

## Annual ARR Allocation and FTR Auction Transmission Outage Modeling

PJM determines the transmission outages to model in the simultaneous feasibility test utilized in the Annual ARR Allocation and FTR Auction using the following procedure.

PJM executes the SFT analysis on transmission outages as follows:

1. PJM begins with the initial outage list as it is submitted to PJM by the transmission owners posted on the PJM OASIS. This is a raw list of outages available to the public on the PJM OASIS page. This list is not necessarily a list of approved outages or actual outages that will be occurring as it changes daily and many of the outages are not yet approved. This list consists of all transmission outages of duration of two weeks or longer. Transmission outages will only be considered in final model if scheduled for at least two months or if identified in step four below.
2. PJM reviews the initial outage list for all PJM transmission zones and identifies outages that are occurring during the period of the Annual ARR allocation and FTR auction which do not occur simultaneously. Outages often occur during different times of the year and would not be approved to occur simultaneously because they would cause reliability concerns. Therefore, PJM models the best representation of outages to reflect the expected conditions of the auction time period. In many instances it is impractical and unrealistic to model multiple outages in a similar region that occur during different time periods because the Annual ARR/FTR model is a single year period and if these multiple outages were modeled the optimization program would fail because of a power imbalance or infeasibility.
3. PJM market engineers also review all transmission outages of interest with the PJM interconnection and operations group for the likelihood of the outages actually occurring. In many instances outages are submitted to PJM and posted on OASIS that are not yet approved and will be delayed, cancelled, or rescheduled. Outages might be rescheduled, cancelled, or delayed for reasons such as cancelled transmission upgrades, conflicts with other outages, maintenance cancellations, etc. This information is gathered by the PJM Interconnection Planning department, PJM System Operations department, and the actual transmission owners.
4. PJM market engineers will review the transmission outage list and identify transmission outages that could have a large impact on congestion and possibly FTR revenue adequacy. This determination is made by comparing transmission outages to historical data, focusing on higher voltage transmission outages, considering outage duration, and performing power flow congestion analysis.
5. After this analysis is performed on the initial OASIS outage list and PJM determines the actual outages that will be placed in the optimization program, PJM posts a separate FTR outage list to the FTR web page. This separate FTR outage list is posted publicly along with the actual FTR model usually at least one week before the

bidding window opens so that PJM members have a transparent view of the conditions to be used for the optimization program.

PJM must use reasonable assumptions for the topology to be used as part of the optimization program. The goal of the simultaneous feasibility determination shall be to ensure that there are sufficient revenues from Transmission Congestion Charges to satisfy all Financial Transmission Rights obligations for the auction period under expected conditions and to ensure that there are sufficient revenues from the annual Financial Transmission Right Auction to satisfy all Auction Revenue Rights obligations.

The SFT analysis has resulted in the below transmission outages to be modeled in the 2015/2016 Annual ARR Allocation and FTR Auction.

2015/2016 Annual ARR/FTR Outages					
Zone	Facility Name	Type	Modeled Period	Scheduled Start Day	Scheduled End Day
AE	BUTLER 69 KV BUT-LINC	LINE	All	10/15/2015	2/6/2016
AE	CEDAR 230 KV CEDAR T9	XFMR	All	10/1/2015	1/7/2016
AE	CEDAR 69 KV CED-SHI	LINE	All	10/1/2015	1/7/2016
AE	CHESTNAE69 KV CHE-MOSS	LINE	All	9/2/2015	6/7/2016
AE	CHESTNAE69 KV CHE-MOT6	LINE	All	9/2/2015	6/7/2016
AE	CORSON 69 KV COR-TUC	LINE	All	9/2/2015 1/2/2016	10/6/2015 5/7/2016
AE	COURT 69 KV COU-MID8	LINE	All	10/15/2015	6/7/2016
AE	COURT 69 KV COU-SWA	LINE	All	10/15/2015	6/7/2016
AE	DEEPWATE138 KV DEE-LNT	LINE	All	9/2/2015	1/7/2016
AE	DEEPWATE138 KV T12	XFMR	All	9/2/2015	1/7/2016
AE	DEEPWATE69 KV DEE-SAL	LINE	All	9/2/2015	2/7/2016
AE	DOROTHY 138 KV DOR-LEW	LINE	All	10/1/2015	4/6/2016
AE	DOROTHY 138 KV DOR-LNT	LINE	All	10/1/2015	4/6/2016
AE	LAKEAVEN69 KV LAK-MIDT	LINE	All	9/14/2015	1/9/2016
AE	LANDITAP138 KV LNT-MON	LINE	All	10/1/2015	4/6/2016
AE	LEWIS 69 KV LEW-MOSS	LINE	All	6/1/2015 9/2/2015	6/29/2015 6/7/2016
AE	LINCOLN369 KV LIN-SMIL	LINE	All	1/2/2016	6/6/2016
AE	MILL 138 KV MILL #2	XFMR	All	10/8/2015	6/7/2016
AE	MILL 138 KV MIL-SCU7	LINE	All	10/8/2015 1/8/2016	11/9/2015 6/7/2016
AE	MILL 138 KV MIL-SCU8	LINE	All	10/8/2015 1/8/2016	11/18/2015 6/7/2016
AE	PINEHILL69 KV PIN-TER	LINE	All	9/14/2015	1/7/2016
AE	SECONDST69 KV SEC-SHE1	LINE	All	10/15/2015	2/6/2016
AE	SHERMAN 138 KV SHER #3	XFMR	All	10/15/2015	2/6/2016

AE	SICKLER 69 KV SIC-TAN	LINE	All	10/12/2015	1/7/2016
AEP	AMOS 138 KV AMO-STA1	LINE	All	8/31/2015	11/27/2015
AEP	AMOS 138 KV AMO-TUR1	LINE	All	8/31/2015	11/27/2015
AEP	ASTOR 138 KV AST-EBR1	LINE	All	9/1/2015 3/7/2016	11/20/2015 5/27/2016
AEP	BEVERLY2345 KV BEV-TID1	LINE	All	9/28/2015	12/1/2015
AEP	BEXLEY 138 KV BEX-STC1	LINE	All	9/8/2015	12/1/2015
AEP	CHEMICAL138 KV CHE-UNI1	LINE	All	8/31/2015	11/27/2015
AEP	CLOVERD2500 KV .6A	XFMR	All	1/4/2016 4/15/2016	4/14/2016 5/22/2016
AEP	CLOVERD2500 KV .6B	XFMR	All	1/4/2016 4/15/2016	4/14/2016 5/22/2016
AEP	CLOVERD2500 KV CLO-LEX	LINE	All	1/4/2016	6/30/2016
AEP	COUNTYLI138 KV COU-SAN	LINE	All	9/8/2015	11/30/2015
AEP	DEQUINE 345 KV DEQ-WES1	LINE	All	2/29/2016	5/27/2016
AEP	DUBLIN 138 KV DUB-DAV1	LINE	All	9/8/2015 3/7/2016	10/16/2015 5/6/2016
AEP	ELIMA 345 KV ELI-MAR1	LINE	All	3/7/2016	5/27/2016
AEP	FINDLAYT138 KV FIN-FOS1	LINE	All	8/31/2015	12/29/2015
AEP	FINDLAYT138 KV FIN-NEW1	LINE	All	8/31/2015	12/29/2015
AEP	FOSTORIA138 KV FOS-NEF1	LINE	All	8/31/2015	12/29/2015
AEP	HOCKING 138 KV HOC-WLA1	LINE	All	9/14/2015	11/30/2015
AEP	KAMMER2 138 KV KAM-ORM2	LINE	All	12/4/2014	12/31/2015
AEP	KAMMER2 138 KV KAM-ORM3	LINE	All	12/4/2014	12/31/2015
AEP	KAMMER2 138 KV KAM-ORM4	LINE	All	12/4/2014	12/31/2015
AEP	KAMMER2 345 KV TR301	XFMR	All	12/4/2014	12/31/2015
AEP	KAMMER2 765 KV .400-P	XFMR	All	9/1/2015	12/31/2015
AEP	MARYSVI2345 KV .1A	XFMR	All	12/21/2014	1/2/2016
AEP	MARYSVI2345 KV .1B	XFMR	All	12/21/2014	1/2/2016
AEP	NFINDLAY138 KV NFI-NWO1	LINE	All	8/31/2015	12/29/2015
AEP	RUTH 138 KV RUT-TUR1	LINE	All	8/31/2015 11/30/2015	11/27/2015 4/1/2016
AEP	SCANTON2345 KV SCA-STA1	LINE	All	12/1/2015	5/31/2016
AEP	TACKETTC138 KV TAC-TUR1	LINE	All	8/31/2015	11/27/2015
AEP	WMILLERS345 KV WMI-HYA1	LINE	All	8/31/2015	11/6/2015
APSS	BARTONVI138 KV BAR-STE	LINE	All	10/16/2015	12/31/2015
APSS	DOUBS 500 KV DOU-PLV	LINE	All	9/8/2015	12/1/2015
APSS	KEISTERS69 KV T2	XFMR	All	1/4/2016	5/27/2016
APSS	MILLVILL138 KV MIL-SLE	LINE	All	3/1/2016	5/31/2016

APSS	NFAYETTE138 KV NFA-SMI	LINE	All	6/1/2015 9/1/2015	6/30/2015 10/30/2015
BC	WAUGHCHA500 KV 500-3	XFMR	All	5/23/2014	12/31/2015
COMED	111 ELEC138 KV TR83CT-S	XFMR	All	9/14/2015 10/12/2015	10/9/2015 10/30/2015
COMED	111 ELEC345 KV TR83CT-P	XFMR	All	9/14/2015 10/12/2015	10/9/2015 10/30/2015
COMED	112 WILT345 KV TR93CT-S	XFMR	All	9/14/2015	12/18/2015
COMED	112 WILT765 KV TR93CT-P	XFMR	All	9/14/2015	12/18/2015
COMED	113 WATE138 KV 11106 6	LINE	All	11/30/2015	2/26/2016
COMED	11416 138 KV 11416 3	LINE	All	1/16/2016	3/4/2016
COMED	115 BEDF138 KV TR82CT-S	XFMR	All	9/14/2015	12/4/2015
COMED	115 BEDF345 KV TR82CT-P	XFMR	All	9/14/2015	12/4/2015
COMED	117 PROS138 KV TR81CT-S	XFMR	All	10/12/2015	12/18/2015
COMED	117 PROS345 KV TR81CT-P	XFMR	All	10/12/2015	12/18/2015
COMED	13 CRAWF345 KV 1311	LINE	All	9/14/2015	12/11/2015
COMED	156 CHER138 KV TR81CT-S	XFMR	All	9/7/2015	12/11/2015
COMED	156 CHER345 KV TR81CT-P	XFMR	All	9/7/2015	12/11/2015
COMED	23 COLLI345 KV TR92CT-S	XFMR	All	9/14/2015	1/18/2016
COMED	23 COLLI765 KV TR92CT-P	XFMR	All	9/14/2015	1/18/2016
COMED	31 GALEW138 KV 3704Y	LINE	All	9/14/2015	1/15/2016
COMED	37 NATOM138 KV 3706	LINE	All	10/19/2015	12/23/2015
COMED	50 ROCKW138 KV 8223	LINE	All	9/7/2015	12/18/2015
COMED	51 MC CO138 KV TR82CT-S	XFMR	All	9/14/2015	12/12/2015
COMED	51 MC CO345 KV TR82CT-P	XFMR	All	9/14/2015	12/12/2015
COMED	7 STATE 138 KV 0702	LINE	All	1/4/2016	3/19/2016
COMED	76 BLUE 138 KV TR83CT-S	XFMR	All	9/21/2015 1/11/2016	12/11/2015 1/24/2016
COMED	76 BLUE 345 KV TR83CT-P	XFMR	All	9/21/2015 1/11/2016	12/11/2015 1/24/2016
COMED	83 GLIDD138 KV 11106 4	LINE	All	11/30/2015	2/26/2016
COMED	86 DAVIS138 KV 0902 7	LINE	All	9/14/2015	12/18/2015
COMED	88 SKOKI138 KV 8805 1	LINE	All	1/16/2016	3/4/2016
COMED	88 SKOKI138 KV TR82CT-S	XFMR	All	1/16/2016	3/4/2016
COMED	88 SKOKI345 KV 8824	LINE	All	1/16/2016	3/4/2016
COMED	88 SKOKI345 KV TR82CT-P	XFMR	All	1/16/2016	3/4/2016
DOM-C	MANCHSTR115 KV 157A	LINE	All	6/1/2015	9/1/2015
DOM-C	NEAST 230 KV TX7	XFMR	All	6/11/2015	10/15/2015
DOM-C	POWHATAN230 KV 2027B	LINE	All	8/27/2015	12/31/2015
DOM-E	DENBIGH 230 KV 285C	LINE	All	6/26/2015 7/11/2015	7/10/2015 9/25/2015
DOM-E	GRAFTON4115 KV 58J	LINE	All	9/26/2015	12/18/2015

DOM-E	HUNTMNDP230 KV 2110A	LINE	All	5/16/2015	8/28/2015
DOM-E	HUNTMNDP230 KV 2110B	LINE	All	5/16/2015	8/28/2015
DOM-E	HUNTMNDP230 KV TX1	XFMR	All	5/16/2015	8/28/2015
DOM-E	LANEXA 115 KV 34A	LINE	All	5/5/2015	9/1/2015
DOM-E	LEBANON4115 KV 58H	LINE	All	9/26/2015	12/18/2015
DOM-E	LEEHAL 115 KV 58I	LINE	All	9/26/2015	12/18/2015
DOM-E	VABEACH 230 KV TX5	XFMR	All	3/1/2016	5/27/2016
DOM-N	AQUAHAR 230 KV 2120	LINE	All	9/30/2013	8/31/2015
DOM-N	BRAMBLET500 KV 558A1	LINE	All	8/31/2015	1/29/2016
DOM-N	BRAMBLET500 KV 590A	LINE	All	2/1/2016	6/1/2016
DOM-N	GOOSECRE500 KV 558	LINE	All	8/31/2015	1/29/2016
DOM-N	POSSUMP4115 KV 145A	LINE	All	1/31/2016 4/24/2016	4/23/2016 7/16/2016
DOM-S	CAROLINA115 KV 54A	LINE	All	10/1/2015 3/1/2016	12/15/2015 5/15/2016
DOM-S	ETNFERDP115 KV 22A	LINE	All	6/15/2015	5/2/2016
DOM-W	DOOMS4 230 KV TX6	XFMR	All	8/31/2015	11/19/2015
DOM-W	EDINBUR4138 KV EDI-STR	LINE	All	8/31/2015 9/28/2015	9/25/2015 11/20/2015
DOM-W	EDINBUR4138 KV TX3	XFMR	All	8/31/2015 9/28/2015	9/25/2015 11/20/2015
DOM-W	EDINBUR4138 KV TX4	XFMR	All	8/31/2015 9/28/2015	9/25/2015 11/20/2015
DPL	BELLEHAV69 KV BEL-KEL	LINE	All	4/1/2015	6/1/2016
DPL	BELLEHAV69 KV BEL-TAS	LINE	All	4/1/2015	6/1/2016
DPL	CEDARCRE230 KV CED-RED	LINE	All	9/8/2015	5/31/2016
DPL	CHURCH 138 KV CHU-OIL	LINE	All	3/2/2016	5/27/2016
DPL	DUPSEAFD69 KV DUP-LAU	LINE	All	1/1/2016	5/31/2016
DPL	HOCKESIN138 KV HOC-KIA	LINE	All	9/1/2015	11/25/2015
DPL	KINGSCRK138 KV KIN-LOR	LINE	All	10/5/2015	12/4/2015
DPL	LAURELDP69 KV LAU-SHO	LINE	All	2/1/2016	5/31/2016
DPL	NSALISBU69 KV NSA-WAL	LINE	All	10/5/2015	12/31/2015
DPL	REHOBOTH138 KV AT-1	XFMR	All	9/7/2015	12/23/2015
DPL	REHOBOTH138 KV REH-ROB	LINE	All	9/7/2015	12/23/2015
DUQU	BRUNOTIS138 KV BRU-MON	LINE	All	9/15/2015 12/14/2015 4/4/2016	12/3/2015 3/25/2016 5/6/2016
DUQU	BRUNOTIS138 KV BRU-NEV	LINE	All	11/2/2015 12/14/2015	12/11/2015 5/28/2016
DUQU	CRES DUQ138 KV CRE-MON	LINE	All	9/14/2015	5/27/2016
DUQU	CRES DUQ345 KV T2	XFMR	All	12/13/2014	12/31/2016

DUQU	NEVILTAP138 KV NEV-SEW	LINE	All	11/2/2015 12/14/2015	12/11/2015 5/6/2016
EKPC	3M 69 KV 3M-CYNT	LINE	All	2/23/2015	10/2/2015
EKPC	CYNTHIA269 KV CYN-CYN2	LINE	All	2/23/2015	10/2/2015
EKPC	CYNTHIA269 KV CYN-HEAD	LINE	All	2/23/2015	10/2/2015
FE	BAYSHOR2138 KV BAY-IRO1	LINE	All	10/20/2015	12/26/2015
FE	BLUEBELL138 KV TR5	XFMR	All	9/19/2015	11/25/2015
FE	CAMPOHED69 KV CAM-KEI	LINE	All	1/4/2016	5/27/2016
FE	CLOVEROE138 KV CLO-REB1	LINE	All	10/8/2014	5/2/2016
FE	CLOVEROE138 KV CLO-REB2	LINE	All	1/1/2016	5/2/2016
FE	CLOVEROE138 KV CLO-REB3	LINE	All	3/2/2015	5/2/2016
FE	DIXIEFE 138 KV TR6	XFMR	All	8/20/2015	10/26/2015
FE	HIGHLAOE345 KV 1	XFMR	All	10/7/2015	12/14/2015
FE	IRONVILL138 KV TR1	XFMR	All	10/20/2015	12/26/2015
FE	LEMOYNE2138 KV LEM-MAC1	LINE	All	3/23/2015	3/23/2016
FE	MACLEAN 138 KV TR2	XFMR	All	10/20/2015	12/23/2015
FE	RICHLND 138 KV TR-4	XFMR	All	10/20/2015	12/26/2015
FE	SHENANGO345 KV 2	XFMR	All	8/7/2015	10/13/2015
FECL	02EMILY 138 KV 02E-EMI1	LINE	All	3/7/2015	4/8/2016
FECL	BEAVER 345 KV TR1	XFMR	All	8/18/2015	10/22/2015
FECL	EASTLAKE345 KV 61	XFMR	All	9/6/2015	11/12/2015
FECL	INLAND 345 KV 4	XFMR	All	10/15/2015 4/18/2016	12/19/2015 6/1/2016
FEPA	MAPLEOE 138 KV TR1	XFMR	All	10/26/2015	12/17/2015
FEPA	SHARON 138 KV TR2	XFMR	All	9/17/2015	11/9/2015
JC-S	ATLANTIC230 KV ATL-LAR	LINE	All	1/11/2016	4/15/2016
JC-S	ATLANTIC230 KV ATL-OCEX	LINE	All	9/14/2015	5/2/2016
JC-S	LAKWOOD230 KV LAK-LAR	LINE	All	1/11/2016	4/15/2016
JC-S	OCEANVIE230 KV BK 2TR	XFMR	All	9/14/2015	5/2/2016
JC-S	SMITHBUR500 KV BK 1 50	XFMR	All	6/24/2013	7/31/2016
ME	PORTLAND230 KV 3 BANK	XFMR	All	9/7/2015 3/14/2016	12/4/2015 5/6/2016
PEP	BURCHESH230 KV BUR-TAL1	LINE	All	9/12/2015	4/30/2016
PEP	BURCHESH500 KV BUR-CHA	LINE	All	1/5/2016	6/15/2016
PEP	HAWKINS 230 KV HAW-MOR6	LINE	All	9/26/2015	4/30/2016
PEP	HAWKINS 230 KV HAW-OAK4	LINE	All	9/12/2015	4/30/2016
PEP	MORGANTO230 KV MOR-TAL6	LINE	All	9/12/2015	4/30/2016
PEP	MTZION 230 KV MTZ-NOR8	LINE	All	9/5/2015	12/5/2015
PEP	NORBECK 230 KV 158-2T	XFMR	All	9/5/2015	12/5/2015
PEP	OAKGROVE230 KV OAK-TAL8	LINE	All	9/12/2015	4/30/2016
PEP	PALMERS 230 KV 084-3T	XFMR	All	9/1/2015	12/5/2015

PL	EPALMERT230 KV 2	XFMR	All	10/1/2015 3/23/2016	11/27/2015 4/20/2016
PL	HOSENSAC230 KV 2	XFMR	All	10/5/2015	12/4/2015
PL	HOSENSAC230 KV HOS-WES	LINE	All	10/1/2015	5/27/2016
PL	LOCKHAVE69 KV LOC-LYC2	LINE	All	6/15/2015 9/21/2015	9/18/2015 3/11/2016
PL	WESCOSVI230 KV 2	XFMR	All	10/1/2015	5/27/2016
PS-N	49STREET230 KV 49T-HOB	LINE	All	9/1/2015 2/1/2016	12/30/2015 5/30/2016
PS-N	BERGEN 138 KV BER-HOM	LINE	All	10/15/2015	12/31/2020
PS-N	BERGEN 138 KV BER-NBE	LINE	All	10/5/2015	12/31/2020
PS-N	BRANCHBU500 KV 500-3T	XFMR	All	9/15/2015	11/16/2015
PS-N	DEANS 230 KV DEA-NEW	LINE	All	2/11/2016	4/30/2016
PS-N	HOBOKEN 230 KV HOB-NEWY	LINE	All	9/1/2015	5/15/2016
PS-N	HOMESTEAD138 KV HOM-MARF	LINE	All	9/28/2015	12/31/2020
PS-N	SEWAREN 138 KV SEW-WOOM	LINE	All	9/28/2015	12/31/2020
PS-S	NEWFREED500 KV 500-3	XFMR	All	1/13/2016 5/4/2016	4/27/2016 5/24/2016