



MISO Update

Missouri Public Service Commission

August 30th, 2017

Topics Covered

- MISO Update
- MISO-OMS Survey
- Generation Interconnection Queue
- Distributed Energy Resources
- MISO/SPP Coordinated Transmission Study

MISO Update

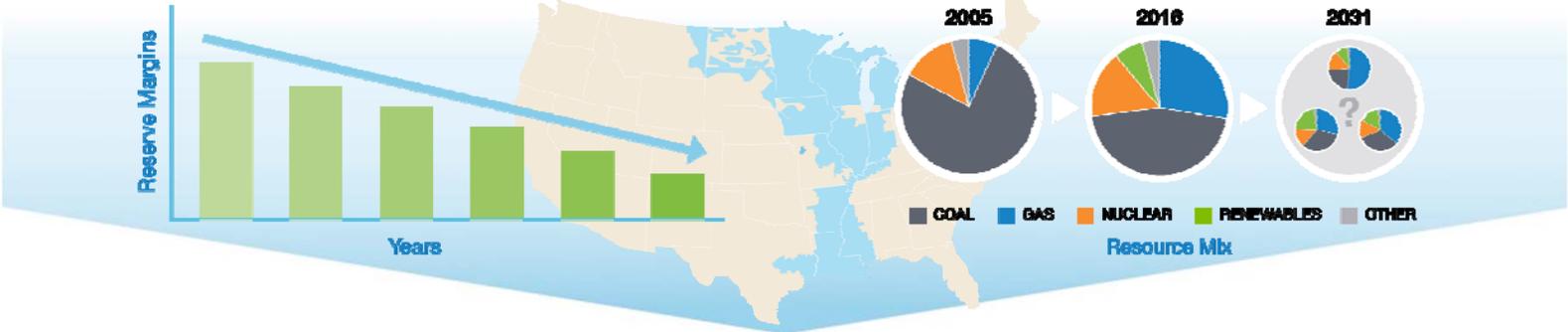
MISO's Response to the Changing Energy Landscape

THE ENERGY INDUSTRY

Several factors are affecting the industry and MISO region



The impact to MISO is lower reserve margins and a changing resource mix



Here's what we're doing to ensure reliability

-  Facilitating efforts to ensure adequate resource capacity exists in all areas of the footprint
-  Streamlining processes for new electricity sources to connect to the grid
-  Enabling transmission investment needed to support the generation portfolio of the future
-  Ensuring operational practices can reliably accommodate the shifting resource mix, including improved coordination with the natural gas industry

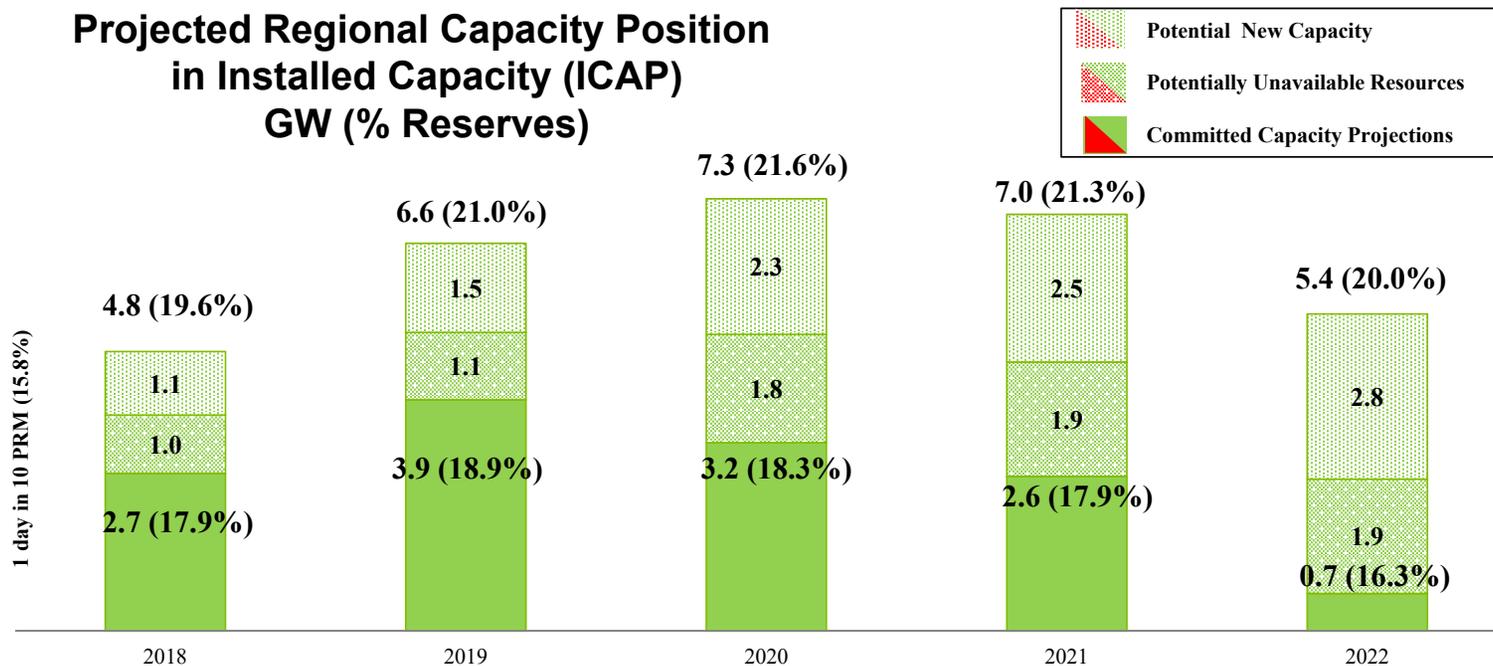
MISO/OMS Survey

Overview of MISO-OMS Survey



- Cooperative effort to quantify how much electricity-generating the region will have for the next 5 years.
- Voluntary survey illustrates how existing and anticipated future resources compare to the region's Planning Reserve Margin Requirements (PRMR) a measure of future demand and reserve expectations
- The survey is especially important now, given that the region's history historical reliance on coal-fired energy is evolving due to factors such as environmental regulations, low gas prices and state renewable standards.

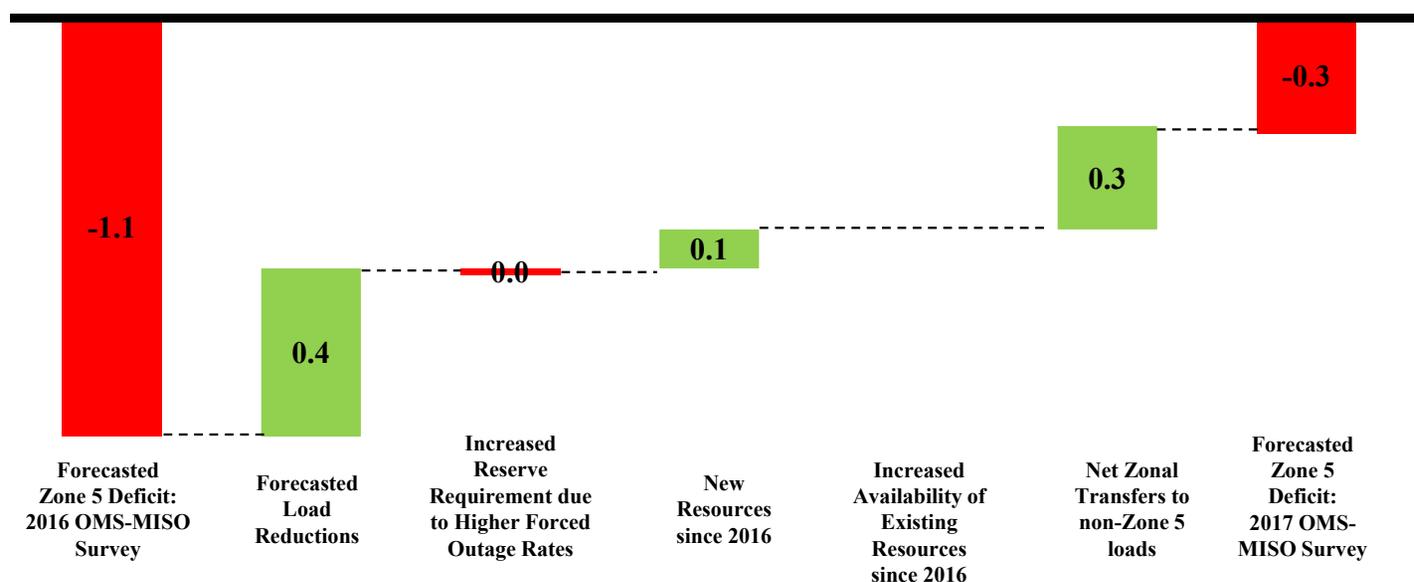
Existing resources, potential retirements, and new resources create a range of resource balances



- Regional outlook includes projected constraints on capacity, including Capacity Export Limits and the Sub-regional Power Balance Constraint
- These figures will change as future capacity plans are solidified by load serving entities and state commissions.
- **Potential New Capacity** represents 35% of the capacity in the final stage of the MISO Generator Interconnection queue, as of May 11, 2017.
- **Potentially Unavailable Resources** includes potential retirements and capacity which may be constrained by future firm sales across the Sub-regional Power Balance Constraint

Changes in Missouri (Zone 5) include both forecasted load reductions and an increase in Net Zonal Transfers

Zone 5 2018 Outlook
Committed Capacity Projection Variations
since 2016 OMS MISO Survey
 In GW (ICAP)



New resources include resources with newly signed Interconnection Agreements and new Load Modifying Resources
Increased availability results from deferred retirements and internal resources with reduced commitments to non-MISO load
 Positions include reported inter-zonal transfers, but do not reflect other possible transfers between zones

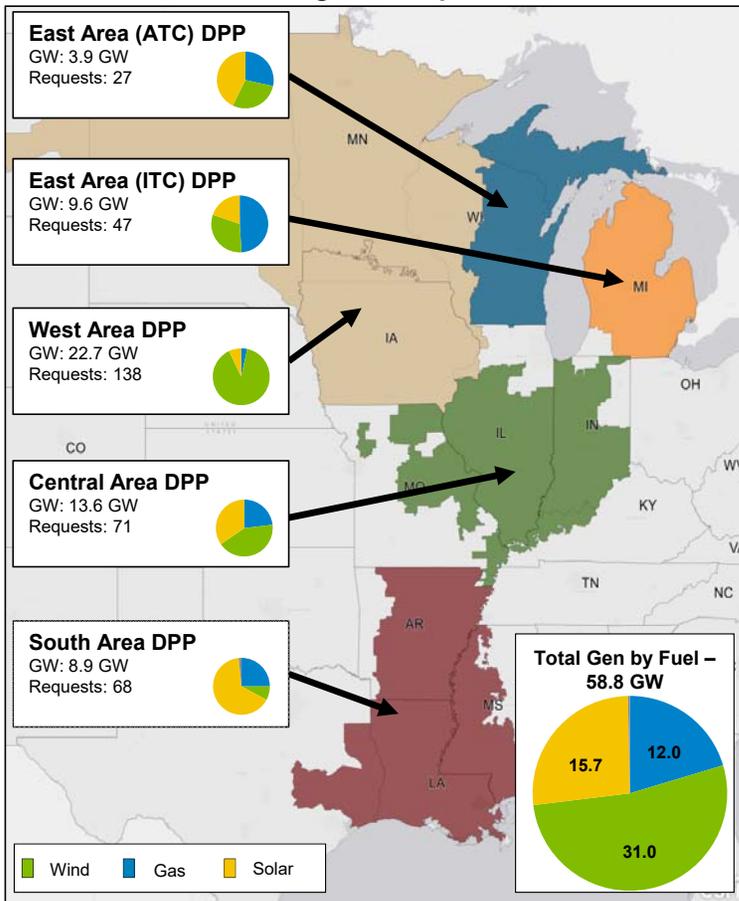


Generation Interconnection

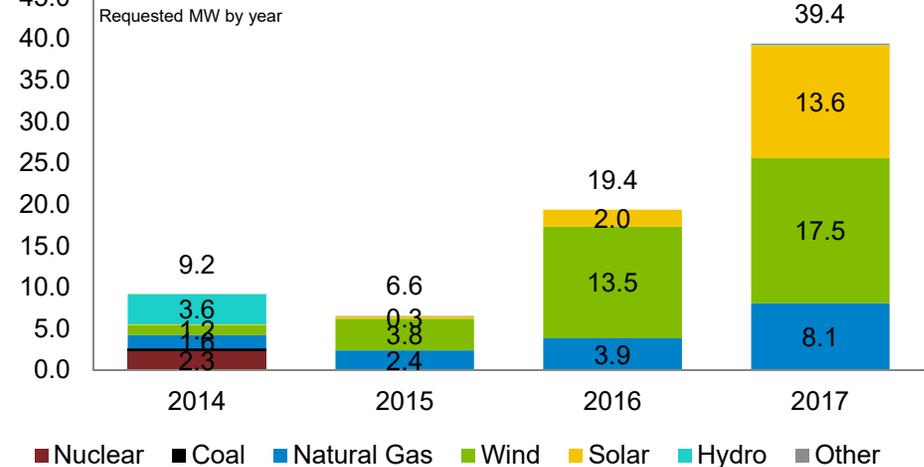
Most Recent Generator Interconnection Queue

With the addition of 2017-Aug projects, the Generation Interconnect Queue has grown to 355 projects totaling 59 GW

MISO Definitive Planning Area Map



DPP Trends



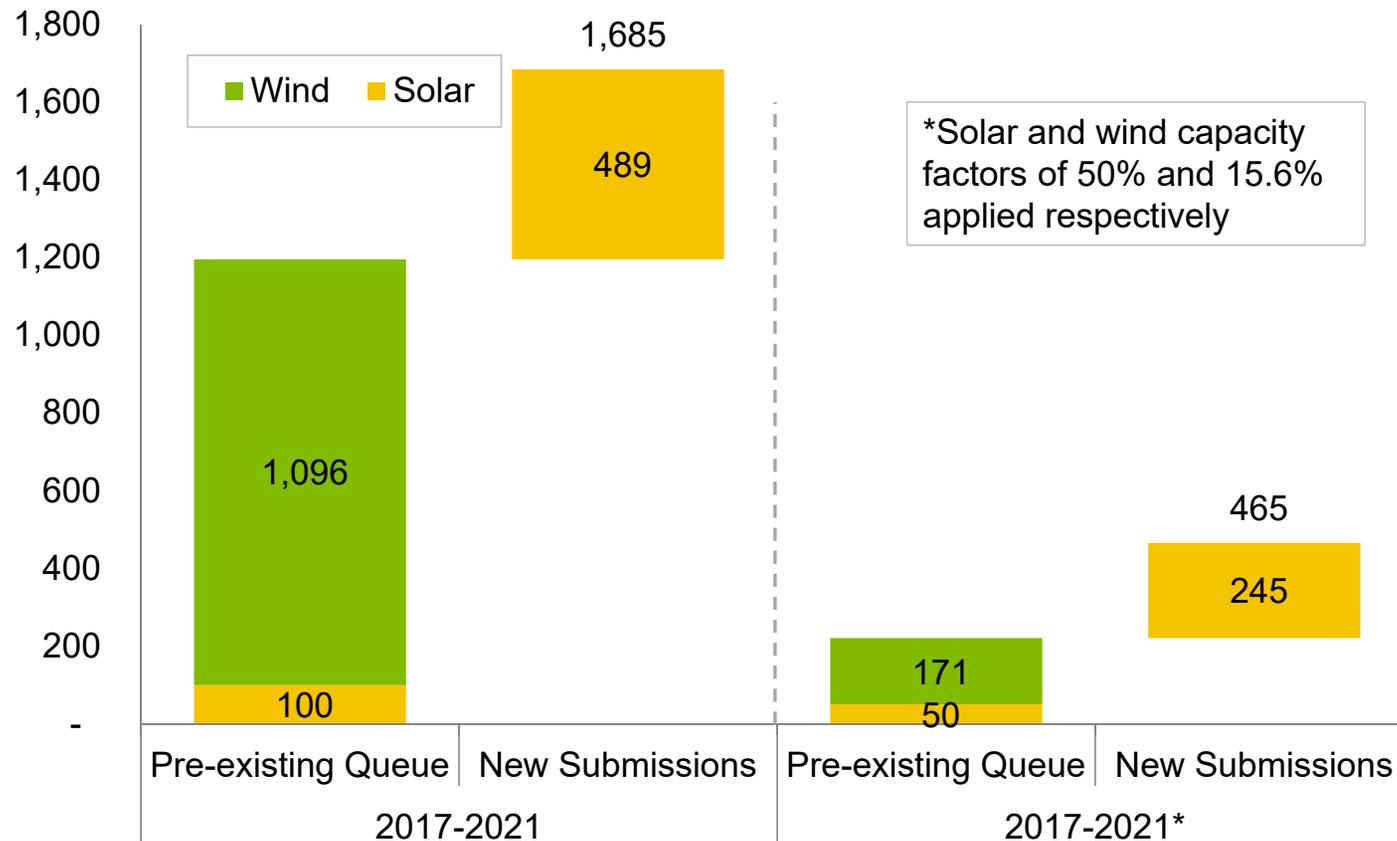
Notes:

- The Queue now has 140 MW of battery storage requests
- Requested projects have in service dates ranging from 2017-2022
- Detailed queue cycle information can be found [MISO's website](#)

Missouri Generation Interconnection Queue

Missouri: Incoming Queue Generation

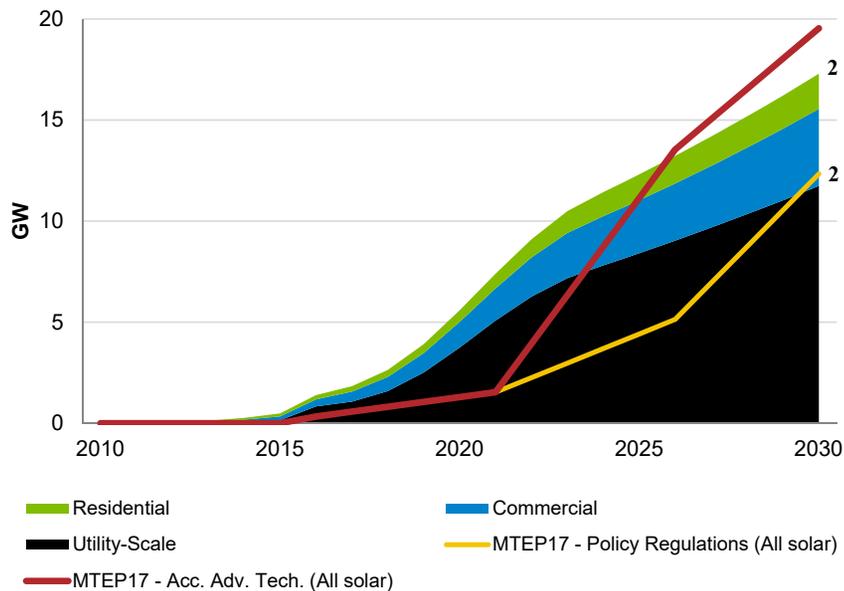
(MW) by Requested in Service Date



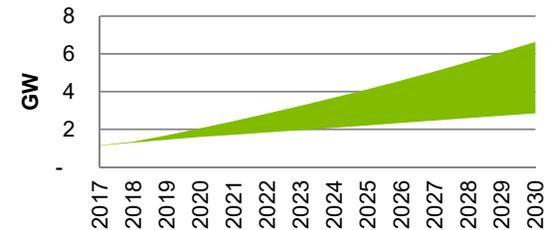
Distributed Energy Resources

Significant new DER is forecasted – external forces could accelerate pace of change

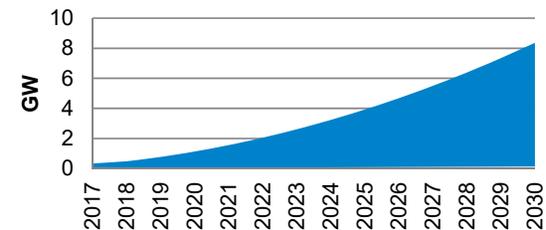
Installed PV in MISO by Segment¹



Possible Range of DR Deployment²



Possible Range of EE Deployment²



Utility scale PV represents majority of growth

Compared to today, DERs pose challenges and opportunities when it comes to planning, operations and potentially markets



Planning

DERs need to be incorporated into the traditional planning process



Operations

Short term net load requirements will become more dynamic and more challenging to forecast



Markets

Markets can be enhanced to include DERs if deemed useful by membership

MISO/SPP Coordinated Study

2016 MISO-SPP Coordinated Study

- During the 2016 MISO-SPP Coordinated Study, MISO and SPP both advanced a potential interregional project for regional review
- MISO's regional review identified a regional solution that cost less than the interregional project
- Order 1000, provides that interregional projects be selected if they are more cost effective than regional solutions.
- MISO finds great value in interregional coordination, including evaluation of projects that could benefit regions across seams, despite the fact that it doesn't always result in a finding that an interregional solution is most economical.

