Transmission Expansion Advisory Committee
Stage 1A 10-Year ARR Analysis

September 15, 2016

Overview

- Purpose:
  - Update stakeholders on PJM's Stage 1A 10-Year Auction Revenue Rights (ARR) analysis

- Key Takeaways
  - PJM completed its 2016 Stage 1A 10-Year ARR analysis
  - PJM observed internal and external(M2M) infeasible facilities
  - All infeasible facilities are mitigated through expected:
    - ✓ Planning Upgrades or
    - ✓ Market design enhancements

Background

- ARRs are transmission network entitlements awarded to firm network and point-to-point customers because they fund embedded transmission costs
- On an annual basis:
  - PJM Awards ARRs through a multi stage process (Stage 1A, 1B and 2)
  - PJM Examines the feasibility of stage 1A ARRs for a 10-year period
- Results of 10-year analysis on 2016/17 Stage 1A ARRs:

Violation Type	Mitigation Plan
Internal	PJM Upgrades
External M2M	PJM, MISO Upgrades and M2M Design Changes

Area Summary

Area	Reference	Solution(s)	Expected in-service date
ComEd	Appendix I	Byron-Wayne 345KV	2017
PSEG	Appendix II	Bergen – Athenia 230KV	2016-2018
MISO M2M	Appendix III & IV	1) RTEP, MTEP and IPSAC 2) M2M FFE Redesign	2017-2024

Appendix I: 2016/2017 Stage 1A 10-Year ComEd ARR Results

Facility Name	Facility Type	Upgrade expected to fix infeasibility	Expected in-service date
11106 138 KV 11106 2 o/l L345.ChrryVlly-SilvrLk.15616+L345.Nlson-Elec.15502	Internal	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
11106 138 KV 11106 7 o/l L345.ChrryVlly-SilvrLk.15616+L345.Nlson-Elec.15502	Internal	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
122 BELV138 KV 15624 2 o/l L345. ChrryVlly-SilvrLk.15616+L345.Nlson-Elec.15502	Internal	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
12204 138 KV 12204 1 o/l L345.ChrryVlly-SilvrLk.15616+L345.Nlson-Elec.15502	Internal	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
133 ROCK138 KV 7411 2 o/l L345. ChrryVlly-SilvrLk.15616+L345.Nlson-Elec.15502	Internal	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
151 WOOD138 KV 12205 Z1 o/l L345. ChrryVlly-SilvrLk.15616+L345.Nlson-Elec.15502	Internal	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
151 WOOD138 KV 14106 Z1 o/l L345. ChrryVlly-SilvrLk.15616+L345.Nlson-Elec.15502	Internal	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
155 NELS138 KV 15509 o/l L345.ChrryVlly-SilvrLk.15616+L345.Nlson-Elec.15502	Internal	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
155 NELS138 KV TR82CT-S o/l L345. ChrryVlly-SilvrLk.15616+L345.Nlson-Elec.15502	Internal	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
156 CHER138 KV 15623 1 o/l L345. ChrryVlly-SilvrLk.15616+L345.Nlson-Elec.15502	Internal	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
156 CHER138 KV 15624 1 o/l L345. ChrryVlly-SilvrLk.15616+L345.Nlson-Elec.15502	Internal	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
156 CHER138 KV 15627 1 o/l L345. ChrryVlly-SilvrLk.15616+L345.Nlson-Elec.15502	Internal	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
156 CHER138 KV TR81CT-S o/l L345. ChrryVlly-SilvrLk.15616+L345.Nlson-Elec.15502	Internal	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
156 CHER138 KV TR82CT-S o/l L345. ChrryVlly-SilvrLk.15616+L345.Nlson-Elec.15502	Internal	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
156 CHER138 KV TR83CT-S o/l L345. ChrryVlly-SilvrLk.15616+L345.Nlson-Elec.15502	Internal	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
156 CHER345 KV TR81CT-P o/l L345. ChrryVlly-SilvrLk.15616+L345.Nlson-Elec.15502	Internal	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
156 CHER345 KV TR82CT-P o/l L345. ChrryVlly-SilvrLk.15616+L345.Nlson-Elec.15502	Internal	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
74 KEWAN138 KV 15508 4 o/l L345. ChrryVlly-SilvrLk.15616+L345.Nlson-Elec.15502	Internal	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
74 KEWAN138 KV 7411 1 o/l L345. ChrryVlly-SilvrLk.15616+L345.Nlson-Elec.15502	Internal	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
83 GLIDD138 KV 15627_Z1 o/l L345. ChrryVlly-SilvrLk.15616+L345.Nlson-Elec.15502	Internal	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017

Appendix II: 2016/2017 Final Stage 1A 10-Year PSEG ARR Results

Facility Name	Facility Type	Upgrade expected to fix infeasibility	Expected in-service date
ATHENIA 230 KV ATH-CLIB o/l L230. Cedar Grove - Clifton - Athenia.K-2263	Internal	PJM RTEP: B1304.1 Convert the existing 'D1304' and 'G1307' 138 kV circuits between Roseland - Kearny-Hudson to 230 kV operation. B1304.3: Build second 230 kV underground cable from Bergen to Athenia	2016
ATHENIA 230 KV ATH-CLIK o/l L230. Cedar Grove-Clifton-Athenia.B-2228	Internal	PJM RTEP: B1304.1 Convert the existing 'D1304' and 'G1307' 138 kV circuits between Roseland - Kearny-Hudson to 230 kV operation. B1304.3: Build second 230 kV underground cable from Bergen to Athenia	2016
BERGENFI230 KV BER-NEWO o/l L230. Fairlawn-Waldwick.O-2267 + Fairlawn.220-1	Internal	PJM RTEP: B1304.1 Convert the existing 'D1304' and 'G1307' 138 kV circuits between Roseland - Kearny-Hudson to 230 kV operation. B1304.3: Build second 230 kV underground cable from Bergen to Athenia	2016
CEDARGRO230 KV CED-CLIB l/o L230. CedarGrove-Clifton-Athenia.K-2263	Internal	PJM RTEP: B1304.1 Convert the existing 'D1304' and 'G1307' 138 kV circuits between Roseland - Kearny-Hudson to 230 kV operation. B1304.3: Build second 230 kV underground cable from Bergen to Athenia	2016
CEDARGRO230 KV CED-CLIK l/o L230. Cedar Grove-Clifton-Athenia.B-2228	Internal	PJM RTEP: B1304.1 Convert the existing 'D1304' and 'G1307' 138 kV circuits between Roseland - Kearny-Hudson to 230 kV operation. B1304.3: Build second 230 kV underground cable from Bergen to Athenia	2016
CEDARSUB230 KV CED-ROSY o/l L230.Roseland-William.S-2297	Internal	PJM RTEP: B1304.1 Convert the existing 'D1304' and 'G1307' 138 kV circuits between Roseland - Kearny-Hudson to 230 kV operation. B1304.3: Build second 230 kV underground cable from Bergen to Athenia	2016

Appendix III: 2016/2017 Final Stage 1A 10-Year MISO M2M ARR Results

Facility Name	Facility Type	Upgrade expected to fix infeasibility	Expected in-service date
0404 Quad Cities-H471 l/o 15503 Cordova-Nelson 345 kV	Flowgate	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
0621 Byron-Cherry Valley 345 kV l/o 0622 Byron-Cherry Valley 345 kV	Flowgate	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
0622 Byron-Cherry Valley 345 kV l/o 0621 Byron-Cherry Valley 345 kV	Flowgate	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
12205-151 Woodstock 138 kV l/o Cherry Valley-Silver Lake 345 kV	Flowgate	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
124 Maryland-11902 138kV l/o Byron-LeeCo 345kV	Flowgate	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
155 Nelson-15508 138kV l/o Nelson -ElectricJct 15502 345kV	Flowgate	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
15616 Cherry Valley-Silver Lake l/o 15502 Nelson-Electric Jct.	Flowgate	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
15623-Belvidere 138 l/o Cherry Valley -Silver Lake 345	Flowgate	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
Albany-Garden Plain 138 l/o Quad Cities-H471 345	Flowgate	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
Beaver Channel-Albany 161 l/o Quad Cities-H471 ESS 345	Flowgate	MISO MVP 3127: Dubuque to Cardinal	2024
Belvidere-12205 138 l/o Cherry Valley-Silver Lake 345	Flowgate	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
Braidwood-East Frankfurt 2001 345 l/o Braidwood-East Frankfurt 2003 345	Flowgate	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
Byron-Wempletown 0624 345 kV line l/o Byron-Cherry Valley 0621 345 kV	Flowgate	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
Cherry Valley TR83 345/138 l/o Cherry Valley-Silver Lake 345	Flowgate	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
Cordova-Nelson 345 (flo) Quad Cities-H471 345	Flowgate	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
Dixon-McGirr Rd 138 kV l/o Nelson-Electric Jct 345 kV	Flowgate	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
Galesburg 161/138 Xfm #2 flo Electric Jct.-Nelson B 345	Flowgate	MISO MVP 3022: Fargo-Oak Grove 345 kV Line	2016
Garden Plain-15518 138kV l/o Nelson TR84 345/138kV	Flowgate	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
MarengoTap-PlsntValley(12204-2)138kV l/o ChryVly-SilverLake(15616)345kV	Flowgate	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
Mercer IP-Galesburg 161kV l/o Nelson-Electric Junction 345kV	Flowgate	MISO MVP 3022: Fargo-Oak Grove 345 kV Line	2016
Nelson 345/138 TR82 l/o Nelson-Electric Jct 345	Flowgate	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
Nelson-Electric Jct (15502) l/o Cherry Val-Silver Lake (15616)	Flowgate	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
Oak Grove-Mercer 161 kV l/o Byron-LeeCo 345 kV	Flowgate	MISO MVP 3022: Fargo-Oak Grove 345 kV Line	2016
Quad Cities-Cordova 0402 345 l/o Quad Cities-Cordova 0403 345	Flowgate	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
Quad Cities-Rock Creek 345/MEC Cordova-Sub 39	Flowgate	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017
Quad Cities-Sub 91 345 kV FLO Cordova-Sub 39 345kV & Sub 39 TR1 345/161 kV	Flowgate	PJM RTEP B2141: New Byron-Wayne 345 kV circuit	2017

Appendix III: 2016/2017 Final Stage 1A 10-Year MISO M2M ARR Results

Facility Name	Facility Type	Upgrade expected to fix infeasibility	Expected in-service date
AEPCIN16_BREED_BRED-CSYW-1_1	Flowgate	Pseduo Tie Flowgate, FFE need to be determined	
AMI13125_HENNEPIN_IP-1512_1	Flowgate	Pseduo Tie Flowgate, FFE need to be determined	
AMI34002_LAS_LAS-VINC-1_1	Flowgate	Pseduo Tie Flowgate, FFE need to be determined	
AMI34002_LOUS_LOUS-OLNN-1_A	Flowgate	Pseduo Tie Flowgate, FFE need to be determined	
AMI34002_NEWTON2_LOUS-NWTY-1_A	Flowgate	Pseduo Tie Flowgate, FFE need to be determined	
AMI34012_WFRK_WFRE-WFRK-1_A	Flowgate	Pseduo Tie Flowgate, FFE need to be determined	
AMI34023_BALDWIN_TX01_TR4	Flowgate	Pseduo Tie Flowgate, FFE need to be determined	
AMI34023_TURKY_HL_TX00_TR1	Flowgate	Pseduo Tie Flowgate, FFE need to be determined	
AMIAEP02_LAS_LAS-VINC-1_1	Flowgate	Pseduo Tie Flowgate, FFE need to be determined	
AMICEK03_SHRAM_TP_IP-1466_2	Flowgate	Pseduo Tie Flowgate, FFE need to be determined	
AMO34027_LABADIE_L_GRAY_2_A	Flowgate	Pseduo Tie Flowgate, FFE need to be determined	
BASE_GBCS_GBCS_PAXE_1_B	Flowgate	Pseduo Tie Flowgate, FFE need to be determined	
BROKAW_CNBELT_138_flo_BROKAW_NLEROY_WEEDMN_138	Flowgate	Pseduo Tie Flowgate, FFE need to be determined	
Cornbelt_Brokaw_GBCS-1_2_138Kv_flo_Vermilion_4N_Champgnw_138Kv	Flowgate	Pseduo Tie Flowgate, FFE need to be determined	
Gibson_GIBSOPETER34_1_1_345Kv_flo_Gibson_Francisco_345Kv	Flowgate	Pseduo Tie Flowgate, FFE need to be determined	
Rossvill_Ross_Verm_1305_A_138Kv_flo_RantoulJ_Sidney1+Rantoul_RantoulJ+PxtonE_RaJ	Flowgate	Pseduo Tie Flowgate, FFE need to be determined	
VERMILION_TILTONEC_138_flo_BUNSONVL_CASEY_345	Flowgate	Pseduo Tie Flowgate, FFE need to be determined	