



# 2011 Economic Planning Futures Matrix Review

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# Introduction

- Assumptions and Modifications
  - 2021 Futures
  - 2021 Drivers
- Updated Spaghetti Diagrams



# Introduction

This presentation is intended to provide updated information related to ATC's 2011 Economic Analysis process.

The following details pertain primarily to those assumptions from ATC's 2011 Futures Matrix which were modified over the course of the 2011 analytical process.

# ATC 2021 Futures Matrix

Drivers	Load Growth within ATC	Energy Growth within ATC	Load Growth outside ATC	Energy Growth outside ATC	Total Coal Retirements (or conversions to natural gas) Within ATC	Generator Additions Within ATC	Total Percent Energy from Renewables for ATC
<b>Bounds</b>	2021	2021	2021	2021	2021	2021	2021
<b>Lower</b>	0.00%	0.00%	0.03%	0.05%	453 MW	Planned Wind, Plus required expansion generation (Wind / Fossil)	10%
<b>Mid</b>	0.90%	0.90%	0.78%	0.79%	907 MW	Planned Wind, Plus required expansion generation (Wind / Fossil)	15%
<b>Upper</b>	1.70%	1.70%	1.28%	1.42%	1,521 MW	Planned Wind, DRG, Plus required expansion generation (Wind / Fossil)	25%
<b>2021 Futures Descriptions</b>							
<b>Aggressive Energy Efficiency</b>	Lower	Lower	Lower	Lower	Mid	Lower	Lower
<b>Cautious Investment</b>	Mid	Mid	Mid	Mid	Lower	Mid	Mid
<b>Clean Robust Economy</b>	Upper	Upper	Upper	Upper	Upper	Upper	Upper
Drivers	Natural Gas Price Forecast	Coal Price Forecast for New Units	Environmental Regulations	Renewable Portfolio Standards (RPSs) and Wind Power Zones (GW: Existing Model / Expansion / Total)	Transmission Overlay Outside ATC	Generation Portfolio Outside ATC	
<b>Bounds</b>	2021	2021	2021	2021	2021	2021	
<b>Lower</b>	- 50% (2020 Price = \$3.29 / MMBtu)	- 10%	\$0/ton for CO <sub>2</sub> , 0% higher mercury costs	WI 10% RPS and Current State RPSs for all MISO States with an RPS (for 2020) and Allocation to RGOS Wind Zones Proportion to Associated Cap. Factors as utilized in MISO's MTEP 11 PROMOD analysis	MISO MVP Starter Projects	Business as Usual - Gas Only	
<b>Mid</b>	NYMEX forecast (2020 Price = \$6.58 / MMBtu)	Mid (Actual - Projected)	\$25/ton for CO <sub>2</sub> , 25% higher mercury costs	WI 15% RPS and Current State RPSs for all MISO States with an RPS (for 2020) and Allocation to RGOS Wind Zones Proportion to Associated Cap. Factors as utilized in MISO's MTEP 11 PROMOD analysis	MISO MVP Starter Projects Plus DATC Projects	Business as Usual	
<b>Upper</b>	+ 50% (2020 Price = \$9.87 / MMBtu)	+ 20%	\$45/ton for CO <sub>2</sub> , 25% higher mercury costs	WI 25% RPS and Current State RPSs for all MISO States with an RPS (for 2020) and Allocation to RGOS Wind Zones Proportion to Associated Cap. Factors as utilized in MISO's MTEP 11 PROMOD analysis	MISO MVP Starter Projects Plus DATC Projects	OMS CARP	
<b>2021 Futures Descriptions</b>							
<b>Aggressive Energy Efficiency</b>	Lower	Mid	Mid	Lower	Lower	Lower	
<b>Cautious Investment</b>	Mid	Upper	Lower	Mid	Mid	Mid	
<b>Clean Robust Economy</b>	Upper	Lower	Upper	Upper	Upper	Upper	



# ATC 2021 Futures Matrix Modifications – Study Year

- Previous 2011 Futures Matrix:
  - 2020 study year
  - Based on previous ATC and MISO analysis (MTEP10)
- Final 2011 Futures Matrix:
  - 2021 study year
  - Consistent with MISO MTEP11 analysis
  - Ensures coordination with MTEP11 PROMOD models

# ATC 2021 Futures Matrix Modifications – Transmission Overlay

## Previous 2011 Futures Matrix

Drivers	Transmission Overlay Outside ATC
Lower	MISO MVP Starter Projects
Mid	MISO MVP Starter Projects Enhanced
Upper	MISO RGOS Native Voltage Overlay
2021 Futures Descriptions	
Aggressive Energy Efficiency	Lower
Cautious Investment	Mid
Clean Robust Economy	Upper

## Final 2011 Futures Matrix

Drivers	Transmission Overlay Outside ATC
Lower	MISO MVP Starter Projects
Mid	MISO MVP Starter Projects Plus DATC Projects
Upper	MISO MVP Starter Projects Plus DATC Projects
2021 Futures Descriptions	
Aggressive Energy Efficiency	Lower
Cautious Investment	Mid
Clean Robust Economy	Upper



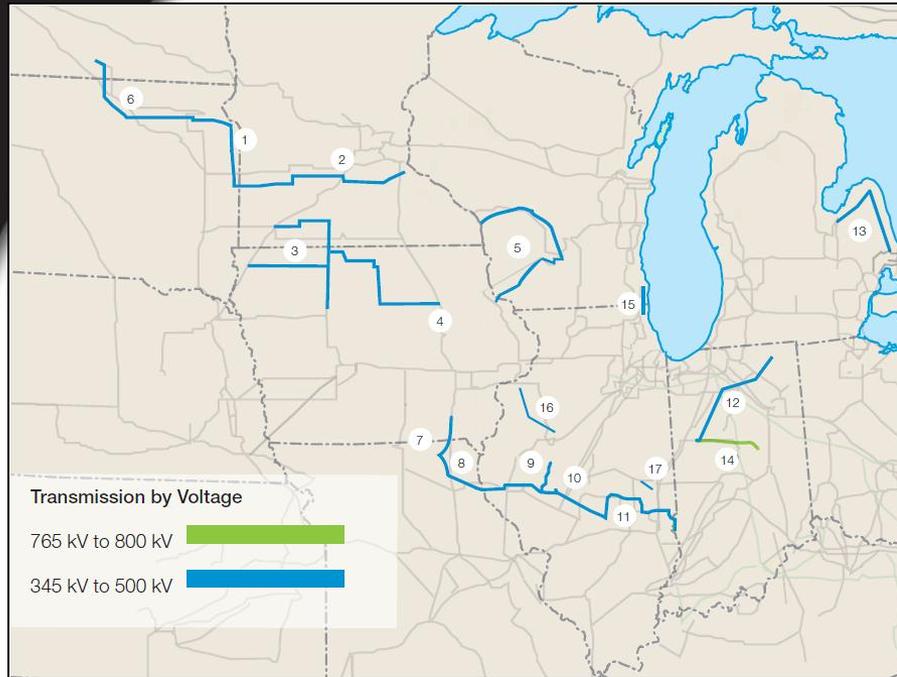
# ATC 2021 Futures Matrix Modifications – Transmission Overlay

## Justification for Transmission Overlay Modifications:

- Previous plan to utilize MISO RGOS Native Voltage Overlay
  - Designed for upwards of ~29 GW of expansion wind
  - Need no more than ~18 GW of expansion wind (2021 Clean Robust Economy)
  - MVPs + DATC Projects utilized
- DATC Projects
  - 7 projects in the Midwest
  - Replaces “Enhanced” placeholder in the Futures Matrix

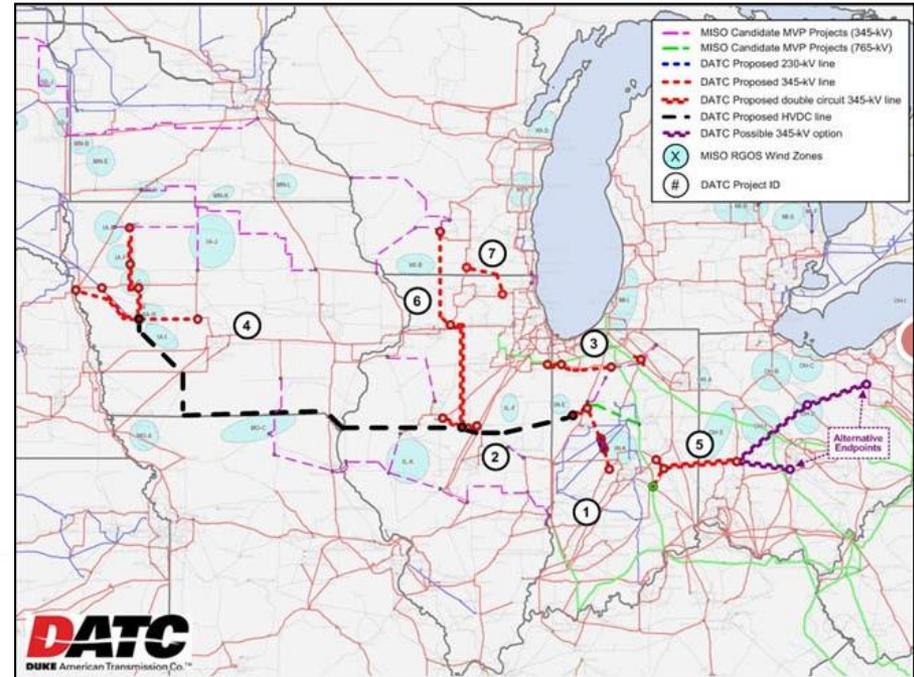
# ATC 2021 Futures Matrix Modifications – Transmission Overlay

MISO MVP Projects



Source:  
<https://www.misoenergy.org/Library/Repository/Communication%20Material/Power%20Up/MVP%20Benefits%20-%20Total%20Footprint.pdf>

DATC Projects



Source:  
<http://www.datcllc.com/project-benefits/>

# ATC 2021 Futures Matrix Modifications – Generation Portfolio

## Previous 2011 Futures Matrix

Drivers	Generation Portfolio Outside ATC
Lower	MISO MTEP 11 Carbon Constraint
Mid	MISO MTEP 11 Business as Usual
Upper	MISO MTEP 11 Business as Usual - High D&E
2021 Futures Descriptions	
Aggressive Energy Efficiency	Upper
Cautious Investment	Mid
Clean Robust Economy	Lower

## Final 2011 Futures Matrix

Drivers	Generation Portfolio Outside ATC
Lower	MISO MTEP 11 Carbon Constraint
Mid	MISO MTEP 11 Business as Usual
Upper	MISO MTEP 11 Business as Usual - High D&E
2021 Futures Descriptions	
Aggressive Energy Efficiency	Lower
Cautious Investment	Mid
Clean Robust Economy	Upper

# ATC 2021 Futures Matrix Modifications – Generation Portfolio

## Justification for Generation Portfolio Modifications:

- Previous 2011 Futures Matrix utilized incorrect matching
  - Match Load and Energy Growth Rates
  - AEE matched to BAU + High D&E  
(Low matched to High)
  - CRE matched to CC  
(High matched to Low)
- Final 2011 Futures Matrix utilized correct matching
  - AEE matched to CC  
(Low matched to Low)
  - CRE matched to BAU + High D&E  
(High matched to High)



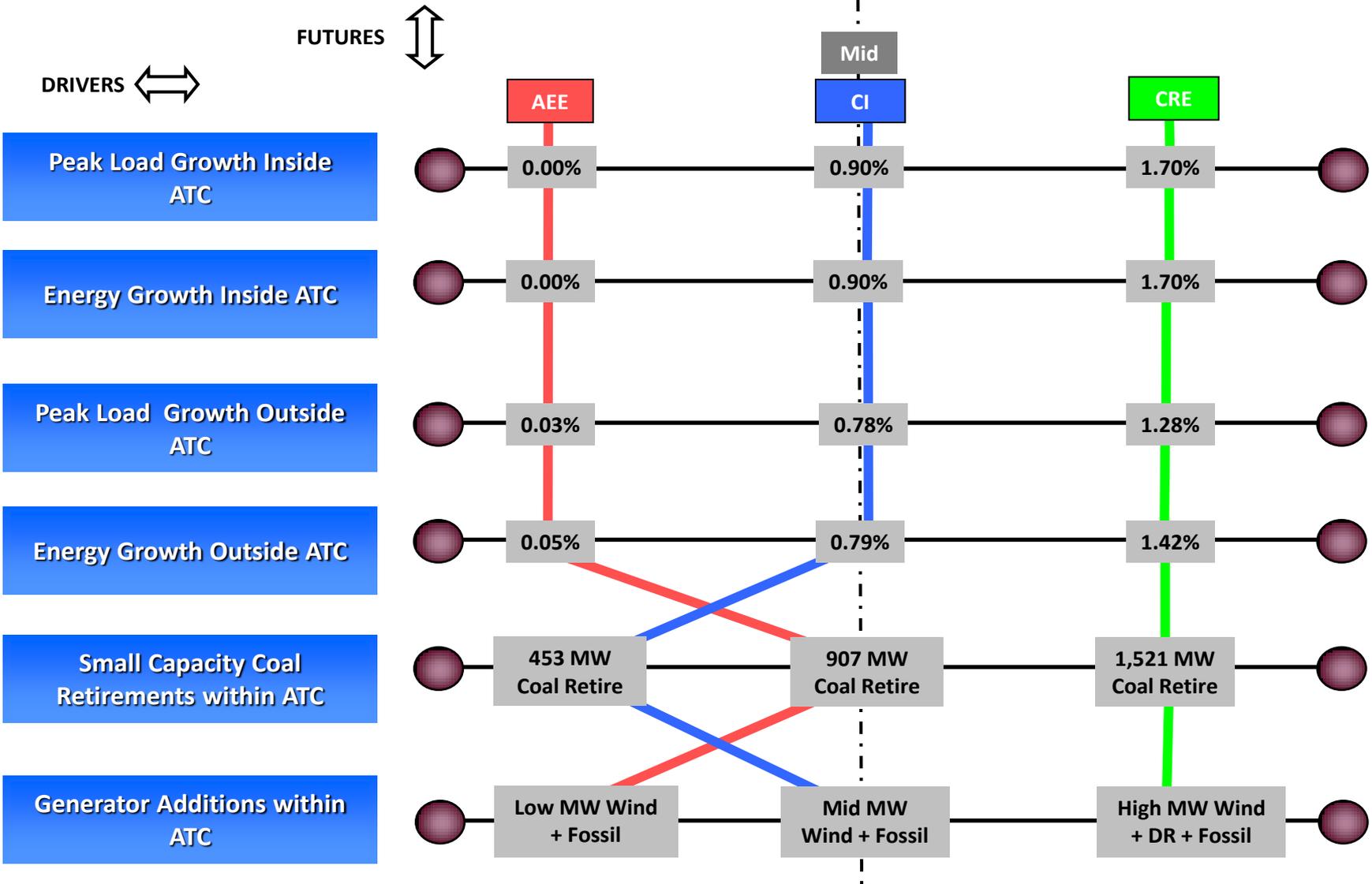
# Spaghetti Diagrams

## Help to:

- Visualize the relationship between the drivers
- Ensure that the drivers are widely (and logically) spread across the futures

# ATC 2021 Futures Spaghetti Diagrams

- AEE Aggressive Energy Efficiency
- CI Cautious Investment
- CRE Clean Robust Economy

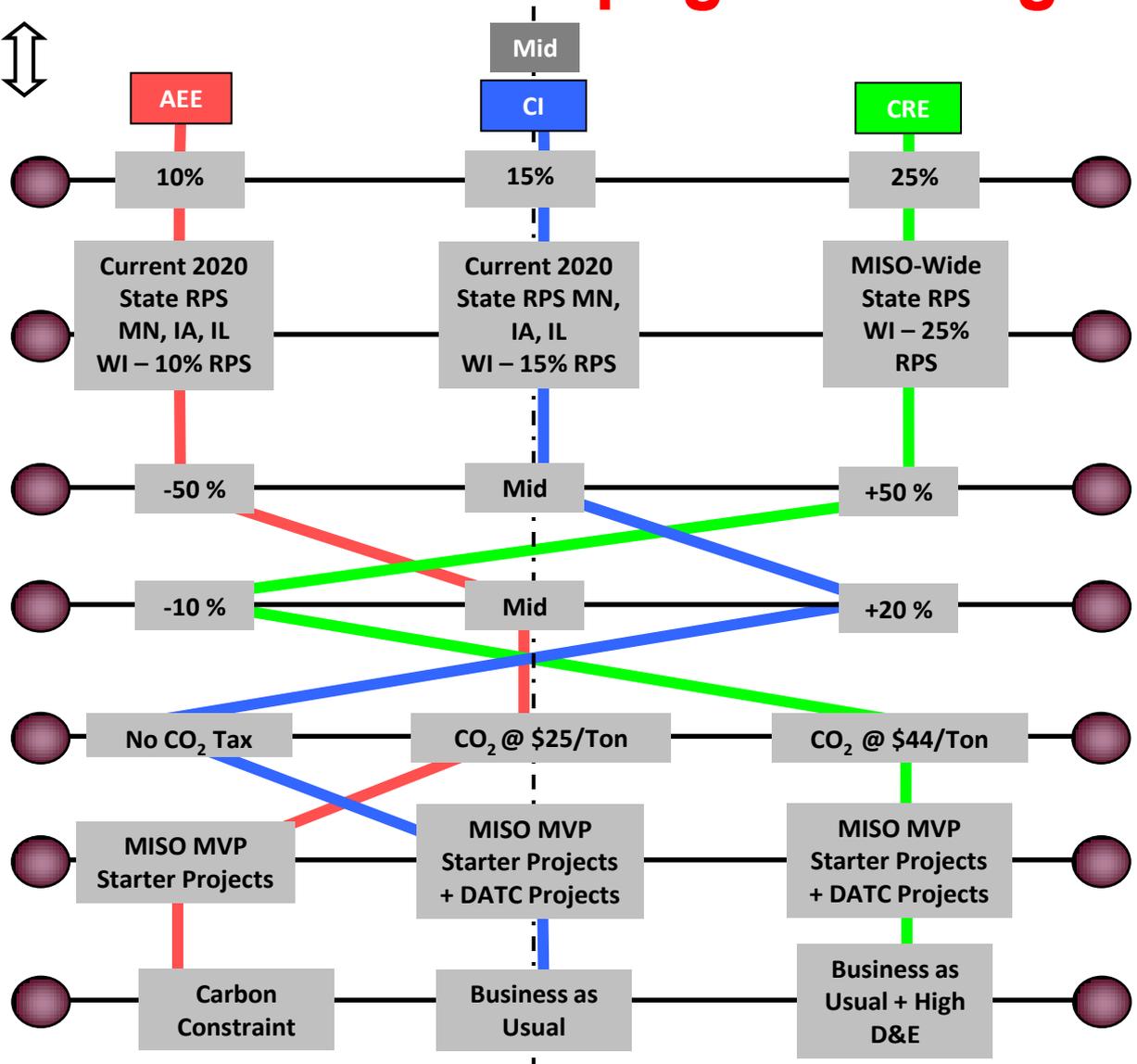


# ATC 2021 Futures Spaghetti Diagrams

- AEE Aggressive Energy Efficiency
- CI Cautious Investment
- CRE Clean Robust Economy

DRIVERS  $\longleftrightarrow$  FUTURES  $\updownarrow$

- Approximate % Energy from Wind
- Renewable Energy from inside IA, MN, ND, SD, WI, and IL
- Natural Gas Price Forecast
- Coal Price Forecast for New Units
- Environmental Regulations
- Transmission Overlay
- Generation Expansion Plan



# Questions?

## ATC Economic Planning

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