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2015 Economic Planning Study Kickoff

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Introduction

- Process Overview and Timeline
- 2015 Futures Development
  - Historical Process
  - Proposed Process
- MISO MTEP16 Futures Assumptions
- Next Steps

Process Overview and Timeline

- ATC Economic Project Planning
  - **During February,** we hold an initial stakeholder meeting to review the market congestion summary and potential fixes and to discuss economic study scenarios, drivers, ranges, and assumptions.
  - **By March 1**, we work with stakeholders to request and prioritize new/other economic studies and recommend study assumptions.
  - **By April 15** – we identify preliminary areas of economic study, study assumptions and models and solicit further comments from stakeholders.
  - **By May 15** – we finalize areas of economic study, study assumptions and models to be used in analysis.
  - **By November 15** – we provide a summary of the results of the economic analyses to our stakeholders.

2015 Futures Development

- ATC does not create a specific futures matrix
- Utilize the MISO MTEP models and futures
- Review MISO models and provide updates as necessary
- Ensures greater alignment with MISO stakeholder process

MISO MTEP15 Futures Definitions

Future	Narrative
Business As Usual	*The baseline, or Business as Usual, future captures all current policies and trends in place at the time of futures development and assumes they continue, unchanged, throughout the duration of the study period. All applicable EPA regulations governing electric power generation, transmission and distribution (NAICS 2211) are modeled. Demand and energy growth rates are modeled at a level equivalent to the 50/50 forecasts submitted into the Module E Capacity Tracking (MECT) tool. All current state-level Renewable Portfolio Standard (RPS) and Energy Efficiency Resource Standard (EERS) mandates are modeled. To capture the expected effects of environmental regulations on the coal fleet, a total of 12.6 GW of coal unit retirements are modeled, including units which have either already retired or publicly announced they will retire.*
Low Demand	*The Low Demand future is designed to capture the effects of reduced economic growth resulting in lower energy costs and medium – low gas prices. The magnitude of demand and energy growth is determined by using the lower bound of the Load Forecast Uncertainty metric. All current state-level Renewable Portfolio Standard (RPS) and Energy Efficiency Resource Standard (EERS) mandates are modeled. All applicable EPA regulations governing electric power generation, transmission and distribution (NAICS 2211) are modeled. To capture the expected effects of environmental regulations on the coal fleet, 12.6 GW of coal unit retirements are modeled, including units which have either already retired or publicly announced they will retire. Additional, age-related retirements are captured using 60 years of age as a cutoff for non-coal thermal units and 100 years for conventional hydroelectric.*
High Demand	*"he High Demand future is designed to capture the effects of increased economic growth resulting in higher energy costs and medium – high gas prices. The magnitude of demand and energy growth is determined by using the upper bound of the Load Forecast Uncertainty metric and also includes forecasted load increases in the South region. All current state-level Renewable Portfolio Standard (RPS) and Energy Efficiency Resource Standard (EERS) mandates are modeled. All existing EPA regulations governing electric power generation, transmission and distribution (NAICS 2211) are incorporated. To capture the expected effects of environmental regulations on the coal fleet, 12.6 GW of coal unit retirements are modeled, including units which have either already retired or publicly announced they will retire. Additional, age-related retirements are captured using 60 years of age as a cutoff for non-coal thermal units and 100 years for conventional hydroelectric.*
Regional Clean Power Plan Compliance	*The Regional Clean Power Plan future focuses on several key items from a footprint wide level which combine to result in significant carbon reductions over the course of the study period. Assumptions are consistent with previous CPP sensitivity analysis, and include the following:* • *To capture the expected effects of existing environmental regulations on the coal fleet, 12.6 GW of coal unit retirements are modeled, including units which have either already retired or publicly announced they will retire.* • *14 GW of additional coal unit retirements, coupled with a $25/ton carbon cost, state mandates for renewables, and half of the EE annual growth used by the EPA, result in a significant reduction in carbon emissions by 2030.* • *Additional, age-related retirements are captured using 60 years of age as a cutoff for non-coal thermal units and 100 years for conventional hydroelectric.* • *Solar and wind include an economic maturity curve to reflect declining costs over time.* • *Demand and energy growth rates are modeled at levels as reported in Module E.*
Sub-Regional Clean Power Plan Compliance	*The Sub-Regional Clean Power Plan future focuses on several key items from a zonal or state level which combine to result in significant carbon reductions over the course of the study period. Assumptions are consistent with previous CPP sensitivity analysis, and include the following:* • *To capture the expected effects of existing environmental regulations on the coal fleet, 12.6 GW of coal unit retirements are modeled, including units which have either already retired or publicly announced they will retire.* • *20 GW of additional coal unit retirements, coupled with a $40/ton carbon cost, state mandates for renewables, and half of the EE annual growth used by the EPA, result in a significant reduction in carbon emissions by 2030.* • *Additional, age-related retirements are captured using 60 years of age as a cutoff for non-coal thermal units and 100 years for conventional hydroelectric.* • *Solar and wind include an economic maturity curve to reflect declining costs over time.* • *Demand and energy growth rates are modeled at levels as reported in Module E*

Source: MISO 1-15-2015 MTEP16 Futures Development Workshop (https://www.misoenergy.org/Events/Pages/MTEP20150115.aspx)

MISO MTEP15 Future Matrix

Future	Demand and Energy Growth	Retirements Level* (GW)	Natural Gas Price (2015$/MMBTu)	Incremental Renewables (GW) N/C: North/Central MISO S: South MISO	CO_2 Cost (2015$/ton)
Business as Usual	0.9%	12.6 GW Coal	$4.30	N/C: 4.2 Wind/ 1.4 Solar S: 0 Wind/ 0 Solar	None
Low Demand	1.6%	12.6 GW Coal + Age-Related	$4.30	N/C: 2.4 Wind/ 1.3 Solar S: 0 Wind/ 0 Solar	None
High Demand	0.2%	12.6 GW Coal + Age-Related	$3.44	N/C: 7.2 Wind/ 1.6 Solar S: 0 Wind/ 0 Solar	None
Regional CPP Compliance	0.9%	12.6 GW Coal + 14 GW coal + Age-Related	$5.16	N/C: 4.2 Wind/ 1.4 Solar S: 0 Wind/ 0 Solar + economically chosen wind/solar based on cost maturity curves	$25 cost
Regional CPP Compliance	0.9%	12.6 GW Coal + 20 GW coal + Age-Related	$5.16	N/C: 4.2 Wind/ 1.4 Solar S: 0 Wind/ 0 Solar + economically chosen wind/solar based on cost maturity curves	$40 cost

12 GW of MATS related coal-retirements are assumed in all futures
Age-related retirement assumption applies to non-coal generation only

Source: MISO 1-15-2015 MTEP16 Futures Development Workshop (https://www.misoenergy.org/Events/Pages/MTEP20150115.aspx)

MTEP16 Futures Matrix Status

- Feb 18th, MISO PAC intends to vote on draft futures matrix
- MISO will post full draft futures matrix prior to MISO PAC meeting
- MISO may delay vote on matrix and hold e-mail ballot
- ATC will update customers/stakeholders on finalized matrix at next meeting

Stakeholder and Customer Feedback

- ATC is soliciting stakeholders and customers for new/other economic studies, recommended study assumptions changes, and study areas for our 2015 study
- ATC also requests feedback in areas where Public Policy Requirements may drive transmission needs.
  - Public Policy Requirements are enacted statutes (i.e., passed by the legislature and signed by the executive) and regulations promulgated by a relevant jurisdiction, whether within a state or at the federal level, including duly enacted laws or regulations passed by a local governmental entity, such as a municipal or county government. Stakeholders are encouraged to provide ATC with Public Policy Requirements. ATC utilizes transmission needs driven by Public Policy Requirements in its assumptions when performing economic analysis of study areas. The transmission needs driven by Public Policy Requirements that will be included in ATC's finalized assumptions will be posted prior to May 15th.

Next Steps

- Project / Analysis Development
  - Review of Congestion
  - Stakeholder Feedback
- 2015 Futures Development
  - Continued Review of MISO MTEP16 Development
  - Review of MISO PROMOD Models
- Analysis of Projects
  - Study Years - 2025
  - Futures – All MISO MTEP16 Futures
- Timelines
  - April 15: Define Preliminary Assumptions
  - May 15: Finalize Assumptions
  - November 15: Provide Analysis Update

ATC-Stakeholder-Customer Discussion

- Take advantage of multiple interests and levels of knowledge and experience
- Continue improving ATC's economic planning studies
- Keeping an open and transparent process that involves input from stakeholder/customers
  - Expansion Resource Planning
  - Expansion Resource Planning – Renewables
  - Modeling of Load
  - Emission Modeling
  - Other topics?

Expansion Resource Planning

- MISO uses planning software to determine future generation (EGEAS)
- Assumptions from the futures matrix are used in EGEAS
- Generation siting may not consider all impacts
  - Transmission capacity
  - Other infrastructure (rail and pipe)

Expansion Resource Planning - Renewables

- MISO currently follows state mandated Renewable Portfolio Standards (RPS)
- Older models did not properly site some renewables in the ComEd area (N. Illinois)
  - MISO has since corrected some of those issues
- Do stakeholder/customers have insight regarding:
  - Prospective future enhancements to RPS mandates in WI?
  - Thoughts on utility scale renewables (wind, solar, other?)
  - Modeling residential/commercial renewables
  - Connecting to lower kV vs. higher kV?

Modeling of Load

- MISO currently uses 2005 load profile
  - Used based on stakeholder feedback
  - Monthly energy percentages
  - Daily energy use patterns
- MISO incorporating non-conforming loads
  - Relatively constant throughout time
  - Do not follow normal daily energy use patterns
- Are there stakeholder/customer thoughts on:
  - Current or future changes that may cause concern?
  - Loads that aren't exclusively non-conforming
    - Are customers willing to work with ATC to improve modeling?

Emission Modeling

- Can't dive into all details of EPA 111(d) today
- MISO is developing futures tailored around these measures
- MISOs modeling may have impacts on predicted costs of energy
  - Thoughts on emissions costs being captured as a:
    - Regulation – impacts dispatch but not a cost adder
    - Emissions market/tax – impacts dispatch and cost of energy adder
  - Impacts on dispatch for retrofitted units
  - Costs of emissions controls in Variable O&M
  - Other thoughts?

Questions?

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Thank You For Your Time!