Responses to Questions/Comments from 9/15/2022 Rate Advisory Committee Meeting
Version: 10/17/2022

PROCESS-RELATED QUESTIONS

1. Portfolio decisions should be focused on actions that CPS Energy could take in the near term. How does the generation planning process enable RAC to make decisions for near-term actions?
   - The generation planning process is focused on providing information that enables RAC members to make recommendations on *near-term* actions. Since near-term actions have long-term consequences, resource planning analysis usually entails 20-30-year time horizons across a range of uncertain factors. Key metrics have been refined to show near-term impacts along with major long-term considerations.
   - The portfolio analysis will generate nine candidate portfolios. Each portfolio provides information on when existing power plants are retired and when new capacity (which type and how much) is added. This information is provided with annual granularity from 2025 to 2048. From the nine candidate portfolios, RAC members will be able to compare and contrast different capacity retirement and addition decisions over the study period, and near-term portfolio changes will receive the most focus.
2. How will the results from the Dot Plot exercise on the priorities of different planning objectives be used as part of the generation planning process?
   - The Dot Plot exercise has two purposes. Firstly, it is intended to identify areas of consensus regarding RAC member planning objective priorities. Secondly, it can be used by RAC members to inform the selection of the preferred resource portfolio. For example, the RAC may decide to give additional importance to top-scoring objectives when evaluating portfolio tradeoffs.

OBJECTIVE AND METRIC-RELATED QUESTIONS

3. Environmental sustainability and climate resiliency objectives have different focus. They should be reported separately.
   - We agree. Climate resiliency will be merged with the system reliability objective. Metrics for climate resiliency will include revenue requirements under extreme weather conditions and market purchases under extreme weather conditions (see Question #12 below on the definition of extreme weather).
   - While we recognize that climate resiliency also requires considerations for the resiliency of transmission and distribution networks to weather events, this is beyond the scope of this exercise which focuses on generation planning.
4. What are the thresholds for financial metrics under the CPS Energy financial stability objective? Shouldn't all portfolios be designed to keep CPS Energy financially stable?
   - CPS Energy will evaluate the bill impact and revenue requirement metrics such that the revenues are sufficient for CPS Energy to maintain financial metrics (i.e. Adjusted Debt Coverage Ratio, Debt / Capitalization, and Days Cash on Hand) at the required level to maintain financial sustainability.
   - Since maintaining financial sustainability is a "going-in" assumption, the performance under the CPS Energy financial stability objective will be similar across all portfolios. Therefore, we can remove this objective from the scorecard in response to RAC guidance.
5. What is the scope of carbon emissions considered under the Environmental Sustainability planning objective?
   - Carbon emissions include direction emissions from the CPS Energy generation fleet.
6. How does CPS Energy consider the impact on low-income customers?
   - The bill impact on low-income customers is a rate design objective. This topic will be covered during the upcoming rate design discussions after the generation planning exercise is completed.

7. What expenditures are included in the revenue requirement metric?

   - Revenue requirements are intended to capture the all-in costs associated with providing generation service to customers. They include fuel purchase costs, emission costs, fixed and variable operation and maintenance costs, capital recovery for capital expenditures, financing costs, and net wholesale market purchases of electricity. Net wholesale market purchases combine wholesale purchases (a positive number) and wholesale sales (a negative number) and net purchases can be negative if sales are greater than purchases.

8. Can CPS Energy also report emissions of other pollutants?

   - The core scorecard metric will be focused on CO_2 emissions. Emissions of Nitrogen Oxides and Sulfur Oxides associated with each portfolio will be reported in an appendix.

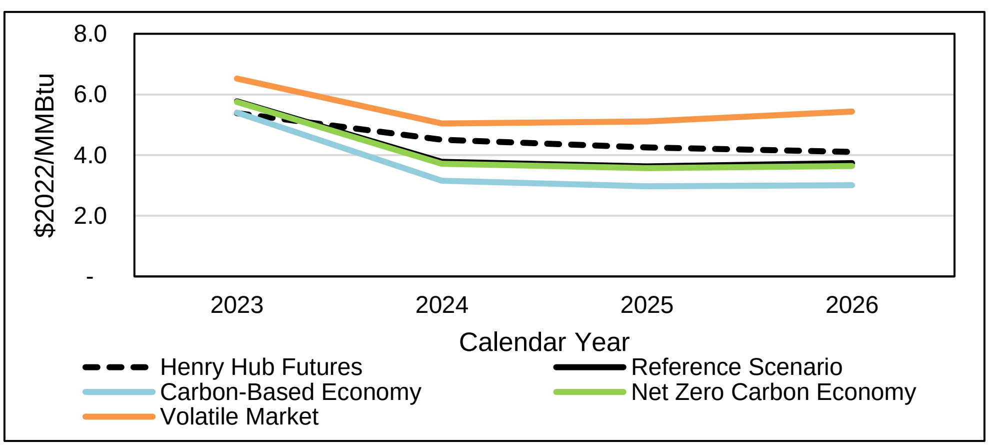
9. Can CPS Energy add energy efficiency to the pie chart metric?

   - Energy efficiency will be added as a resource type in the pie chart metrics summary. Energy Efficiency is a “fifth-fuel” in the portfolio beyond coal, natural gas, nuclear and renewables. Energy efficiency saves on emissions and overall costs for customers by reducing the amount of new generation required to serve customer load.

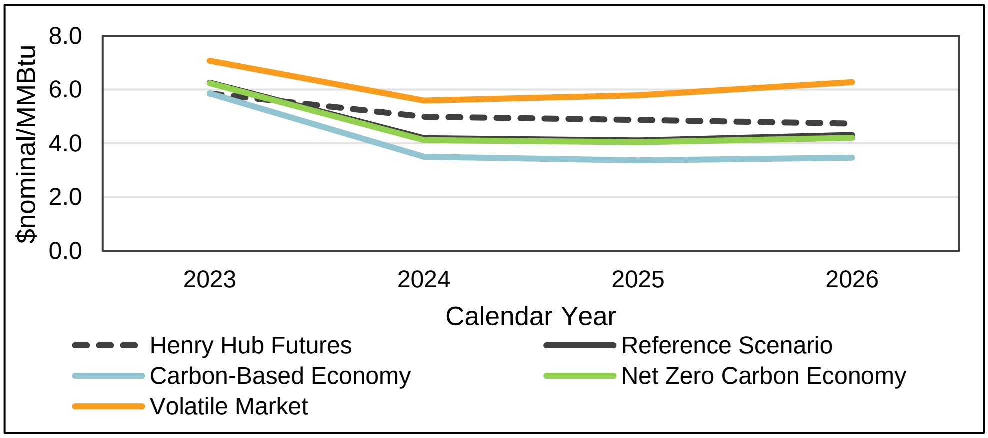
SCENARIO-RELATED QUESTIONS

10. The natural gas price scenarios appear out of line with the market fundamentals, given the situation in Europe.

    - Scenarios are used as a tool to evaluate the risk profiles of each portfolio. They are meant to cover a broad but possible range of future outcomes.
    - Recent Henry Hub gas prices have been volatile due to domestic as well as international developments. While European gas prices remain elevated (in the $45 to $100/mmBtu (U.S dollars) range over Q3/2022 based on NYMEX Dutch TTF), US LNG export capacity is limited.
    - This leads to a divergence between US domestic gas prices and European gas prices. Indeed, CME Henry Hub Futures are trading at $5.4/MMBtu (2022 dollars) for 2023 delivery, $4.5/MMBtu for 2024, and $4.3/MMBtu for 2025 (see chart below). These prices are within the range of natural gas prices being used across the CPS Energy scenarios.



- The chart below shows the same information, but expressed in nominal dollars.



11. How does CPS Energy account for the impact of potentially high levels of electrification across its service territory?
    - High electrification is considered as part of the Net Zero Economy Scenario.
    - The scenario considers near universal electrification of heating in residential and commercial buildings, as well as near universal adoption of electric vehicles by 2050. This results in approximately 20% higher electricity demand in 2050 relative to the Reference Scenario.
12. How does CPS Energy consider the impact of extreme weather events?
    - CPS Energy is developing extreme weather sensitivities for extreme winter storms as well as extreme summer heat waves.
    - The extreme winter storm is modeled after 2021 Winter Storm Uri. The extreme summer heat wave is modeled after the 2011 Texas heat wave.
    - The sensitivities will evaluate how the portfolios would perform under electricity demand, natural gas prices, and renewable generation profiles similar to those observed during the two weather events.
13. How does CPS Energy consider potential future changes to the ERCOT market design? How are the findings from the State Energy Plan Advisory Committee September 2022 report incorporated?
    - Potential future changes to the ERCOT market design are analyzed in the Net Zero Economy scenario by assuming an introduction of a capacity market within ERCOT.
    - Led by the Government Relations, Regulatory Affairs, & Public Policy team, CPS Energy actively engages in legislative and regulatory policymaking processes that could impact our utility and our generation planning. Specific to the current market design proposals, the Public Utility Commission (PUC) is working with an outside consulting firm to measure the impacts and develop recommendations for the PUC to consider. We are expecting a report on market design proposals to be published in early November and the PUC may elect to defer action to the legislature based on the recommendations in the report, especially if they require legislative changes. Once approved, the market redesign is likely to have an implementation period of between 1 to 3 years, based on the complexity of the new market mechanisms being created.
    - Regarding the State Energy Plan Advisory Committee Report, that committee is one of a handful of entities tasked by the 87th Legislature with reviewing the electric and natural gas markets and providing recommendations for future legislative or regulatory action. This work is in addition to the relevant Senate and House committees of jurisdiction, as well as the Sunset Advisory Commission, which is currently undertaking a comprehensive assessment of the PUC and ERCOT and their respective functions. The 88th Legislature will take all the recommendations made by these various entities under advisement when contemplating bills to file in the next legislative session, which will

take place in the January to May 2023 timeframe. Should the legislature decide to pass any bills that impact CPS Energy's generation plan, they will likely not take effect until September 2023, at which time they will then need to go through a rulemaking/implementation process at the PUC and/or ERCOT, which could take an additional several months.

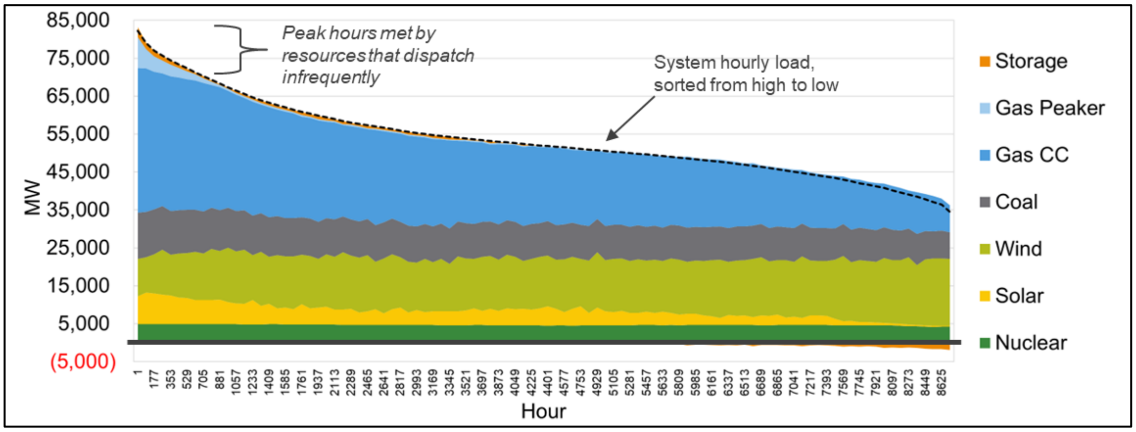
14. How does the generation planning process consider energy efficiency as an option to defer investments in new generation capacity?
    - CPS Energy recognizes the role of energy efficiency and conservation in meeting future energy demand and reducing bills for our customers.
    - As the baseline, the level of expected energy savings from the recently approved Sustainable Tomorrow Energy Plan (STEP) is embedded in the CPS Energy electricity demand forecast, which is used to develop the nine generation portfolios.
    - In addition, CPS Energy is developing two portfolio sensitivities to test the impact of an expanded STEP program and a scaled back STEP program on bill impact for customers. The results will provide additional information to RAC members to evaluate the role of energy efficiency and conservation in CPS Energy's resource portfolio.
15. How are distributed-level resources considered in the planning process? Does the behind-the-meter rooftop solar adoption amount change in the expanded STEP sensitivity assumption as compared to the Reference Portfolio assumption?
    - Distributed solar resources may be behind-the-meter or on the utility-side of the meter. CPS Energy updates the customer demand forecast yearly to adjust for behind-the-meter distributed generation resources such as solar photovoltaics. CPS Energy also updates the generation resource plan yearly to account for utility-side-of-the-meter generation distributed-level resources such as community solar.
    - While solar rebate incentives are phasing out of the STEP program, the future growth of behind-the-meter solar is assumed to be on a non-rebate basis. The growth of behind-the-meter solar adoption is assumed to continue and to be the same in the expanded STEP sensitivity and the Reference Portfolio.

DATA REPORTING-RELATED QUESTIONS

16. On the technology cost charts – add "Installed Cost" label.
    - Appendix A includes the same slides from the September RAC meeting with updated "Installed Cost" labeling
17. Could CPS Energy provide a comparison of generation cost across different technologies on a levelized cost of electricity (LCOE) basis?
    - Please see Appendix B for the requested information
18. Report on projected firm capacity in ERCOT over peak demand
    - Please see Appendix C for the requested information
19. Report on the amount of land required for solar and wind
    - We will use public sources that provide "rules of thumb" regarding the number of acres per MW generally required for solar and wind and will report this in backup data summaries (not the main scorecard).
20. Report rate vs fuel adjustment separately
    - Incremental base, fuel, and total bill impacts by rate group will be provided at a later date.
21. Report on financial ratios when not in compliance
    - Please see Appendix D for the requested information

22. Report on the utilization of various generation resources across CPS Energy's portfolio

- Given the fact that demand for electricity varies widely across seasons, within days, and hourly; and given current limitations on storing electricity at large scale, power systems will naturally be made up of generation resources with different energy utilization factors (or capacity factors). Intermittent resources with low variable costs (wind and solar) will run when available, while other controllable resource types will be called as needed in order of their variable cost of production. See 2025 ERCOT-wide graphic below for an illustration.



- Generation resource planning analysis aims to develop portfolios that can serve demand at all times, while balancing costs and other objectives. CPS Energy will report utilization factors for different resources within the portfolios as the analysis is completed.
- See Appendix E for an updated explanation on generation utilization.

APPENDICIES:

APPENDIX A: ERCOT SCENARIOS – KEY INPUTS & RESULTS

APPENDIX B: LEVELIZED COST OF ELECTRICITY

APPENDIX C: PROJECTED FIRM CAPACITY IN ERCOT OVER PEAK DEMAND

APPENDIX D: FINANCIAL METRICS SLIDE THAT SHOWS TARGET AND RATING AGENCY THRESHOLDS

APPENDIX E: GENERATION UTILIZATION UPDATE

APPENDIX A:

ERCOT SCENARIOS – KEY INPUTS & RESULTS

Scenarios vs. CPS Energy Portfolios

Scenarios and portfolios are two distinct concepts. Scenarios are **external** factors, while **portfolios** are CPS Energy decisions

Focus of this section

Demand

Carbon Prices

Commodity Prices

Technology Costs

Scenarios

Future states of the world independent of CPS Energy resource decisions

- Reflect diverse, but possible, futures
- Include multiple linked and correlated key variables
- Independent of resources and resource plans

Level/type of new capacity

Capacity retirements

Timing of new capacity

Demand-side programs

Portfolios

CPS Energy plans to meet customer requirements in the future

- A combination of decisions taken by CPS Energy to meet the challenges posed by the scenario or address other objectives
- Typically include decisions on new resources and retirements

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ERCOT Scenarios

CRA developed 4 ERCOT scenarios, which are designed to reflect diverse but possible future states of the world

ERCOT Scenario	Narrative
Reference Scenario (REF)	• Continuation of historical trends in demand growth, technological developments
Carbon-Based Economy (CBE)	• Reduced environmental regulations and no federal or state-level carbon limits
Net Zero Carbon Economy (NZE)	• Federal or state-level economy-wide net zero carbon targets by 2045
Volatile Market (VMA)	• Geopolitical concerns drive policy decision-making

Key sources of uncertainty to incorporate into analysis.

- Natural Gas Prices
- Carbon Policies
- Technology Costs
- Demand Growth
- Market Design

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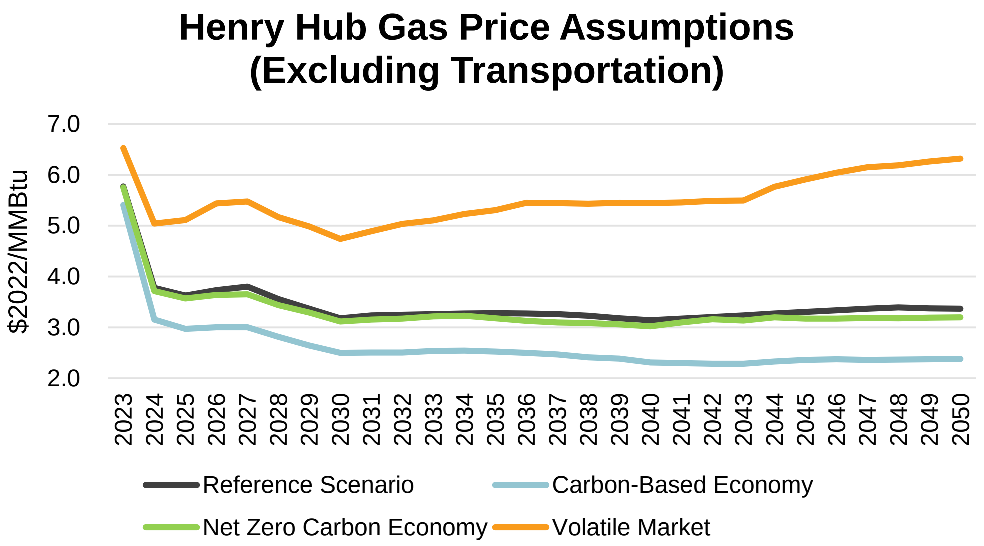
Key ERCOT Scenario Input Variables

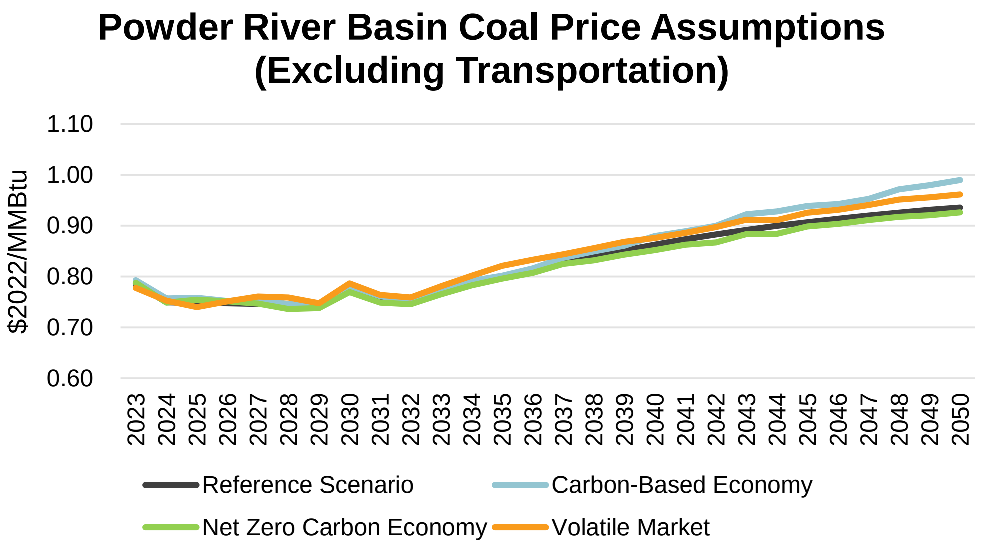
Each scenario comprises a combination of five input variables whose levels vary across the scenarios as shown below

ERCOT Scenario	Natural Gas Prices	Carbon Policies	Technology Costs	Demand Growth	ERCOT Market Design Change
Reference Scenario (REF)	Baseline	Baseline carbon price	Baseline	Baseline	Confirmed changes only
Carbon-Based Economy (CBE)	Low due to production increases	No carbon price	Baseline	High demand driven by low fuel and carbon prices	Confirmed changes only
Net Zero Carbon Economy (NZE)	Low due to electrification drive	High carbon price	Fast decline + Inflation Reduction Act Tax Credits*	High demand driven by electrification	Capacity market launched & seasonal reserve margins
Volatile Market (VMA)	High	No carbon price to alleviate inflation pressure	Slow decline + Inflation Reduction Act Tax Credits*	Low demand due to high natural gas prices	Confirmed changes only

**Note that all CPS Energy portfolio analysis will incorporate IRA tax credit provisions*

Fuel Price Scenarios

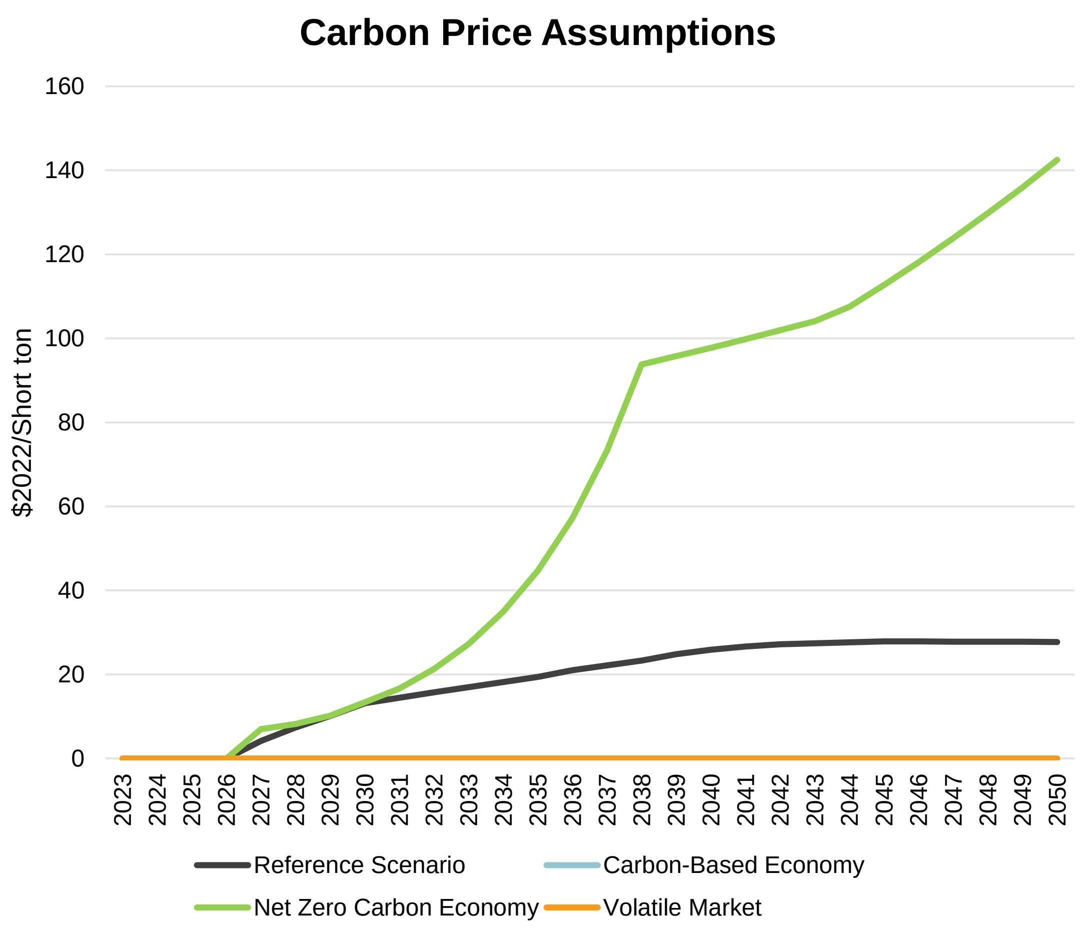




- Henry Hub gas price assumptions in 2050 across all scenarios range from $2.4/MMBtu to $6.3/MMBtu (**in today's real dollars**)
- The upper end is consistent with the level in Q2 of 2022, driven by geopolitical conflicts and high exports to Europe
- The lower end is consistent with the level observed in 2020 during the outset of the COVID-19 crisis.

- Powder River Basin ("PRB") price assumptions increase over time in all scenarios, reflecting rising marginal cost of production
- Historical PRB prices have had limited volatility, resulting in forecasts that are in a relatively tighter range compared to gas price forecasts

Carbon Policy Scenarios



- Carbon price assumptions in 2050 across all scenarios range from $0/ton to $142/ton of carbon dioxide emissions
- The $142/ton assumed for the Net Zero Economy (NZE) scenario in 2050 is consistent with the studies reviewed by CRA, which generally estimate carbon prices exceeding $140 per ton with sharp increases between 2045 and 2050 in order to reduce carbon emissions to a level that limits global temperature increase to 1.5 degrees Celsius

Technology Cost Scenarios

Technology cost assumptions were developed based on a combination of third-party sources and near-term market data

ERCOT Scenario	Level of Technology Costs Assumed for the Scenario
Reference Scenario (REF)	Baseline
Carbon-Based Economy (CBE)	Baseline
Net Zero Carbon Economy (NZE)	Fast decline
Volatile Market (VMA)	Slow decline

- Generation technologies are split into two categories: currently available technology (“CAT”) and advanced emerging technology (“AET”)
- CATs include wind, solar, battery storage (2, 4, and 8-hour durations), paired solar and storage, gas combined cycles, reciprocating internal combustion engines (“RICE”), and enhanced geothermal system
  - CRA sources CAT technology costs and performance assumptions for 2022 from EIA AEO 2022, other public sources for current technology and PPA prices, and CPS Energy market intelligence. CRA then applies technology cost and performance improvement rates that vary by scenario based on publicly available sources
- AETs include small modular nuclear (“SMR”), emerging long duration storage technologies (compressed air, flow battery, and pumped thermal), and hydrogen fuel use in turbines
  - CRA collates projections of AET technology costs and performance from various third-party sources. CRA then forms central, low, and high estimates of AET technology costs based on the data collected. AET technologies are generally not available for selection until at least 2030, reflecting current level of technology maturity

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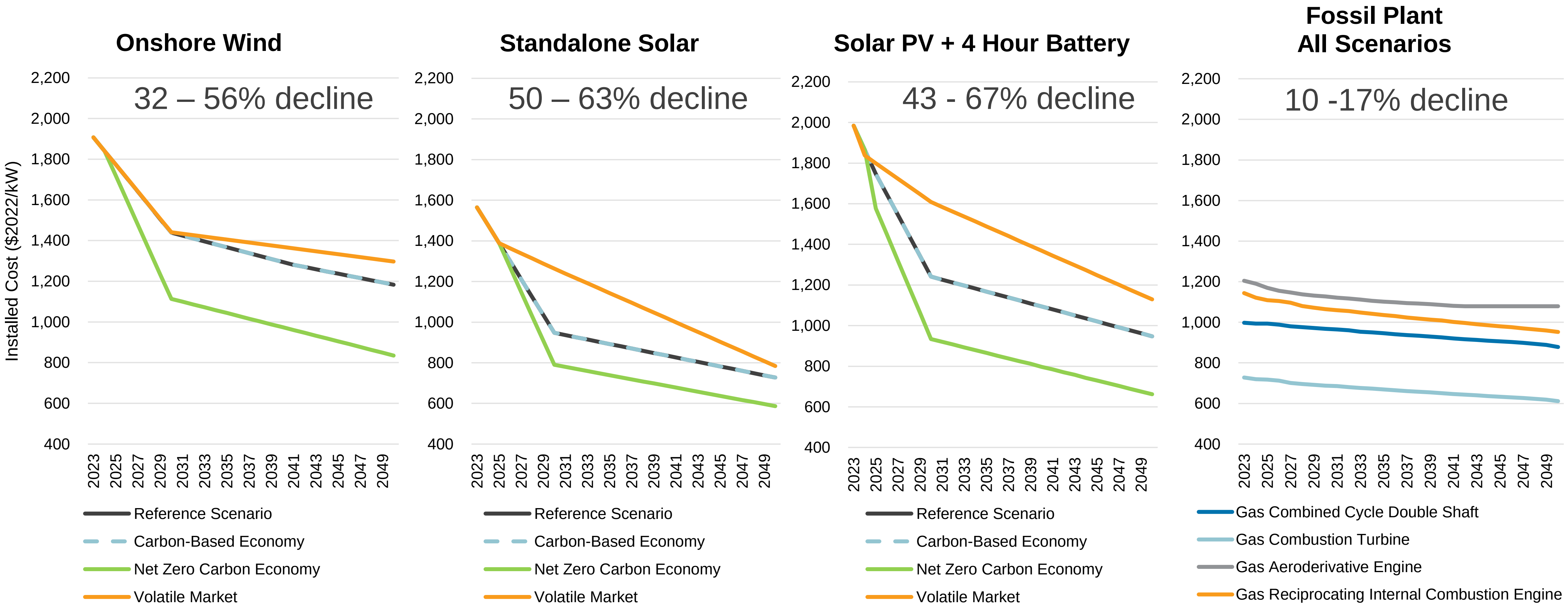
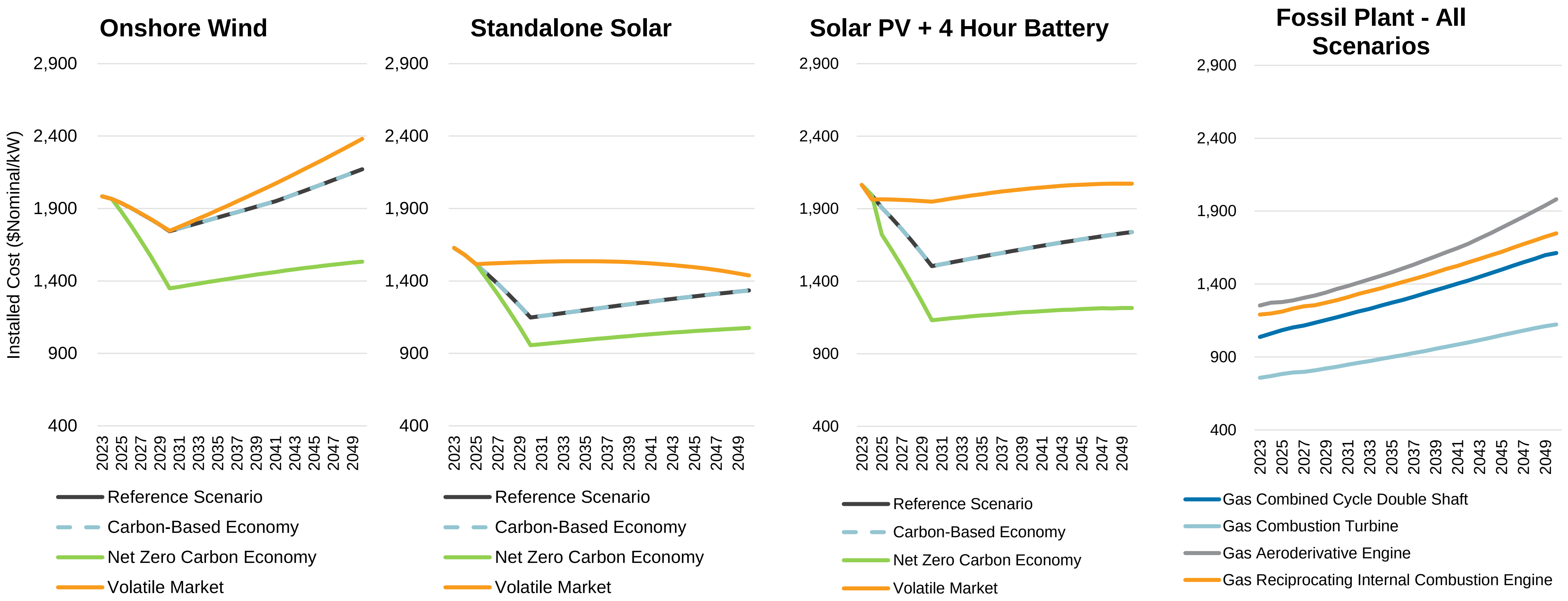
Installed Technology Cost Scenarios ($2022) – Renewable & Fossil

Technology cost assumptions were developed based on well-established third-party sources



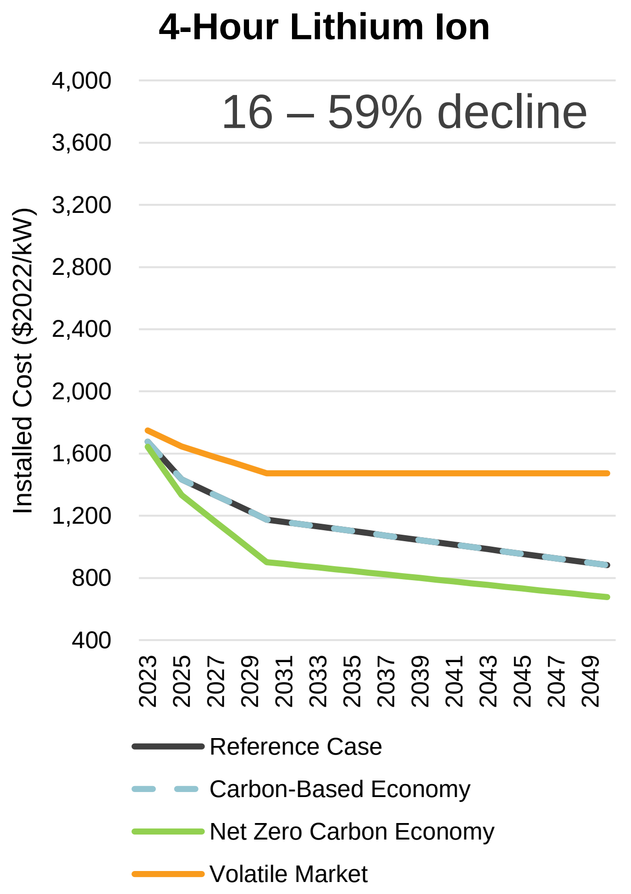
Installed Technology Cost Scenarios ($Nominal) – Renewable & Fossil

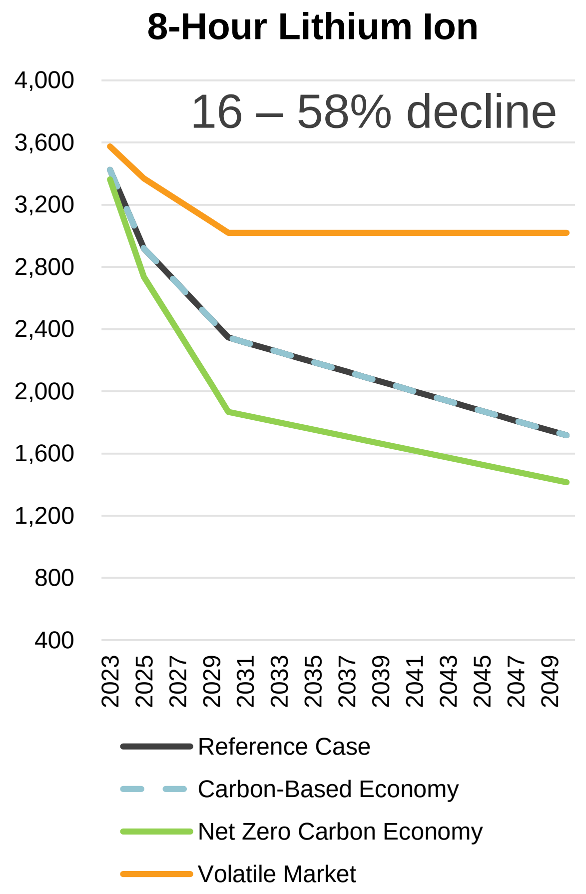
Technology cost assumptions were developed based on well-established third-party sources

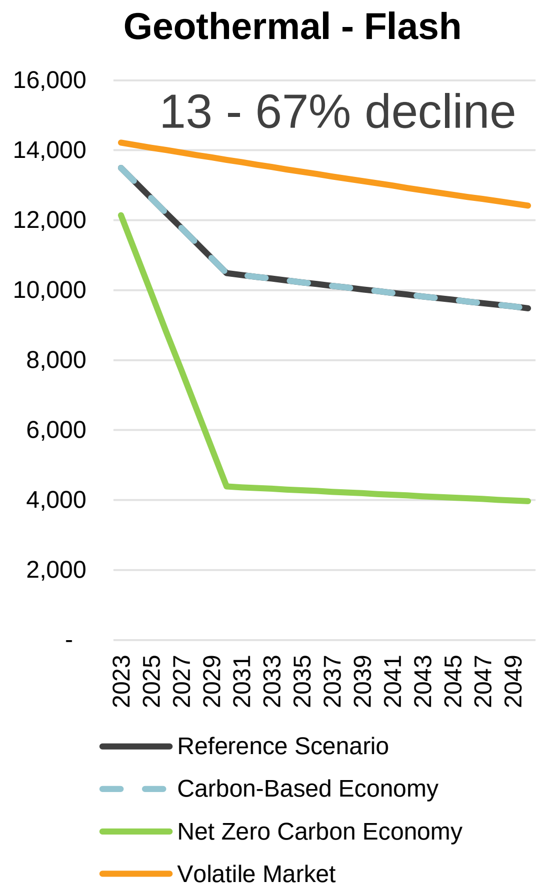


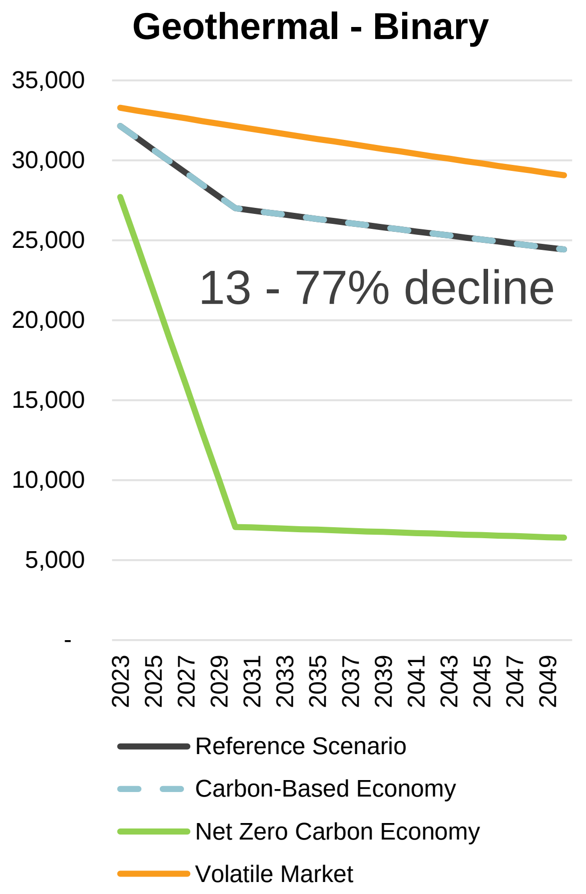
Installed Technology Cost Scenarios ($2022) – Lithium Ion and Geothermal

Technology cost assumptions were developed based on authoritative third-party sources



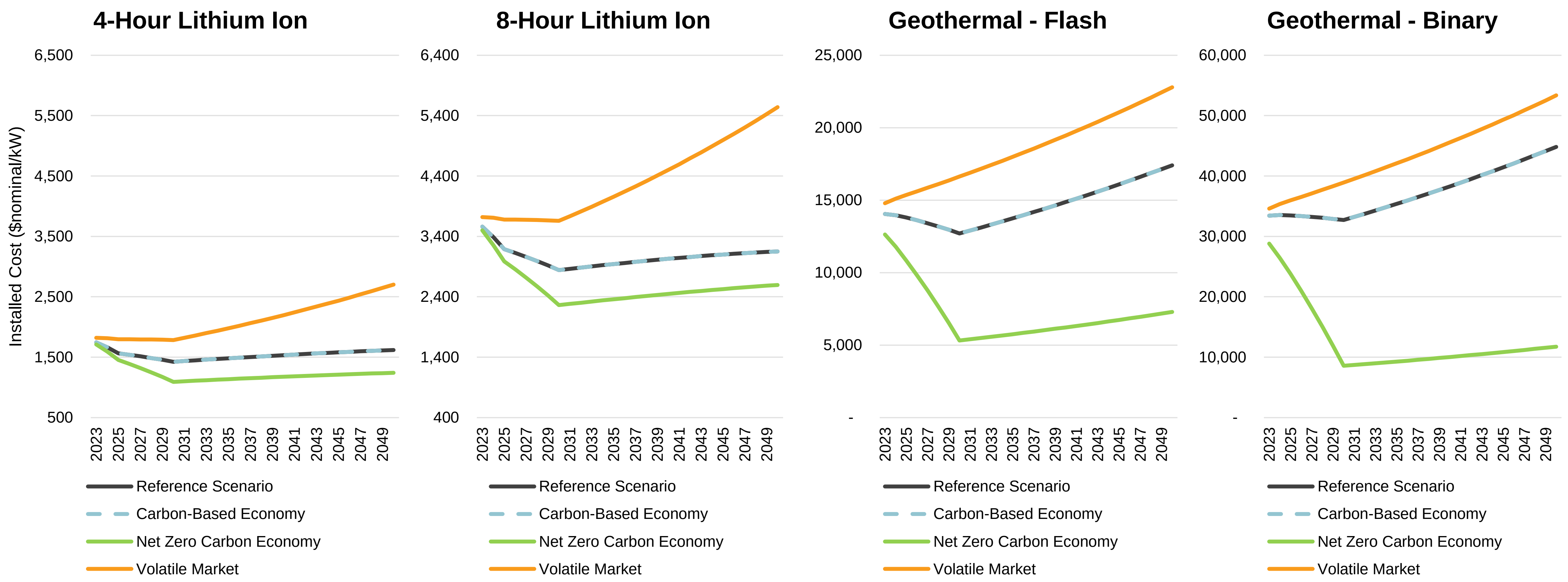






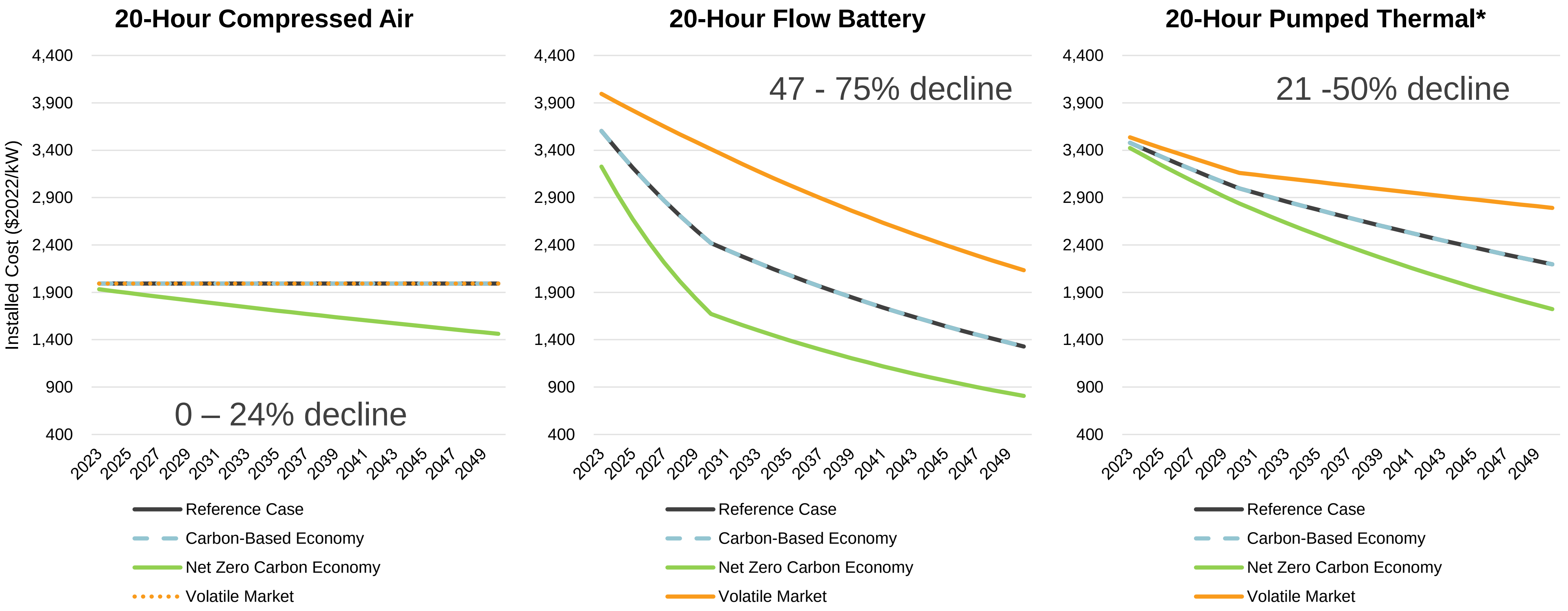
Installed Technology Cost Scenarios ($Nominal) – Lithium Ion and Geothermal

Technology cost assumptions were developed based on authoritative third-party sources



Installed Technology Cost Scenarios ($2022) – Long Duration Storage

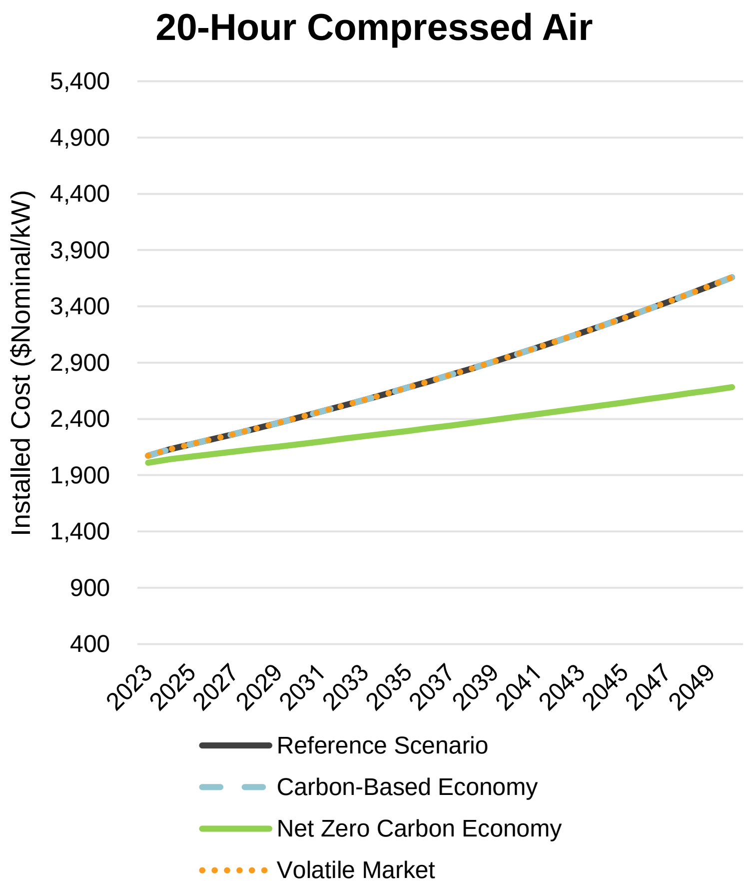
Technology cost assumptions were developed based on authoritative third-party sources

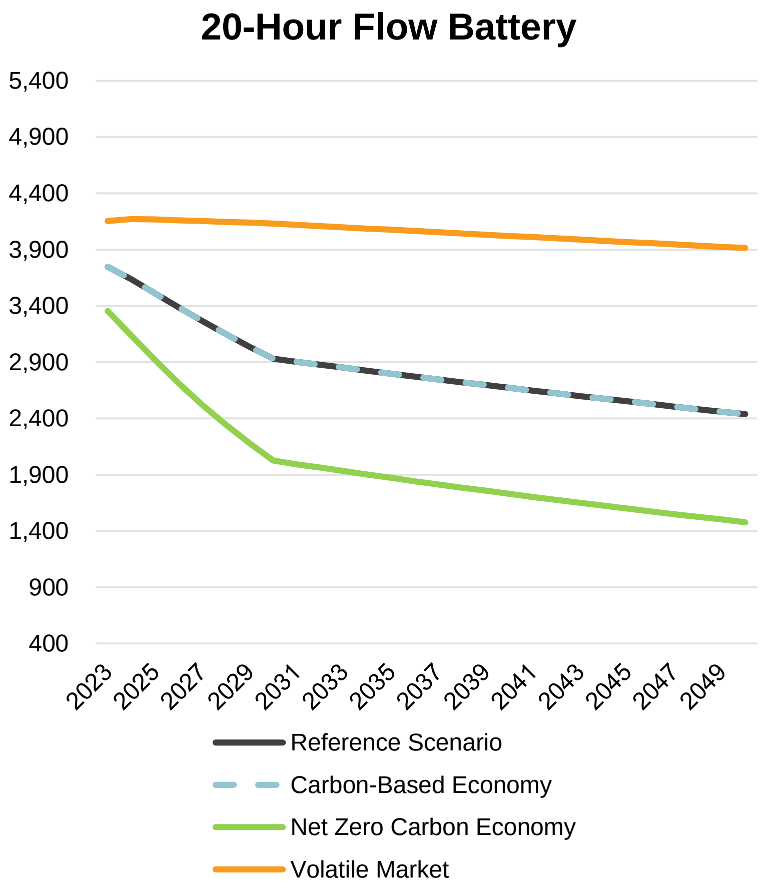


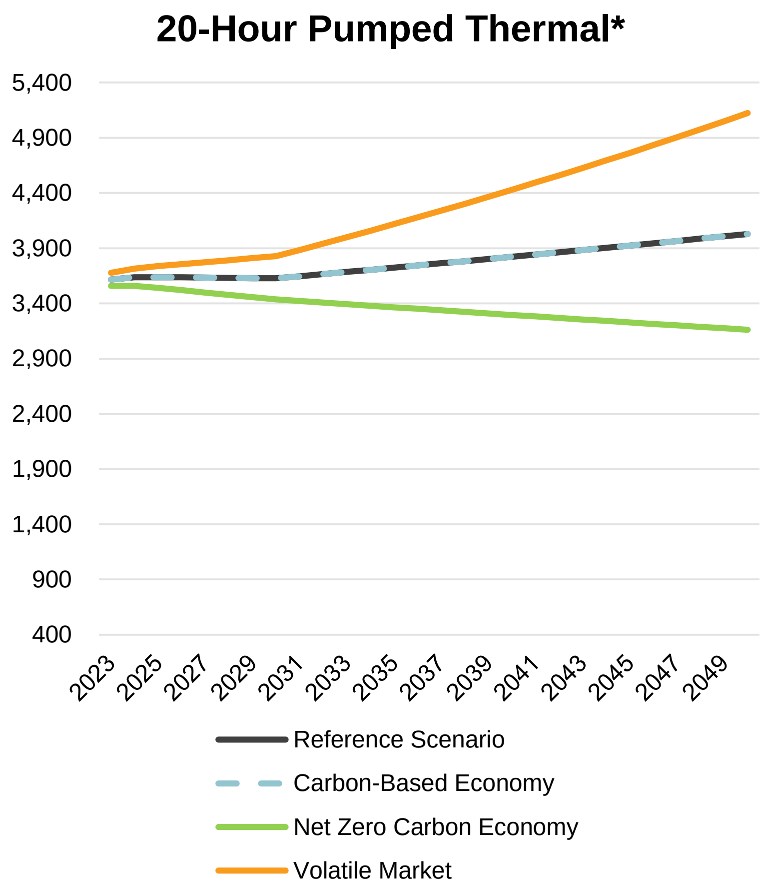
*Note: *Pumped thermal uses electricity to drive a heat pump to store electricity as heat. When electricity is required, the heat is turned back into electricity using a heat engine.*

Installed Technology Cost Scenarios ($Nominal) – Long Duration Storage

Technology cost assumptions were developed based on authoritative third-party sources



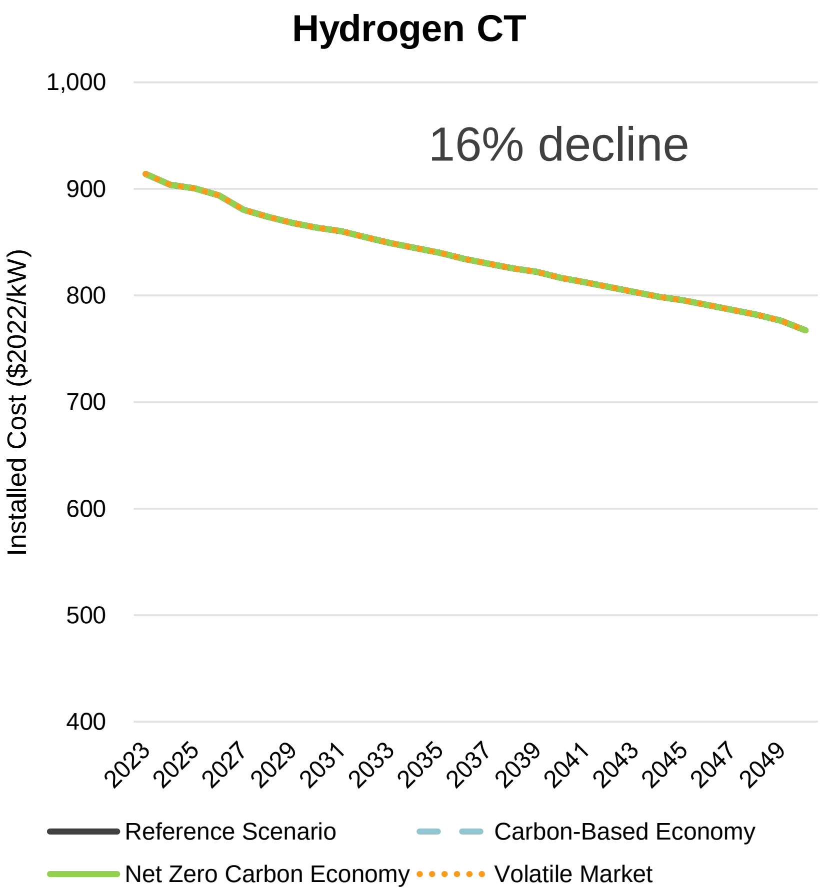


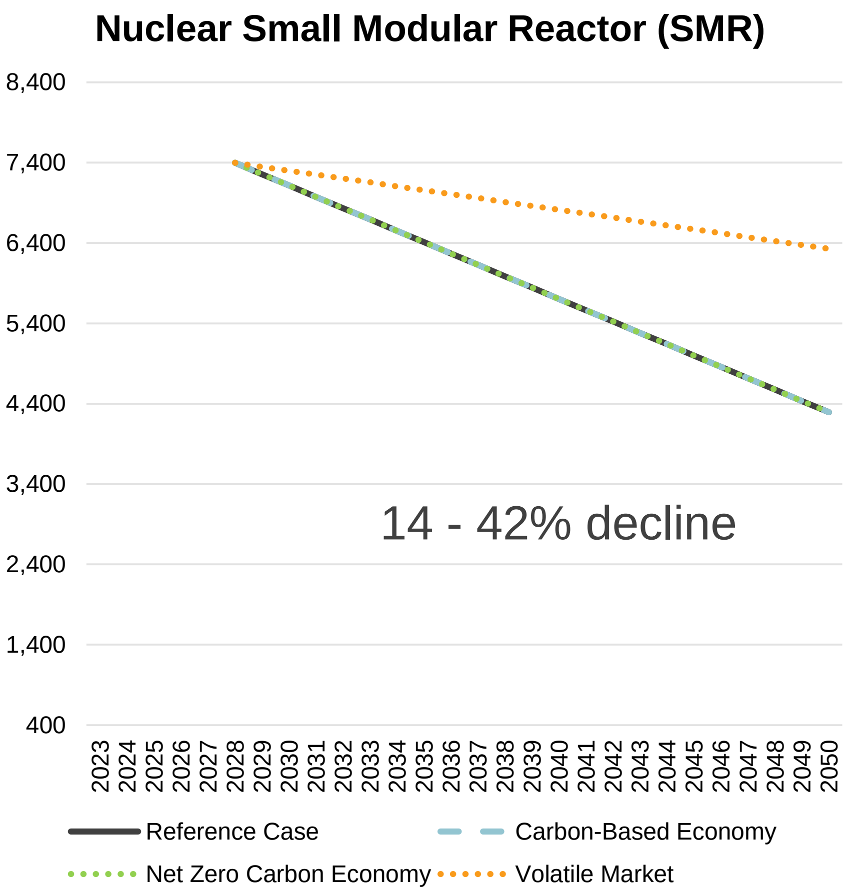


*Note: *Pumped thermal uses electricity to drive a heat pump to store electricity as heat. When electricity is required, the heat is turned back into electricity using a heat engine.*

Installed Technology Cost Scenarios ($2022) – Hydrogen & SMR

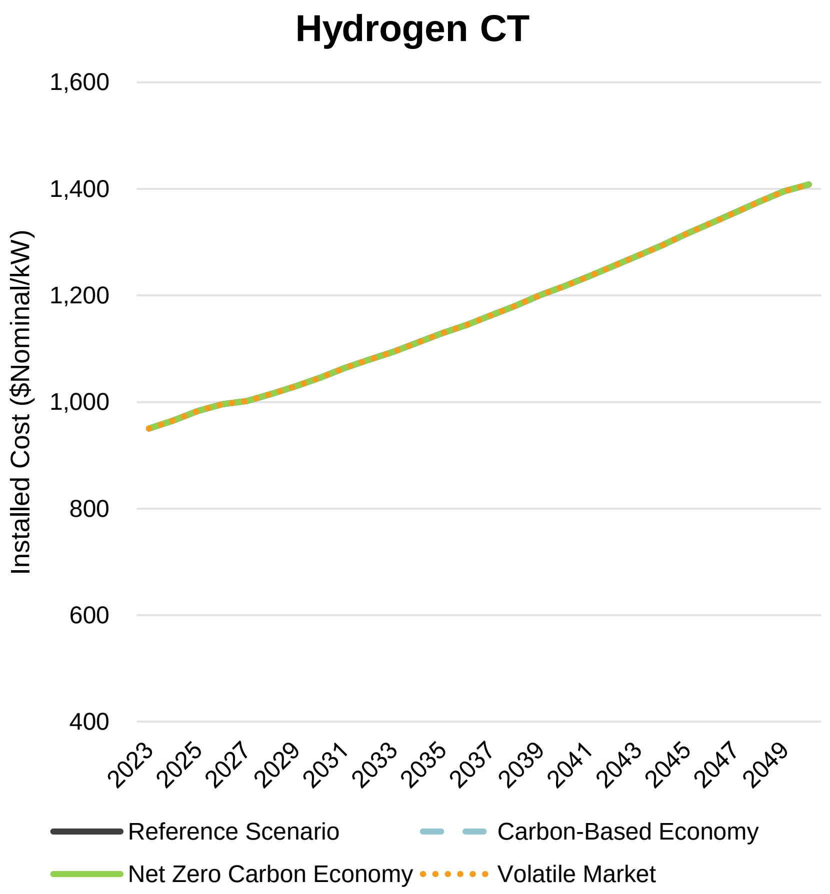
Technology cost assumptions were developed based on authoritative third-party sources

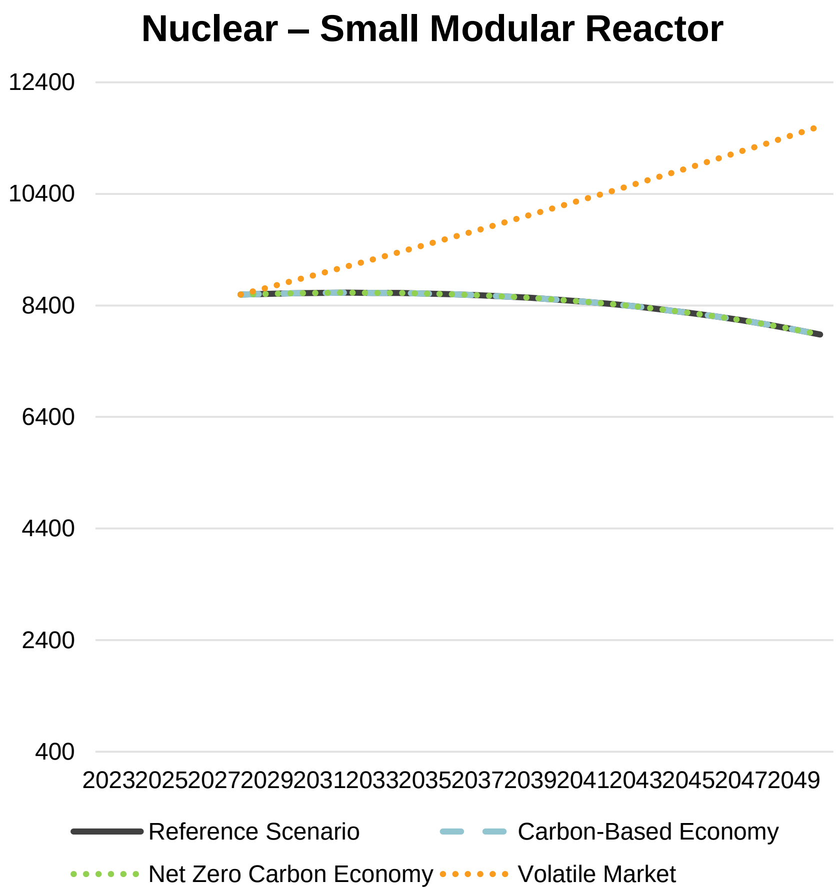




Installed Technology Cost Scenarios ($Nominal) – Hydrogen & SMR

Technology cost assumptions were developed based on authoritative third-party sources

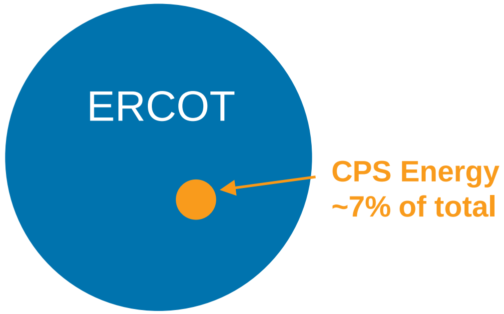




Key ERCOT Scenario Output Variables

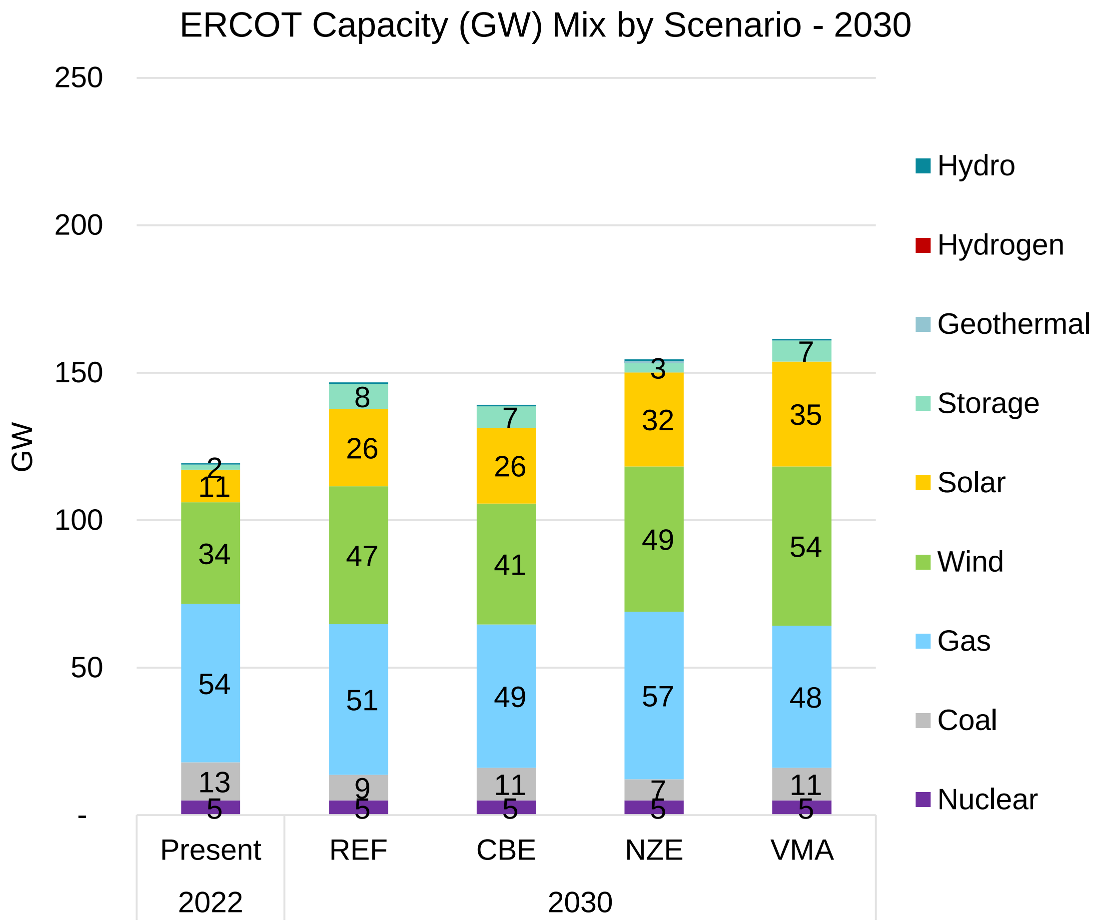
The scenario outputs summarize key ERCOT-wide outcomes, establishing a range of market conditions in which the CPS Energy system operates

- Each market scenario results in a fundamentally different view of ERCOT-wide resource additions and retirements
- The following key scenario output variables are relevant to the portfolio evaluation process:
  - Projected ERCOT market capacity mix (MW);
  - Projected ERCOT generation mix (MWh);
  - Projected ERCOT market emissions (Million tCO2); and
  - Projected ERCOT zonal electricity prices ($/MWh)
- Each portfolio will be analyzed within the framework of each scenario. Metrics will be calculated for each portfolio/scenario combination.



2030 ERCOT Market Capacity (GW) Mix

The model simulation optimizes a least-cost regional capacity expansion plan under each scenario’s input drivers.



ERCOT Scenario	Commentary
Reference Scenario (REF)	• Increased wind and solar capacity displaces some coal and gas capacity • Additional storage capacity supports intermittency
Carbon-Based Economy (CBE)	• Lower commodity prices drive delayed coal and gas retirements and reduce renewable capacity additions relative to REF
Net Zero Carbon Economy (NZE)	• Earlier coal retirements as high carbon prices make coal generation uneconomic • New gas additions initially as battery costs remain higher than gas through 2030
Volatile Market (VMA)	• Accelerated renewable growth in late 2020s due to IRA tax credits • Delayed coal retirements due to high gas prices, making coal more competitive

*Note: There is limited hydro, hydrogen, and geothermal capacity.

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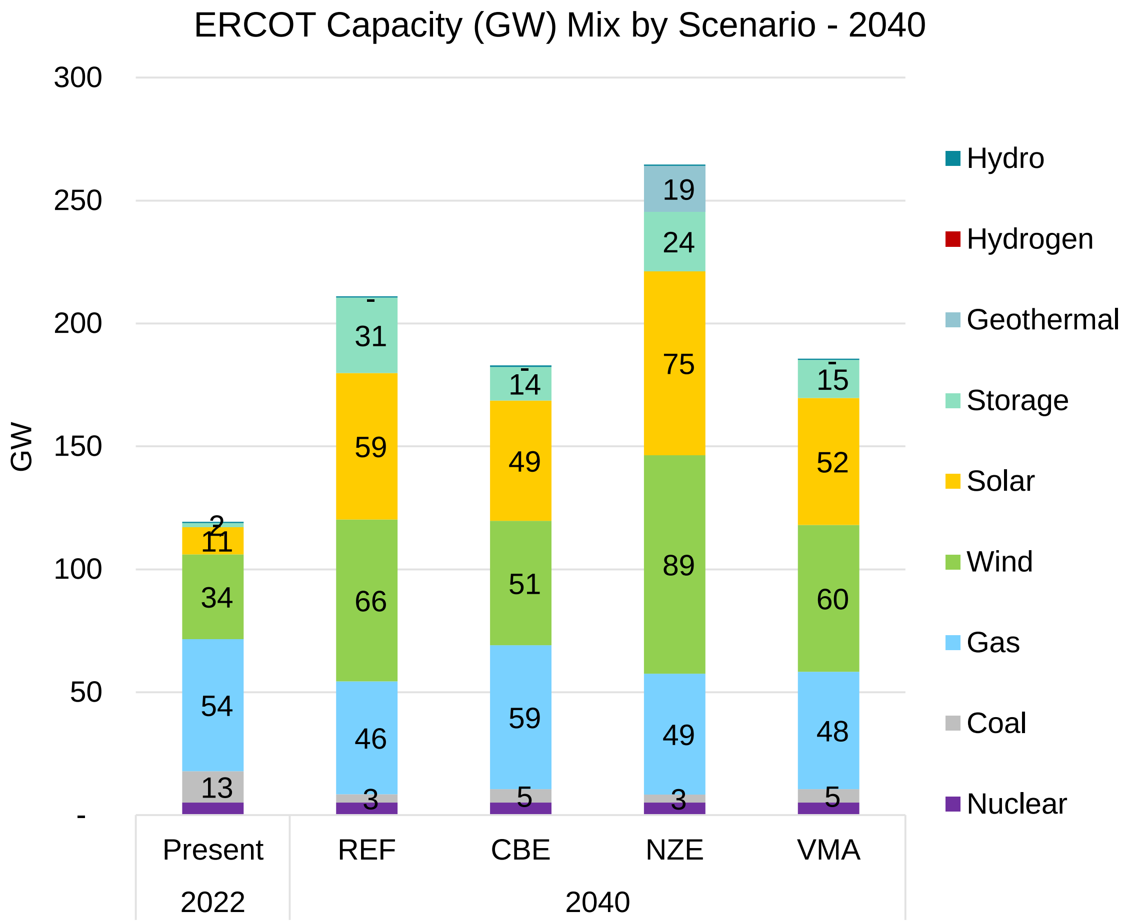
2040 ERCOT Market Capacity (GW) Mix

The model simulation optimizes a least-cost regional capacity expansion plan under each scenario's input drivers.



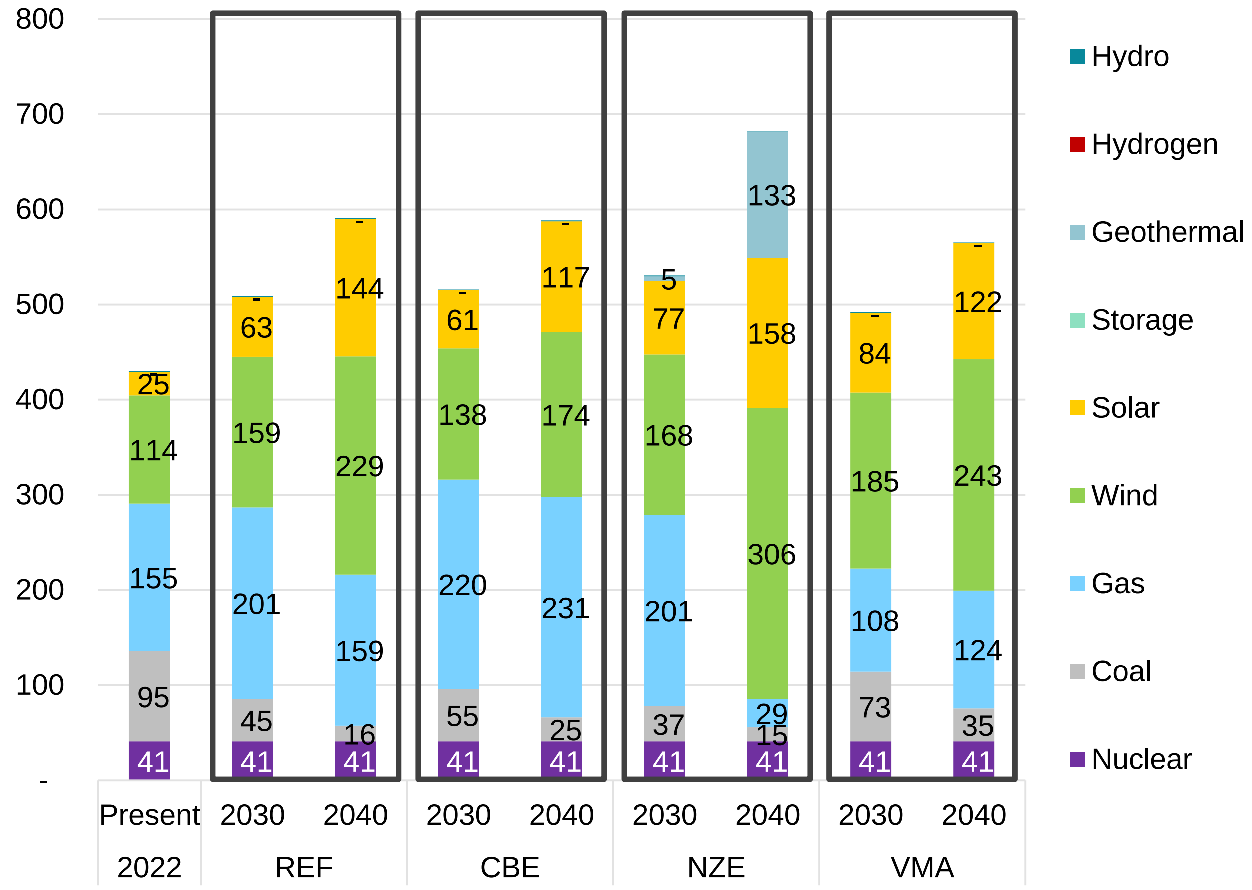
ERCOT Scenario	Commentary
Reference Scenario (REF)	• Further retirements of aging coal fleet • Continued growth in renewables, as well as storage to support higher intermittency • Gas remains to balance intermittency
Carbon-Based Economy (CBE)	• Low gas prices keep gas capacity competitive against renewables and storage for longer, leading to new gas additions
Net Zero Carbon Economy (NZE)	• Large capacity growth to meet electrification demand • Geothermal is selected for baseload needs • 20-Hr duration storage is selected to balance intermittency instead of new gas
Volatile Market (VMA)	• Slower wind & solar additions over the long-term • Gas capacity is retained to meet peak demand due to slow declines in battery costs

Notes:
1. There is limited hydro and hydrogen generation.
2. Geothermal is the low-cost resource option from a long-term capacity expansion perspective in NZE but could be representative of other "baseload" zero-emitting technologies.

2030 & 2040 ERCOT Market Generation (TWh) Mix

The share of renewable generation is expected to increase in all scenarios. Gas is projected to continue to play a significant role in the CBE scenario, while clean energy makes up the largest generation share in NZE.

2030 & 2040 ERCOT Generation (TWh) Mix by Scenario

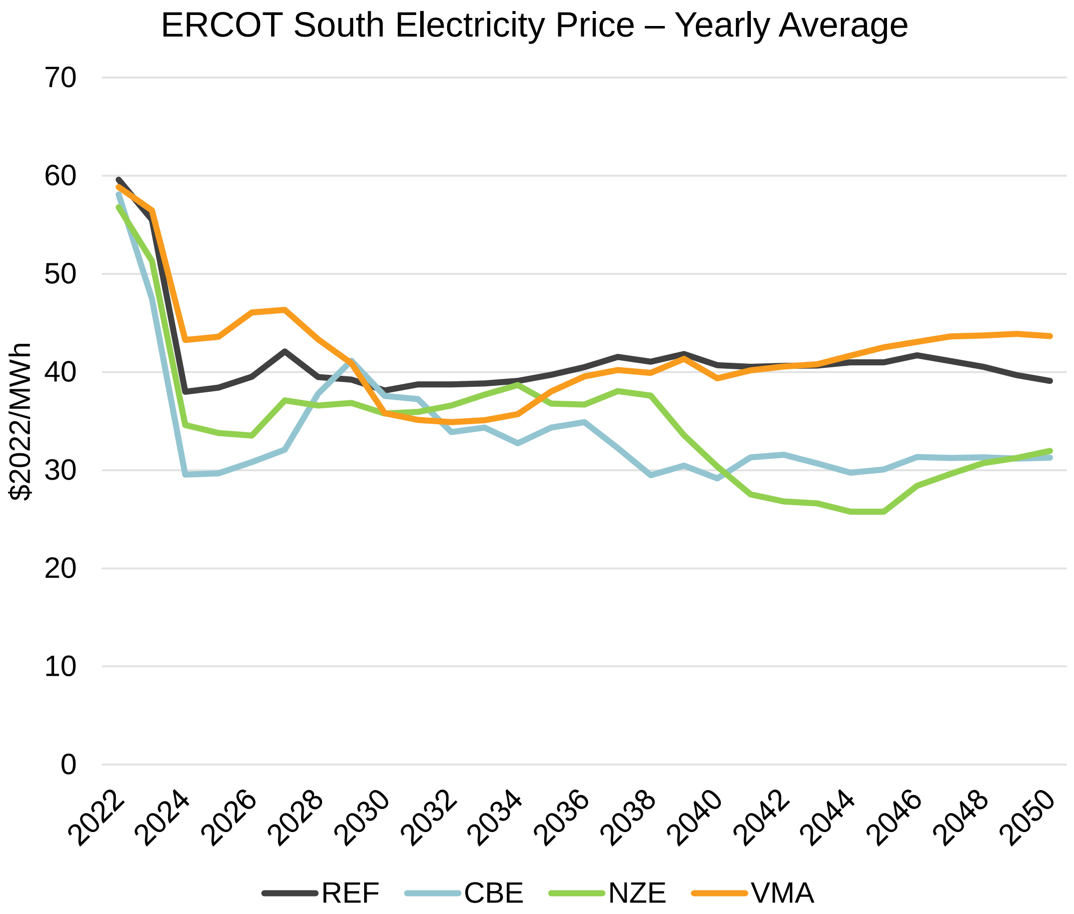


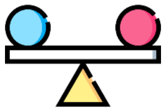
ERCOT Scenario	Commentary
Reference Scenario (REF)	• Further retirements of aging coal fleet • Continued growth in renewables, as well as storage to support renewables • Gas remains to balance intermittency
Carbon-Based Economy (CBE)	• Low gas prices keep gas generation competitive, leading to higher gas generation relative to REF
Net Zero Carbon Economy (NZE)	• High carbon prices make coal and gas uncompetitive against renewables, reducing capacity factors • Renewables have the largest generation share
Volatile Market (VMA)	• Higher coal generation than REF due to favorable coal prices relative to gas

Notes:
1. There is limited hydro and hydrogen generation.
2. Geothermal is the low-cost resource option from a long-term capacity expansion perspective in NZE but could be representative of other "baseload" zero-emitting technologies.
3. Storage capacity does not contribute positive net energy to the system and is thus not shown.

ERCOT South Electricity Price Projections

Power prices are driven by natural gas prices, carbon prices, and the level of renewable penetration in the market



ERCOT Scenario		Commentary
	**Reference Scenario (REF)**	• Electricity prices track the price expectations for natural gas, which fall over the next few years
	**Carbon-Based Economy (CBE)**	• Electricity prices fall further than the Reference Scenario due to sustained low commodity prices
	**Net Zero Carbon Economy (NZE)**	• High carbon prices lead to faster renewable growth, suppressing long-term power prices • Beyond 2040, geothermal displaces coal and gas generation, further offsetting the impact of high carbon prices
	**Volatile Market (VMA)**	• Higher prices in the 2020s than REF due to high gas prices • Price suppressed in early 2030s due to IRA-induced wind and solar growth • Prices track high gas prices in 2040s as coal is retired and renewable growth slows

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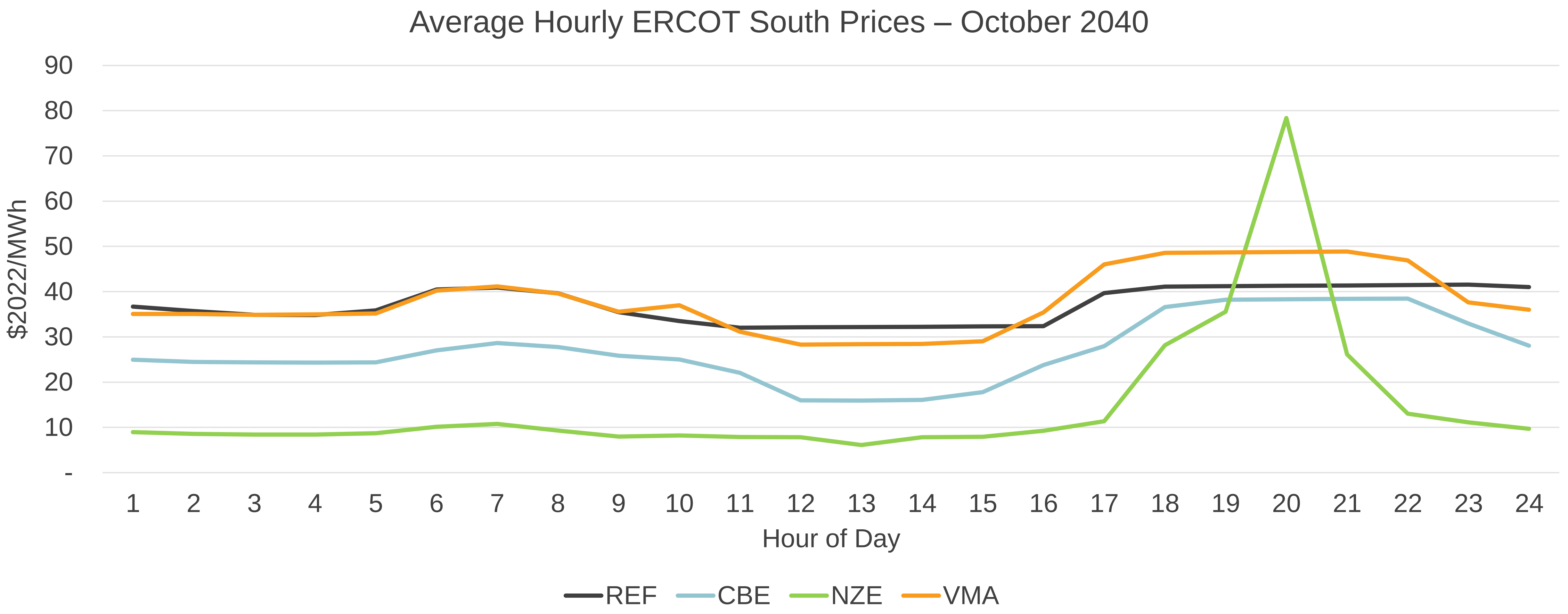
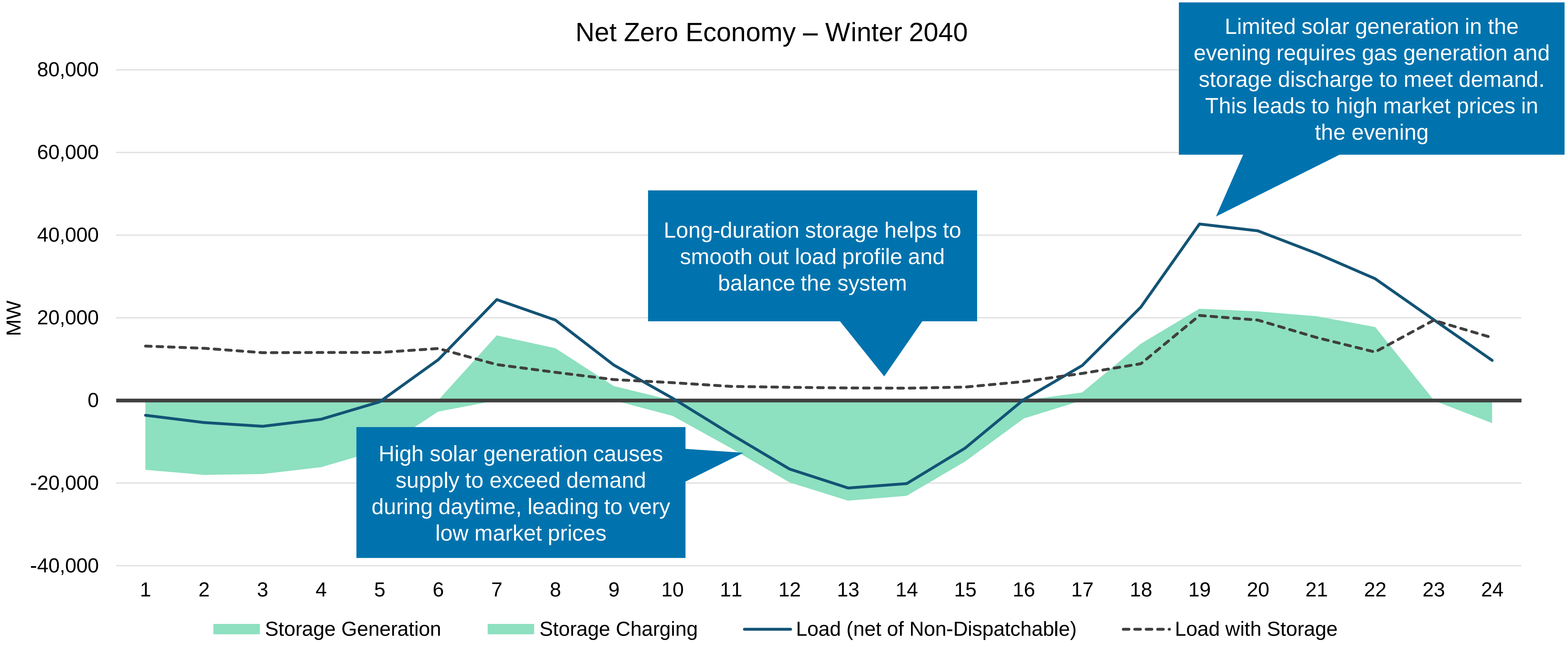
High Intermittency in NZE Leads to Volatile Market Prices

High levels of clean energy reduce power prices during most hours of the day, but price spikes are likely during evening hours, particularly as solar generation declines



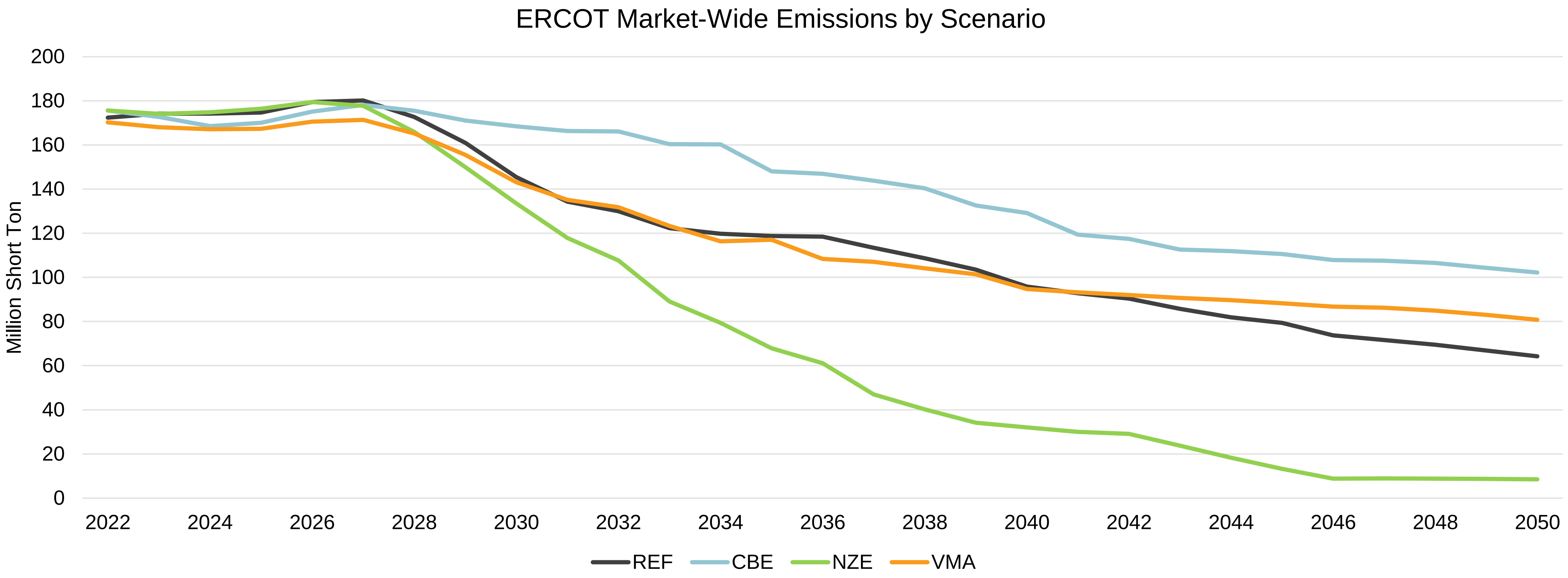
High Intermittency in NZE Leads to Volatile Market Prices

High solar generation suppresses prices during daytime, but leads to higher prices in the evening hours



ERCOT Market Emissions

The NZE scenario is projected to reach near zero emissions as high carbon prices lead to fossil-fired plant retirements, while emissions in the CBE scenario are highest, as gas utilization remains high due to low natural gas prices.

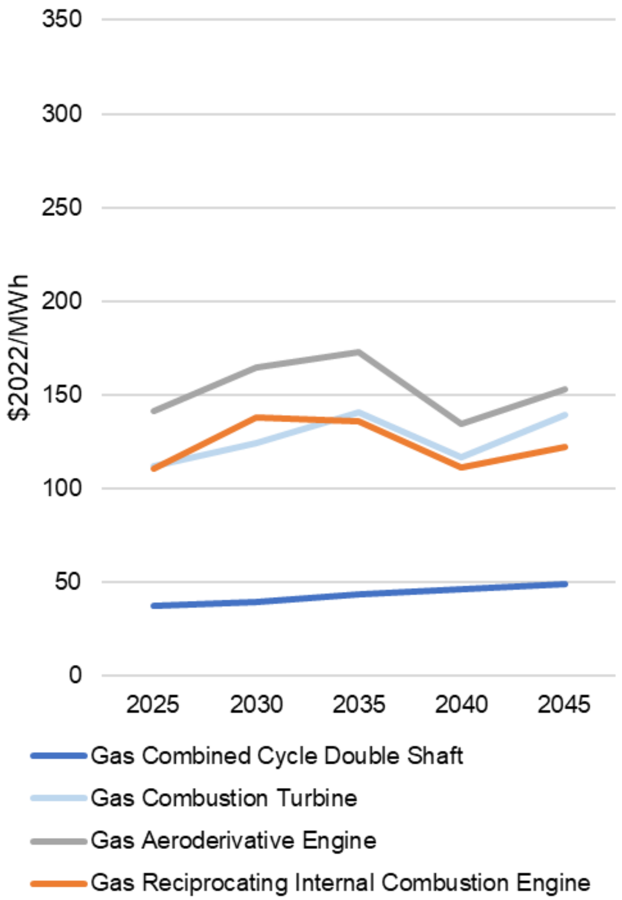


APPENDIX B:

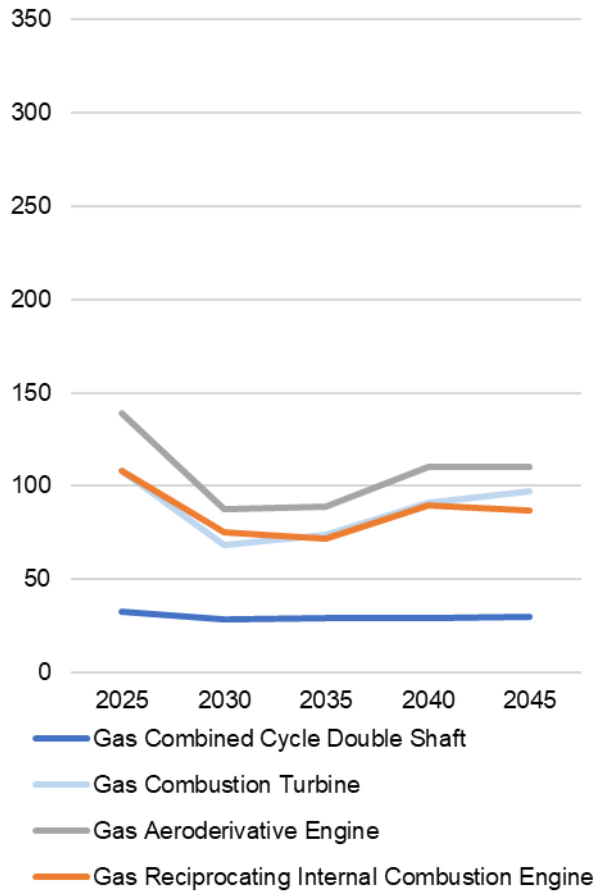
LEVELIZED COST OF ELECTRICITY

Levelized Cost of Electricity ($2022) – Natural Gas Resources

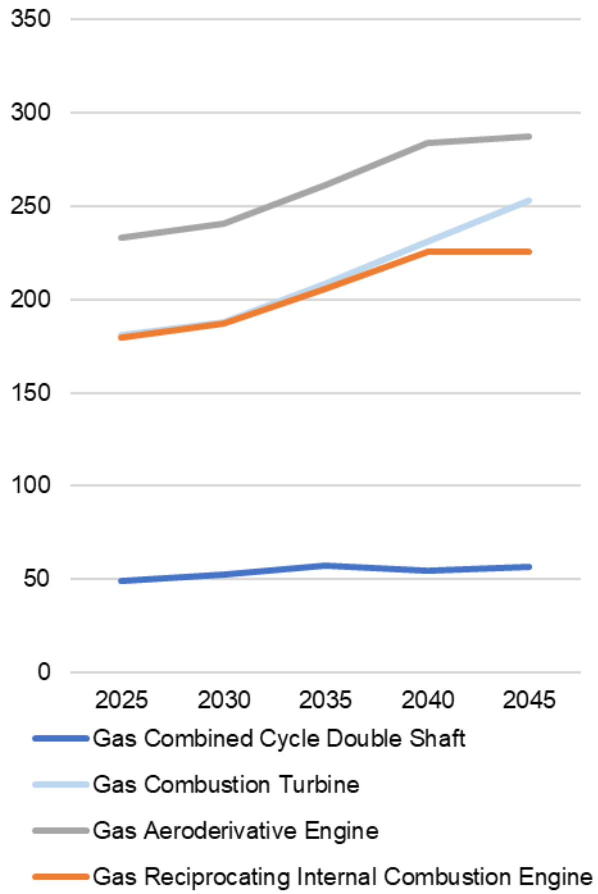
Reference Scenario



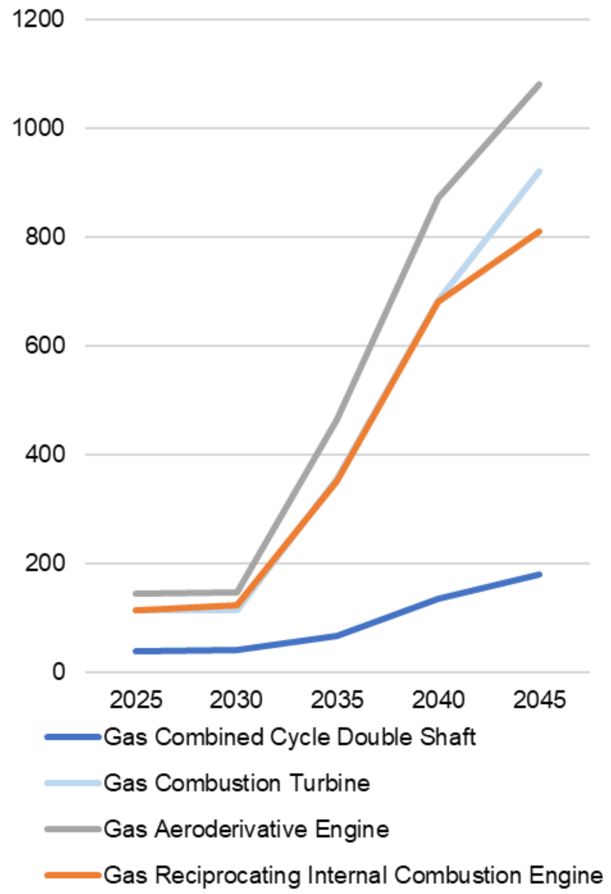
Carbon-Based Economy



Volatile Market



Net Zero Economy



Note: Expected capacity factors vary by technology and scenario and are based on ERCOT market scenario analysis results.

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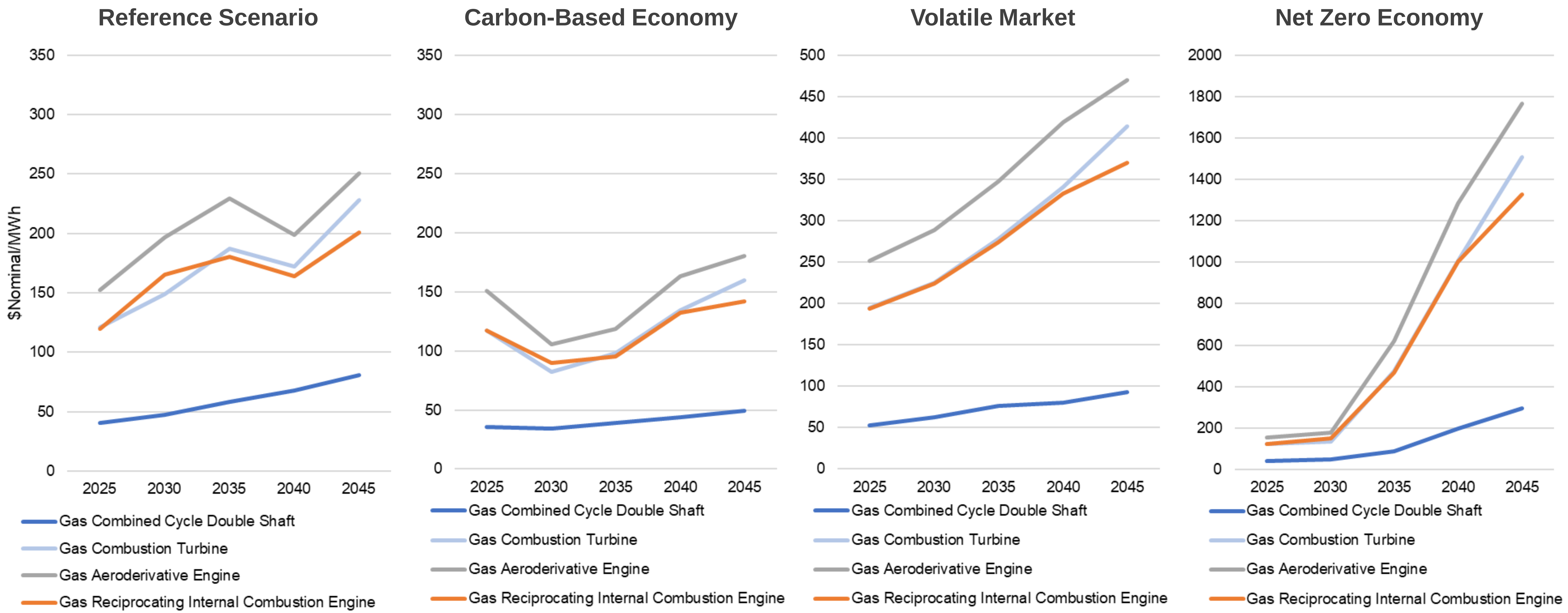
Levelized Cost of Electricity ($Nominal) – Natural Gas Resources



Note: Expected capacity factors vary by technology and scenario and are based on ERCOT market scenario analysis results.

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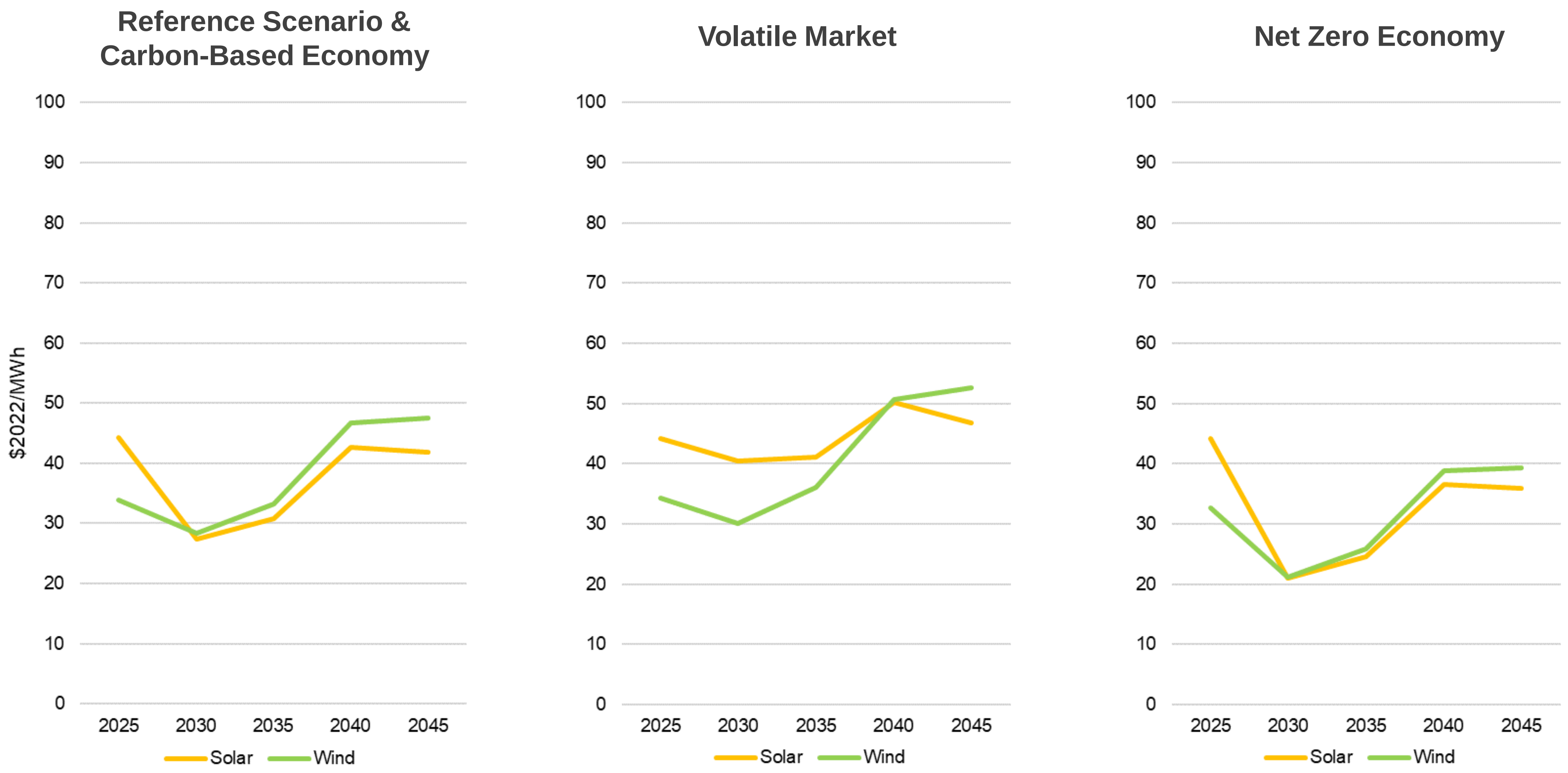
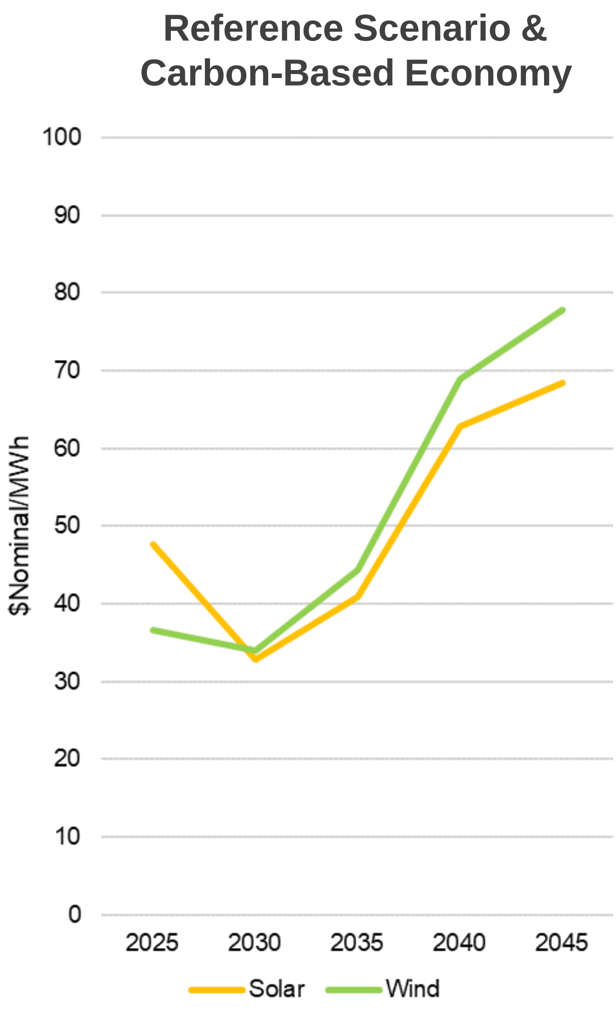
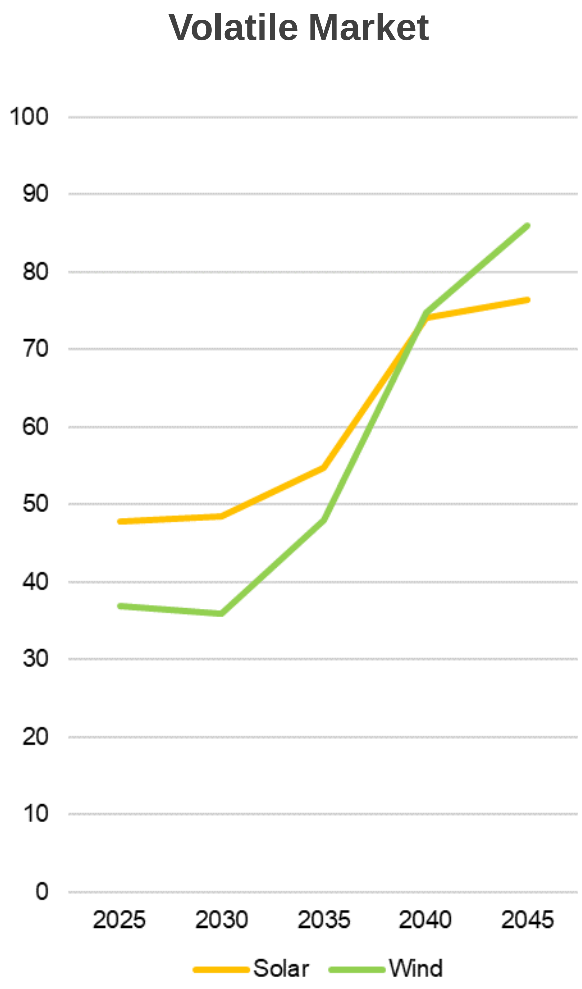
Levelized Cost of Electricity ($2022) – Wind & Solar

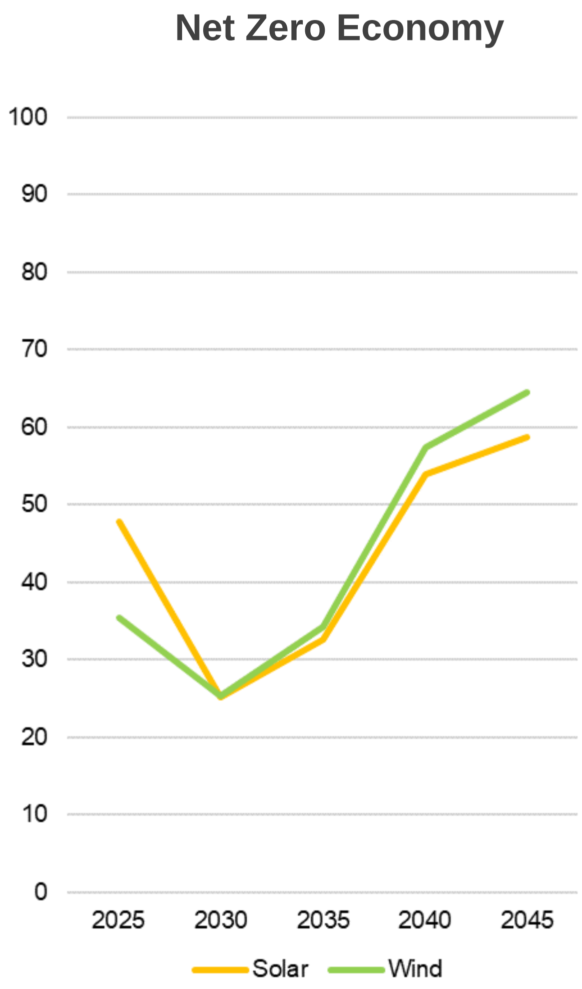


Notes: 1) Costs are inclusive of the impact of Production Tax Credits under the Inflation Reduction Act.
2) Costs include expected congestion between likely project sites and CPS Energy load.

Levelized Cost of Electricity ($Nominal) – Wind & Solar







Notes: 1) Costs are inclusive of the impact of Production Tax Credits under the Inflation Reduction Act.
2) Costs include expected congestion between likely project sites and CPS Energy load.

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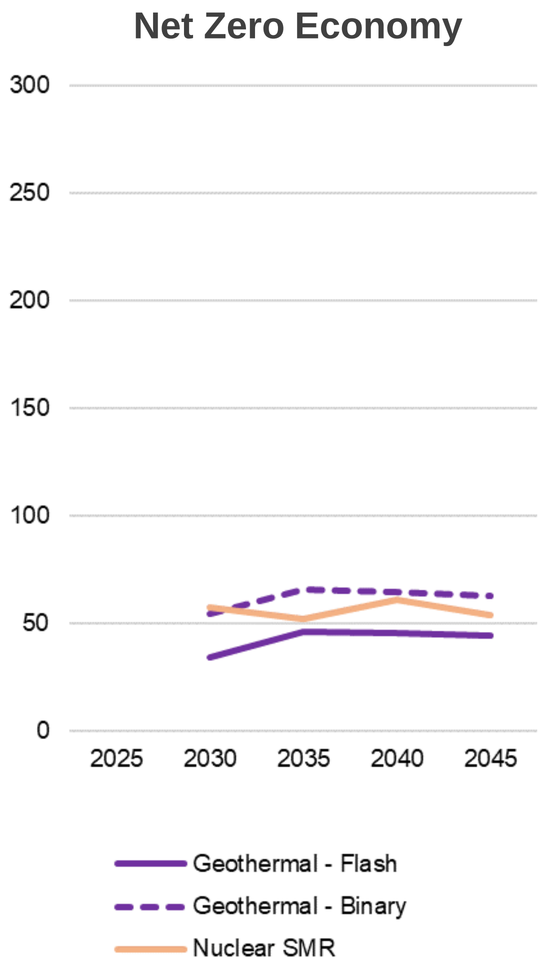
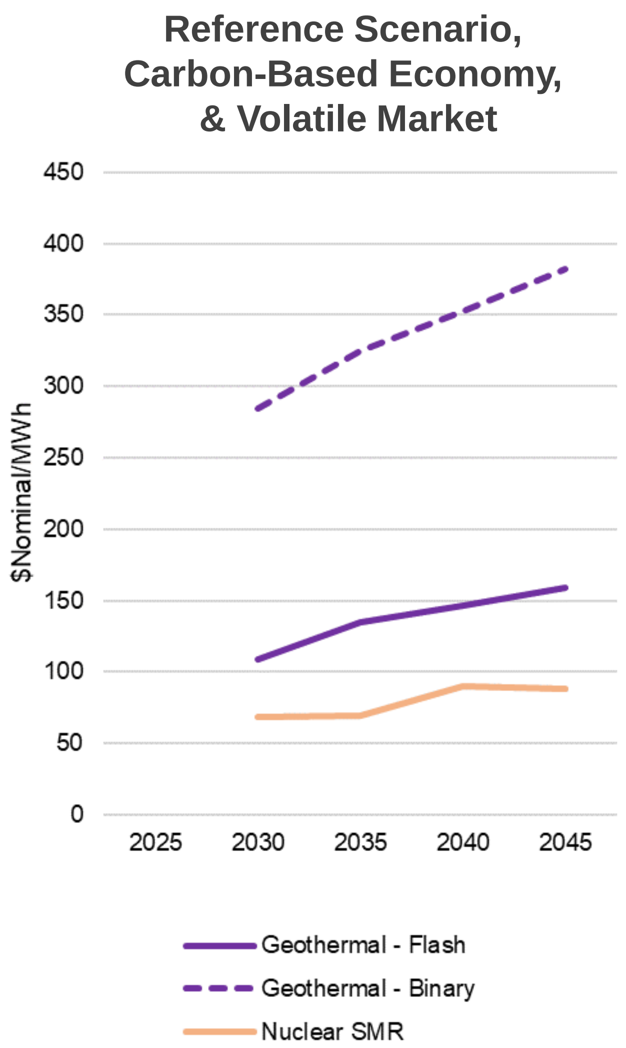
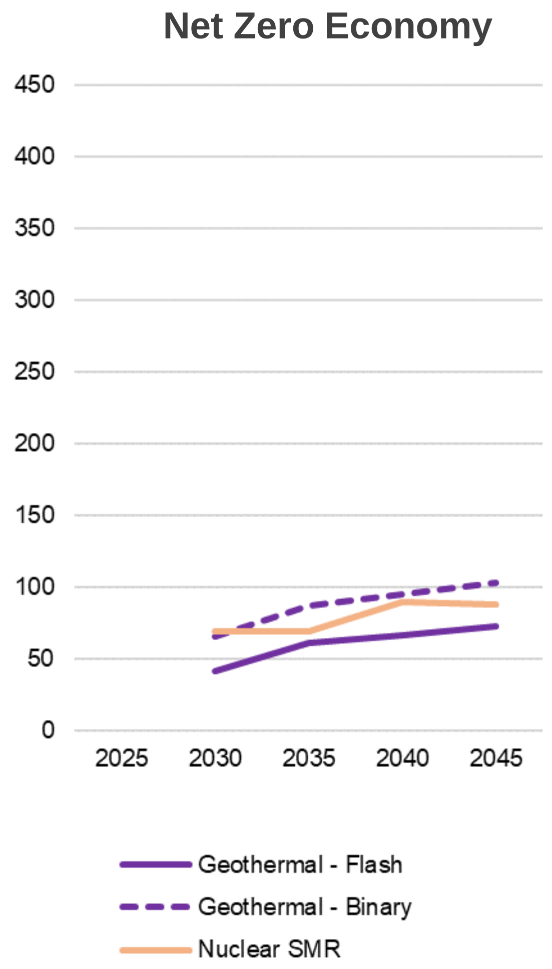
Levelized Cost of Electricity ($2022) – Geothermal & Nuclear



Notes: 1) Nuclear SMR costs are inclusive of the impact of Investment Tax Credits under the Inflation Reduction Act.
2) Geothermal costs are inclusive of the impact of Production Tax Credits under the Inflation Reduction Act.

Levelized Cost of Electricity ($Nominal) – Geothermal & Nuclear





Notes: 1) Nuclear SMR costs are inclusive of the impact of Investment Tax Credits under the Inflation Reduction Act.
2) Geothermal costs are inclusive of the impact of Production Tax Credits under the Inflation Reduction Act.

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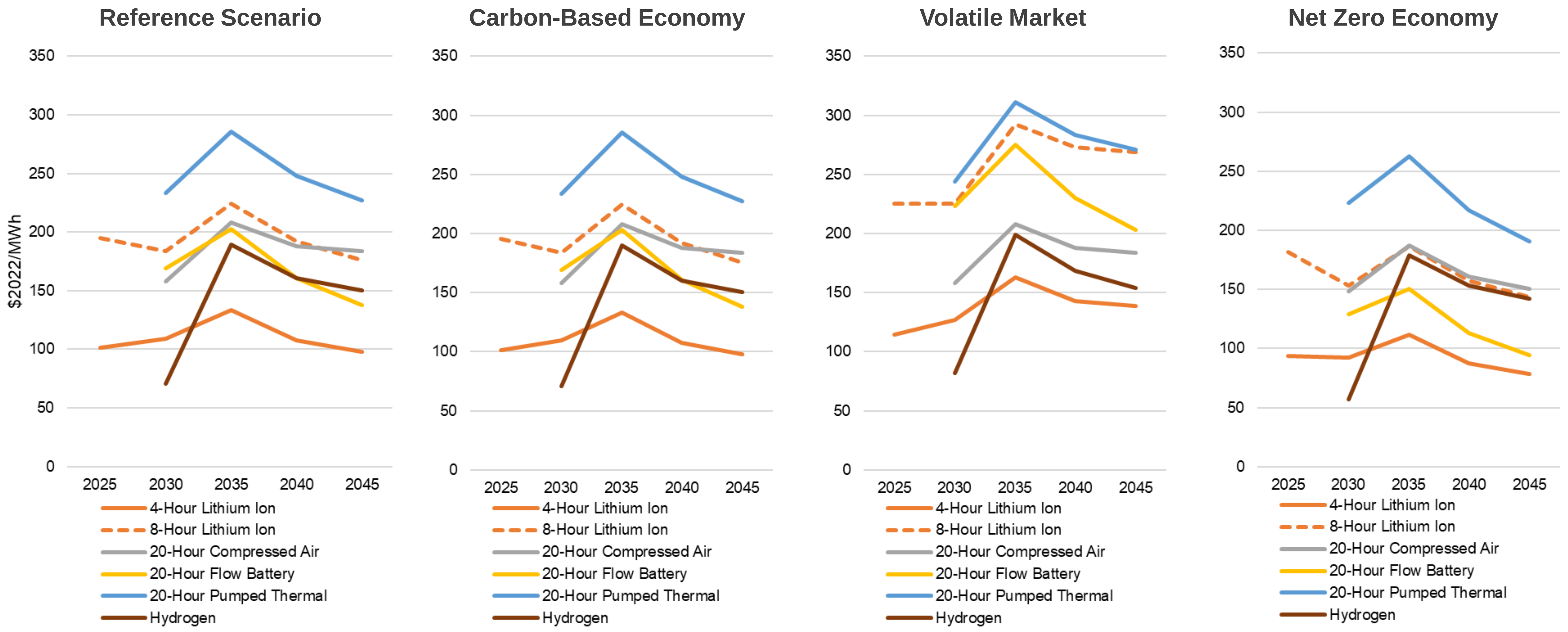
Levelized Cost of Electricity ($2022) – Storage Resources



Note: All technologies are assumed to have the same effective capacity factor associated with charging and discharging, although capacity factors vary by year and scenario. All storage technology costs, except Hydrogen, are inclusive of the impact of the Investment Tax Credits under the Inflation Reduction Act. Hydrogen costs are inclusive of the impact of the hydrogen Production Tax Credit.

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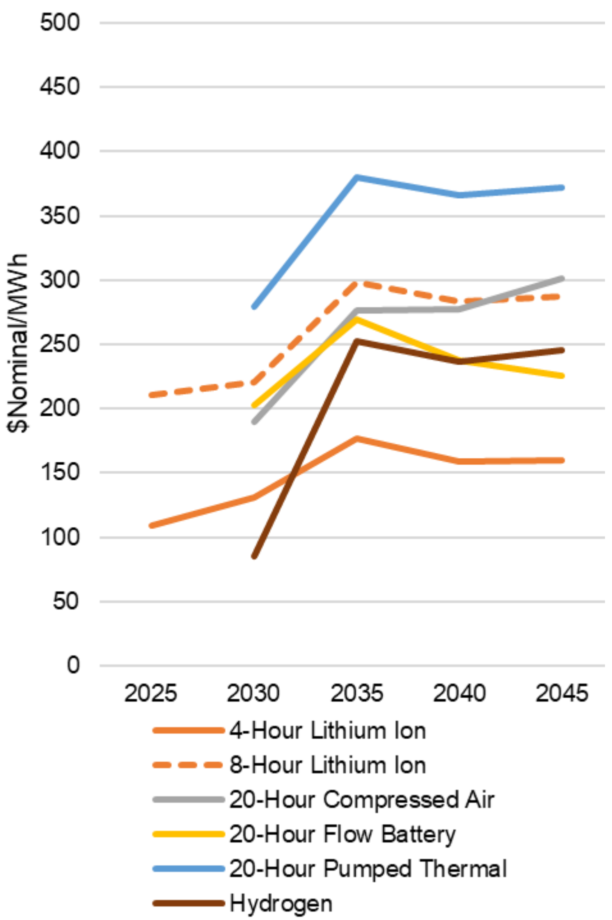
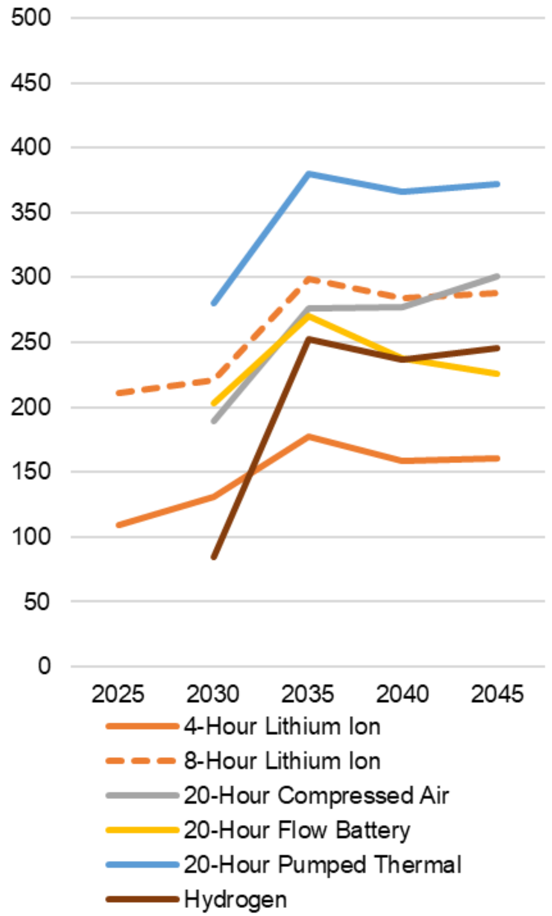
Levelized Cost of Electricity ($Nominal) – Storage Resources

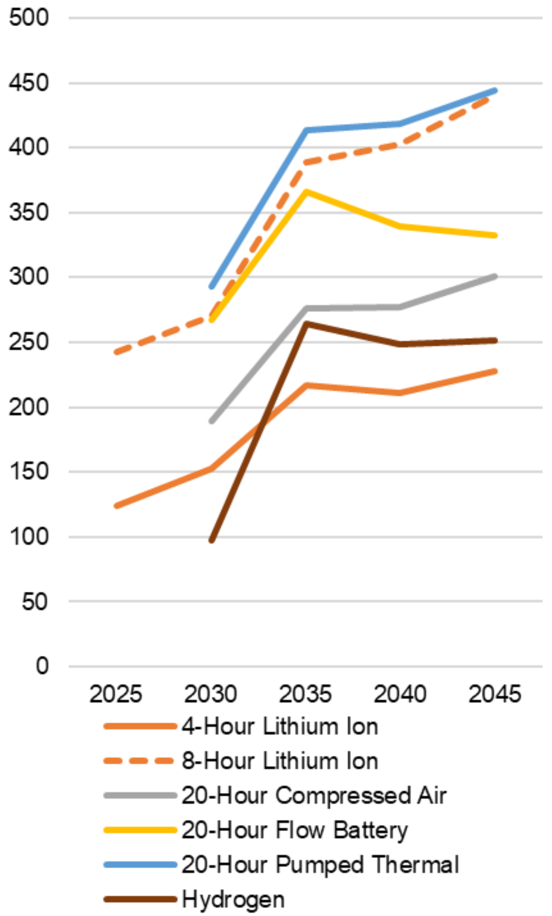
Reference Scenario



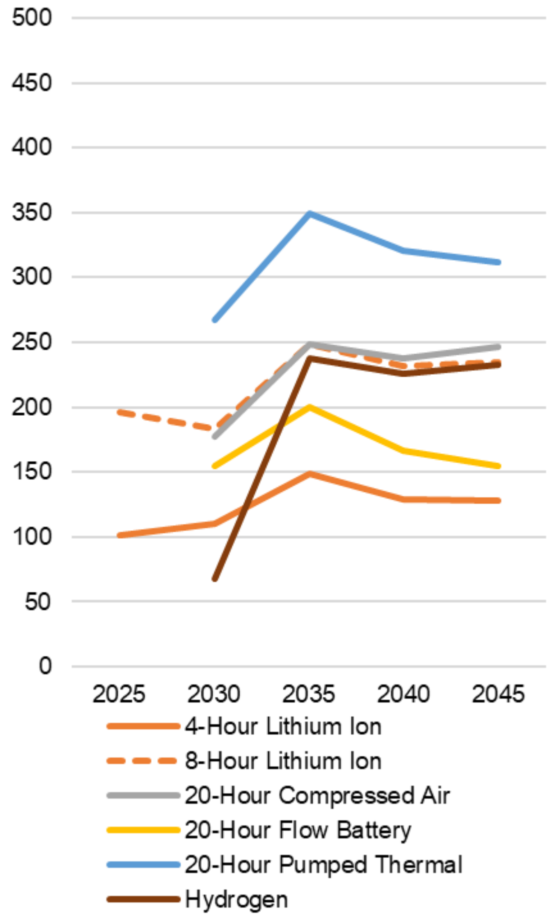
Carbon-Based Economy



Volatile Market



Net Zero Economy



Note: All technologies are assumed to have the same effective capacity factor associated with charging and discharging, although capacity factors vary by year and scenario. All storage technology costs, except Hydrogen, are inclusive of the impact of the Investment Tax Credits under the Inflation Reduction Act. Hydrogen costs are inclusive of the impact of the hydrogen Production Tax Credit.

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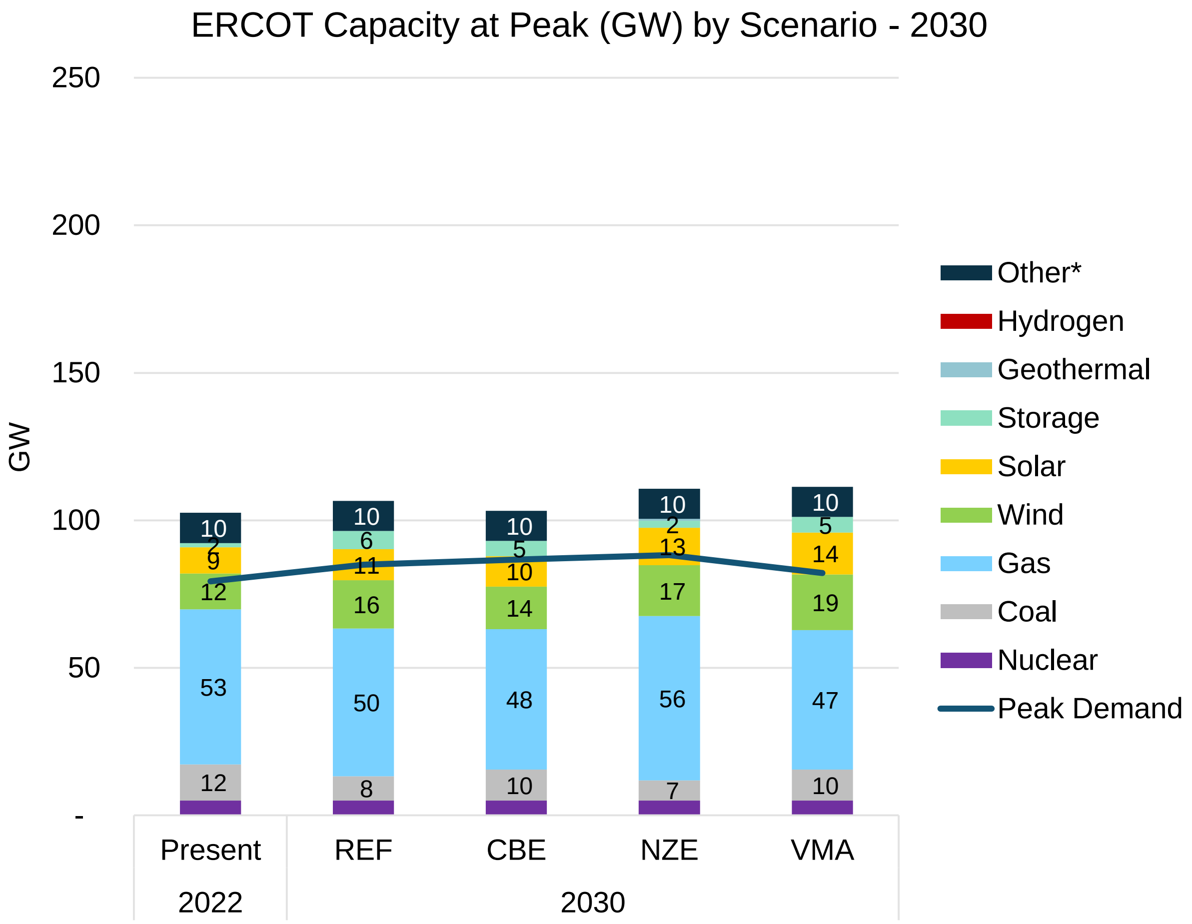
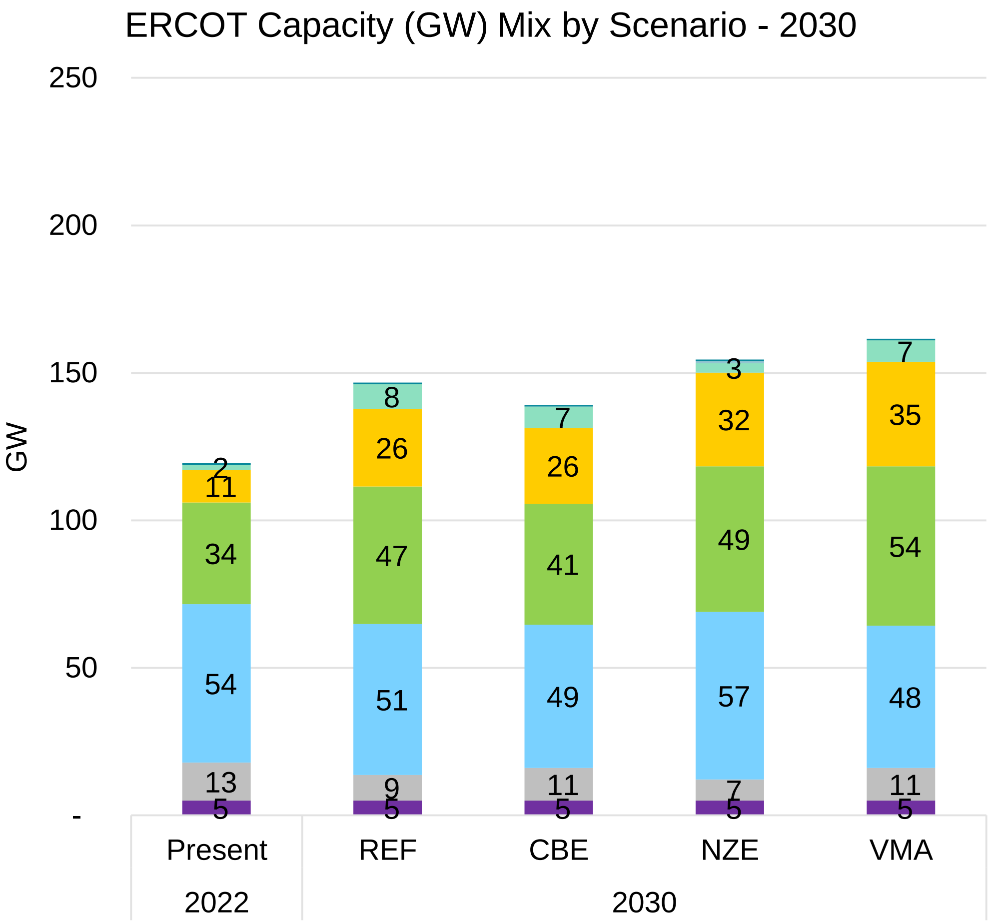
APPENDIX C:

PROJECTED FIRM CAPACITY IN ERCOT OVER PEAK DEMAND

2030 ERCOT Market Capacity (GW) Mix

The model simulation optimizes a least-cost regional capacity expansion plan under each scenario’s input drivers.





Note:
1. There is limited hydro, hydrogen, and geothermal capacity.
2. *Other includes contributions from EE/DR, imports, switchable capacity, capacity from available mothballed plants, and private network capacity. The estimates are included by ERCOT in its Capacity, Demand and Reserves report and have been incorporated for reserve margin modeling purposes.

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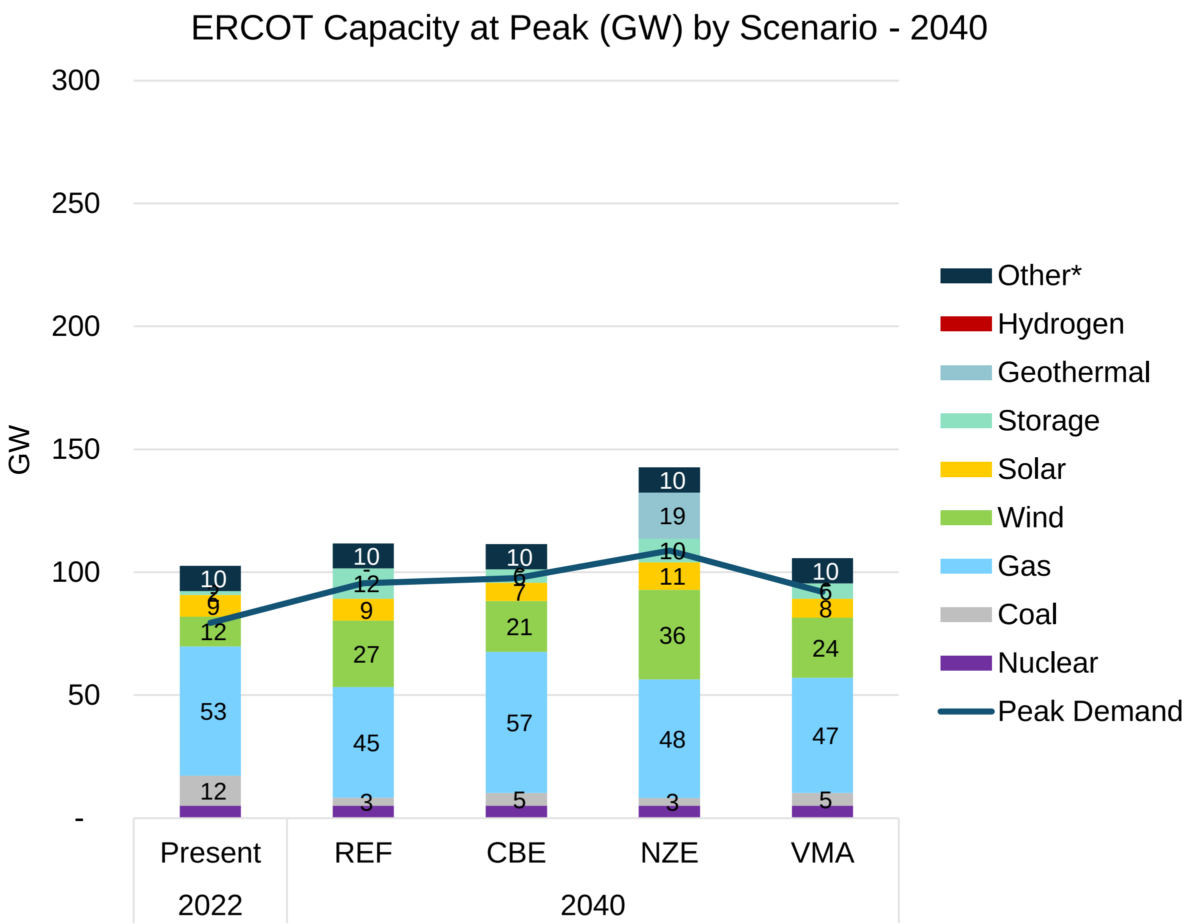
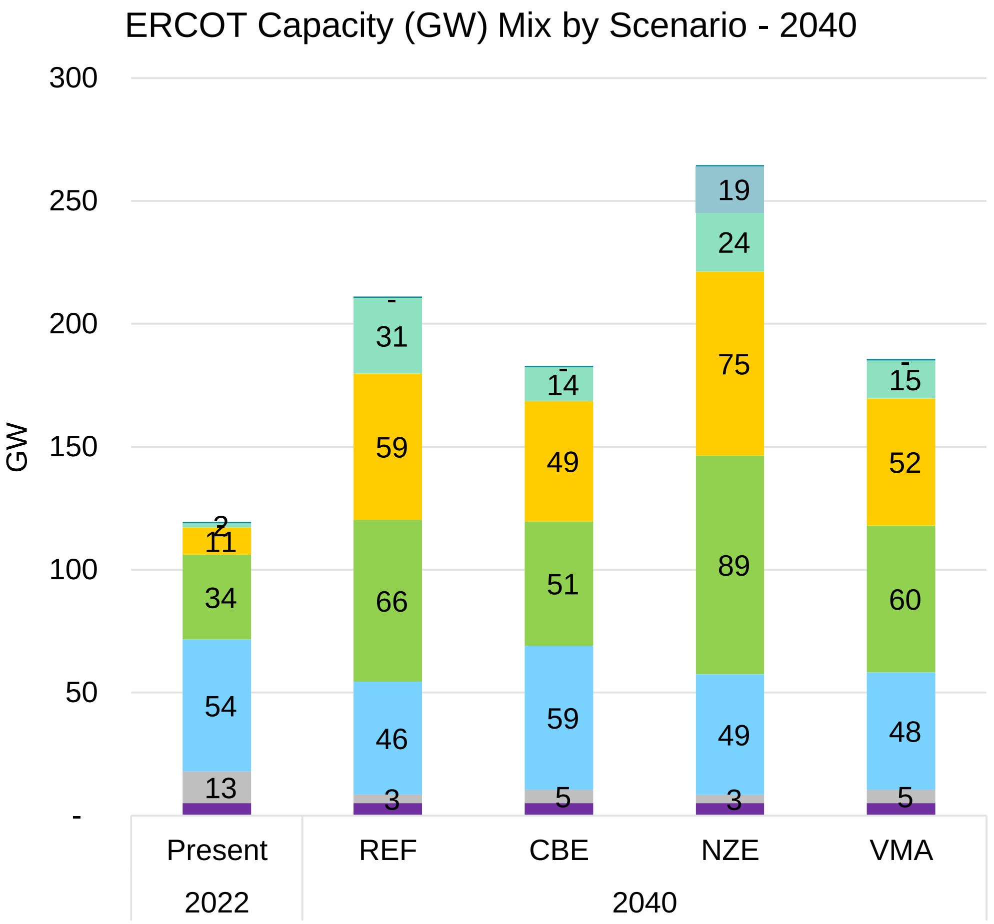
2040 ERCOT Market Capacity (GW) Mix

The model simulation optimizes a least-cost regional capacity expansion plan under each scenario’s input drivers.





Notes:

1. There is limited hydro and hydrogen generation.
2. Geothermal is the low-cost resource option from a long-term capacity expansion perspective in NZE but could be representative of other “baseload” zero-emitting technologies.
3. *Other includes contributions from EE/DR, imports, switchable capacity, capacity from available mothballed plants, and private network capacity. The estimates are included by ERCOT in its Capacity, Demand and Reserves report and have been incorporated for reserve margin modeling purposes.

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APPENDIX D:

TIER 1 METRICS UPDATE
AS OF
AUGUST 31, 2022

(Delivered Monthly to the CPS Energy Board)

FY2023 TIER 1 METRIC SUMMARY
AS OF AUGUST 31, 2022

Tier	Unrecoverable		At Risk		On Track		Achieved		Total Metrics
1	0	0%	3	18.8%	13	81.2%	0	0%	16

FY2023 OUTLIER SUMMARY

Tier 1	Unrecoverable	N/A
	At Risk	Customer Satisfaction - Residential
	At Risk	Enterprise Recordable Incident Rate – (RIR)
	At Risk	Portfolio Commercial Availability – (PCA)

Business Areas are working mitigation plans and assessing ability to bring At-Risk metrics back on target.

FY2023 TIER 1 METRIC REPORT
AS OF AUGUST 31, 2022

Metric Name	Business Unit	Measure Frequency	Unit	Target Indicator	Historical Actuals		Current Year			Year-End Forecast	Latest Estimate
					FY 2021 CY 2020	FY 2022 CY 2021	YTD Target	YTD Actual	Year-End Target		
Enterprise Readiness – Executives	Administration	annually	%	↑	88	83	75	N/A	75	On Track	N/A
Enterprise Recordable Incident Rate - (RIR)	Administration	monthly	#	↓	1.31	1.68	1.41	1.73	1.41	At Risk	1.69
Employee Engagement – Enterprise	Administration	annually	#	↑	4.10	3.99	N/A	N/A	4.04	On Track	N/A
Critical IT System Availability	Business & Technology Excellence (BTE)	monthly	%	↑	99.8	99.9	99.9	99.8	99.5	On Track	99.8
Customer Satisfaction – Residential [1]	Customer Strategy	quarterly	#	↑	83.2	78.9	79.0	77.2	79.0	At Risk	77.9
System Average Interruption Duration Index (SAIDI) [1]	Energy Delivery Services	monthly	#	↓	56.85	67.68	42.18	38.59	63.70	On Track	58.64
System Average Interruption Frequency Index (SAIFI) [1]	Energy Delivery Services	monthly	#	↓	0.93	1.01	0.65	0.59	0.98	On Track	0.92
Portfolio Commercial Availability [1]	Energy Supply	monthly	%	↑	93.9	77.1	88.9	79.7	88.9	At Risk	79.6
Adjusted Debt Service Coverage	Financial Services	monthly	#	↑	1.59	1.66	1.98	2.07	1.79	On Track	1.83
Capital Budget (Gross of CIAC)	Financial Services	monthly	$	↓	630.8	689.5	439.3	405.5	832.9	On Track	808.0
Debt Capitalization	Financial Services	monthly	%	↓	60.5	61.6	62.3	60.8	61.7	On Track	61.2
Days Cash on Hand	Financial Services	monthly	#	↑	209	182	160	124	170	On Track	160
Enterprise Senior Lien Bond Ratings[2]	Financial Services	monthly	#	=	1	0	1	1	1	On Track	1
O&M Budget	Financial Services	monthly	$	↓	654.9	618.5	396.8	389.2	729.7	On Track	732.2
Gas System Growth	Gas Solutions	monthly	%	↑	2.33	1.97	1.05	1.09	1.85	On Track	1.85
Environmental Compliance Issues - NOE & NOV (Category A & B) Enterprise	Legal & General Counsel	monthly	#	↓	1	0	0	0	0	On Track	0

[1] These Metrics are measured on a calendar year cycle for industry comparison purposes
[2] A measure of the senior lien bond ratings as measured by Fitch, Moody's, and Standard & Poor's (Fitch = AA-, Moody's = Aa2, Standard & Poor's = AA-) such that "1" represents the maintenance of current ratings, a "2" (or "0") indicates an upgrade (or downgrade) in one or more ratings.

KEY FINANCIAL METRICS

REVISED FORECAST VS. BUDGET (AS OF AUGUST 31, 2022)

	Threshold	FY2023 Budget	FY2023 Forecast	Variance Favorable (Unfavorable)
Debt Service Coverage Ratio	1.50	1.79	1.83	0.04
Debt Capitalization Ratio	<60%	61.66%	61.15%	0.51%
Days Cash On Hand	150	170	160	(10)

All metrics forecasted to remain at acceptable levels. DCOH forecasted to be below plan but above Credit Rating Agency threshold of 150 (driven by higher receivables and lower wholesale margin).

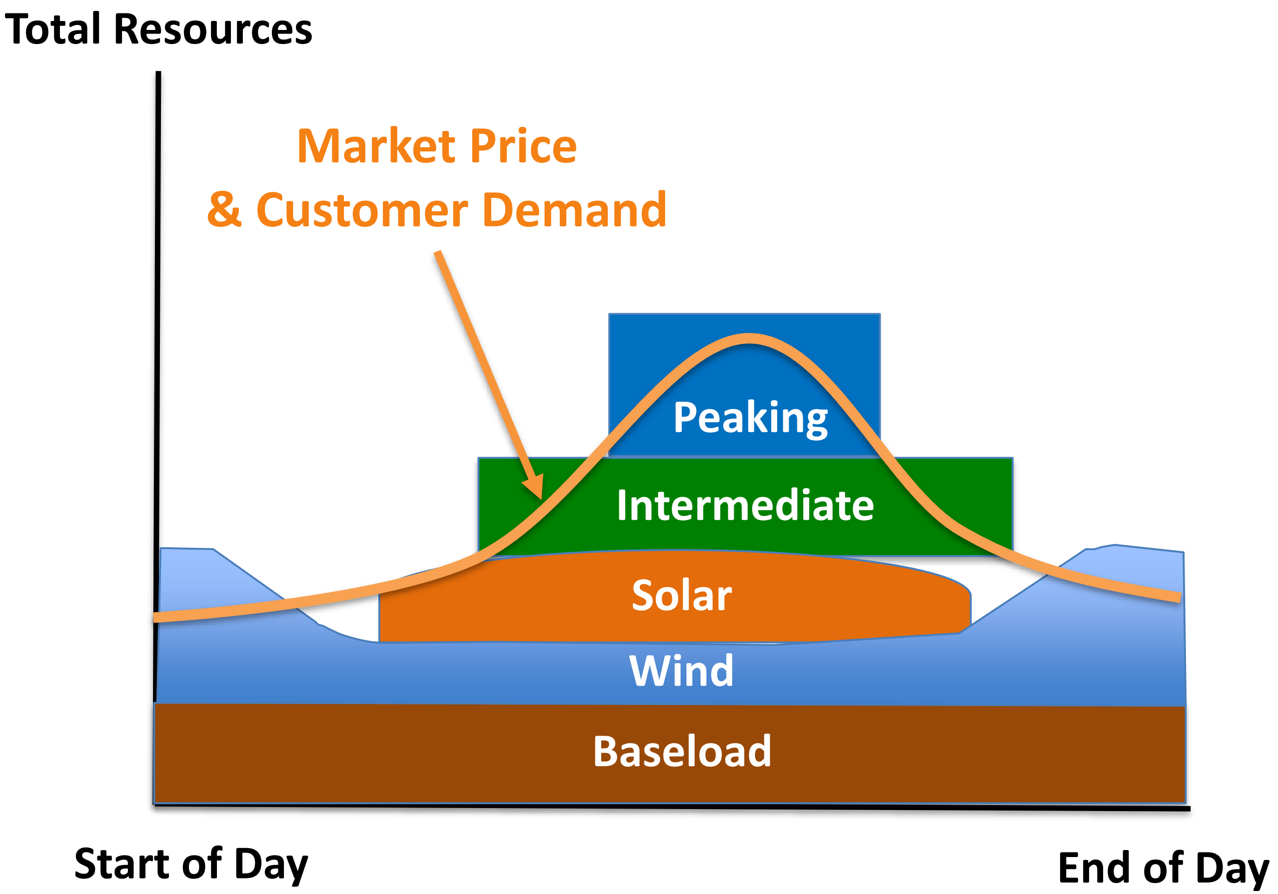
APPENDIX E

GENERATION UTILIZATION UPDATE

October 14, 2022

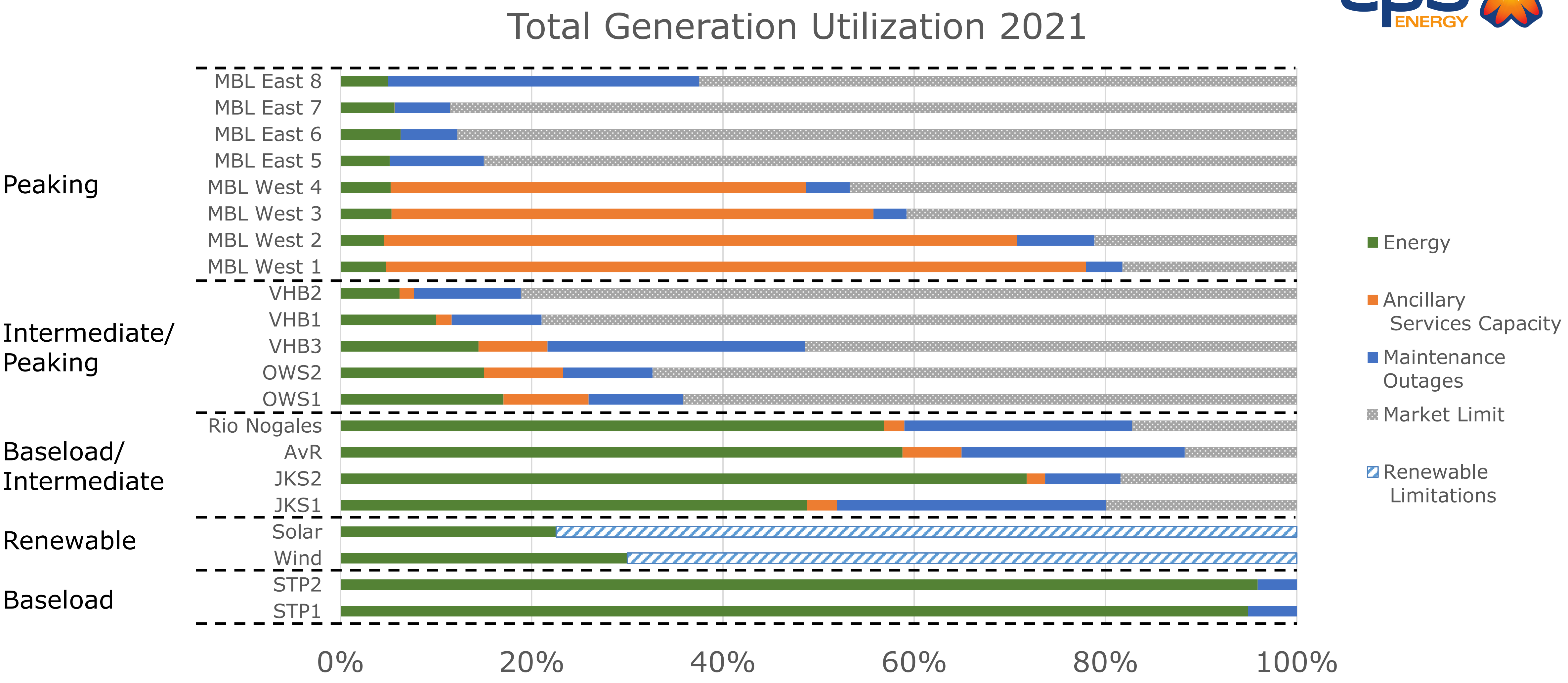
GENERATION TYPES

- **Peaking Generation**: To minimize capacity shortages and costs over short periods of time
- **Intermediate Generation**: To balance the resource needs of the system between peak and baseload on a daily basis.
- **Renewable Generation**: To minimize emissions & energy costs over long periods of time
- **Baseload Generation**: To minimize fuel & energy costs over long periods of time



An array of generation types, that balance cost & performance, is used to reliably meet customer demand & manage risk.

TOTAL GENERATION UTILIZATION 2021



The total utilization for Energy & Ancillary Services of each generation resource is dependent on customer load limitations and the market. Renewable output depends on the time of day, season, and weather patterns.

UTILIZATION – KEY FACTORS

Referring to the "*Total Generation Utilization 2021*" chart:

- Baseload, Intermediate, & Peaking Resources:
  - ➢Consist of nuclear, coal, and gas technologies
  - ➢100% Utilization = Energy + Ancillary Service + Maintenance Outages + Market Limit
- Renewables:
  - ➢100% Utilization = Energy + Renewable Limitations

UTILIZATION – KEY FACTORS

- Energy Utilization:
  - ➢Initial energy utilization was presented to the RAC at Jan & May 2022 meetings – additional context is included herein
  - ➢*Customer demand* drives *power generation plant* utilization
    - ➢Customer demand utilization ranges from 55% to 60%
  - ➢Competitive wholesale *market prices* also drive power plant energy utilization
    - ➢Generally, generators bid variable costs (fuel* & variable O&M)
  - ➢Generation units are primarily dispatched (started and run) based on variable cost
    - ➢The least expensive plants run the most, minimizing cost to customers
  - ➢Customer demand *profile* and *market prices* vary by hour, day, night, & season**

* Fuel cost is a function of fuel price & plant fuel efficiency.

** In addition, electric supply must be produced & delivered in "real time" to meet demand because electricity cannot be stored in large enough quantities.

UTILIZATION – KEY FACTORS
PAGE 3 OF 4

- Energy Utilization:
  - To "manually" increase utilization would result in higher cost to customers
  - To shut down plants with low utilization rates will expose our customer demand to wholesale market prices & potentially high price spikes

UTILIZATION – KEY FACTORS
PAGE 4 OF 4

- Ancillary Service Utilization
  - Generation resources are needed for “capacity” for responding quickly to changing grid conditions, i.e. the units usually do not run
- Maintenance Outages
  - Consists of planned and unplanned maintenance outages
- Market Limit
  - Key drivers that determine the limit: Customer demand hourly profile, market prices, and generation technology
- Renewable Limitations
  - Renewable output depends on the time of day, season, weather patterns, & market limits

UTILIZATION BY GENERATION TYPE

Generation Type	Utilization	
	Energy	Ancillary Services
Peaking	5% to 25%	Frequently used
Intermediate	25% to 75%	Frequently used
Renewable (Solar & Wind)	25% to 45%	Not used due to intermittent output
Baseload	75% to 100%	Can be limited (resource dependent)

When operating, generation resources are constantly optimized considering many variables.

The energy utilization ranges for baseload, renewable, intermediate & peaking generation; are typical numbers commonly seen across the electric utility industry.

ENERGY UTILIZATION CY2027 FORECAST

Generation Type	Generation Technology	Energy Utilization
Peaking - Existing	Aeroderivative Combustion Turbine	7%
Peaking - ***New***	Reciprocating Internal Combustion Engine (RICE)	13%
Intermediate - Existing	Combined Cycle: F-Class	40%
Intermediate - ***New***	Combined Cycle: H-Class	57%

Utilization will typically be higher for new technologies if they have better efficiency than existing units.

Note: CY 2027 capacity factor forecast is per Reference Scenario – Portfolio P2 (Blend 1)

KEY TAKEAWAYS

- Customer demand profile and market prices drive energy utilization in the power generation industry
- The energy utilization ranges for baseload, renewable, intermediate & peaking generation; are typical numbers commonly seen across the electric utility industry
- Utilization will typically be higher for new technologies if they have better efficiency than existing units
- To "manually" increase utilization would result in higher cost to customers
- To shut down plants with low utilization rates will expose our customer demand to wholesale market prices & potentially high price spikes

APPENDIX

RESOURCE NAME & TYPE
CONVENTIONAL TECHNOLOGIES

Resource Name	Short Name	Capacity (MW)	Type/Fuel
SOUTH TEXAS 1	STP1	517	Baseload/Nuclear
SOUTH TEXAS 2	STP2	512	Baseload/Nuclear
J K SPRUCE 1	JKS1	560	Baseload/Intermediate/Coal
J K SPRUCE 2	JKS2	785	Baseload/Intermediate/Coal
A VON ROSENBERG 1	AvR	518	Baseload/Intermediate/Gas Combined Cycle (CC)/Gas
RIO NOGALES	Rio Nogales	777	Baseload/Intermediate/Gas Combined Cycle (CC)/Gas
O W SOMMERS 1	OWS1	420	Intermediate/Peaking/Gas Steam
O W SOMMERS 2	OWS2	410	Intermediate/Peaking/Gas Steam
V H BRAUNIG 1	VHB1	217	Intermediate/Peaking/Gas Steam
V H BRAUNIG 2	VHB2	230	Intermediate/Peaking/Gas Steam
V H BRAUNIG 3	VHB3	412	Intermediate/Peaking/Gas Steam
MILTON LEE PEAKING 5	MBL East 5	48	Peaking/Gas Combustion Turbine (CT)/Gas
MILTON LEE PEAKING 6	MBL East 6	48	Peaking/Gas Combustion Turbine (CT)/Gas
MILTON LEE PEAKING 7	MBL East 7	48	Peaking/Gas Combustion Turbine (CT)/Gas
MILTON LEE PEAKING 8	MBL East 8	47	Peaking/Gas Combustion Turbine (CT)/Gas
MILTON LEE PEAKING 1	MBL West 1	46	Peaking/Gas Combustion Turbine (CT)/Gas
MILTON LEE PEAKING 2	MBL West 2	46	Peaking/Gas Combustion Turbine (CT)/Gas
MILTON LEE PEAKING 3	MBL West 3	46	Peaking/Gas Combustion Turbine (CT)/Gas
MILTON LEE PEAKING 4	MBL West 4	46	Peaking/Gas Combustion Turbine (CT)/Gas
	Total	5,733	

RESOURCE NAME & TYPE

RENEWABLE TECHNOLOGIES

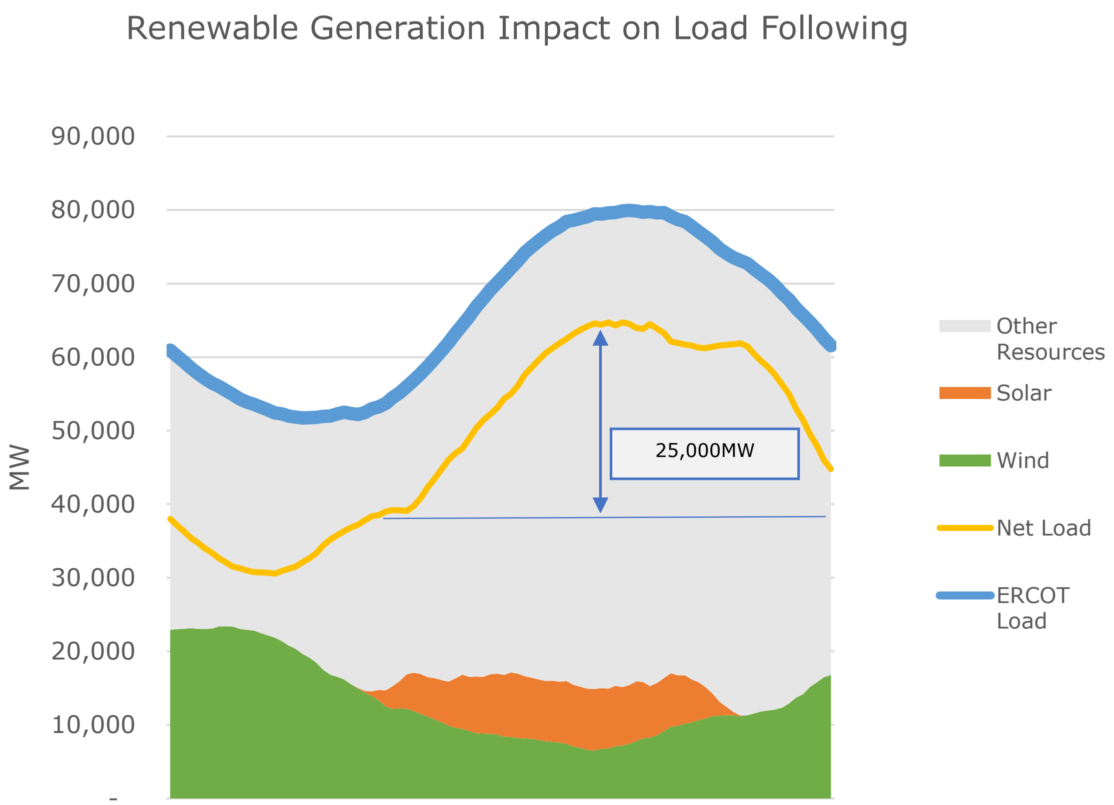
Resource Name	Capacity Maximum Capability (MW)	Capacity at Summer Peak (MW)	Type
Desert Sky Wind Farm	63.4	12.7	Wind
Cottonwood Creek Wind Farm	82.6	16.5	Wind
Sweetwater 4	240.8	48.2	Wind
Penascal	76.8	43.8	Wind
Papalote Creek	130.4	74.3	Wind
Cedro Hill	150.0	30	Wind
Los Vientos	200.1	114.1	Wind
Blue Wing	13.9	7	Solar
Sinkin 1	9.9	5	Solar
Sinkin 2	9.9	5	Solar
Somerset	10.6	5.3	Solar
CEC_Beck (Community Solar)	1.0	0.5	Solar
Alamo 1	39.2	19.6	Solar
St. Hedwig (Alamo 2)	4.4	2.2	Solar
Eclipse (Alamo 4)	39.6	19.8	Solar
Walzem (Alamo 3)	5.5	2.8	Solar
Helios (Alamo 5)	95.0	47.5	Solar
Solara (Alamo 7)	106.4	53.2	Solar
Sirius 1 (Alamo 6)	110.2	55.1	Solar
Sirius 2 (Pearl)	50.0	25	Solar
Lamesa 2 (Ivory)	50.0	25	Solar
Commerce PV	5.0	2.5	Solar
Commerce BESS	10.0	10.0	Storage
Covel Gardens	9.6	7.3	Landfill Gas
Nelson Gardens	4.2	3.2	Landfill Gas

Type	Summer Peak Contribution (% of Max. Capacity)
Nuclear, Coal, Gas, & Storage	100%
West Wind	20%
Coastal Wind	57%
Solar	50%
Landfill Gas	76%

Type	Total (MW)	Total Summer (MW)
Wind	944.1	339.6
Solar	550.6	275.5
Storage	10.0	10.0
Landfill Gas	13.8	10.5
	1519	635.6

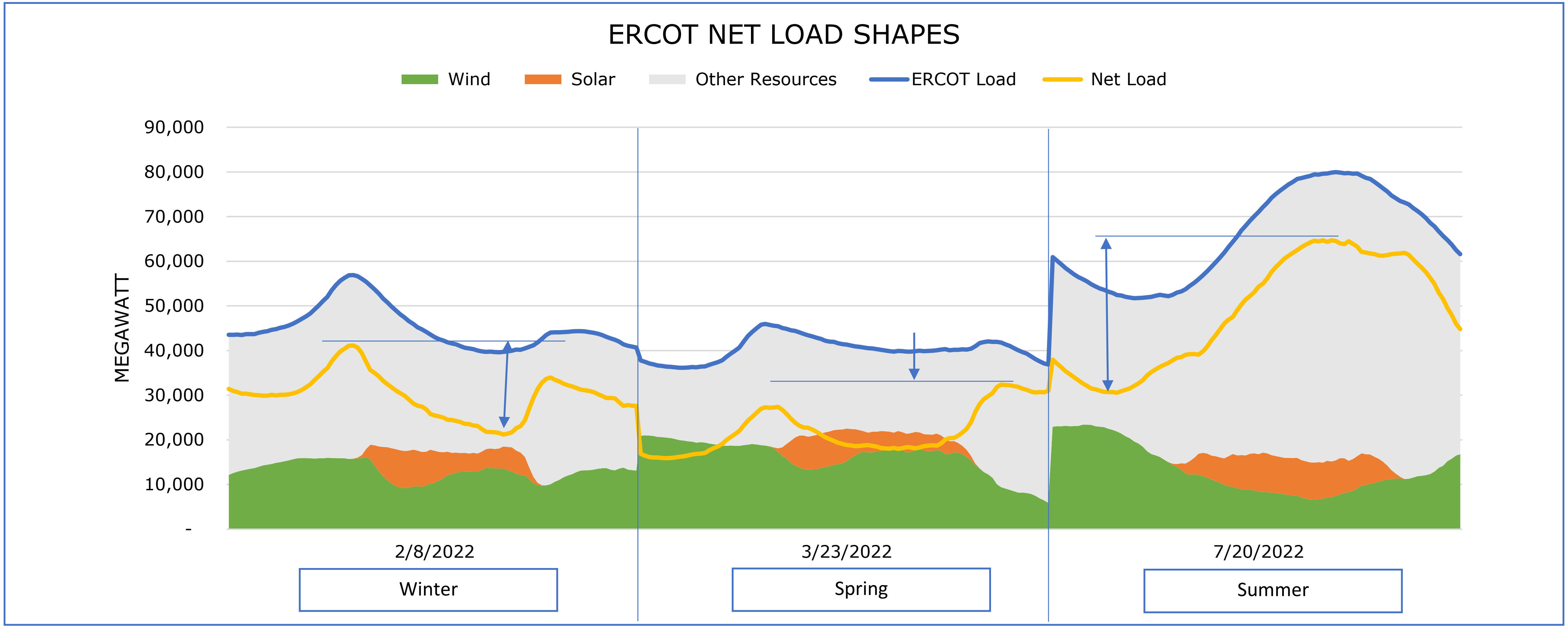
LOAD-FOLLOWING POWER PLANTS

- Flexible and controllable (dispatchable)
- Load-following power plants usually run during the day and early evening and are operated in direct response to changing demand for power supply.
- They either shut down or greatly curtail output during the night and early morning, when the demand for electricity is the lowest.



Daily large variations in demand require a large load following or peaking power plant capacity.

ERCOT NET LOAD
IMPACT OF RENEWABLE GENERATION



Renewable generation variations can cause net load ramps greater than the load and impacts generation utilization. Peaks can occur at different times.

Net Load = Load minus renewable generation, i.e. the load to be served by other resources