

ESIG Spring Workshop March 19<sup>th</sup> 2025

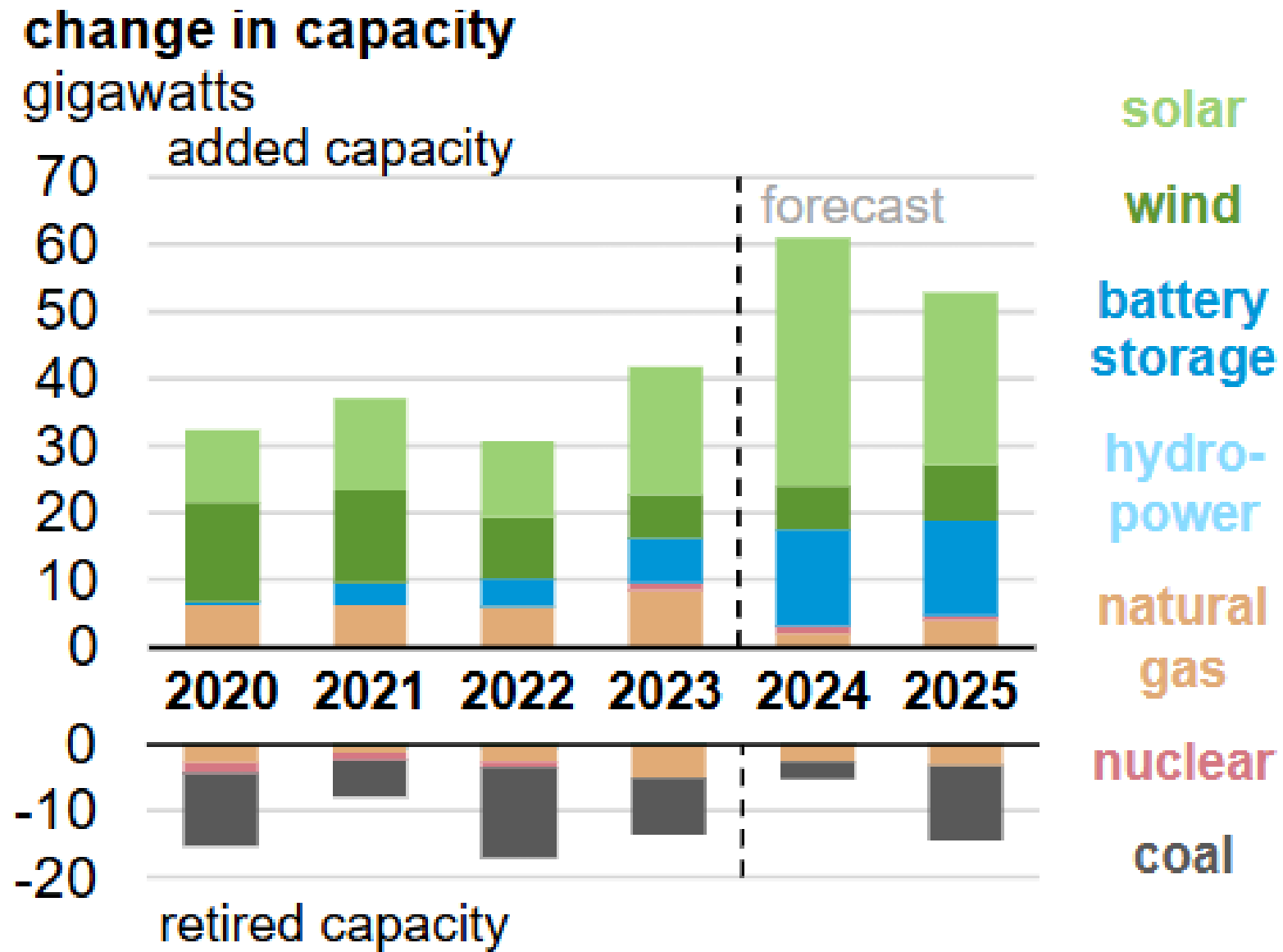
# Integrating Transmission Silos

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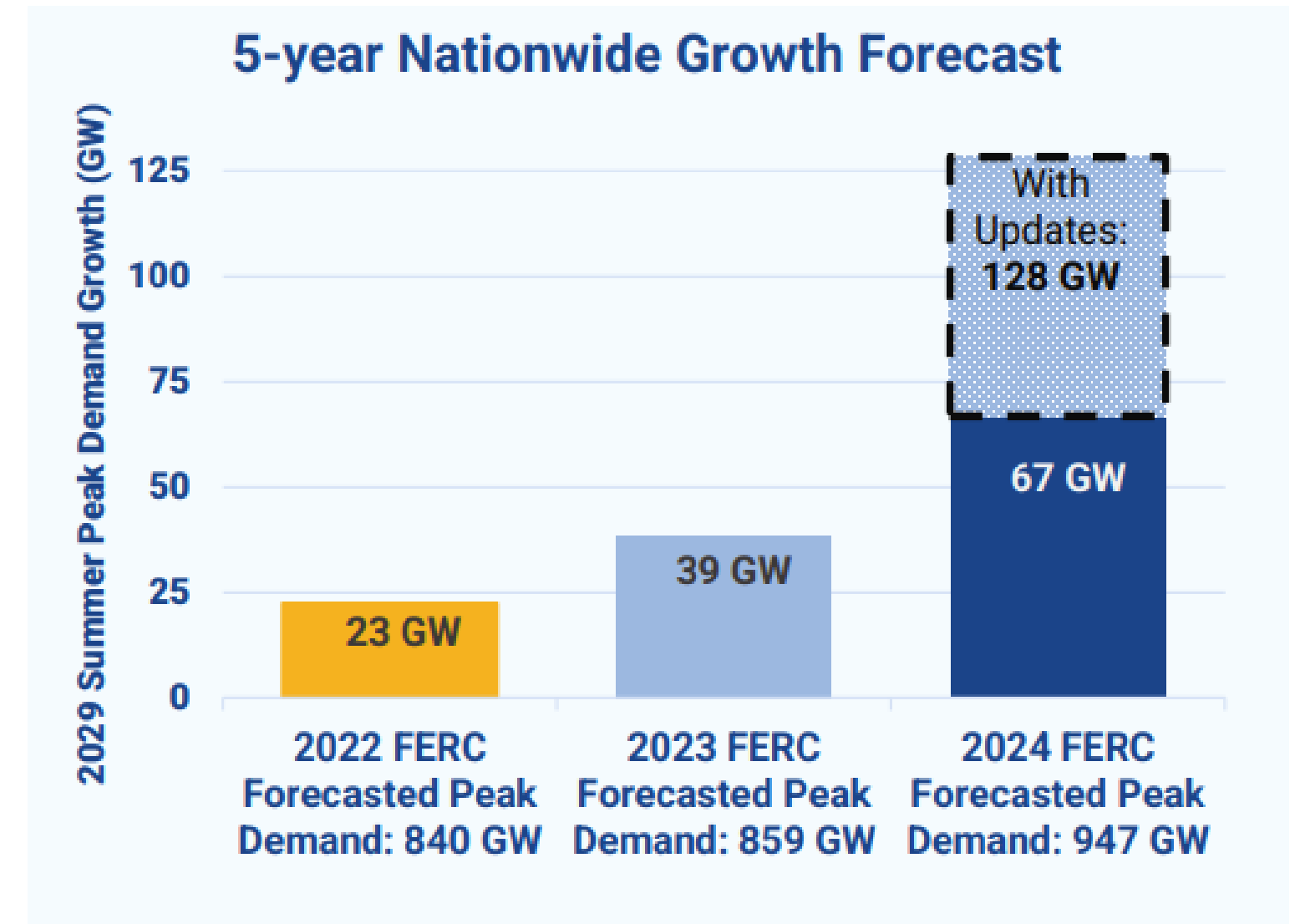
# Planning Practices Need to Evolve

- The purpose of transmission planning is to **identify the investments** required to ensure the system can be reliably **operated**.
- Established transmission planning practices have mostly proven adequate for the **decades in which they were developed**; however, having been optimized for only incremental changes, these processes are now being stretched in their ability to facilitate both the **magnitude and pace of change** the power system is undergoing.
- This has led to power system **infrastructure trailing the needs** of its customers, while also resulting in inefficient operations illustrated by **\$20 billion in congestion** costs in 2023 alone.
- Opportune time to adopt more **integrated** planning methodologies that **consolidate multiple needs**, including interconnection, reliability, economic and policy driven needs, across near- and long-term planning horizons.
- Optimized upgrade portfolios will deliver the **critical outcomes**: reliability, cost-effectiveness, operability, and resiliency

# Drivers of Change

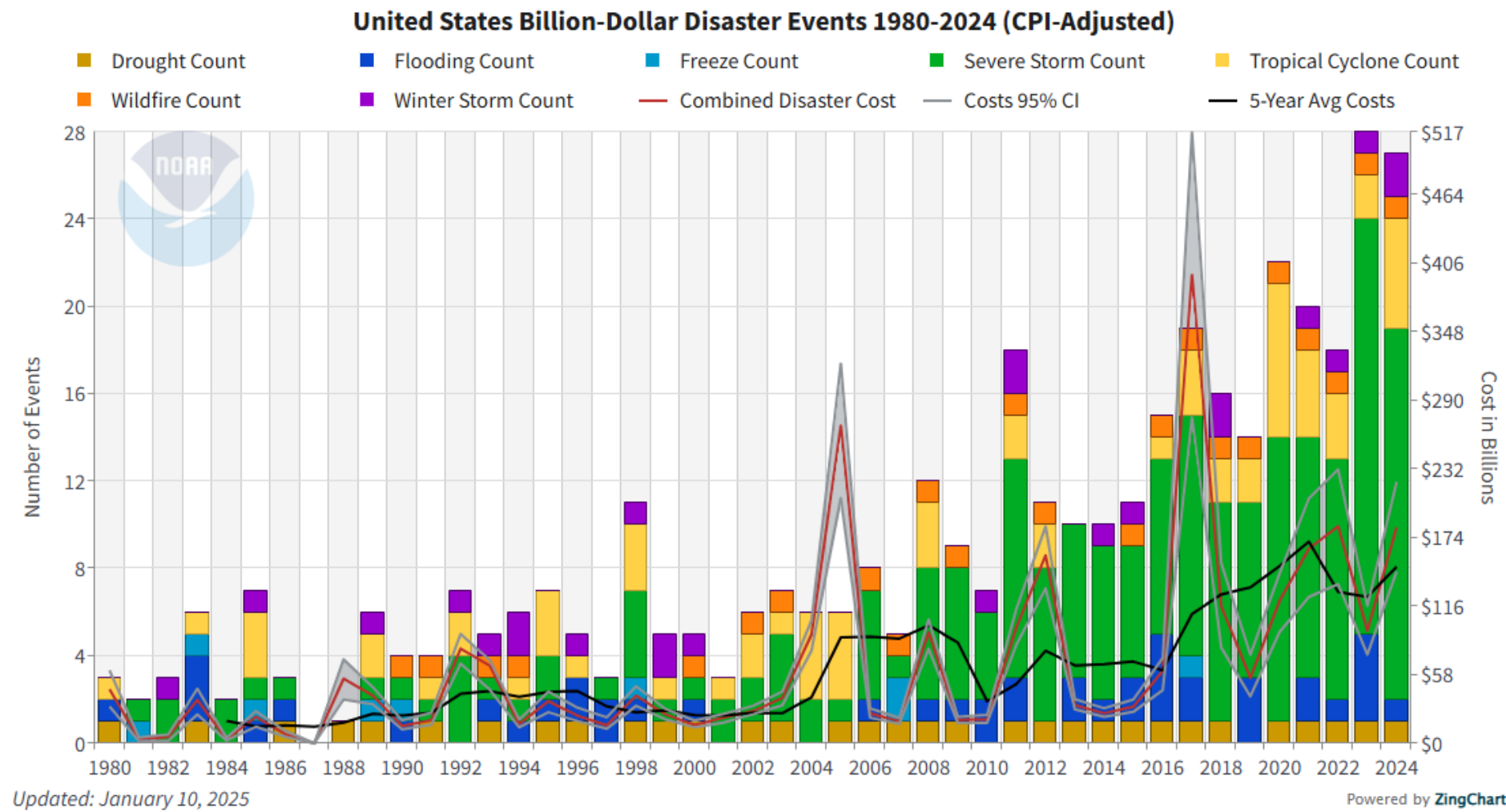


Source: U.S. Energy Information Administration, [Short-Term Energy Outlook](#) (STEO), January 2025

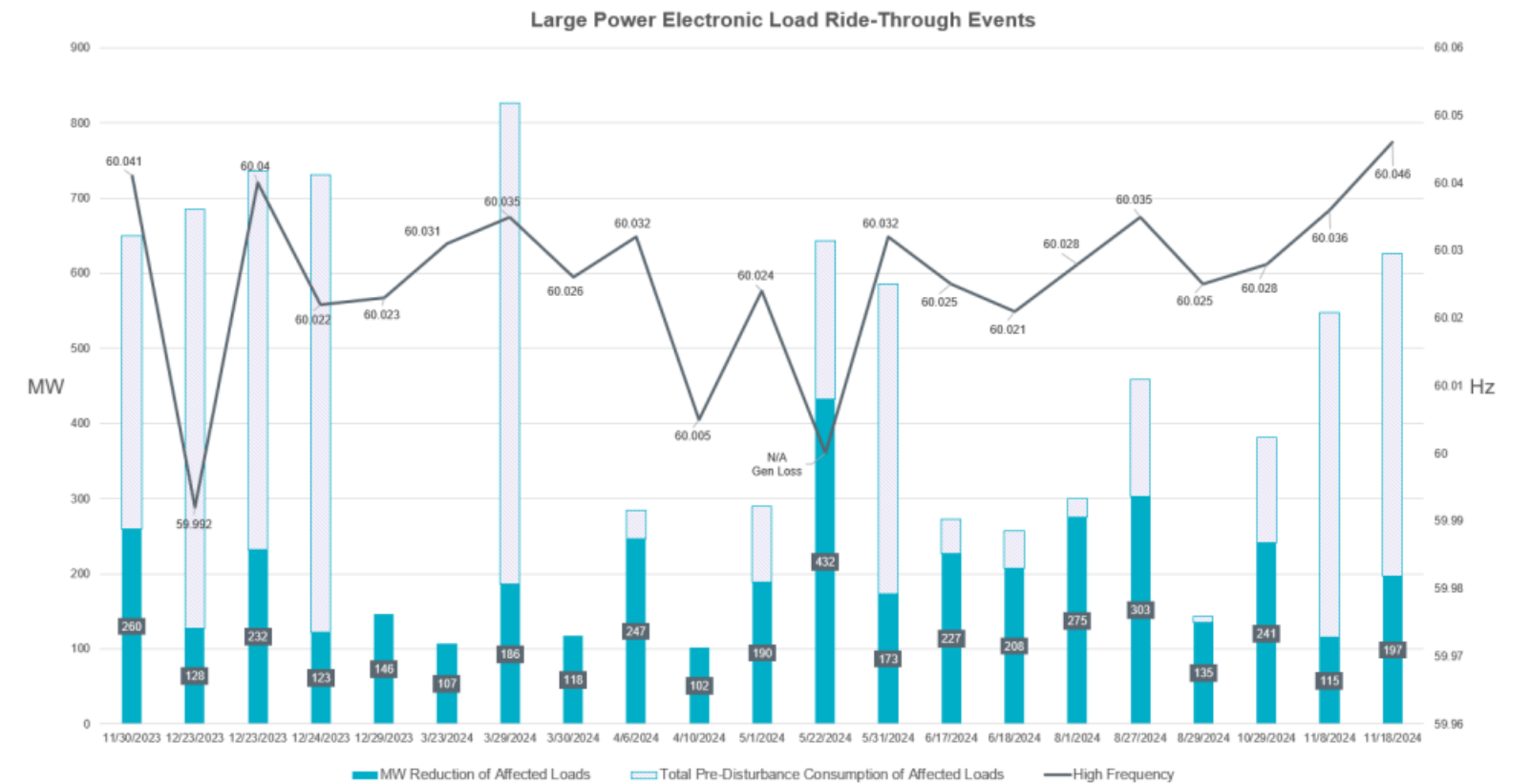
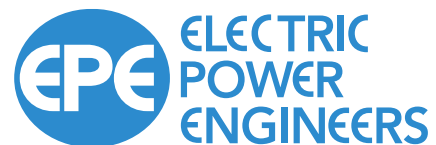


Source: Grid Strategies Strategic Industries Surging: Driving US Power Demand, [Strategic Industries Surging: Driving US Power Demand](#)

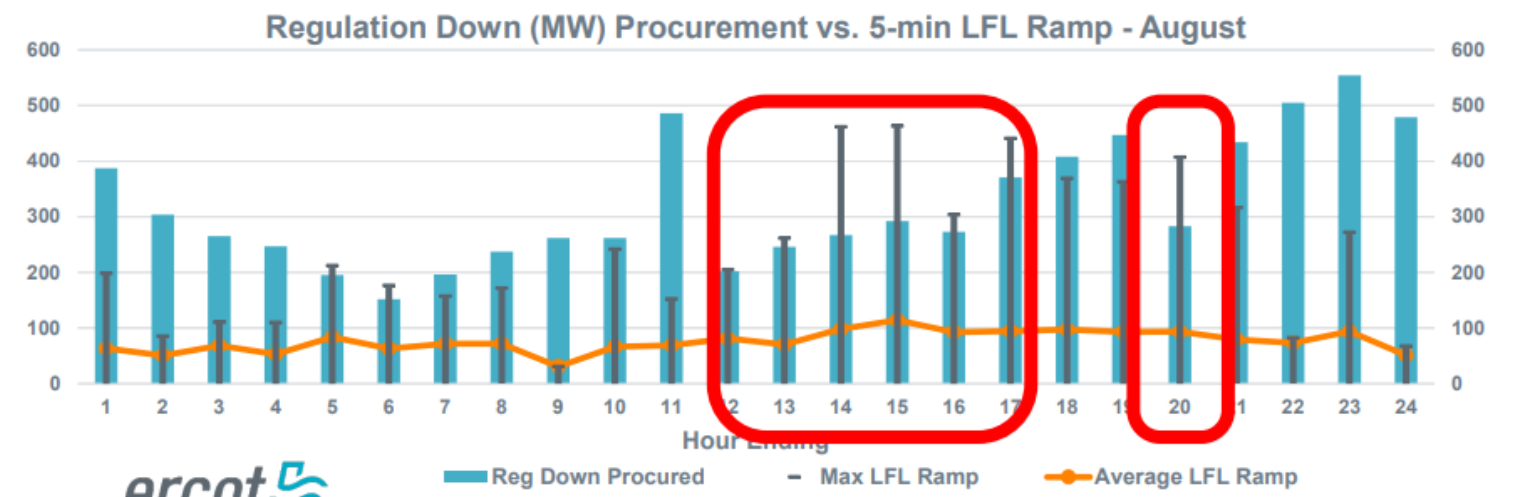
# Drivers of Change Cont'd



Source: NOAA Billion Dollar Weather and Climate Disasters, [Billion-Dollar Weather and Climate Disasters / United States Summary / National Centers for Environmental Information \(NCEI\)](#)



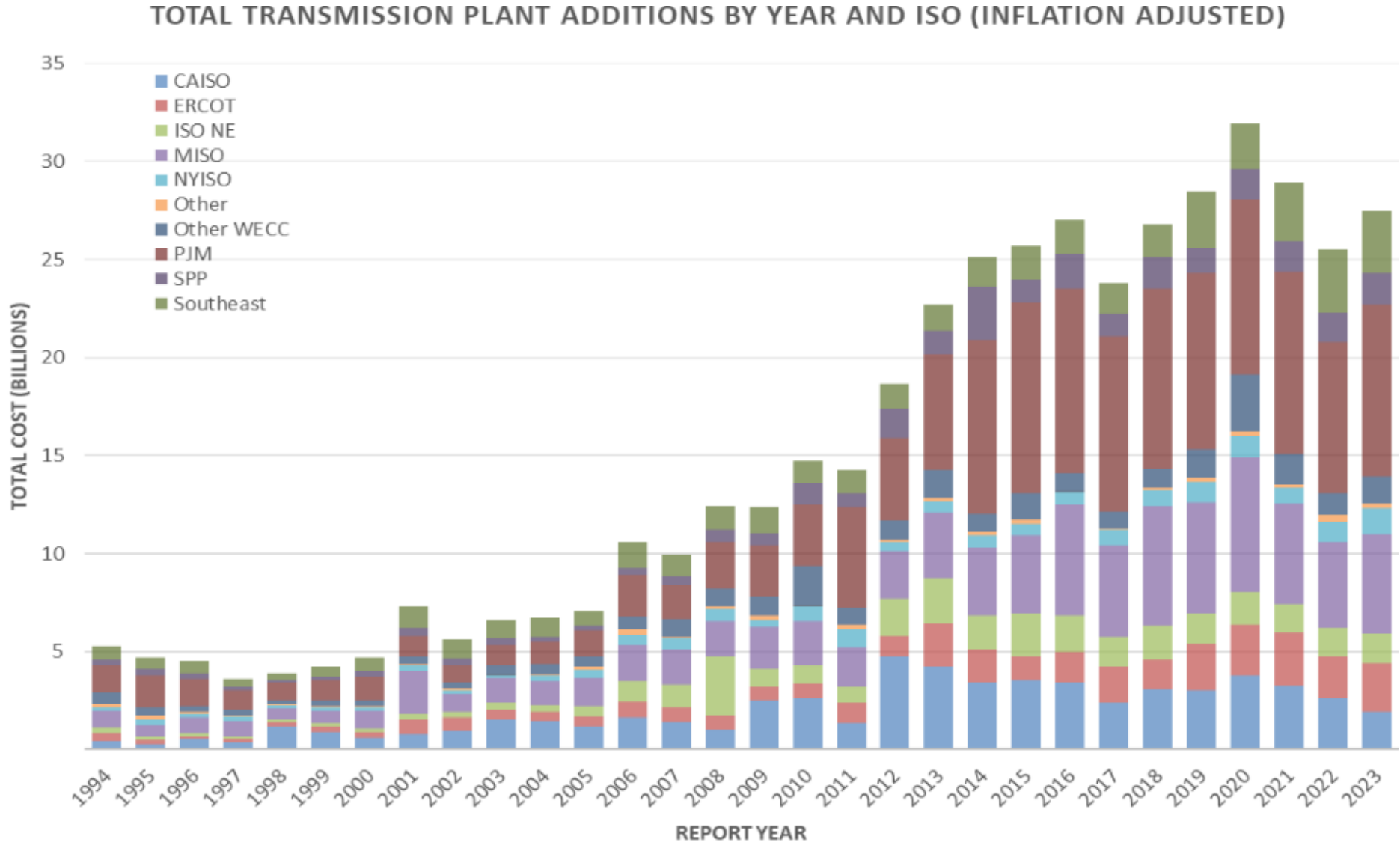
Source: NERC LLTF December 2024 Presentation, [ERCOT Large Load Loss/Reduction Events 2020-2024](#)



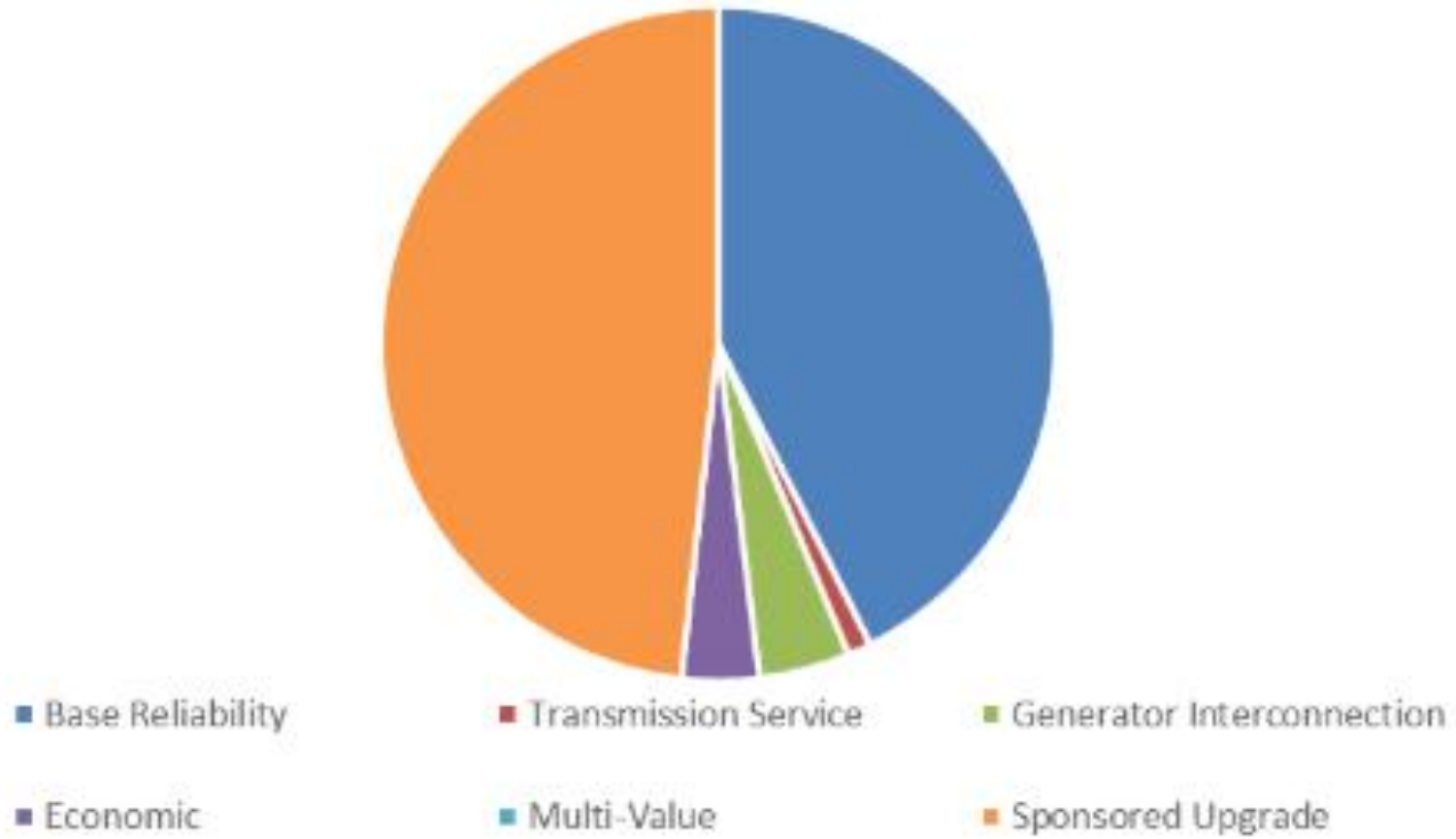
Source: NERC LLTF October 2024 Presentation, [Large Loads in ERCOT - Observations and Risks to Reliability](#) 4

# Retrospective on Transmission Investment

Based on FERC Form 1 Data



Overall Transmission Additions - 2023

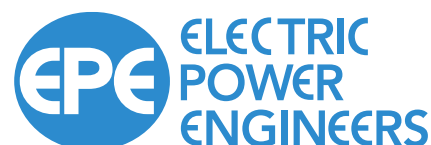


# Drivers of Transmission Silos

- Varying planning horizons and study timelines
- Increased levels of uncertainty due to greater reliance on forecasts rather than knowns
- Siloed processes are faster to execute
- Cost allocation principles driving focused assessments to simplify upgrade cost assignment
- Jurisdictional differences limiting optimization to within associated boundaries
- Continued organizational separation of planning functions limiting coordination
- Transmission upgrade data is not standardized and difficult to combine to evaluate efficacy of processes

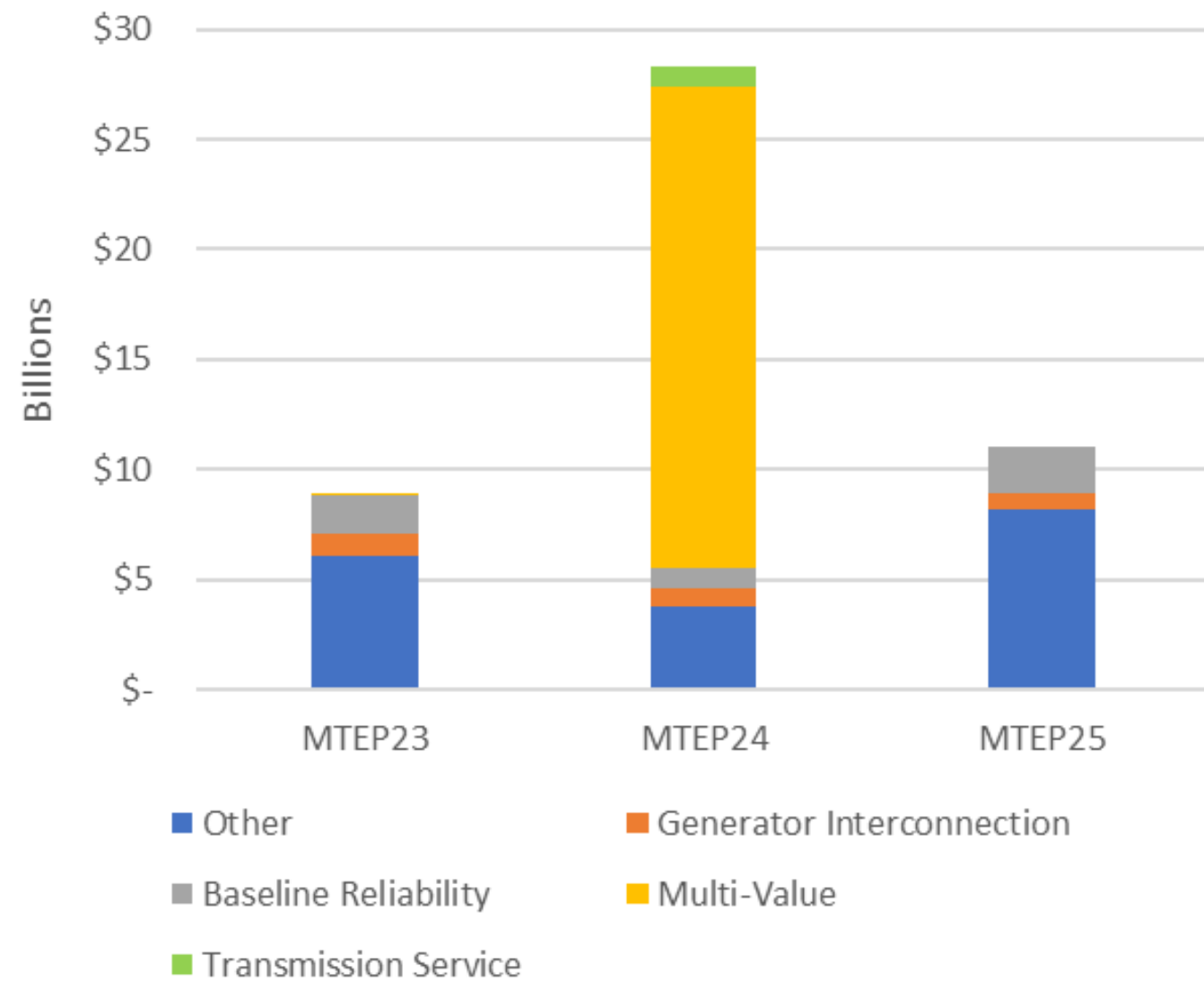
# Recent Significant Investments

- MISO approved the \$10.3 billion LRTP Tranche 1 portfolio, approved in 2022, followed by the substantially larger Tranche 2.1. This second portfolio is estimated at \$21.8 billion.
- In SPP, 765 kV was introduced as part of a \$7.7 billion 2024 ITP portfolio addressing both new and long-standing constraints in the footprint.
- MISO and SPP finalized an interregional expansion plan, the Joint Targeted Interconnection Queue (JTIQ) portfolio, estimated at \$1.8 billion and designed to resolve constraints impacting new generation interconnections on both sides of their seam.
- PJM approved an estimated \$5 billion from the 2022 RTEP Window 3 designed to meet baseline needs to handle retirements of existing resources while accommodating increased data center demand.
- ERCOT's \$13 - \$15.5 billion Permian Basin transmission plan was approved by the Public Utility Commission of Texas to meet extensive load growth.
- CAISO approved their \$6.1 billion 2023-2024 transmission plan portfolio including reliability, economic and public policy drivers.
- The New York Long Island Public Policy Transmission Need portfolio, estimated at \$3 billion.

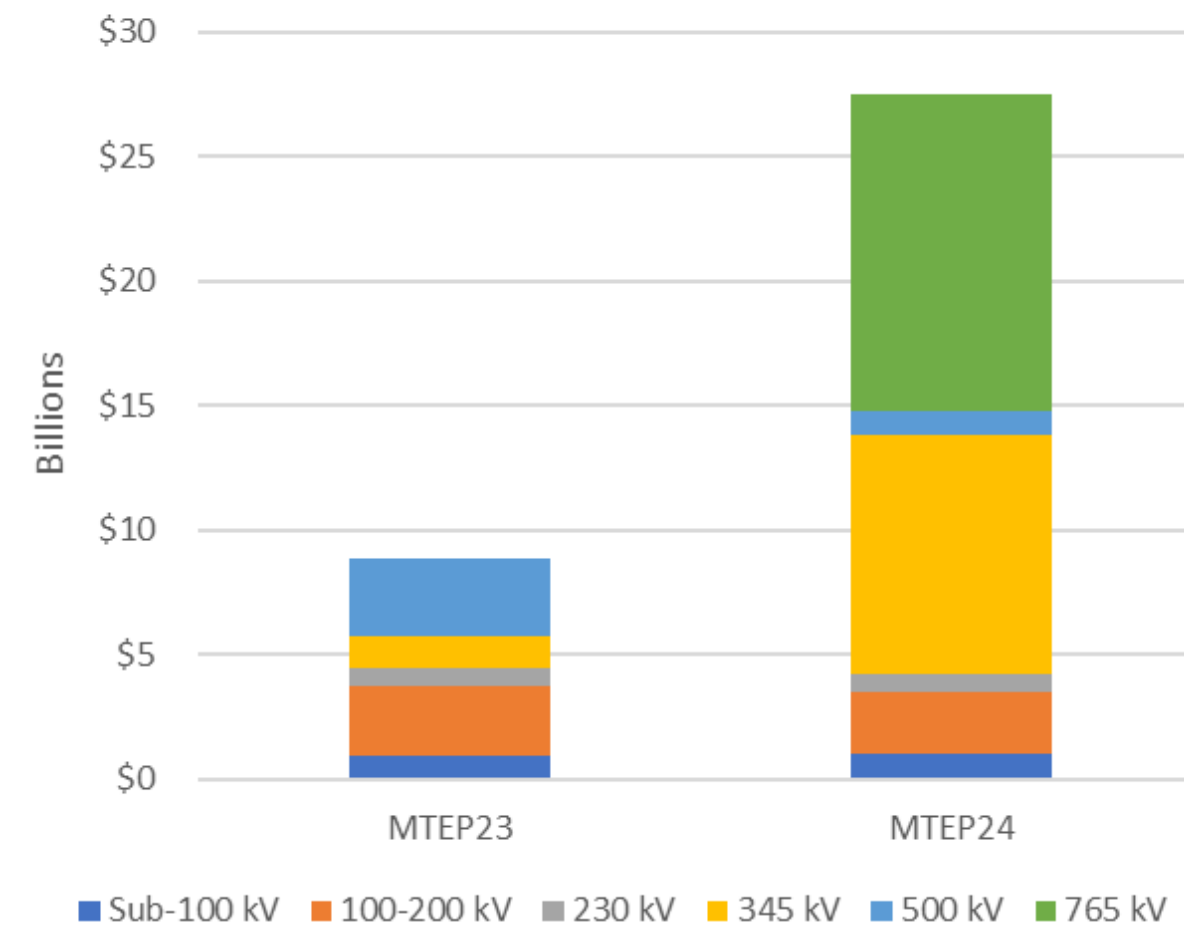


# MTEP 23 – 25 At a Glance

Project Cost by Project Type



Project Cost by Voltage



# Integration of Processes

- **Study Consolidation**

Combined generation interconnection, reliability, economic, policy and interregional analyses into a single study process.

- **Generation Expansion Planning Integration**

Align planning and generation interconnection through the identification of likely project locations via generation expansion planning. Location, type and magnitude of generation is a primary driver of transmission need.

- **Upgrade Consolidation and Optimization**

Purpose and timeline driven studies may still be required to identify system limitations and upgrade opportunities (e.g. generation interconnection, reliability and economic planning studies). Once each individual portfolio of upgrades is determined, iterative consolidation and optimization of the transmission portfolio is recommended to more efficiently meet the needs across the scenarios and drivers considered.

- **Near-Term and Long-Term Plan Continuity**

Ensure that near-term planning decisions are made considering prospective long-term needs, posturing near-term solutions to be able to scale to meet a multitude of potential futures.

# Expanding Breadth of Planning

- **Policy Driver Inclusion**

Consistent with FERC order 1920, including policy driven changes such as retirements and supply mix considerations are fundamental in evaluating the appropriate future system scenarios. Delaying the study of outcomes of policy direction until they occur (e.g. notice of retirement) can lead to insufficient time to adequately plan the system to meet expected demand.

- **Interregional Opportunity Identification**

Implementation of processes that allow for interregional projects to be considered as solutions to identified system needs. Today, most interregional projects are merchant driven.

- **End-of-life Project Assessment Incorporation**

Considering facility end-of-life impacts in planning studies to identify potentially more optimal upgrade portfolios addressing multiple needs. Today, a like-for-like replacement approach is commonplace.

# Increasing Depth of Planning

- **Scenario Based Planning**

Alleviates uncertainties by evaluating various combinations of inputs in analyses. This allows for quantification of the uncertainty by understand the spectrum of potential needs driven by variation in base assumptions. This helps establish bounds around recommendations, provides context for regulatory decisions and allows for projects to be developed with optionality in mind.

Optionality can be achieved by evaluating potential solutions that reduce future impacts on customers, land-owners and the environment when designing system upgrades.

- **Multi-Value Project Evaluation**

Consistent with FERC Order 1920, enable a more fulsome benefit-to-cost assessment of transmission projects by incorporating benefits across multiple metrics. This more comprehensive benefits evaluation allows for a better characterization of improved system performance, making upgrades otherwise evaluated on single or few metrics potentially more appealing.

# Increasing Depth of Planning Cont'd

- **Adapting processes to better handle large-scale changes**

Large scale changes such as the incorporation of renewable generation and large loads are becoming increasingly prevalent and impactful, leaving our planning and approvals processes stretched in their ability to effectively maintain reliability. In adapting processes it's essential to understand operating behaviors, document operating philosophies, establish appropriate technical and participation requirements, and identify best study practices.

- **Evolving processes to consider operational challenges**

As operational experiences change due to increasingly severe weather events and the incorporation of new facility types and participation models, evolution of planning processes is required to continue to prepare for successful operations and design of a resilient grid.

Incorporating operational challenges in planning requires modeling and consideration of uncertainties experienced in operations, and understanding the reliability impacts of transitioning from one operating state to another.

System resiliency can be enhanced by anticipating conditions that could lead to loss of grid elements, instituting procedures that allow for the safe posturing of the system to minimize impacts, incorporating supply path redundancy in power system planning practices, and developing and coordinating plans to ensure timely restoration following outages.

# People and Data

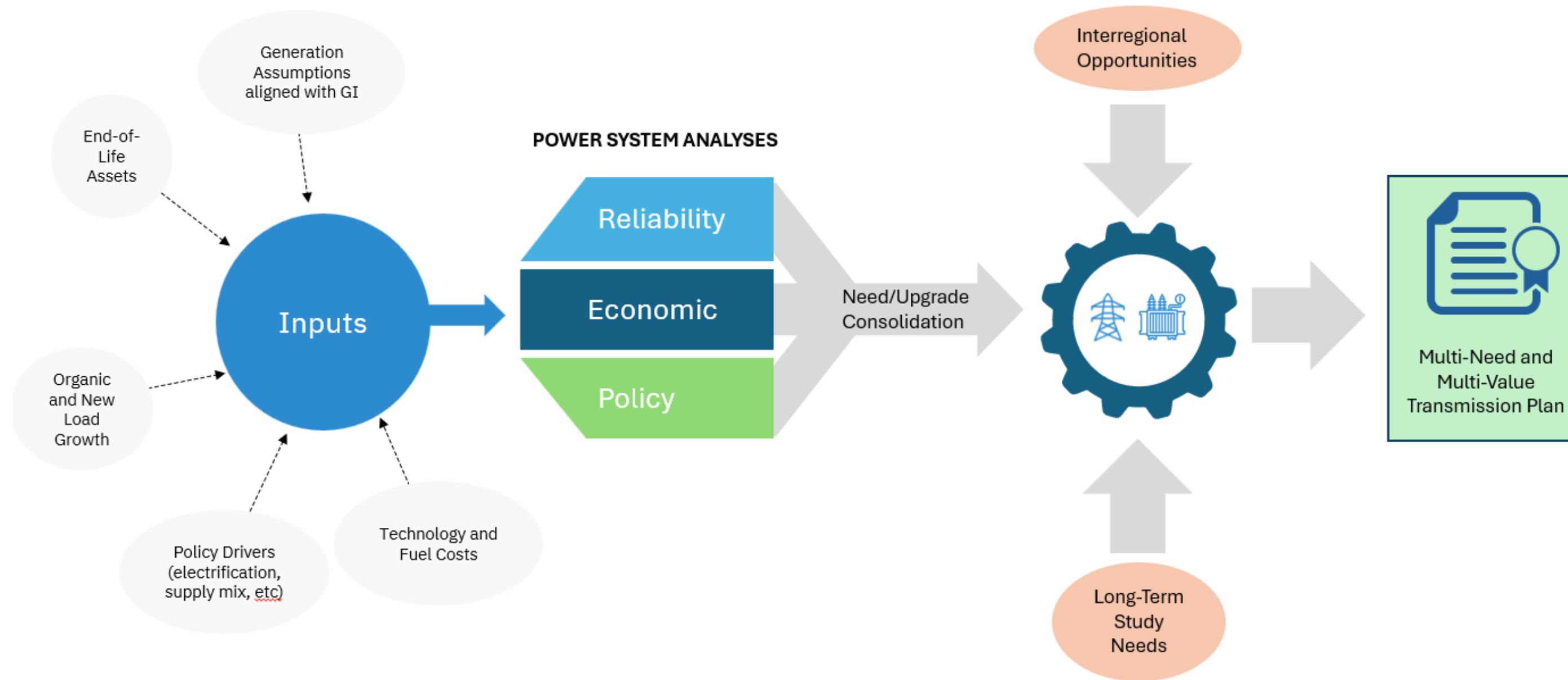
- **Organizational Structure**

Structural changes that allow for different study types and components to be performed within the same organizations could lead to increased coordination and continuity of studies and upgrade plans.

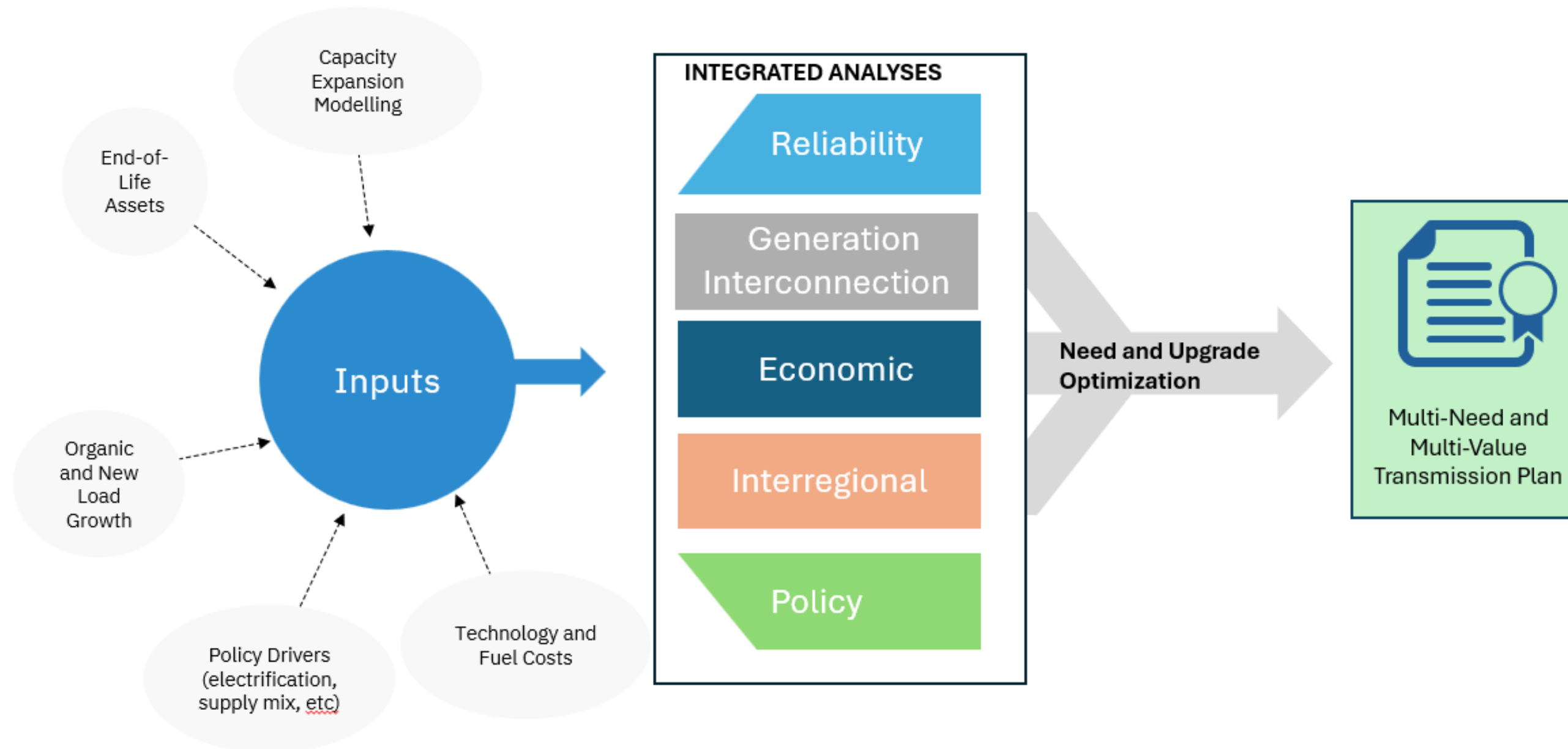
- **Standardizing Datasets**

Standardizing datasets including project status (e.g. approved, approvals, under construction), driver (e.g. generation interconnection, reliability, economic, policy), voltage level, cost and in-service date, would help enable integrated transmission planning by providing clarity on outcomes and also offering data to support measuring indicators of efficiency.

# Integration Between Processes



# Integration of Processes



# Thank You!