

**OMS**

Organization of MISO States

# Under Alternative Futures

Organization of  
Midwest ISO  
States

# Regional Transmission Planning

**Purpose:** To develop alternative transmission plans required to meet possible alternative futures.

**Reason:** With the potential changes that are occurring in national energy policy, there is a need to proactively develop transmission plans that would be required to meet these national objectives.

# OMS Role

OMS has been working with the Midwest ISO in developing alternative futures and the inputs to the planning process that characterize these futures. This effort is named Cost Allocation and Regional Planning (CARP)

MISO has previously performed this type of analysis as a part of its planning studies. But this will be the first such study that reflects direct input from the Commissions in the MISO states.

# Alternative Futures

The OMS used three components that make up the potential changes that are being considered for national energy policy:

1. Possible Renewable Energy Policy
  - Federal Renewable Portfolio Standard
2. Possible Carbon Policies
  - Carbon Tax
  - Carbon Cap
3. Possible Smart Grid Policy
  - Deployment of AMI
  - Increase in Demand Response and Price Responsive Demand

# Business As Usual

Business as Usual (BAU) means that none of the above changes would take place.

- Capacity:
  - Demand for wind power and a mix of other renewable generation resources based on state requirements.
  - Capacity prices at mid levels (from PowerBase), escalating with the rate of inflation (2.91%).
- Fuels:
  - Fossil fuel and uranium prices at mid levels, escalating with the rate of inflation.
    - Natural Gas: \$6.22/MMBtu
    - Coal: from PowerBase – unit specific
    - Uranium: \$1.12/MMBtu
- Renewables:
  - All but two states in MISO have either renewable standards or targets
- Emissions:
  - Emission prices at mid levels: SO<sub>2</sub> and NO<sub>x</sub> (from PowerBase); Hg (from CARP consensus) with CO<sub>2</sub> price at \$0.
- Load:
  - Maintain **mid** growth rate in energy consumption (1.0%)
  - Maintain **mid** growth rate in demand (0.75%)

# Federal RPS Future

Federal RPS will likely be a requirement that 20% of energy be met by renewable energy sources by 2020.

– Capacity impacts:

- Greater demand for wind power and a mix of other renewable generation resources.
- Slowed growth in added base-load generation
- Same capacity prices as in BAU case

– Fuel impacts:

- Reduced usage of fossil fuels from BAU case
- Same natural gas and coal prices as in BAU case

– Emission impacts:

- Reductions in SO<sub>2</sub>, NO<sub>x</sub>, Hg and CO<sub>2</sub> from BAU case.

– Load Impacts:

- Maintain base growth in energy and demand

– Export Impacts:

- Increased exports of wind power from MISO footprint

# Carbon Tax Future

Carbon tax future is one in which the federal government places a tax on carbon emissions.

- Capacity impacts:
  - Capacity prices stay the same as in BAU case.
- Fuel impacts:
  - Reduced usage of coal-fired generation from BAU case
  - Lower coal prices than in BAU case
- Emission impacts:
  - High CO<sub>2</sub> emission cost of \$100/ton
- Load Impacts:
  - Low growth rates for energy (0.3%) and demand (0.3%)

# Carbon Cap & Trade Future

Carbon Cap & Trade future is one in which the federal government restricts carbon output from electric generating plants.

- Capacity impacts:
  - Increased demand for low carbon based generation.
    - Renewables, Natural Gas-Fired and Nuclear
  - Somewhat higher capacity prices for natural gas-fired and nuclear generation than in BAU case.
- Fuel impacts:
  - Reduced usage of coal-fired generation from BAU case
  - Higher natural gas and uranium prices and lower coal prices than in BAU case
- Emission impacts:
  - Low-range CO<sub>2</sub> cost of \$20/ton
- Load Impacts:
  - Low growth rates for energy (0.3%) and demand (0.3%)

# Smart Grid Future

Smart Grid Future is one that focuses on deployment of AMI, with increases in demand response and price sensitive demand to reduce the need for future generating capacity.

- Capacity impacts:
  - Same capacity prices as in BAU case
- Fuel impacts:
  - Same fuel prices as in BAU case
- Emission impacts:
  - Same emission costs as in BAU case.
- Load Impacts:
  - Maintain mid growth rate for energy consumption
  - Low growth rate for demand

# Transmission Planning Design

A design goal is to create a set of futures that will cause the greatest variation in technology choices and geographic locations of future generating resources.

From a transmission planning perspective, this will result in:

- The greatest variation in transmission upgrades to meet these futures
- The overlap in transmission design among the various futures

# First Step:

## Generation Resource Selection

- With the inputs defining the various futures, MISO will run an “optimization” to determine the generation mix that best meets each of the futures.
  - Planned future generation (as submitted to MISO) will be treated as given
  - Optimization applied to future needs for a 20-year period
  - Location of generation to meet resource adequacy requirements within each of the three MISO planning regions: West, Central and East

# Combined Futures

- In order to maximize the amount of information derived during the generation resource selection process, an additional set of futures will also be run that represent alternative combinations of the futures described above. They are:
  - Federal RPS + Carbon Cap
  - Federal RPS + Smart Grid
  - Carbon Cap + Smart Grid + Electric Cars
  - Federal RPS + Carbon Cap + Smart Grid
  - BAU + High Growth in Demand and Energy

# Changes in Inputs for Combined Futures

- Federal RPS + Carbon Cap
  - Same as Carbon Cap with greater exports from MISO footprint
- Federal RPS + Smart Grid
  - Same as Federal RPS with low demand growth
- Carbon Cap + Smart Grid + Electric Cars
  - Same as Carbon Cap with mid demand growth, high energy growth and low oil prices
- Federal RPS + Carbon Cap + Smart Grid
  - Same as Carbon Cap with greater exports from MISO footprint, mid demand growth rate and high energy growth rate
- BAU + High Growth in Energy and Demand
  - Same as BAU with high demand and energy growth rates

# Next Steps

- After the generation expansion mixes are determined for the futures (including the combinations), the OMS/CARP taskforce will select which of the futures with associated generation mixes will be used by MISO as the basis for developing transmission plans.
  - This is a highly time consuming process, and MISO would like to keep the number of futures for which it develops transmission plans to no more than four.
  - The OMS/CARP criteria in the selection process will be to get the best picture of possible differences and similarities in the transmission plans.

# State Commission Review

Review by State Commissions to determine if all of the Futures and Modeling Inputs are reasonable; i.e., do the State Commissions see any “red flags”?

- Low, Base and High levels for various inputs
- Various levels (Low, Base and High) of inputs used to define futures

# Attachments

- Spread Sheets attached to give:
  - Specifics of low, base and high assumption
  - Specifics of low, base and high used in each future