



MPSC – CNF Integration Group Meeting LOLP Analysis Update July 25 , 2005

- Revised date: Aug 12, 2005
Revised slides: 8,11

Topics

- Stand-alone LOLP
 - Summary
- With Support LOLP
 - Notes
 - IESO 0 MW Summary
 - IESO 0 MW Findings
 - IESO 1500 MW Summary
 - IESO 1500 MW Findings
- Questions/Discussion
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● Preliminary stand-alone LOLP

- METC – 0.38 days/year (previously 0.73)
- ITC – 32.3 days/year (previously 36.61)
- MECS – 5.17 days/year (previously 6.3)
- ATC zone2 – 289 days/year
- Note:
 - Study period is 2009.
 - Revised values are after forced outage rate (FOR) changes were made to Consumers and DTE data
 - One of the PJM muni/co-op was included in Lower Peninsula forecasts. Values presented reflect *updated forecasts*.

● Standalone system - Summary

STAND ALONE SYSTEM						
	Sensitivity Cases					
	BaseCase		High Growth		Low Growth	
	LOLP	Support (MW)	LOLP	Support (MW)	LOLP	Support (MW)
METC	0.4	450	1.6	1000	0.1	(-) 100
ITC	32.3	> 1000	49.8	> 1000	20.5	> 1000
MECS	5.2	> 1000	11.6	> 1000	1.8	> 1000
ATC zone2	289.1	315	338.6	355	204.3	275

Note: 1) A negative sign for “support” indicates the capacity a given area can export before reaching the reliability target.
 2) LOLP is in days/year.
 Reliability target is 0.1 day/year or 1 day in 10 year

● Notes for “with support” values

- The import values correspond to May 10 results on the T&D web page (previous presentations pointed to March results)
- Only “prevailing limits” were considered
- Both Phase Shifter positions (0 MW and 1500 MW) were considered

“With Support” system – Summary

(IESO Phase Shifter Flow = 0 MW)

IESO Phase Shifter Flow = 0 MW								
Sink	Imports From	Import Value	BaseCase		High Growth		Low Growth	
			LOLP	Additional Imports Needed	LOLP	Additional Imports Needed	LOLP	Additional Imports Needed
ITC	MAIN	3000	0.69	880	2.2	1540	0.16	None
	TVA	2800	1.03	1050	3.03	1700	0.26	400
	VACAR	2700	1.24	1100	3.55	1800	0.33	450
	MAAC	2500	1.76	1350	4.75	1980	0.51	630
	ALL	2800	1.03	1050	3.03	1700	0.26	400
METC	MAIN	3800	0	(-) 3360	0	(-) 2800		N/A
	TVA	3500	0	(-) 2645	0	(-) 2375		N/A
	VACAR	3250	0	(-) 3720	0	(-) 2160		N/A
	MAAC	3000	0	(-) 2530	0	(-) 1980		N/A
	ALL	3500	0	(-) 2645	0	(-) 2375		N/A
MECS	MAIN	3250	0.13	120	0.8	1440	0	(-) 1200
	TVA	3000	0.2	440	1.03	1540	0	(-) 880
	VACAR	3000	0.2	440	1.03	1540	0	(-) 880
	MAAC	2800	0.28	630	1.24	1890	0	(-) 630
	ALL	3000	0.2	440	1.03	1540	0	(-) 880

Note: 1) A negative sign for “support” indicates the capacity a given area can export before reaching the reliability target.
 2) LOLP is in days/year.
 Reliability target is 0.1 day/year or 1 day in 10 year

“With Support” system – Summary (IESO Phase Shifter Flow = 1500 MW)



IESO Phase Shifter Flow = 1500 MW								
Sink	Imports From	Import Value	BaseCase		High Growth		Low Growth	
			LOLP	Additional Imports Needed	LOLP	Additional Imports Needed	LOLP	Additional Imports Needed
ITC	MAIN	1750	5.62	2080	11.33	2700	2.14	1430
	TVA	1750	same as above					
	VACAR	1500	7.63	2145	14.33	> 2200	3.22	1650
	MAAC	1500	same as above					
	ALL	1500	same as above					
METC	MAIN	1000	0.02	(-) 560	0.13	70	0	(-) 1120
	TVA	1000	same as above					
	VACAR	1000	same as above					
	MAAC	1000	same as above					
	ALL	1000	same as above					
MECS	MAIN	1500	1.33	1870	3.9	> 2200	0.3	660
	TVA	1500	same as above					
	VACAR	1500	same as above					
	MAAC	1250	1.68	1800	4.87	> 1800	0.43	900
	ALL	1250	same as above					

- Note: 1) A negative sign for “support” indicates the capacity a given area can export before reaching the reliability target.
 2) LOLP is in days/year.
 Reliability target is 0.1 day/year or 1 day in 10 year

“With Support” system – Summary



● (ATC zone 2 – 2009 on-peak and off-peak)

	ON PEAK	BaseCase		High Growth		Low Growth	
	Imports		Additional Imports		Additional Imports		Additional Imports
Sink	From	LOLP	Needed	LOLP	Needed	LOLP	Needed
ATC zone2	South (300 MW)						
	East (50 MW)	0	(-) 40	0.19	10	0	(-) 80
	OFF PEAK						
ATC zone2	South (210 MW)						
	East (50 MW)	1.07	60	4.38	100	0.22	20

Note: 1) A negative sign for “support” indicates the capacity a given area can export before reaching the reliability target.
 2) LOLP is in days/year.
 Reliability target is 0.1 day/year or 1 day in 10 year

“With Support”- Findings

- ● IESO Phase Shifter flow at 0 MW
 - Base Case Scenario
 - METC meets the criteria
 - MECS needs 120 to 630 MW of *additional* imports
 - ITC needs 880 to 1350 MW of *additional* imports
 - High Growth Scenario
 - METC meets the criteria
 - MECS needs 1440 to 1890 MW of *additional* imports
 - ITC needs 1540 to 1980 MW of *additional* imports
 - Low Growth Scenario
 - METC, MECS meet the criteria
 - ITC needs 0 to 630 MW of *additional* imports

“With Support” - Findings

- IESO Phase Shifter flow at 1500 MW
 - Base Case Scenario
 - METC meets the criteria
 - MECS needs approx 1800 MW of *additional* imports (almost thrice of PS at 0 MW scenario)
 - ITC needs approx 2100 MW of *additional* imports (almost twice of PS at 0 MW scenario)
 - High Growth Scenario
 - METC meets the criteria *marginally*
 - MECS needs more than 2200 MW of *additional* imports
 - ITC needs 2700 MW of *additional* imports
 - Low Growth Scenario
 - METC meets the criteria
 - MECS needs 660 to 900 MW of *additional* imports
 - ITC needs 1430 to 1650 MW of *additional* imports

● “With Support”- Findings

■ ATC zone 2 summary

- On a stand-alone basis, ATC zone 2 has 289 days/year LOLP, it needed 315 MW of support to meet the 1 day in 10 year reliability criteria
- On-peak analysis
 - ATC zone 2 meets the reliability criteria in all scenarios
- Off-peak analysis
 - ATC zone 2 needs *additional* imports of 60 MW under base case conditions

● Questions

- The “imports needed” value, is that:
 - How much imports you need? *or*
 - How much generation capacity would you need?
- If a supporting area has deficient resources, will it still be able to provide support?
 - E.g. Can PJM support Michigan utilities?

● Discussion

- Can a resource-deficient area provide support?
 - MARELI creates a surplus resource probability curve for a supporting area. With a 'no loss sharing' option, that area can only support when it has surplus capacity
 - Most areas have some probability of being surplus and some probability of being deficit
 - So far, all MARELI runs are with 'no loss sharing' option active

● Discussion

- The “Imports Needed” value represents additional firm capacity required to meet target reliability:
 - Can be a generation resource
 - Represents lower bound on needed capacity.
 - Non-firm capacity required (allowing for maintenance schedules and forced outages) will be higher
 - Can be firm tie support from an external area
 - Represents lower bound on needed tie increase, assuming supporting area has 100% probability of surplus
 - Actual tie increase depends on availability of surplus capacity in neighboring area



Appendix

Notes

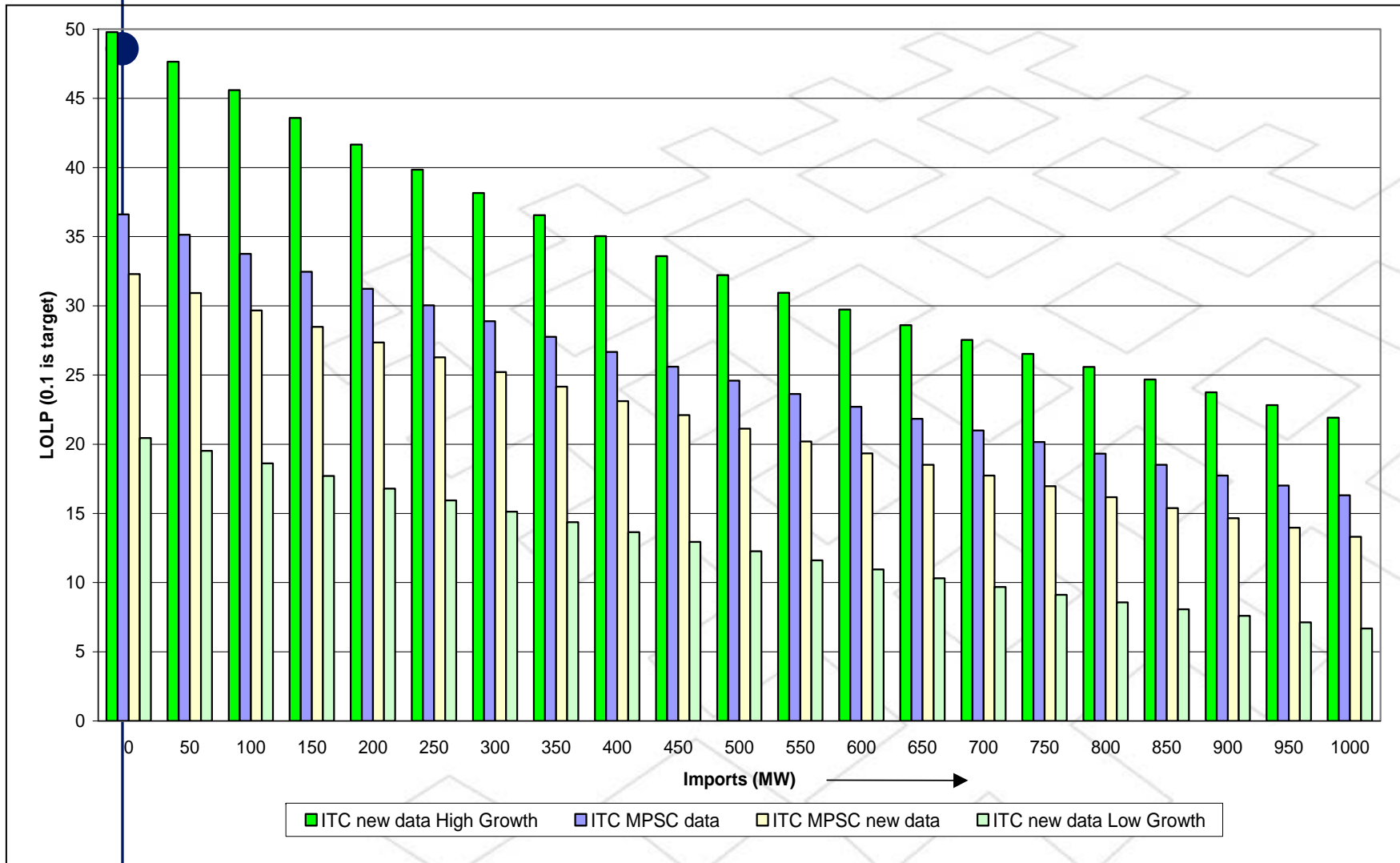
- These values are without giving DTE credit for Ludington PS
- With 2003 Hourly Load profiles
- Maintenance Schedules “optimized”
- No Loss Sharing option
 - An area can only support when it has surplus
- In the model
 - $ITC = DTE + Wyandotte$
 - $METC = \text{Consumers Energy (includes Midwest Energy, Lower Peninsula Municipals, Alpena Power)} + \text{Wolverine Power} + \text{Lansing Board}$
 - $ATC \text{ zone2} = WPS + \text{We Energies} + \text{Escanaba} + \text{Marquette} + \text{Xcel} + \text{UPPCO}$

Input Data Comparison

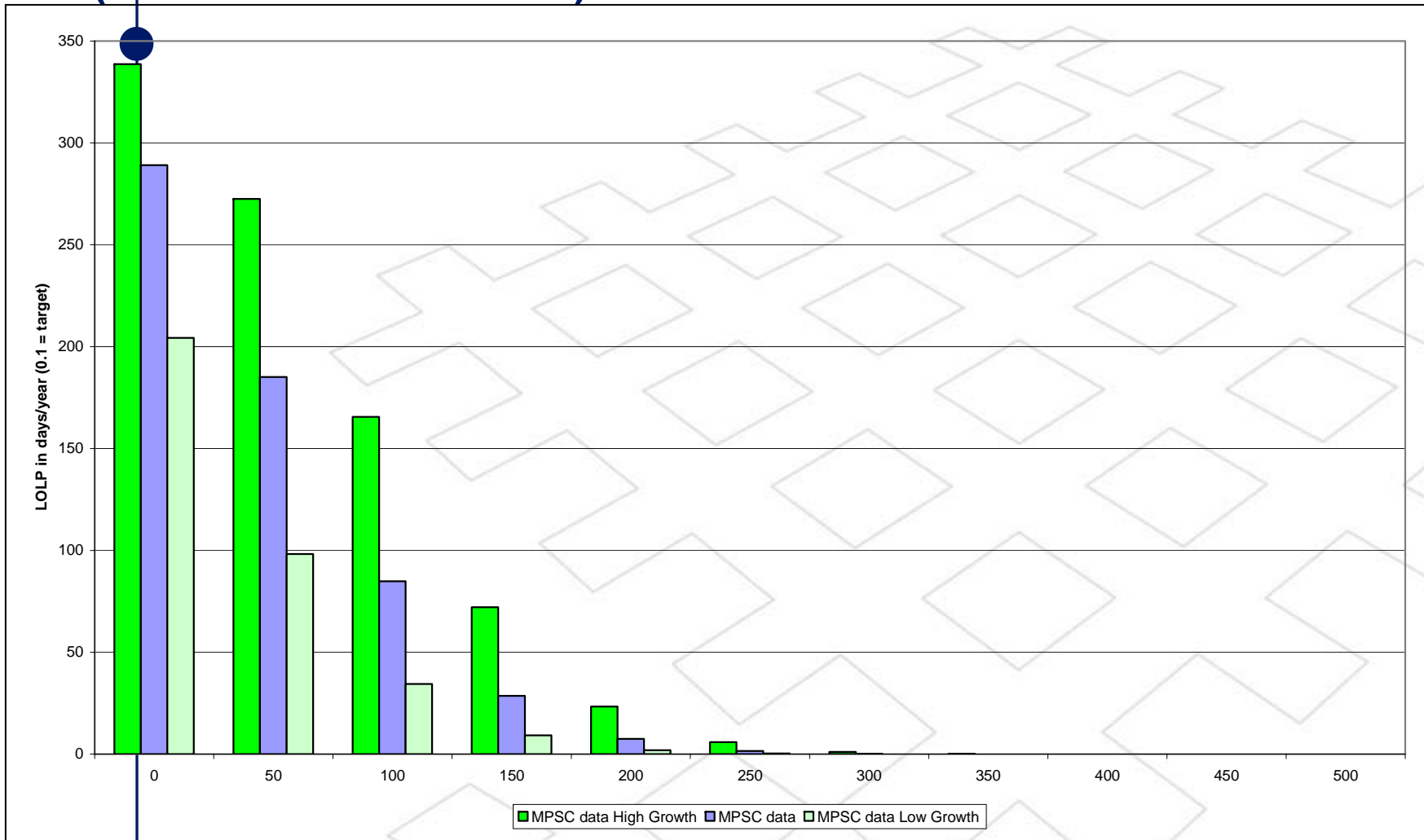
		Load & Capability for 2009	
		MISO LD Study	MPSC CNF Study
		(MW)	(MW)
Consumers Energy			
	Loads	10,171	11,212
	Capability	14,674	13,450
	Reserves (MW)	4,503	2,238
	Reserves (%)	44%	20%
Wolverine Power			
	Loads	739	494
	Capability	364	386
	Reserves (MW)	-375	-108
	Reserves (%)	-51%	-22%
Lansing Board			
	Loads	581	526
	Capability	369	532
	Reserves (MW)	-212	6
	Reserves (%)	-37%	1%
METC			
	Loads	11,491	12,232
	Capability	15,407	14,368
	Reserves (MW)	3,916	2,136
	Reserves (%)	34%	17%
ITC			
	Loads	13,595	13,648
	Capability	12,527	12,110
	Reserves (MW)	-1,068	-1,538
	Reserves (%)	-8%	-11%
MECS			
	Total - Load	25,086	25,880
	Total - Capability	27,934	26,478
	Reserves (MW)	2,848	598
	Reserves (%)	11%	2%

Annual Load Remaining Curve – ITC

(on a stand-alone basis)



Annual Load Remaining Curve – ATC zone2 (on a stand-alone basis)



Imports Modeled

