



2011 Economic Planning Preliminary Futures Matrix

Todd Tadych
ATC Economic Planning

April 28, 2011

Preliminary

Helping to **keep the lights on,**
businesses running and communities strong®



Introduction

- PROMOD - Comprehensive Analysis
- Assumptions
 - 2020 Futures
 - 2020 Drivers
- Spaghetti Diagrams
- PROMOD Savings
 - PROMOD Energy Benefits Description
 - Loss Savings Description
- Next Steps

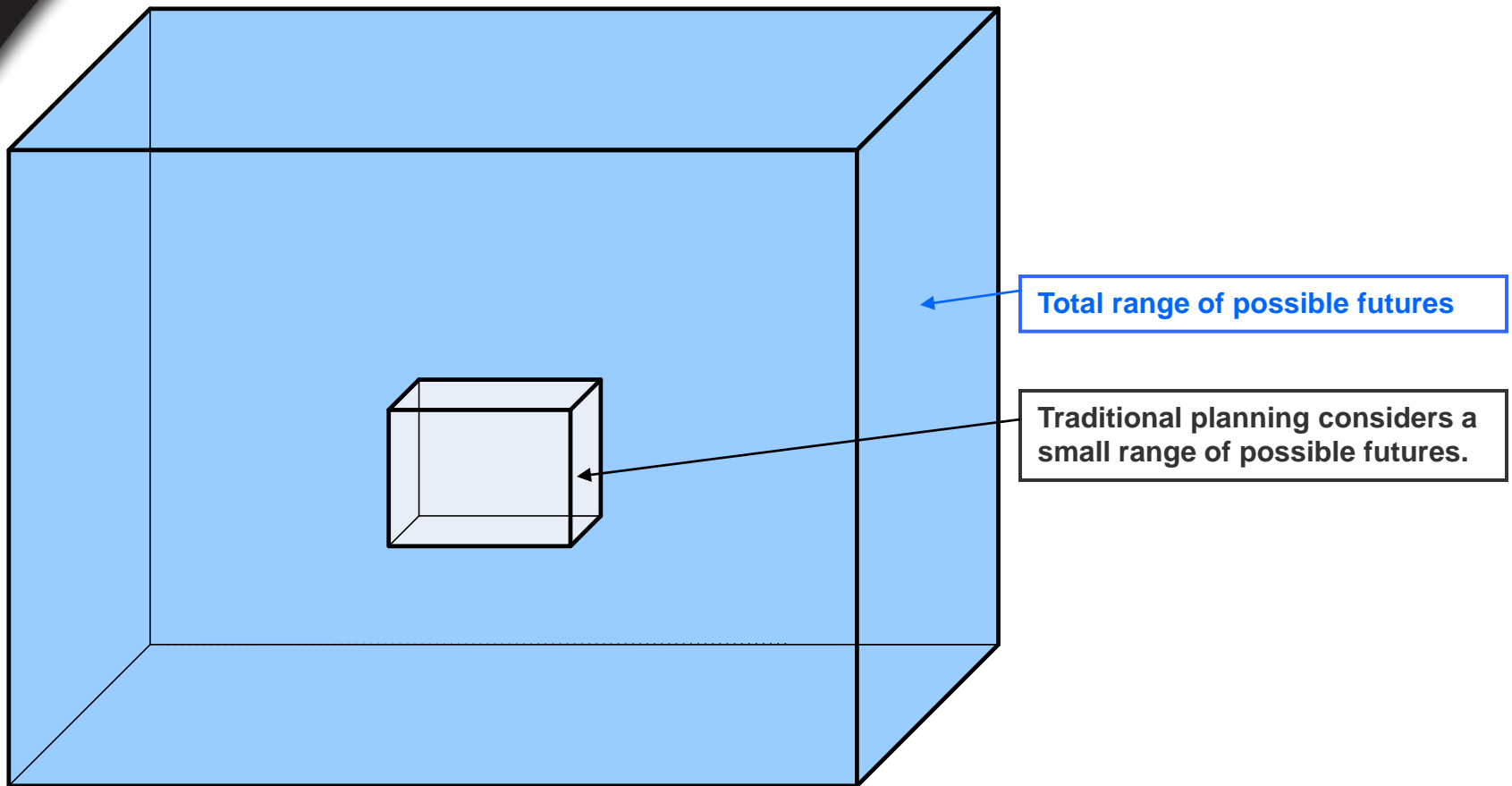


Comprehensive Analysis

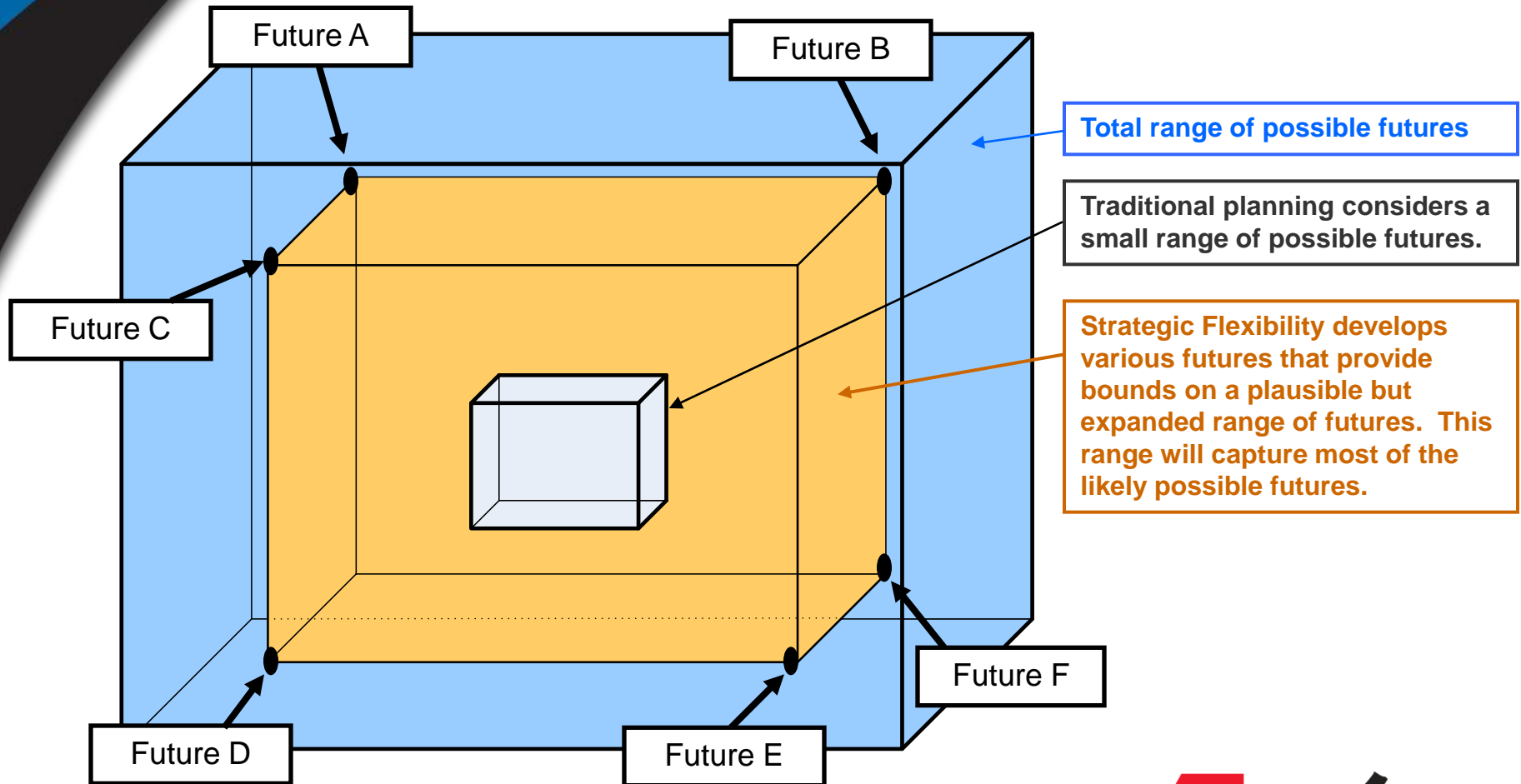
Strategic Flexibility

- Future is uncertain - can't be reliably predicted
- Multiple plausible futures developed
- Futures bound the range of plausible outcomes

Traditional Planning



Strategic Flexibility



ATC 2020 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	Energy from Renewables for ATC
Bounds	Year	Year	Year	Year	Year	Year	Year
Lower	0.00%	0.00%	0.03%	0.05%	453 MW	Planned Wind, Plus required expansion generation (Wind / Fossil)	10%
Mid	1.00%	1.00%	0.78%	0.79%	907 MW	Planned Wind, Plus required expansion generation (Wind / Fossil)	15%
Upper	1.70%	1.70%	1.28%	1.42%	1,521 MW	Planned Wind, DRG, Plus required expansion generation (Wind / Fossil)	25%
2020 Futures Descriptions							
Slow Growth	Lower	Lower	Lower	Lower	Upper	Lower	Mid
Limited Investment	Mid	Mid	Mid	Mid	Lower	Mid	Lower
Green Economy	Upper	Upper	Upper	Upper	Mid	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
Bounds	Year	Year	Year	Year		Year	Year
Lower	- 50% (2020 Price = \$3.29 / MMBtu)	- 10%	\$0/ton for CO ₂ , 0% higher mercury costs	Current State RPSs for MN, IA, IL & WI (for 2020) and Allocation to Wind Zones located only in the UMTDI States in Proportion to Associated Cap. Factors		MISO MVP Starter Projects	Business as Usual - Gas Only
Mid	NYMEX forecast (2020 Price = \$6.58 / MMBtu)	Mid (Actual - Projected)	\$25/ton for CO ₂ , 25% higher mercury costs	WI 15% RPS & MN, IA & IL RPSs (for 2020) and Allocation to RGOS I Wind Zones in Proportion to Associated Capacity Factors		MISO MVP Starter Projects Enhanced	Business as Usual
Upper	+ 50% (2020 Price = \$9.87 / MMBtu)	+ 20%	\$50/ton for CO ₂ , 25% higher mercury costs	WI 25% & All MISO States with an RPS (for 2020) and Allocation to RGOS I Wind Zones in Proportion to Associated Capacity Factors		MISO RGOS Native Voltage Overlay	OMS CARP
2020 Futures Descriptions							
Slow Growth	Lower	Mid	Mid	Mid		Lower	Upper
Limited Investment	Mid	Upper	Lower	Lower		Mid	Mid
Green Economy	Upper	Lower	Upper	Upper		Upper	Lower

ATC 2020 Futures Matrix Load & Energy Growth within ATC

Drivers	Load Growth within ATC	Energy Growth within ATC
Lower	0.00%	0.00%
Mid	1.00%	1.00%
Upper	1.70%	1.70%
2020 Futures Descriptions		
Slow Growth	Lower	Lower
Limited Investment	Mid	Mid
Green Economy	Upper	Upper

ATC 2020 Futures Matrix

Load & Energy Growth outside ATC

Drivers	Load Growth outside ATC	Energy Growth outside ATC
Lower	0.03%	0.05%
Mid	0.78%	0.79%
Upper	1.28%	1.42%
2020 Futures Descriptions		
Slow Growth	Lower	Lower
Limited Investment	Mid	Mid
Green Economy	Upper	Upper



ATC 2020 Futures Matrix

Coal Retirements within ATC

Drivers	Total Coal Retirements (or conversions to natural gas) Within ATC
Lower	453 MW
Mid	907 MW
Upper	1,521 MW
2020 Futures Descriptions	
Slow Growth	Upper
Limited Investment	Lower
Green Economy	Mid



ATC 2020 Futures Matrix Generator Additions within ATC

Drivers	Generator Additions Within ATC
Lower	Planned Wind, Plus required expansion generation (Wind / Fossil)
Mid	Planned Wind, Plus required expansion generation (Wind / Fossil)
Upper	Planned Wind, DRG, Plus required expansion generation (Wind / Fossil)
2020 Futures Descriptions	
Slow Growth	Lower
Limited Investment	Mid
Green Economy	Upper



ATC 2020 Futures Matrix

% Energy from Renewables within ATC

Drivers	Total Percent Energy from Renewables for ATC
Lower	10%
Mid	15%
Upper	25%
2020 Futures Descriptions	
Slow Growth	Mid
Limited Investment	Lower
Green Economy	Upper



ATC 2020 Futures Matrix

Natural Gas Price Forecast

Drivers	Natural Gas Price Forecast
Lower	- 50% (2020 Price = \$3.29 / MMBtu)
Mid	NYMEX forecast (2020 Price = \$6.58 / MMBtu)
Upper	+ 50% (2020 Price = \$9.87 / MMBtu)
2020 Futures Descriptions	
Slow Growth	Lower
Limited Investment	Mid
Green Economy	Upper



ATC 2020 Futures Matrix

Coal Price Forecast for New (Expansion) Units

Drivers	Coal Price Forecast for New Units
Lower	- 10%
Mid	Mid (Actual - Projected)
Upper	+ 20%
2020 Futures Descriptions	
Slow Growth	Mid
Limited Investment	Upper
Green Economy	Lower



ATC 2020 Futures Matrix

Environmental Regulations

Drivers	Environmental Regulations
Lower	\$0/ton for CO ₂ , 0% higher mercury costs
Mid	\$25/ton for CO ₂ , 25% higher mercury costs
Upper	\$50/ton for CO ₂ , 25% higher mercury costs
2020 Futures Descriptions	
Slow Growth	Mid
Limited Investment	Lower
Green Economy	Upper



ATC 2020 Futures Matrix Renewable Portfolio Standards

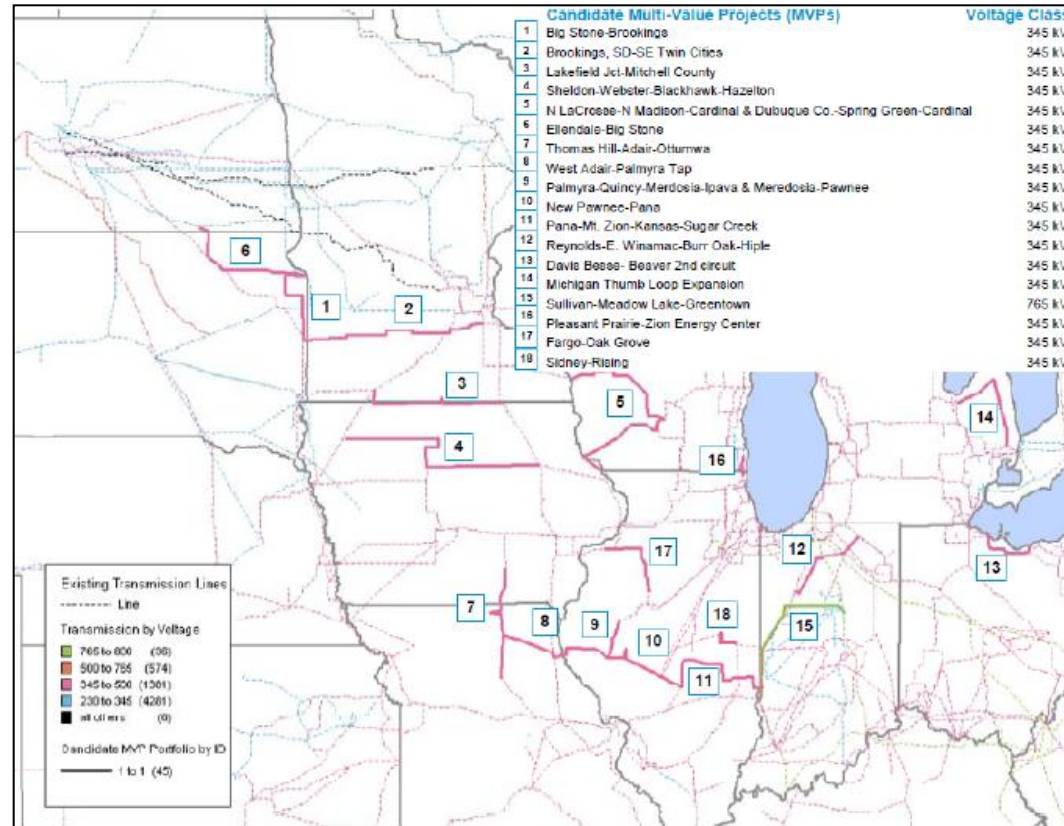
Drivers	Renewable Portfolio Standards (RPSs) and Wind Power Zones
Lower	Current State RPSs for MN, IA, IL & WI (for 2020) and Allocation to Wind Zones located only in the UMTDI States in Proportion to Associated Cap. Factors
Mid	WI 15% RPS & MN, IA & IL RPSs (for 2020) and Allocation to RGOS I Wind Zones in Proportion to Associated Capacity Factors
Upper	WI 25% & All MISO States with an RPS (for 2020) and Allocation to RGOS I Wind Zones in Proportion to Associated Capacity Factors
2020 Futures Descriptions	
Slow Growth	Mid
Limited Investment	Lower
Green Economy	Upper

ATC 2020 Futures Matrix Transmission Overlay outside ATC

Drivers	Transmission Overlay Outside ATC
Lower	MISO MVP Starter Projects
Mid	MISO MVP Starter Projects Enhanced
Upper	MISO RGOS Native Voltage Overlay
2020 Futures Descriptions	
Slow Growth	Lower
Limited Investment	Mid
Green Economy	Upper

ATC 2020 Futures Matrix Transmission Overlay outside ATC

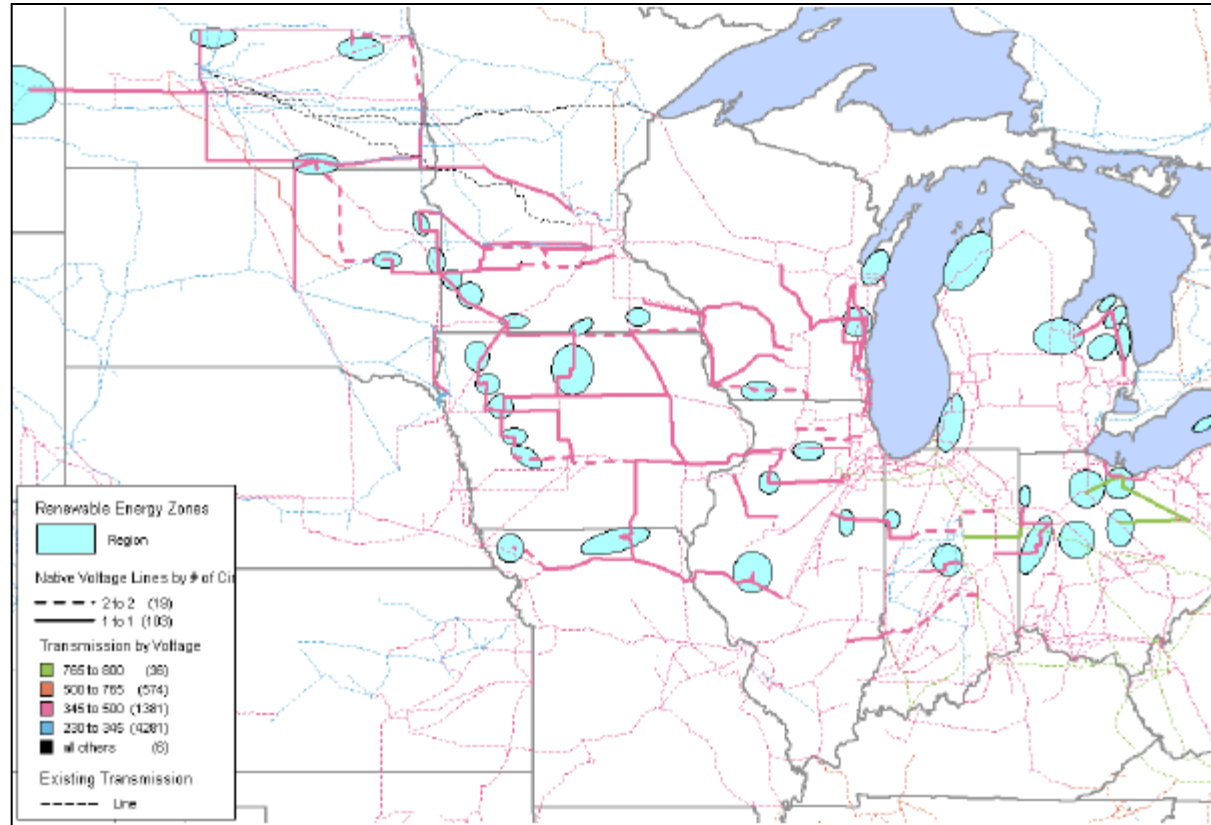
MISO Candidate MVP Starter Projects



Source: MISO Transmission Expansion Plan 2010 – Executive Summary

ATC 2020 Futures Matrix Transmission Overlay outside ATC

MISO RGOS Native Voltage Overlay

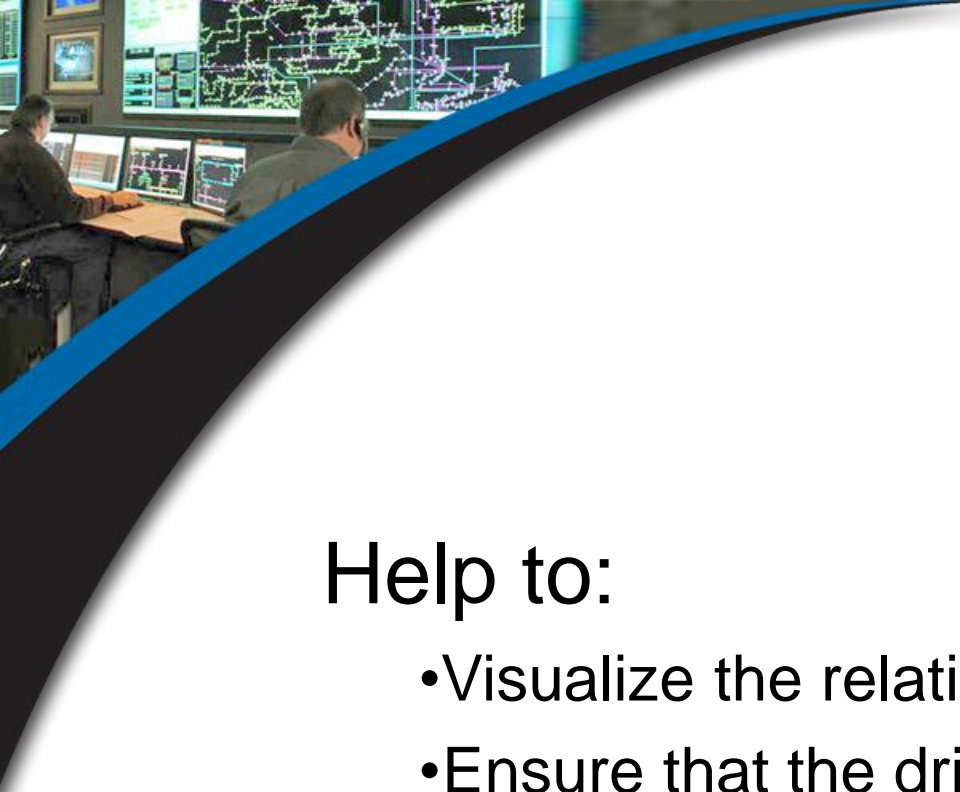


Source: MISO RGOS Study Report, November 19, 2009



ATC 2020 Futures Matrix Generation Portfolio outside ATC

Drivers	Generation Portfolio Outside ATC
Lower	Business as Usual - Gas Only
Mid	Business as Usual
Upper	OMS CARP
2020 Futures Descriptions	
Slow Growth	Upper
Limited Investment	Mid
Green Economy	Lower



Spaghetti Diagrams

Help to:

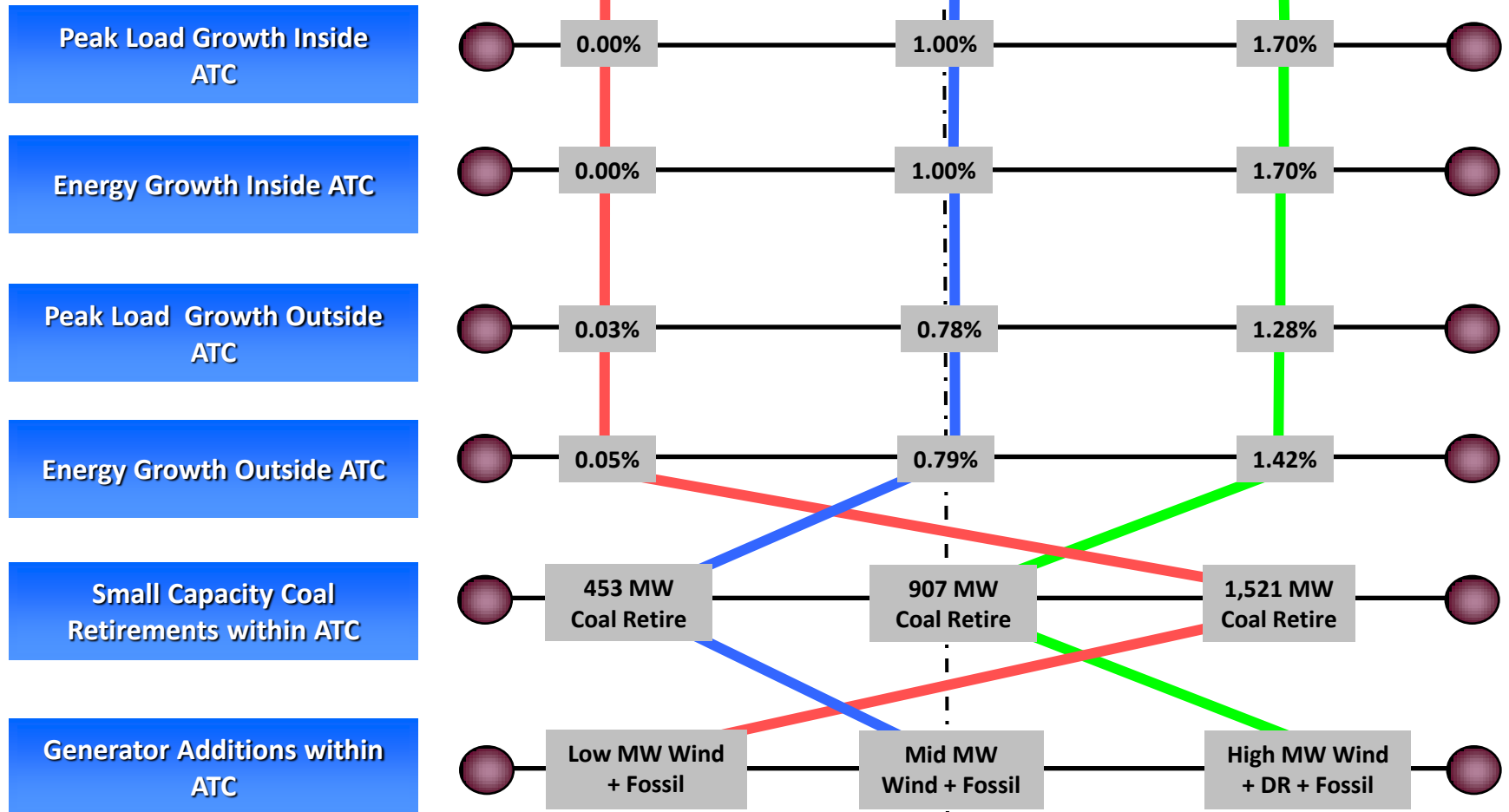
- Visualize the relationship between the drivers
- Ensure that the drivers are widely (and logically) spread across the futures

ATC 2020 Futures Spaghetti Diagrams



DRIVERS \longleftrightarrow

FUTURES \updownarrow

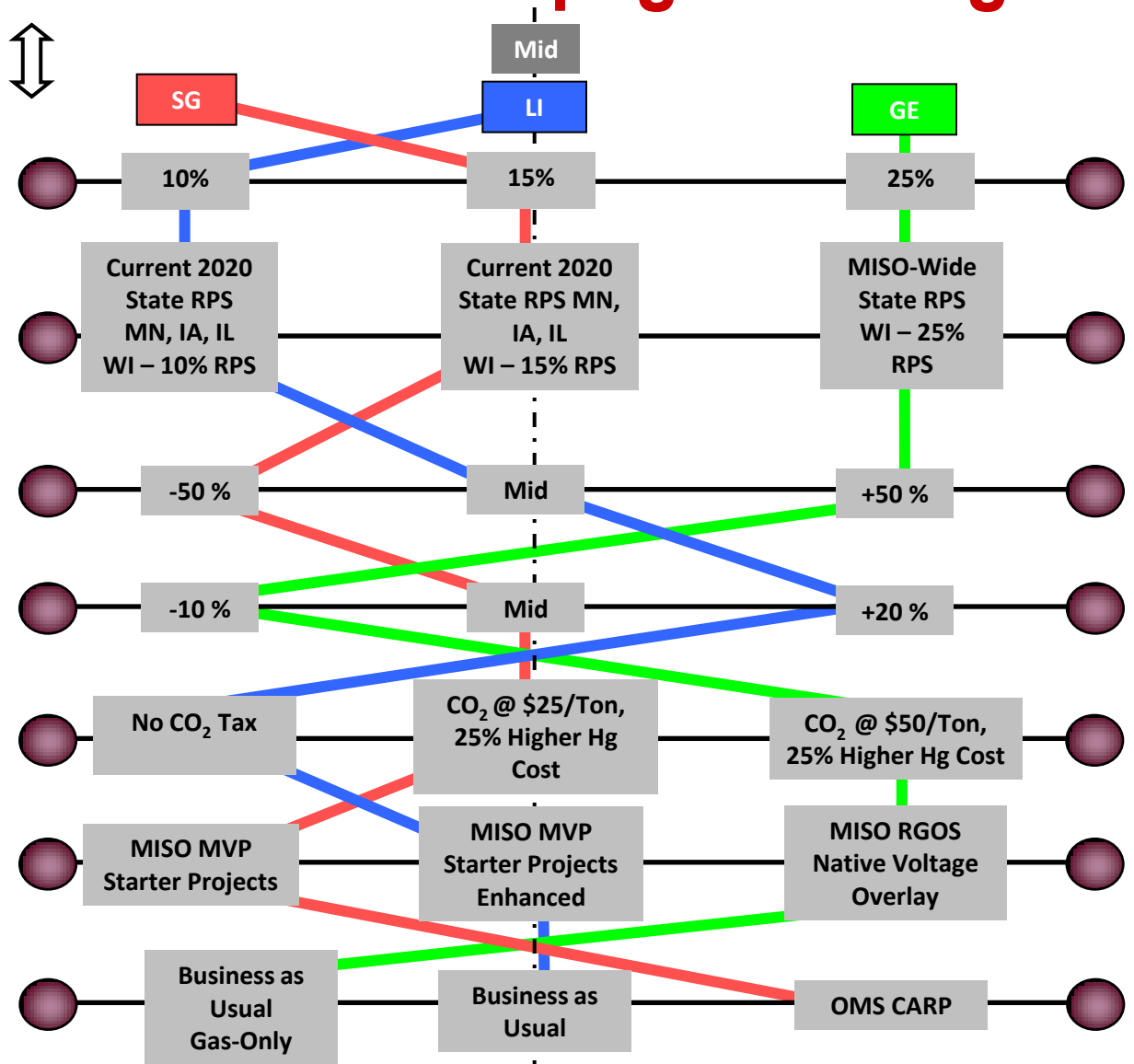


ATC 2020 Futures Spaghetti Diagrams



DRIVERS \longleftrightarrow

FUTURES \updownarrow



PROMOD Energy Benefits Description

- PROMOD used to analyze 2020 study year
- Difference analysis performed to determine project savings
- All Futures analyzed using ATC Customer Benefit (CB) Metric:

Settlements Format for CB Metric

- Load Pays local Locational Marginal Price (LMP)
- Generator Revenues Received at local Gen LMP
- + Cost of Utility Generation (Production Cost)
- FTR Revenue to the Utility
- Loss Refund Revenues for over-collection
- = Impact to Ratepayers



Loss Savings Description

- Loss evaluation is a valuable component of economic project analysis
- PROMOD difference analysis performed to determine system loss savings (\$)
 - Loss savings (MWHrs) calculated from PROMOD
 - Economic value of loss savings determined by pricing losses (MWHrs) at PROMOD area LMPs (\$/MWHrs)

Next Steps

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.**



Questions?

ATC Economic Planning

- Jamal Khudai
 - jkhudai@atcllc.com
 - (262) 506-6166
- Todd Tadych
 - ttadych@atcllc.com
 - (608) 877-7119