ATC Economic Planning Futures Matrix Review

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February 22, 2010

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Topics of Discussion

- Open, Collaborative Process
- Comprehensive Analysis
- 2020 Futures Matrix
- 2009 Economic Analysis Project List and Status Update
- Economic Energy Shifters (EES)
- Next Steps

Open, Collaborative Planning

- ATC strongly supports an open, collaborative planning process
- ATC filed Tariff attachment FF in order to formalize this process
- Attachment FF lays out a specific timeline for working with stakeholders to perform economic analysis studies each year

ATC 2010 Economic Planning Timeline

Jan - ATC collects data / analyzes prior year congestion

Feb - Initial Stakeholder meeting

- Congestion summary / potential fixes
- Economic study scenarios and assumptions

By **Mar 1** - Stakeholders provide input

- Prioritize and/or request economic studies
- Recommend study assumptions

By **Apr 15** - ATC posts preliminary projects list and assumptions

By **Apr 30** - Stakeholders provide comments

By **May 15** - ATC posts final projects list and assumptions

By **Nov 15** - ATC posts updated results

- Viable projects move on to regulatory approval process

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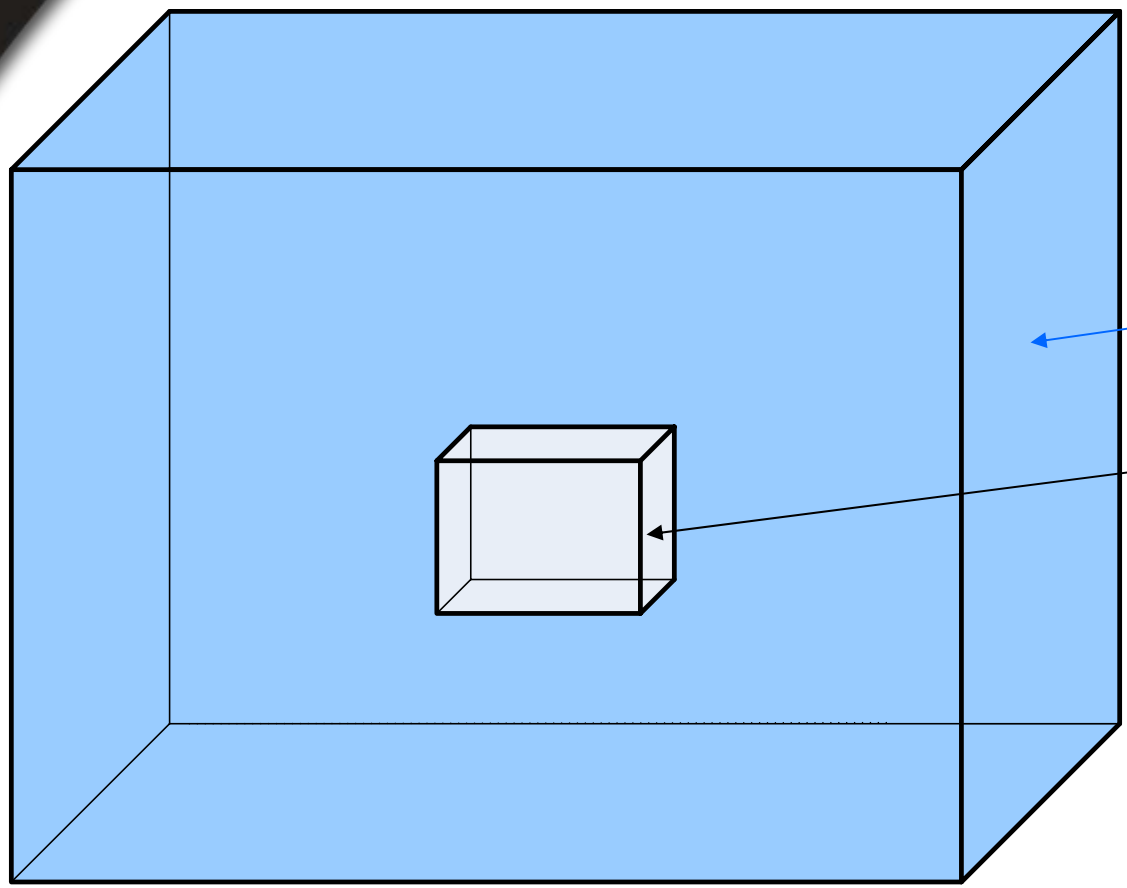
Comprehensive Analysis

Strategic Flexibility

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

Traditional Planning



Total range of possible futures

Traditional planning considers a small range of possible futures.

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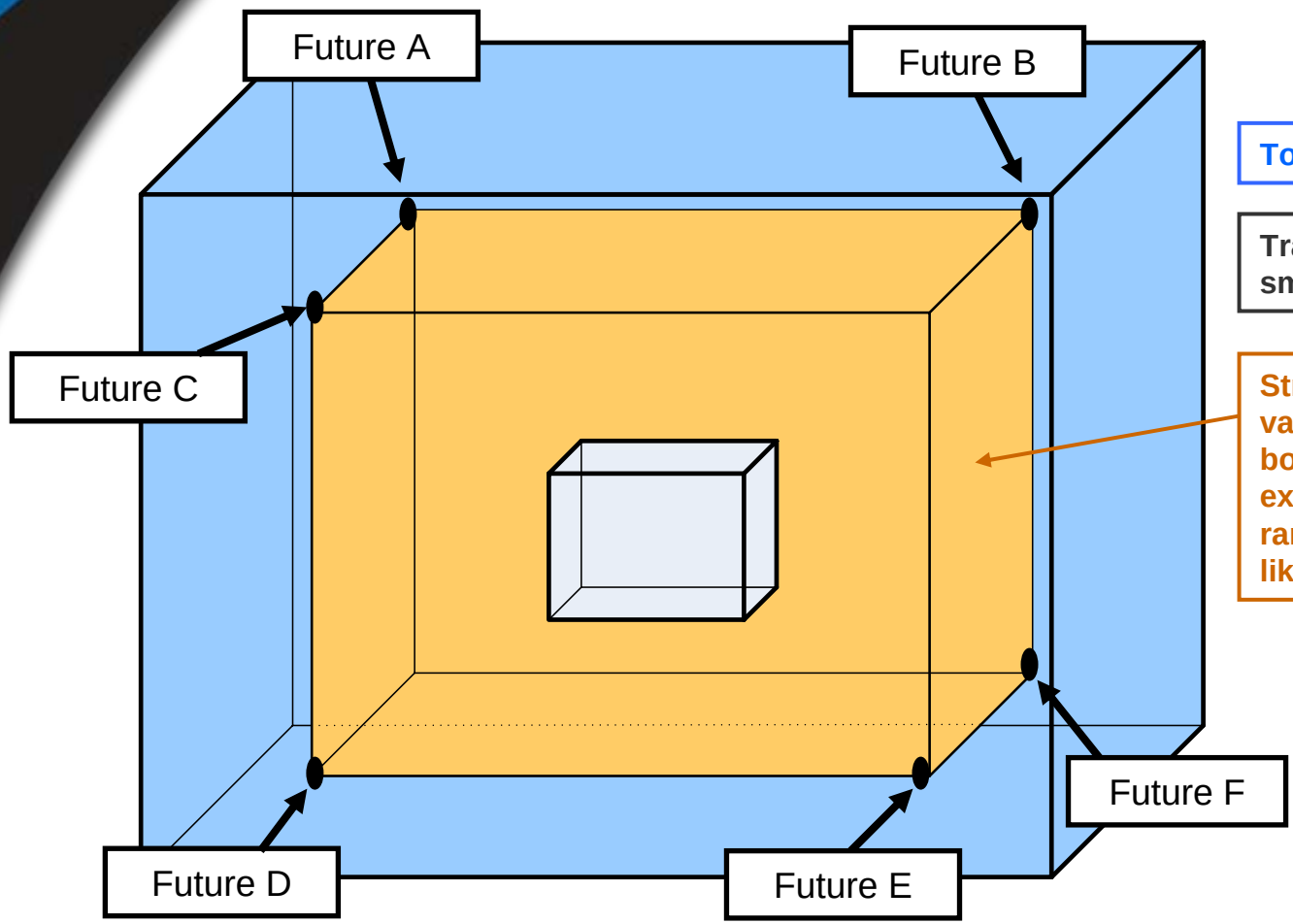
Strategic Flexibility



Total range of possible futures

Traditional planning considers a small range of possible futures.

Strategic Flexibility develops various futures that provide bounds on a plausible but expanded range of futures. This range will capture most of the likely possible futures.

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ATC 2020 Futures Matrix

Drivers	Load Growth within ATC	Energy Growth within ATC	Load Growth outside ATC	Energy Growth outside ATC	Total Small Capacity Coal Retirements (or conversions to natural gas) Within ATC	Generator Additions Within ATC
Bounds	2020	2020	2020	2020	2020	2020
Lower	0.20%	0.10%	0.30%	0.30%	907 MW	Planned Wind Plus Wind Specified Below
Mid	1.40%	1.10%	0.75%	1.00%	453 MW	Planned Wind Plus Wind Specified Below
Upper	2.50%	2.20%	1.60%	2.19%	Announced (289 MW)	Fossil & Planned Wind Plus Wind Specified Below
2020 Futures Descriptions						
Robust Economy	2.50%	2.20%	1.60%	2.19%	Upper	+1,176 MW ATC Wind
Green Economy	1.40%	2.20%	0.75%	2.19%	Lower	+1,823 MW ATC Wind & DRG
Slow Growth	0.20%	0.10%	0.30%	0.30%	Mid	+31 MW ATC Wind
Regional Wind	1.70%	1.40%	1.60%	1.32%	Lower	+918 MW ATC Wind
Limited Investment	1.00%	0.70%	0.75%	1.00%	Mid	+113 MW ATC Wind
Carbon Constrained	0.20%	0.10%	0.30%	0.30%	Lower	+1,047 MW ATC Wind & DRG

Drivers	Total Percent Energy from Renewables for ATC & Inside/Outside Percent	Natural Gas Price Forecast	Coal Price Forecast for New Units	Environmental Regulations	Renewable Portfolio Standards (RPSs) and Wind Power Zones	Transmission Overlay Outside ATC	Generation Portfolio Outside ATC
Bounds	2020	2020	2020	2020	2020	2020	2020
Lower	10 / 7.4 / 2.6%	-40%	-10%	$0/ton for CO_2, 0% higher mercury costs	Current State RPSs for MN, IA & WI (for 2020) and Allocation to Wind Zones located only in the UMTDI States in Proportion to Associated Cap. Factors	Overlay Light-CAPX, Corridor & RIGO Projects	See Below
Mid[1]	20 / 10.5 / 9.5%	NYMEX for as many years as available followed by EIA esc. Rate	MISO Central & West $2.07 & $1.74 per MMBTU, respectively, for 2020	$25/ton for CO_2, 25% higher mercury costs	WI 20% RPS & MN, IA & IL RPSs (for 2020) and Allocation to RGOS I Wind Zones in Proportion to Associated Capacity Factors	15 GW RGOS I Overlay	See Below
Upper	25 / 13 / 12%	50%	20%	$44/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	25 GW RGOS I Overlay	See Below
2020 Futures Descriptions							
Robust Economy	20 / 9.8 / 10.2%	Mid-Upper +25%	Upper	Low	Mid (Existing + ~9.2 GW)	15 GW-765KV Overlay	Reference
Green Economy	25 / 12.5 / 12.5%	Upper	Mid	Upper	Upper (Existing + ~20.7 GW)	25 GW-345kV Overlay	Gas-only
Slow Growth	10 / 7.4 / 2.6%	Lower	Mid	Low	Low (Existing + ~3.2 GW)	Overlay Light	Reference
Regional Wind	20 / 9.7 / 10.3%	Mid	Lower	Mid	Upper-20% WI (Existing + ~17.5 GW)	25 GW-765kV Overlay	Reference
Limited Investment	10 / 7.2 / 2.8%	Mid-Upper +25%	Upper	Mid	Low (Existing + ~3.8 GW)	Overlay Light	Gas-only
Carbon Constrained	25 / 12.4 / 12.6%	Mid	Lower	Mid	Mid-25% WI (Existing + ~7.3 GW)	15 GW-345kV Overlay	Gas-only

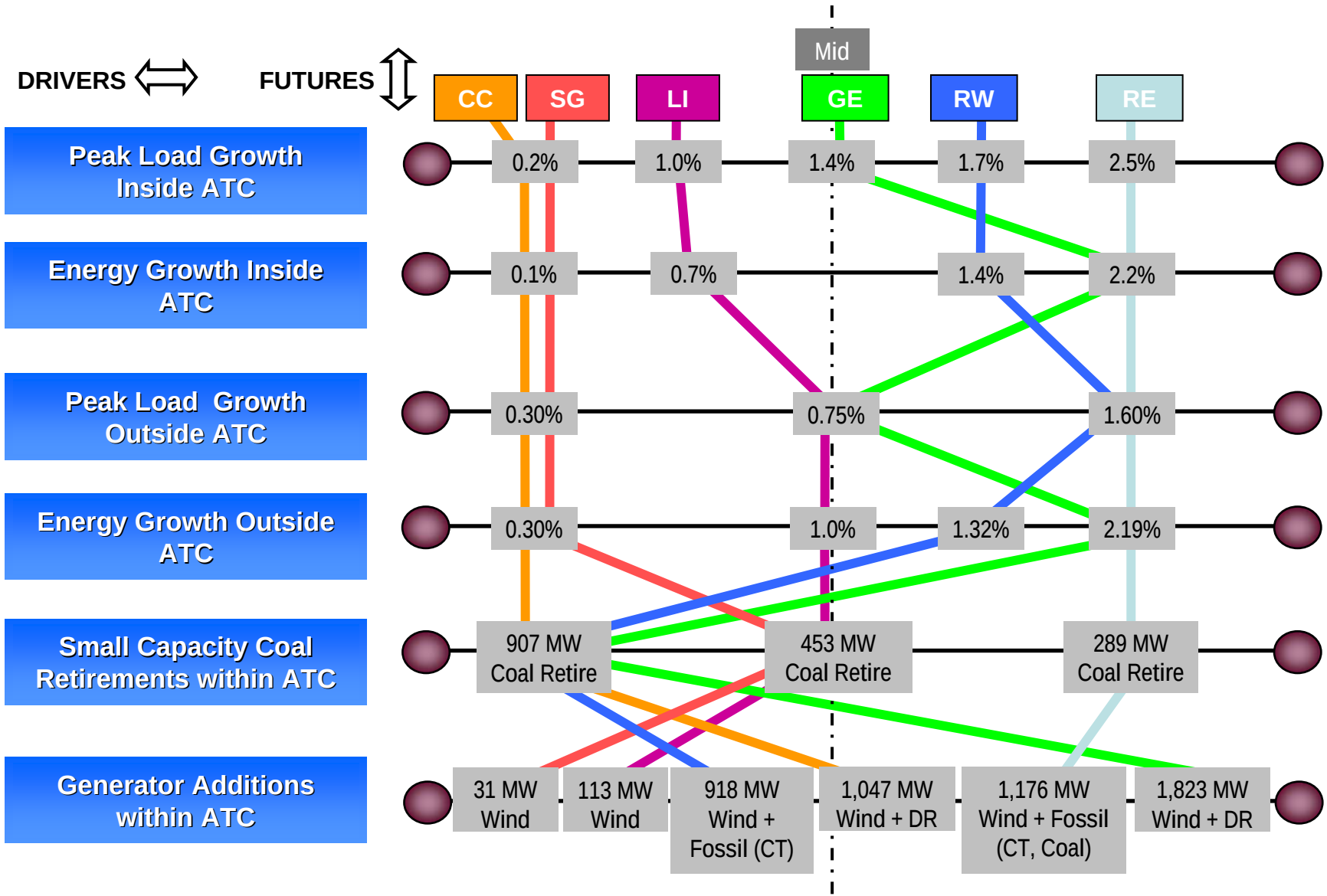
Spaghetti Diagrams

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

SG Slow Growth
LI Limited Investment
CC Carbon Constrained
RW Regional Wind
RE Robust Economy
GE Green Economy



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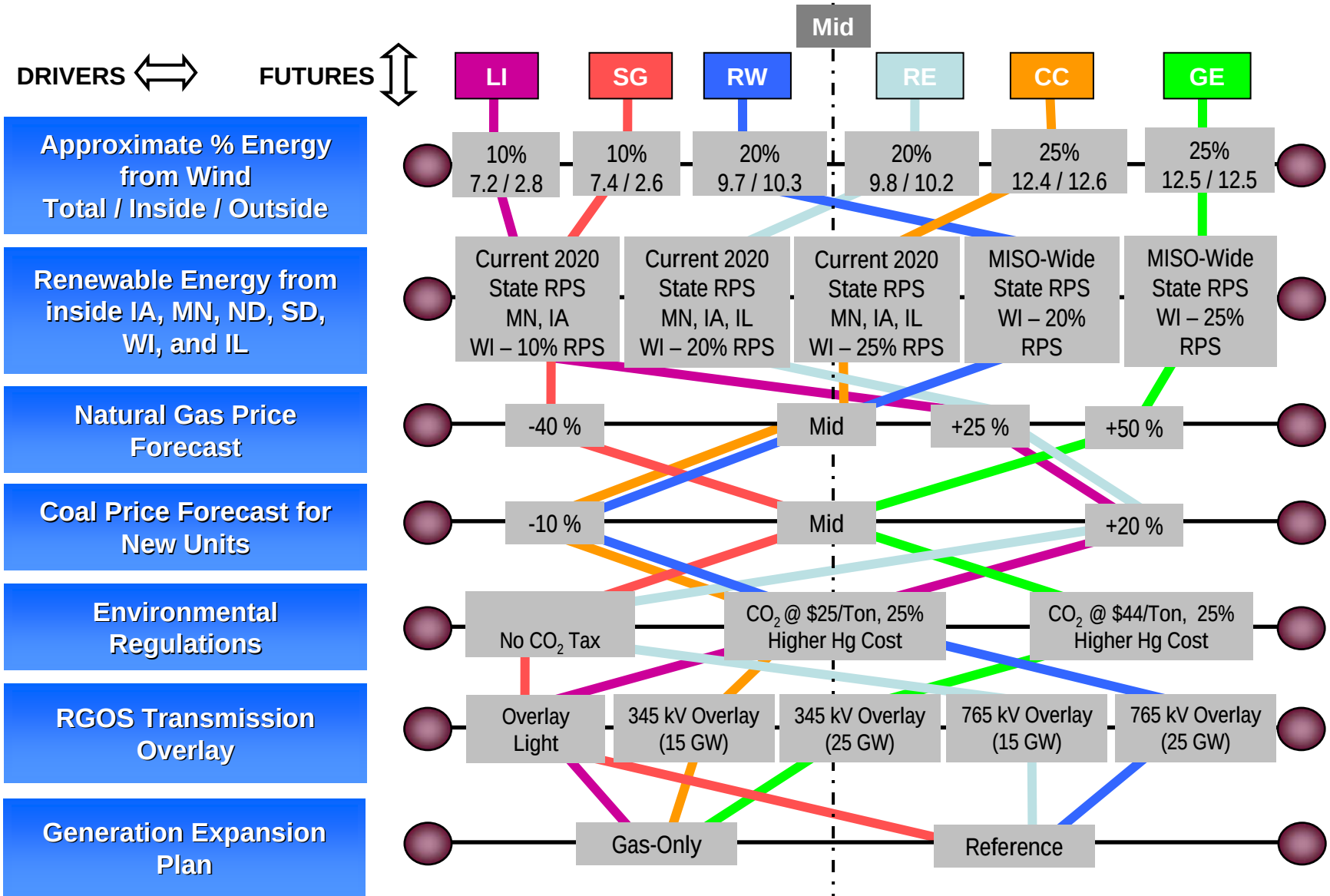
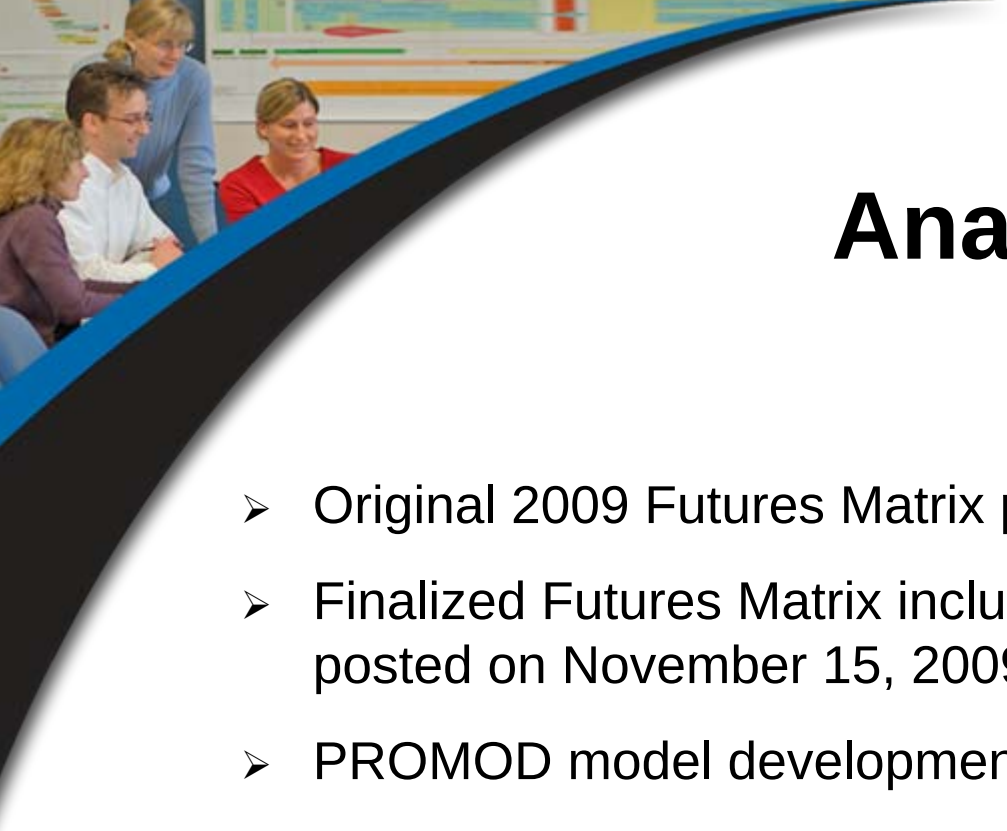


Stakeholder Specified Projects and Alternatives

2009 / 2010 Projects under study:

1) North La Crosse – Spring Green – Cardinal Madison 345 kV Project
2) Lore – Spring Green – Cardinal 345 kV Project
3) North La Crosse – North Madison – Cardinal 345 kV Project
4) Option 2 + Option 3
5) Genoa – North Monroe 765 kV Project
6) Western Wisconsin Low Voltage Alternative
7) Bain – Zion Energy Center 345 kV Project



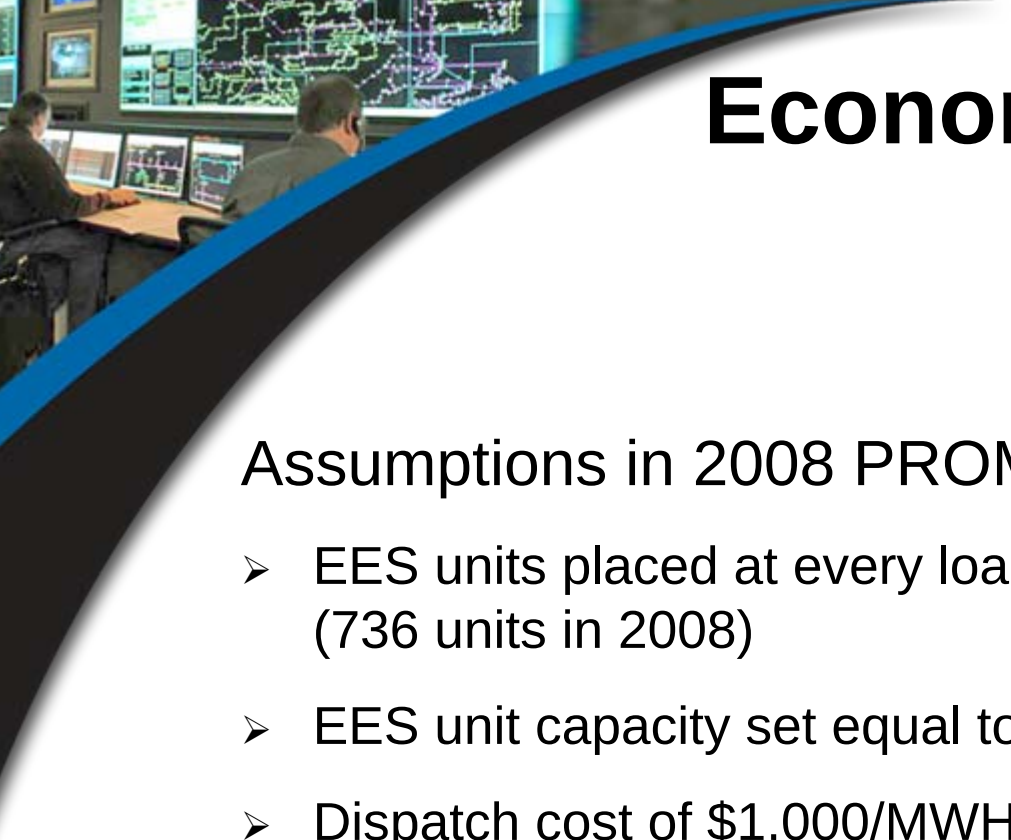
2009 Economic Analysis Status Update

- Original 2009 Futures Matrix posted on May 28, 2009
- Finalized Futures Matrix including stakeholder input was posted on November 15, 2009
- PROMOD model development completed in mid-December
- Project analysis commenced in mid-December
- Project analysis is currently under way
- Analysis and results are expected to be completed and presented by the end of the second quarter of 2010

Economic Energy Shifters (EES)

EES Background and Definition

- EES units modeled to mimic demand response actions and other technologies that may serve to offset load in the future
- Serve to prevent unrealistic PROMOD results
  - "Buying through" constraints
  - Dispatching "emergency" generation
  - Highlights congested areas
- Model units as fast-starting Combustion Turbines
- First modeled in ATC's 2008 Economic Models
- Further refined in ATC's 2009 Economic Models



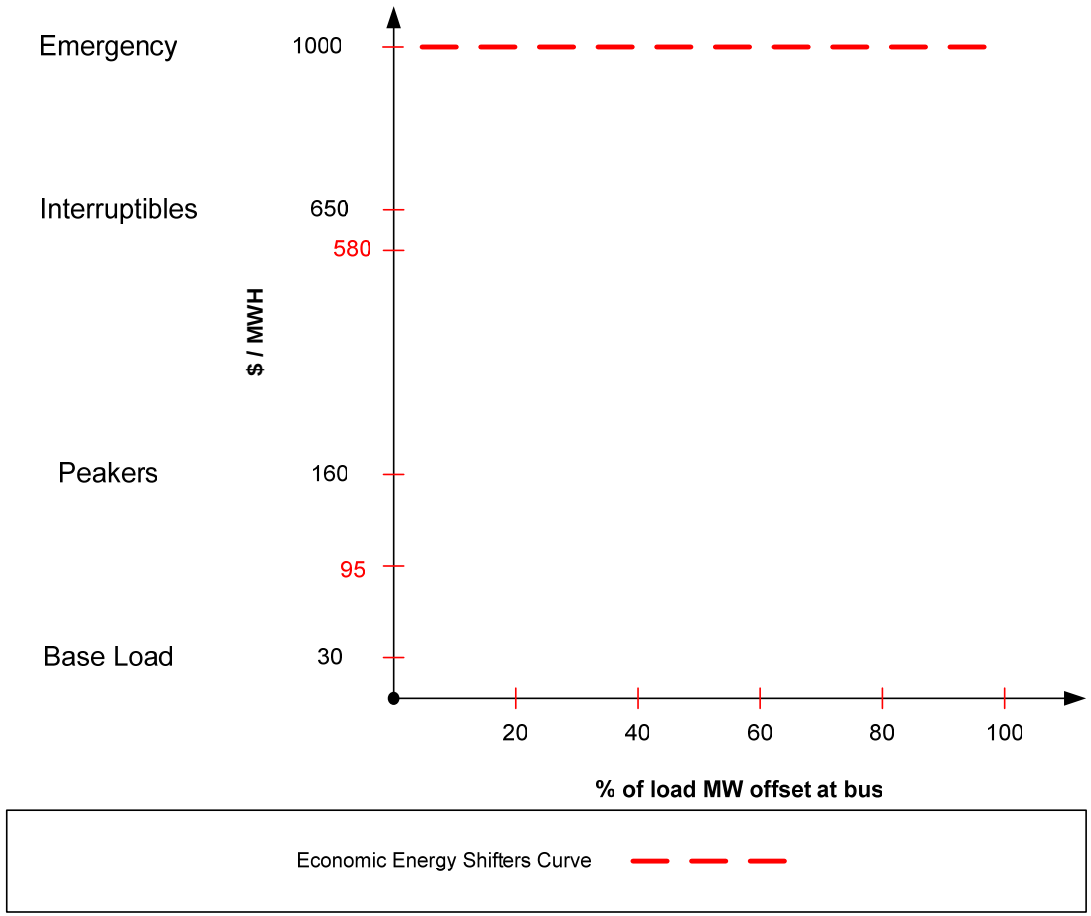
Economic Energy Shifters (EES)

Assumptions in 2008 PROMOD Analysis

- EES units placed at every load 5 MW and higher within ATC (736 units in 2008)
- EES unit capacity set equal to peak load value at location
- Dispatch cost of $1,000/MWH in 2008 ($1,336 in 2024)

Economic Energy Shifters (EES)

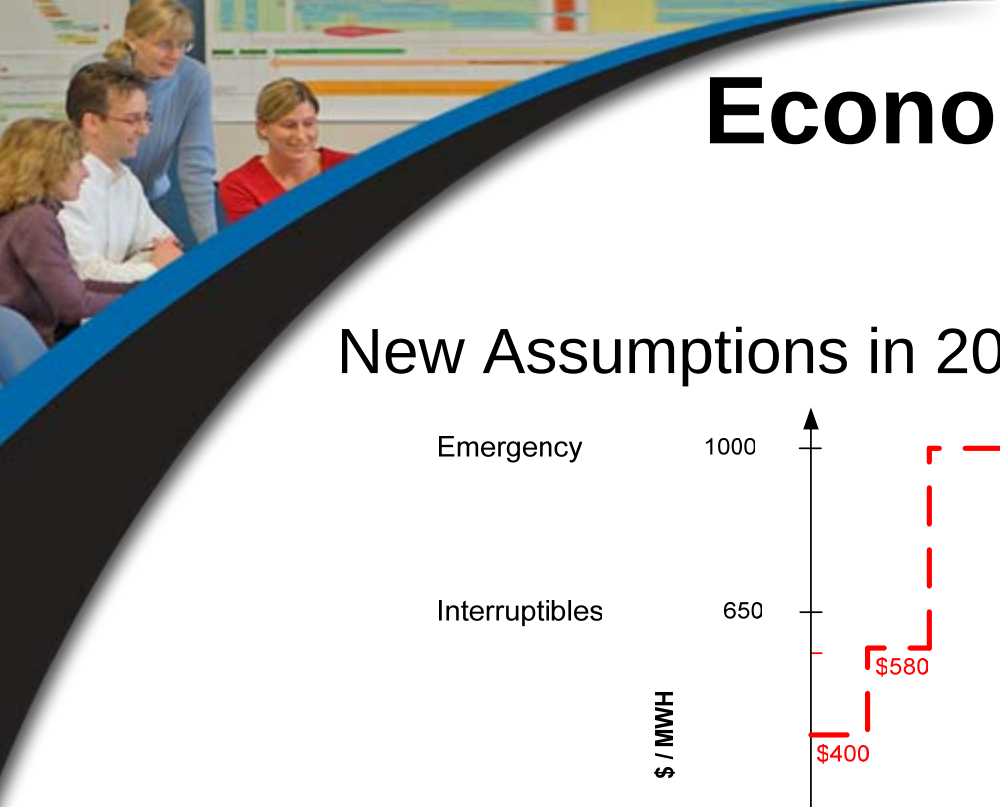
Assumptions in 2008 PROMOD Analysis



Economic Energy Shifters (EES)

New Assumptions in 2009 PROMOD Analysis

- EES units placed at every load 5 MW and higher within ATC (700 units in 2009)
- Economic Energy Shifter capacity set equal to 50% of bus load
- Use increasing cost curves on Economic Energy Shifter units
- "FERC on Smart Grid" scenarios and expected reduction in peak demand from DR:
  - Business-as-usual: 4% reduction
  - Expanded Business-as-Usual: 9% reduction **< Assume this for WI**
  - Achievable Participation: 14% reduction
  - Full Participation: 20% reduction



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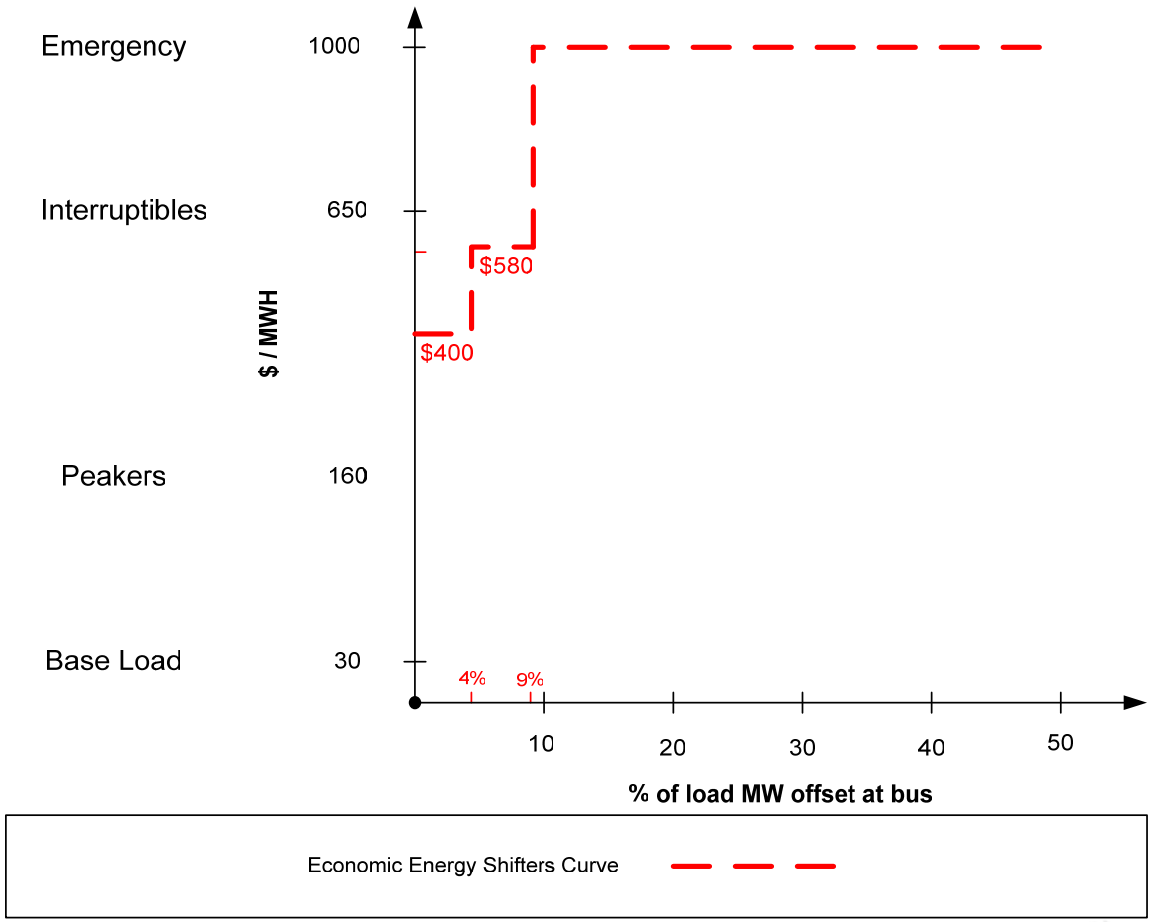


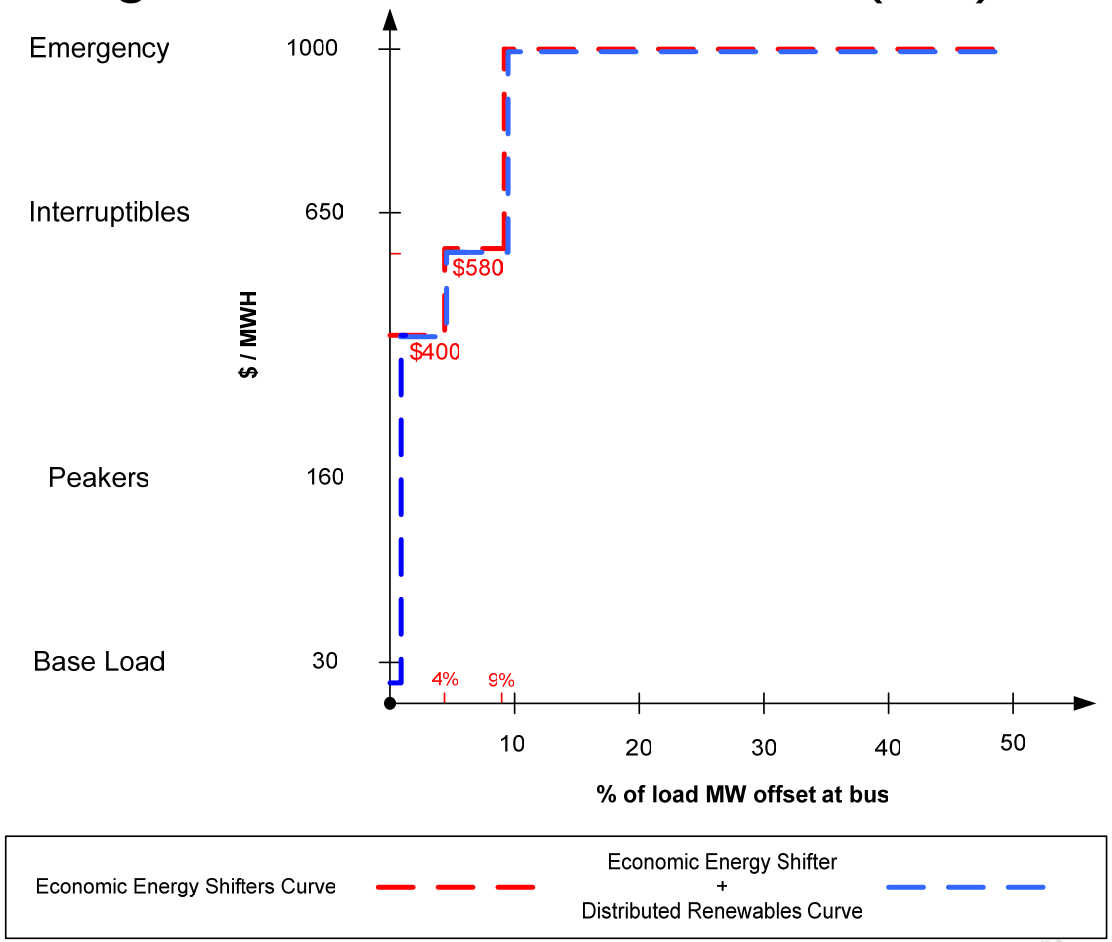
Economic Energy Shifters (EES)

Including Distributed Renewables (DR) in EES

- Use a sampling of existing EES units
- At these units, add low-cost segment to the cost curve
- Pricing of low-cost segment below baseload average
- Set units as “must run” to ensure these are always dispatched

Economic Energy Shifters (EES)

Including Distributed Renewables (DR) in EES



Economic Energy Shifters (EES)

Initial Results from 2009 Base Runs

2020 Future	EES Energy Dispatch (MWHr)	EES Associated Capacity Dispatch (MW)	Futures Matrix Targeted DR (MW)
Robust Economy	9,542	1.09	0
Green Economy	562,912	64.08	67
Slow Growth	575	0.07	0
Regional Wind	2,953	0.34	0
Limited Investment	2,871	0.33	0
Carbon Constrained	430,225	48.98	52

Next Steps

- The Futures Matrix as used in 2009 will be the base point for the 2010 Futures analysis
- Initial stakeholder feedback is due by
  March 1, 2010
- ATC will post the initial project list and assumptions by
  April 15, 2010
- Additional stakeholder review and feedback due by
  April 30, 2010
- Final project list and assumptions to be posted by
  May 15, 2010
- **Comments and feedback are greatly appreciated and strongly encouraged!**

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Questions?

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