



Long Range Transmission Planning - Preparing for the Evolving Future Grid

Planning Advisory Committee

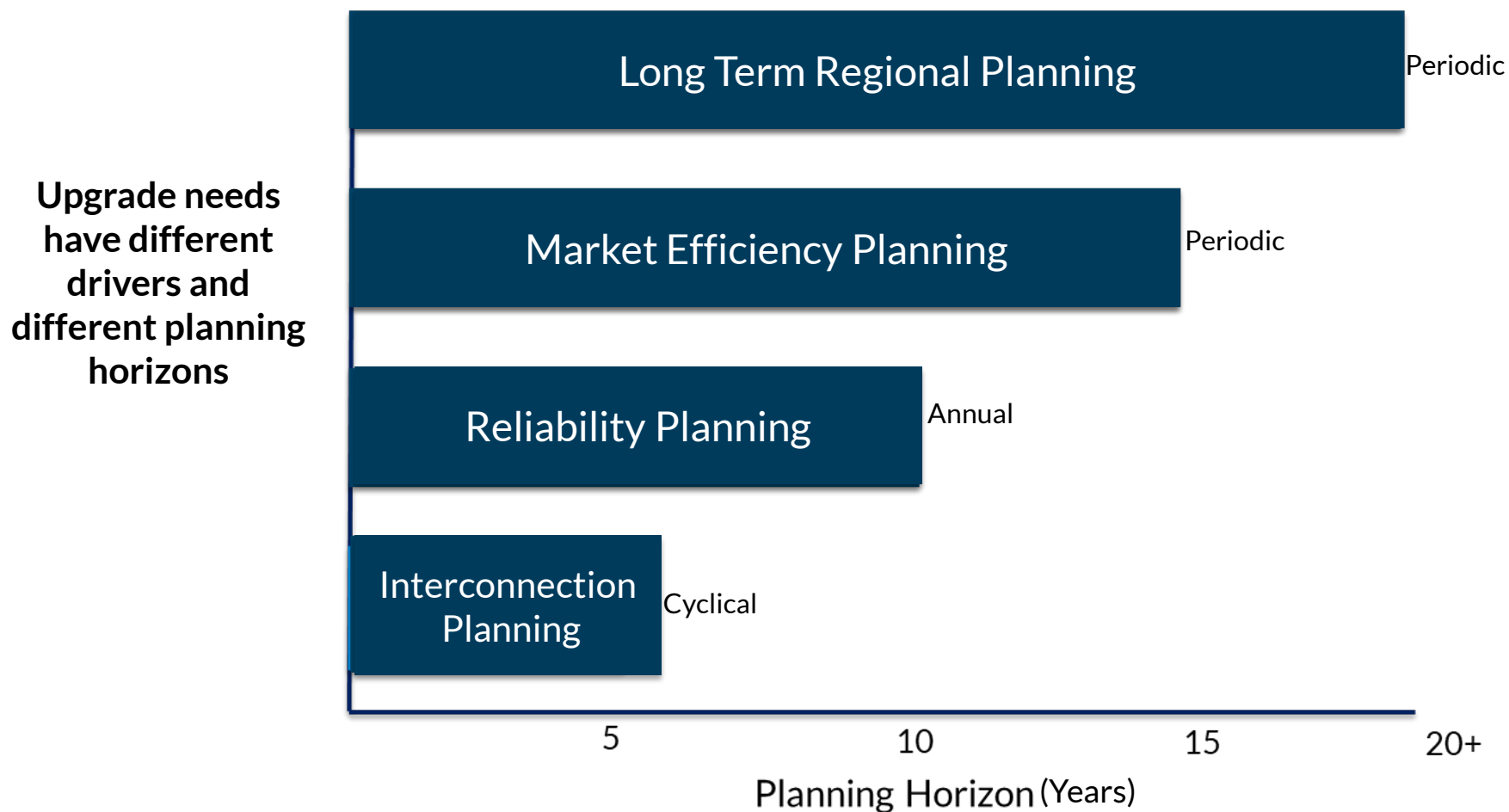
August 2020

Executive Summary

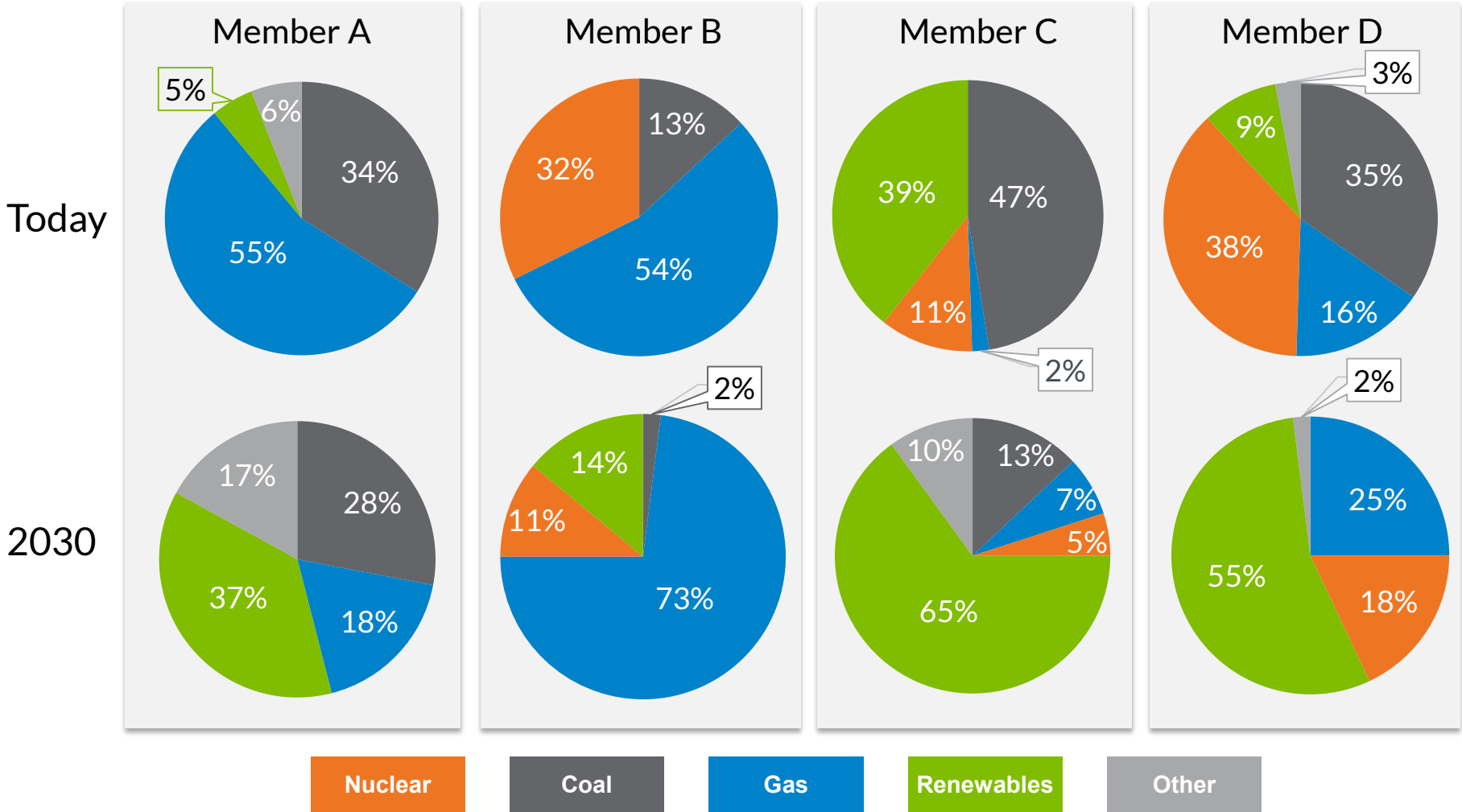


- Industry trends are driving MISO members to make significant changes to their portfolios including retirements of aging units and integration of increased levels of renewables
- MISO must focus now on solutions that anticipate and adapt to those rapid changes
- Long Range Transmission Planning is necessary to ensure a reliable and efficient regional and interregional transmission system that enables the changing portfolio across the near and long term
- MISO plans to be creative in identifying transmission planning / interconnection solutions that can more holistically address emerging regional needs

Transmission planning provides a comprehensive approach that covers short and long term needs to address generation additions, ongoing reliability, market efficiency and policy trends



Member plans project a significant portfolio shift; differences across individual member portfolios present additional challenges and opportunities

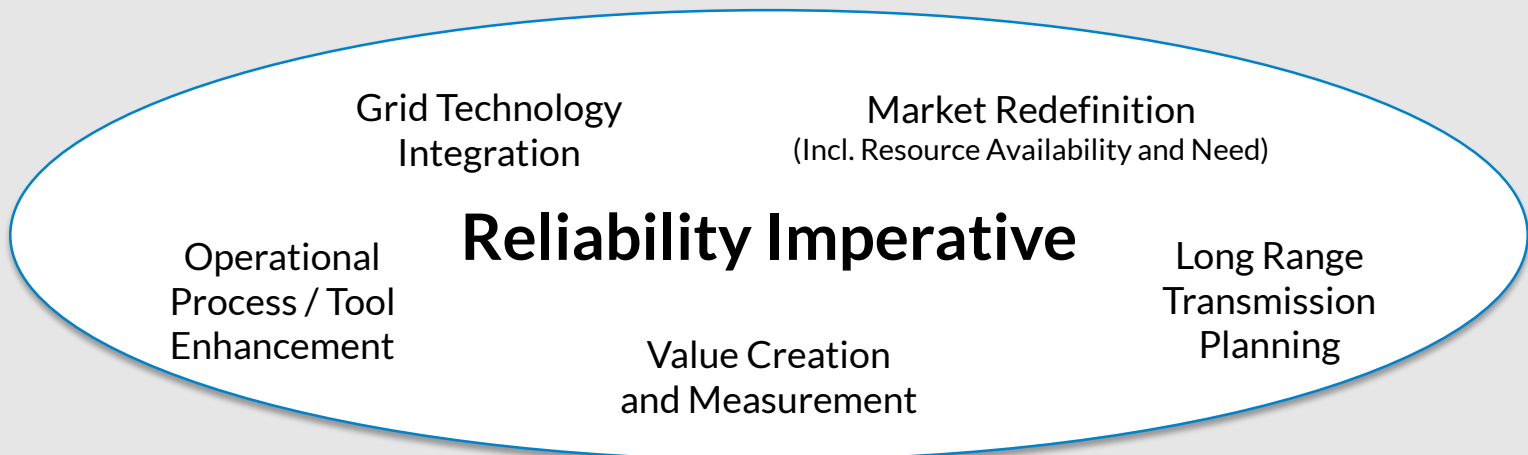


MISO's Regional Reliability Imperative will help ensure ongoing, efficient reliability as members evolve their resource fleets

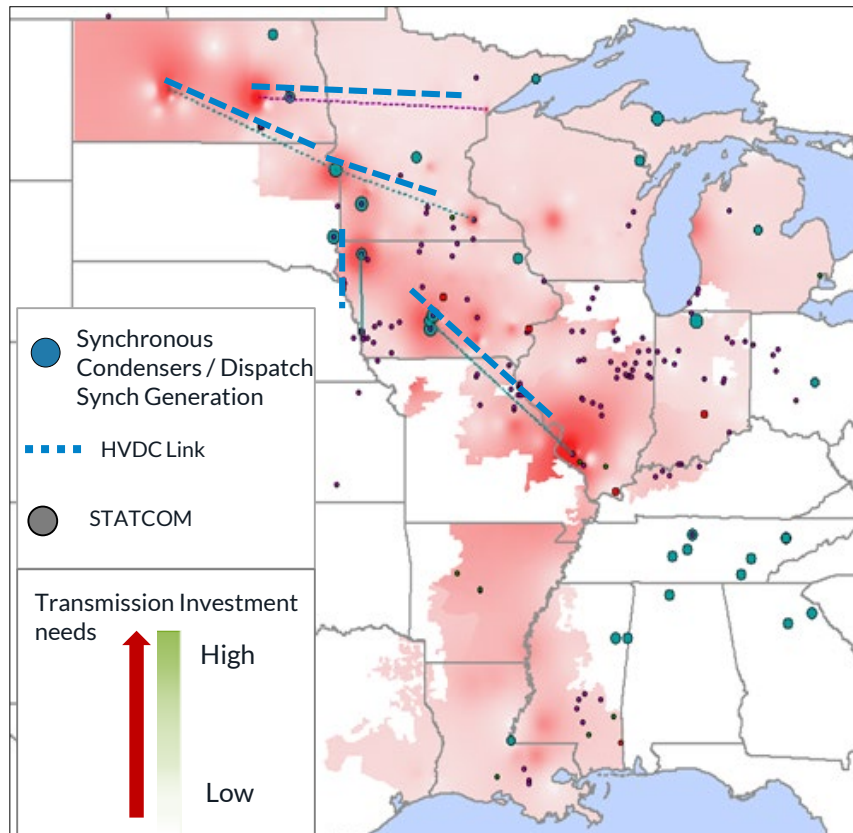
Members' resource fleets have changed and will continue to change at an accelerated rate.

The fleet changes are resulting in substantially more grid diversity and volatility.

MISO is actively pursuing multiple workstreams to ensure on-going reliability and value creation. This requires visibility of the volatility, the availability of flexible resources and the ability to both manage and move those resources to where they are needed.



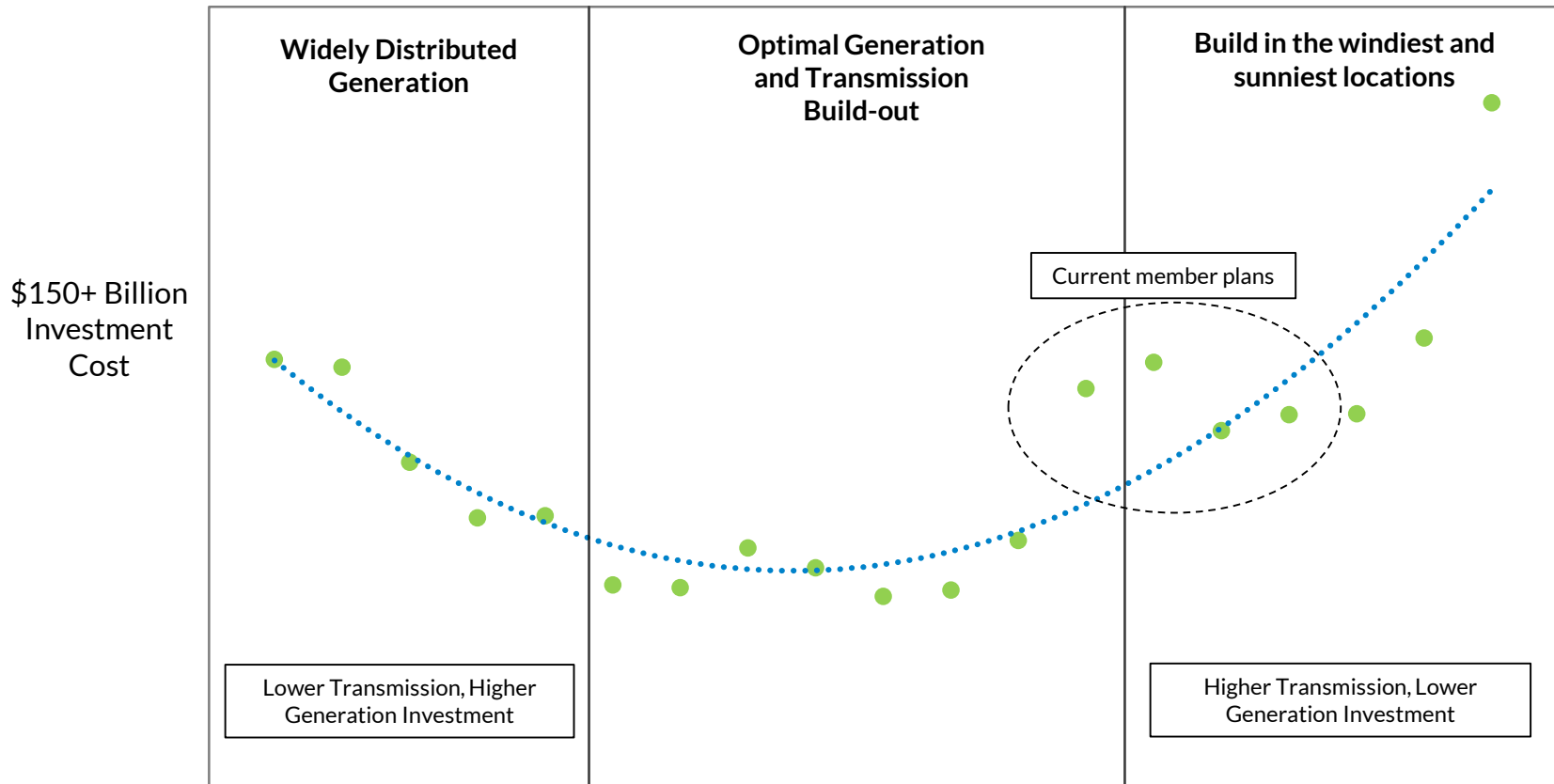
Work to-date indicates expected portfolio changes will cause significant grid and stability issues requiring increased transmission investment



- Issues are driven by reduction in conventional generation and the increase in inverter based (i.e. wind/solar/battery) generation
- Regional energy transfer increases in magnitude and becomes more variable leading to a need for increased extra high-voltage line thermal capabilities
- Increase in renewable penetration causes different dispatch patterns of conventional generators, leading to several dynamic issues
- Power delivery from weaker areas may need transmission technologies equipped with dynamic-support capabilities

Transmission needs, overall transmission costs and generation costs can change based on where renewables are sourced, but planned generation costs will far outweigh transmission costs in any case

Total MISO Projected Generation and Transmission Cost



There are conditions precedent for longer-term transmission plans to be approved and successfully developed



Policy Consensus

Consensus that transmission is required to address the subregional and collective needs of the footprint



Robust Business Case

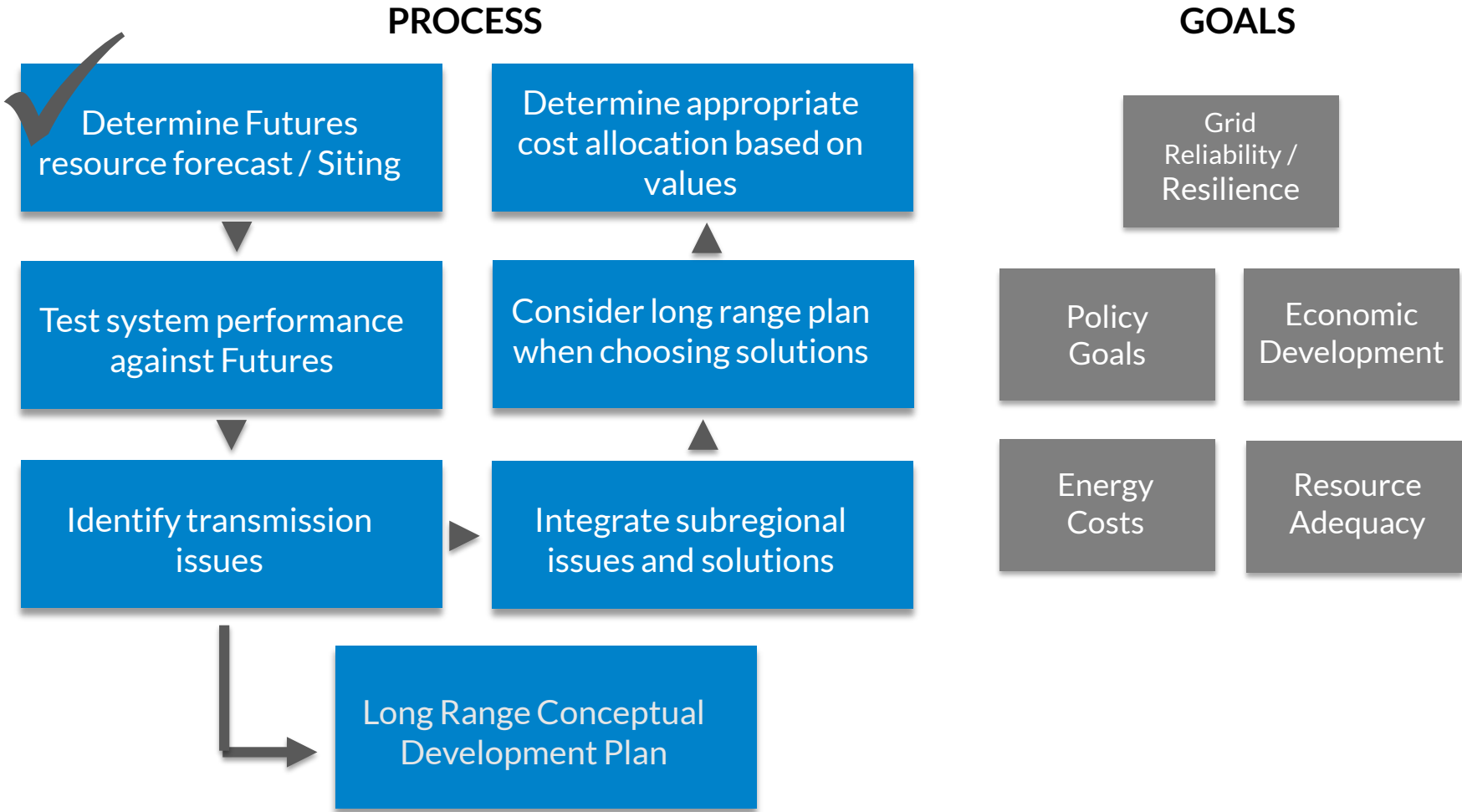
Analysis of subregional issues and solutions compatible with regional reliability and market operations needs



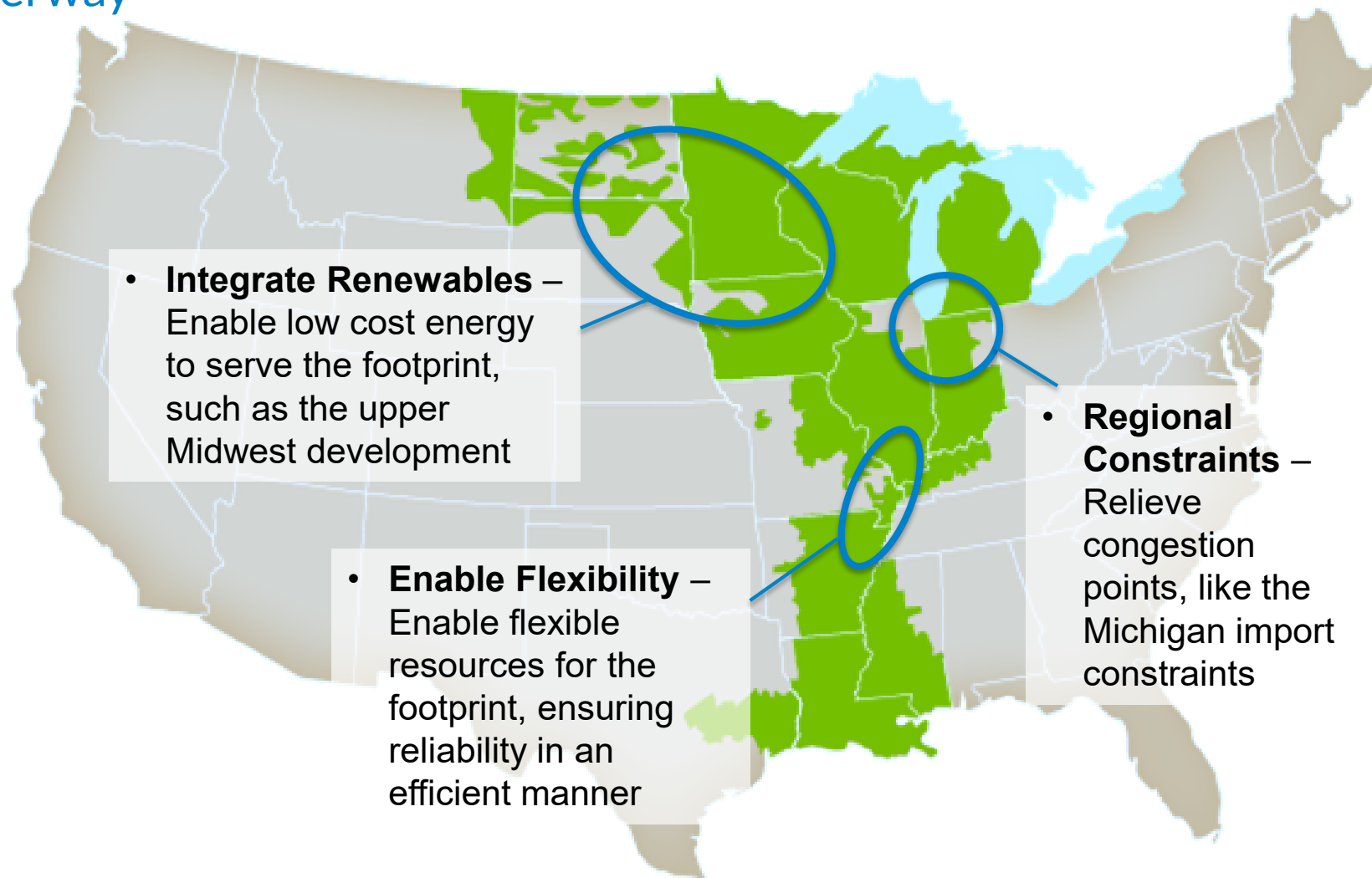
Cost Allocation & Recovery

Costs assigned roughly commensurate with benefits to each area

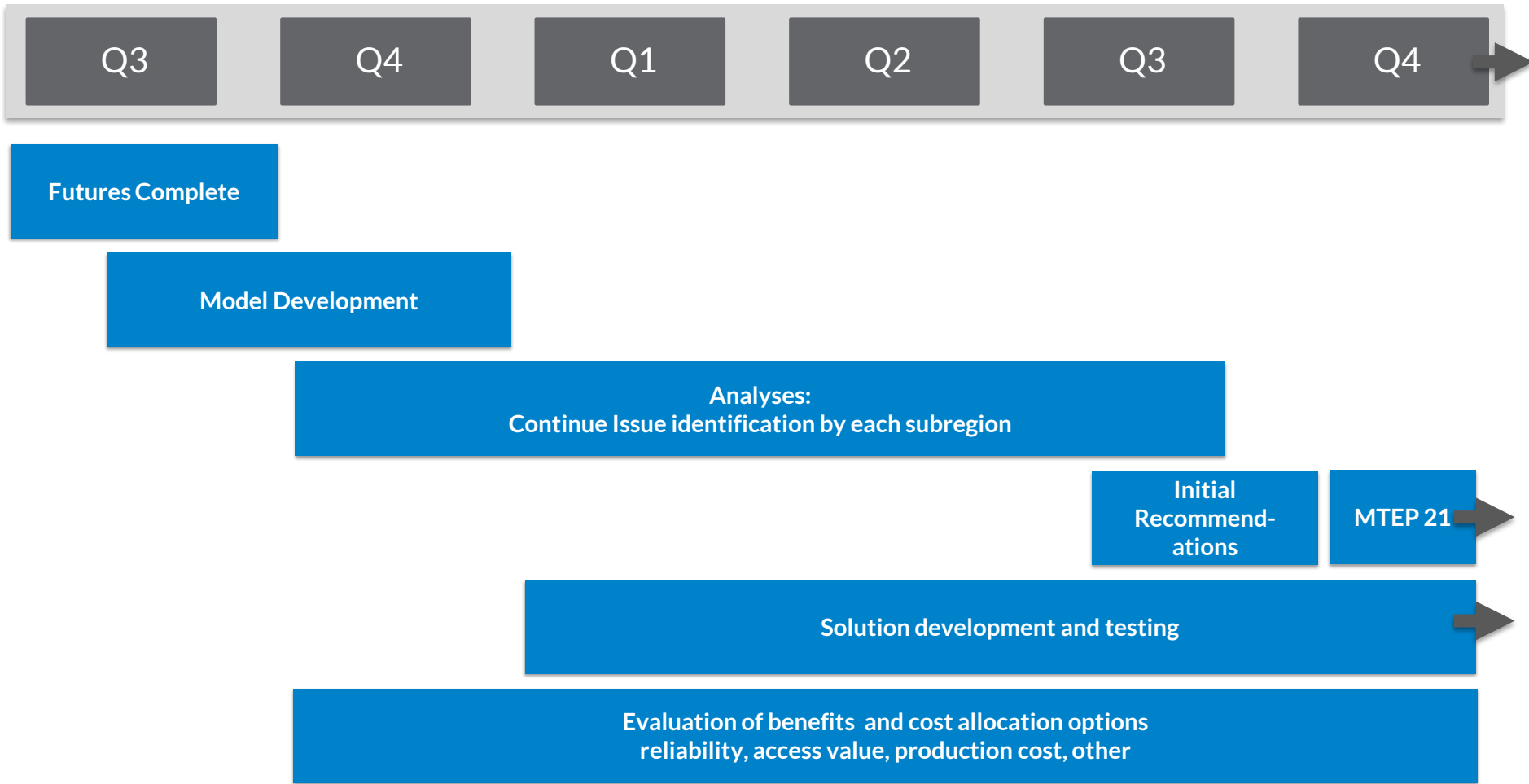
Long Range Planning identifies grid needs based upon Futures, is multi-step, and considers subregional needs and solutions



Long Range Transmission Planning will solve multiple problems in a cost-efficient manner; some of the subregional work is already underway



The Long Range Planning Process will continue in an iterative fashion, with logical groupings of transmission projects coming forward over multiple MTEP cycles





Questions