

Transmission Expansion Advisory Committee  
(TEAC)  
Recommendations to the PJM Board

PJM Staff Whitepaper  
August 04, 2011



## EXECUTIVE SUMMARY

On July 26, 2011 the PJM Board of Managers approved changes to the Regional Transmission Expansion Plan (RTEP), totaling \$127.4 million, based on the addition of a number of baseline system upgrades identified in the American Transmission System, Incorporated (ATSI) system that are required to resolve reliability criteria violations that would otherwise result in 2011 through 2026 timeframe.

One of the starting point assumptions for the 2010 RTEP was that the ATSI transmission zone would be integrated into PJM on June 1, 2011. Analyses conducted as part of the 2010 RTEP identified reliability criteria violations in the ATSI transmission zone. With the ATSI transmission zone now integrated into PJM, approval of the upgrades required to resolve the reliability criteria violations is being requested. The total increase to the RTEP to include these baseline project changes is \$127.4 million. With these changes, the RTEP will include over \$19.2 billion of transmission additions and upgrades since the first plan was approved by the Board in 2000.

The additional baseline upgrades for the 2010 RTEP are summarized below and are presented for the Board Reliability Committee's consideration and for recommendation to the Board for approval.

## SUMMARY OF RESULTS

### ATSI Integration

One aspect of the development of the RTEP Process is an evaluation of the "baseline" system; i.e., the transmission system without any of the generation interconnection requests included in the current planning cycle. This baseline analysis determines the compliance of the existing system with reliability criteria and standards. Transmission upgrades required to maintain a reliable system are identified and reviewed with the Subregional RTEP Committees and the Transmission Expansion Advisory Committee (TEAC). The cost of transmission upgrades to mitigate such criteria violations are allocated to load.

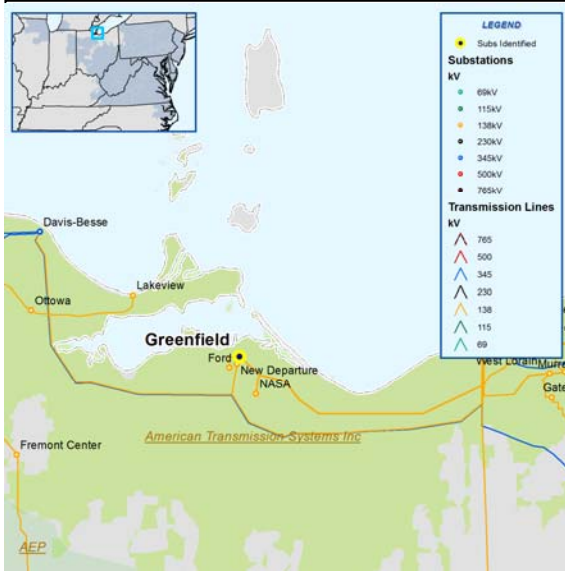
Baseline analysis was completed for the ATSI transmission zone as part of the 2010 RTEP. This work identified 30 baseline upgrades that are required to mitigate reliability criteria violations. A summary of the major baseline project additions that are \$5 million or greater are detailed below.



Beaver – Hayes – Davis Besse 345 kV

PJM Load Deliverability testing of the ATSI zone identified a voltage collapse condition for multiple contingencies : loss of Beaver – Davis Besse 345kV line; loss of Sammis – Star 345kV line; loss of Star – Scanto 345kV line; Loss of Lakeview – Greenfield 138kV line ; loss of Dale – West Cant 138kV line, loss of Ottawa – Lakeview 138kV line; loss of Athtabula-Perry 345kV line; loss of any single Edgewater unit and ect... the Cleveland area is the most problematic area.

The recommended solution to address the violation is to build a second Beaver to Hayes to Davis Besse 345 kV line. The second line will utilize an existing open position on a double circuit tower line [please confirm]. The estimated cost for the project is \$34.7 million million. The required in-service date for the project is June 1, 2015.



New Hayes 345/138 kV Substation

The PJM Load Deliverability test identified voltage collapse conditions for multiple contingencies. ( The same contingencies as listed in the Beaver – Hayes – Davis Besse 345 kV project above.)

The recommended solution to address the violation is to build a new 345/138 kV substation at Hayes by tapping the new Beaver to Davis Besse line and extending two 138 kV lines to Greenfield and a single 138 kV line to Avery. The estimated cost for the project is \$33 million. The required in-service date for the project is June 1, 2015.



Cost Allocation

Cost allocations for all of the upgrades in the ATSI zone were calculated consistent with PJM's FERC approved methodology. The results of those calculations are summarized in the table below. These cost allocations will be filed at FERC following PJM Board approval.

Network Upgrade ID	Network Upgrade Description	TO	Cost (\$M)	ATSI
b1190	Reconductor Lemoyne - Maclean 138KV circuit with 954ACSS conductor	ATSI	4.3	100.00%
b1191	Replace the Shenango - Crossland 138KV circuit #2 meter with a higher rated meter	ATSI	0.015	100.00%
b1192	Reconductor the Bayshore - Chevy 138KV circuit with 636 ACSS conductor	ATSI	4.3	100.00%
b1193	Replace the Hanna - East Akron 138KV 800 Amp wavetraps with a 1200 Amp wavetraps	ATSI	0.052	100.00%
b1194	Replace substation conductor on GM powertrain 138kV line exit (replace 636 ACSR with 1590 AAC or ACSR)	ATSI	0.01848	100.00%
b1229	Replace the circuit terminal and sections of substation bus conductor at Shenango 138 kV substation	ATSI	0.247	100.00%
b1281	Build new Hayes 345/138 kV substation with new 138 kV lines to: Greenfield #1, Greenfield #2, and Avery.	ATSI	33	100.00%
b1282	Build Beaver - Hayes - Davis - Besse #2 345 kV line	ATSI	34.65	100.00%
b1283	Loop the Chamberlin - Mansfield 345 kV line into the Hanna 345 kV substation	ATSI	9.075	100.00%
b1284	Install 50.0 MVAR capacitor bank at the Lime City 138 kV Substation	ATSI	2.35	100.00%
b1285	Replace Barberton - Star 138 kV #1 wavetraps, CFZ relay, and line exit conductor at Barberton	ATSI	0.075	100.00%
b1286	Reconductor Hanna - W. Ravenna 138 kV #1	ATSI	2.05	100.00%
b1287	Reconductor Hanna - W. Ravenna 138 kV #2	ATSI	2.05	100.00%
b1288	Replace Masury - Crossland 138 kV terminal equipment at Masury	ATSI	0.01	100.00%
b1289	Reconductor Evergreen - Niles 138 kV (3 miles) and replace terminal equipment at Evergreen on Evergreen - Niles 138 kV	ATSI	0.87	100.00%
b1290	Build new Niles - Salt Springs #2 138 kV with 795 ACSR	ATSI	2.89	100.00%
b1291	Replace substation equipment at Eastlake on the Q-12 138 kV line exit	ATSI	0.0207	100.00%
b1292	Replace substation equipment at Eastlake on the Q-13 138 kV line exit	ATSI	0.0207	100.00%
b1293	Replace substation equipment at the Tangy sub on the E. Springfield - Tangy line	ATSI	0.014	100.00%
b1294	Modify the Brookside - Longview #2 138 kV CT ratio and correct the design temperature	ATSI	0.025	100.00%
b1295.1	Modify the Brookside - Longview #1 138 kV CT ratio + correct the design temperature (Longview - Madison)	ATSI	0.025	100.00%
b1295.2	Modify the Brookside - Longview #1 138 kV CT ratio + correct the design temperature (Brookside - Madison)	ATSI	0.025	100.00%
b1296.1	Reconductor BG line exit conductor at Lemoyne Sub	ATSI	0.01	100.00%
b1296.2	Change the CT ratio at Lemoyne B13213 towards Brim Tap to increase line loadability	ATSI	0.01	100.00%
b1297	Install a new Fulton 345/138 kV substation	ATSI	23	100.00%
b1299	Add SCADA control and motor operators to switches 13153 and 13154 near Silica	ATSI	0.55	100.00%
b1341	Install a 25MVAR cap bank at Airpark 138kV substation	ATSI	1.5	100.00%
b1342	Install a 50MVAR cap bank at Sharon 138kV substation	ATSI	1.32	100.00%
b1547	Reconductor the Lakeview - Greenfield 138 kV line - Replace 4/0 Cu with 336.4 ACSR, maintain 6-wire arrangement	ATSI	2.8	100.00%
b1548	Reconductor the Ottawa - Lackview 138 kV line - Replace 4/0 Cu with 336.4 ACSR, maintain 6-wire arrangement	ATSI	2.1	100.00%