



Light Load Operational Performance

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- What load level should the system be evaluated at for off-peak studies?
- What generation dispatch should be specified as part of the criteria?
- What interchange with adjacent areas should be assumed?
- What tests should be evaluated?



Wind Capacity Factor November – April from 1AM to 5AM

- Wind
 - **November – April** Hours ending 1 AM – 5 AM (approximately 900 samples per year)
 - Higher average wind capacity factor of 38% when only looking at these hours

 - Wind Capacity Factors during this period
 - Highest
 - 87%
 - Percentage of hours when the Wind Capacity Factor was 50% - 60%
 - 32%
 - Percentage of hours when the Wind Capacity Factor was 60% - 70%
 - 26%
 - Percentage of hours when the Wind Capacity Factor was 50% - 70%
 - 58%
 - Percentage of hours when the Wind Capacity Factor was > 70%
 - 16%



Wind Capacity Factor November – April from 1AM to 5AM

- Load
 - Operational data
 - Entire PJM RTO
 - **November – April** Hours ending 1 AM – 5 AM (approximately 900 samples per year)
 - Metered PJM RTO load as a percentage of the yearly hourly peak
 - Measured RTO load / Peak RTO load averages approximately 53% for these hours

YEAR	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	Average
2007	52%	50%	50%	49%	50%	50%
2008	55%	54%	53%	53%	54%	54%
2009	56%	54%	53%	53%	54%	54%



Historical Capacity Factor Data

- Operational data
- Entire PJM RTO
- Average capacity factor calculated for three years of data, 2007 – 2009

Fuel Type	Percentage of Installed Capacity	2007 - 2009 Hours ending 1AM – 5AM Annual Average Capacity Factor	2007 – 2009 Hours ending 1AM – 5AM November - April Average Capacity Factor
Coal (<500 MW)	15%	46%	46%
Coal (>500 MW)	26%	59%	58%
Natural Gas	29%	6%	6%
Nuclear	19%	93%	91%
Wind	0%	27%	35%
Other	13%	7% or less	10% or less
TOTAL	100%		



Proposed Scenario – Base Case Model

- Proposed Scenario
- Base model

Network Model	RTEP Case
Load Model	Light Load (50% of Summer Peak 50/50)
Base Generation Dispatch	Coal > 500MW = 45% Coal < 500 MW = 60% Natural Gas = 5% Nuclear = (1-EEFORD) = approximately 92% Wind = 40%
External Transfers (Interchange)	Yearly Long Term Firm
Notes:	Scale coal generation to balance the case to meet load + losses + interchange



Proposed Scenario – Analysis Methodology

- Model the variability of wind generation during the light load period through the ramping impact of the generator deliverability test
- Also consider impact of neighboring systems

Test Methodology	Generator Deliverability, Common Mode Outage Procedure
Monitored Facilities	Monitor thermal limits of PJM facilities including tielines
Contingencies	NERC Category A, B, C
Ramping Limits for Generator Deliverability test methodology	Wind 40% capacity factor in base case ramping up to 80%
Generation Participation from Neighboring Systems	DFAX cutoff to be determined (3-5% proposed)

- Model base conditions
- Modify generator deliverability tool
 - Ramping impact
 - Neighboring system impact
- Test system performance of proposed scenario