Network Upgrades and Statistics

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Interconnection Analysis

Transmission Expansion Advisory Committee

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Overview

- All study reports located at: https://pjm.com/planning.aspx

- Covers period between August 31, 2021 and October 9, 2022

- 403 System Impact Study Reports Issued
- 224.98 million net increase in total Network Upgrade costs
  - 322.74 million in New Network Upgrades
  - 77.0 million decrease for cancelled Network Upgrades
  - 20.75 million decrease from scope/cost changes

New System Impact Study Reports

Merchant Transmission Projects

Queue	Project Name	TO	Rights Requested
AF1-088	Sullivan 345 kV	AEP	1000 F/1000 NFTIR/1000 F/1000 NFTWR
AF1-200	Plano 345 kV	ComEd	2035 F/NFTIR/2100 NF/TWR
AF2-008	Sullivan 345 kV	AEP	500 FTIR/1000 NFTIR

Long Term Firm Projects

- None

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Network Upgrades and Statistics

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Revision History

- V1 – 10/24/2022 – Original slides posted

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Appendix

Generation Interconnection Projects - ACE

Queue	Fuel	MW Energy	MW Capacity
AE1-061	Storage	5.5	2.75
AE2-020	Offshore Wind	604.8	106.44
AE2-021	Offshore Wind	604.8	106.44
AE2-022	Offshore Wind	300	52.8
AE2-222	Offshore Wind	300	84.3
AE2-251	Offshore Wind	1200	337.2
AE2-334	Solar	44	26.4
AG1-001	Solar	31	11.78
AG1-088	Storage	0	0

Generation Interconnection Projects - AEP

Queue	Fuel	MW Energy	MW Capacity
AB1-087	Natural Gas	575	550
AB1-088	Natural Gas	575	550
AC2-015	Solar	117	53.55
AC2-090	Solar	100	38
AC2-157	Solar	200	76
AD1-043	Solar	120	45.6
AD2-016	Solar	127	62.5
AD2-020	Solar	100	61.9
AD2-022	Solar	96	60
AD2-023	Solar	54	35
AD2-071	Solar	100	67

Queue	Fuel	MW Energy	MW Capacity
AD2-075	Natural Gas	285	145
AD2-086	Solar	230	138
AD2-136	Wind	360	46.8
AD2-162	Solar	110	73.81
AE1-093	Storage	42	42
AE1-146	Solar	120	81.8
AE1-209	Wind	100	13
AE1-210	Wind	100	13
AE1-212	Solar	90	53.3
AE1-245	Wind	150	19.5
AE1-250	Solar	150	90

Generation Interconnection Projects - AEP

Queue	Fuel	MW Energy	MW Capacity
AE2-072	Solar	150	90
AE2-089	Solar	155	93
AE2-130	Solar; Storage	800	480
AE2-140	Solar	201.1	120.66
AE2-154	Wind	250	32.5
AE2-166	Solar	90	54
AE2-169	Solar	33	33
AE2-174	Wind	198	34.85
AE2-219	Solar	100	42
AE2-220	Solar	125	52.5
AE2-276	Storage	50	50

Queue	Fuel	MW Energy	MW Capacity
AE2-290	Solar	100	60
AE2-297	Solar	152.5	91.5
AE2-298	Solar	50	30
AE2-322	Solar	60	40.3
AF2-083	Solar	150	100
AF2-186	Solar	45	18.9
AF2-389	Solar	50	30
AF2-396	Solar; Storage	200	200
AG1-124	Solar	100	58.9
AG1-163	Solar	100	42
AG1-232	Solar	135	81

Generation Interconnection Projects - AEP

Queue	Fuel	MW Energy	MW Capacity
AG1-311	Solar; Storage	99	69.4
AG1-324	Solar; Storage	45	31.5
AG1-417	Solar	50	30
AG1-418	Solar	50	30
AG1-424	Solar	100	60

Generation Interconnection Projects - APS

Queue	Fuel	MW Energy	MW Capacity
AE1-052	Storage	0	10
AE1-105	Natural Gas	1270	1235
AE1-106	Solar	99.6	59
AE2-001	Solar	20	12
AE2-074	Solar	35	15.11
AE2-120	Solar	20	12
AE2-248	Solar	16	9.6
AE2-289	Wind	80	11.76
AF1-136	Solar	15.72	9.43
AF1-254	Solar	20	12
AF1-290	Solar	80	40.4

Queue	Fuel	MW Energy	MW Capacity
AF2-075	Solar	50	30
AG1-095	Solar	16	10.67

Generation Interconnection Projects - ATSI

Queue	Fuel	MW Energy	MW Capacity
AD1-118	Natural Gas	60	60
AE2-176	Solar	125	75
AE2-181	Solar	49	29.4
AE2-193	Solar	120	50.4
AE2-194	Solar	145	84
AE2-282	Solar	67	43.9
AF1-146	Solar	201.95	121.17

Generation Interconnection Projects - BGE

Queue	Fuel	MW Energy	MW Capacity
AG1-104	Storage	300	120
AG2-050	Solar	0	0

Generation Interconnection Projects - ComEd

Queue	Fuel	MW Energy	MW Capacity
AB1-089	Natural Gas	575	550
AB1-091	Natural Gas	575	550
AB2-132	Wind; Storage	0	2.2
AD1-031	Solar	70	26.6
AD1-039	Natural Gas	102.7	93
AD1-098	Solar	100	57.8
AD1-100	Wind	850	150
AD1-116	Solar	20	7.6
AD1-133	Solar	300	180
AD2-038	Wind	150	26.4
AD2-047	Wind	200	34

Queue	Fuel	MW Energy	MW Capacity
AD2-066	Solar	116	69.6
AD2-100	Solar	210	126
AD2-102	Solar	200	120
AD2-131	Solar	50	8.3
AD2-134	Wind	105.9	21.2
AD2-159	Wind	187.5	33
AD2-194	Natural Gas	60	120
AD2-214	Solar	68	40.8
AE1-070	Natural Gas	135	135
AE1-114	Wind	150	34
AE1-134	Natural Gas	9	24.4

Generation Interconnection Projects - ComEd

Queue	Fuel	MW Energy	MW Capacity
AE1-166	Solar	150	78
AE1-193	Wind	500	65
AE1-194	Wind	500	65
AE1-195	Wind	500	65
AE1-198	Solar; Storage	357	193
AE1-205	Solar	200	84
AE1-252	Solar; Storage	150	90
AE2-152	Solar	150	90
AE2-261	Solar	299	179.4
AE2-341	Solar	150	100.6
AF1-296	Wind	212.1	37.3

Queue	Fuel	MW Energy	MW Capacity
AF2-305	Wind	0	9.2
AF2-317	Wind	0	15.68
AF2-349	Solar	300	180
AG1-398	Wind	0	7.33
AG1-513	Storage	10	4
Z1-127	Natural Gas	20	20

Generation Interconnection Projects - Dayton

Queue	Fuel	MW Energy	MW Capacity
AD2-031	Solar	49.9	19
AE2-319	Solar	100	66.9
AE2-320	Solar	100	66.9

Generation Interconnection Projects - Dominion

Queue	Fuel	MW Energy	MW Capacity
AC1-086	Solar	180	123.7
AC1-189	Solar	80	53.4
AC2-084	Solar	60	40.2
AD1-022	Solar	80	51.8
AD1-023	Solar	40	25.9
AD1-025	Solar	150	94.2
AD1-056	Solar	60	38.9
AD1-057	Solar	34	22.4
AD1-074	Solar	300	198.8
AD1-075	Solar	75	49.7
AD1-076	Solar	109	72.2

Queue	Fuel	MW Energy	MW Capacity
AD1-087	Solar	64.2	43.7
AD1-088	Solar	105	71.4
AD1-105	Solar	74	44.4
AD1-151	Solar	150	90
AD1-152	Solar	80	48
AD2-008	Solar	52.1	16.4
AD2-033	Solar	130	78
AD2-046	Solar	80	54.8
AD2-051	Solar	74.9	52.4
AD2-063	Solar	149.5	90
AD2-074	Solar	86	32.68

Generation Interconnection Projects - Dominion

Queue	Fuel	MW Energy	MW Capacity
AE1-056	Solar	60	38.8
AE1-068	Solar	500	322.1
AE1-069	Solar	400	254.5
AE1-072	Solar	150	98.6
AE1-075	Solar	18	12
AE1-085	Solar	75	50
AE1-103	Solar	40	16.8
AE1-148	Solar	90	54
AE1-149	Solar	100	60
AE1-153	Solar	149	89.4
AE1-155	Solar	127	76.2

Queue	Fuel	MW Energy	MW Capacity
AE1-157	Solar	120	77.8
AE1-158	Solar	120	79.4
AE1-173	Solar	800	480
AE1-190	Solar	20	12
AE1-191	Solar	80	48
AE1-206	Solar	285	171
AE2-019	Storage	120	120
AE2-027	Solar	120	72
AE2-029	Solar	50	30
AE2-033	Solar	149	89
AE2-034	Solar	60	42

Generation Interconnection Projects - Dominion

Queue	Fuel	MW Energy	MW Capacity
AE2-040	Storage	15.7	15.7
AE2-041	Storage	40	40
AE2-044	Solar	40	28
AE2-051	Solar	150	90
AE2-052	Storage	20	20
AE2-053	Storage	20	20
AE2-092	Solar	138	82.8
AE2-094	Solar; Storage	300	207.2
AE2-104	Solar	49	18.92
AE2-122	Offshore Wind	800.1	158.9
AE2-123	Offshore Wind	800.1	163.3

Queue	Fuel	MW Energy	MW Capacity
AE2-124	Offshore Wind	800.1	148.5
AE2-147	Solar	150	90
AE2-150	Storage; Solar	0	0
AE2-156	Storage	100	100
AE2-182	Solar	17	11.6
AE2-185	Solar; Storage	60	36
AE2-187	Solar; Storage	60	36
AE2-190	Solar	70	27.02
AE2-212	Solar	20	12
AE2-247	Solar	20	8.4
AE2-250	Solar	82.5	54

Generation Interconnection Projects - Dominion

Queue	Fuel	MW Energy	MW Capacity
AE2-258	Solar	0	14.1
AE2-259	Solar	100	60
AE2-260	Solar; Storage	200	82.7
AE2-270	Solar; Storage	150	150
AE2-283	Solar	60.4	39.6
AE2-291	Solar	102	61.2
AE2-292	Solar	127	76.2
AE2-346	Solar	12	8.4
AF1-018	Storage	40	40
AF1-028	Storage	200	200
AF1-042	Solar	45	17.1

Queue	Fuel	MW Energy	MW Capacity
AF1-066	Storage	50	50
AF1-075	Solar	73	45.5
AF1-079	Solar	44.8	19
AF1-114	Solar	100	42
AG1-518	Solar; Storage	50	50

Generation Interconnection Projects - DPL

Queue	Fuel	MW Energy	MW Capacity
AC1-190	Solar	50	35
AC2-023	Solar	45.8	26.5
AE1-117	Offshore Wind	152	41.5
AE2-093	Solar	44	16.72
AE2-112	Solar	17	6.46
AE2-257	Offshore Wind	120	33
AF1-015	Solar	15	6.3
AF1-036	Solar	20	8.4
AF1-231	Storage	19	7.6
AF2-060	Storage	9	9
AF2-061	Storage	40	40

Queue	Fuel	MW Energy	MW Capacity
AG1-061	Solar	109.3	65.58
AG1-087	Offshore Wind	440	119
AG1-150	Storage	40	40
AG1-450	Storage	25	25
AG1-464	Storage	50	20
AG1-497	Solar; Storage	120	84
AG1-529	Solar	75	48.9

Generation Interconnection Projects - EKPC

Queue	Fuel	MW Energy	MW Capacity
AD2-048	Solar	70	46.7
AD2-072	Solar	95	63.75
AE1-144	Solar; Storage	120	80.2
AE1-246	Solar; Storage	120	80.7
AE2-038	Solar; Storage	80	53.5
AE2-071	Solar	35	21
AE2-275	Solar; Storage	90	65.4
AE2-308	Solar; Storage	150	110
AE2-339	Solar	40	26.8
AF1-038	Solar; Storage	60	36
AF1-050	Solar; Storage	60	36

Queue	Fuel	MW Energy	MW Capacity
AF1-083	Solar; Storage	55	33
AF2-111	Solar	250	150
AF2-307	Solar	66	39.6
AF2-348	Solar	250	150
AF2-355	Solar	225	135
AF2-391	Solar; Storage	120	72

Generation Interconnection Projects - JCPL

Queue	Fuel	MW Energy	MW Capacity
AE1-020	Offshore Wind	816	229.3
AE1-238	Offshore Wind	816	225
AE2-024	Offshore Wind	882	155.23
AE2-025	Offshore Wind	445.2	78.36
AF1-320	Solar; Storage	70	42
AF2-138	Solar	19.8	8.32

Generation Interconnection Projects - ME

Queue	Fuel	MW Energy	MW Capacity
AE1-138	Solar	22	13.2
AE1-139	Solar	65	39
AE2-256	Solar	70	29.4
AE2-345	Solar	70	42
AG1-419	Solar	50	21

Generation Interconnection Projects - ODEC

Queue	Fuel	MW Energy	MW Capacity
AE1-145	Solar; Storage	20	20
AF2-055	Storage; Solar	45	27
AG1-429	Solar	58.7	35.2

Generation Interconnection Projects - PENELEC

Queue	Fuel	MW Energy	MW Capacity
AD2-062	Solar	80.3	53.5
AE1-053	Storage	0	10
AE1-128	Solar; Storage	120	72
AE2-113	Solar	120	61.9
AE2-117	Solar	20	12
AE2-118	Solar	20	12
AE2-139	Solar	100.5	60.3
AE2-224	Solar	100	60
AE2-264	Solar	80	48
AE2-299	Storage	160	32
AE2-316	Solar	90	41.2

Queue	Fuel	MW Energy	MW Capacity
AE2-344	Solar	116.5	69.9
AF1-094	Solar	20	12
AF1-240	Solar	20	12
AF1-286	Solar	13.6	5
AF1-321	Solar	20	12
AF2-294	Solar	17	10.2
AG1-040	Solar	20	12

Generation Interconnection Projects - PPL

Queue	Fuel	MW Energy	MW Capacity
AC2-092	Natural Gas	55	65
AE1-058	Hydro	500	250
AG2-389	Solar; Storage	3	0
AG2-394	Solar; Storage	3	0
AG2-395	Solar; Storage	2	0

Generation Interconnection Projects - PSEG

Queue	Fuel	MW Energy	MW Capacity
AF1-109	Solar; Storage	20	20
AG1-080	Solar	19.9	10.7
AG2-422	Solar; Storage	1.2	0

Network Upgrades

Network Upgrades Scope/Cost Change

NUN	Description	Cost ($M)	Driver	TO
n1808	Marysville - Modify relay settings on the East Lima circuit for the U2-072 project	$0.037	U2-072	AEP
n6064	Adjust remote relay and metering settings at the Glen Falls 138 kV Substation.	$0.010	AD2-192	APS
n6025	Expansion of TSS 900 Elwood to accommodate AC1-204 attachment 345kV	$11.450	AC1-204	ComEd
n6058	Replace GOODGRV B3 345.kV breaker '116 BT3-4 B3' from 40 kA to 63 kA	$3.600	AC1-204	ComEd
n6065	Oversight and review of relaying at TSS 929 Jackson 345kV	$1.080	AC1-204	ComEd
n6391	Option to build oversight TSS 939 Mulberry and TSS924 Three Rivers 345kV	$3.300	AB1-122	ComEd
n6392	Install Fiber Optics Cable 13.1 miles TSS 939 Mulberry to Station 23 Collins 345kV	$2.390	AB1-122	ComEd

Network Upgrades Scope/Cost Change

NUN	Description	Cost ($M)	Driver	TO
n6393	Modify 93913 Relaying at TSS 908 Mole Creek 345kV	$0.800	AB1-122	ComEd
n6394	Modify 1202 Line Relaying Sta 12 Dresden 345kV	$0.670	AB1-122	ComEd
n6395	Modify 1227 Line Relaying Sta 12 Dresden 345kV	$0.870	AB1-122	ComEd
n6396	Modify 93915 Relaying Tazewell 345kV	$0.020	AB1-122	ComEd
n6397	Modify 1202 Tie In TSS 939 Mulberry 345kV	$1.150	AB1-122	ComEd
n6398	Modify 1227 Tie in TSS 939 Mulberry 345kV	$0.780	AB1-122	ComEd
n6399	Modify 93913 Tie In TSS 939 Mulberry 345kV	$1.170	AB1-122	ComEd

Network Upgrades Scope/Cost Change

NUN	Description	Cost ($M)	Driver	TO
n6400	Modify 93915 Tie In TSS 939 Mulberry	$0.830	AB1-122	ComEd
n5692	AC1-085 Interconnection Switchyard Tie-In to Stuart-Clinton 345 kV Line	$1.294	AC1-085	Dayton
n5752	Modify relays at Raritan River 230 kV Substation	$0.040	AD1-113	JCPL
n5753	Modify relays at Parlin 230 kV Substation on Raritan River Terminal	$0.040	AD1-113	JCPL
n5754	Modify relays at Red Oak 230 kV Substation on Raritan River Terminal	$0.040	AD1-113	JCPL
n5755	Modify relays at Werner 230 kV Substation on Raritan River Terminal	$0.040	AD1-113	JCPL
n5838	West Flemington 34.5 kV Substation: Adjust remote relay and metering settings.	$0.010	AE1-156	JCPL

Network Upgrades Scope/Cost Change

NUN	Description	Cost ($M)	Driver	TO
n5839	Baptistown 34.5 kV Substation: Adjust remote relay and metering settings.	$0.010	AE1-156	JCPL

New Network Upgrades – ACE

NUN	Description	Cost ($M)	Driver
n7382	Replace two (2) 138 kV circuit breakers (452A and 452B) at B.L. England to upgrade them to a 3000A rating.	$1.47	AE1-104

New Network Upgrades – AEP

NUN	Description	Cost ($M)	Driver
n5604	Upgrade line protection and controls at the Smith Mountain 138 kV substation to coordinate with the new 138 kV switching station.	$0.12	AC1-083
n6034	Expansion of College Corner 138 kV substation and installation of associated protection and control equipment	$3.00	AC2-111
n6035	Modify 138 kV Revenue Metering at College Corner 138 kV substation	$0.25	AC2-111
n6939	AEP shall install one (1) 34.5 kV circuit breaker at AEP's existing Capital Avenue 34.5 kV substation.	$0.82	AD2-079
n6940	AEP shall Install 34.5 kV revenue metering at the Capital Avenue 34.5 kV substation.	$0.29	AD2-079
n6941	AEP shall extend one span of 34.5 kV transmission line for the generation-lead going to the Customer Facility. AEP will build and own the first transmission line structure outside of the Capital Avenue 34.5 kV substation, to which AEP's transmission line conductor will attach.	$0.24	AD2-079
n6942	AEP shall install a fiber-optic connection from the Customer Facility's telecom equipment to AEP's Capital Avenue 34.5 kV control house.	$0.12	AD2-079

New Network Upgrades – AEP

NUN	Description	Cost ($M)	Driver
n7268	Construct an exit Span and 1st Structure to Gen Lead Line at Delano 138kV substation	$0.52	AC1-001
n7269	To accommodate the interconnection at AEP's existing Delano 138 kV station, the station will have to be expanded by adding two (2) 138 kV circuit breakers, extending the 138 kV bus #1 and #2, and adding a new circuit breaker string.	$3.18	AC1-001
n7270	Install metering at Delano 138kV station	$0.48	AC1-001
n7282	Modify and expand the existing Payne 69 kV Station including one 69 kV circuit breaker installation	$0.65	AD1-119
n7283	Upgrade line protection and controls at the Payne 69 kV Station	$0.27	AD1-119
n7284	Install 69 kV Revenue Metering at Payne 69kV substation	$0.32	AD1-119
n7285	Perform relay and remote end work at Haviland 69 kV Station	$0.20	AD1-119

New Network Upgrades – AEP

NUN	Description	Cost ($M)	Driver
n7286	Perform relay and remote end work at South Hicksville 69 kV Station	$0.10	AD1-119
n7371	New 138 kV Station Oversight for AC2-059	$0.47	AC2-059
n7372	Biers Run-Circleville 138 kV T-Line Cut-In and Fiber installation	$0.79	AC2-059
n7373	Upgrade line protection and controls at the Biers Run 138 kV Station	$0.04	AC2-059
n7374	Upgrade line protection and controls at the Circleville 138 kV Substation	$0.04	AC2-059
n7452	Install 138 kV Revenue Meter, generator lead transmission line span from the Nottingham 138 kV station to the Point of Interconnection, including the first structure outside the Nottingham 138 kV station, and extend dual fiber-optic from the Point of Interconnection to the Nottingham 138 kV Station control house.	$0.98	AE2-290
n7453	Expand Nottinham 138 kV Station, including the addition of two (2) 138 kV circuit breakers, installation of associated protection and control equipment, 138 kV line risers, and supervisory control and data acquisition (SCADA) equpment.	$1.24	AE2-290

New Network Upgrades – AEP

NUN	Description	Cost ($M)	Driver
n7489	Install 69kV metering at the Continental 69kV station. Construct line from the Continental 69kV Station to the Point of Interconnection. Install dual fiber telecommunications from the Continental 69kV station to the Customer Facility collector station.	$0.40	AD1-101
n7490	Expand Continental 69kV Station, including the addition of one (1) 69kV circuit breaker, installation of associated protection and control equipment, 69kV line risers, switches, jumpers, and supervisory control and data acquisition (SCADA) equipment.	$1.00	AD1-101
n7508	Install a new 345-138kV 450 MVA transformer, 138 kV circuit breaker, 345 kV circuit breaker, two (2) 3-pole turning structures, monopole transition structure, 345 kV rigid bus conductor, and Discontinuous Inductor Current Mode (DICM) expansion.	$7.91	MISO (J793)
n7671.1	Install 138 kV metering at the Axton 138 kV station. Construct generator lead transmission line from the Axton 138 kV Station to the Point of Interconnection. Install dual fiber telecommunications from the Axton 138 kV station to the Customer Facility collector station.	$2.39	AE1-100
n7671.2	Expand Axton 138 kV Station, including the addition of two (2) 138 kV circuit breakers, extending the south 138 kV Bus #1, installation of associated protection and control equipment, 138 kV line risers, switches, jumpers, and supervisory control and data acquisition (SCADA) equipment.	$1.41	AE1-100
n7953	Modify relay settings at Buckskin 69kV Substation	$0.05	AE1-040

New Network Upgrades – APS

NUN	Description	Cost ($M)	Driver
n5794	Construct a 138kV three breaker ring bus interconnection substation.	$4.67	AD1-155
n5795	Meadow Brook-Strasburg 138 kV Line Loop: Cut and loop into the new AD1-155 138 kV interconnection switchyard. Cut will take place 2.25 mi from Meadow Brook and 7.11 mi from Strasburg.	$0.70	AD1-155
n5796	Meadow Brook 138 kV Substation: Replace Strasburg line tuner with wide band tuner. Add DTT, change carrier frequency and modify relay settings. SCADA work to support relay installation.	$0.15	AD1-155
n5797	Strasburg 138 kV Substation: Replace Meadow Brook line tuner with wide band tuner. Add DTT, change carrier frequency and modify relay settings. SCADA work to support relay installation.	$0.15	AD1-155
n5798	Fiber Communication: Install ADSS fiber from AD1-155 control to FirstEnergy fiber backbone about 0.5 mi to support communication backhaul.	$0.14	AD1-155
n6893	New Sulphur City 138 kV Substation: Engineering and Construction Oversight	$0.54	AD2-180
n6895	Kelso Gap-Parr Run 138 kV Line Loop to new Sulphur city 138 kV Interconnection Substation including project management, environmental, forestry, real estate and right-of-way	$1.66	AD2-180

New Network Upgrades – APS

NUN	Description	Cost ($M)	Driver
n6896	Elk Garden 138 kV Substation: Modify drawings and nameplates	$0.03	AD2-180
n6897	Parr Run 138 kV Substation: Install new relay protection panel. Wave trap and line tuner will be retuned. Anti-islanding trasmitter will be replaced.	$0.41	AD2-180
n6898	Kelso Gap 138 kV Substation: Replace Transfer Trip receiver. Wave trap and line tuner will be retuned. Anti-islanding transmitter will be installed.	$0.45	AD2-180
n6899	AD2-180 Generation Substation: Oversight of specification and installation of metering system. Includes nameplate, drawing review and energization support.	$0.02	AD2-180
n7010	Construct a new 3-breaker Ring Bus on the 138 kV line between Guilford and McConnellsburg	$6.12	AE1-101
n7011	Loop the Guilford-McConnellsburg 138 kV line into new AE1-101 ring bus	$0.83	AE1-101
n7012	McConnellsburg 138 kV: Replace Breaker, Wave Trap, Arresters, Relaying	$0.68	AE1-101

New Network Upgrades – APS

NUN	Description	Cost ($M)	Driver
n7013	Guilford 138 kV: Replace Breaker, Wave Trap, Arresters, Relaying	$0.68	AE1-101
n7249	Installation of a 138 kV line exit take-off structure, foundations, disconnect switch and associated equipment to accommodate the termination of the 138 kV generator lead line.	$0.39	AD1-125
n7250	Revenue metering - engineering oversight of specification and design of new revenue metering that will be installed by power producer (interconnection customer) at their location (AD1-125) and connected to the new ring bus station at the Baker substation. Coordinate FE MV90 access to the new meter.	$0.00	AD1-125
n7251	Reconfigure Baker Substation into a 138 kV three breaker ring bus configuration. Reterminate the existing 138/34.5 kV Transformer 1 and add new AD1-125 generation interconnection line at Baker 138 kV	$3.55	AD1-125
n7252	Upgrade carrier equipment for anti-islanding and add CCVT at Hardy 138 kV	$0.56	AD1-125
n7253	Upgrade carrier equipment for anti-islanding at Junction 138 kV	$0.28	AD1-125
n7254	Upgrade carrier equipment for anti-islanding at North Petersburg 138 kV	$0.33	AD1-125

New Network Upgrades – APS

NUN	Description	Cost ($M)	Driver
n7255	Upgrade carrier equipment for anti-islanding at Seneca Caverns 138kV substation	$0.33	AD1-125
n7256	Upgrade carrier equipment for anti-islanding at William 138kV substation	$0.28	AD1-125
n7257	Re-terminate the Baker - Hardy 138 kV line into the expanded Baker Substation at Baker - Hardy 138 kV Line	$0.21	AD1-125
n7258	Install fiber from the Baker control house to connect with the fiber ran from the generator site.. Estimated SCADA work at Baker, Hardy, Junction, North Petersburg, Seneca Caverns and William Substations to support interconnection requirements.	$0.21	AD1-125
n7259	Project Management, Environmental, and Forestry associated with AD1-125	$0.27	AD1-125
n7274	Tap the McConnellsburg – Mercersburg 34.5 kV Line, install two manual 1200A gang operated line switches on the existing McConnellsburg-Mercersburg 34.5kV Line, for the LSBP solar facility (AD1-061) at McConnellsburg-Mercersburg 34.5kV Line Tap.	$0.10	AD1-061
n7275	Estimated SCADA work at McConnellsburg & Mercersburg substations to support relay replacements and updated relay settings.	$0.07	AD1-061

New Network Upgrades – APS

NUN	Description	Cost ($M)	Driver
n7276	Install new relaying on the Mercersburg 34.5kV line for the LSPB Solar interconnection (AD1-061). at McConnellsburg 34.5kV	$0.32	AD1-061
n7277	Review and revise relay settings at Mercersburg 34.5 kV	$0.01	AD1-061
n7378	McConnellsburg Substation: Install a 138 KV breaker for the AD2-009 generation interconnection. This line item also includes project management and environmental tasks.	$0.37	AD2-009
n7379	Cherry Run: Replace (1) 1200A wavetrap and line tuner with (1) 2000A wideband wavetrap and line tuner.	$0.32	AD2-009
n7380	Guilford: Replace (1) 1200A wavetrap and line tuner with (1) 2000A wideband wavetrap and line tuner.	$0.32	AD2-009
n7381	Estimated SCADA work at McConnellsburg, Cherry Run, & Guildford substations to support relay installations, wave trap installations, and updated relay settings. Estimated in-sub fiber run to from McConnellsburg control house to developer ran fiber for communications to AD2-009.	$0.11	AD2-009

New Network Upgrades – ATSI

NUN	Description	Cost ($M)	Driver
n6707	AC2-195 Interconnection Switchyard including SCADA, metering and Project Management	$7.31	AC2-195
n6708	Loop the Galion-Roberts South 138kV circuit into the proposed 3-breaker ring bus near towers 3825 & 3826. @ Galion-Roberts South 138kV Loop.	$0.68	AC2-195
n6709	Install mid-span structure to raise height of Galion-Roberts North 138 kV to permit loop of Galion-Roberts 138 kV South to the new interconnection substation for AC2-195.	$0.11	AC2-195
n6710	Galion Substation – Upgrade line relaying for Roberts 138kV line exit and rename for new AC2-195 PJM station.	$0.21	AC2-195
n6711	Roberts Substation 138 kV - Upgrade line relaying for Galion 138kV line exit and rename for new AC2-195 PJM station.	$0.21	AC2-195
n6713	Dual Rail Substation 138 kV – Change nameplates, revise engineering drawings and settings.	$0.02	AC2-195
n6714	Hamilton Substation 138 kV – Change nameplates, revise engineering drawings and settings.	$0.02	AC2-195

New Network Upgrades – ATSI

NUN	Description	Cost ($M)	Driver
n7312	Maysville: Extend the Maysville 69 kV bus. Install one 69 kV circuit breaker.	$0.82	AE2-285
n7313	Estimated SCADA work at Maysville substation to support breaker and relay installations. Estimated in-sub fiber run from Maysville control house to developer ran fiber build for communications and control to AE2-285 Generation Interconnection.	$0.06	AE2-285
n7314	Sharon 69kV: Modify relay settings	$0.10	AE2-285
n7315	Dilworth 69kV: Modify relay settings	$0.10	AE2-285
n7316	McDowell 69kV: Modify relay settings	$0.10	AE2-285
n7317	Masury 69kV: Modify relay settings	$0.10	AE2-285
n7318	AD2-163: OPTION TO BUILD: Install a 138kV three breaker ring bus on the East Springfield Broadview – Tangy line to provide interconnection facilities for 200MW of solar generation. Modify drawings and nameplates for FE standards. Project Management, Environmental, Real Estate, and Right of Way.	$0.86	AD2-163

New Network Upgrades – ATSI

NUN	Description	Cost ($M)	Driver
n7319	SCADA/Fiber Communication: Estimated SCADA work at Tangy, Broadview, Bellepoint, and Mill Creek substations to support relay and wavetrap installations. Estimated installation of Cellular system to support RTU installation at AD2-163. Assumed SCADA work is included in this cost. Estimated (1) in-sub fiber run from AD2-163 substation control house to developer built fiber run to support communications and control to generator site.	$0.19	AD2-163
n7320	Broadview Tangy 138 kV Line Loop: Cut the Broadview-Tangy 138kV line and terminate the line inside the proposed AD2-163.	$0.77	AD2-163
n7321	Tangy 138kV: Line terminal upgrade	$0.40	AD2-163
n7322	Bellepoint 138kV: Line terminal upgrade	$0.22	AD2-163
n7323	Millcreek 138kV: Line terminal upgrade	$0.29	AD2-163
n7324	Broadview 138kV: Line terminal upgrade	$0.40	AD2-163

New Network Upgrades – ComEd

NUN	Description	Cost ($M)	Driver
n5756	Mitigate sag limitation on the AB1-122 Tap – Dresden; R 345 kV line.	$1.49	AB1-122
n6778	Install Fiber Optics Cable OPGW 2 miles TSS 939 Mulberry to Sta 12 Dresden	$0.54	AB1-122
n6804	Engineering Oversight for TSS 909 Deer Creek 345 kV	$1.92	AB2-070
n6805	Protection and communication equipment upgrades at Brokaw 345kV for AB2-070	$0.08	AB2-070
n6806	Protection and communication equipment upgrades at TSS 188 Mt. Pulaski 345kV for AB2-070	$0.15	AB2-070
n6807	Loop line 18806 into TSS 909 Deer Creek 345kV	$2.88	AB2-070
n6808	Upgrade TSS 95 Chestnut 345kV Communications for AB2-070	$0.17	AB2-070

New Network Upgrades – ComEd

NUN	Description	Cost ($M)	Driver
n6809	Upgrade Wapella 345kV Communications for AB2-070 interconnection	$0.17	AB2-070
n7417	Review and Modify the line L11904 relay settings at Lena 138kV to accommodate the interconnection of the AD2-172/AE2-035 Projects	$0.17	AD2-172

New Network Upgrades – Dayton

NUN	Description	Cost ($M)	Driver
n7471	AE2-206 138kV interconnection switching station – Construct a new 138kV switching station to interconnect the Customer Facility	$4.01	AE2-206
n7472	Construct a new loop-in tap line from Dayton's existing East Sidney - Quincy 138kV line to the new AE2-206 138kV interconnection switching station.	$1.10	AE2-206
n7473	Shelby 138kV Substation – modify relay settings	$0.02	AE2-206
n7474	Logan 138kV Substation – modify relay settings	$0.02	AE2-206
n7476	Construct a new 345kV switching station to interconnect the AE2-221 Customer Facility	$6.88	AE2-221
n7477	Construct a new loop-in tap line from Dayton's existing Clinton - Stuart 345kV line to the new AE2-221 345kV interconnection switching station.	$1.99	AE2-221
n7478	Modify relay settings at Clinton 345kV substation	$0.02	AE2-221

New Network Upgrades – Dayton

NUN	Description	Cost ($M)	Driver
n7479	Modify relay settings at Stuart 345kV substation	$0.02	AE2-221
n7482	Construct a new four breaker ring bus 69kV switching station to interconnect the Customer Facility	$3.93	AE2-303
n7483	Construct a new loop-in tap line from Dayton's existing Honda East Liberty-East Liberty Union REA-Honda Marysville Union REA 69 kV line to the new AE2-303 69kV interconnection switching station	$2.15	AE2-303
n7484	Modify relay settings at Honda East Liberty 69kV Substation	$0.02	AE2-303
n7485	Modify relay settings at Honda Marysville 69kV substation	$0.02	AE2-303
n7486	Modify relay settings at Peoria 69kV substation	$0.02	AE2-303
n7487	Construct a four circuit breaker ring bus 69kV substation. This includes the installation of all physical structures, protection and control equipment, communications equipment, and associated facilities at the Woodstock 69kV substation	$3.28	AE2-342

New Network Upgrades – Dayton

NUN	Description	Cost ($M)	Driver
n7488	Re-route transmission circuits at the Woodstock 69kV substation	$0.66	AE2-342
n7952	Washington CH 69kV Substation – Modify relay settings	$0.02	AE1-040

New Network Upgrades – Dominion

NUN	Description	Cost ($M)	Driver
n6655	Build a three breaker 115 kV substation at the AC2-112 facility	$6.25	AC2-112
n6656	Build new structures to cut and loop the transmission line into AC2-112 115 kV sustation	$1.10	AC2-112
n6657	Modify protection and communication work to support interconnection of new AC2-112 generator	$0.12	AC2-112
n6695	Build a three breaker 230 kV substation at the AD1-033 facility	$6.80	AD1-033
n6696	Build new structures to cut and loop the transmission line into AD1-033 230 kV sustation	$1.80	AD1-033
n6697	Modify protection and communication work to support interconnection of new AD1-033 generator	$0.20	AD1-033
n6704	Build a three breaker 115 kV substation at the AD1-041 facility	$5.90	AD1-041

New Network Upgrades – Dominion

NUN	Description	Cost ($M)	Driver
n6705	Build new structures to cut and loop the transmission line into AD1-041 115 kV sustation	$1.60	AD1-041
n6706	Modify protection and communication work to support interconnection of new AD1-041 generator	$0.20	AD1-041
n5726	Install circuit breaker and associated substation equipment at Ahoskie 34.5 substation	$0.39	AB2-099
n5727	Install a new circuit at Ahoskie 34.5 kv substation	$0.13	AB2-099
n6055	Replace wave trap at North Anna Substation for Midlothian – North Anna 500 kV line #576. This will increase emergency rating by 31% to 3424 MVA. Estimated to 12-16 months to engineer and construct.	$0.30	AC1-161
n6072	Build a three breaker ring bus at the new AC1-105 substation	$5.23	AC1-105
n6073	Build new structures to cut and loop the line into AC1-105 115 kV switching station	$1.19	AC1-105

New Network Upgrades – Dominion

NUN	Description	Cost ($M)	Driver
n6074	Modify protection and communication work to support interconnection of new AC1-105 generator	$0.18	AC1-105
n6083	Construct a three breaker ring bus for AC1-076 interconnection substation	$5.12	AC1-076
n6084	Line 115 kV modifications for Locust Grove - Paytes 115 kV line	$2.02	AC1-076
n6085	Install metering and associated protection equipment at the AC1-076 Interconnection substation	$0.49	AC1-076
n6086	Relay modifications for 115kV Oak Green, Unionville, Locust Grove and Spotsylvania substations	$0.16	AC1-076
n6118	Upgrading the breaker leads, switch and 1 span of line at DVP's Battleboro 115kV terminal will bring the rating to 398 MVA (will still be limited by terminal equipment at Rocky Mount 115kV Duke Substation)	$0.10	AC1-034
n6217	This network upgrade is an advancement cost to the baseline ---The line can be uprated from 2598 MVA to 2914 MVA normal and emergency by replacing a wave trap.2914/2914/3351	$0.02	AC1-158

New Network Upgrades – Dominion

NUN	Description	Cost ($M)	Driver
n6252	Expand the Chickahominy 230kV subtation with a new bay for AC1-164	$5.00	AC1-164
n6282	Construction of new substation connection on Transmission Line 1015 between South Justice Branch and Scotland Neck Substation into the new AC1-098_099 three breaker ring bus	$1.13	AC1-098
n6283	Remote protection and communication work at Earleys, Scotland Neck, and South Justice Branch 115 kV substations	$0.15	AC1-098
n6325	Modify protection and communication to support interconnection of new AC1-042 generator	$0.25	AC1-042
n6326	Build new structures to cut and loop the line into AC1-042 69 kV sustation	$0.84	AC1-042
n6371	Rebuild 7.46 miles of 115 kV Line 198 from Spotsylvania to Todds Tavern DP with 768 ACSS.	$9.70	AE2-134
n6372	Rebuild 1.34 miles of 115 kV Line 198 from Ni River DP to Chancellor with 768 ACSS.	$1.74	AE2-134

New Network Upgrades – Dominion

NUN	Description	Cost ($M)	Driver
n6373	Rebuild 5.07 miles of 115 kV Line 198 from Todds Tavern DP to Ni River DP with 768 ACSS.	$6.59	AE2-134
n6468	Modify protection and communication work to support interconnection of new AC1-208 generator	$0.15	AC1-208
n6469	Build new structures to cut and loop the line #81 into AC1-208 115 kV sustation	$1.80	AC1-208
n6470	Build a three breaker 115 kV substation at the AC1-208 facility	$5.30	AC1-208
n6618	Rebuild Line #55 (Tarboro – Anaconda 115 kV) and associated 230 kV work on towers shared with 230 kV line 229.	$14.05	AD1-022
n6618.1	Split the 115 kV Bus at Hathaway into two separate buses with a 115 kV Line on each bus and close the tie switch between Line 55 & 80. Line #1001 is opened at Battleboro thus making Line #1001 radial from Chestnut Substation	$0.02	AD1-022
n6635	Install transfer trip from the #2076 line to Sanders DP to trip the AD2-073 facility	$0.00	AD2-073

New Network Upgrades – Dominion

NUN	Description	Cost ($M)	Driver
n6644	Build a three breaker ring bus at the new AC1-034 115kV substation	$5.30	AC1-034
n6645	Install new structures to cut and loop the line into AC1-034 switching station	$1.29	AC1-034
n6646	Modify protection and communication work to support interconnection of new AC1-034 generator	$0.08	AC1-034
n6647	Create a new bay position at the Septa 500kV substation for the interconnection of the AC1-161 project	$1.50	AC1-161
n6651	Build a three breaker 230 kV substation at the AC2-100 facility	$6.25	AC2-100
n6652	Build new structures to cut and loop the transmission line into AC2-100 115 kV sustation	$1.10	AC2-100
n6653	Modify protection and communication work to support interconnection of new AC2-100 generator	$0.12	AC2-100

New Network Upgrades – Dominion

NUN	Description	Cost ($M)	Driver
n6730	Expand the AB2-161 115 kV ring-bus substation by one breaker position to accommodate the interconnection of the AD1-082 project.	$0.60	AD1-082
n6749	Build a three breaker 115 kV substation at the AC2-079 facility	$5.24	AC2-079
n6750	Build new structures to cut and loop the transmission line into AC2-079 115 kV sustation	$2.00	AC2-079
n6751	Modify protection and communication work to support interconnection of new AC2-079 generator	$0.23	AC2-079
n6753	Build a three breaker 230 kV substation at the AD2-160 facility	$6.20	AD2-160
n6755	Modify protection and communication work to support interconnection of new AD2-160 generator	$0.19	AD2-160
n6900	Build a three breaker 115 kV substation at the AD2-085 facility	$5.40	AD2-085

New Network Upgrades – Dominion

NUN	Description	Cost ($M)	Driver
n6901	Build new structures to cut and loop the transmission line into AD2-085 115 kV sustation	$1.10	AD2-085
n6902	Modify protection and communication work to support interconnection of new AD2-085 generator	$0.28	AD2-085
n6903	Build a three breaker 115 kV substation at the AC2-012 facility	$5.60	AC2-012
n6904	Build new structures to cut and loop the transmission line into AC2-012 115 kV sustation	$1.90	AC2-012
n6905	Modify protection and communication work to support interconnection of new AC2-012 generator	$0.24	AC2-012
n7247	Endless Caverns Substation: Install a transfer trip panel to send CB'w L5T128 & 12852 breaker positions on Line 128 to Strasburg via Edinburg Substation on Line 152.	$0.06	AD1-155
n7248	Edinburg Substation: Install a transfer trip panel to receive Endless Caverns CB's L5T128 & 12852 breaker positions on Line 128 and send those breaker positions along with Edinburg CB's 12812, L412, & L312 to Strasburg Substation on Line 152.	$0.07	AD1-155

New Network Upgrades – Dominion

NUN	Description	Cost ($M)	Driver
n7437	Re-arrange line #2137 to loop into and out of the new three breaker AF1-147 230 kV switching station	$2.42	AF1-147
n7438	Build a three breaker AF1-147 230kV switching station	$7.73	AF1-147
n7439	Remote protection and communication work at AF1-147 230kV station	$0.08	AF1-147
n7440	Remote protection and communication work at 230kV Poland Rd station	$0.22	AF1-147
n7441	Remote protection and communication work at 230kV Shellhorn station	$0.05	AF1-147
n7442	Remote protection and communication work at 230kV Sojourner station	$0.14	AF1-147
n7873	Construct a new Three Breaker Ring Substation AE2-029. The facilities identified provides for the initial construction of a new 115 kV Three Breaker Ring Substation near Transmission Structure 119/413 in Rockingham County, Virginia.	$5.63	AE2-029

New Network Upgrades – Dominion

NUN	Description	Cost ($M)	Driver
n7874	Re-arrange line #119 to loop into and out of the new three breaker AE2-029 115 kV switching station This project will connect line number 119 to a new 115kV switching station located off the main line 119 between structures 119/412 and 119/414. This project is located in Rockingham County, Virginia.	$2.45	AE2-029
n7875	Remote protection and communication work AE2-029 provides for the installation of Line #118 Islanding Transfer Trip scheme to send Islanding Transfer Trip to AE2-029 Generator Interconnection Substation via Merck No. 5 Substation. This project is Indirect Network Upgrade for the AE2-029 Generator Interconnect project.	$0.07	AE2-029
n7876	Remote protection and communication work AE2-029 provides for the installation of Line #272 Islanding Transfer Trip scheme to work with the new AE2-029 Generator Interconnect Substation. This project is the Non-Direct Connect for the AE2-029 Generator Interconnect project.	$0.07	AE2-029
n7877	Remote protection and communication work AE2-029 provides for drawing work, relay resets, and field support necessary to change Line #119 destination from Merck No. 5 Substation to AE2-029 Generator Interconnect. The Line Relay Panel will be replaced with the Line Current Differential via Fiber Optics and the Wave Trap removed. Islanding Transfer Trip will be installed to receive from Dooms 230kV Substation on Line 272 via PLC and send to AE2-2029 G.I. on Line 119 via fiber. Fiber Optics will need to be installed on the 119 Line between Grottoes and AE2-029. This project is the Non-Direct Connect for the AE2-029 Generator Interconnect Project.	$0.22	AE2-029

New Network Upgrades – Dominion

NUN	Description	Cost ($M)	Driver
n7878	Remote protection and communication work AE2-029 provides for drawing work, relay resets, and field support necessary to change Line 119 destination from Grottoes Substation to AE2-029 Generator Interconnect. Islanding Transfer Trip will be installed to receive from Endless Caverns Substation on Line 118 via PLC and send to AE2-029 G.I. on Line 119 via PLC. The control enclosure will need a 10’ expansion to install the Islanding Transfer Trip panel.	$0.38	AE2-029

New Network Upgrades – DPL

NUN	Description	Cost ($M)	Driver
n6928	Install an additional 138kV circuit breaker (CB 135), 138kV line disconnect switch, 138kV CCVTs (P7), and new protection & control relaying at Carville 138 kV substation	$1.09	AD2-076
n6995	Cut and loop in Church - Kent 69 kV transmission line to new AB2-135 69 kV substation	$2.82	AB2-135
n7000	Cut and loop in West Cambridge - Bayly 69 kV circuit to new AB2-136 69 kV substation	$2.82	AB2-136
n7424	Install harmonic measurement equipment and provide harmonic measurement data to IC for the completion of a 12-month Harmonic Study for the interconnection of AE1-104	$0.00	AE1-104
n8050	Install new seventh position on the 69 kV six-position ring bus at the Todd Substation. Replace the Preston to Todd 69 kV Line 6716 terminal disconnect switches with 2000 A switches. Replace 600 A Disconnect Switch at the Todd Substation.	$1.39	AB2-172
n8053	Build one (1) new position and relocate one (1) position onto the 69 kV Chestertown Substation bus. Convert the existing four (4) position ring bus arrangement to a 5 position ring bus. Relocate transmission and distribution lines on the west side of the Chestertown Substation yard further to the west.	$3.56	AB2-133

New Network Upgrades – DPL

NUN	Description	Cost ($M)	Driver
n8057	Perform a Relay Coordination Study and adjust relays at the 230 kV Silver Run substation	$0.10	AA2-069

New Network Upgrades – EKPC

NUN	Description	Cost ($M)	Driver
n5860	Install a 69 kV switch structure at the point of demarcation, revenue metering, and attachment facility line/bus and associated hardware to accept the Interconnection Customer generator lead line/bus terminating at the AD2-072 Interconnection switching station	$0.25	AD2-072
n5861	Build 69kV switching station along the Van Arsdell - Mercer Industrial 69 kV line.	$2.00	AD2-072
n5862	Van Arsdell - Mercer Industrial 69 kV line: Install a line loop to the proposed AD2-072 interconnection switching station.	$0.70	AD2-072
n5863	Adjust remote, relaying, and metering settings at Van Arsdell - 69kV Sub.	$0.05	AD2-072
n5864	Adjust remote, relaying, and metering settings at Mercer Industrial 69 kV Sub.	$0.05	AD2-072
n6731	Install OPGW fiber from on the Van Arsdell-Clay Lick Junction-South Anderson 69 kV line, which is approximately 5.1 miles in length.	$0.44	AD2-072
n6732	Marion County 161kV Substation: Install necessary equipment (a 161 kV isolation switch structure and associated switch, plus interconnection metering, fiber-optic connection and telecommunications equipment, circuit breaker and associated switches, and relay panel) to accept the IC's generator lead line/bus	$1.19	AE1-143

New Network Upgrades – EKPC

NUN	Description	Cost ($M)	Driver
n6913	EKPC to install necessary equipment (a 69 kV isolation switch structure and associated switch, plus interconnection metering, fiber-optic connection and telecommunications equipment, circuit breaker and associated switches, and relay panel) at the new South Lancaster Switching station to accept the IC generator lead line/bus	$1.14	AE2-254
n6914	EKPC to construct a new 69 kV switching station (South Lancaster Switching) to facilitate connection of the Turkey Creek Solar generation project	$3.41	AE2-254
n6915	EKPC to design and construct facilities (~250 feet) to loop the existing Tommy Gooch-Garrard County 69 kV line section into the new South Lancaster 69kV Switching substation	$0.24	AE2-254
n6916	EKPC to upgrade relays and modify relay settings at Garrard County substation for existing line to South Lancaster 69kV Switching substation	$0.10	AE2-254
n6917	EKPC to modify relay settings at Liberty Junction substation for existing line to South Lancaster 69kV Switching substation	$0.01	AE2-254
n6918	EKPC to design and install OPGW in the Garrard County – South Lancaster 69kV line section (1.9 miles)	$0.28	AE2-254

New Network Upgrades – JCPL

NUN	Description	Cost ($M)	Driver
n5853	F734 Flemington-Lebanon 34.5kV Line Tap: Construct a line tap to the customer Point of Interconnection (POI) on the F734 East Flemington- Lebanon 34.5kV line.	$0.21	AD2-213
n5854	East Flemington Substation: Revise relay settings and install 700 MHz radio system to support SCADA switch installation.	$0.09	AD2-213
n5855	Lebanon Substation: Revise relay settings and install 700 MHz radio system to support SCADA switch installation.	$0.09	AD2-213
n5856	F734 Flemington-Lebanon 34.5kV Line Switches: Replace existing double circuit pole with three way tap pole. Install two (2) switch structures. Includes project management and environmental. Also includes nameplates and review of AD2-213 customer drawings.	$0.95	AD2-213
n6675	Manitou-Pleasant Plains 34.5 kV Line- Install new tap structures and conductor to AE1-142 POI.	$0.46	AE1-142
n6912	T748 Flemington-Glen Gardner 34.5 kV Reconfigure: Install (2) single circuit tangent structures on the T748 Fleming-Glen Gardner 34.5kV line to accommodate a new line tap to a customer POI on the F734 East Flemington-Lebanon 34.5kV line.	$0.13	AD2-213

New Network Upgrades – JCPL

NUN	Description	Cost ($M)	Driver
n6984	AE1-060 Generator Lead Termination (Kittatinny – Newton (E707) 34.5 kV Line Tap): Install (3) 34.5 kV load-break air switches with SCADA control on the Kittatinny – Newton (E707) 34.5 kV line. Install 34.5 kV metering in customer's facilities and build single span to point of interconnection with customer.	$0.12	AE1-060
n6985	SCADA Communication: Estimated installation of (3) 700 MHz radio systems (70% penetration of FE territory) to support the SCADA switch replacements. Assumed SCADA work is included in this cost.	$0.10	AE1-060
n6986	Kittatinny Substation: Review/ revise relay settings on the Newton (E707) 34.5 kV line exit	$0.03	AE1-060
n6987	Newton Substation: Review/ revise relay settings on the Kittatinny (E707) 34.5 kV line exit	$0.03	AE1-060
n7463	Update relay settings at remote substations (Gilbert, Morris Park) 34.5kV	$0.02	AF2-139

New Network Upgrades – MAIT

NUN	Description	Cost ($M)	Driver
n6886	Installation of one span of 69 kV circuit from the Point of Interconnection to the tap point at or near MAIT structure #838-175 on the Lyons-Moselem 69 kV line.	$0.17	AD2-115
n6887	Install 69 kV dead-end structure and associated hardware. Install two motor-operated, Supervisory Control and Data Acquisition controlled (SCADA controlled) air break switches at the tap point or near MAIT structure #838-175 on the Lyons-Moselem 69 kV line.	$0.46	AD2-115
n6888	At AD2-115 Substation, install a 700 Mhz or cellular radio system to support SCADA switch operation.	$0.05	AD2-115
n6889	Project management, construction management and environmental at Lyons-Moselem 69 kV	$0.26	AD2-115
n6890	Tap the South Troy- Athens 34.5 kV line (distribution circuit 00517-63) near pole STS-17961 and install a span of 34.5 kV line to the Point of Interconnection with the Interconnection Customer including a new Supervisory Control and Data Acquisition (SCADA) recloser.	$0.10	AF2-265
n6891	South Troy 34.5 kV Substation: Adjust remote relay and metering settings on the Athens 34.5 kV terminal.	$0.01	AF2-265
n6979	Upgrade/adjust relaying as generation expansion at Eagle Valley 115kV	$0.09	AD2-133

New Network Upgrades – MAIT

NUN	Description	Cost ($M)	Driver
n6980	Eldorado-Westfall 46kV line loadability increase for the AD2-133 System Upgrade @ Eldorado SS	$0.17	AD2-133
n6981	Eldorado-Westfall 46kV line loadability increase for AD2-133 System Upgrade @ Westfall SS	$0.23	AD2-133
n6982	Estimated SCADA work at Eldorado & Westfall substations to support relay installations 46kV	$0.05	AD2-133
n7001	At new AE1-129 115 kV Switchyard: Install line exit take-off structure, foundations, disconnect switch and associated equipment at ring bus substation	$0.69	AE1-129
n7002	Construct a new 3-breaker Ring Bus on the 115kV (977) line between Middletown Junction and Zions View	$5.89	AE1-129
n7003	Loop the Middletown Junction-Smith Street (977) 115 kV line into new AE1-129 ring bus ~6.4 miles from Middletown Junction	$1.05	AE1-129
n7004	Middletown Junction115kV: Replace limiting equipment at line terminal: Trap, Tuner, CVT, Relaying	$0.41	AE1-129

New Network Upgrades – MAIT

NUN	Description	Cost ($M)	Driver
n7005	Smith Street 115kV: Replace limiting equipment at line terminal: Trap, Tuner, CVT, Relaying	$0.65	AE1-129
n7085	Construct a new 3-breaker Ring Bus on the 115 kV line between Roxbury and Shade Gap	$6.65	AE1-071
n7086	Loop the Roxbury-Shade Gap 115 kV line into new AE1-071 ring bus	$0.67	AE1-071
n7087	Roxbury 115kV: Install Hybrids and 1 DTT UPLC transmitter	$0.26	AE1-071
n7088	Lewistown 115kV: Install Hybrids and 1 DTT UPLC transmitter. Replace wave trap and line tuner.	$0.36	AE1-071
n7089	Shade Ga 115kV: Install Hybrids and 1 DTT UPLC transmitter	$0.30	AE1-071
n7261.1	AE1-185 Supervisory Control and Data Acquisition (SCADA)/Fiber Communication Estimated installation of 700 MHz radio system (70% penetration of FE territory) to support the SCADA switch installations.	$0.10	AE1-185

New Network Upgrades – MAIT

NUN	Description	Cost ($M)	Driver
n7261.3	AE1-185 Generator Lead Termination: Tap the Hokes – Jackson (79) 69 kV line to the new developer substation.	$1.11	AE1-185
n7261.4	Hokes 69 kV Substation: Update Relay Settings.	$0.08	AE1-185
n7261.5	Jackson 69 kV Substation: Update Relay Settings.	$0.08	AE1-185
n7333	AE1-196 Supervisory Control and Data Acquisition (SCADA)/Fiber Communication Estimated installation of (2) 700 MHz radio system (70% penetration of FE territory) to support the SCADA switch installations. SCADA work included.	$0.10	AE1-196
n7334	Hokes-Jackson 69 kV Line Switches: At Hokes-Jackson (79) 69 kV line structure 79-142, install two (2) SCADA controlled disconnect switches, one each on either side of the tap. Includes Project Management, Commissioning, Environmental, Forestry, Real Estate, and Right of Way.	$0.73	AE1-196
n7335	Hokes 69 kV Substation: Update Relay Settings.	$0.09	AE1-196
n7336	Jackson 69 kV Substation: Update Relay Settings.	$0.09	AE1-196

New Network Upgrades – MAIT

NUN	Description	Cost ($M)	Driver
n7454	Estimated installation of 700 MHz radio systems (70% penetration of FE territory) to support SCADA Switches at Andover (Maysville) 69 kV Line . Assumed SCADA work is included in this cost.	$0.12	AE2-343
n7455	Tap the Andover (Maysville) 69kV line at or near structure 137. Install two 69kV line switches with SCADA at Dilworth-Maysville 69kV Tap	$0.92	AE2-343
n7456	Update relay settings at Dilworth 69kV	$0.10	AE2-343
n7457	Update relay settings at Maysville 69kV	$0.10	AE2-343
n7458	Update relay settings at Sharon 69kV	$0.10	AE2-343

New Network Upgrades – ME

NUN	Description	Cost ($M)	Driver
n6026	Install one span of Attachment Facility line from the Point of Interconnection (POI) to the tap point at the Hokes – Grantley 69 kV Line.	$0.20	AD2-116
n6027	Install two switches at the tap point at the Hokes – Grantley 69kV Line	$0.40	AD2-116
n6028	Estimated installation of 700 MHz radio system at Hokes and Grantley 69kV (70% penetration of FE territory) to support the SCADA switch replacements. Assumed SCADA work is included in this cost	$0.05	AD2-116
n6253	New Line Terminal Equipment 115kV: Install radial equipment from ring bus terminal to the point of interconnection including revenue metering.	$0.41	AD1-020
n6254	Fiber – ADSS fiber installation to AD1-020 interconnection substation.	$0.24	AD1-020
n6255	New AD1-020 Switchyard- Install 115kV six breaker ring bus interconnection station for new customer generation addition. Includes Project Management and Construction Management.	$4.30	AD1-020
n6256	SCADA Communication- Estimated MPLS router at new AD1-020 Interconnection substation to support new RTU.	$0.34	AD1-020

New Network Upgrades – ME

NUN	Description	Cost ($M)	Driver
n6257	Hunterstown-Lincoln Line Loop- Loop the Hunterstown-Lincoln 115 kV circuit into the proposed 3-breaker ring bus between structures #78/79 and #80/81.	$0.47	AD1-020
n6258	Lincoln Substation - Upgrade line relaying for Hunterstown 115 kV line exit and rename for new AD1-020 PJM station.	$0.26	AD1-020
n6259	Hunterstown Substation –Upgrade line relaying for Lincoln 115 kV line exit and rename for new AD1-020 PJM station.	$0.26	AD1-020

New Network Upgrades – OVEC

NUN	Description	Cost ($M)	Driver
n7881	Replace 32 transmission structures along the Dearborn – Pierce 345kV line.	$17.00	AE2-297

New Network Upgrades – PENELEC

NUN	Description	Cost ($M)	Driver
n6717	Philipsburg 34. 5 kV Substation- Adjust remote relay and metering settings.	$0.04	AE2-131
n6726	Dubois 34.5kV SS. Adjust Remote Relay and Metering Settings.	$0.04	AE2-126
n6727	Curwensville 34.5kV SS. Adjust Remote Relay and Metering Settings.	$0.04	AE2-126
n6745	East Towanda 34.5kV SS. Adjust Remote Relay and Metering Settings.	$0.01	AF2-436
n6746	New Albany 34.5kV SS. Adjust Remote Relay and Metering Settings.	$0.01	AF2-436
n6747	Wyalusing 34.5kV SS. Adjust Remote Relay and Metering Settings.	$0.01	AF2-436
n6748	Oxbow 34.5kV SS. Adjust Remote Relay and Metering Settings.	$0.01	AF2-437

New Network Upgrades – PPL

NUN	Description	Cost ($M)	Driver
n7242.1	Construct Attachment Facilities including: 69 kV circuit from the Milton – AE2-042 69kV line to the Point of Interconnection. One (1) Motor Operated Load Break Air Break Switch, and associated poles, structures, and foundations	$0.35	AE2-042
n7242.2	Add a second circuit (Milton - AE2-042 69 kV line), to the existing Milton - Millville line structures, and modify the new Milton - AE2-042 69kV circuit to tie in the Attachment Facilities.	$0.64	AE2-042
n7242.3	Modify the Milton 69 kV substation relays	$0.28	AE2-042
n7885	Install a 69 kV Tap line, MOLBAB Switch, Poles, structure, and foundations for AE2-060.	$0.55	AE2-060
n7886	Complete MIFF line modifications to tie in the new AE2-060 Attachment Facilities. This includes replacing existing steel monopole structure (grid # 10248S44679) with a new steel monopole single circuit tap structure with a foundation and reframe the structures on each side of the tap from suspension to tension.	$0.06	AE2-060
n7887	Short Circuit Study, Review IC Engineering Package, and Remote End Work at the Juniata 69 kV Substation	$0.17	AE2-060
n7891	69 kV Tap line, MOLBAB Switch, Poles, structure, and foundations for AE2-133	$0.94	AE2-133

New Network Upgrades – PPL

NUN	Description	Cost ($M)	Driver
n7892	Complete SUNB-MIDD 1 line modifications to tie in the new AE2-133 Attachment Facilities. This includes connecting the conductors and OPGW from the MILT-MVIL line to the new tap structure. Reframe the two existing structures on each side of the tap.	$0.10	AE2-133
n7893	Short Circuit Study, Review IC Engineering Package, and Remote End Work at the Sunbury 69 kV Substation	$0.11	AE2-133

New Network Upgrades – PSEG

NUN	Description	Cost ($M)	Driver
n6234	Replacement of (2) poles and associated PSE&G standard conductor Installation of (2) new poles as H-frame for STATCOM equipment Installation and commissioning of STATCOM equipment Relocation of branch recloser to new poles at Deptford 13kV	$0.41	AE2-065