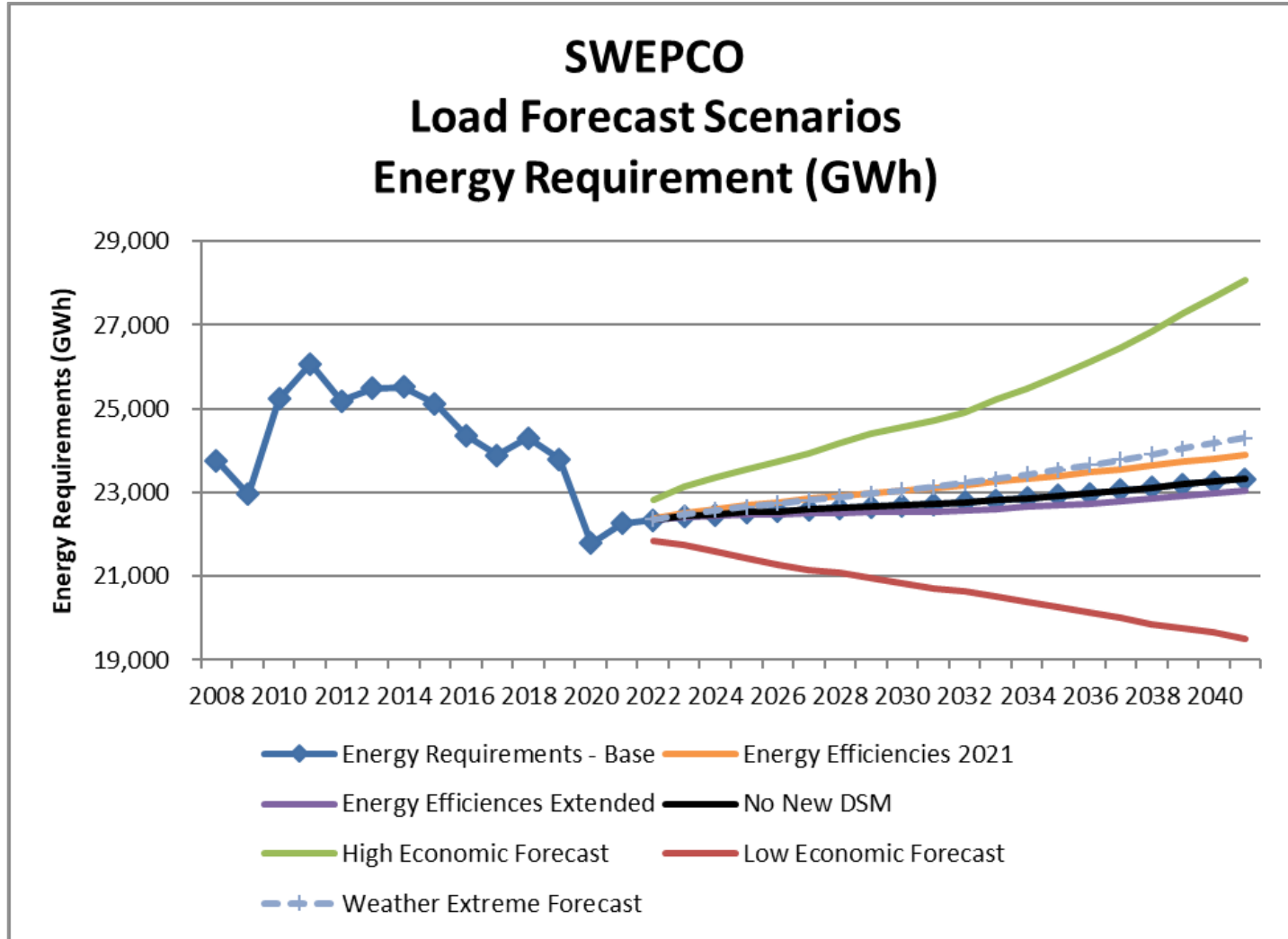
SWEPCO’s peak demand forecast is relatively flat over the next decade. (CAGR +0.2% from 2021-2031.)

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 15, SWEPCO intends to update the load forecasts prior to filing the December 2022 Draft IRP.

Load Scenarios (2021 SWEPCO AR IRP)



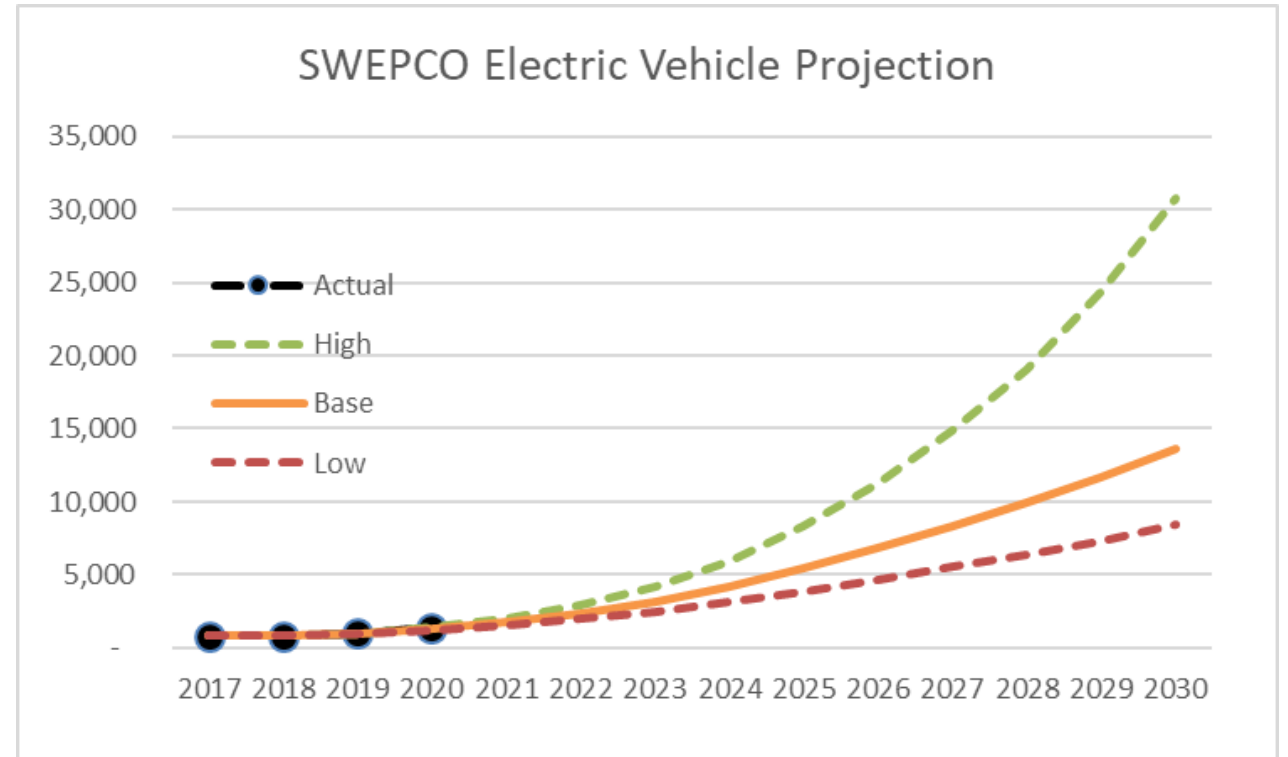
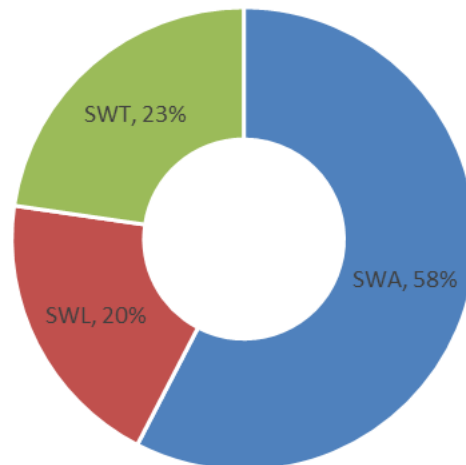
Scenario	CAGR 2021- 2031
High Economic	1.1%
Frozen Efficiencies 2020	0.4%
Extreme Weather	0.4%
No New DSM	0.2%
Base Forecast	0.2%
Extended Efficiencies	0.1%
Low Economic	-0.7%

*As indicated on slide 15, SWEPCO intends to update the load forecasts prior to filing the December 2022 Draft IRP.

EV Projections (2021 SWEPCO AR IRP)

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.

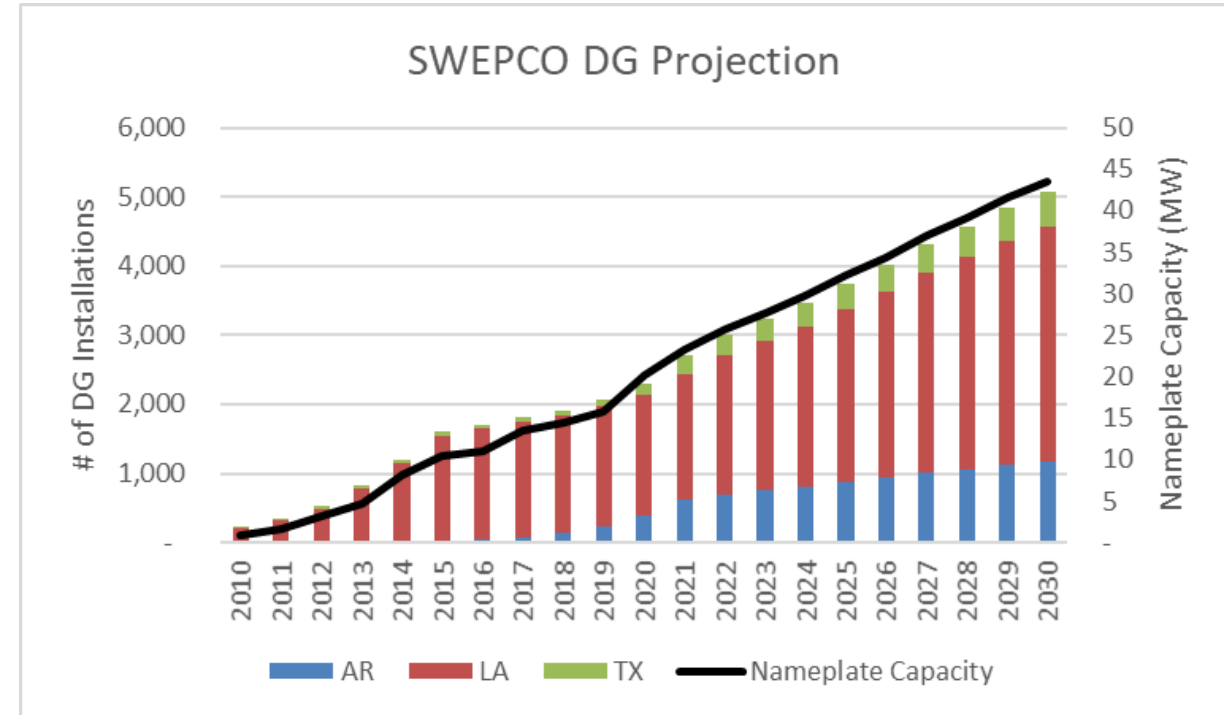
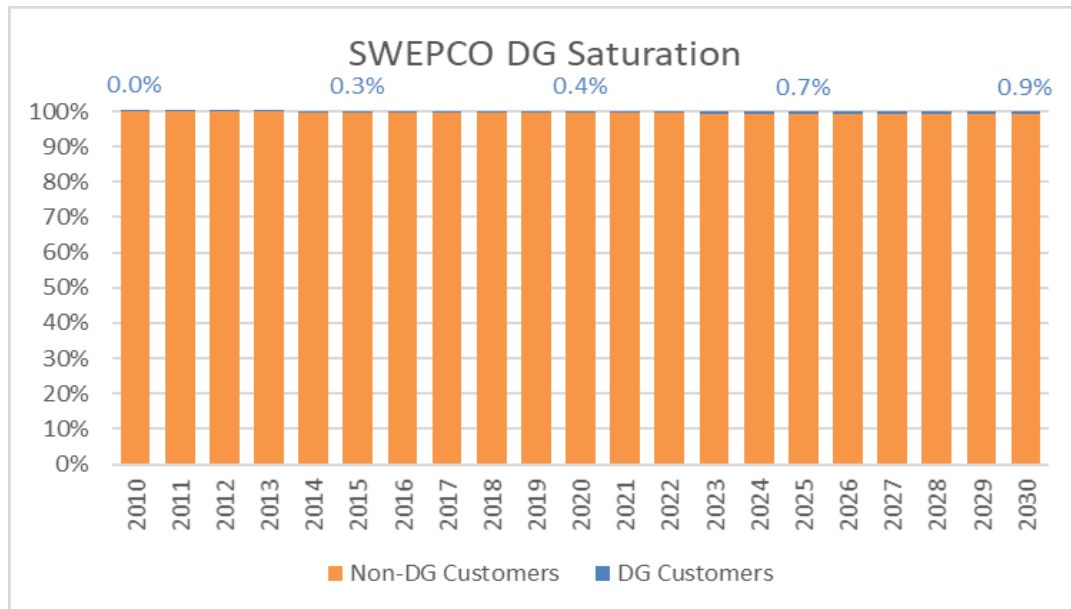


*As indicated on slide 15, SWEPCO intends to update the load forecasts prior to filing the December 2022 Draft IRP.

DG Projections (2021 SWEPCO AR IRP)

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

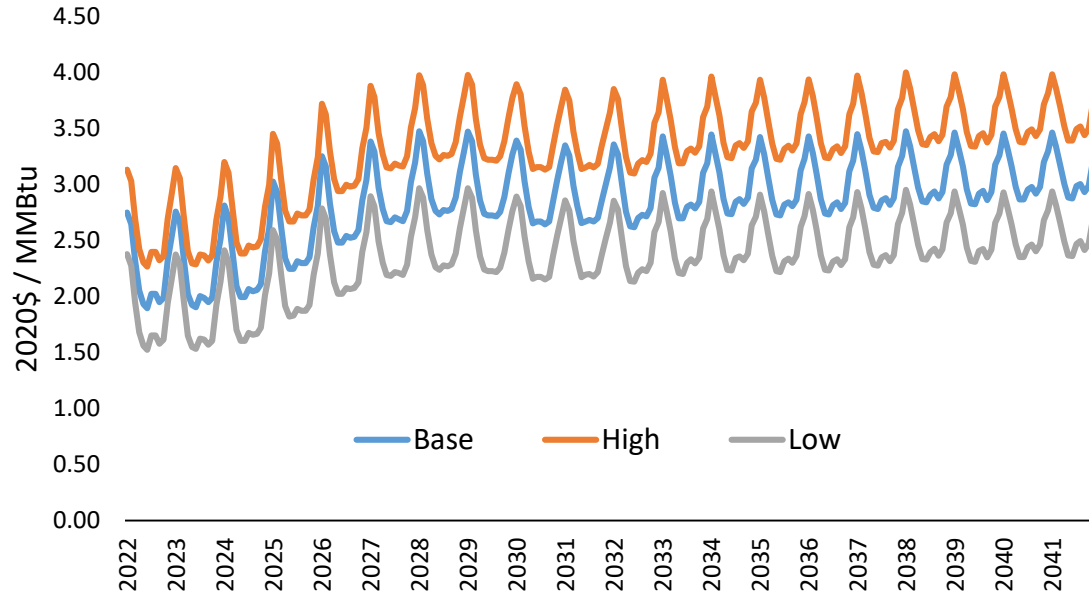
By 2030, SWEPCO projects 0.9% of customers will have installed DG at their premise.



*As indicated on slide 15, SWEPCO intends to update the load forecasts prior to filing the December 2022 Draft IRP.

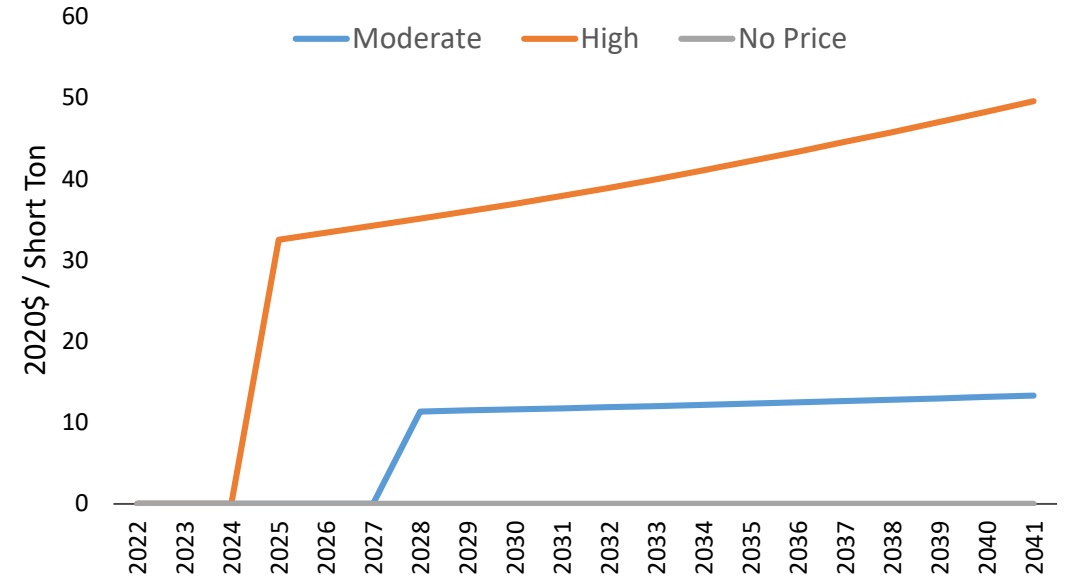
Natural Gas & Carbon Inputs (2021 SWEPCO AR IRP)

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

CO₂ 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 15, 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

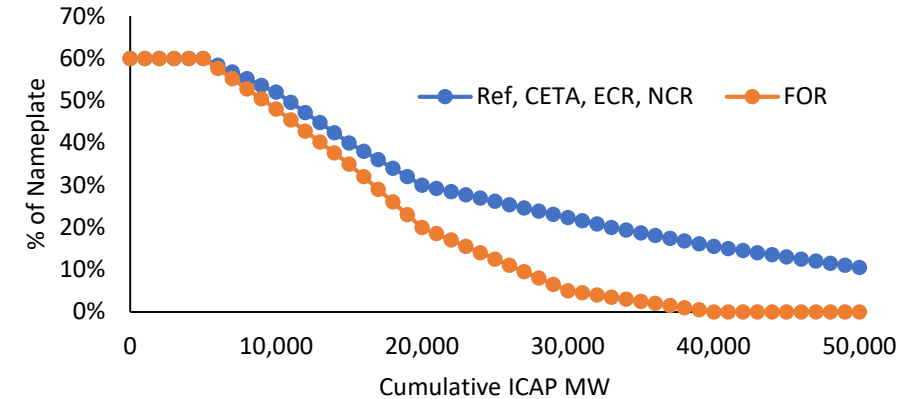
Summer Peak Credit

- Summer peak credit of incremental solar and storage additions in the SPP market is based on the total amount installed¹
- Under the FOR Scenario, SWEPCO tests a case where the summer peak credit of incremental solar and 4-hr battery storage is lower

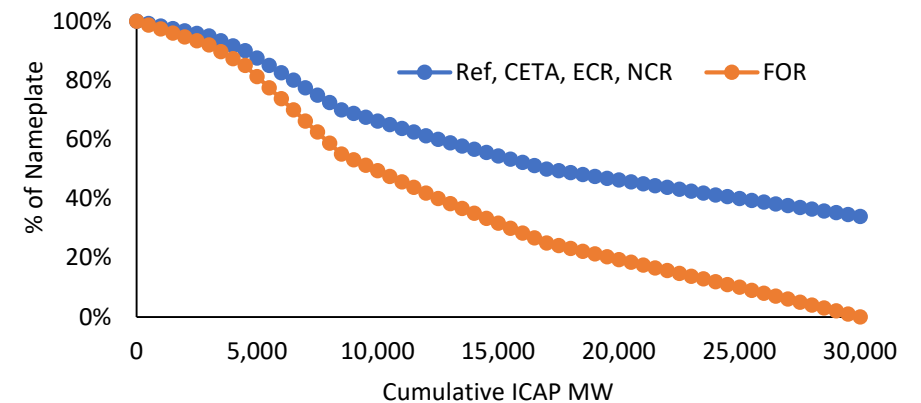
Winter Capacity Requirements

- 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

Solar Peak Credit by Amount Installed



4-hr Storage Peak Credit by Amount Installed



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.

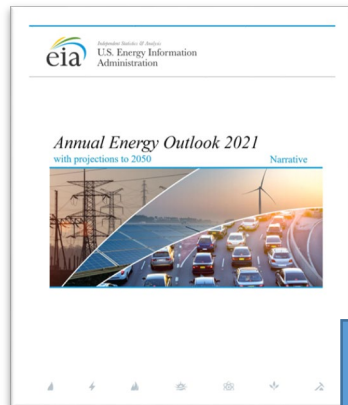
Assumption Development

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

Intermediate & Peaking Options

Renewable Options

Advanced Generation 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*

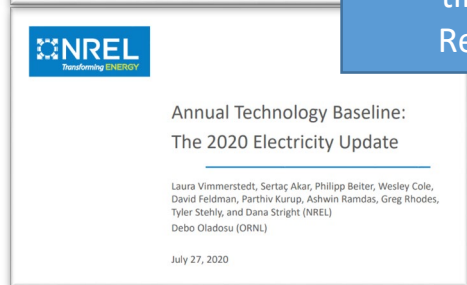


Step 3: Applying investment tax credit for wind project entering service before the end of 2025, and 30% production tax credit for solar project entering service before the end of 2023, 26% before the end of 2025 and 10% thereafter

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 15, 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.

Supply Side Resources

SWEPSCO 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

Baseline Assumptions (2021 SWEPCO AR IRP)

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 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

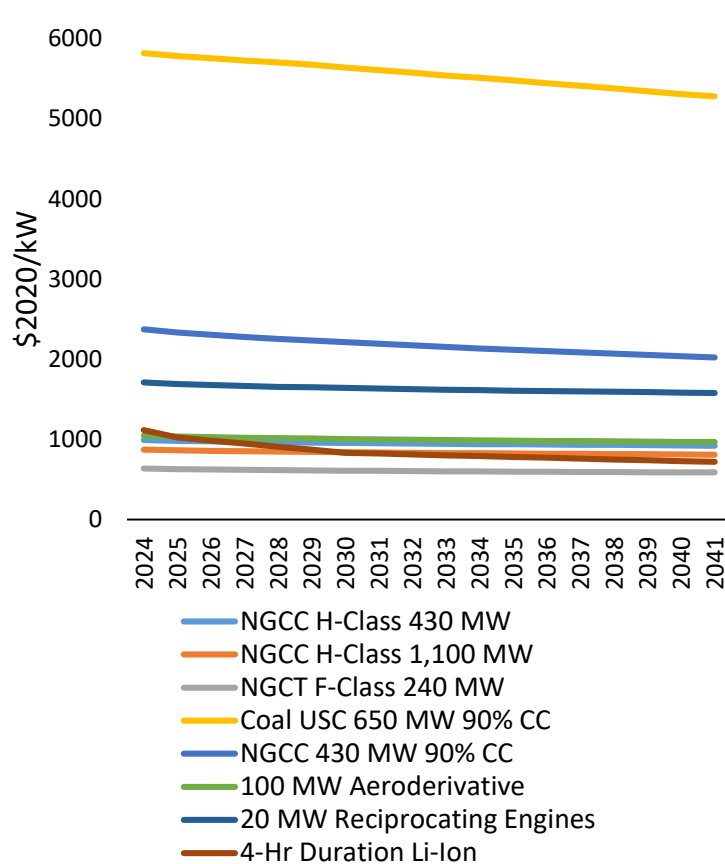
Note: *The passage of Section 45Q legislation provides a tax credit of \$50/tCO₂ sequestered. This is implemented as a negative VOM adder.

†As indicated on slide 15, 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.

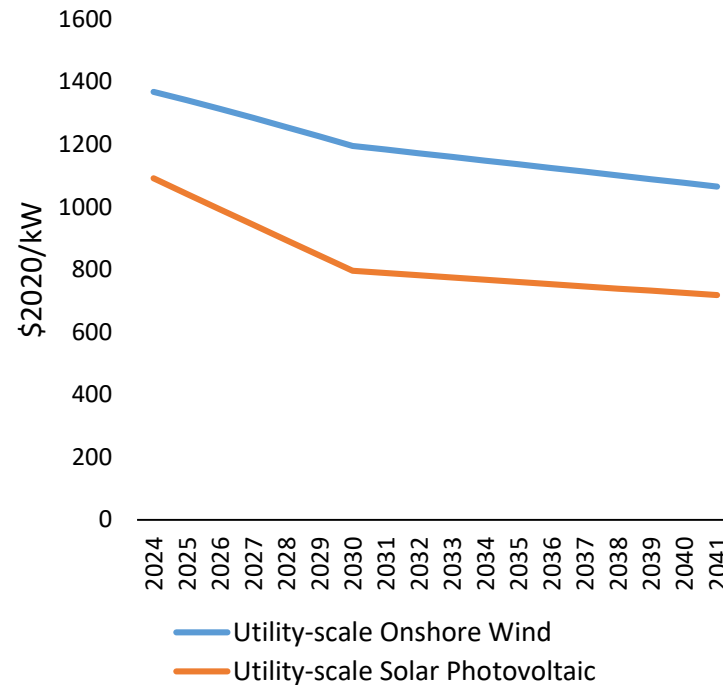
Cost Improvements*

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

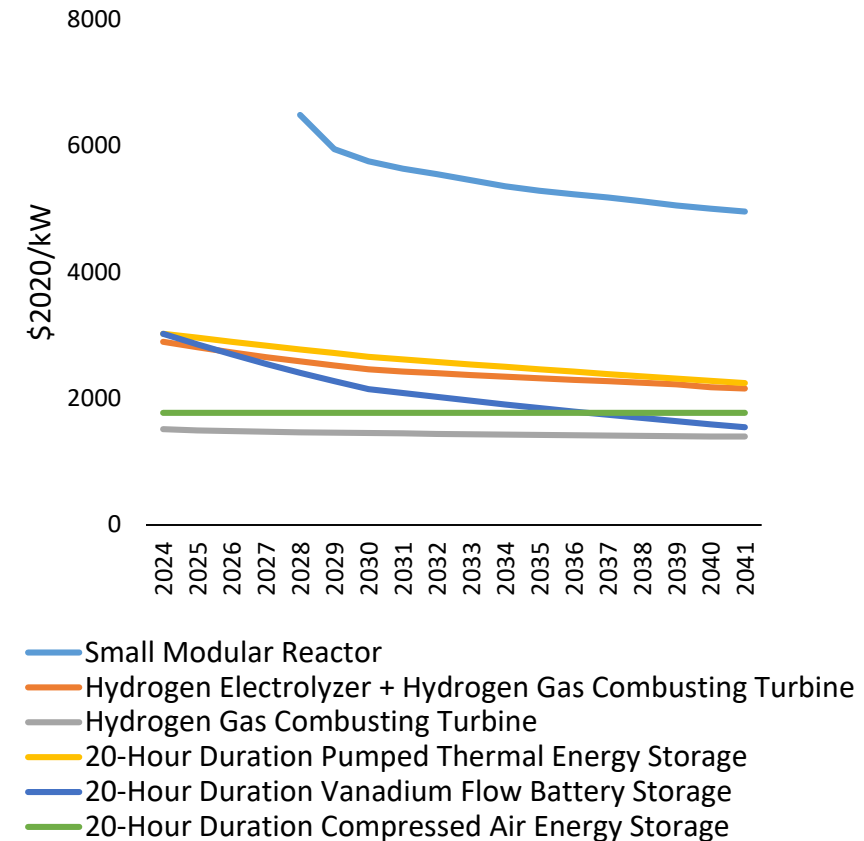
Intermediate & Peaking Options



Renewable Options



Advanced Generation Options



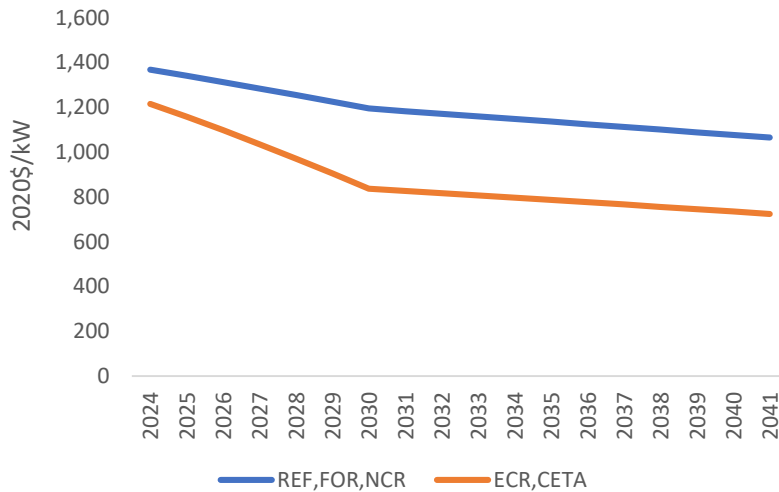
* As indicated on slide 15, SWEPCO intends to update the new resource parameters prior to filing the December 2022 Draft IRP to reflect market data received through ongoing RFPs and updated estimates provided by EIA and NREL.

Technology Cost Ranges* (2021 SWEPCO AR IRP)

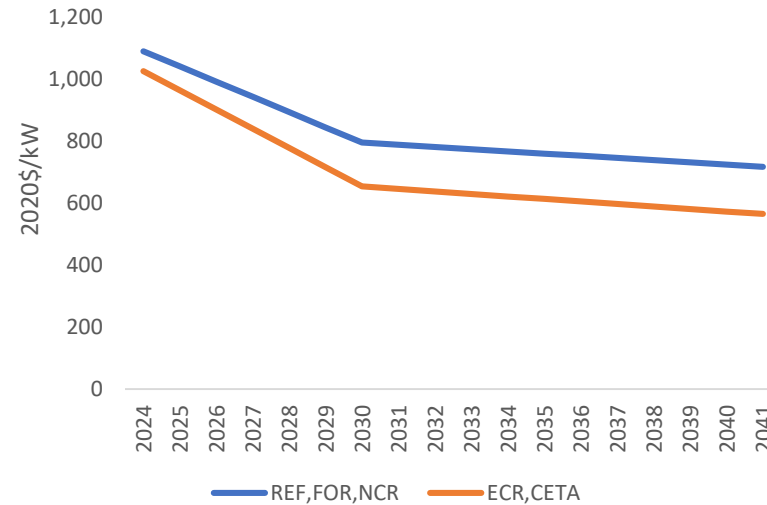
Technology Cost Assumptions

- 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

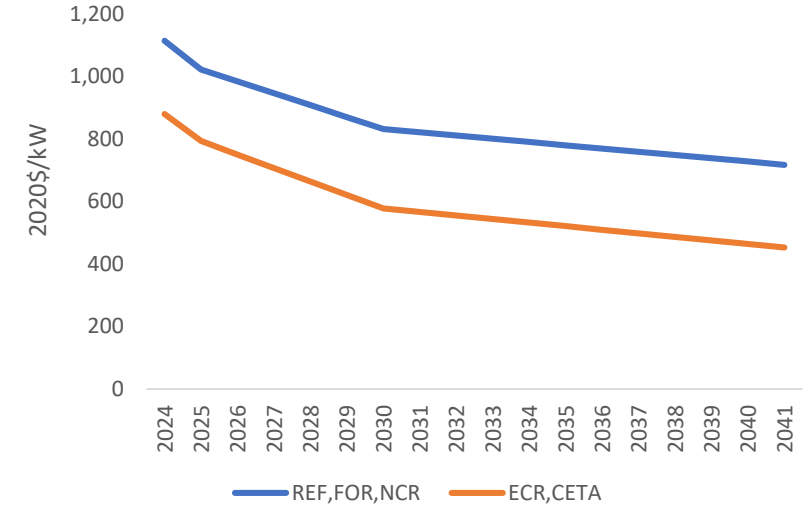
Wind Capital Costs



Solar Capital Costs - Pre ITC



4-hr Storage Capital Costs – Pre ITC



* As indicated on slide 15, 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.

Demand Side Resources

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

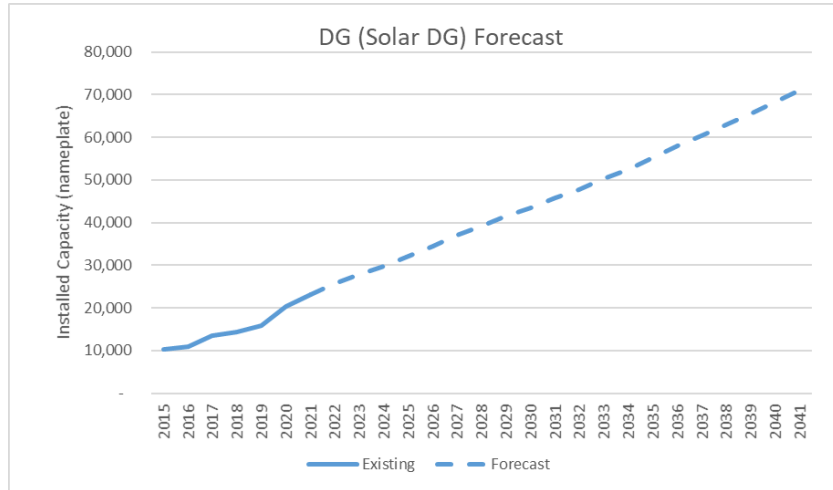
Commercial Bundles		Time Periods		
Bundle		2023-2027	2028-2032	2033-2037
Low (13 yrs)	Energy Savings (MWh)	33,880	2,622	0
	LCOE (\$/MWh)	8.79	10.09	NA
Medium (15 yrs)	Energy Savings (MWh)	11,115	0	0
	LCOE (\$/MWh)	22.52	NA	NA

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



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

- SWEPCO has proposed several demand response tariffs in response to a commission order in Louisiana. These tariffs are undergoing review by the LPSC. SWEPCO will continue to evaluate demand response as part of these proposed programs, if approved.

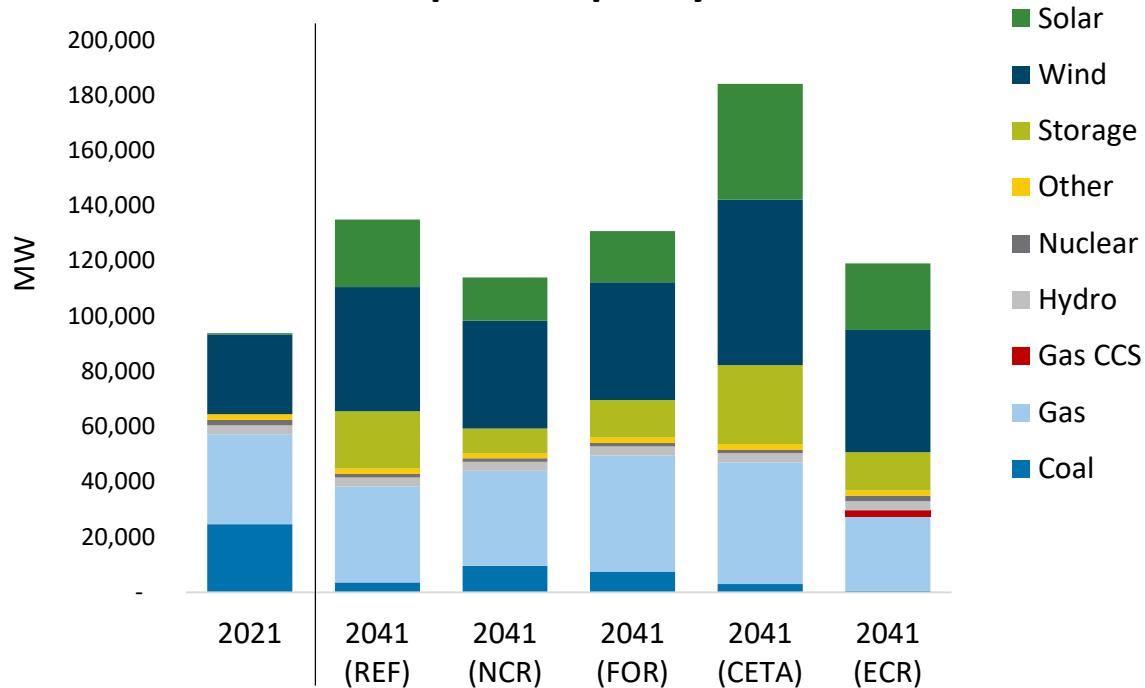
Scenario Outputs

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

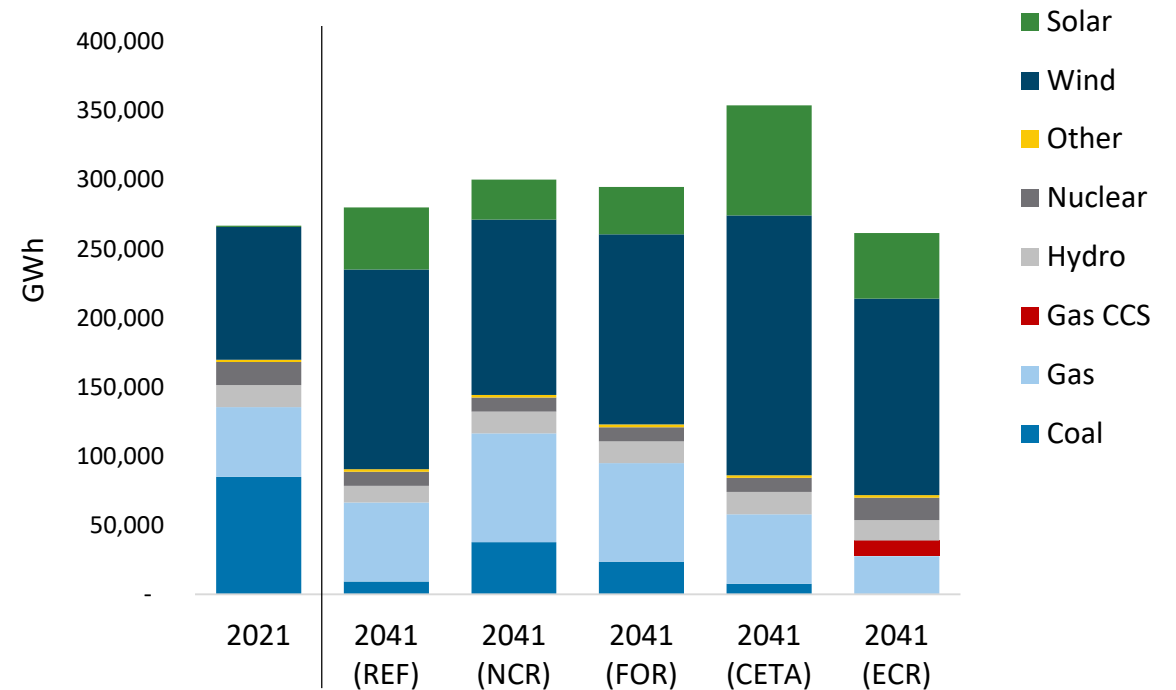
Scenario outputs are important for comprehending possible future states of the world. Some of the scenario outputs (electricity prices, peak credit of solar and storage) are also key inputs for SWEPCO portfolio modeling.

SPP Supply Mix Changes (2021 SWEPCO AR IRP)

Nameplate Capacity - SPP



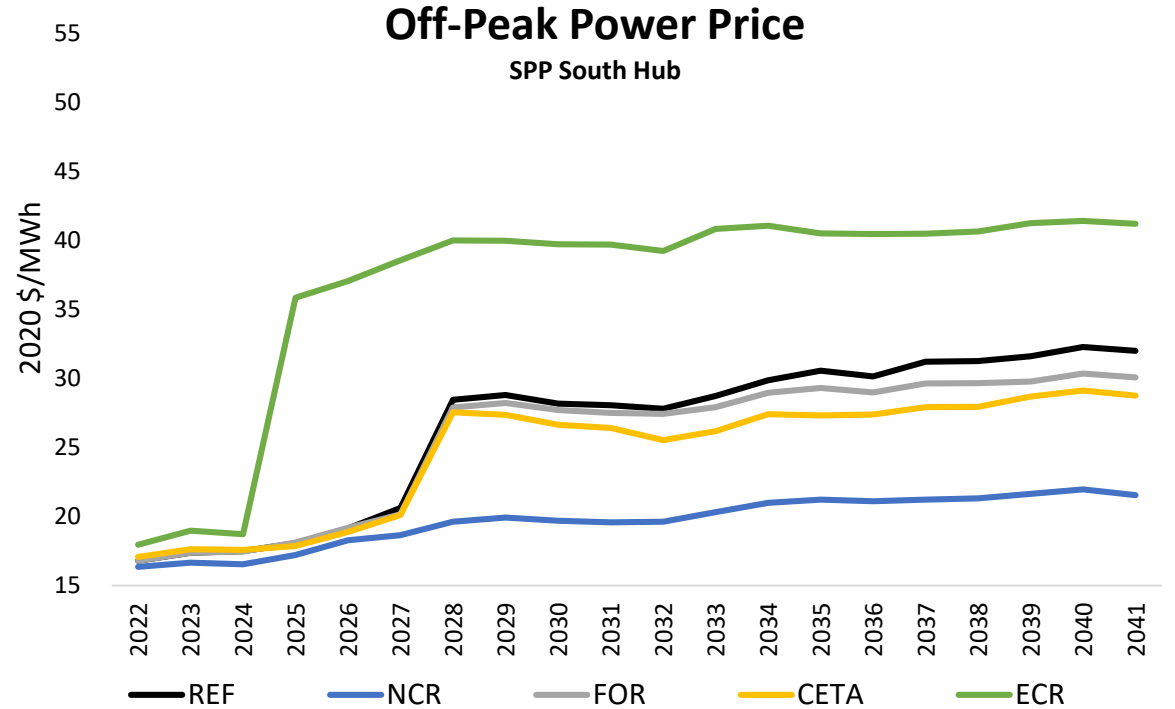
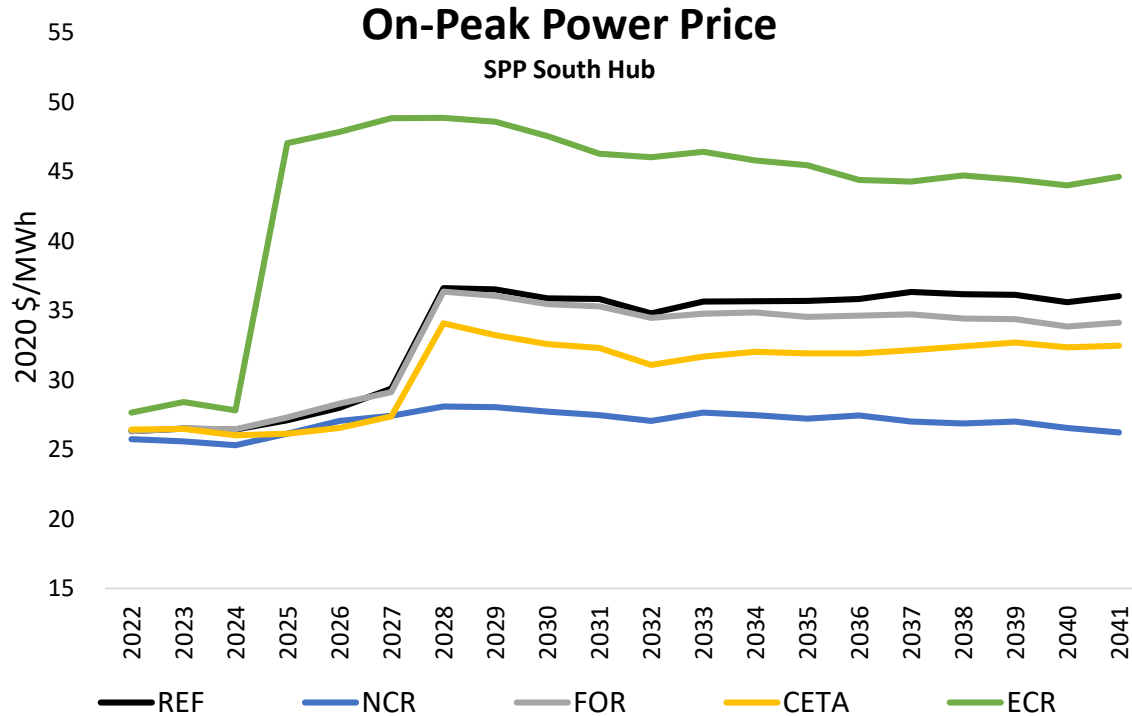
Total Generation - SPP



- Under all scenarios, coal capacity declines between 2022-2041 while the share of gas capacity remains steady in all but the highest CO₂ 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 CO₂ pressure

SPP Market Prices (2021 SWEPCO AR IRP)

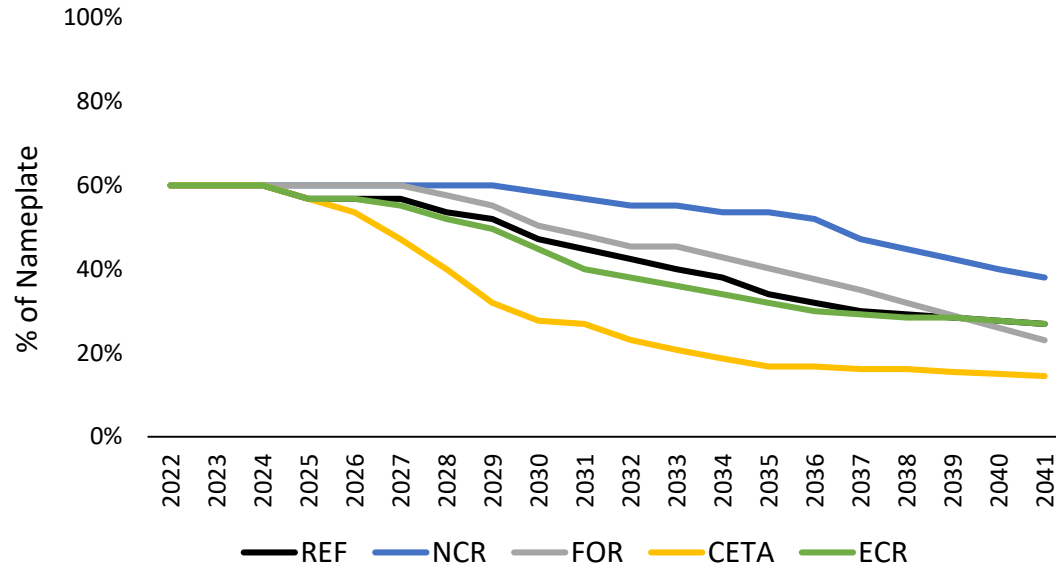


- Under the REF scenario, On-Peak prices grow modestly from current levels until the CO₂ price is introduced in 2028, leading to a step-up in prices that hold steady around \$37/MWh
- On-Peak prices are lowest in the NCR scenario due to the combination of low gas prices and zero CO₂ price
- On-Peak prices are highest in ECR scenario, reflecting higher gas commodity prices and the higher CO₂ 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

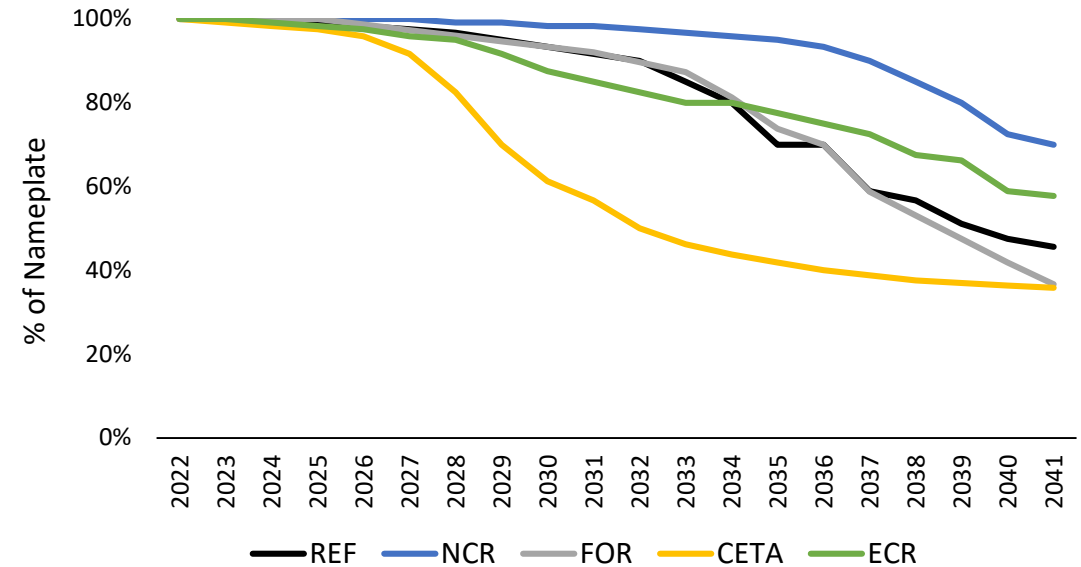
Solar & Storage Capacity Credit

Solar Summer 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

4-hr Battery Storage Summer Capacity Credit



- 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

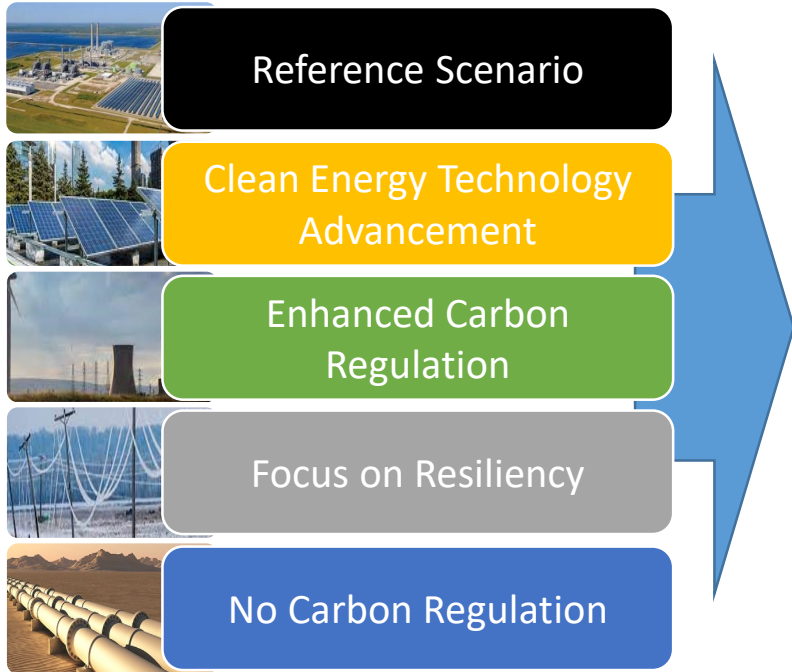
Expected Future Updates to IRP Inputs

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

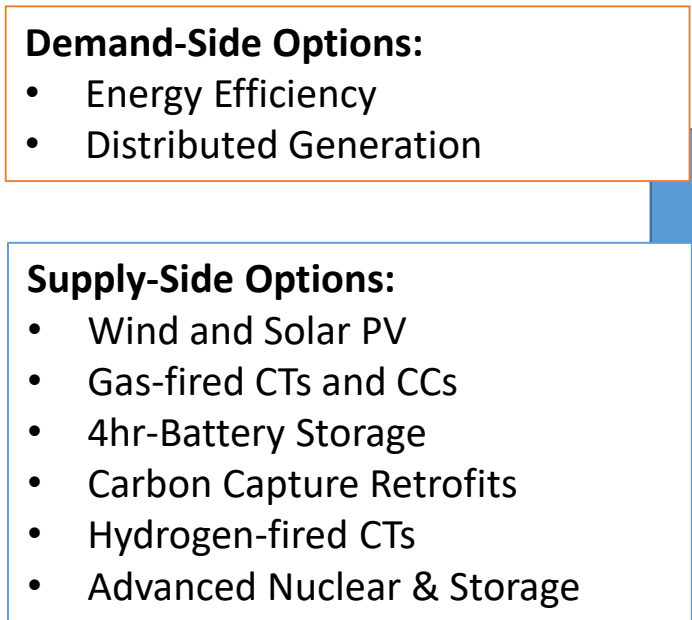
1. AEP's fundamentals forecast of commodity prices
2. Market data collected through ongoing SWEPCO RFPs
3. SWEPCO's forecast of customer energy and peak demand
4. EIA's Annual Energy Outlook report
5. NREL's Annual Technology Baseline report
6. Announced additions and retirements in the SPP market

Portfolio Development

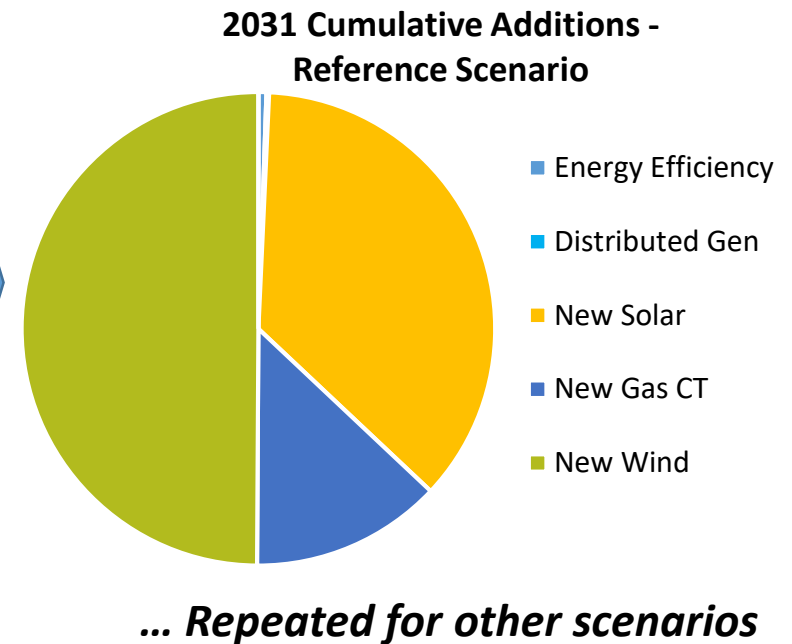
IRP Scenarios Determine Market Prices, Tech Costs, Load & ELCC Inputs



AURORA Evaluates Expected Resource Performance Under Scenario Conditions



AURORA Selects the Least-Cost Combination of New Resources



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.

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

