Long Term Transmission Service Modeling and Studies

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- Possible options
  - Model multiple cases
    - Model all flows in to PJM and not model flows out
    - Model all flows out of PJM and not model flows in
    - Model flows based on utilization
      - Model flows based on seasonal usage
      - Model flows based on usage during delivery year
    - Model flows to maintain RPM commitments at 100% with others at utilization

Transmission Service Utilization

Annual values correcting error from 7/31 meeting materials

Export

Year	Reservations (MW)	Not utilized	
		MW	Percentage
2014	4571	1489	33%
2013	4071	1654	41%
2012	3172	1465	46%
2011	2568	1581	62%
2010	2368	1496	63%

Import

Year	Reservations (MW)	Not utilized	
		MW	Percentage
2014	4391	1309	30%
2013	3393	976	29%
2012	2135	428	20%
2011	2035	1048	51%
2010	1072	300	28%

Note: Values above for utilization indicate a peak usage of the reserved MWs at some point in the year and not an average for the year.

- Export utilization trending higher, currently approaching 65%
- Import utilization appears to be leveling at ~70%

Additional Timeframes

- Seasons
  - Winter: December 1 – February 28(29)
  - Spring: March 1 – May 31
  - Summer: June 1 – September 31
  - Fall: October 1 – November 30

- Delivery Year (DY)
  - June 1 of year X to May 31 of year X+1
    - 2014 DY – June 1, 2014 – May 31, 2015

Import Reservation Comparison

Spring Year	Total Available (MW)	Total Usage (MW)	Total not Utilized (MW)	Total not Utilized
2010	913	553	360	39%
2011	1218	743	475	39%
2012	2035	921	1114	55%
2013	2541	1479	1062	42%
2014	3393	2154	1239	37%

Fall Year	Total Available (MW)	Total Usage (MW)	Total not Utilized (MW)	Total not Utilized
2010	976	614	362	37%
2011	1582	637	945	60%
2012	2135	1158	977	46%
2013	2984	1563	1421	48%
2014	3393	1801	1592	47%

Summer Year	Total Available (MW)	Total Usage (MW)	Total not Utilized (MW)	Total not Utilized
2010	976	672	304	31%
2011	1548	756	792	51%
2012	2135	1245	890	42%
2013	2984	2001	933	31%
2014	3393	2030	1363	40%

Winter Year	Total Available (MW)	Total Usage (MW)	Total not Utilized (MW)	Total not Utilized
2010	1072	763	309	29%
2011	2035	899	1136	56%
2012	2135	1277	858	40%
2013	3393	2337	1056	31%
2014	4391	3019	1372	31%

Note: Values above for utilization indicate a peak usage of the reserved MWs at some point in the year and not an average for the year.

Average Utilization

- Spring: 58%
- Summer: 61%
- Fall: 53%
- Winter: 63%

Export Reservation Comparison

Spring Year	Total Available (MW)	Total Usage (MW)	Total not Utilized (MW)	Total not Utilized
2010	2268	1619	649	29%
2011	2368	1847	521	22%
2012	2972	1718	1254	42%
2013	3172	2001	1171	37%
2014	4071	2436	1635	40%

Fall Year	Total Available (MW)	Total Usage (MW)	Total not Utilized (MW)	Total not Utilized
2010	2268	1599	669	29%
2011	2568	1701	867	34%
2012	3172	1897	1275	40%
2013	4071	2170	1901	47%
2014	4071	2436	1635	40%

Summer Year	Total Available (MW)	Total Usage (MW)	Total not Utilized (MW)	Total not Utilized
2010	2268	1612	656	29%
2011	2568	1723	845	33%
2012	3172	1895	1277	40%
2013	3982	2346	1636	41%
2014	4071	2419	1652	41%

Winter Year	Total Available (MW)	Total Usage (MW)	Total not Utilized (MW)	Total not Utilized
2010	2368	1699	669	28%
2011	2568	1702	866	34%
2012	3172	1901	1271	40%
2013	4071	2575	1496	37%
2014	4571	2737	1834	40%

Note: Values above for utilization indicate a peak usage of the reserved MWs at some point in the year and not an average for the year.

Average Utilization

- Spring: 66%
- Summer: 63%
- Fall: 62%
- Winter: 64%

Delivery Year Comparison

Import

Year	Total Available (MW)	Total Usage (MW)	Total not Utilized (MW)	Total not Utilized
2010	1218	763	455	37%
2011	2035	921	1114	55%
2012	2541	1479	1062	42%
2013	3393	2337	1056	31%
2014	4391	3019	1372	31%

Export

Year	Total Available (MW)	Total Usage (MW)	Total not Utilized (MW)	Total not Utilized
2010	2368	1847	521	22%
2011	2669	1723	946	35%
2012	3172	2001	1171	37%
2013	4071	2575	1496	37%
2014	4621	2737	1884	41%

Note: Values above for utilization indicate a peak usage of the reserved MWs at some point in the year and not an average for the year.

Average Utilization

- Import: 61%
- Export: 66%

Utilization

- Peak Utilization consistent across multiple timeframes

- Utilization to incorporate in further scenarios
  - RPM commitments: 100%
  - Remaining Import: 65%
  - Export: 65%

Modeling Methods

1. Basecase Vs Import Only (TSRs modeled in the Basecase)
   - Simulates area transfers for all TSRs
   - Not as accurate to source of MWs for Network External Designated Transmission Service (NEDS)

2. Basecase Vs Import Only (TSRs modeled in Sub file)
   - Simulates area transfers for Point to Point TSRs
   - Simulates individual generator dispatch for NEDS
   - TSRs not allowed to reduce loading based on counter flow

3. Basecase Vs Import Only (TSRs modeled in Sub file and allowed to back off flows)
   - Simulates area transfers for Point to Point TSRs
   - Simulates individual generator dispatch for NEDS
   - TSRs allowed to reduce loading based on counter flow

Potential Violations - Import

Zone	Basecase Vs Import Only (TSRs modeled in the Basecase)		Basecase Vs Import Only (TSRs modeled in Sub file)		Basecase Vs Import Only (TSRs modeled in Sub file and allowed to back off flows)	
	Number of Facilities	kV level	Number of Facilities	kV level	Number of Facilities	kV level
APS	1	1- 138 kV line	1	1- 138 kV line	1	1- 138 kV line
ATSI	2	2- 138 kV line	2	2- 138 kV line	1	1- 138 kV line
AEP	1	1- 138 kV line	1	1- 138 kV line	1	1- 138 kV line
ATSI - AEP	1	1 - 138 kV line				
AEP - OVEC	2	2 - 345 kV lines				
AEP - DEOK	1	1 - 345 kV line				
DEOK	1	1 - 138 kV line	1	1 - 345/138 kV transformer	1	1 - 138 kV line
DEOK - OVEC	1	1 - 138 kV line				
ComEd	4	4 - 138 kV lines	1	1- 138 kV line	1	1 - 138 kV lines
ComEd-AMIL	1	1 - 138 kV line	2	1 - 138 kV line, 1 - 345 kV line	1	1 - 138 kV line
Penelec	13	4-115 kV lines, 5 - 230 kV lines, 3-230/115 kV transformers, 1 - 345/230/23 kV transformers	7	2-115 kV lines, 1 - 230 kV line, 3-230/115 kV transformers, 1 - 345/230/23 kV transformer	7	2-115 kV lines, 1 - 230 kV line, 3-230/115 kV transformers, 1 - 345/230/23 kV transformer
Penelec-NYISO	3	2-115 kV lines, 1-230 kV line	1	1-115 kV line	1	1-115 kV line
PSEG	1	1 - 230 kV line	1	1 - 230 kV line	1	1 - 230 kV line
DOM	1	1- 500 kV line	1	1 -69 kV line	1	1 -69 kV line

Potential Violations - Export

Zone	Basecase Vs Export Only (LTFs modeled in the Basecase)		Basecase Vs Export Only (LTFs modeled in Sub file)		Basecase Vs Export Only (LTFs modeled in Sub file and allowed to backoff flows)	
	Number of Overloaded Facilities	kV level	Number of Overloaded Facilities	kV level	Number of Overloaded Facilities	kV level
APS	13	9-138 kV lines, 3-500/138 kV transformer, 1 - 500 kV line	9	8-138 kV lines, 1-138/115 kV transformer	7	7-138 kV lines, 1-138/115 kV transformer
ATSI	4	4 - 138 kV lines	4	4 - 138 kV lines	1	1 - 138 kV line
AEP	4	2-138 kV lines, 2-345 kV lines	1	1-138 kV line	1	1-138 kV line
DEOK	2	2- 345/138 kV transformers	1	1- 345/138 kV transformer	1	1- 345/138 kV transformer
ComEd			2	2-138 kV lines	2	2-138 kV lines
ComEd-AMIL	2	1- 345 kV line, 1-138 kV line	2	1- 345 kV line, 1-138 kV line	2	1- 345 kV line, 1-138 kV line
Penelec	6	3-115 kV lines, 1-138/115 kV transformer, 2-230/115 kV transformer	10	6-115 kV lines, 1-345/230/115 kV transformer, 3-230/115 kV transformer	2	2-115 kV lines
Penelec - NYISO			1	1 - 115 kV line	1	1 - 115 kV line
Meted	5	4 - 115 kV lines, 1 - 138/115 kV transformer	4	4 - 115 kV lines	4	4 - 115 kV lines
PPL	1	1-230 kV line	2	1-230 kV line, 1-115/69 kV transformer	2	1-230 kV line, 1-115/69 kV transformer
PPL-BGE	2	2-230 kV lines				

Potential Violations - Export

Zone	Basecase Vs Export Only (LTFs modeled in the Basecase)		Basecase Vs Export Only (LTFs modeled in Sub file)		Basecase Vs Export Only (LTFs modeled in Sub file and allowed to backoff flows)	
	Number of Overloaded Facilities	kV level	Number of Overloaded Facilities	kV level	Number of Overloaded Facilities	kV level
BGE-PECO	1	1-500 kV line	1	1-500 kV line	1	1-500 kV line
PECO	4	3-230 kV lines, 1-138 kV line				
BGE	2	2-230 kV lines				
AEC	1	1-138 kV line				
EKPC-LGEE	2	1-69 kV line, 1 -138 kV line	1	1-69 kV line	1	1-69 kV line
DOM	1	1- 230 kV line	1	1- 230 kV line		

Modeling

- Methods 1 & 2 modeling consistent with internal resources
  - Aligns with RPM requirements

- Incorporate utilization in method 1 & 2 analysis for review

- Possible options:
  - Lower MW threshold
  - Decrease percentage impact threshold
  - Changes rules for TSRs to only look for a minimum MW impact

- MW threshold established for internal processing of resources (5MW)
  - Considered internal resource as injection point
- Over time internal process has been modified to limit impacts from distant resources
  - No need to change identification thresholds for internal resources
- Percentage impact change will be more difficult to implement

MW Threshold

- Lowering MW threshold for identification of constraints and cost allocation determination appears to be best method to pursue

- Lower MW threshold for external resources in additional scenarios
  - 2MW ≥100kV
  - 1MW <100kV