Long-Range Transmission Plan Roadmap

PAC March 2021

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Purpose & Key Takeaways

Purpose:

Provide an update on MISO's Long-Range Transmission Plan (LRTP)

Key Takeaways:

- LRTP for MTEP transmission solutions is part of the Reliability Imperative initiative
- Resource evolution and electrification represented in MISO Futures necessitate a LRTP for needed transmission solutions
- An initial transmission roadmap has been developed to indicate expected scope of long-range needs
- Possible projects for MTEP Appendix A will be developed as analyses, business cases, and cost allocation are developed

The transmission development need is urgent as the resource fleet rapidly evolves

- A transmission plan is needed to reliably enable the goals and plans of MISO states, utilities and industries
- The resource mix has been evolving at an increasing pace for more than 10 years; MISO queue has almost 56 GW of solar
- Reliability will become increasingly difficult as renewable energy levels increase throughout region
  - Instantaneous wind peak records were set on November 1st,15th, and December 23rd, where MISO set its existing instantaneous wind peak of 20.2 GW Serving 26.8% of MISO's load
  - Total In Service Wind is 26.5 GW with as much as an additional 4,500 MW expected to come online in next 12 months
  - MISO Futures project renewable penetration ranging from 26% to 50% in less than 20 years

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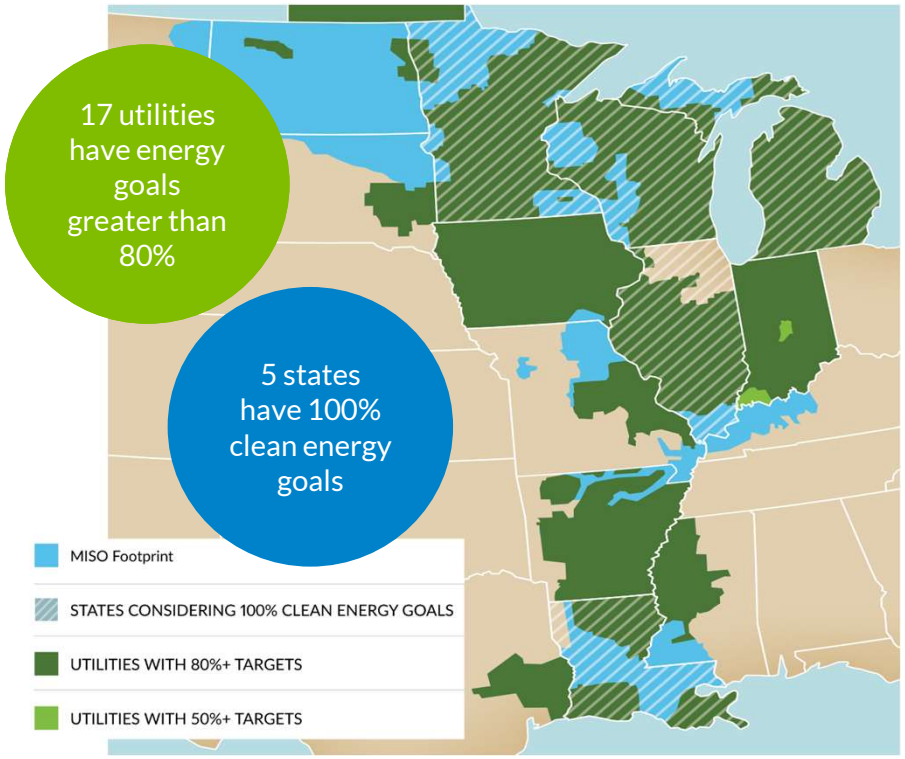
A transmission roadmap will help MISO Members realize plans captured in Future 1



Future 1

- The footprint develops in line with 100% of utility IRPs and 85% of utility announcements, state mandates, goals, or preferences
- Carbon emissions, driven by state and utility plans, decline 63% from 2005 levels
- Load growth consistent with current trends

As of late 2020; changing rapidly.

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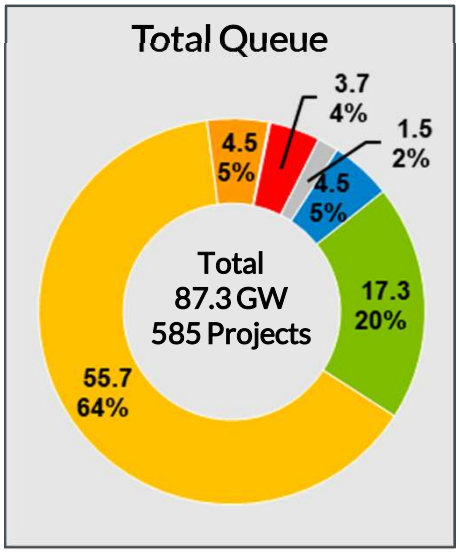
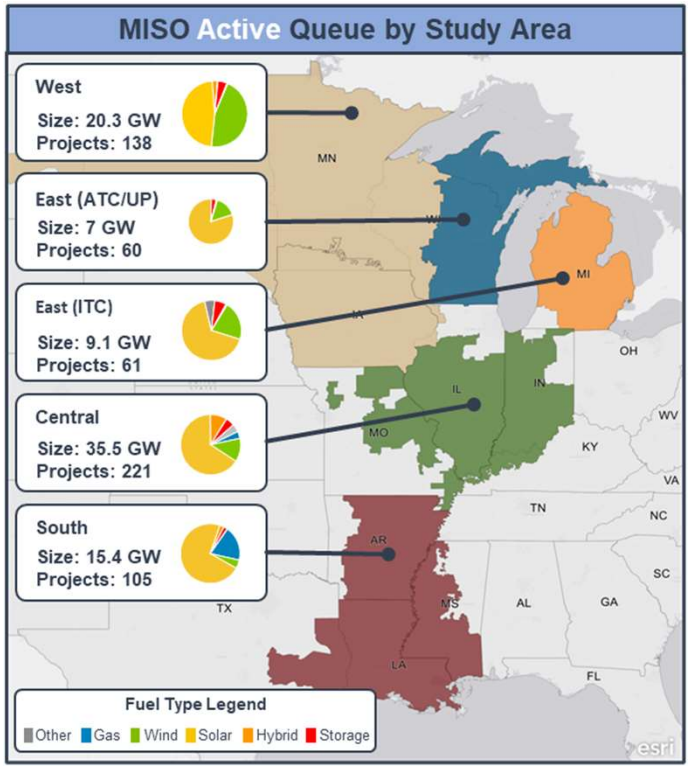
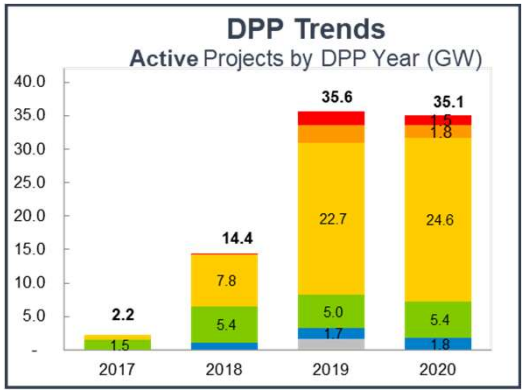
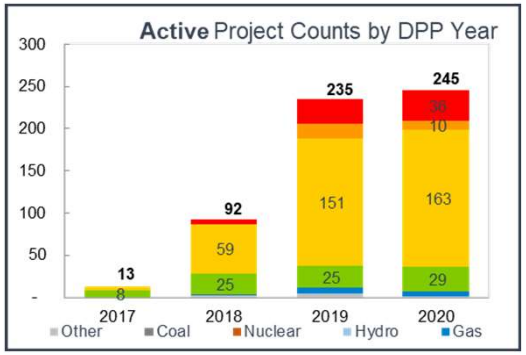
The Generator Interconnection Queue is reflective of system barriers that need to be addressed so states, members and customers can meet their renewable goals



Updated 3/8/2021







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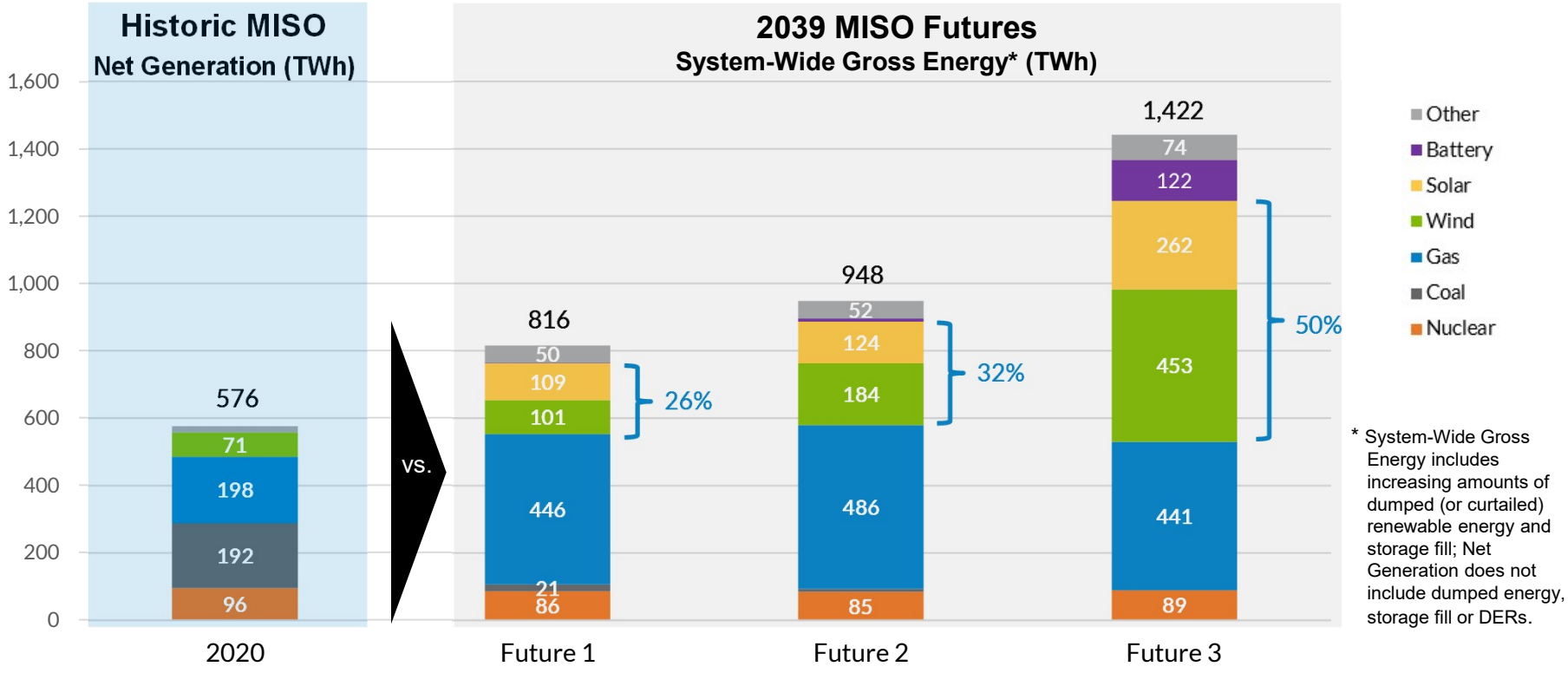
New Futures incorporate and build upon member plans to inform the resource transition and changing demand patterns



* System-Wide Gross Energy includes increasing amounts of dumped (or curtailed) renewable energy and storage fill; Net Generation does not include dumped energy, storage fill or DERs.

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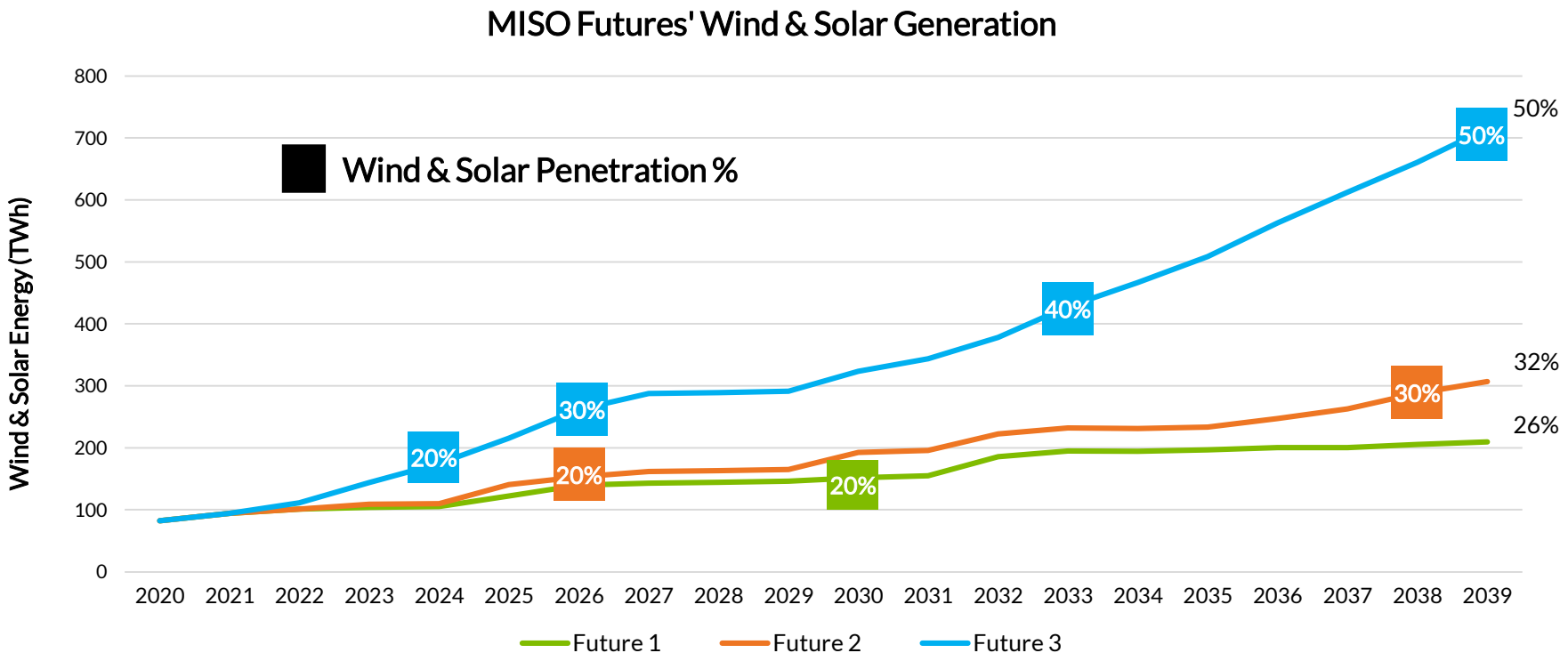
MISO's Futures reflect a broad range of how the fleet evolution may unfold, including large increases in renewables



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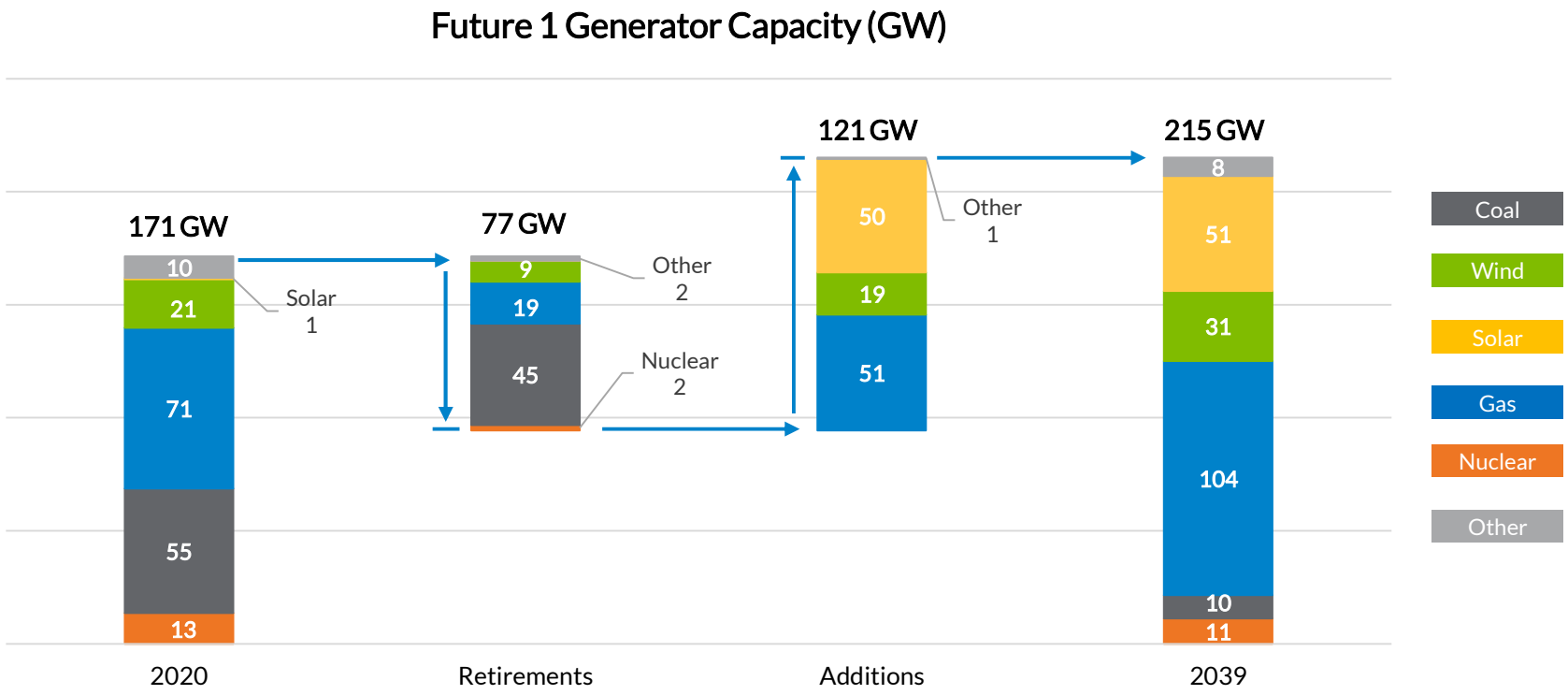
Long Range Transmission Planning activities in 2021 will focus on Future 1



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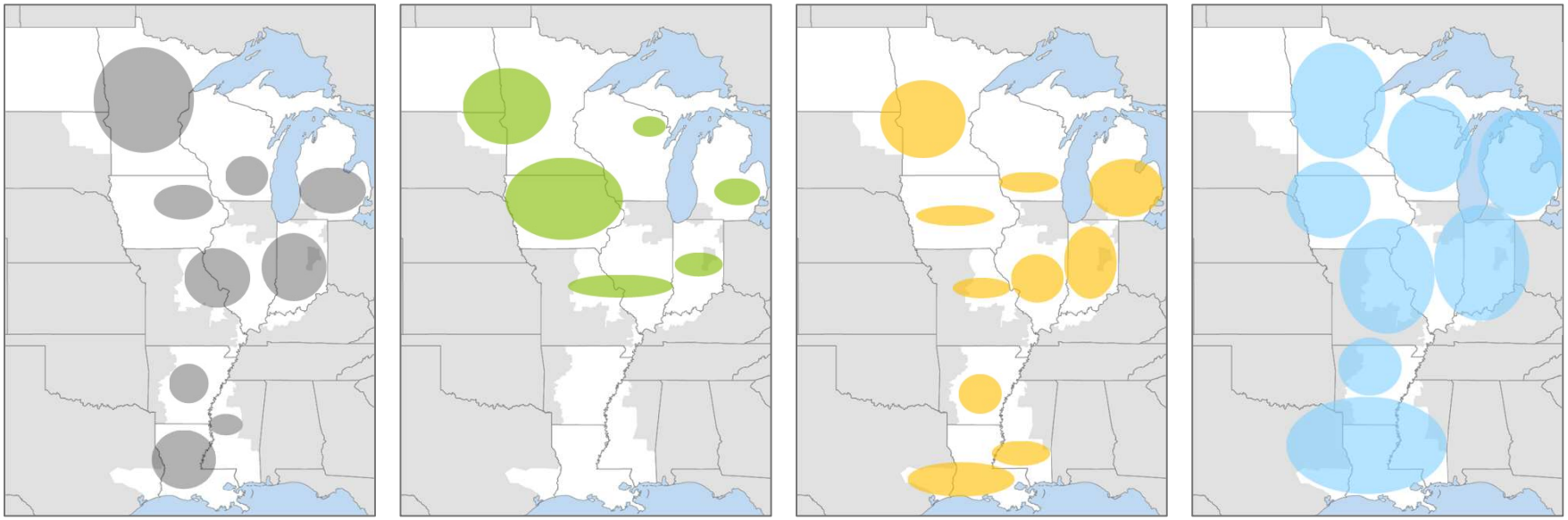
Future 1 will have areas of wind, solar and thermal resources spread across the region with approximately three times the renewables of today

Future 1 (2039)*



Retired - 77 GW

Wind* - 31 GW

Solar† - 51 GW

Thermal‡ - 127 GW

- Doesn't include interregional needs
* 0.2 GW in Local Resource Zone 10 (Mississippi); Hydro and batteries not included (~5.8 GW)

† Solar = PV (Photovoltaic) + DGPV (Distributed, Grid-connected Photovoltaic) + Hybrid
‡ Thermal = Coal + Natural Gas + Oil + Nuclear + Other

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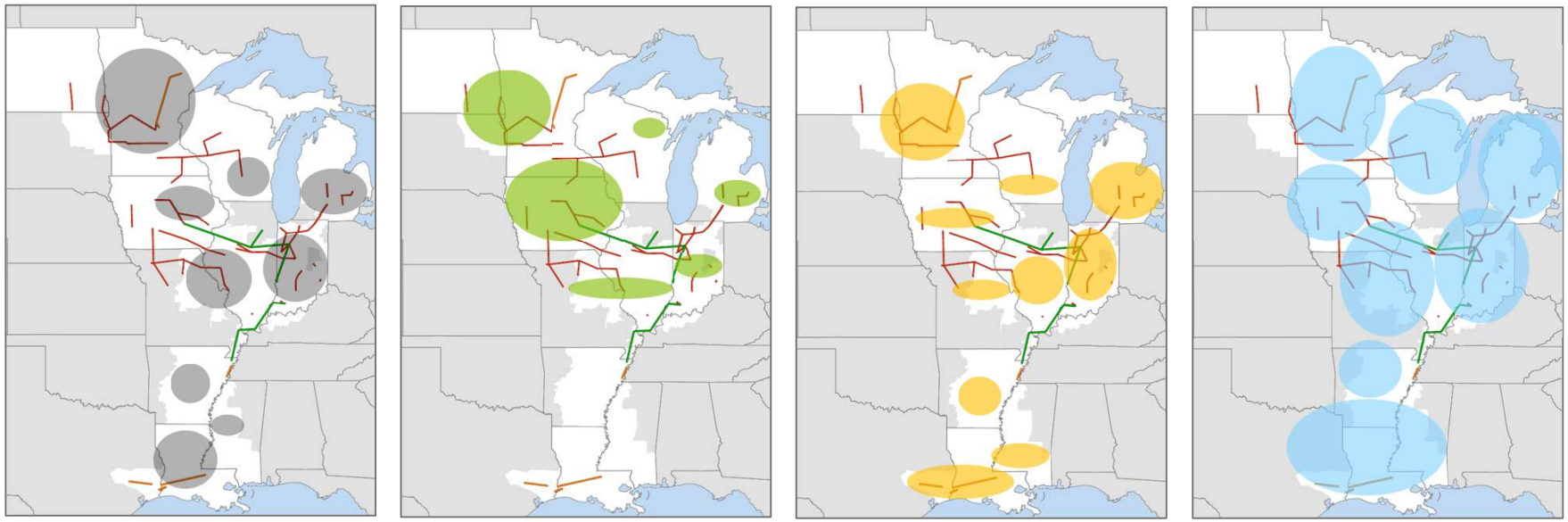
To address the types of system performance challenges such as those identified in the Renewable Integration Impact Assessment (RIIA), significant new transmission capacity will be needed to connect these resource areas together and to loads

Future 1 (2039)*



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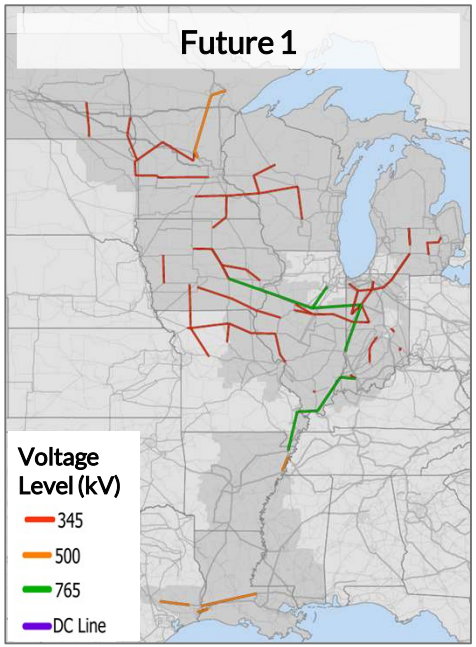
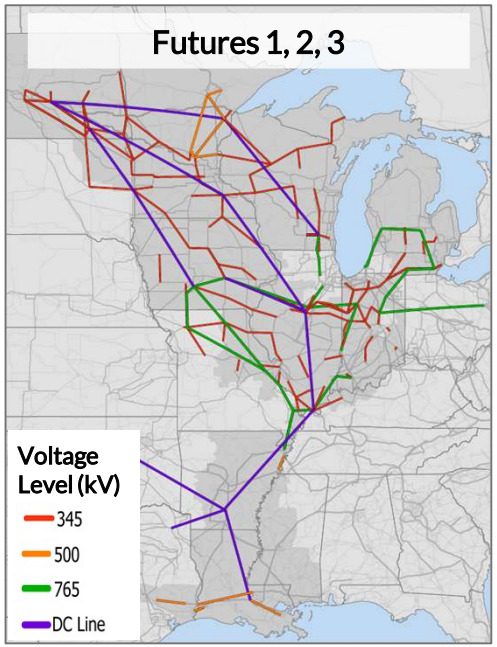
MISO's projected scope of transmission expansion needs is reflected in the initial roadmap for Future 1; the Future 1 roadmap also serves as the starting point for the potential transmission needs in Futures 2 and 3

Long Range Transmission Planning Roadmap

- Projected system development shown here is indicative at this point, based on known constrained areas, and options based upon system configuration
- LRTP analyses will confirm or modify solutions as dictated by system performance and values
- MISO will recommend transmission solutions as business cases are developed





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Questions?