

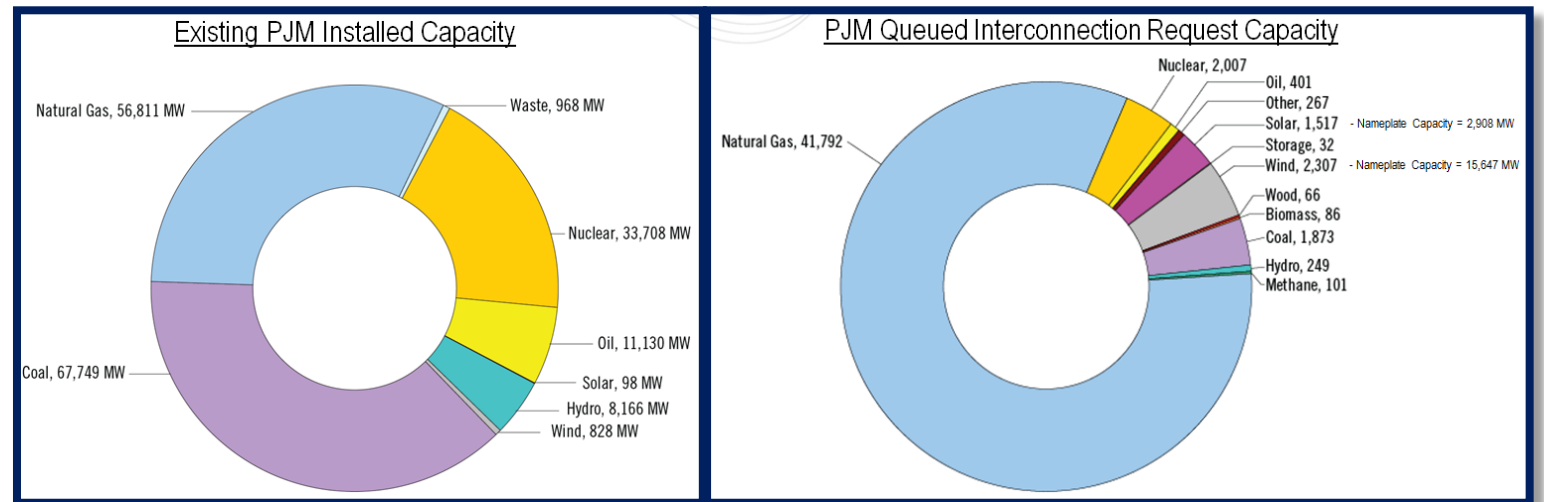
Winter Peak Study

Wenzheng Qiu
Transmission Planning

- Winter Peak is higher Summer Peak for several zones in PJM

Area / Year	PN	METED	JCPL	PL	PECO	PSEG	BGE	PEPCO	AE	DPL	UGI	RECO	APS	ATSI	AEP	DAYTON	DUKE	DLCO	COMED	VAP	EKPC
2020 Summer	3,118	3,150	6,596	7,492	9,096	10,649	7,457	6,853	2,762	4,388	206	434	9,255	13,581	24,507	3,749	5,777	3,084	24,582	22,068	2,082
2020 Winter	3,145	2,784	4,046	7,597	7,006	6,865	6,005	5,599	1,731	3,569	208	236	9,362	10,745	23,839	3,108	4,535	2,258	16,930	19,546	2,530

- Gas Deficiency
 - Low gas price
 - Increased gas heating
 - Limited pipe line capacity



- “Winter Peak Period”
 - December 1st – February 28th
 - Hours Ending 06:00 – 09:00 and 17:00-20:00
- Winter Peak Base Case
 - Dispatch reflects observed winter conditions.
- Winter Peak Analytical Studies
 - Includes thermal and voltage evaluations.

- **Base case dispatch**

- Pumped storage will be in generating mode
- Generator fuel type will be considered in the initial base case dispatch
- Queue generation and MTX projects with FSA are modeled along with their associated network upgrades
- Average Capacity Factors (CF) by fuel type during the winter peak hours are used for the base case generating levels as described in the Manual 14B language (initial generator output = AVG CF* ICAP)
- Maintain target PJM RTO area interchange that reflects all yearly long term firm (LTF) transmission service

1. Winter Generator Deliverability/Common Mode Outage test
 - The ramping limit for generators of all fuel types will be 100% except wind
 - 80% ramping limit is applied for wind for single contingencies
 - Contingencies: NERC Category A, B, C (except N-1-1) or P0, P1, P2, P4, P5 and P7 (for the new TPL-001-4)
 - Annual DR
2. Winter Load Deliverability test
 - Winter CETO
 - Annual DR
 - 27 LDAs
 - Contingencies: NERC Category A, B
3. N-1 thermal, voltage
 - Contingencies: NERC Category A, B, C (except N-1-1) or P0, P1, P2, P4, P5 and P7 (for the new TPL-001-4)
4. N-1-1 thermal and voltage
 - Contingencies - (NERC TPL-001-4 P3 and P6)
- Overall Assumptions
 - Monitor all PJM BES and lower voltage BES and market monitored facilities
 - Currently, 30 Gas contingencies (TPL-001-4 Extreme Event) that results in 1000MW or more of generation loss including pipeline outage or temperature threshold contingencies will be evaluated in the tests above

- All technical evaluation results of anticipated 2020 Winter conditions were reviewed at the 9/10/2015 TEAC meeting (as a sensitivity study)
- Application of Winter Criteria
 - Analysis not including gas contingencies
 - Violations constitute a reliability violation and solutions will be developed through the PJM TEAC
 - Gas contingencies
 - Where simulations indicate a potential for cascading, an additional evaluation of potential solutions will be performed

- Implementation Dates
 - The criteria is proposed to be effective to the baseline studies upon the effective date of 1/1/2016
 - For interconnection queue studies, the criterion will be effective for queue requests received after the effective date of the Manual 14B language.

- Analysis Performed With and Without Gas Contingencies
 - Not Including Gas Contingencies
 - Baseline N-1, Generator Deliverability and Common Mode Outage Thermal Results
 - Baseline N-1 Voltage Results
 - N-1-1 Thermal
 - N-1-1 Voltage
 - Gas Contingencies Included
 - Baseline N-1, Generator Deliverability and Common Mode Outage Thermal Results
 - Baseline N-1 Voltage Results
 - N-1-1 Thermal
 - N-1-1 Voltage
 - Winter Load Deliverability (Thermal & Voltage)

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Year 2020 Winter Load Deliverability

- Use 2020 RTEP winter power flow case
- Examined all LDAs that have a significant share of their annual loss of load risk in the winter
- Examined other LDAs that could potentially be impacted by gas pipeline contingencies
 - Did not examine LDAs that are importing significantly more than the CETO in the base case N-1 study
- No load deliverability violations were identified

LDA	MW	MW	Base Imports - CETO /	MW
	CETO	Base Imports	ABS(CETO)	CETL
AE	270	109	-60%	>270
AEP	2270	98	-96%	>2270
APS	2700	1918	-29%	>2700
ATSI	3140	1906	-39%	>3140
BGE	3800	3599	-5%	>3800
CLEV	3070	1330	-57%	>3070
COMED	-6060	-4995	18%	>-6060
DAYTON	1030	-460	-145%	>1030
DLCO	1690	-302	-118%	>1690
DPL	1030	1836	78%	*
DPL SOUTH	1210	1311	8%	>1210
DUKE	3420	1291	-62%	>3420
EKPC	610	1543	153%	>610
EMAAC	-6100	1603	126%	*
JCPL	1490	2268	52%	*
MAAC	-14030	556	104%	*
METED	1310	1154	-12%	>1310
PECO	1640	2482	51%	*
PENELEC	340	-1163	-442%	>340
PEPCO	3220	3120	-3%	>3220
PJM WEST	-2020	1000	150%	*
PLGRP	-340	-269	21%	>-340
PSEG	2850	2798	-2%	>2850
PSEG NORTH	1330	809	-39%	>1330
SWMAAC	3920	4722	20%	>3920
VAP	-960	4443	563%	*
WMAAC	-7010	-5774	18%	>-7010

* Base case imports - CETO > 50% of CETO so load deliverability was not performed



QUESTIONS?
