



# Winter Generation Outage Analysis

Planning Committee  
6/5/2014

- Given the levels of generator unavailability PJM experienced in January, 2014, should changes be made to planning study assumptions to better model these winter risks?
- PJM Planning is performing analysis of winter generation performance with a focus on gas curtailments and other weather-related forced outages across all unit types.



## Gas Curtailments/Gen Performance vs. Temperature

- PJM is compiling information on the frequency of gas curtailment outages and other weather-related outages.
- These outages will be strongly correlated with temperature and winter load level.
- The outages will be examined on a zonal as well as RTO-wide basis.



## Preliminary Analysis Results

- The Delivery Year examined is 2019/2020.
- PJM examined the performance of existing gas plants over the winters of 2007/08 through 2012/13.
- “Chronically curtailed” existing units are those gas plants that were curtailed an average of 12 hours/yr or more over the last six winters.
- “Chronically curtailed” future units are defined to be those “at risk” of curtailment based on their pipeline supply.
- The “Worst Case Scenario” assumes all existing gas plants that were curtailed at least once over the last seven winters are unavailable and that all “at risk” future units are also unavailable.



## "Chronically Curtailed" Gas Plants

Sum of ICAP	Column Labels			
Row Labels	CC	CT	ST	Grand Total
AE	1586.0	139.7		1725.7
AEP	161.0			161.0
APS		132.0		132.0
ATSI		169.7		169.7
COMED		2636.0		2636.0
DAYTON		375.0		375.0
JCPL		41.0		41.0
PECO		322.7		322.7
PL		44.7		44.7
PS	755.0	1379.0	321.5	2455.5
PEPCO			1180.3	1180.3
<b>Grand Total</b>	<b>2502.0</b>	<b>5239.8</b>	<b>1501.8</b>	<b>9243.6</b>



# "Worst Case" Curtailment Scenario

Sum of ICAP Row Labels	Column Labels CC	CT	ST	Unknown	Grand Total
AE	1703.3	139.7			1843.0
AEP	789.0	922.5			1711.5
APS		220.0			220.0
ATSI	180.0	950.7		3736.0	4866.7
BGE		232.5		678.0	910.5
COMED	500.0	6379.4		1055.0	7934.4
DAYTON		1120.0			1120.0
DPL	59.0		72.0	958.2	1089.2
DQE	244.0				244.0
DUKE		44.0			44.0
JCPL	382.5	66.0		785.0	1233.5
METED	770.4				770.4
PECO	754.9	652.7		391.0	1798.6
PENLC		286.5			286.5
PEPCO	401.6	147.0	1180.3		1728.9
PL	445.5	317.6		4030.0	4793.1
PS	2597.4	1735.0	321.5	755.0	5408.9
VEPCO	388.2	312.0	316.0	5651.0	6667.2
<b>Grand Total</b>	<b>9215.8</b>	<b>13525.6</b>	<b>1889.8</b>	<b>18039.2</b>	<b>42670.4</b>



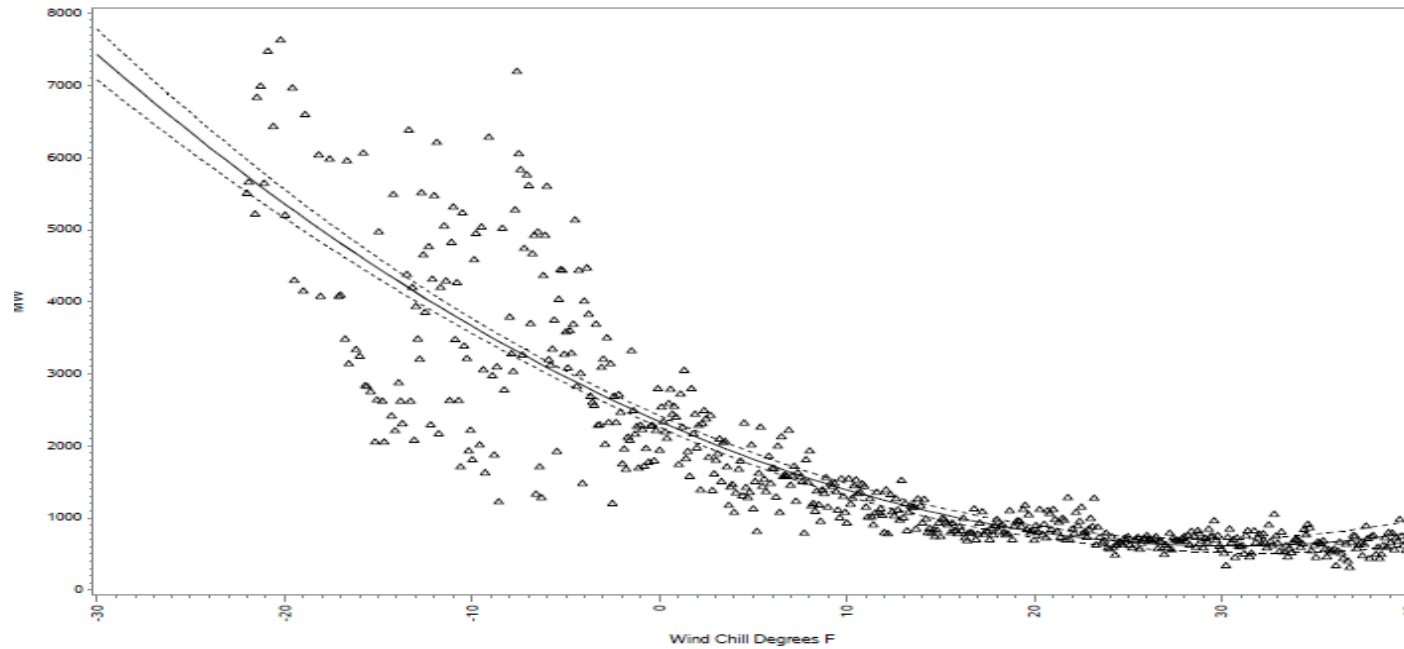
## Preliminary Analysis Results

- PJM examined the relationship between wind chill index and generator forced outages. Forced outages include both gas curtailments and mechanical or start-up failures of all unit types.
- The relationship varies by TO zone and by the particular fuel mix of the zone.
- Two sample graphs (for the ComEd and PSEG zones) are included on the next two slides.



# Wind Chill vs. Forced Outage MW – ComEd Zone

Wind Chill (24 Hr) v Forced Outage MW (incl. Gas Curtailments) (incl W 2013)  
ZONE=COMED

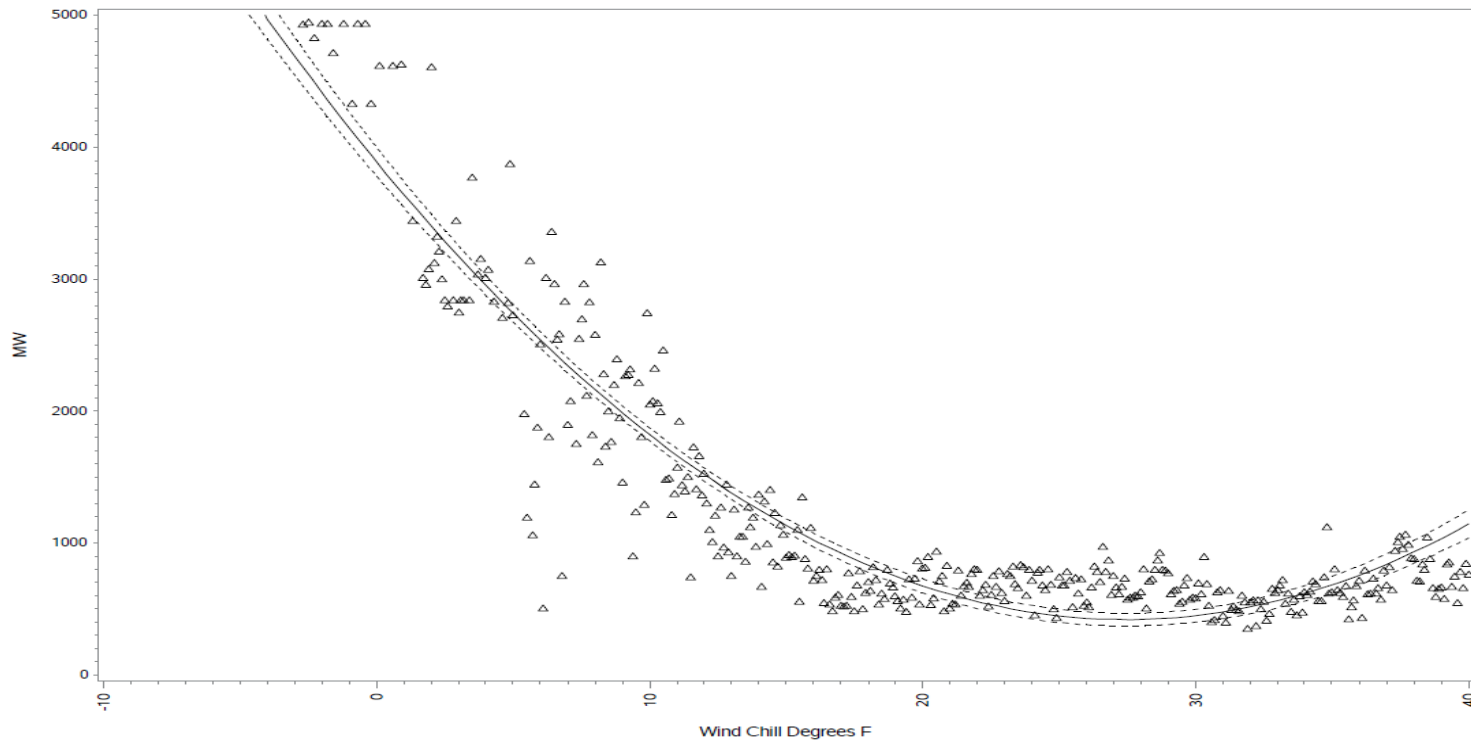






# Wind Chill vs. Forced Outage MW – PSEG Zone

Wind Chill (24 Hr) v Forced Outage MW (incl. Gas Curtailments) (incl W 2013)  
ZONE=PS



- Planning studies currently assume that forced outages are random and occur at a constant rate throughout the four seasons.
- These data clearly show that winter forced outages are not random but are strongly correlated with extreme temperature.
- This investigation may result in modified planning procedures to recognize this non-random winter risk and/or new rules regarding the firmness of fuel supply in the winter.
- Gas-related contingencies will be developed for the 2019/2020 winter case and “winter” CETOs and CETLs will be calculated.
- The 2019/2020 Winter Study will be discussed further at the 6/5/14 TEAC meeting.