



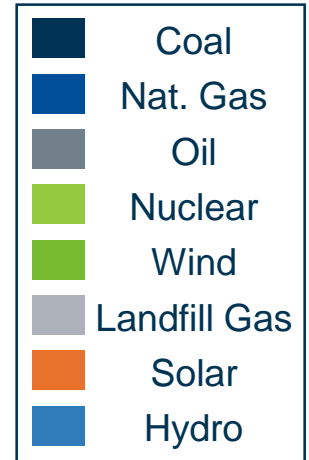
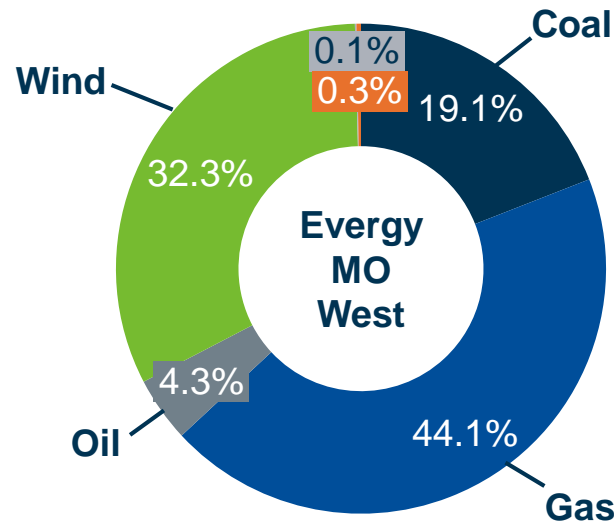
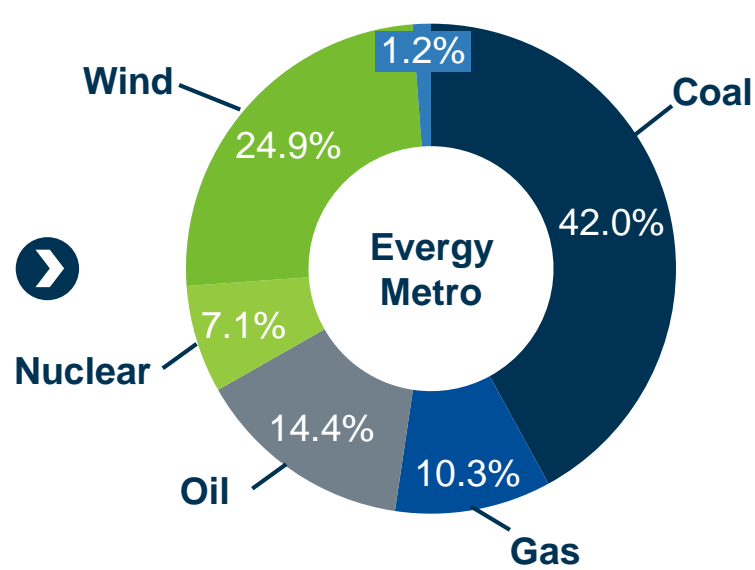
Evergy Integrated Resource Planning

Kayla Messamore, VP Strategy & Long-term Planning
October 4, 2023

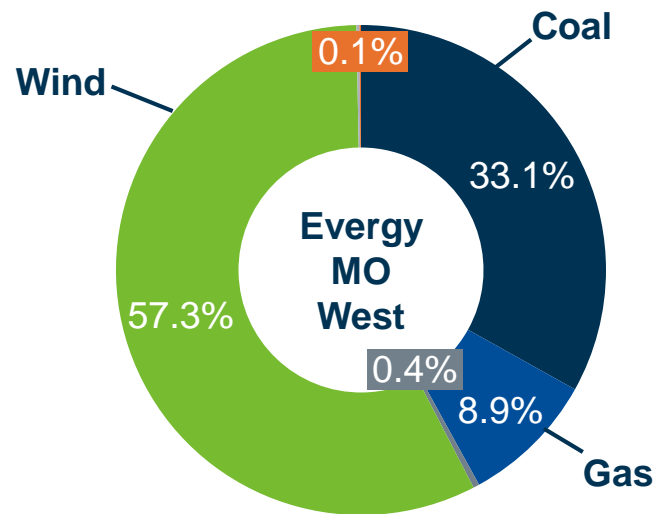
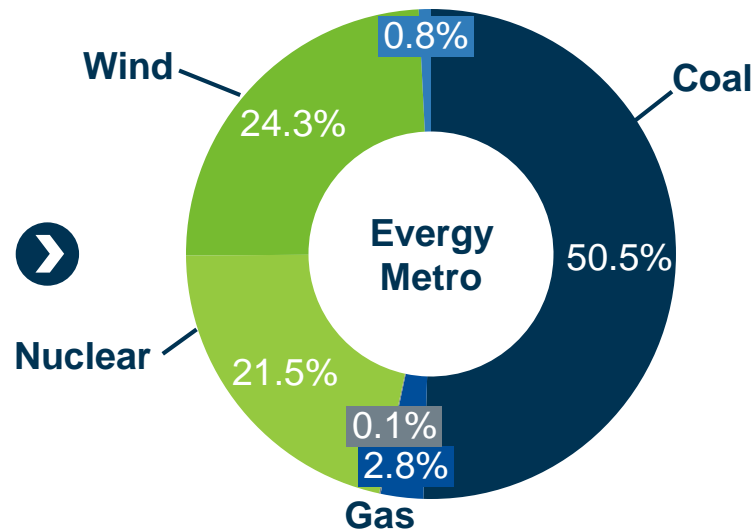


Capacity & Energy Profiles

Capacity ➔



Energy ➔



Core Tenets of Evergy's Generation Strategy





What is an Integrated Resource Plan?

- Long-term plan for supply- and demand-side resources to meet forecasted customer needs – Triennial Filing every three years with annual updates every year
- The IRP process ultimately results in the selection of a Preferred Plan
- Preferred Plan contains expected retirements, demand- and supply-side additions over the 20-year planning horizon
- Preferred Plan is selected using the “minimization of the present worth of long-run utility costs as the primary selection criterion” (Net Present Value of Revenue Requirement or NPVRR)
- This assessment is informed by risk analysis of potential uncertain factors which could ultimately impact long-run utility costs (e.g., NPVRR is calculated across a variety of market price scenarios which vary based on gas price and carbon restrictions)

Evolving Planning Dynamics

- Capacity and Energy Requirements
- Commodity Prices
(primarily natural gas)
- Carbon Restrictions / Other Regulations
- Relative Technology Economics

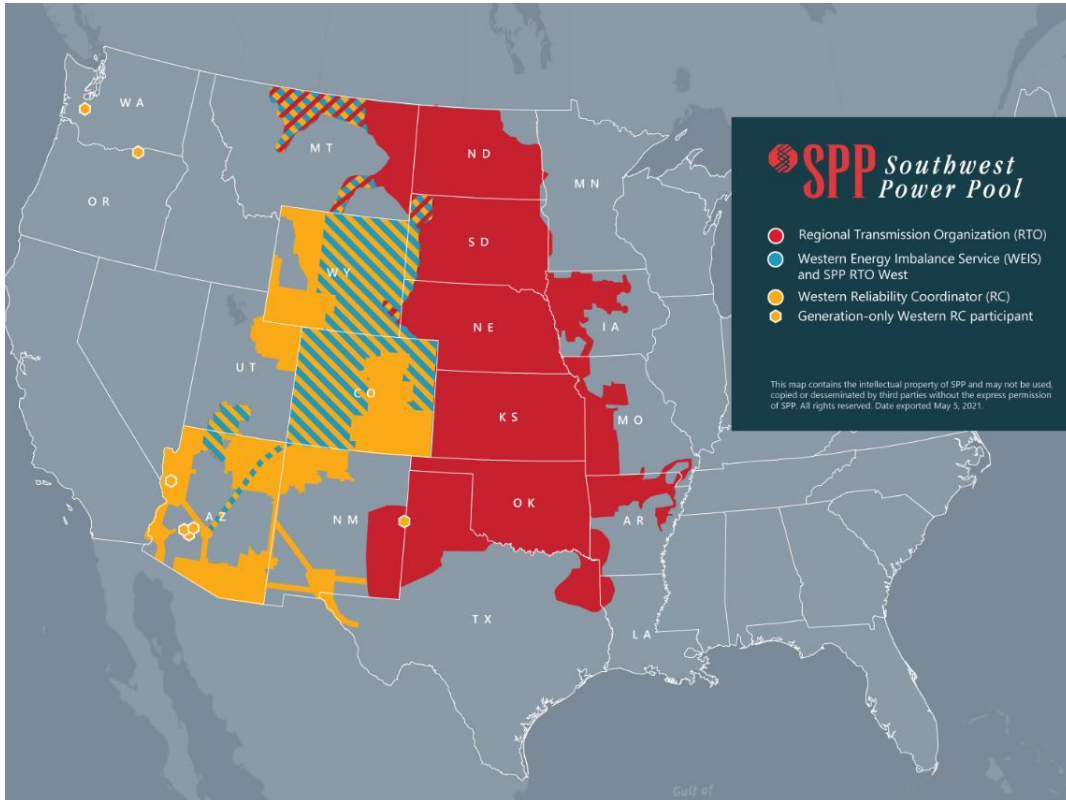


Changes reflected in 2023 Annual Update

- Updated market pricing reflecting latest SPP transmission planning model assumptions of future resource mix and potential transmission congestion
- Updated fuel price forecasts, including high, mid, and low natural gas price scenarios
- Carbon Dioxide emissions limitations scenarios reflecting future environmental risks, including high, mid, and low (no) restrictions
- Updated cost estimates and timing assumptions for resource additions based on First Quarter 2023 Request for Proposal (RFP) results
- Modeling of battery storage and hybrid resources as supply-side options
- Inclusion of incentives for new renewable and storage resources based on Inflation Reduction Act
- Updated load forecasts including large new customers in both Missouri and Kansas, and considerations for future large customer growth based on existing economic development pipeline
- Updated demand side management potential study, including four Missouri program options
- Included possible reductions in peak demand from Missouri Commission-ordered mandatory time of use rates
- Updated planning reserve margin consistent with SPP rule changes enacted in 2022
- Increased focus on planning for utility-level (as opposed to Evergy-level) resource needs to better identify each utility's specific energy and capacity needs in the future, reduced level of assumed market availability (for both capacity and energy) and reliance on other Evergy affiliates to meet long-term customer needs
- Removal of Persimmon Creek wind farm (due to the company not advancing the project further in the Missouri West jurisdiction)
- Expanded use of PLEXOS software for production cost modeling and capacity expansion, which was first implemented for 2022 IRP
- Annual refresh of data for existing generators (Capital and Operations & Maintenance costs)

Southwest Power Pool Overview

- SPP dates back to December 16, 1941 when 11 utility companies banded together to provide power to an aluminum plant as the US entered WWII
- Legacy Energy companies' joined date
 - Kansas Gas & Electric (12/16/41) – 1 of 11 original members
 - Westar Energy (10/23/58)
 - Kansas City Power & Light (10/23/58)
 - KCP&L Greater Missouri Operations (11/10/93)
- In March 2014 SPP established its “Integrated Marketplace” and took over balancing authority responsibility
- Key statistics – peak demand record (summer); peak demand record (winter)
 - Peak demand record (summer): 56,184 MW (8/21/23)
 - Peak demand record (winter): 47,157 MW (12/22/22)
 - Generating nameplate capacity (as of 7/18/23): 98,793 MW
 - Transmission miles: 70,025





Interactions With SPP

Market Operations

- SPP develops market rule changes in collaboration with stakeholder groups (including Evergy) and seeks FERC approval
- SPP maintains and operates market engine and processes for energy, ancillary, congestion rights

Transmission Operations

- As Reliability Coordinator, responsible for maintaining reliability of transmission system
- Evergy Transmission Operations coordinates with SPP on real-time transmission operations and submits planned transmission outages for approval

Transmission Planning

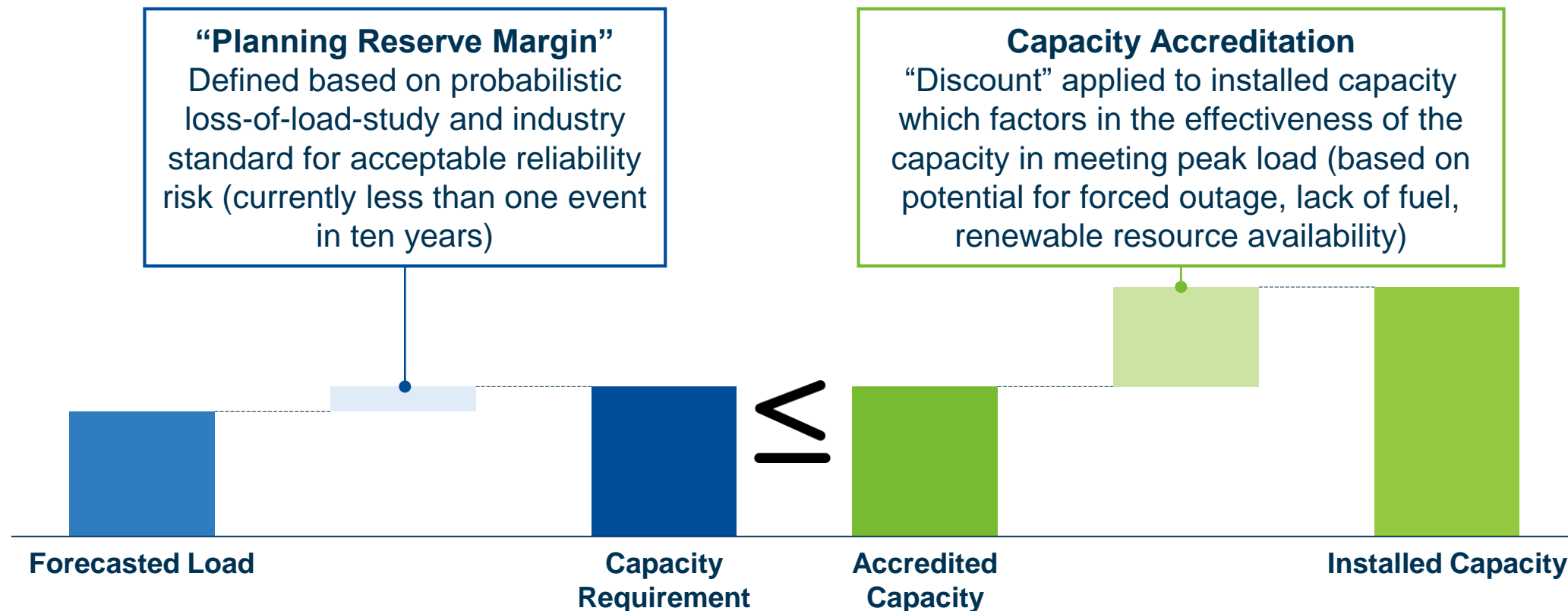
- SPP conducts annual Integrated Transmission Planning as well as load / generation interconnection and transmission service studies
- Evergy provides model inputs, projects and cost estimates to meet SPP-identified needs

Resource Adequacy

- SPP creates Resource Adequacy Requirements and Evergy complies as Load Responsible Entity

SPP plays a key role in many parts of our operations and can have a large impact on how we plan for the future and how we operate our assets

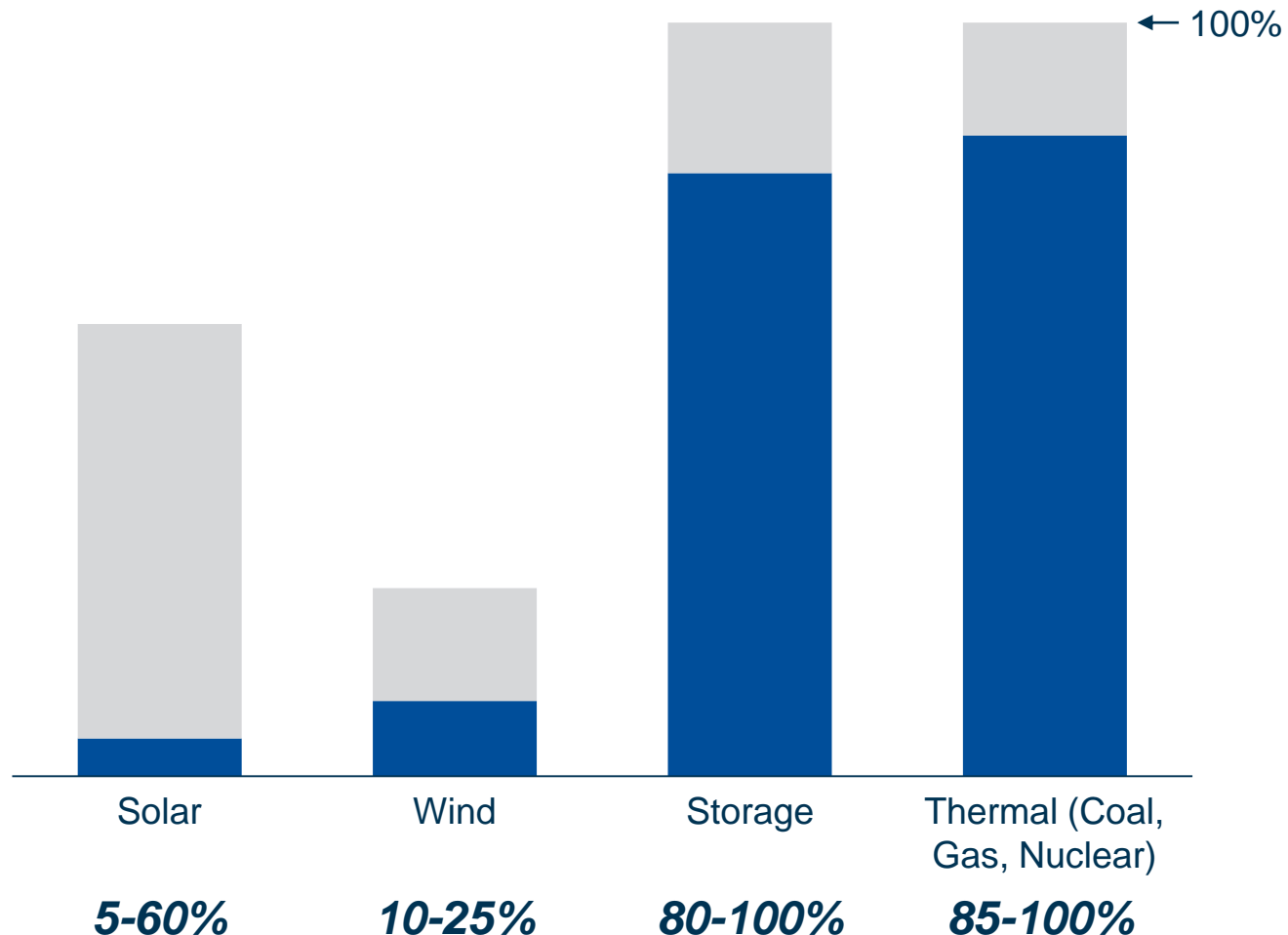
Capacity Requirements



Ultimately, capacity requirements (the need for installed capacity) is driven by expected load, but also by a variety of other reliability risk constructs which all combine to create “Resource Adequacy Requirements”

Capacity Accreditation

Illustrative Range of Capacity Credit (% of Nameplate)

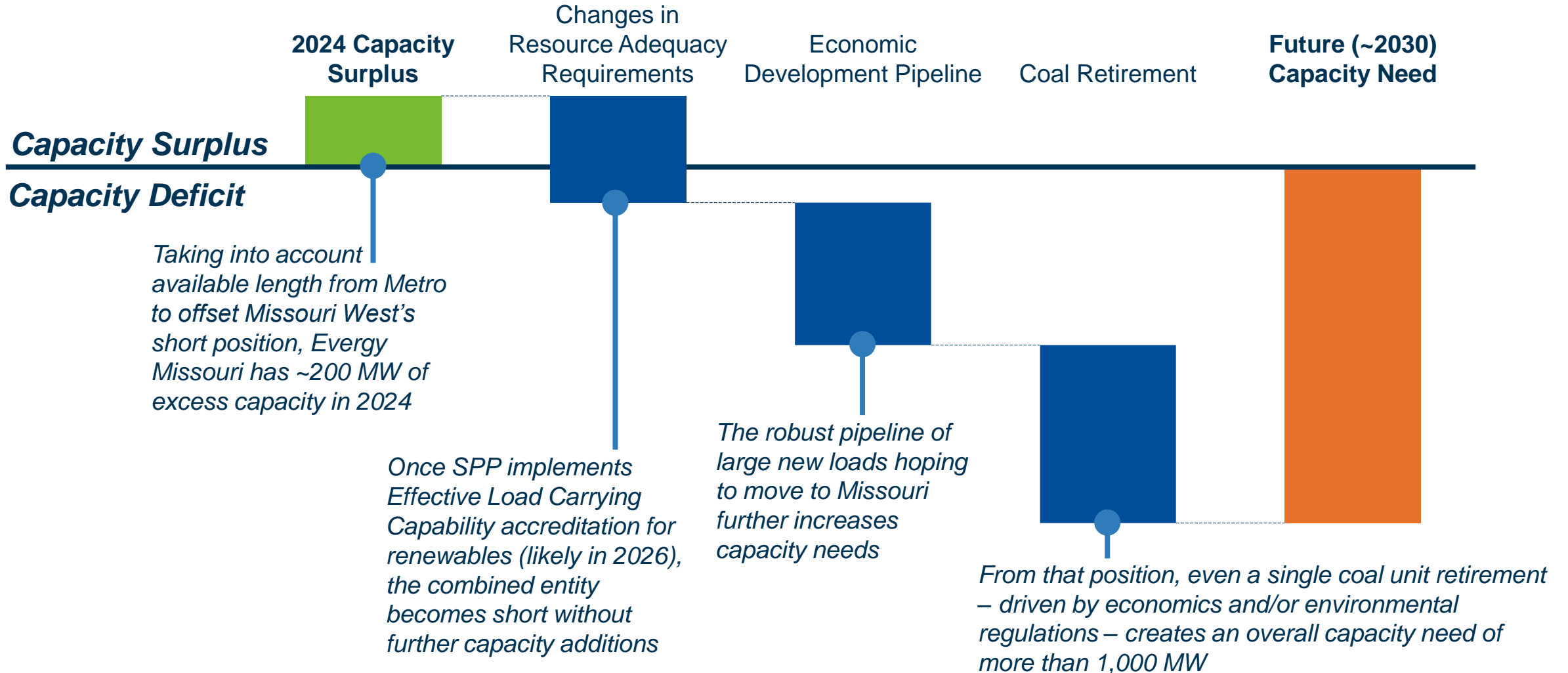


- Capacity Accreditation rules are established by SPP and are the measure of how much a certain MW of generation “counts” toward capacity requirements (can vary by season)
- Expectation is that wind, solar, and storage will all be accredited using Effective Load Carrying Capability (ELCC)
- In parallel, SPP is implementing Performance Based Accreditation for thermal resources which will accredit resources based on their reliability



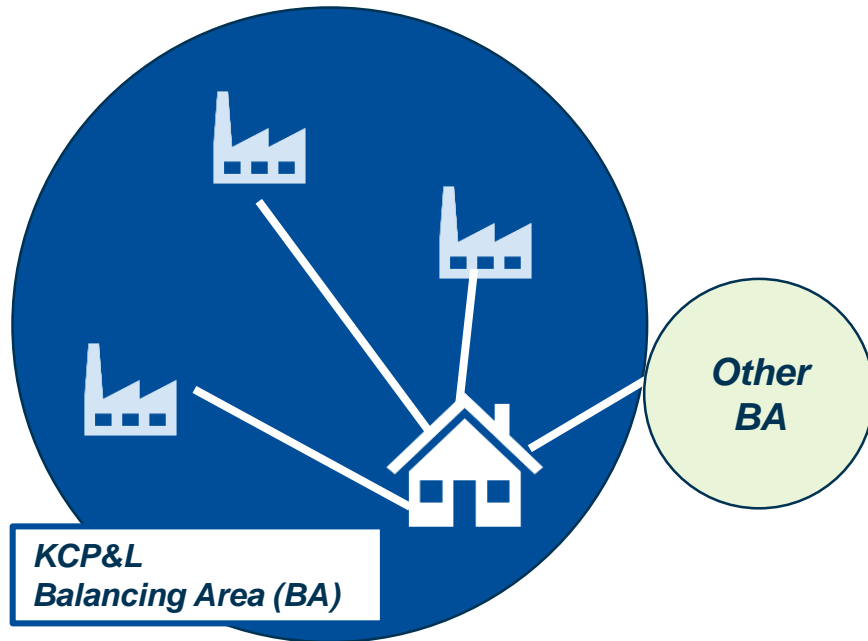
Future Capacity Needs

Indicative Capacity Position



SPP Integrated Market

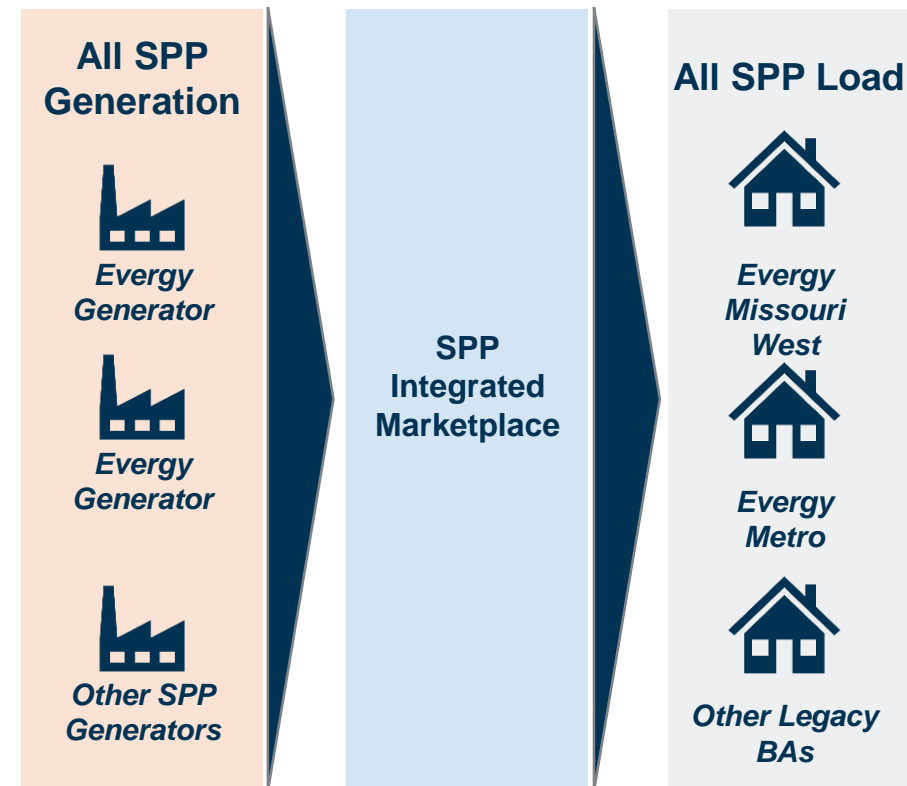
Operations Pre-SPP Integrated Market



Prior to the Integrated Market, it was the responsibility of the individual BA (e.g., KCP&L) to balance real-time generation and load through their own generation and bilateral purchases from other BAs

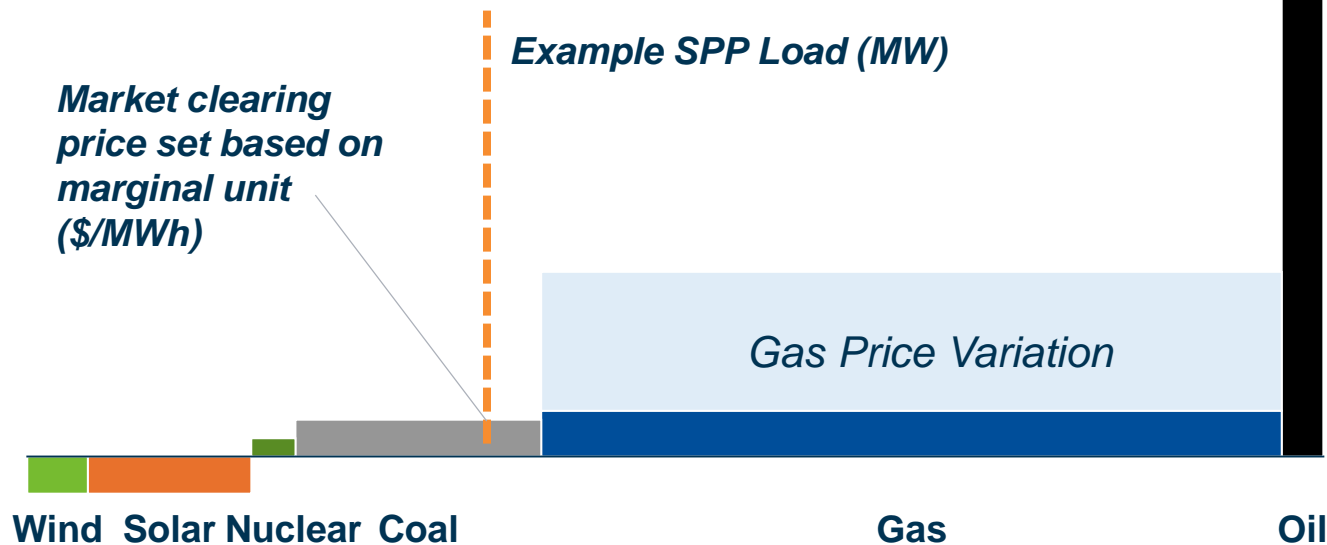
Operations in SPP Integrated Market

In the Integrated Market, SPP is responsible for balancing generation and load. All generators sell into the SPP market and all load is purchased from the market, irrespective of whose load & whose generation it is



SPP Integrated Market

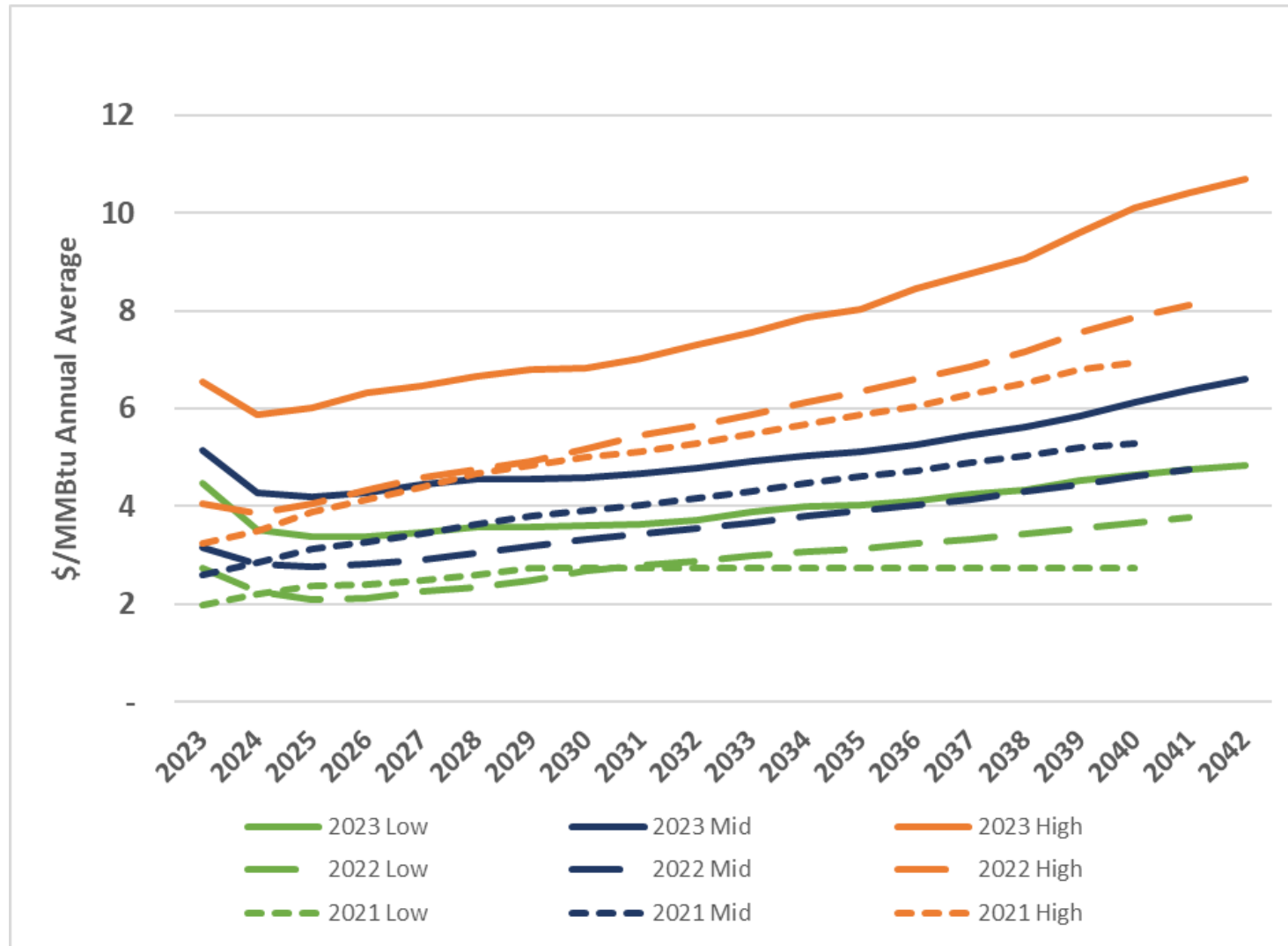
Illustrative SPP Region Supply Curve



SPP Market Mechanics

- Day Ahead hourly market commitments based on “Security Constrained Economic Dispatch” – based on marginal generator costs, transmission constraints, and operational parameters
- Real-Time Balancing Market balances generation and load on 5-minute basis
- Other markets: Ancillary products and transmission congestion rights

Commodity (Natural Gas) Price Forecasts

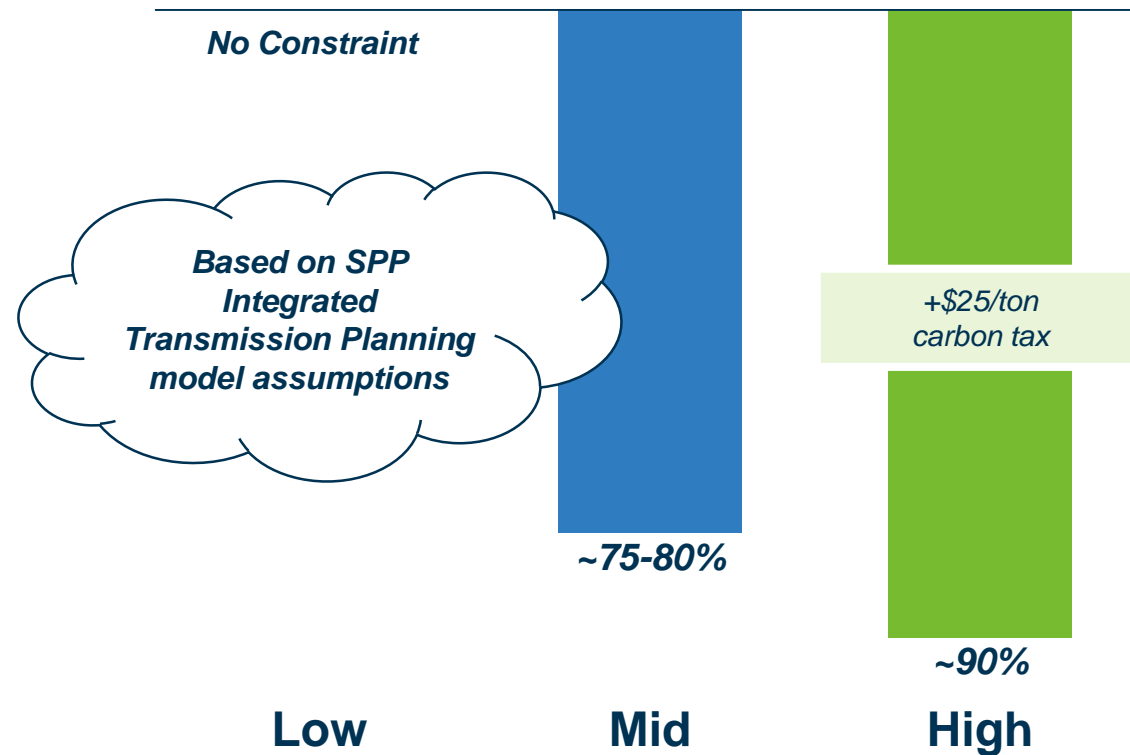




Carbon Restrictions

- Passage of Inflation Reduction Act signaled that progress toward carbon reductions is likely to be “incentive-focused” (promoting clean energy build-out) for the foreseeable future as opposed to “penalty-focused” (taxing emissions)
- In combination, new and proposed Environmental Protection Agency (EPA) regulations focus on restricting emissions from generators without explicit taxes

2023 IRP Carbon Constraint (% Reduction vs 2005 by 2040)



Consistent with SPP’s long-term economic models (and corresponding resource mixes), the 2023 IRP incorporated a carbon restriction as opposed to prior use of CO₂ tax assumptions

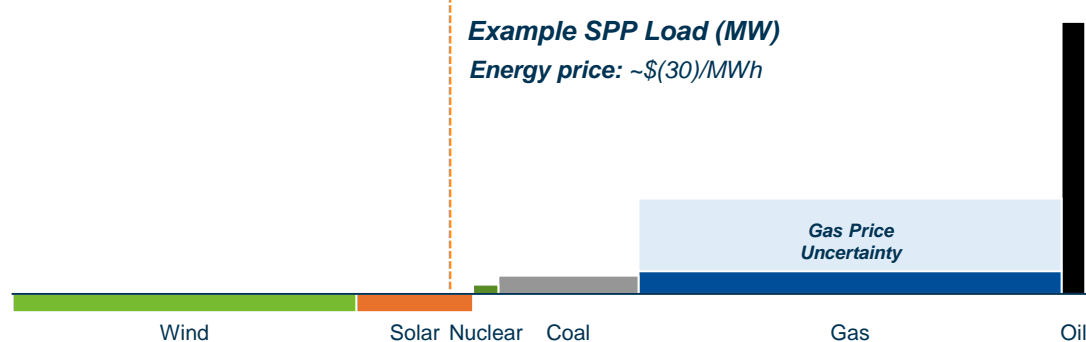


Interdependencies Between Future Scenarios For New Generation And Energy Prices

As renewables are built out based on available tax incentives, it drives overall energy prices negative when renewable resources are sufficient to meet SPP load

Illustrative SPP Region Supply Curve

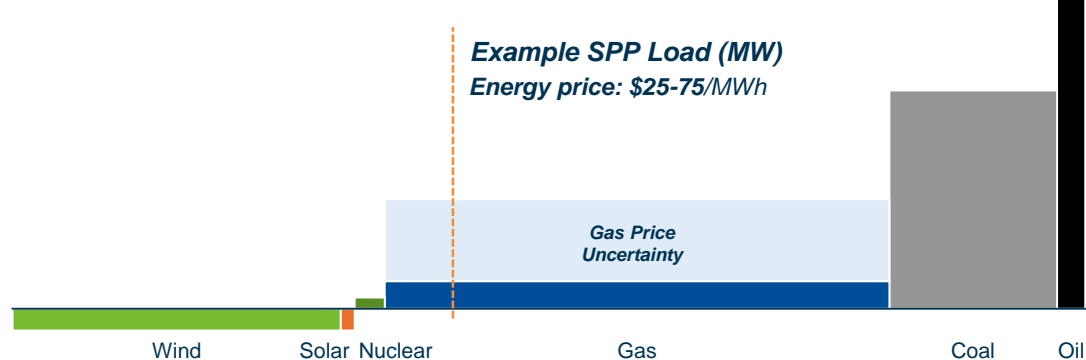
Large renewable build-out and high output¹, no CO₂ restriction, low load



If this is combined with carbon restrictions, this creates significant price volatility as gas becomes a more frequent marginal unit

Illustrative SPP Region Supply Curve

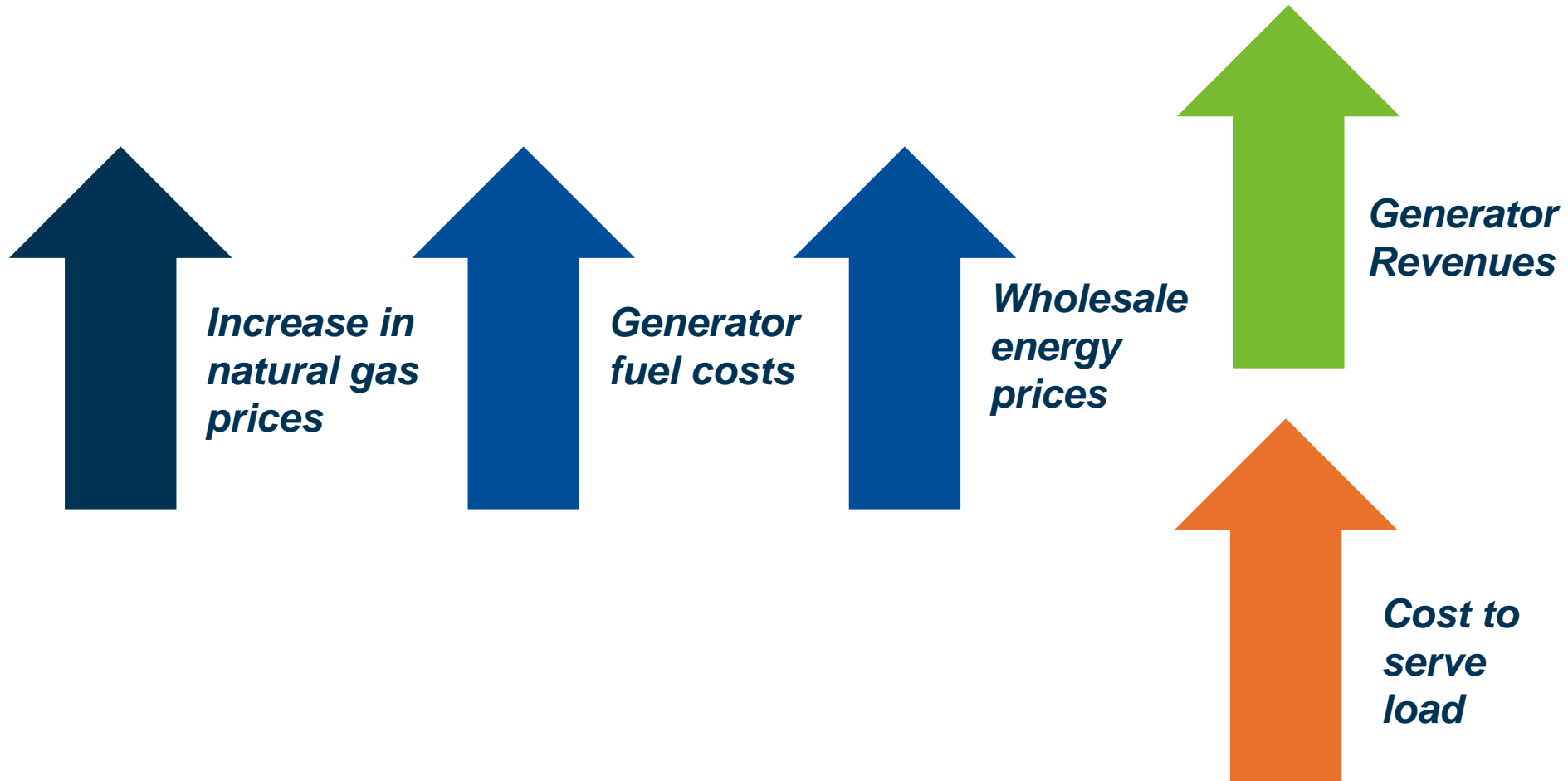
Evening peak (after sundown), high wind output, carbon restriction + high gas price



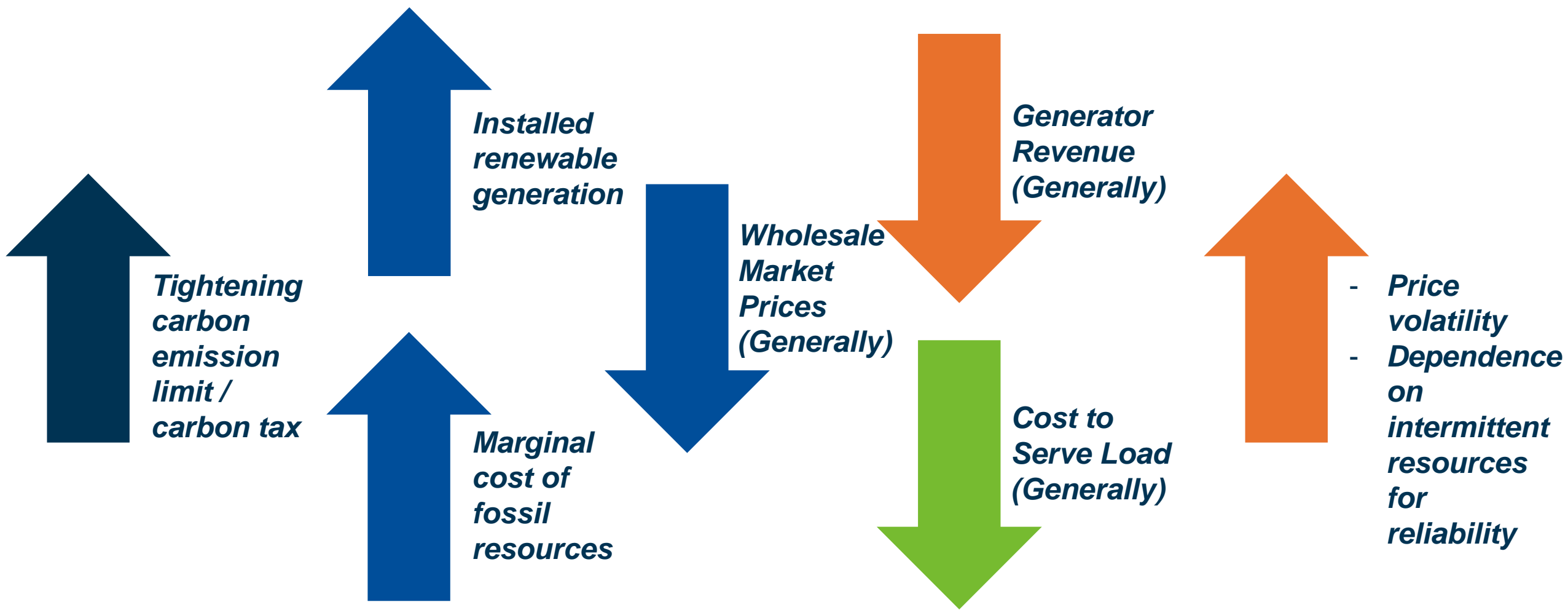
The combination of gas forecasts, carbon restrictions, and expected SPP resource mix all drive expected market prices and generator revenue

1) Future 3 2032 model with renewables assumed at 80% output Pool-wide; assumes mix of Production Tax Credit (PTC) eligible and non-PTC eligible wind

Impact of Commodity Prices on Generation

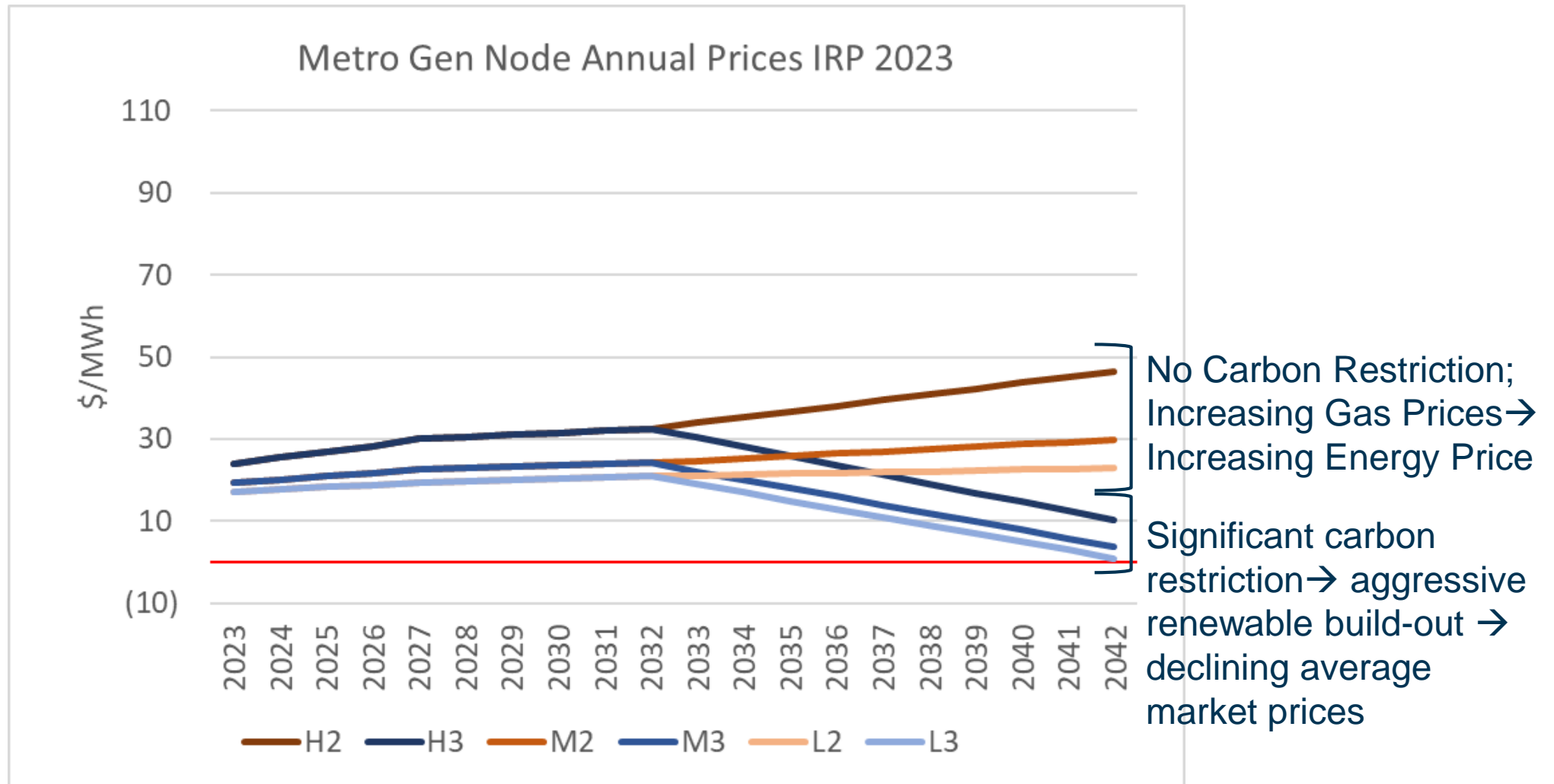


Impact of Carbon Restrictions on Generation





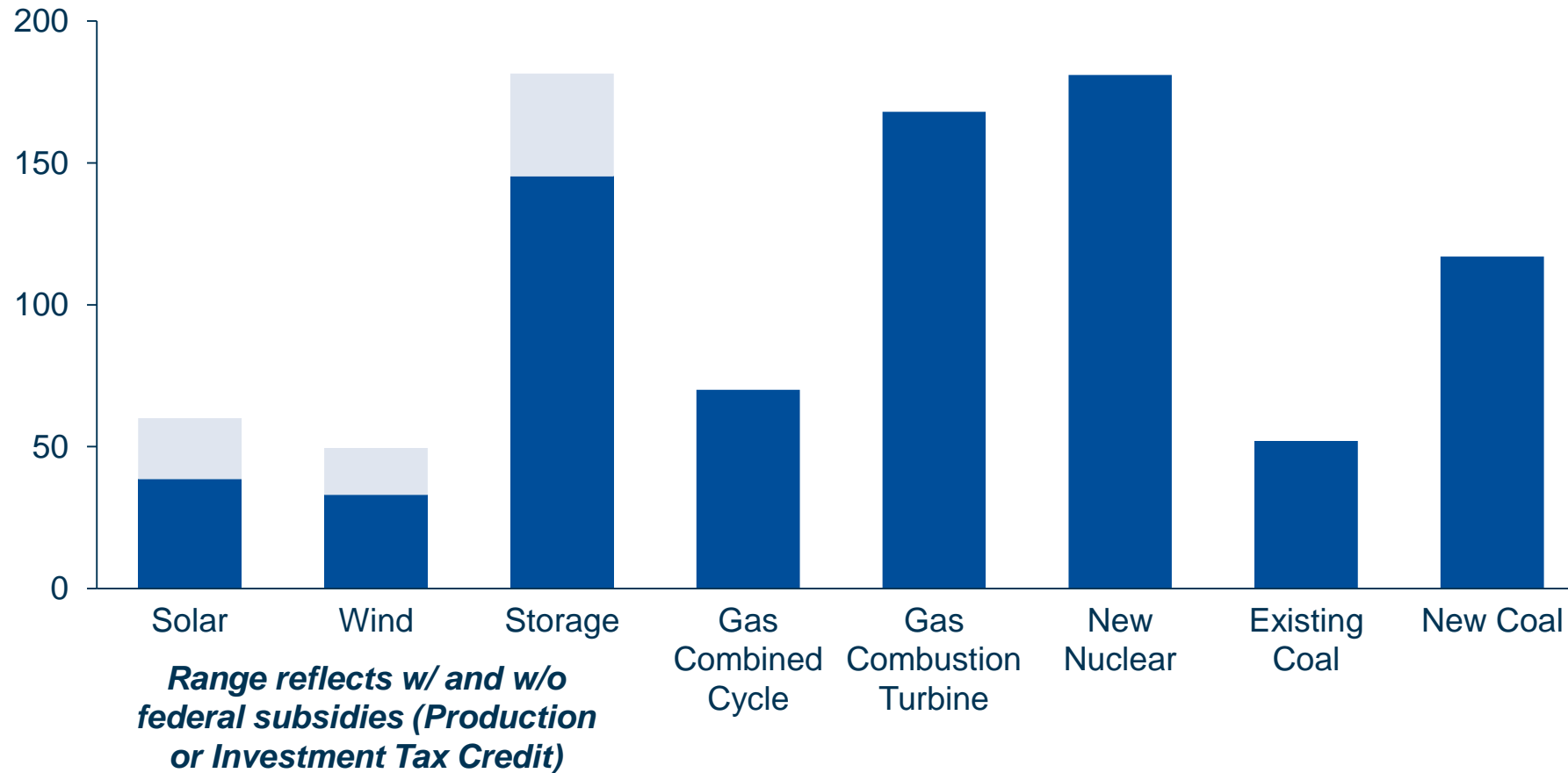
IRP Market Price Forecasts





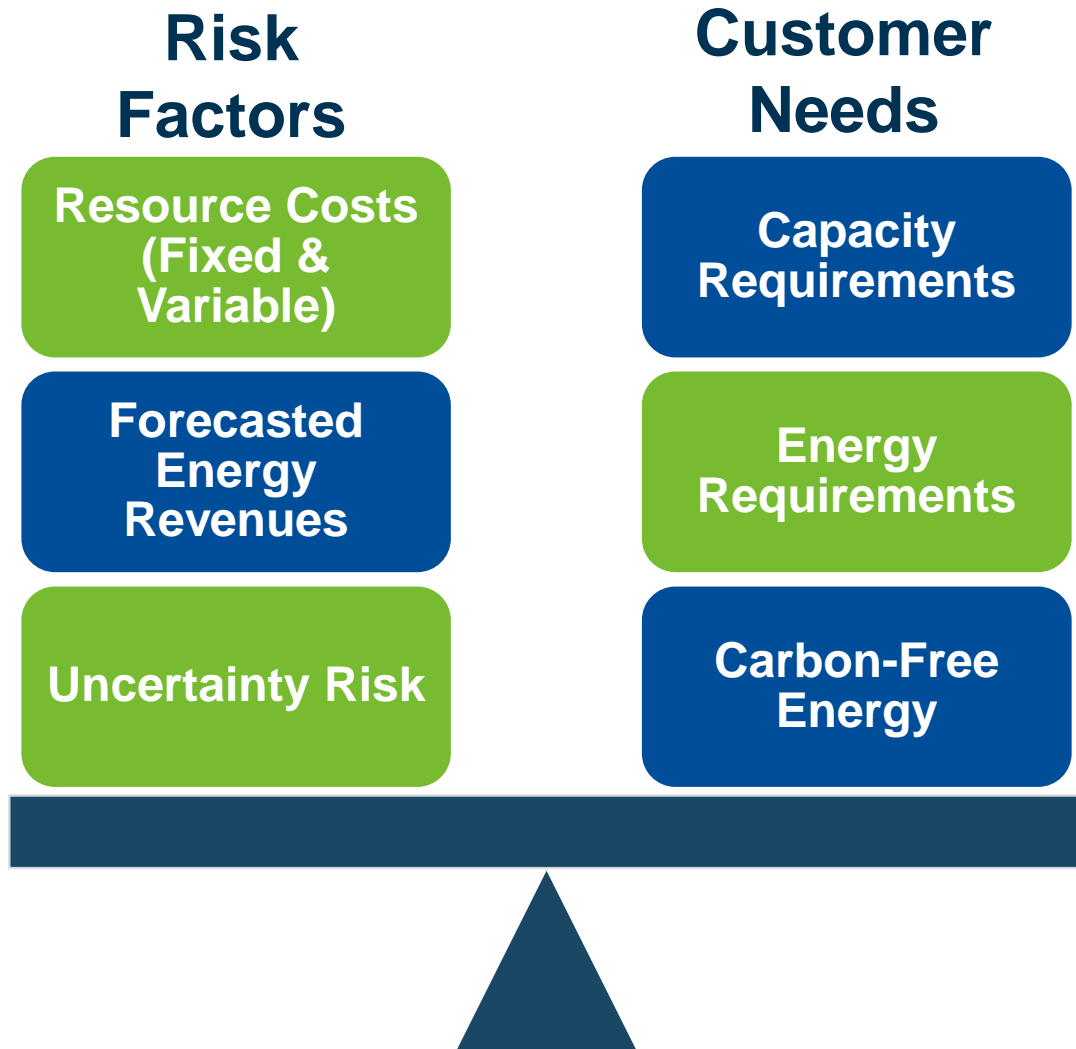
Relative Technology Economics

Lazard Levelized Cost of Energy (\$/MWh)



Source: Lazard 2023 Levelized Cost of Energy Plus Report and Levelized Cost of Storage v 7.0; Values reflect midpoint of Lazard ranges; No subsidized cost for standalone storage was provided so high-level assumption made is that subsidized cost of storage is 80% of unsubsidized cost (after 30% tax credit which impacts a large portion of project costs – consistent with ITC impact to solar costs in Lazard subsidized analysis)

Selecting a Preferred Portfolio



- In an IRP, portfolios are assessed based on 1) how well they meet future customer needs and 2) how well they perform in a variety of scenarios given an uncertain future
- Plans are constructed with an eye to both quantitative (e.g., market price) and qualitative (e.g., future reliability requirements, fuel diversity) risks



Evergy's 2023 Preferred Plans

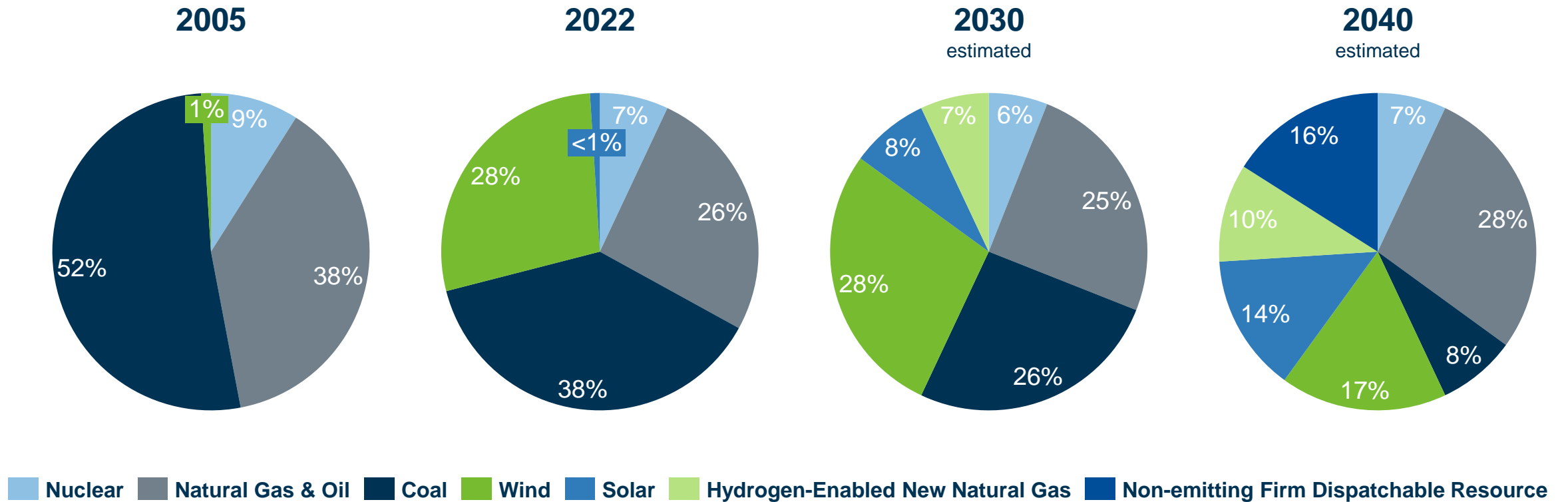
Missouri West Preferred Plan

Year	Wind (MW)	Solar (MW)	Battery (MW)	Thermal (MW)	Capacity Only (Annual MW)	DSM (Annual MW)	Retirements (MW)
2023	0	0	0	0	0	73	0
2024	0	0	0	143	110	81	0
2025	0	0	0	0	94	128	0
2026	0	0	0	0	67	164	0
2027	0	150	0	0	0	183	0
2028	0	0	0	260	0	201	0
2029	0	150	0	0	0	216	0
2030	150	0	0	0	0	230	0
2031	150	0	0	0	0	243	117
2032	150	0	0	0	0	253	0
2033	150	0	0	0	0	260	0
2034	150	0	0	0	0	270	0
2035	0	0	0	0	0	283	0
2036	0	0	0	0	0	297	0
2037	0	0	0	0	0	307	0
2038	0	0	0	0	0	322	0
2039	0	0	0	0	0	333	0
2040	0	0	0	260	0	344	187
2041	0	0	0	0	0	353	0
2042	0	150	0	0	0	362	0

Metro Preferred Plan

Year	Wind (MW)	Solar (MW)	Battery (MW)	Thermal (MW)	Capacity Only (Annual MW)	DSM (Annual MW)	Retirements (MW)
2023	0	0	0	0	0	51	0
2024	0	0	0	0	0	86	0
2025	0	0	0	0	0	142	0
2026	0	0	0	0	0	178	0
2027	0	0	0	0	0	206	0
2028	0	0	0	0	0	187	0
2029	0	0	0	0	0	199	0
2030	0	150	0	0	0	211	0
2031	0	150	0	0	0	222	0
2032	150	0	0	0	0	232	0
2033	150	0	0	0	0	236	380
2034	0	150	0	0	0	244	0
2035	0	0	0	0	0	256	0
2036	0	0	0	0	0	267	0
2037	0	0	0	0	0	279	0
2038	0	0	0	260	0	290	0
2039	0	0	0	260	0	299	0
2040	0	0	0	260	0	308	832
2041	0	150	0	0	6	316	0
2042	150	0	0	0	30	324	0

Evergy's Preferred Plan





Future Considerations

- Near-term execution of renewable and thermal additions will have to manage ongoing supply chain and transmission interconnection-driven delays
- Have seen a significant uptick in renewable pricing – will need to evaluate whether that change is structural or if costs will come down in the future
- Continued acceleration of economic development activity could impact ability to retire coal / could require additional new capacity resources
- If new / changing environmental regulations cause acceleration of coal retirements, could drive dependence on new dispatchable non-emitting technologies earlier in the time horizon in order to maintain reliability
- Ongoing monitoring on dispatchable, non-emitting technologies (nuclear, long-duration energy storage, hydrogen) to determine feasibility / economics

Thank You

