ATC Energy Collaborative – Michigan Needs Analysis Update

Customer and Stakeholder Update Meeting

March 6, 2009

Pewaukee CR160

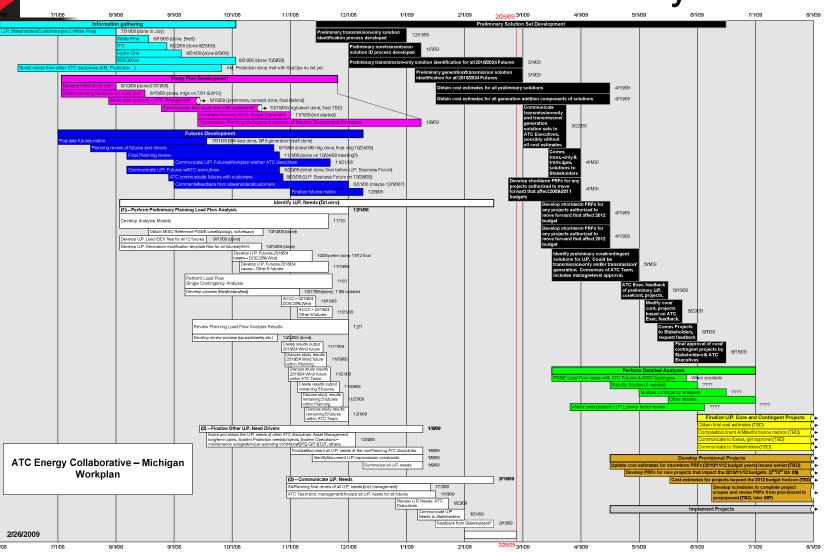


Summary

- Collaborative Goals and Schedule
- Analysis Technique
 - Strategic Flexibility
- Stakeholder Process
- Needs Update
- Next Steps
 - Solution Screening

Goals and Schedule

 Goal is to identify medium and long range needs for the UP transmission system





- Used the Strategic Flexibility process introduced in the Paddock – Rockdale study
- Developed six "Futures" based on MISO and ATC models
- Customized the Futures using UP specific drivers

Definition of Futures

Futures are:

- Robust Economy -Slow Growth
- Environmental -High Retirements
- DOE 20% Wind -Fuel and Investment Limitations
- Drivers are:
- Demand and Energy Growth
 - Scalable and Point Loads
- Generation
 - Additions, Retirements and Dispatch of Existing Units
- Market Flows

Stakeholder Process

•Plausible Bounds for Drivers were Developed with Stakeholder Input

		ATC Futures - ATC Energy Collaborative - Michigan January 2, 2009 (ATC Internal Use Only Discussion) (Rev 4.0) Load Assumptions Generation Assumptions																							
UP Micro- Drivers Bounds	0	Demand Growth Within UP (Demand MWs) West Central East			Energy Growth Within UP (Energy MWHrs) West Central East			Total Point Loads MW added in the UP (2018/2024) West Central East		Total UP Growth (2018) U.P.	Total UP Growth (2024) U.P.	Demand Growth Outside UP (MWs)	Existing UP Generation Profile (Note: U.P. generation on-line only if dictated by merit order dispatch, or unless noted below) West Contral East			UP Generation Additions West Central East			UP Generation retirements Wind Generation West Central East West Central				n	New Generation in Northern Lower Michigan	
Dodinos	West	Central	Lux	cs.	Central	Lust	nes.	Central	Lust	0.1.	0.1.		nes.	October	Lust	West	Ocinital	2001	west	Central	Lust	···cs.	CCITETA	LUST	
							(-6 / 0)	(-111 / 0)	(-2/0)				Fossil (-69M/W Total) "WP Mine1 2-3 (40) + SM-ST (11) + Warden (18)	Fossil (-151MW Total) 'PI5-6 Derate (40) + ESC1-2 (28) + Neenah-MUN (5)+NP7 Plus (55) + MBLP (25)	9.4MW Diesel Available			5 MW		116 MW					
Lower	-0.10%	0.08%	0.10%	-0.10%	0.08%	0.10%	-6 MW	-111 MW	-2 MW	-1.44%	-0.86%	0.5%	Hydro 20% of max	Hydro 20% of max	0MW Hydro Available	None	None	5MW Diesel	None	PI3-4 (116)	None	Zero	Zero	Zero	Zero
								(-40 / 0)					(-51MW Total) 'WP Mine1-2-3 (40) + SM-ST (11)	Fossil (-134MW Total) PI5-6 Derate (40) + ESC 1-2 (26) + Neenah-MUN (5) + MBLP (25) + NP7 (38)											
Mid-Lower	0.36%	0.48%	0.40%	0.36%	0.48%	0.40%	No Change	-40 MW	No Change	-0.24%	-0.05%	1.0%	Hydro 20% of max	Hydro 20% of max			None								
							(+5 / 0)	(+29 / 0)	(+33 / 0)				(-40MW Total) "WP Mine1-2-3 (40)	Fossil (-65MW Total) PI5-6 Derate (40) + MBLP (25)	11.4MW Diesel Available		10MW 10MW Bio	29 MW 5MW Diesel + 24MW Bio	None		None				
Mid	0.73%	0.84%	0.75%	0.73%	0.84%	0.75%	+5 MW	+29 MW	+33 MW	1.14%	0.84%	1.75%	Hydro 40% of max	Hydro 40% of max.	20MW Hydro Available	None	Mass NMU	Mass			None	25MW	50MW	50MW	100MW
							(+16 / +3)	(+79 / +20)	(+35 / +5)				Fossil all available	Fossil (-40MW Total) PI 5-6 (40)	11.4MW diesel Available		60MW 10 NMU+50 Sawyer Bio	93MW 24MW Bio Mass + 9MW	None		None				
Mid-Upper	1.23%	1.25%	1.25%	1.23%	1.25%	1.25%	+19 MW	+99 MW	+40 MW	2.00%	1.60%	2.0%	Hydro 50% of max	Hydro 50% of max	32MW Hydro Available		Mass	Hydro + 60 MW Mascoma				50MW	100MW	100MW	
							(+19 / +22)	(+134 /+50)	(+46 / +10)				Fossil all available	Fossil all available	16MW Diesel Available		110MW 10 NMU+100	101 MW 8MW Diesel + 24MW Bio	None	138 MW	None				
Unner	1.93%	2.00%	2.00%	1.93%	2.00%	2.00%	+41 MW	+184 MW	+56 MW	3.00%	2.58%	3.0%	Hydro 60% of max	Hydro 60% of max	44MW Hydro Available	None	Sawyer Bio Mass	Mass + 9MW Hydro + 60 MW Mascoma		PI3-4 (116) +GLAD (22)		100MW	200MW	200MW	600MW
2018 Futures														, , , , , , , , , , , , , , , , , , , ,	7										
Descriptions																									
	(+1.93%)	(+2.00%)	(+2.00%)	(+1.93%)	(+2.00%)	(+2.00%)	(+19 MW)	(+134 MW)	(+46 MW)	(+3.00%)		3.0%	-OMW	-OMW	20MW Hydro	(none)	60MW	(+101 MW)	(none)	(-116 MW)	(none)	(+25 MW)	(+50 MW)	(+50 MW)	(+ 600 MW)
Robust Economy	Upper (+0.73%)	Upper (+0.84%)	Upper (+0.75%)	Upper (+0.73%)	Upper (+0.84%)	Upper (+0.75%)	Upper (+5 MW)	Upper (+29 MW)	Upper (+33 MW)	Upper (+1.14%)		Upper 1,75%	Upper -69MW	Upper -151MW	Mid 32MW Hydro	Upper (none)	Mid-Upper (none)	Upper (+29MW)	Lower (none)	Lower (-138 MW)	Lower (none)	Mid (+25 MW)	Mid (+50 MW)	Mid (+50 MW)	Upper (+ 600 MW)
High Retirements	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid		Mid	Lower	Lower	Mid-Upper	Lower	Lower	Mid	Lower	Upper	Lower	Mid	Mid	Mid	Upper
	(+0.36%)	(+0.48%)	(+0.40%)	(+0.36%)	(+0.48%)	(+0.40%)	(no change)	(-40 MW)	(no change)	(-0.24%)		1.0%	-51MW	-134MW	20MW Hydro	(none)	(none)	(+5 MW)	(none)	(-116 MW)	(none)	(+50 MW)	(+100 MW)	(+100 MW)	(none)
High Environmental	Mid-Lower (-0.10%)	Mid-Lower (+0.08%)	Mid-Lower (+0.10%)	Mid-Lower (-0.10%)	Mid-Lower (+0.08%)	Mid-Lower (+0.10%)	Mid-Lower (-6 MW)	Mid-Lower (-111 MW)	Mid-Lower (-2 MW)	Mid-Lower (-1.44%)		Mid-Lower 0.5%	Mid-Lower -40MW	Mid-Lower -65MW	Mid 44MW Hydro	Lower (none)	Lower 10MW	Lower (+5 MW)	Lower (none)	Lower (-116 MW)	Lower (none)	Mid-Upper (+100 MW)	Mid-Upper (+200 MW)	Mid-Upper (+200 MW)	Lower (none)
Slow Growth	Lower	Lower	Lower	Lower	Lower	Lower	Lower	Lower	Lower	Lower		Lower	Mid	Mid	Upper	Mid	Mid	Lower	Lower	Lower	Lower	Upper	Upper	Upper	Lower
	(+1.23%)	(+1.25%)	(+1.25%)	(+1.23%)	(+1.25%)	(+1.25%)	(+16 MW)	(+79 MW)	(+35 MW)	(+2.00%)		2.0%	-69MW	-151MW	20MW Hydro	(none)	(none)	(+93 MW)	(none)	(-138 MW)	(none)	(+100 MW)	(+200 MW)	(+200 MW)	(+ 100 MW) (Wind)
DOE 20% Wind	Mid-Upper (+0.73%)	Mid-Upper (+0.84%)	Mid-Upper (+0.75%)	Mid-Upper (+0.73%)	Mid-Upper (+0.84%)	Mid-Upper (+0.75%)	Mid-Upper (no change)	Mid-Upper (+6 MW)	Mid-Upper (no change)	Mid-Upper (0.48%)		Mid-Upper 1.3%	Lower -40MW	Lower -65MW	Mid 0MW Hydro	Lower (none)	Lower 10MW	Mid-Upper (+5 MW)	Lower (none)	Upper (-116 MW)	Lower (none)	Upper (none)	Upper (none)	Upper (none)	Mid (none)
Fuel and Investment Limitations	Mid	Mid	Mid	Mid	Mid	Mid	Mid-Lower	Mid-Lower	Mid-Lower	Mid-Lower		Mid-Lower	Mid	Mid	Lower	Mid	Mid	Lower	Lower	Lower	Lower	Lower	Lower	Lower	Lower
2024 Futures																									
<u>Descriptions</u>	(+1.93%)	(+2.00%)	(+2.00%)	(+1.93%)	(+2.00%)	(+2.00%)	(+41 MW)	(+184 MW)	(+56 MW)		(+2.58%)	3.0%	-oMW	-OMW	20MW Hydro	(none)	110MW	(+101 MW)	(none)	(-116 MW)	(none)	(+25 MW)	(+50 MW)	(+50 MW)	(+ 600 MW)
Robust Economy	(+1.55%)	Lloner	Linnar	(#1.50%)	Linner	Unner	(14) mir)	(Floring)	Linner		(#E.00/0)	Linner	Upper	Upper	Mid	(none)	Unner	Upper	Lower	Lower	Lower	Mid	Mid	Mid	(Unner
	(+0.73%)	(+0.84%)	(+0.75%)	(+0.73%)	(+0.84%)	(+0.75%)	(+5 MW)	(+29 MW)	(+33 MW)		(+0.84%)	1.75%	-69MW	-151MW	32MW Hydro	(none)	(none)	(+29MW)	(none)	(-138 MW)	(none)	(+25 MW)	(+50 MW)	(+50 MW)	(+ 600 MW)
High Retirements	Mid (+0.36%)	Mid (+0.48%)	Mid (+0.40%)	Mid (+0.36%)	Mid (+0.48%)	Mid (+0.40%)	Mid (no change)	Mid (-40 MW)	Mid (no change)		Mid (-0.05%)	Mid 1.0%	Lower -51MW	Lower -134MW	Mid-Upper 20MW Hydro	Lower (none)	Lower (none)	Mid (+5 MW)	Lower (none)	Upper (-116 MW)	Lower (none)	Mid (+50 MW)	Mid (+100 MW)	Mid (+100 MW)	Upper (none)
High Environmental	Mid-Lower	Mid-Lower	Mid-Lower	Mid-Lower	Mid-Lower	Mid-Lower	Mid-Lower (-6 MW)	Mid-Lower (-111 MW)	Mid-Lower		Mid-Lower	Mid-Lower	Mid-Lower -40MW	Mid-Lower -65MW	Mid 44MW Hydro	Lower	Lower 10MW	Lower (+5 MW)	Lower	Lower (-116 MW)	Lower	Mid-Upper	Mid-Upper	Mid-Upper	Lower
Class County	(-0.10%)	(+0.08%)	(+0.10%)	(-0.10%)	(+0.08%)	(+0.10%)	(-6 MW)	(-111 MW)	(-2 MW)		(-0.86%)	0.5%	-40MW Mid	-65MW Mid	· ·	(none) Mid	10MW Mid		(none)		(none)	(+100 MW)	(+200 MW)	(+200 MW)	(none)
Slow Growth	(+1.23%)	(+1.25%)	(+1.25%)	(+1.23%)	(+1.25%)	(+1.25%)	(+19 MW)	(+99 MW)	(+40 MW)		(+1.60%)	Lower 2.0%	Mid -69MW	-151MW	Upper 20MW Hydro	Mid (none)	Mid (none)	Lower (+93 MW)	(none)	(-138 MW)	(none)	(+100 MW)	(+200 MW)	(+200 MW)	(+ 100 MW)
DOE 20% Wind	Mid-Upper	Mid-Upper	Mid-Upper	Mid-Upper (+0.73%)	Mid-Upper (+0.84%)	Mid-Upper (+0.75%)	Mid-Upper	Mid-Upper (+6 MW)	Mid-Upper (no change)		Mid-Upper (0.45%)	Mid-Upper	Lower -40MW	Lower -65MW	Mid 0MW Hydro	Lower (none)	Lower 10MW	Mid-Upper (+5 MW)	Lower (none)	Upper (-116 MW)	Lower (none)	Upper (none)	Upper (none)	Upper (none)	(Wind) Mid
Fuel and Investment Limitations	(+0.73%) Mid	(+0.84%) Mid	(+0.75%) Mid	(+0.73%) Mid	(+0.84%) Mid	(+0.75%) Mid	(no change) Mid-Lower	(+6 MW) Mid-Lower	(no change) Mid-Lower		(0.45%) Mid-Lower	1.3% Mid-Lower	-40MW Mid	-65MW	0MW Hydro Lower	(none) Mid	10MW Mid	(+5 MW) Lower	(none) Lower	(-116 MW) Lower	(none)	(none)	(none)	(none)	(none)
Limitations	Mid	Mid	Mid	Mid	Mid	Mid	Mid-Lower	n/lid-Lower	Mid-Lower		mid-Lower	Mid-Lower	Mid	Md	Lower	Mid	Mid	Lower	Lower	Lower	Lower	Lower	Lower	Lower	Lower

UP Need Summary

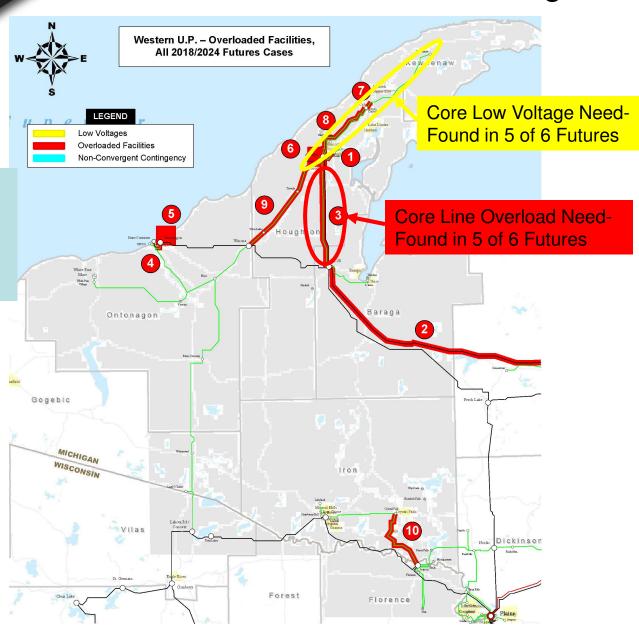
Aggregation of ATC Need Drivers

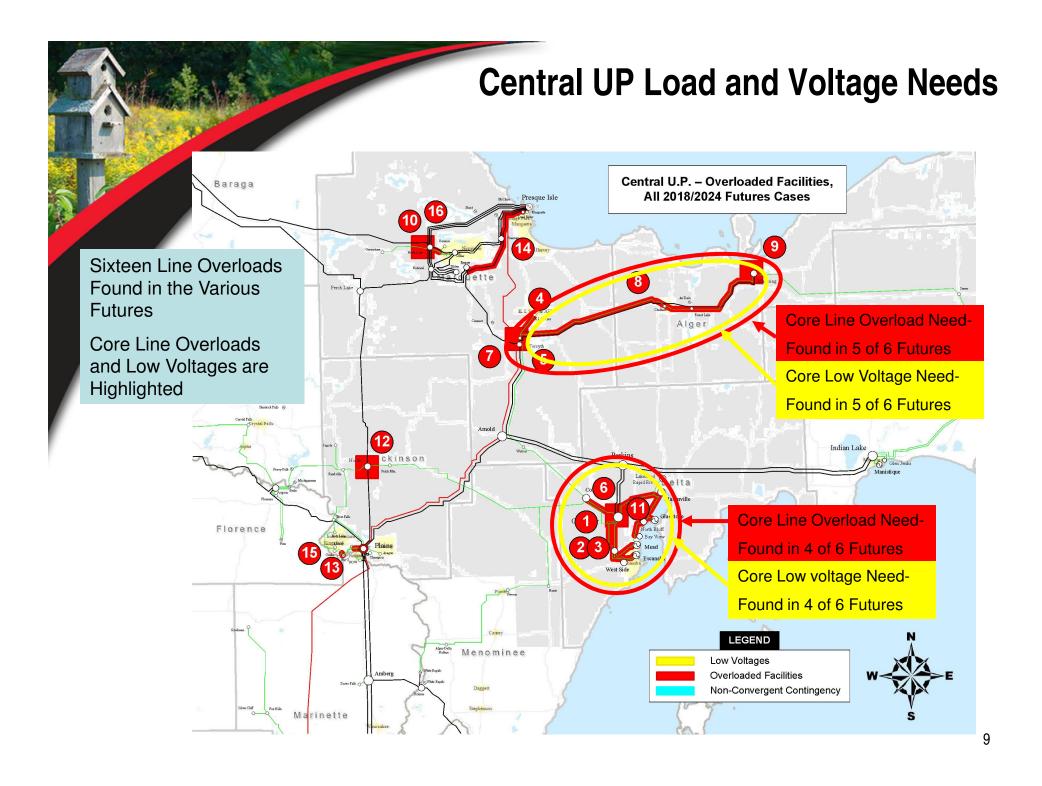
- Planning Studies
 - Line Loadings and Voltages
- System Operations
 - Special Operating Guides
- Asset Management
 - Poor Line Performance
 - Transformers, Circuit Breakers and Relays
- New Interconnections
 - 14 Load Requests under Study
 - 2 Wind Generation Studies in progress
- Smart Grid Initiatives
 - Fiber Optic corridor additions
 - RTU and SCADA projects

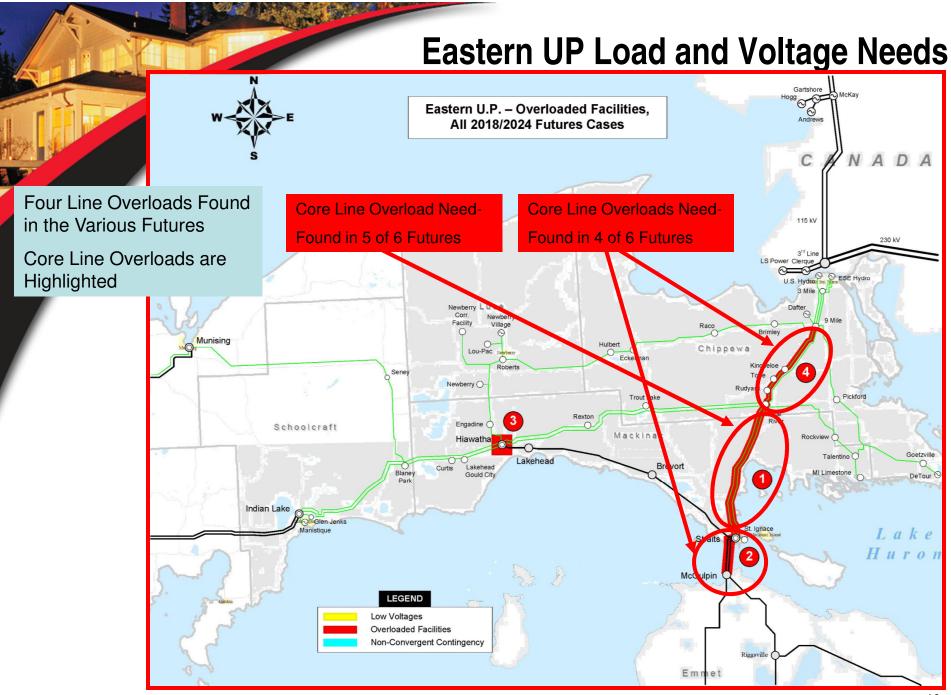
Western UP Load and Voltage Needs

Ten Line Overloads Found in the Various Futures

Core Line Overloads and Low Voltages are Highlighted







UP Lines with Asset Management Need Drivers





- Needs Summary Communication with Stakeholders
- Solution Development Process
 - Joint Meetings with Planning, Asset
 Management, System Operations and Project Management
 - Solicit Non-Transmission Solutions from Stakeholders
 - Right size, Right Place Generation
 - Demand Response
- 2010/2011 Budget Inputs

