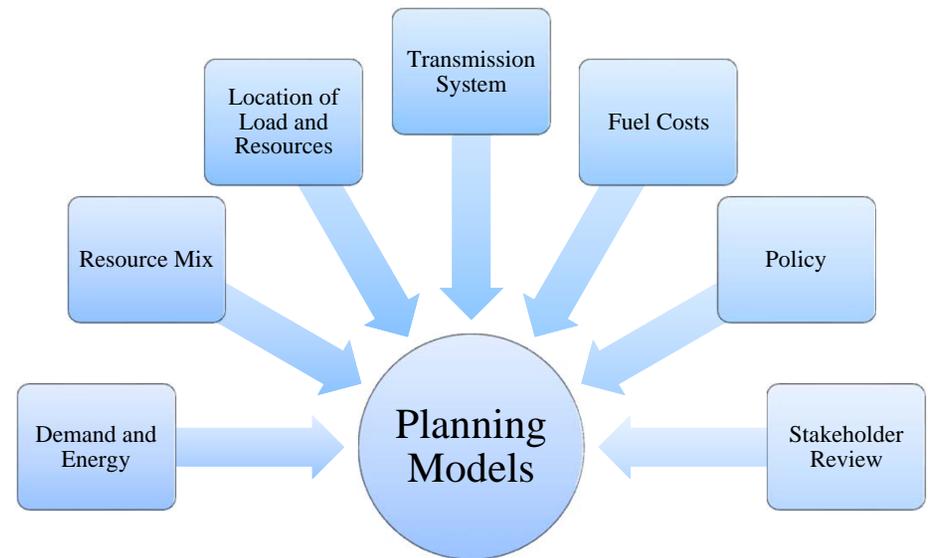




RTO Approaches to Forecasting

OMS Forecasting Workshop
May 22, 2018

MISO's planning processes depend on significant amounts of data from various sources



*Resource Planning includes long term Transmission Service Queue, the Generator Interconnection Queue and Generation Retirements

Different questions, different models, different forecasts needed

Reliability Based Analysis

- Seasonal Demand
 - Aggregate demand by bus
 - Characteristics (dynamic analysis)
 - Non-coincident
- Resource Fleet

Market Energy Based Analysis

- Annual Peak Demand
- Annual Energy
- Hourly Load Shapes
- Fuel Forecasts
- Policy Drivers
- Resource Fleet

Reliability based analysis forecasts sourced from our members

Reliability Based Analysis

- Seasonal Demand
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Model Year	Spring Light Load	Spring	Summer Shoulder	Summer Peak	Fall	Winter Peak
2	X			X		X
5	X		X	X		X
10				X		X

- New resources sourced through the generation interconnection process
- Future resource retirements sourced from the retirement process

Market energy based analysis forecasts sourced from many places

Market Energy Based Analysis

- Annual Peak Demand
- Annual Energy
- Hourly Load Shapes
- Fuel Forecasts
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- Demand and Energy start from forecasts provided by stakeholders through resource adequacy construct
 - Used because of the included energy projections
 - Are utilized to produce growth rates that can be extended beyond the 10-years of submitted data
- Hourly Load Shapes sourced from historic data as provided by our vendor

Market energy based analysis forecasts sourced from many places

Market Energy Based Analysis

- Annual Peak Demand
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- Base fuel forecasts supplied by vendors
 - Reviewed and potentially adjusted with stakeholder input
 - MISO performs some natural gas analysis to reflect impacts of futures and regional diversity
- Policy Driver considerations informed from current regulatory environment and stakeholder insight

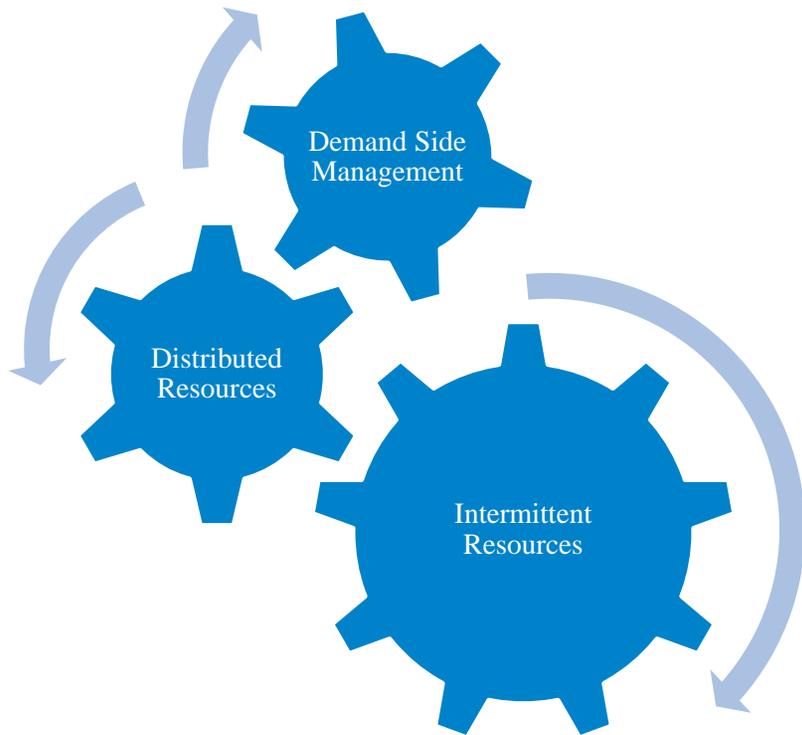
Market energy based analysis forecasts sourced from many places

Market Energy Based Analysis

- Annual Peak Demand
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- Resource forecasts are a result of previously identified inputs plus:
 - Approved interconnections and retirements are base assumptions
 - Vendor supplied DSM and DER potential
- MISO produces resource forecasts based on multiple futures to evaluate and robustness test potential transmission

Current demand and energy forecasting for market energy based analyses may not be robust enough for future needs



- Increased deployment of “behind the meter” impacts planning in two primary ways
 - Shifts focus to planning for energy rather than capacity
 - Net demand and energy changes
- Ability to appropriately model these changes is important to identifying future investment needs that will be used and useful for the asset life

The move from traditional peak capacity planning to energy planning requires changes in demand and energy forecasting

Clarity of impacts

- Changes in gross load shapes
- Impacts of DER and DSM on load shapes

Consistency in development

- All load in the footprint must be considered
- Allows for sensitivity analysis

Tuned to transmission planning needs

- Brings the right information to the planning questions
- Respects LSE forecasts for resource planning