MTEP18 FUTURES

What is a Future?

MISO Transmission Expansion Plan (MTEP) Futures are forward-looking scenarios of the energy landscape. Futures establish ranges of possibilities that, combined, produce a representation of what could be. Futures consider economic, political, and technological changes of different rates over time, i.e. natural gas price forecasts, load growth rates, generator retirements, renewable energy levels, carbon policy, and generation capital cost maturities. This information is used to model economic generation capacity expansion, which forecasts the optimal fleet to meet planning reserve margin and any renewable energy or environmental policy requirements. Using the range of optimal future resource mixes across Futures, MISO then develops transmission plans that ensure continued reliability and market efficiency.

Futures are forward – looking scenarios of the energy landscape.

Why does MISO use Futures in Transmission Planning?

Transmission planning is dependent upon the type, location, and quantity of future generation. Due to long project lead times, transmission planning must occur nearly 10 years prior to a significant transmission need. By contrast, MISO's Attachment Y generation retirement process requires a minimum six month notice and the Generator Interconnection Queue provides a two to three year outlook for resource additions. This gap in foresight poses a challenge to MISO's transmission planners who must plan for the grid of tomorrow. Futures are used to bridge the visibility gap by bookending uncertainty. Futures are long-term and consider possible outcomes as well as capture the uncertainty that the electric industry faces over the next 15 years.

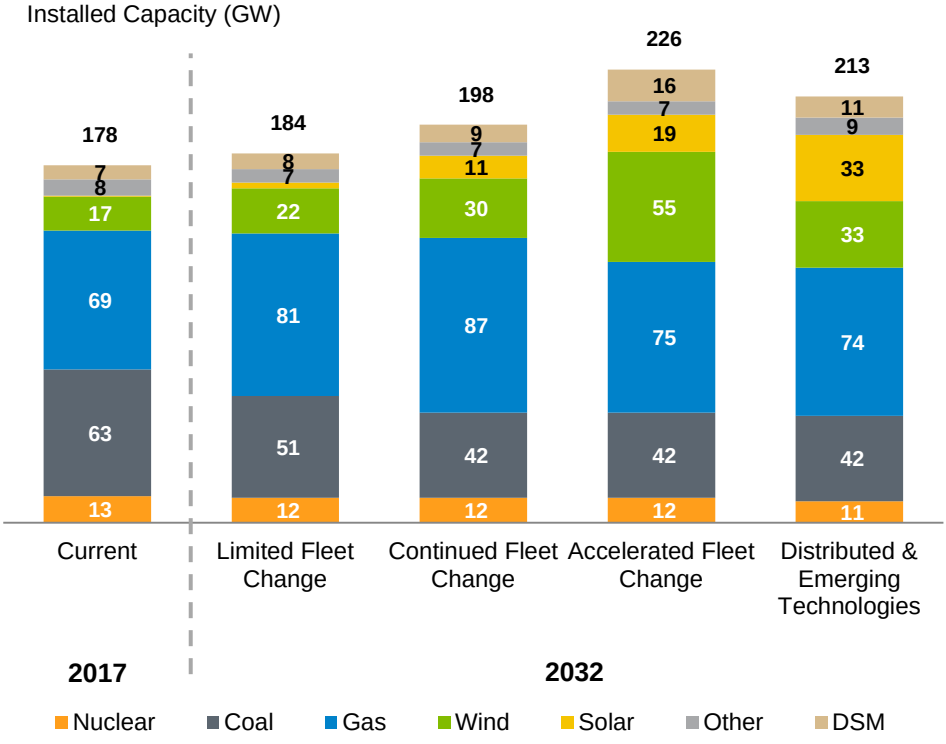
MTEP Futures are designed to bookend uncertainty by defining a wide range of potential plausible outcomes.

MTEP18 Futures

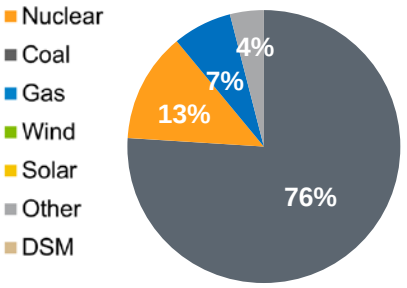
Three of the four MTEP18 Futures highlight a range of fleet evolution similar to the MTEP17 Futures. A new fourth Future attempts to capture the impacts of localized emerging technology, namely lithium-ion battery storage and distributed solar photovoltaics (PV). The generation fleet is shifting from the historical fuel mix to rely on a more balanced mix of coal, natural gas, and renewables. The Futures capture varying rates of change, which technologies drive them, and where they will be connected to the Bulk Electric System.

MTEP18 Futures – Capacity by Type (2032)

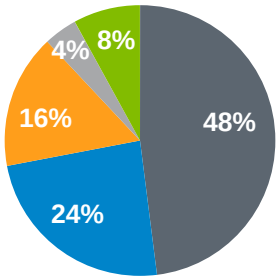
Installed Capacity (GW)



MTEP18 Futures Details and Energy Mix Charts



2005



2017

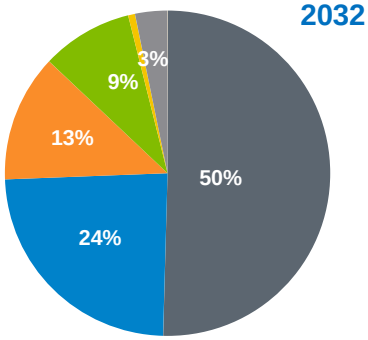
Historical Trends

MISO's system has experienced significant change since 2005. Renewables have entered the market driven by Federal and State policies as well as economics. Low natural gas prices have enabled more gas fired generation.

Limited Fleet Change

Existing generation does not experience any significant drivers of change. Policy and economic conditions favor thermal generation; thermal generators retire only at the end of their useful life. Renewable additions are solely driven by existing Renewable Portfolio Standards. Demand and energy grow more slowly than current forecasts.

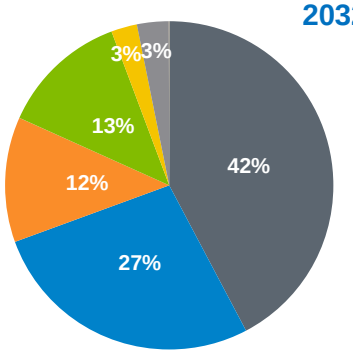
2032



Continued Fleet Change

Fleet evolution will follow historical trends. Coal generation will retire at the historical rate, slightly sooner than the end of useful life. Renewable growth will continue to outpace Renewable Portfolio Standards, and natural gas reliance will increase to replace retired coal generation. Demand and energy growth reflects the current forecast.

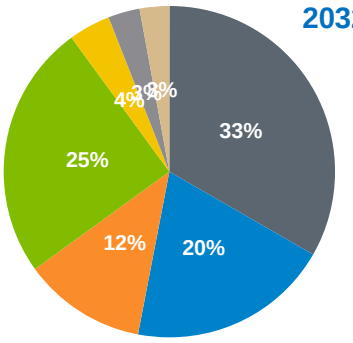
2032



Accelerated Fleet Change

Significant change is driven by a robust economy with increased demand and energy growth rates and favorable economic and policy conditions for renewables. Higher gas prices as well as a 20% carbon emissions reduction from current levels create a favorable landscape for renewable expansion and increased demand-side management. Coal generation retires at the historical rate and operates only in peak season.

2032



Distributed & Emerging Technologies

Characterized by the addition of emerging and distributed technologies, this Future models 2 GW of lithium-ion battery storage and increased distributed solar PV. Demand and energy rates are higher due to electric vehicle adoption, with energy growing faster than demand to simulate smart charging. Coal generation retires at the historical rate, and renewable additions grow due to favorable economics, particularly solar PV.

2032