

# Mississippi Power Company 2021 IRP Technical Conference

February 25, 2021

## MPC Participants:

*David Schmidt – MPC Generation Services*

*Theron Furr – MPC Generation Services*

*Phillip Worland – MPC Generation Services*

*Lynda Johnson – MPC Marketing Services*

*Mike Pruitt – MPC Marketing Services*

*Shawn Shurden – MPC Regulatory Affairs*

*Randy Hubbert – SCS Resource Planning*

*Charles Rossmann – SCS Resource Planning*

*Marc Parker – SCS Generation Planning & Development*



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# Purpose



“The purpose of the technical conference is for the electric utility to provide an overview of the process, planning assumptions and inputs ultimately used to develop its Integrated Resource Plan, and to answer questions related thereto.”

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# Topics



- Executive Summary
- Existing Generating Fleet
- Planning Assumptions for Fossil Steam Units
- Coordinated Planning
- Reserve Margin
- Scenario Development
- Demand Side Management
- Expansion Plan

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# Executive Summary



- Using broad range of scenarios.
- Battery storage and utility-scale solar will be incorporated as generic resource options.
- Commission's order regarding fossil steam retirements will be incorporated.
- Capacity need is not anticipated until 2031 or later.
- Current models indicate a wide range of assets from renewables to gas options across the scenarios.

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# Existing Generating Fleet

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# Generating Fleet

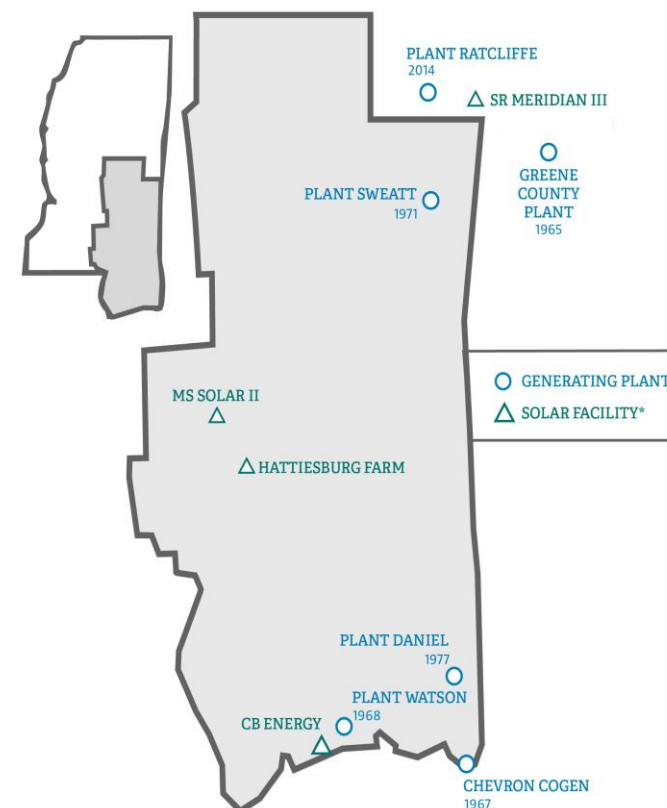


Plant	Location	Fuel	Capacity (MW)
Sweatt	Meridian	Gas	32
Watson	Gulfport	Gas	817
Greene County <sup>1</sup>	Alabama	Gas	206
Chevron Cogen	Pascagoula	Gas	135
Daniel <sup>2</sup>	Moss Point	Coal & Gas	1,583
Ratcliffe	Dekalb	Gas	693
CB Energy <sup>3</sup>	Gulfport	Solar PPA	3.29
MS Solar 2 <sup>3</sup>	Sumrall	Solar PPA	52
Hattiesburg Farm <sup>3</sup>	Hattiesburg	Solar PPA	50
SR Meridian III <sup>3</sup>	Meridian	Solar PPA	52.5

<sup>1</sup> Represents the Company's 40% share of Greene County Unit No. 1 and Unit No. 2.

<sup>2</sup> Includes the Company's 50% share of Plant Daniel Unit No. 1 and Unit No. 2.

<sup>3</sup> Represents AC nameplate capacity.



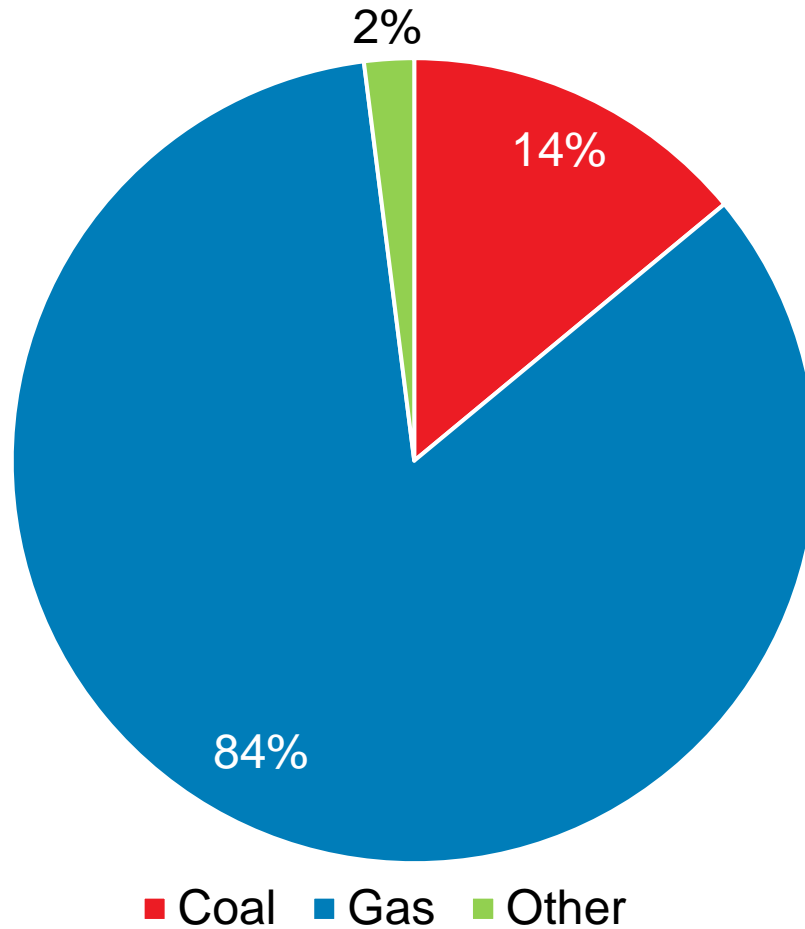
\*Mississippi Power receives the solar energy and renewable energy credits generated by these facilities, which we can use to serve our customers or sell to third parties for the benefit of customers.

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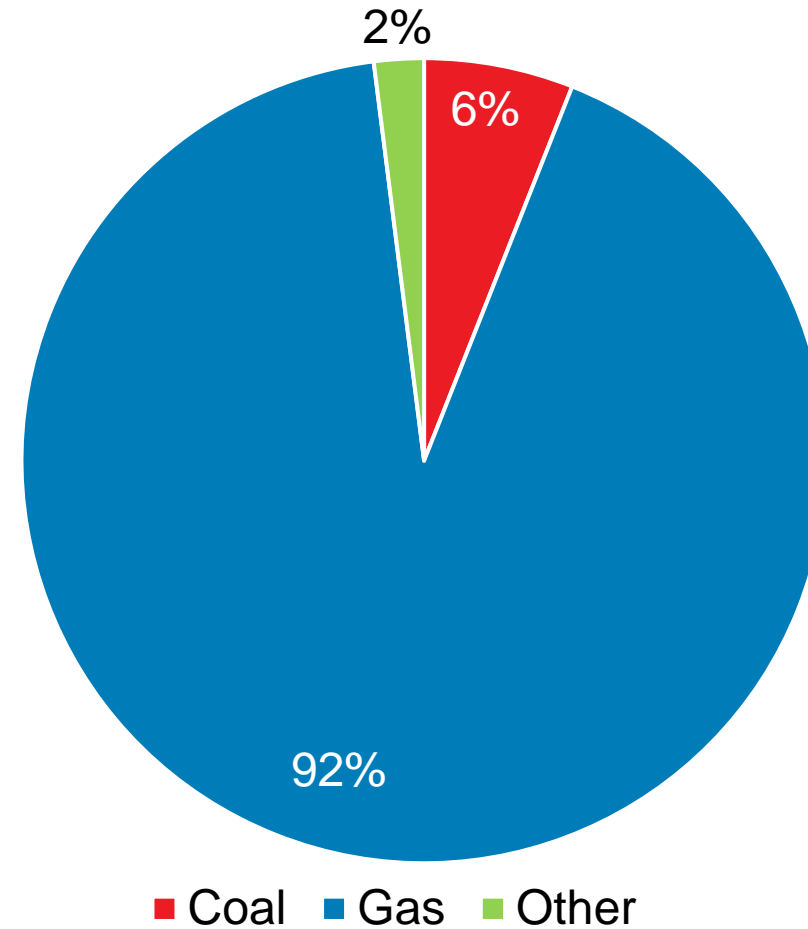
# Generating Capacity and Energy Mix – 2020



Generating Capacity Mix

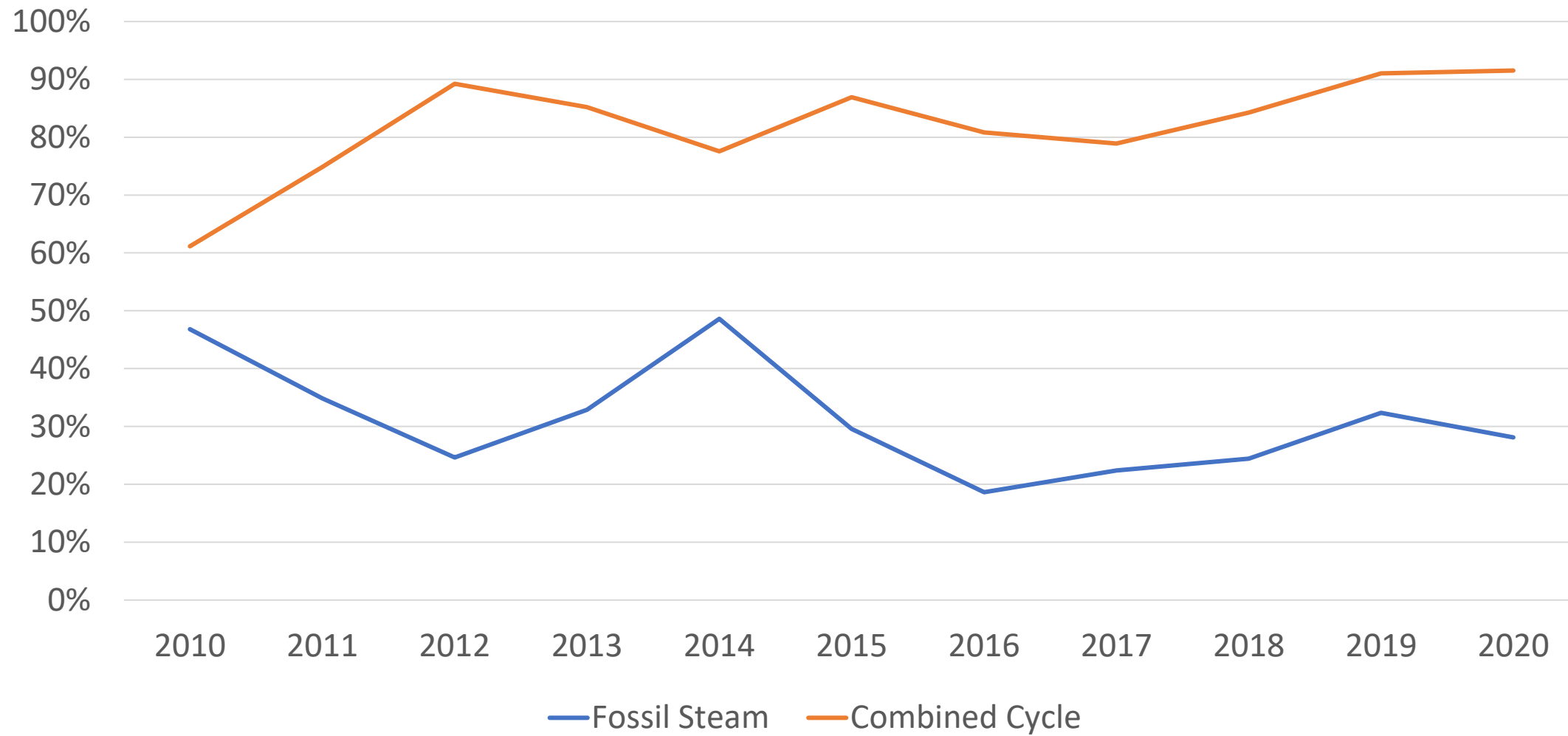


Energy Mix



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# Historical Capacity Factors



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# Planning Assumptions for Fossil Steam Units



- MPC's IRP will incorporate a plan to retire 950 MW of fossil steam generating capacity by the end of 2027 per the Commission's recent order.
- The final plan will be based on the results of asset valuations currently underway.

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# Planning for the Future

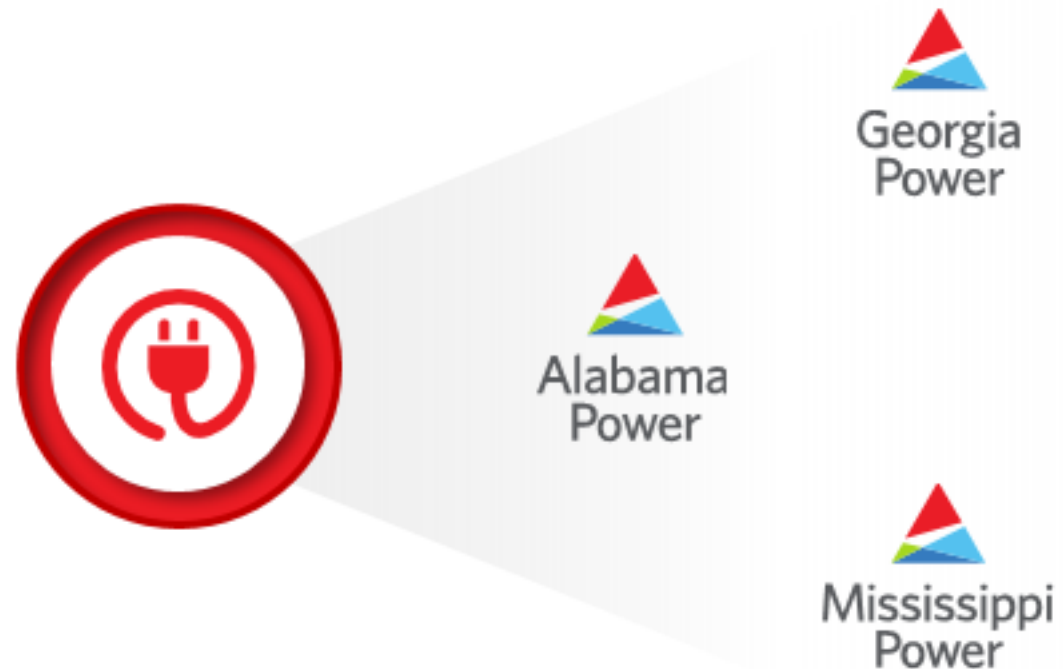
## Integrated Resource Planning

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# Coordinated Planning



- Coordinated planning is a forward-looking process to provide adequate resources to meet anticipated customer load obligations.
- The individual retail operating companies utilize integrated resource planning (IRP) to ensure reliable and cost-effective supply for customers.
- The coordinated retail Operating Company IRPs are combined into an aggregate plan that reflects the benefits of load diversity, pooling and reserve sharing to economically meet the minimum system target reserve margins.
- Retail Operating Companies make their own plans and decisions informed by the efficiencies available from the aggregate plan.



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# Reserve Margin

Addressing uncertainty in weather, unit performance and market conditions

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# Reserve Margin Study (RMS)



Performed every three years

Determines the Target Reserve Margin (TRM) for the Southern Company system, considering reliability and economics

Reserves are needed to account for uncertainty in:

- Weather
- Economic growth
- Unit performance
- Market purchase availability

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# Target Reserve Margin Considerations



In setting a Target Reserve Margin, Southern Company considers:

- **Cost Optimization**

Optimizes costs to customers (production costs, incremental capital costs, customer outage costs), adjusted for risk

- **Minimum Reliability Threshold**

Targets generation-related firm load curtailment of no more than 1 event every 10 years – called “1 in 10 LOLE” (Loss of Load Expectation)

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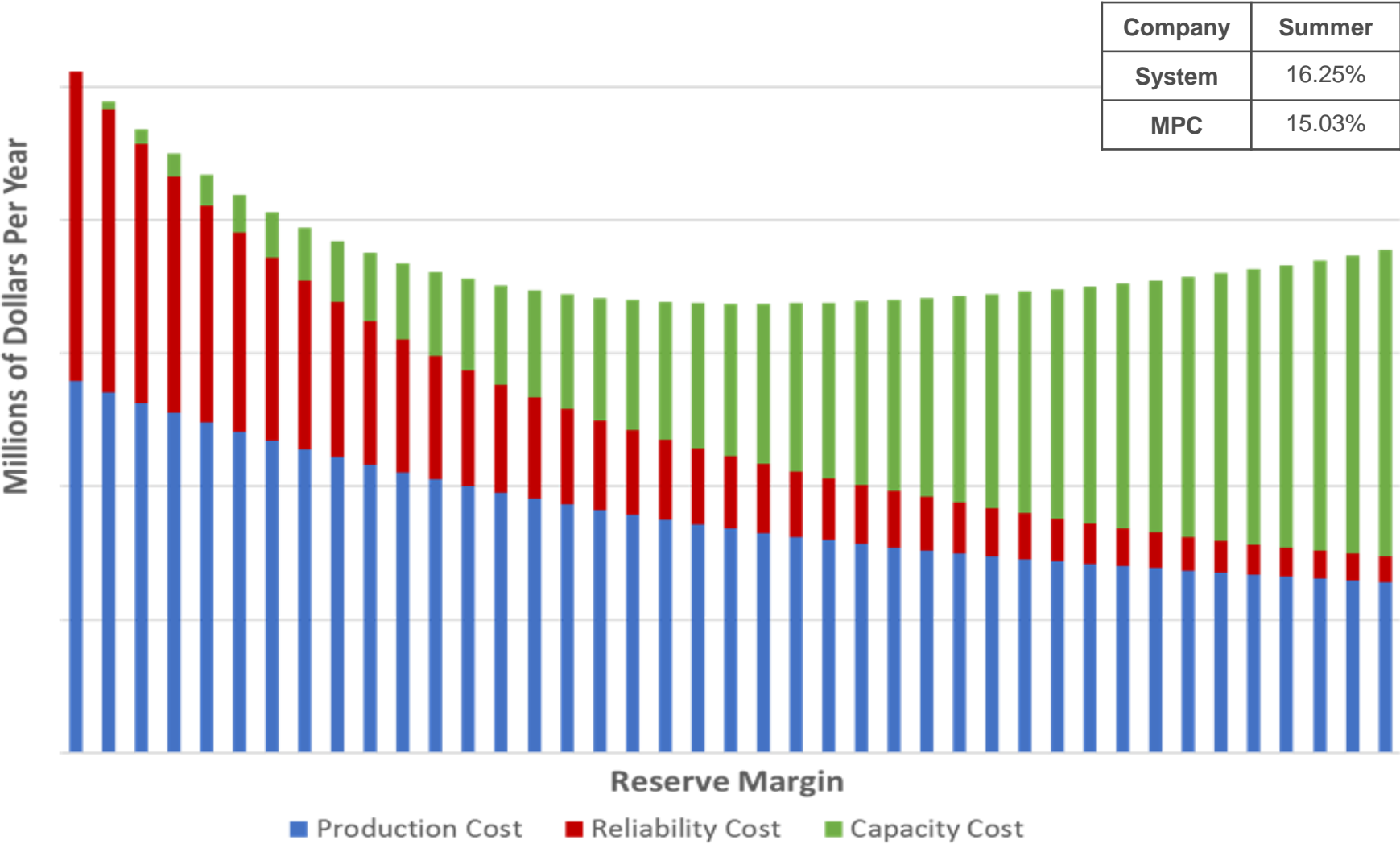
# Winter Reliability Risk Drivers



- Winter peak demand growth and volatility
  - Winter peak demand growth
  - Greater weather (thus load) volatility in winter vs. summer
- Less available generation at extremely cold temperatures
  - Unplanned outages at extremely cold temperatures
  - Solar generation is less during winter peaks
  - Operational Flow Orders limit natural gas to firm transportation and even hourly withdrawals more frequently on cold winter days
  - Market purchases limited on extremely cold days

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# Reserve Margin Study Example Results



Company	Summer	Winter
System	16.25%	26.00%
MPC	15.03%	25.25%

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# Scenario Planning

Addressing uncertainty in future fuel cost, CO<sub>2</sub> pressure, load growth and technology cost and performance

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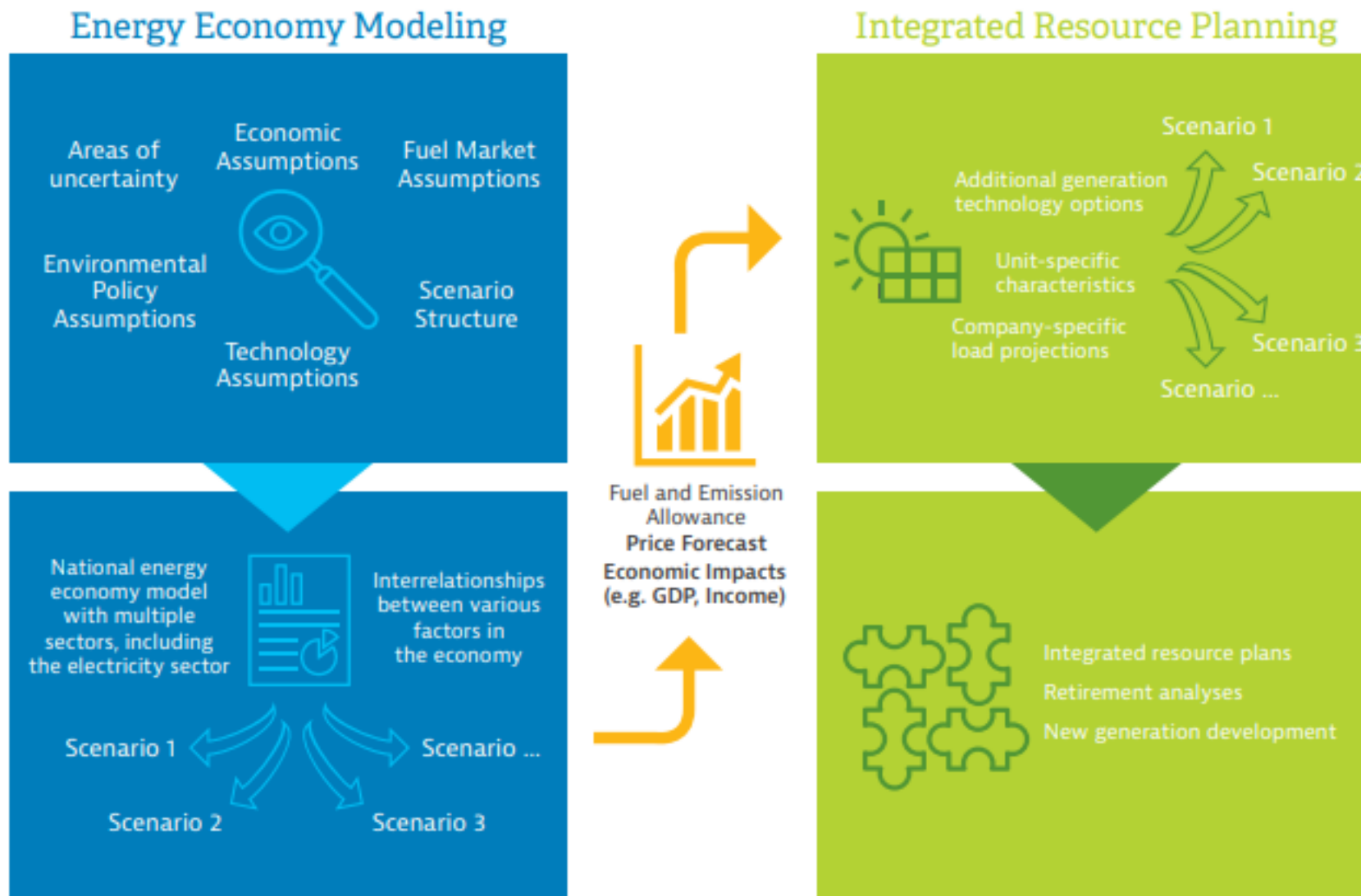
# Outline



- Scenario Development Process
- 10 Scenarios of the Future
- Key Uncertainties – Fuel Price, Greenhouse Gas Pressure, Load Growth, Technology Cost
  - 4 Views of Future Fuel Prices – Lower; Moderate; Higher; \$50 CO<sub>2</sub>
  - 4 Views of Future Greenhouse Gas Pressure – \$0; \$20; \$50; declining annual emissions limit
  - 2 Views of Future Technology Cost and Performance – Current; Lower cost of zero-CO<sub>2</sub> tech
  - 8 views of Future Load Growth – Official forecast; 5 adjustments for gas price and CO<sub>2</sub> pressure, higher growth, lower growth

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# Scenario Development Process



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# Scenarios



Scenario	Natural Gas Price Path	Greenhouse Gas Pressure	Technology Cost & Performance	Load	Short Name
1	Moderate	\$0 fee	Tech Application Stds <sup>1</sup>	Reference <sup>2</sup>	MG0
2	\$50 CO <sub>2</sub>	\$50+ fee	Tech Application Stds	Reference + \$50 delta	\$50
3	Low	\$0 fee	Tech Application Stds	Reference + LG0 delta	LG0
4	Low	\$20+ fee	Tech Application Stds	Reference + LG20 delta	LG20
5	High	\$0 fee	Tech Application Stds	Reference + HG0 delta	HG0
6	High	\$20+ fee	Tech Application Stds	Reference + HG20 delta	HG20
7	Moderate	\$0 fee	Tech Application Stds	High Electrification	HL
8	Moderate	\$0 fee	Tech Application Stds	High EE & DER adoption	LL
9	Moderate	\$0 fee	Low cost zero-CO <sub>2</sub> tech <sup>5</sup>	Reference	Tech
10	Moderate	CO <sub>2</sub> Intensity <sup>6</sup>	Tech Application Stds	Reference	CI

Notes:

1. Southern Company Technology Application Standards which contain assumptions on generating technology cost and performance benchmarks.
2. Standard load forecasts produced by each operating company that serve as the reference forecasts.
3. Higher load growth based on the EPRI electrification study.
4. Lower load growth based on aggressive adoption of energy efficiency improvements and distributed resources.
5. Lower costs for solar, wind, storage, and 4th generation nuclear technologies.
6. The CO<sub>2</sub> intensity view reflects current legislative ideas that have the effect of imposing a shrinking annual cap on emissions.

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# 4 Views of Future Natural Gas Prices

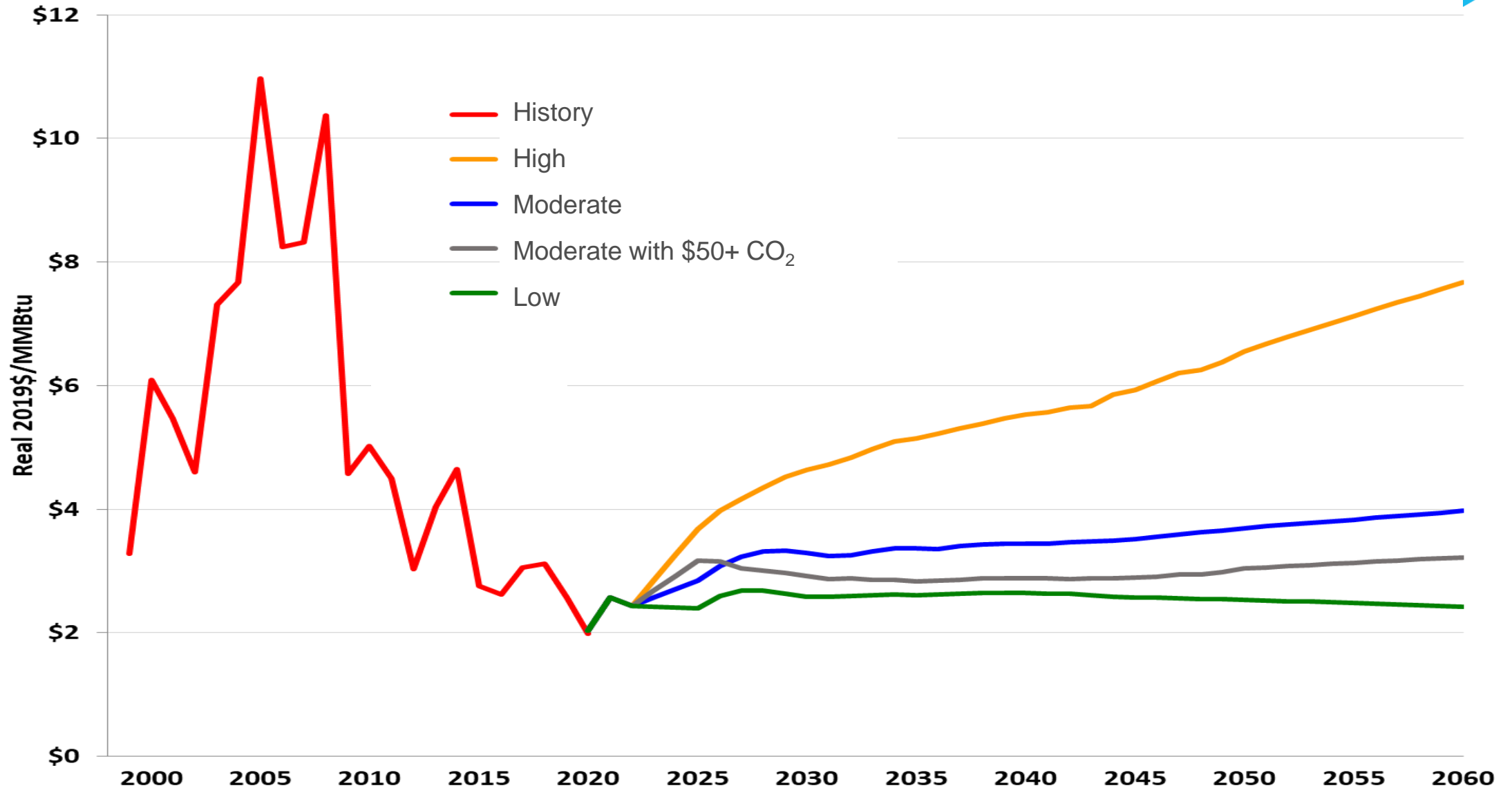


Major Components		High	Moderate and \$50 CO <sub>2</sub> *	Low
Production	<b>Resource Size and Production Rates</b>	<ul style="list-style-type: none"> <li>1,791 Tcf of total dry natural gas TRR</li> <li>IP rates increase to 20% above current levels by 2059</li> </ul>	<ul style="list-style-type: none"> <li>2,829 Tcf of total dry natural gas TRR</li> <li>IP rates increase to 40% above current levels by 2059</li> </ul>	<ul style="list-style-type: none"> <li>3,993 Tcf of total dry natural gas TRR</li> <li>IP rates increase to 60% above current levels by 2059</li> </ul>
	<b>Well Costs</b>	<ul style="list-style-type: none"> <li>Fixed well cost down from current levels 20% by 2059</li> <li>Variable well costs decrease to 90% of current levels by 2059</li> </ul>	<ul style="list-style-type: none"> <li>Fixed well cost down from current levels 40% by 2059</li> <li>Variable well costs decrease to 80% of current levels by 2059</li> </ul>	<ul style="list-style-type: none"> <li>Fixed well cost down from current levels 60% by 2059</li> <li>Variable well costs decrease to 70% of current levels by 2059</li> </ul>
Exports	<b>U.S. LNG Exports</b>	<ul style="list-style-type: none"> <li>Exports grow to 12.7 Bcf/d by 2028, then declines to 10.1 Bcf/d in 2046</li> <li>After 2046, export volumes increase modestly to 10.7 Bcf/d by 2050</li> </ul>	<ul style="list-style-type: none"> <li>Exports grow to 14.0 Bcf/d by 2026, and 15.9 Bcf/d by 2030</li> <li>After 2030, export volumes remain flat at 15.9 Bcf/d</li> </ul>	<ul style="list-style-type: none"> <li>Exports grow to 14.3 Bcf/d by 2026, and 19.3 Bcf/d by 2036</li> <li>After 2040, export volumes remain flat at 19.8 Bcf/d</li> </ul>
	<b>Pipeline Exports to Mexico</b>	<ul style="list-style-type: none"> <li>US exports grow to 7.3 Bcf/d by 2028, before declining to 6.2 Bcf/d in 2050</li> </ul>	<ul style="list-style-type: none"> <li>US exports grow to 7.8 Bcf/d by 2028, and levels off around 8.2 Bcf/d by 2042</li> </ul>	<ul style="list-style-type: none"> <li>US exports grow to 8.1 Bcf/d by 2028, 8.8 Bcf/d by 2040, before leveling off at 9.2 Bcf/d after 2048</li> </ul>

\* The Company's 4th view natural gas price, a view considering the effects of a \$50+ per ton fee on CO<sub>2</sub> emissions, uses the same views of natural gas production and exports as shown above for the Moderate view. The \$50+ CO<sub>2</sub> price path affects how producers and consumers respond to those same views.

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# 4 Views of Future Natural Gas Prices



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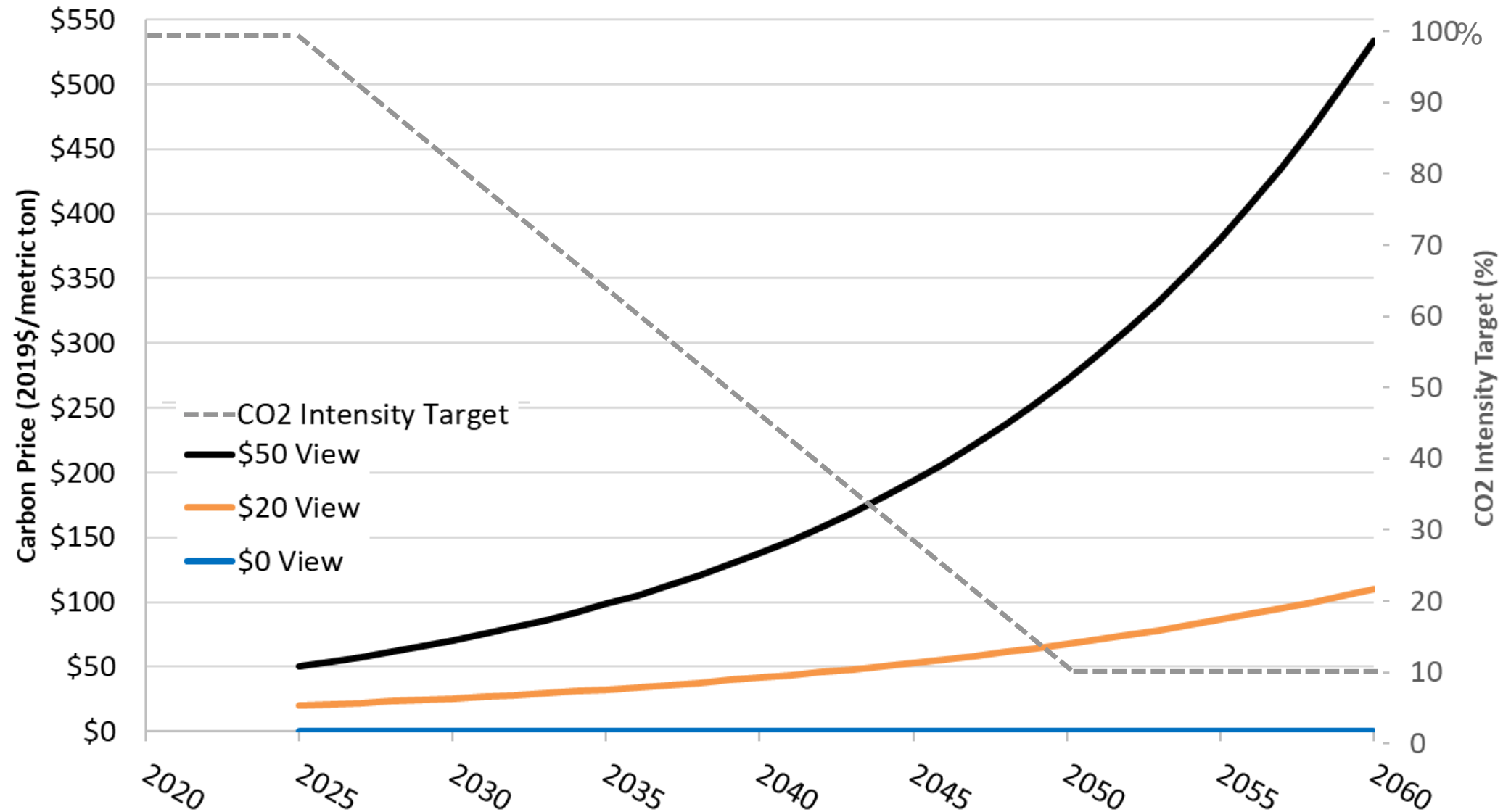
# 4 Views of Future Greenhouse Gas Pressure



		\$0 View	\$20 View (\$20+ / MT CO <sub>2</sub> on all fossil)	\$50 View (\$50+ / MT CO <sub>2</sub> on all fossil)	CO <sub>2</sub> Intensity Target (90% intensity reduction)
New Sources (2014 and later)	NGCC	1000 lbs CO <sub>2</sub> /MWh Full (90%) CCS 2040	1000 lbs CO <sub>2</sub> /MWh Full (90%) CCS 2035	1000 lbs CO <sub>2</sub> /MWh Full (90%) CCS 2035	1000 lbs CO <sub>2</sub> /MWh Full (90%) CCS 2035
	Simple-cycle CTs	25% Annual capacity factor	25% Annual capacity factor  10% Capacity factor 2035	25% Annual capacity factor  10% Capacity factor 2035	25% Annual capacity factor  10% Capacity factor 2035
Existing Sources (pre-2014)	Fossil-fueled Boilers	(No additional pressure)	(No additional pressure)	(No additional pressure)	(No additional pressure)
	NGCC	(No additional pressure)	(No additional pressure)	(No additional pressure)	(No additional pressure)
	Simple-cycle CTs	25% Annual capacity factor	25% Annual capacity factor  10% capacity factor 2035	25% Annual capacity factor  10% capacity factor 2035	25% Annual capacity factor  10% capacity factor 2035

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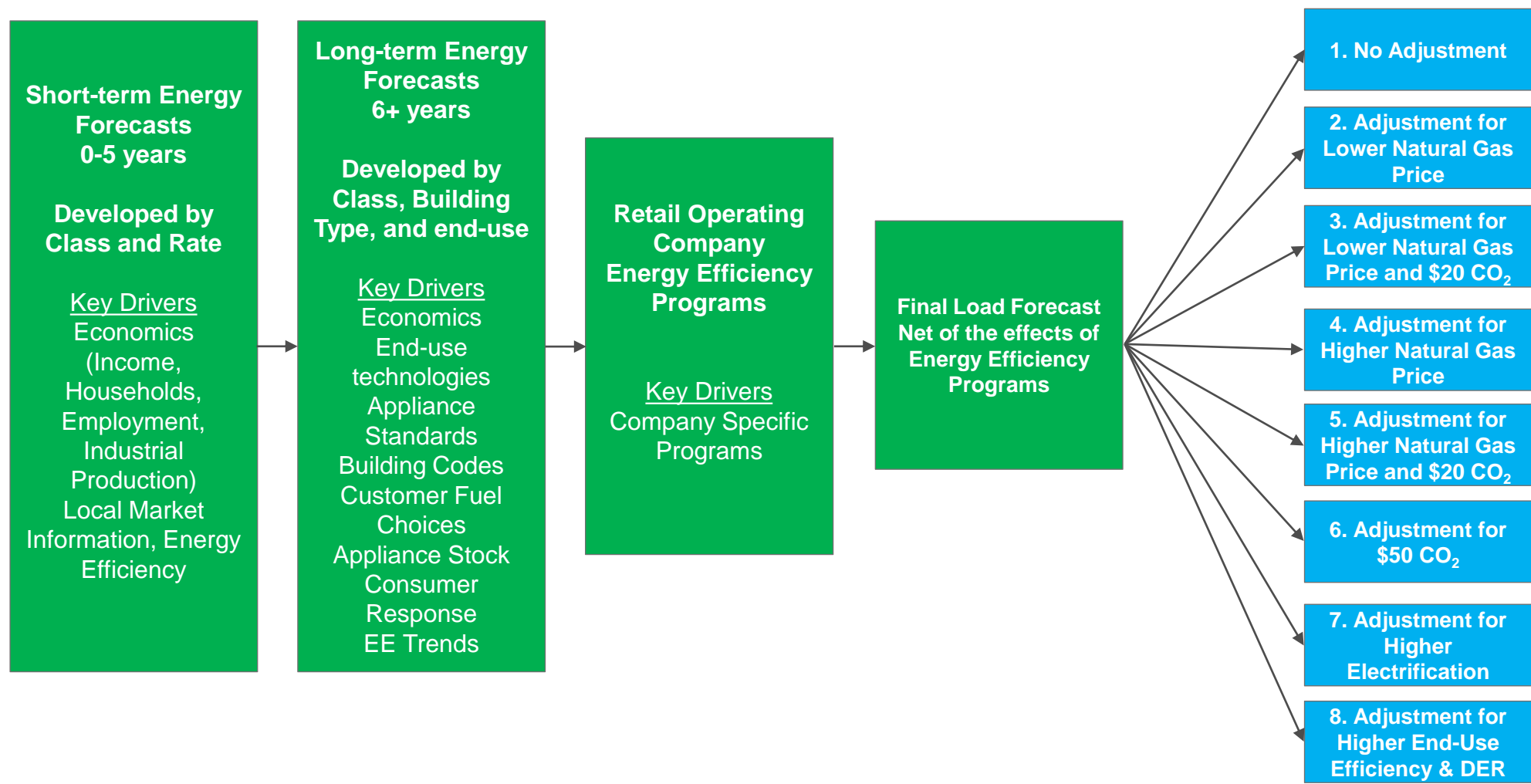
# 4 Views of Future Greenhouse Gas Pressure



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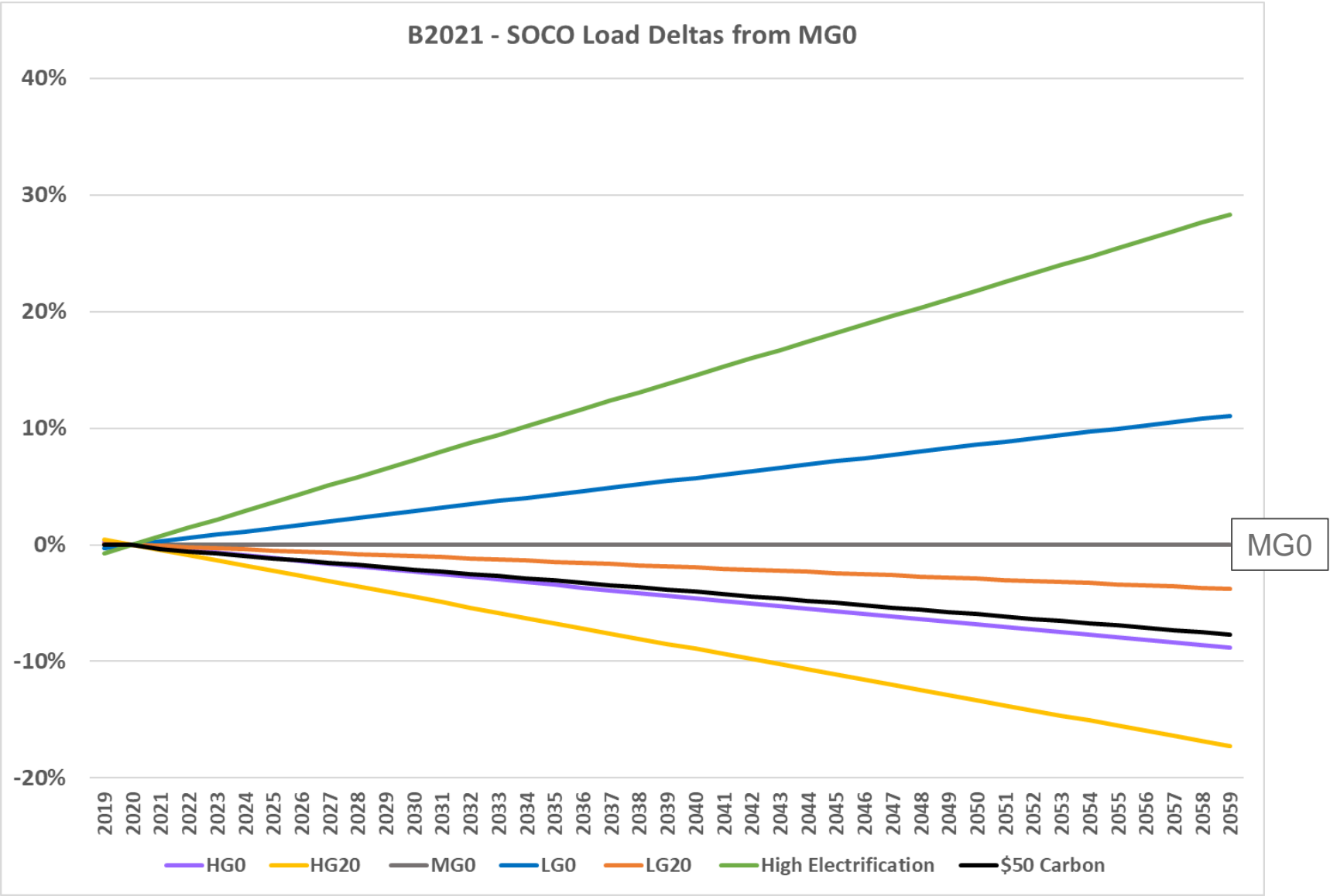


# 8 Views of Future Load Growth



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# 8 Views of Future Load Growth



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# Demand Side Management

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# Program Overview



- 2020 transition to 2021
  - Rule 29 Quick Start Programs - Demand Side Management Programs
- Diverse Program Offerings designed to promote efficiency and new technologies for Residential and Commercial Customers, including:
  - Residential Programs
    - SELECT Program
    - Behavioral Analysis Program
    - REEP Program
    - LED light bulb give-away
  - Commercial Programs
    - Commercial 100 Program
    - Commercial 500 Program
  - Education Programs
    - School Kits and Education Program

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# SELECT Program



- Customer Eligibility
  - Customers  $\leq$ 200% federal poverty guidelines
  - Targeting 80-100 homes/month
- Collateral Presentation and Discussion
  - MPC “Top 10 Energy Saving Tips and Energy Usage in Home”
  - 12 Energy Star LED bulbs
  - Blown-in fiberglass attic insulation up to R-38 if existing insulation level is R-19 or less



## 2021 Targets

Participants	Energy Saved (kWh)	Demand Saved (kW)	Total Program Budget
700	760,337	241	\$494,175



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# Behavioral Analysis Program



- Customer Eligibility
  - Approximately 45,000 randomly selected residential customers
- Program Offerings
  - Participants receive a customized Home Energy Report (HER) in the mail and/or an Electronic Home Energy Report (eHER)

## You have the power to save



### Welcome to the Home Energy Reports program

Based on how your home uses energy, Home Energy Reports can help you use less, save more, and improve your home.

You'll get customized reports and online tools that include:

- Insights into your energy use.
- Personalized tips for comfort and savings.
- Ways to track your progress.



Visit [mspo.opower.com](https://mspo.opower.com) to access your tools and more. Enjoy your first report!

## 2021 Targets

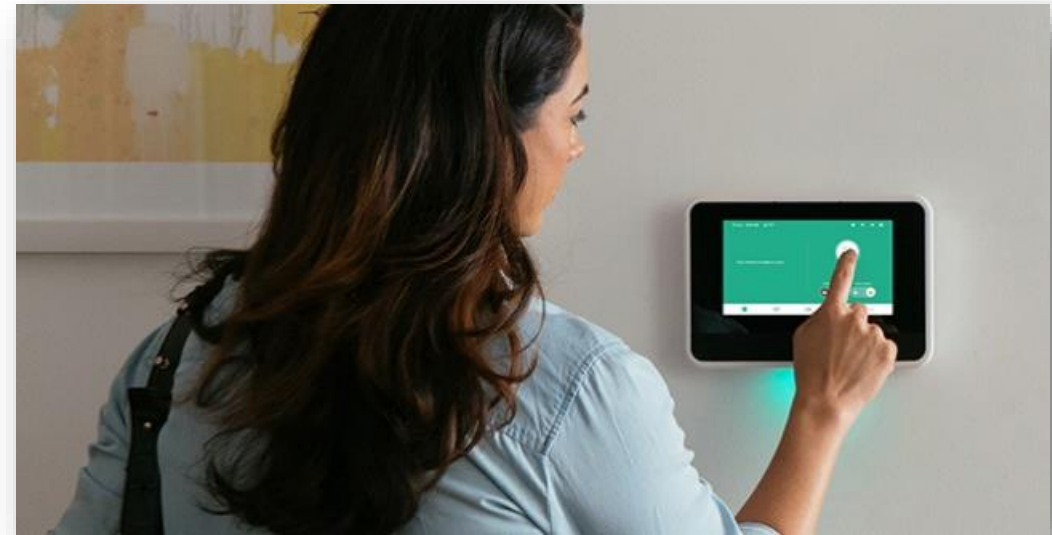
Participants	Energy Saved (kWh)	Demand Saved (kW)	Total Program Budget
46,750	7,486,059	1,649	\$308,987

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# REEP Program



- Customer Eligibility
  - Residential customers – Single Family through Fourplex homes
- Program Incentives for:
  - Air sealing
  - Duct sealing
  - HVAC replacement upgrade
  - Insulation (ceiling, floor, wall)
  - MPC premise observation audit
  - Mail-in rebates, *Energy Star*, if applicable
    - direct install measures



## 2021 Targets

Participants	Energy Saved (kWh)	Demand Saved (kW)	Total Program Budget
750	1,384,574	487	\$555,837

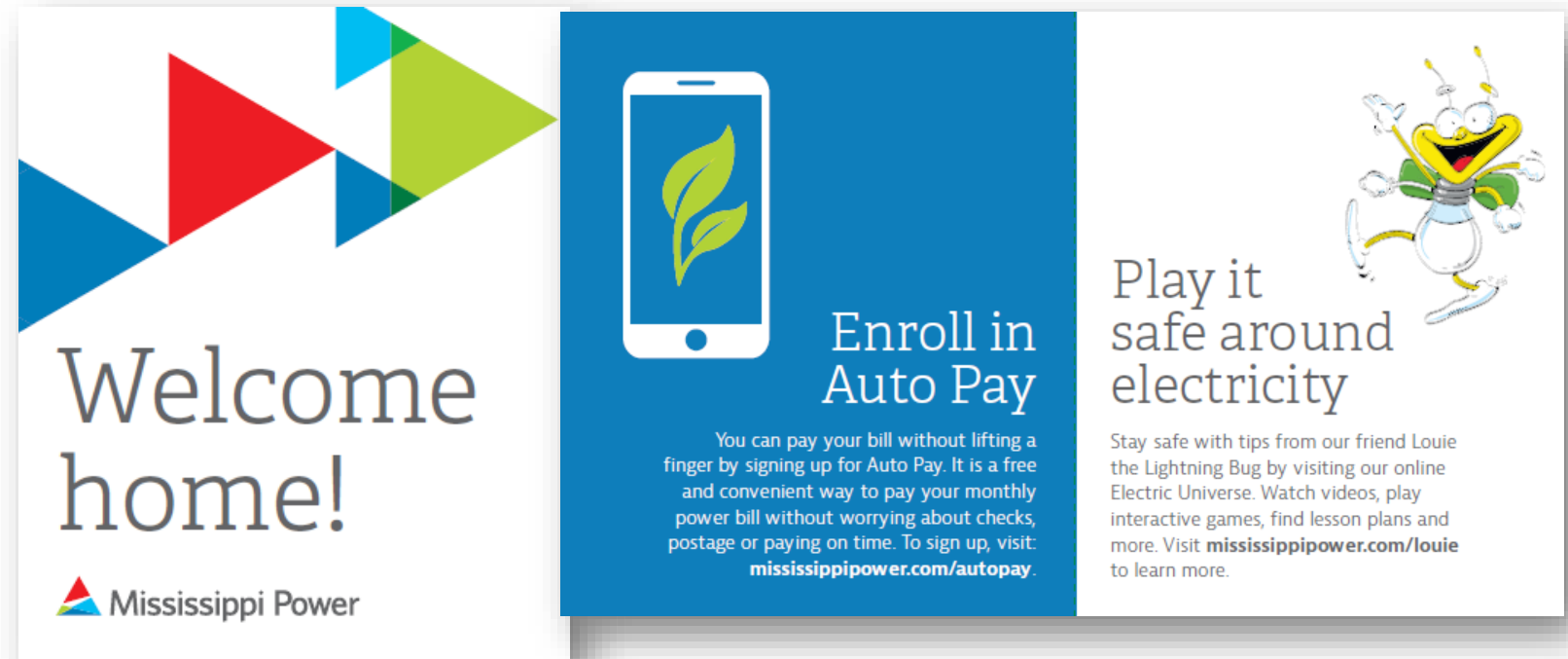


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# Welcome Kits Program – LED lightbulb distribution



- Customer Eligibility
  - New Customers
- Program Offerings
  - 6 Energy Star LED lightbulbs
  - 1 LED nightlight
  - Energy Efficiency tips



## 2021 Targets

Participants	Energy Saved (kWh)	Demand Saved (kW)	Total Program Budget
6,500	1,362,270	319	\$202,197



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# Commercial 100 Program



- Customer Eligibility
  - General Service rate customers  $\leq 100$  kW peak demand
- Incentive Cap
  - The program can pay up to 70% of the project cost
- Program Offerings (*typical*)
- LED Lighting, New and retrofits
  - Lighting Controls
  - Energy Star Smart Thermostats
  - Anti-Sweat Refrigerated Case Doors

## Before



## After



## 2021 Targets

Participants	Energy Saved (kWh)	Demand Saved (kW)	Total Program Budget
175	4,429,974	818	\$867,780

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# Commercial 500 Program



- Customer Eligibility
  - General Service rate customers with >100 kW peak demand
- Incentive Cap
  - Incentives are capped at \$30,000 per customer, per program year
- Program Offerings (*typical*)
  - LED Lighting, New and retrofits
  - Lighting Controls
  - HVAC Replacements
  - Energy Star Smart Thermostats
  - Tune-ups
  - Energy Star Refrigerators and Freezers
  - Anti-Sweat Refrigerated Case Doors
  - LED Cooler/Freezer Retrofit Lighting
  - Ceiling Insulation

## Before



## After



## 2021 Targets

Participants	Energy Saved (kWh)	Demand Saved (kW)	Total Program Budget
60	5,905,421	1,246	\$565,180

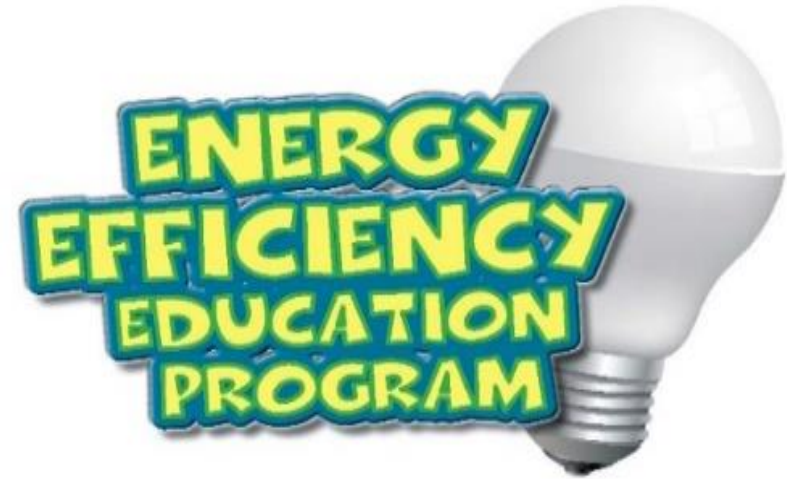


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# School Kits and Education Program



- Program Offerings
  - The program teaches students & families the importance of energy conservation
  - Presented to fourth and fifth-grade students who attend elementary and middle schools within Mississippi Power's service territory
  - \$250 mini-grants are awarded per grade level to schools with 75% or more participation by returning the energy worksheet
- Take home kits for students
  - Kits include:
    - 3 Energy Star LED light bulbs
    - 2 Shower timers
    - 1 Night light
    - 1 Room thermometer
    - 1 Home energy survey
    - 1 Parent/guardian participation card



## 2021 Targets

Participants	Energy Saved (kWh)	Demand Saved (kW)	Total Program Budget
3,759	567,302	167	\$210,569



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# Future Cost and Performance of Generating Technologies

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# Supply-side Technology Screening Process



## Identify Expansive Portfolio

- Generation
- Energy Storage
- Dozens of Technologies

## Preliminary Screening

- Technical Maturity
- Lead Times
- Environmental
- Safety & Health
- Availability
- Financial
- Other Uncertainties

## Secondary Screening

- Site Requirements
- Fuel Availability
- Further Environmental Attributes
- Detailed Cost Information
- Detailed Performance
- Scalability and Repeatability
- Levelized Cost of Energy

## Expansion Options

- Busbar Analysis
- Range of Capacity Factors
- Reliable Capacity Contributions

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# Future Technology Cost and Performance

The Options for Expansion Planning Analysis, 2 views

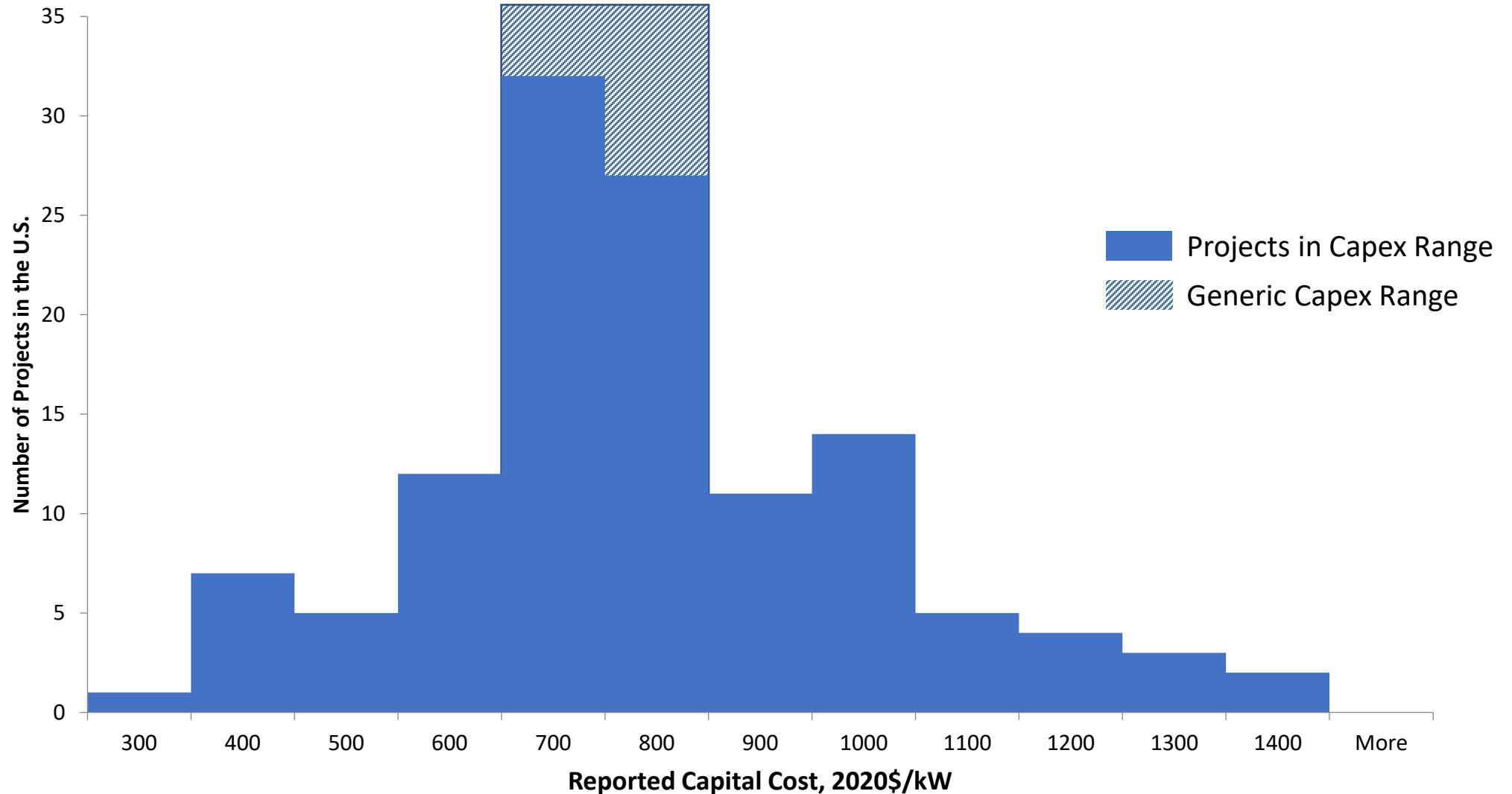


- **Standard View** – Costs from SCS Technology Application Standards
  - Natural Gas Combustion Turbine – SCR required beginning 2035
  - Natural Gas Combined Cycle – Carbon Capture required beginning in 2035 or 2040 depending on CO<sub>2</sub> view
  - Solar Photovoltaic
  - Battery
- **Lower Cost Low-CO<sub>2</sub> Technologies View** – Costs from SCS Technology Strategy Coordination Team
  - Commercialization path for Advanced Nuclear
  - Lower cost path for Solar PV
  - Lower cost path for Battery

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# Combined Cycle (CC)

## Distribution of Researched CC Project Capital Costs

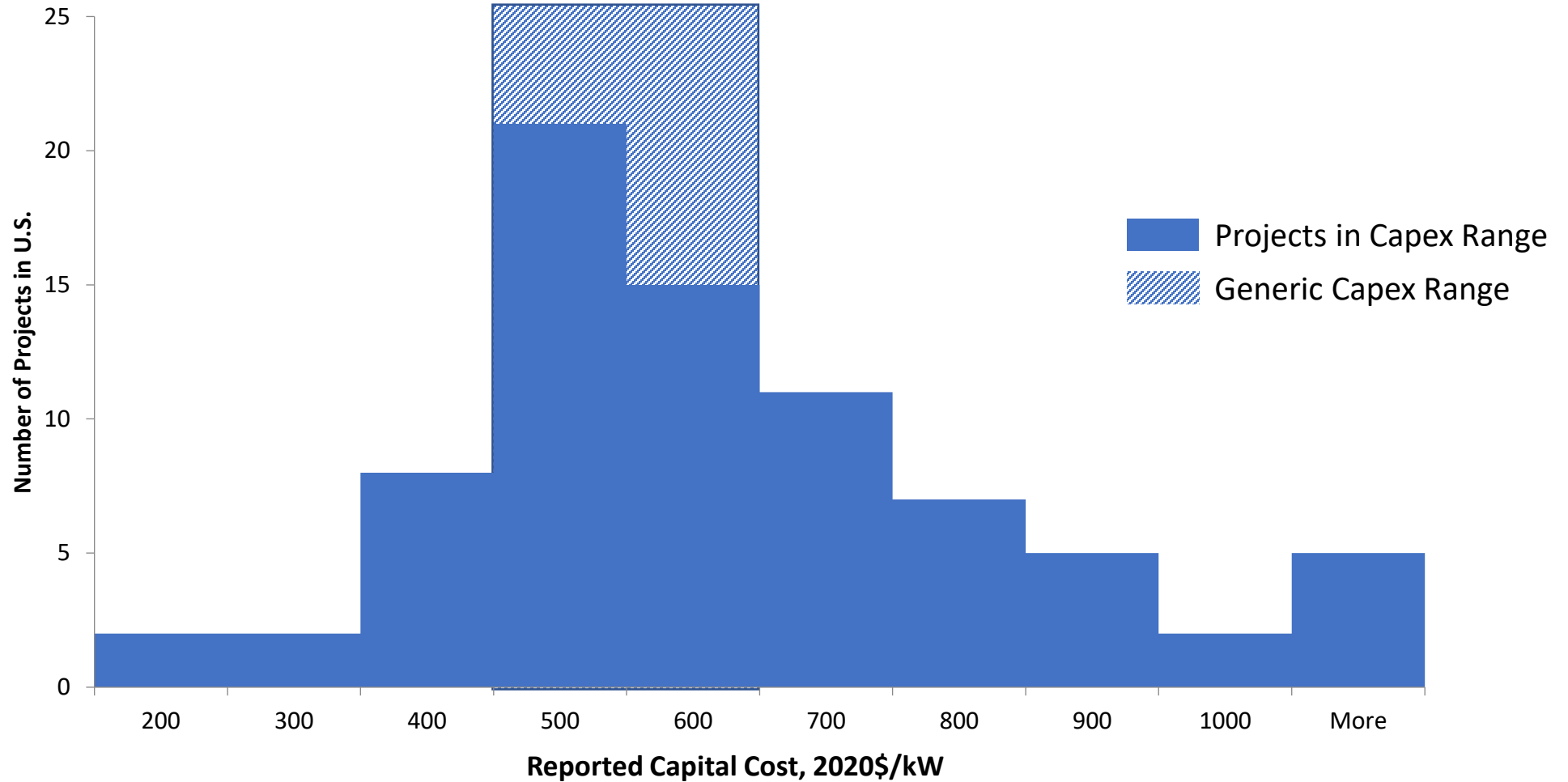


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# Combustion Turbines (CT)

## Distribution of Researched Simple Cycle CT Project Capital Costs

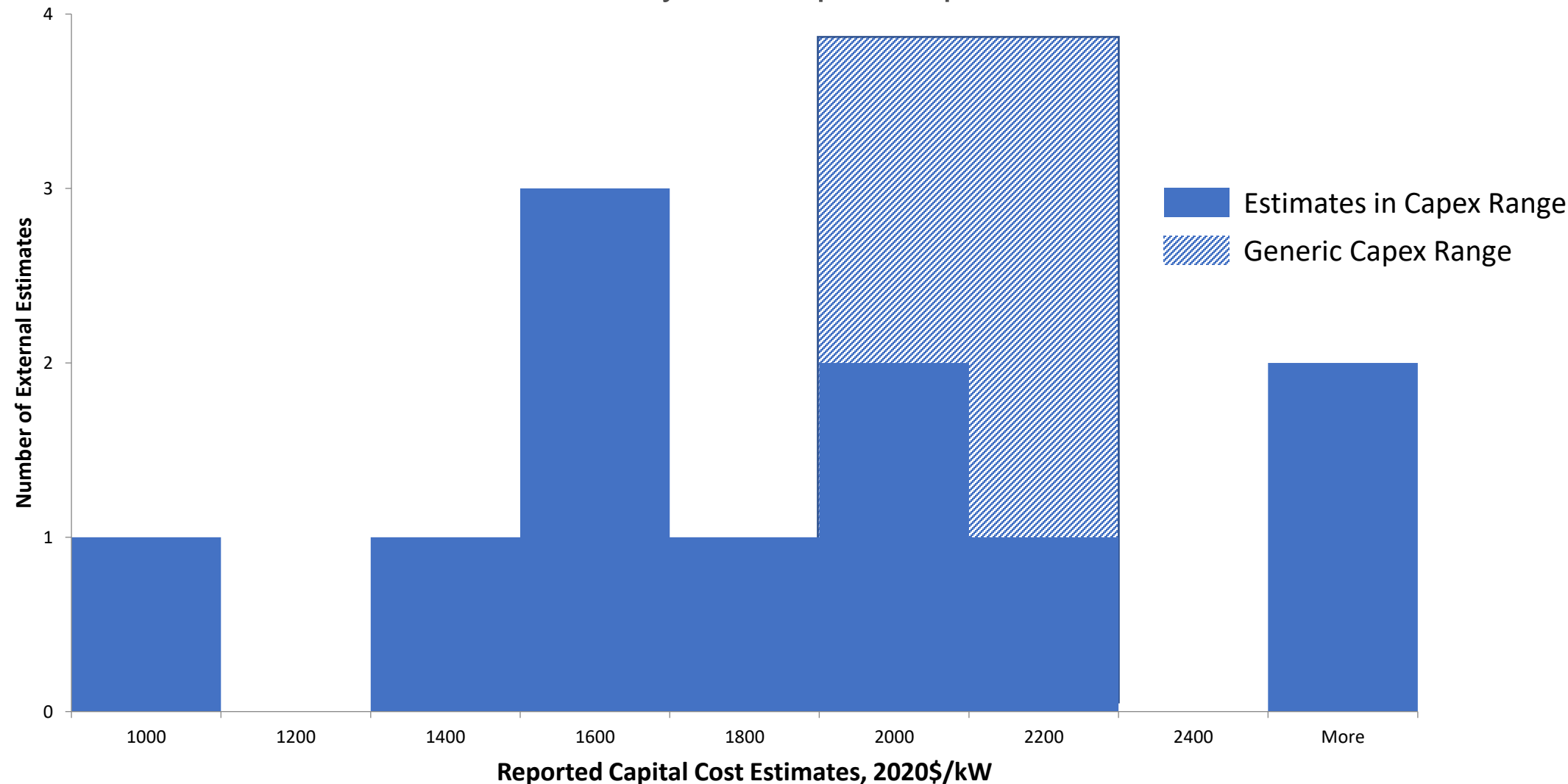


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# Battery Energy Storage Systems (BESS)

Distribution of Researched BESS Externally-Developed Capital Costs



\*All data points represent 4-hour BESS systems, i.e. for every 1 MW of power rating, energy rating equals 4 MWh.

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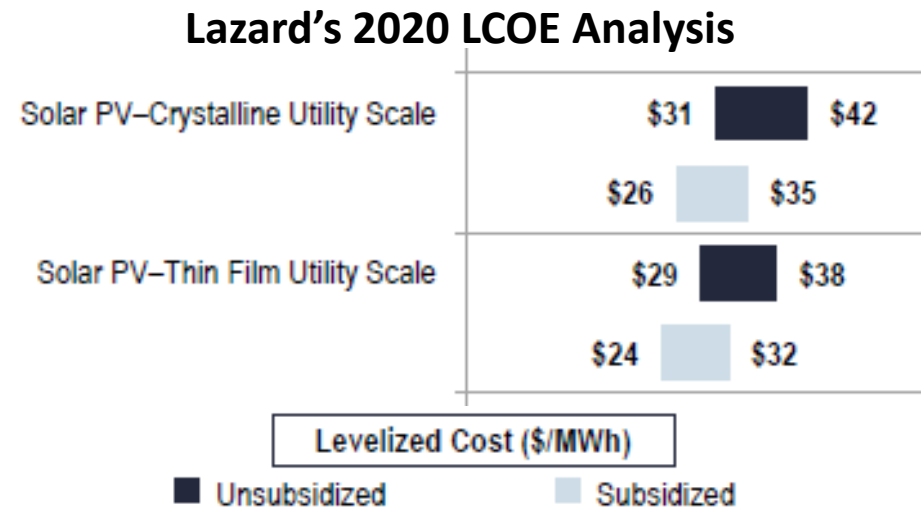
# Solar Photovoltaic

## Cost of Generic Utility Scale Solar PV for IRP Planning

### Prices selected based on market information available to the Company:

- \$25/MWh with 3% annual escalation assuming ITC sunsets as scheduled (equivalent to \$34/MWh levelized)
- \$20/MWh with 3% annual escalation assuming an extension of full ITC (equivalent to \$27/MWh levelized)

Prices are consistent with publicly available industry data\*:



\*<https://www.lazard.com/perspective/levelized-cost-of-energy-and-levelized-cost-of-storage-2020/>

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# Expansion Plan

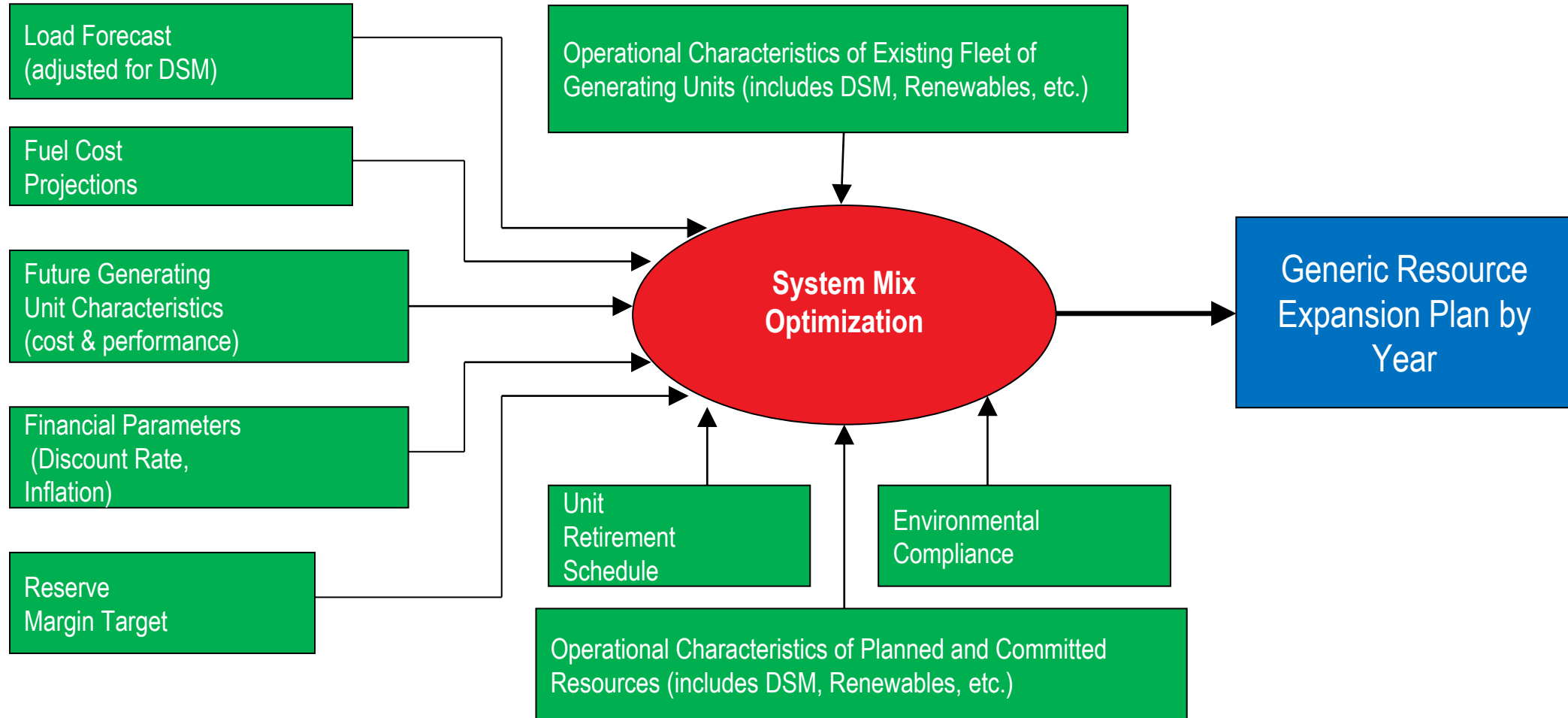
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# IRP Expansion Plan / Mix Study



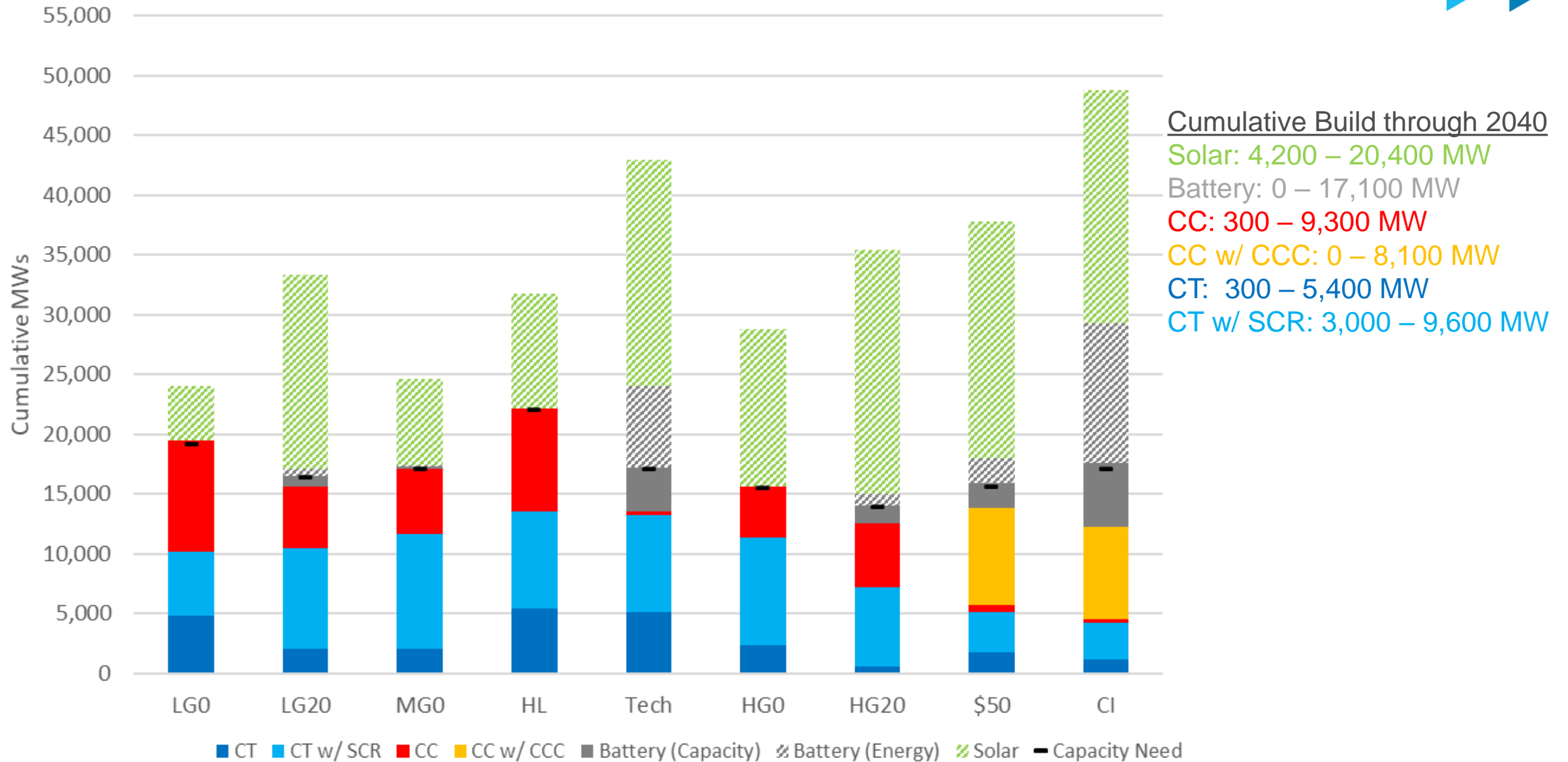
## Purpose:

To provide generation expansion plans for the retail operating companies to meet customers' energy and demand requirements with reliable service at the lowest practical cost



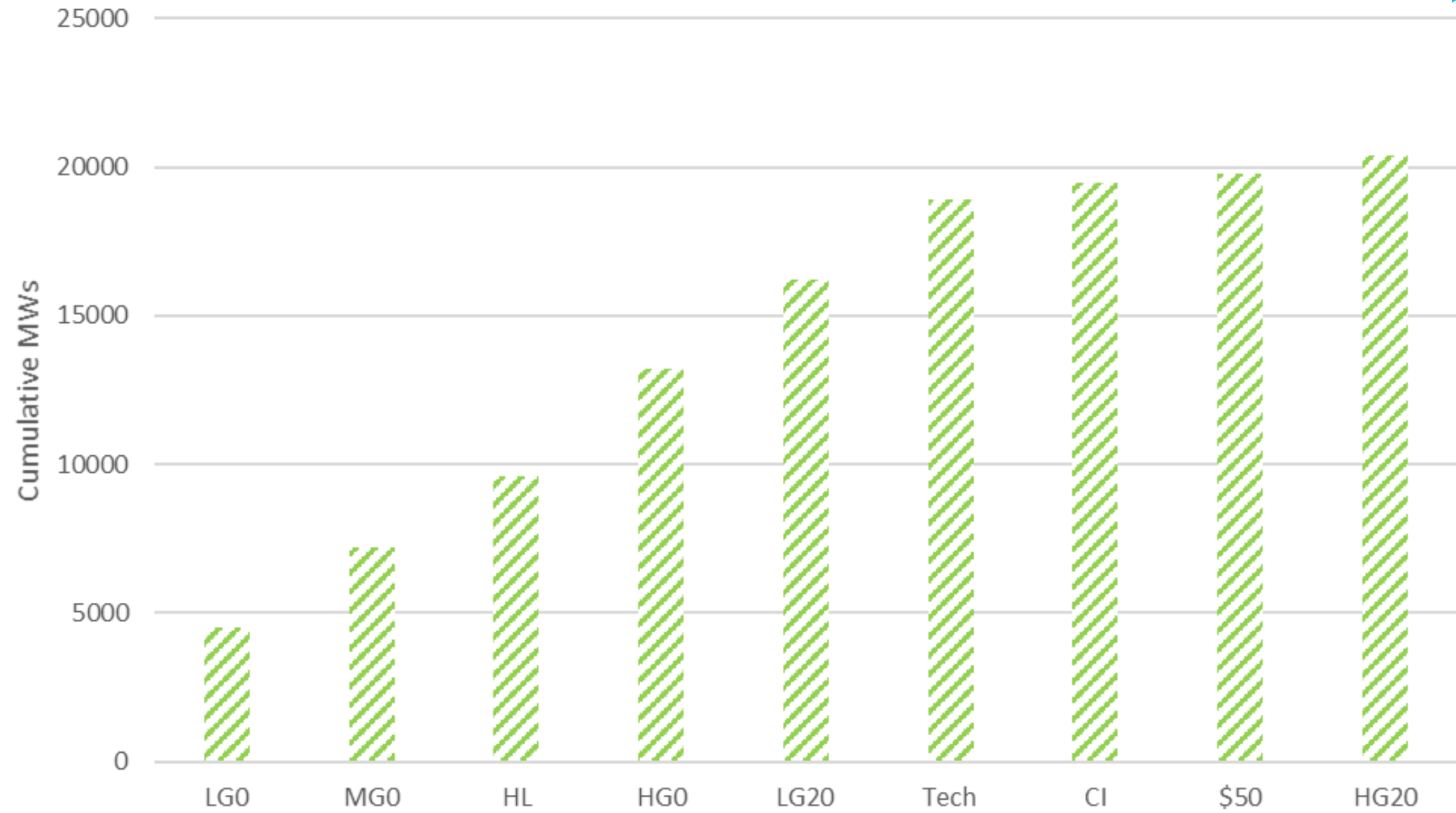
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# 2021 Southern Company System IRP – Cumulative MWs Through 2040



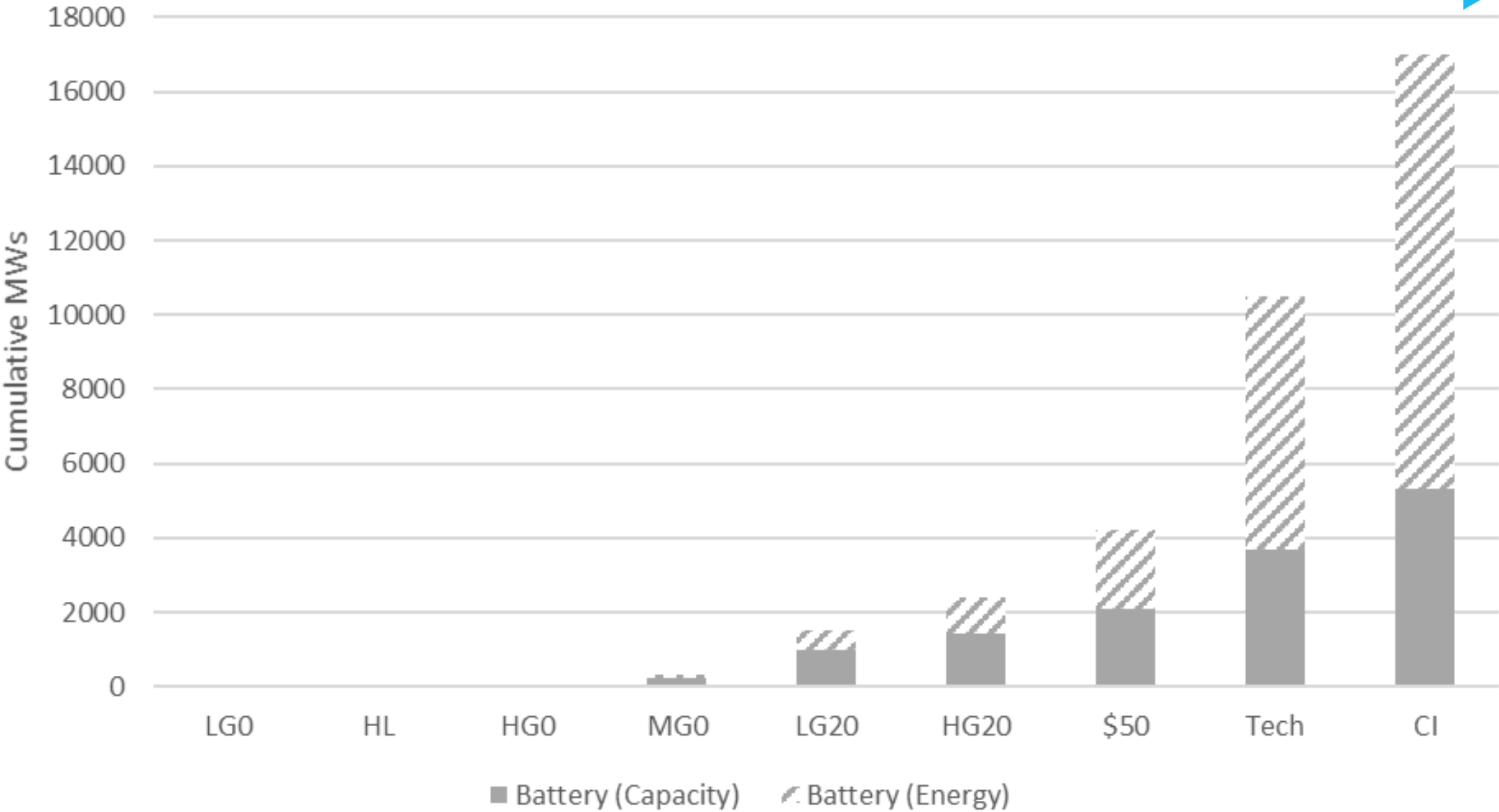
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# 2021 Southern Company System IRP – Cumulative Solar MWs Through 2040



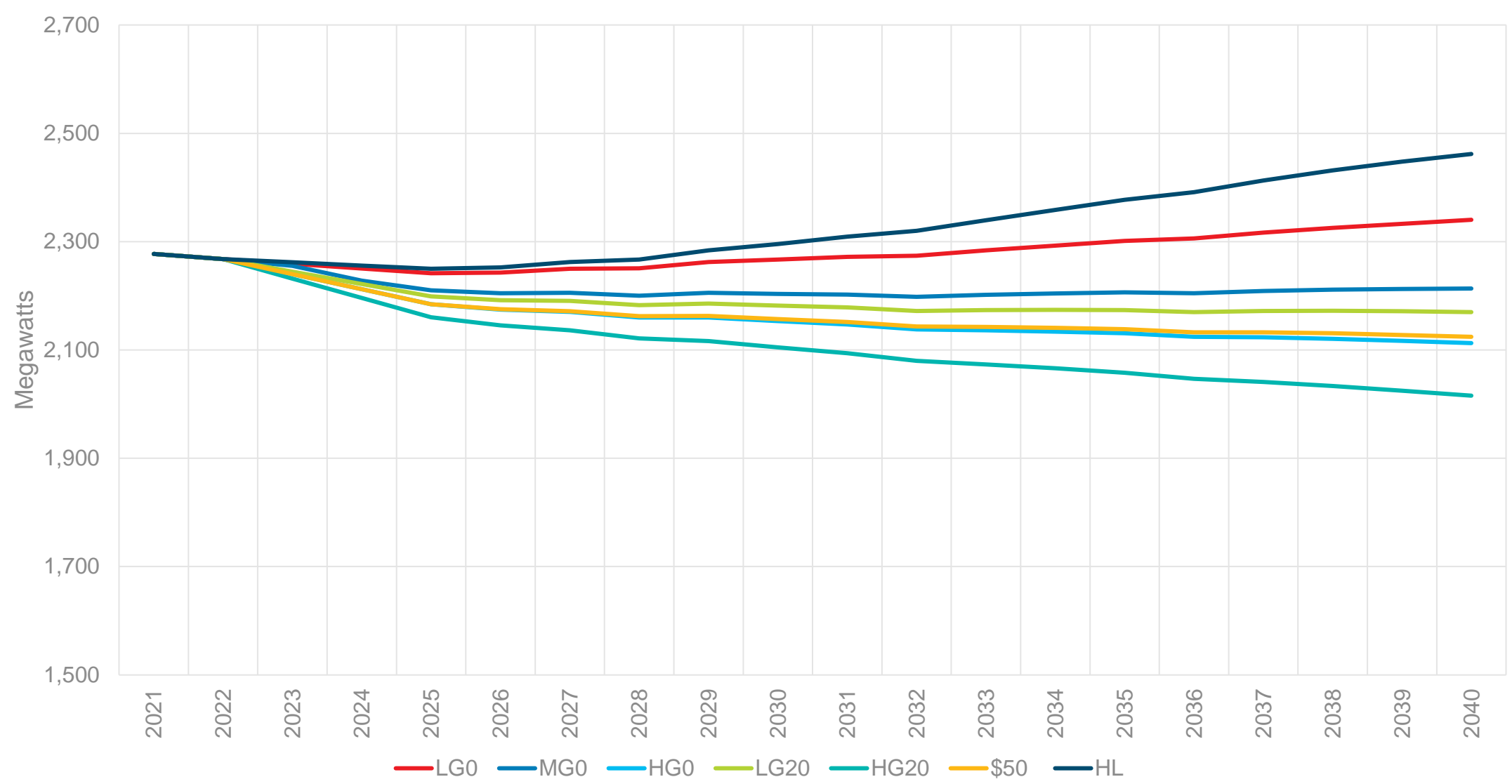
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# 2021 Southern Company System IRP – Cumulative Battery MWs Through 2040



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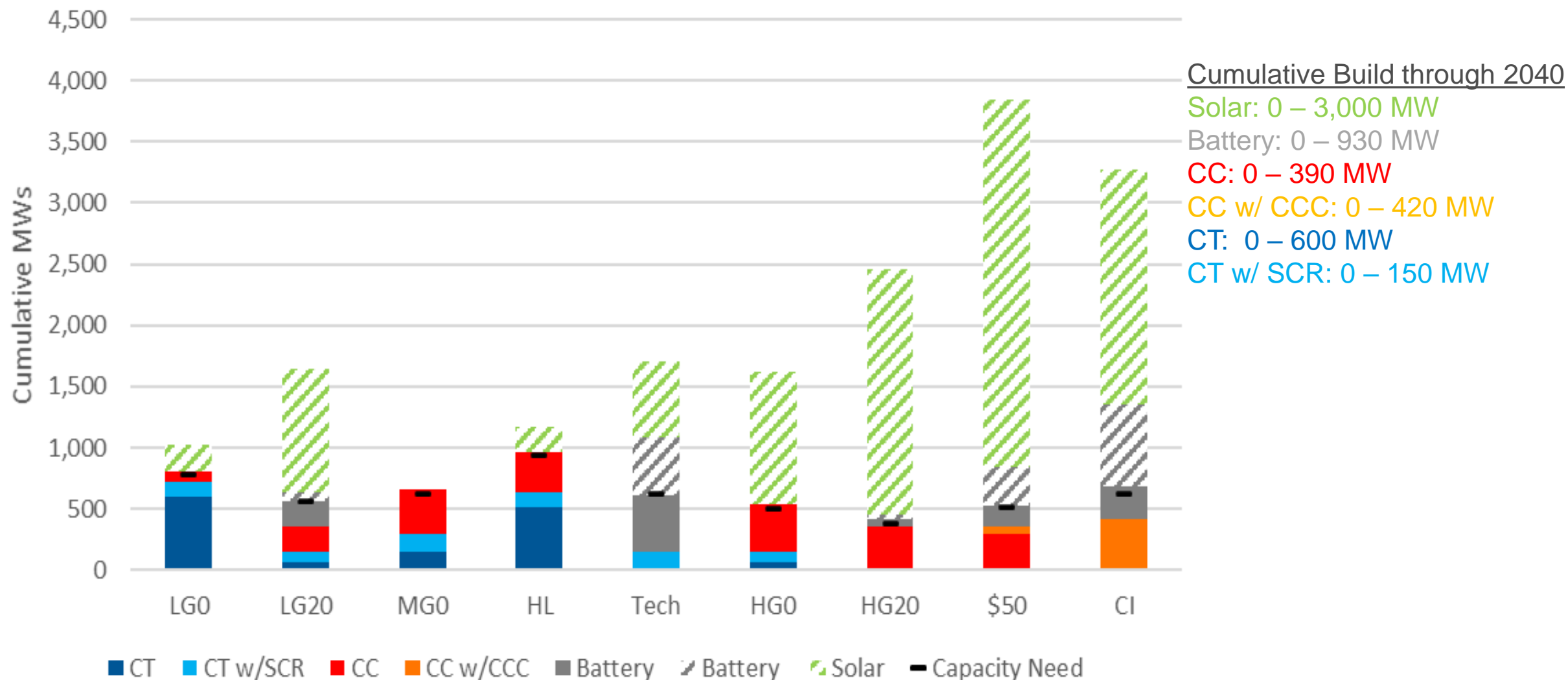
# MPC Load Forecast



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# MPC Cumulative Additions (2021-2040)



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# Questions / Comments

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IRP Technical Conference*

**Break**

*Conference will resume shortly.*

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