Status of Network Upgrades

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Interconnection Analysis

Transmission Expansion Advisory Committee
October 8th, 2024

Overview

- Network Upgrades status as of August 19th, 2024

- $427 million net increase in total Network Upgrade cost estimates since September 2023
- $631 million in New Network Upgrades
- $107 million increase in cost estimates and scope changes
- $311 million decrease for cancelled Network Upgrades

Network Upgrades - AEC

NUN	Description	Cost ($M)	Driver
n4296	The SCULL #2 to MILL #2 138 kV line: In order to mitigate the overloads, the relay settings should be adjusted at Mill 138 kV bus. The new emergency rating will be 270 MVA.	0.005	Y1-077
n7051	To mitigate the Lewis 138 kV bus tie overload, breaker 'JN' will be replaced with a 3000 amp breaker.	0.236	AF2-016
n8026	Install new underground fiber between IC switching station and ring bus substations control enclosure at AE1-179 South Millville-Newport 69 kV line	0.2	AE1-179
n8185	Rebuild approximately 3.5 miles of the 0762 South Millville to Newport 69kV line from South Millville to the POI substation utilizing steel monopoles, 795 ACSR conductor and OPGW	9.9	AE1-179

Network Upgrades - AEP

NUN	Description	Cost ($M)	Driver
n3069	Install metering at the Keystone 345kV substation for V3-015 project	0.07	V3-015
n4106.3	Jefferson - Clifty 345 kV line sag study remediation is one location of grading to remediate clearance location of concern in span 1 to 2. Latest Facility Study: Extend One (1) Tower on the Jefferson - Clifty Creek (IKEC) 345 kV Circuit	0.41	AF1-215
n4323	Loop the Dumont - Sorenson 345 kV line into the new Eldeberry Substation pending the results of the AEP Sag Study	5	X2-052
n4790	Replace Dumont 345 kV substation 2500A wavetrap	0.2	AB1-122
n5034	Build a new Sullivan - Reynolds 765 kV line.	441.7	X3-028
n5357	Upgrade line protection and controls at the Vassell 765 kV substation to coordinate with the new 765 kV switching station.	1.1	AB2-067
n5472	Sag study results on the Wildcat – Hillsboro 138 kV line show that a distribution circuit underneath the line needs to be relocated.	0.19	AC1-089

Network Upgrades - AEP

NUN	Description	Cost ($M)	Driver
n5613	Rebuild or reconductor 0.9 miles of overhead conductor (ACSR 397.5, 30/7, LARK) between ALTVSTA and 05OTTER 138 kV line	2.74	AE1-250
n5668	Install new 138kV three-breaker ring bus station along the Rio-Lick 138kV line, installation of associated protection and control equipment, line risers, switches, jumpers, and supervisory control and data acquisition (SCADA) equipment.	6.7685	AC1-188
n5669	Modify Rio to Lick 138kV transmission line Cut In	1.0727	AC1-188
n5670	Install 138kV Revenue Meter, generator lead transmission line span from the new Terrapin 138kV station to the Point of Interconnection, and install two (2) diverse fiber-optic paths from the Point of Interconnection to the Terrapin 138kV Station control house.	0.8305	AC1-188

Network Upgrades - AEP

NUN	Description	Cost ($M)	Driver
n5674	Rebuild and expand the existing Elk 138 kV Station by removing the two (2) existing 138 kV box bays and associated equipment and installing a new five (5) breaker 138 kV Station, physically designed as a six (6) position breaker and a half station but operated as a five (5) breaker ring bus. The two (2) existing 138 kV circuit breakers will be reused and three (3) new 138 kV circuit breakers will be installed. A 16' x 12' DICM expansion will be added to existing Elk 138 kV Station Control House. Install other associated line protection and control equipment, 138 kV line risers, switches, jumpers, and supervisory control and data acquisition (SCADA) equipment. Review and update remote end protection relay settings at the Corwin and Lemaster 138 kV Stations.	6.722	AC1-194
n5675	Reroute and re-terminate the Corwin-Elk and Elk-Lemaster 138 kV circuits to a new bay position in the rebuilt Elk 138 kV Station	0.6951	AC1-194
n5676	Install portion of 138 kV generator lead line from the Elk 138 kV Station to the point of change of ownership with Interconnection Customer, 138 kV revenue meter, and dual fiber-optic cable from the Elk 138 kV Station control house to Interconnection Customer's fiber connection/transition.	0.9501	AC1-194
n5699	Install 138kV Revenue Meter, generator lead transmission line span from the new Red Run 138kV station to the Point of Interconnection, and install two (2) diverse fiber-optic paths from the Point of Interconnection to the Red Run 138kV Station control house.	0.612	AC2-015

Network Upgrades - AEP

NUN	Description	Cost ($M)	Driver
n5700	Install new 138kV three-breaker ring bus station along the Chatfield-Howard 138kV line, installation of associated protection and control equipment, line risers, switches, jumpers, and supervisory control and data acquisition (SCADA) equipment.	5.4417	AC2-015
n5701	Chatfield-Crawford 138kV T-Line Cut In	1.1041	AC2-015
n5702	Install New SFP Transceivers and Update Protective Relay settings at Chatfield and Howard 138 kV Stations	0.0794	AC2-015
n5703	Install One (1) Fiber-Optic Path to the AEP Network to facilitate relaying between Red Run, Howard, and Melmore 138 kV Stations	0.5592	AC2-015
n6037	Expansion of Sullivan 345 kV substation and installation of associated protection and control equipment	1.75	AB1-087
n6037.1	Install breakers, physical structures, protection and control equipment, and associated facilities at Sullivan 345 kV switching station	3.5746	AB1-087
n6037.2	Install custom dead-end transmission line structure to raise Sullivan-West Casey 345kV line	0.6119	AB1-087
n6037.3	Install custom dead-end transmission line structure to raise Sullivan-Petersburg 345kV line	0.6119	AB1-087

Network Upgrades - AEP

NUN	Description	Cost ($M)	Driver
n6038	Install 345 kV Revenue Metering at Sullivan 345 kV switching station	0.35	AB1-087
n6039	Expansion of Sullivan 345 kV substation and installation of associated protection and control equipment	1.75	AB1-088
n6039.1	Install breakers, physical structures, protection and control equipment, and associated facilities at Sullivan 345 kV switching station	1.6773	AB1-088
n6040	Install 345 kV Revenue Metering at Sullivan 345 kV switching station	0.35	AB1-088
n6124	Increasing the Danville - East Danville 138 kV circuit summer rating to 337/482 MVA will still require AEP to rebuild the line	8.25	AD1-152
n6137	Perform a sag study & mitigation on the AEP-owned portion of the Tidd-Wylie Ridge 345kV tie-line circuit (8.6 miles). This will raise the operating temperature & ratings to the standard value.	0.035	AE1-080
n6263.2	Replace 600 Amp Sw at Harrison to upgrade the Harrison – Zuber 138 kV line.	0.2	AE1-093
n6401.1	Rebuild 13 miles of Adkins - Beatty 345 kV line.	55	AE2-319

Network Upgrades - AEP

NUN	Description	Cost ($M)	Driver
n6461	Perform sag study on AEP's portion of Wildcat-Kenton (Kenton - Emerss) 138kV circuit, 23.5 miles 477 ACSR 26/7 Hawk conductor.	0.094	AE2-038
n6497.2	Replace 6, 3000A Rockport CTs on the Rockport - Jefferson 765 kV line	4.8	AE2-130
n6593	Replace Adam substation conductor on the AE2-089 Tap - Adam 138 kV line	0.3	AE2-089
n6634.1	New 138 kV Switching Station - Construct a new three (3) circuit breaker 138 kV switching station physically configured in a breaker and half bus arrangement but operated as a ring-bus for AC2-061 interconnection	6	AC2-061
n6634.2	Install 138 kV Revenue Metering at Hillsboro-Clinton County 138 kV	0.25	AC2-061
n6634.3	Install Hillsboro-Clinton County 138 kV transmission line cut In	1	AC2-061
n6634.4	Upgrade line protection and controls at the Hillsboro 138 kV substation to coordinate with the new AC2-061 138 kV switching station.	0.25	AC2-061
n6769.1	Upgrade/Replace 3-345kV 1600A switches at Beatty station	1.5	AF1-228

Network Upgrades - AEP

NUN	Description	Cost ($M)	Driver
n7290	Construct generator lead first span exiting the POI station, including the first structure outside the fence at Lockwood Road 138 kV	0.4	AF1-063
n7291	Install 138 kV Revenue Metering at Lockwood Road 138 kV substation	0.388	AF1-063
n7292	Upgrade line protections & controls at the Lockwood Road 138 kV substation	0.045	AF1-063
n7293	Expand the Southwest Lima 345 kV substation: Install one (1) additional 345 kV circuit breakers and extend the 345 kV bus. Installation of associated protection and control equipment, 345 kV line risers and SCADA	1.762	AF1-164
n7294	construct generator lead first span exiting the POI station, including the first structure outside the fence at South West Lima 345 kV	1.025	AF1-164
n7295	Install 345 kV Revenue Metering at South West Lima 345 kV substation	0.427	AF1-164
n7448	Upgrade existing Varner 138 kV Station	1.772288	AF1-141
n7554.1	Replace 5 Sub cond 2000 AAC 91 Str at Danville2 138kV station.	0	AE1-250

Network Upgrades - AEP

NUN	Description	Cost ($M)	Driver
n7554.2	Replace 3 Sub cond 2000 AAC 91 Str at East Danville 138kV station.	0	AE1-250
n7754.3	The Danville – East Danville 138 kV Circuit will require higher capacity conductor to obtain a rating higher than the 482 MVA achieved by the initial rebuild. As such, APCo will instead install 1272 ACSS conductor during the initial rebuild project under n6124	0.46	AG1-030
n8007	Upgrade line protection and controls at the Cherry Creek 138kV station	0.0464	AE1-212
n8008	Install fiber from the new 138kV station to the Grandview 138 kV station for relaying.	0.1463	AE1-212
n8071.1	Construct a new 138 kV Switching Station for AF2-083 interconnection	2.0866	AF2-083
n8071.2	Install transmission line cut-in & update protection settings at Kenzie Creek and Stone Lake 69 kV substations	0.342	AF2-083
n8071.3	Install fiber-optic connections at Kenzie Creek and Stone Lake 69 kV substations	0.0495	AF2-083
n8071.4	Replace substation conductors at Stoner Lake 69 kV	0.0391	AF2-083

Network Upgrades - AEP

NUN	Description	Cost ($M)	Driver
n8071.5	Replace 16 structures and asscoiated spans of conductor at Kenzie Creek and Stone Lake 69 kV substations	0.8699	AF2-083
n8089.1	Expand Huntington Jct Switching Station into a 4 Breaker Ring Bus	4.2344	AF1-092
n8089.2	Sorenson - Delaware 138 kV Re-Route, Sorenson and Hummel Creek 138 kV line Re-Terminations	0.3849	AF1-092
n8089.3	Install Transition Fiber Cable at Huntington Jct 138 kV substation	0.1526	AF1-092
n8089.4	Sorenson and Hummel Creek 138 kV Remote End Work	0.0471	AF1-092
n8158	Expand the Jug Street 138kV Station, including the addition of one (1) 138 kV circuit breaker, installation of associated protection and control equipment, line risers, switches, jumpers and supervisory control and data acquisition (SCADA) equpment.	0.9386	AF1-062
n8196.1	AEP will replace two (2) existing double circuit towers with steel double circuit single pole structures on the Allen - RPMone 345kV line. New rating is 1154 MVA Rate B. Scope is from the Facility Study results of the N6740 Sag Study for AE1-113.	0.9164	AF1-158
n8208.1	Construct a new three (3) circuit breaker 138 kV station, Atalla 138 kV Station, physically designed as a breaker and half bus station but operated as a three (3) breaker ring-bus	5.9239	AE2-089

Network Upgrades - AEP

NUN	Description	Cost ($M)	Driver
n8208.2	Install Two (2) Structures, Two (2) Spans of Conductor and OPGW Shield Wire, Connect Atalla 138 kV Station to Existing Transmission Circuit	0.7743	AE2-089
n8208.3	Install Two (2) Fiber-Optic Paths to facilitate SCADA/CES connectivity Includes CES ICON Upgrade work at Adams and Jay Stations 138 kV	0.198	AE2-089
n8420	Install One (1) New 138 kV Circuit Breaker, Associated Equipment, Update Protective Relay Settings at the Jug Street 138 kV Station	0.9386	AF1-062
n8435	Update Protective Relay Settings at the Platter Creek 69 kV Station	0.045	AE2-322
n8448.1	Install two (2) Structures, two (2) Spans of Conductor, Connect ITO 69 Station to Existing Transmission Circuit	0.68	AE2-298
n8448.2	Install Two (2) Fiber-Optic Paths to facilitate relaying between ITO, Haviland, and South Van Wert 69 kV Stations	0.2632	AE2-298
n8448.3	Replace Protective Relays, Other Equipment at Haviland and South Van Wert 69 kV Stations	0.7422	AE2-298
n8448.4	Review/Update Protective Relay Settings at the Proposed AE2-298 69 kV Station.	0.4533	AE2-298

Network Upgrades - AEP

NUN	Description	Cost ($M)	Driver
n8454	Lower the Southwest Lima – West Moulton 138 kV circuit	0.264	AF1-164
n8456	Review the protection and control settings at the Elk 138 kV Station and adjust as needed. Review the Elk 138 kV Station relay settings	0.0471	AE1-093
n8459.1	Install Custom Steel Double Circuit Tap structure, Two (2) Conductor Spans for in-and-out from the New 138 kV Station to Existing Smith Mountain - East Danville 138 kV Circuit	1.28	AE1-250
n8459.2	Remote protection and relay work at Museville 138 kV	0.421	AE1-250
n8459.3	Remote protection and relay work at East Danville 138 kV	0.421	AE1-250
n8459.4	Build a three breaker at AE1-250 138 kV switching station	4.286	AE1-250
n8474.1	Install Four (4) Structures, Four (4) Spans of Conductor, Connect the Proposed 345 kV AF1-228 Station to existing Beatty - Greenek 345 kV transmission circuit (AEP)	2.7775	AF1-228
n8474.2	Update Protective Relay Settings at the Beatty and proposed AE2-148 345 kV (AEP) substations	0.0665	AF1-228

Network Upgrades - AEP

NUN	Description	Cost ($M)	Driver
n8475.1	Install Three (3) Structures, three (3) Spans of Conductor with Shield Wire, Connect Proposed 345 kV Station to existing Galion to South Berwick 345 KV line	1.877	AF1-229
n8475.2	Replace Protective Relays at South Berwick 345 kV Station, Install SFP Transceiver, Remove Wavetrap	0.3238	AF1-229
n8475.3	Install One (1) Six (6) Mile Fiber-Optic Cable Path to facilitate direct fiber relaying and SCADA Connectivity between the Proposed AF1-229 345 kV Station and Berwick Station	0.463	AF1-229
n8505.1	Install two (2) new fiber optic cable paths consisting of 3 miles of 144 count all-dielectric self-supporting (ADSS) cable installed on existing AEP structures, 0.2 miles of 144 count ADLT cable installed in new underground right of way (ROW), and associated terminating equipment and devices between the proposed AE2-298 switching station, Haviland, and South Van Wert 69 kV stations	0.38673	AE2-298
n8505.2	Install two (2) new steel, 75' single circuit, single pole dead-end structures on concrete piers with anchor bolt cages and two (2) spans of drake transmission line conductor with 7#10 alumoweld shield wire on the Cavett Switch - West Van Wert 69 kV line	1.006408	AE2-298
n8505.3	Replace the protective relays and circuit breaker controls, replace the existing coupling capacitor voltage transformer (CCVT) with a new 3-phase CCVT and Install a new surge arrester at Haviland 69 kV	0.46964	AE2-298

Network Upgrades - AEP

NUN	Description	Cost ($M)	Driver
n8505.4	Replace the protective relays and circuit breaker controls, replace the existing coupling capacitor voltage transformer (CCVT) with a new 3-phase CCVT and Install a new surge arrester at South Van Wert 69 kV	0.519595	AE2-298
n8534	Relocation of Auburn - Varner 138 kV Structure	0.151627	AF1-141
n8540	Expansion of existing substation at Southwest Lima 345 kV	1.789243	AF1-164
n8541	Replace two (2) existing 85’ single pole, single circuit tangent structures on the Southwest Lima to West Moulton 138 kV line	0.311142	AF1-164
n8594.0	Replace all 447 all aluminum conductors, replace the bus differential panel, review and revise the protective relay settings at Stone Lake 69 kV	0.730618	AF2-083
n8595.0	Review and revise relays at Kenzie Creek 69 kV	0.071413	AF2-083
n8596.0	Install two (2) new fiber optic cable paths at Kenzie Creek - Stone Lake 69 kV line	0.238921	AF2-083
n8597.0	Rebuild 0.6 miles of the Pokagon – Colby 69 kV Circuit	2.19111	AF2-083

Network Upgrades - AEP

NUN	Description	Cost ($M)	Driver
n8598.0	Removal of equipment at Pokagon – Colby 69 kV Circuit	0.37206	AF2-083
n8599.0	Construct a new 69 kV ring bus station, initially populated with three (3) circuit breakers, expandable to four (4) breakers on the Kenzie Creek - Stone Lake 69 kV circuit	7.289589	AF2-083
n8600.0	Installation of two (2) new steel, 85' single circuit, single pole dead-end structures on concrete piers with anchor bolt cages and two (2) spans of ACSR 1033.5 (Curlew) transmission line conductor with 7#8 Alumoweld shield wire on the Kenzie Creek - Stone Lake 69 kV circuit	1.200325	AF2-083

Network Upgrades - APS

NUN	Description	Cost ($M)	Driver
n4655	Reconfigure the Albright 138 kV substation to a breaker and a half configuration .	20.7	AD2-180
n4851	Glen Falls 138 kV substation: Grade and extend fence and ground grid approx. 50' x 180'. Install attachment line from 138 kV SF6 breaker to POI	1.79	AA2-119
n4855	Rebuild 2.5 miles of the Glen Falls to Oak Mound 138 kV line	3.03	AA2-119
n6680	Construct one span 25 kV tap to customer's substation on Young Jct. to Sligo 25 kV line	0.03	AF1-210
n6681	Install 25 kV metering in the customer's substation at Young Jct. to Sligo 25 kV line	0.0389	AF1-210
n6682	Construct 25 kV line tap with two 25 kV switches on the at Young Jct. to Sligo 25 kV line for the interconnection of AF1-210.	0.0625	AF1-210
n6683	Update relay settings at Burma 23 kV	0.0144	AF1-210
n6684	Update relay settings at Templeton 23 kV	0.0144	AF1-210

Network Upgrades - ATSI

NUN	Description	Cost ($M)	Driver
n4173	Un-six wire the existing Lakeview-Ottawa and Lakeview-Greenfield 138kV lines, creating a new third line in the process, Ottawa-Greenfield 138kV.	3.52	AB1-107
n6185	Build a new 138 kV line from Black River to Astor substation.	18.67	AE1-119
n6712	Install AC2-195 ADSS fiber: From the new AC2-195 interconnection substation to the anticipated ADSS cable near the intersection of Marion Williamsport Road and N Main Street proposed for PJM queue position AB2-131. The assumed route is a combination of aerial ADSS (0.87 miles) and underground bore (0.14 miles).	0.165	AC2-195
n7310	AE2-285 Generator Lead Termination: Installation of foundations, disconnect switch and associated equipment to accommodate the termination of the 69 kV generator lead line at the new AE2-285 substation.	0.0917	AE2-285
n7311	Metering: Install customer-owned revenue metering at the new AE2-285 substation.	0.0025	AE2-285
n7926	Tap the Maysville-Sharon 69 kV (Y-301) line near structure 62 and install disconnect switches on either side of the tap at the new AE1-079 substation. Includes project management, environmental, forestry, real estate and right of way.	1.193	AE1-079
n7927	Update Relay Settings at Marysville 69 kV substation	0.0926	AE1-079
n7928	Update Relay Settings at Sharon 69 kV substation	0.0926	AE1-079

Network Upgrades - ATSI

NUN	Description	Cost ($M)	Driver
n7929	Update Relay Settings at Masury 69 kV substation	0.0926	AE1-079
n7930	Update Relay Settings at Cedar street 69 kV substation	0.0926	AE1-079
n7931	Update Relay Settings at McDowell Street 69 kV substation	0.0926	AE1-079
n7932	Update Relay Settings at Dilworth 69 kV substation	0.0926	AE1-079
n7933	SCADA/Fiber Communication: Estimated installation of 700 MHz radio system (70% penetration of FE territory) to support the SCADA switch replacements at the new AE1-079 substation	0.1033	AE1-079
n7934	Tap the Dilworth-Andover (Maysville) 69 kV (Y-78) line at structure 145 and install disconnect switches on either side of the tap. Includes project management, environmental, forestry, real estate and right of way.	0.883	AE1-237
n7935	Update Relay Settings at Marysville 69 kV substation	0.0926	AE1-237
n7936	Update Relay Settings at Sharon 69 kV substation	0.0926	AE1-237
n7937	SCADA/Fiber Communication: Estimated installation of 700 MHz radio system (70% penetration of FE territory) to support the SCADA switch replacements at AE1-237 substation. Assumed SCADA work is included in this cost.	0.0517	AE1-237

Network Upgrades - ATSI

NUN	Description	Cost ($M)	Driver
n8087.1	McDowell 69 kV: Replace Maysville Y- 80/107 line relay & control panel with a standard line relaying panel.	0.7186	AF1-093
n8087.2	Masury 69 kV: Relay settings will be revised.	0.0404	AF1-093
n8087.3	AF1-093: Tap the Maysville- McDowell 69kV line roughly 8.2 miles from McDowell substation, near structure 108. Install two 69kV line switches with SCADA. Install one span of 795 ACSR Drake toward the customer substation.	0.7721	AF1-093
n8087.4	Maysville 69 kV: Relay settings will be revised.	0.0388	AF1-093
n8087.5	Cedar Street 69 kV: Relay settings will be revised.	0.0388	AF1-093
n8087.6	Sharon 69 kV: Relay settings will be revised.	0.0388	AF1-093
n8087.7	Campbell 69 kV: Relay settings will be revised.	0.0388	AF1-093
n8409	For the Napoleon Muni-Midway 138 kV Line, reconductor the section of 336 ACSR 30/7 of the transmission line with 556.5 ACSR. Change the relay settings of the SEL relay for the ZR component to meet or exceed 262 MVA for Summer Emergency.	23.1006	AF2-127
n8475.4	Review and revise (as needed) the Galion 345 kV Station remote end line protection relay settings.	0.25	AF1-229

Network Upgrades - ATSI

NUN	Description	Cost ($M)	Driver
n8498.1	AF2-187 Interconnection Substation: Install physical security and camera system.	0.389042	AF2-187
n8498.2	Cloverdale - East Wooster 138kV Line: Install tangent structure to support the Cloverdale-East Wooster 138kV circuit parallel to the Brookside-Cloverdale 138kV loop location	0.227552	AF2-187
n8498.3	Brookside - Cloverdale 138kV Loop: Loop the Brookside - Cloverdale 138kV approximately 18.3 miles from the Cloverdale 138kV substation near structure #487 into the new AF2-187 interconnection substation	0.8254	AF2-187
n8498.4	Ross Substation 138 kV: Install in-sub fiber run and SEL-2506.	0.427003	AF2-187
n8498.5	Brookside Substation 138 kV: Install new wave trap, line tuning unit and revise relay settings.	0.77921	AF2-187
n8498.6	Cloverdale Substation 138 kV: Install new wave trap, line tuning unit and revise relay settings.	0.747618	AF2-187
n8498.7	AF2-187 138 kV Interconnection Substation: Design, installation, and testing/commissioning for MPLS equipment for SCADA transport at AF2-187 Interconnection Substation.	0.327978	AF2-187
n8498.8	AF2-187 138 kV Interconnection Substation: New ADSS Fiber installation between AF2-187 Interconnection Substation and Fiber backbone.	0.272713	AF2-187

Network Upgrades - ATSI

NUN	Description	Cost ($M)	Driver
n8515	Modify Relay Settings at GM Lordstown, Niles, Magellan, Newton Falls, Evergreen, Mahoningside, Bluebell, Darrow, Shalersville, Lordstown, Salt Springs, Bruce Mansfield, Juniper, Brady, Beaver Valley, Chamberlin, Ravenna, and East Akron 345 kV substations and Integrate customer protection and controls to the FirstEnergy transmission system.	1.032442	AB1-105

Network Upgrades - ComEd

NUN	Description	Cost ($M)	Driver
n4601	Replace one overdutied 138 kV breaker with a 63 kA breaker at NELSON B4 bus. Breaker name: 155 15507	2.35	AA1-146
n5145	Reconfigure Wilton 765kV bus thereby allowing for 765kV L11216 (currently on Bus 6) to be relocated to Bus 8. Along with this line relocation, installation of 2-765kV BT CB's (6-8 & 8-2).	55.23	AD1-100
n5171.1	Upgrade, all existing 138kV circuit breakers at Kewanee are 3-cycle devices with achievable clearing time of 6/11 cycles. Relay upgrade on line L6101 will be required to support this clearing time.	0.14	U4-027
n5171.2	Upgrade all existing 138kV circuit breakers at Kewanee are 3-cycle devices with achievable clearing time of 6/11 cycles. Relay upgrade on line L7411 will be required to support this clearing time.	0.14	U4-027
n5171.3	Upgrade all existing 138kV circuit breakers at Kewanee are 3-cycle devices with achievable clearing time of 6/11 cycles. Relay upgrade on line L7421 will be required to support this clearing time.	0.14	U4-027
n5171.4	Upgrade all existing 138kV circuit breakers at Kewanee are 3-cycle devices with achievable clearing time of 6/11 cycles. Relay upgrade on line L7423 will be required to support this clearing time.	0.14	U4-027
n5171.5	Upgrade, all existing 138kV circuit breakers at Kewanee are 3-cycle devices with achievable clearing time of 6/11 cycles. Relay upgrade on line L94301 will be required to support this clearing time.	0.14	U4-027

Network Upgrades - ComEd

NUN	Description	Cost ($M)	Driver
n5171.6	Upgrade all existing 138kV circuit breakers at Kewanee are 3-cycle devices with achievable clearing time of 6/11 cycles. Relay upgrade on line segment of L15508 from Kewanee to U4-027 (new line number 7408)	0.14	U4-027
n5173	Add high-speed backup relaying and associated communications to 138kV line Kewanee to U4-027 (7408)	2.8	U4-027
n5253	Reconductor the ComEd portion of Crete - St John 345 kV line	14.9	AD1-100
n5254	Reconductor the Lee County - Byron 345 kV line.	17.2	AF2-199
n5254.1	Mitigate Sag on the Lee County - Byron 345 kV line	10	AF2-393
n5917	Reconductor the E Frankfort - Crete 345 kV line.	10.3	AE1-198
n6288	A preliminary estimate for sag mitigation between GREENACRE; T and 05OLIVE 345 kV is $13.9M with an estimated construction timeline of 30 months.	13.9	AE1-193
n6840	ComEd 345kV L11212 SSTE rating is 1846 MVA. The upgrade will be to install a new 345kV bus tie circuit breaker at Station 12 Dresden. The new 345kV breaker will be installed as BT CB 12-13. Initial review of this proposal is that the existing contingency will be reduced and potentially reducing the post contingemcy flow. PJM to confirm this proposal in study. The ratings for L11212 will not change rather the contingency as stated above will be revised.	3.44	AD2-100

Network Upgrades - ComEd

NUN	Description	Cost ($M)	Driver
n7383	Relaying upgrades at TSS 100 Shady Oaks 138 kV Substation including: Install a SEL-411L as Current Differential Line protection on L94701 and make the existing primary relay, SEL-311L, the secondary relay. Modify L16901 CB and L13901 CB tripping to accommodate new topology. Install load rejection logic such that transfer trip is initiated on both primary and secondary relaying to TSS 946 GSG-6 Wind Farm if L94701 CBs are open at TSS 100 Shady Oaks.	0.4101	AD2-134
n8073	Install relaying at Kewanee 138 kV substation for the new bay position. Conduct a detailed review of the IC relay settings	0.603	AC1-033
n8162	ComEd 345kV L0304 SSTE rating is 1512 MVA. The upgrade will be to mitigate the sag on the Poweton - Tazewell 345 kV line and replace a 345kV disconnect switch. A preliminary estimate for this work is $9.7M with a estimated construction timeline of 30 months. Upon completion of this upgrade the new ratings will be 1679/2058/2107/2280/2622 MVA (SN/SLTE/SSTE/SLD/ALDR).	9.7	AE2-255
n8189.7	Replace and/or modify remote relay communication devices and SCADA equipment at Powerton - Nevada 345 kV line to reliably interconnect the Customer facility with the Transmission system at the applicable remote end stations. Remove microwave equipment at remote end stations.	0.809386	AD2-038
n8195.9	Relay upgrades at TSS 112 Wilton Center 345kV	0.29	AD1-100
n8436.1	Reroute existing L93913 to the new termination at the new 345kV Bus 4 at TSS 908 Mole Creek 345 kV	3.571	AE1-113
n8436.2	Expand TSS 908 Mole Creek 345 kV to a six breaker ring bus	17.659	AE1-113

Network Upgrades - Dayton

NUN	Description	Cost ($M)	Driver
n5520	Protection system changes at Crystal 69 kV Substation	0.12	AC2-067
n5521	Protection system changes at Hutchings 69 kV Substation	0.5	AC2-067
n7951	Greenfield 69kV substation – Convert the existing 69kV substation to a 2 bus configuration substation. This includes the installation of five 69kV circuit breakers, disconnect switches, all physical structures, protection and control equipment, communications equipment, and associated facilities at the Greenfield 69kV substation	1.315	AE1-040
n8474.3	Rreview and revise (as needed) the Greene 345 kV Station remote end line protection relay settings depending on the relative timing of completion of AE2-148 and AF1-228. (Dayton - AES Ohio)	0.25	AF1-228

Network Upgrades - DEOK

NUN	Description	Cost ($M)	Driver
n8177	Install one (1) dual SEL-311L relay protection package, fiber connected to the customer end, for primary and backup protection of the interconnect line at the Woodsdale 345 kV substation	0.0371	AE2-267

Network Upgrades - Dominion

NUN	Description	Cost ($M)	Driver
n5609	Rebuild 41.13 miles of 500 kV Line 576 from Midlothian to North Anna with 3-1351.5 125C ACSR with the following ratings: Rate A: 4816, Rate B: 4816 & Rate C: 5539	234.441	AC2-141
n5612	Rebuild 2.8 miles 768 ACSS with a rating of A: 393, B: 393, C: 452 at AC1-076 Tap – Paytes DP 115 kV line	3.65	AD1-115
n5613.1	Replace 795 AAC station conductors at Altavista 138 kV substation	$0.100	AE1-250
n6115	For DEV portion, rebuild 4.7 miles of 115 kV Line 45 from Kerr Dam to GW King Tap with 768 ACSS.	11.3505	AD2-033
n6130	Rebuild 12.4 miles 2-636 ACSR between Chesterfield-Basin 230 kV, Ratings after the upgrade: 1047/1047/1204	31	AE1-069
n6141	Replace Relay at Everetts 115 kV, rating after the ugprade: 300/300/345	0.5	AD1-076
n6142	Rebuild 5.14 miles 636 ACSR between AB2-169 TAP 115.0 kV and 3FIVE PT 115.0 kV Circuit 1. Rating after the upgrade: 261/261/301	6.682	AD1-076
n6144	Rebuild DEV portion 20.5 miles 2-636 ACSR and Rebuild 17.5 miles 2-636 ACSR between 6GREENVILE T - 6EVERETS 230.0 kV substations. Rating after the upgrade: 1047/1047/1204	39.92	AD1-023
n6178	Rebuild 4.5 miles of 230 kV Line 2003 from Harrowgate to Tyler with 2-636 ACSR.	11.25	AE2-040

Network Upgrades - Dominion

NUN	Description	Cost ($M)	Driver
n6179	Rebuild 12.3 miles of 230 kV Line 2003 from Poe to Harrowgate with 2-636 ACSR.	30.75	AE2-040
n6287	Trowbridge 230/115kV substation reconfiguration. 230kV Yard changes: Expand 230kV yard to accommodate additional rung of 230kV breakers. This will require relocation of existing 115kV equipment. Relocate Transformer #1 to accommodate new rung of 230kV breakers Install 1 new 230kV breakers, and 2 new 230kV backbones Reterminate Line 2126 on new rung, will require T Line reconfiguration outside of station Terminate new AD1-074/75/76 line on new rung. Will require T Line reconfiguration outside of the station to utilize existing 115kV Line 25 station entrance infrastructure. 115kV Yard changes: Expand station to the north and rebuild entire 115kV yard (8 breakers, 4 backbones) Reterminate all (4) existing 115kV lines Line 1020 and line 25 will require significant T-Line reconfigurations outside of the station	8.1	AD1-074
n6287.1	Add additional 230kV breaker at Trowbridge to prevent loss of TX#1 upon fault on 230kV line 2034 in stuck breaker scenario	0.62	AD1-074
n6328	Reconductor 0.64 miles of 230 kV Line 205 from Harrowgate to Tyler with 1033.5 ACSR. Uprate 4.09 miles of 230 kV Line 205 from Harrowgate to Tyler.	2.148	AE2-094
n6379	Rebuild 6.47 miles of 230 kV Line 2028 from Mt Eagle to Charlottesville with 2-636 ACSR.	16.175	AE2-092
n6514	Line #2068 Halifax (Sedge Hill)–AD1-087 TAP 230 kV: wreck and rebuild the line of 16 miles to increase its line rating to 1047 MVA (normal), 1047 MVA (emergency), and 1204 MVA (load dump). A SCC and a Va CPCN is required.	25.07	AE2-051

Network Upgrades - Dominion

NUN	Description	Cost ($M)	Driver
n6539	Build new 500 kV Line from Rawlings to Morrisville Substation 110 miles	627	AE2-033
n6574	Rebuild 14.53 miles of 500 kV Line 575 from North Anna to Ladysmith with 3-1351.5 113C ACSR	45.043	AE2-031
n6580	Rebuild 16.45 miles of 500 kV Line 585 from AE2-094 Tap to Carson with 3-1351.5 125C ACSR.	50.995	AE2-094
n6643	Reconductor 0.3 miles of the Old Church 34.5kV circuit	0.14	AE2-155
n7180	Rebuild 7.2 miles of 230 kV Line 235 from Prince EDW to Farmville with (2) 768.2 ACSS/TW (20/7) "MAUMEE" at 250 C.	20.7	AF1-042
n7854.1	Re-arrange line #65 to loop into and out of the new three breaker AE1-155 115 kV switching station Line 65 is an existing 115kV line that runs from Northern Neck substation to Harmony Village substation. AE1-155 provides for the construction of a new substation located in the existing Line 65 right-of-way between existing structures 65/498 and 65/499 in Farnham, VA.	1.0672	AE1-155
n7854.2	Build a three breaker AE1-155 115 kV switching station. The facilities identified provides for the initial construction of a new 115 kV three breaker ring substation between structures 65/498 and 65/499.	5.4139	AE1-155

Network Upgrades - Dominion

NUN	Description	Cost ($M)	Driver
n7854.3	Remote protection and communication work. Additional work is required at Northern Neck, Rappahannock, and Harmony Village 115 kV substations. Drawing work, relay resets, and field support necessary to change the line 65 destinations at Garner DP, Lancaster, Ocran & White Stone substations will also be completed.	0.3182	AE1-155
n8070.3	This project provides for the initial construction of a new 230kV three breaker ring substation between transmission structures 2034/220 and 2034/221. The objective of this project is to build a 230kV, 3-breaker ring bus to support the new 120MW Solar Farm built by Sumac Solar, LLC. The site is located along Dominion Energy's existing 230kV, 2034 Line from Earleys to Trowbridge. The cut line will consume two of the positions in the ring bus. The third position will be for the 230kV feed from Sumac Solar, LLC collector station for the new 120MW solar farm.	6.4317	AD1-022
n8167.1	Re-arrange line #2056 to loop into and out of the new three breaker AD1-056/AD1-057 230 kV switching station	1.7083	AD1-057
n8167.2	Build a three breaker AD1-056/AD1-057 230 kV switching station	7.1907	AD1-057
n8167.3	Remote protection and communication work at Hathaway 230 kV and Hornertown 230 kV substations	0.0666	AD1-057
n8283	Install 1 new interconnect at Chesterfield 230 kV Station	4.105	AF1-129
n8311.1	Install line 149 tap to AE2-259 switching station	6.0705	AE2-259

Network Upgrades - Dominion

NUN	Description	Cost ($M)	Driver
n8311.2	Remote protection and communication work at Curdsville 115 kV substation	0.1472	AE2-259
n8317.1	Expand Fenress 500 kV and 230 kV substations to terminate three new 230 kV lines from Harpers Road substation and connect them to Fentress 500 kV	157.5761	AF1-123
n8317.2	Construct three (3) overhead 230kV transmission lines that will start at the existing Fentress Substation and terminate at the new Harpers Road Substation, located approximately 14.3 miles away.	150.6418	AF1-123
n8317.3	Build new 230 kV Harpers Road switching station to terminate nine offshore wind export cables for AF1-123/124/125 and consolidate to three overhead 230 kV transmission lines to go to Fentress Substation	274.9504	AF1-123
n8432.1	Re-arrange line #269 to loop into and out of the new three breaker AE1-072 230 kV switching station	3.89	AE1-072
n8432.2	Remote protection and communication work at Fentress and Sharworo 115 kV substation.	0.433	AE1-072
n8432.3	Build a three breaker AE1-072 230 kV switching station	1.058	AE1-072
n8477	Build a new 230kV interconnect into Finneywood Substation. This will add a new line position and one new 230kV breaker installed at Finneywood Substation to support the new Solar Farm built by 7 Bridges Solar LLC. Finneywood Substation will be a four bay breaker and a half substation located along the 230kV 235 line between Briery and Clover and one of the line positions will be for 7 Bridges Solar.	1.1781	AE2-182

Network Upgrades - Dominion

NUN	Description	Cost ($M)	Driver
n8478	This project serves to install one (1) new 230kV backbone structure, one (1) new 230kV self-supporting switch, and one (1) 230kV three pole structure at the new Finneywood 230 kV Substation. The backbone shall be installed inside the substation and the three pole structure shall be installed outside of the substation allowing 7 Bridges Solar to connect into Finneywood Substation. The conductor and shield wire to be used will be a bundled conductor 768.2 ACSS/TW/HS “Maumee” and dual DNO-1141- OPGW respectively.	2.1547	AE2-182
n8485.1	Build a three breaker AE2-051 500 kV switching substation.	19.5	AE2-051
n8485.2	Re-arrange line #562 to loop into and out of the new three breaker AE2-051 500 kV switching station	3.85	AE2-051
n8485.3	Remote protection and communications work at Septa and Carson 500 kV substations.	0.196	AE2-051
n8492	Construct one (1) overhead 500kV transmission line that will start at the existing Fentress 500 kV Substation and terminate at the existing Yadkin 500 kV Substation, located approximately 13.7 miles away.	73.7224	AF1-123
n8492.1	Add one new 500kV Breaker Position and associated equipment at the Fentress 500kV Substation to terminate the new Yadkin – Fentress 500kV Line.	99.5838	AF1-123
n8492.2	Add one new 500kV Breaker Position and associated equipment at the Yadkin 500 kV Substation and relocate existing Line #565 (Suffolk – Yadkin) as necessary to accommodate the construction of new Yadkin – Fentress 500kV Line.	15.4465	AF1-123

Network Upgrades - Dominion

NUN	Description	Cost ($M)	Driver
n8506	Tap Line 149 into AE2-259 115 kV switching station	6.070526	AE2-259
n8507	Remote protection and communication work at Willis Mountain 115 kV Substation	0.217299	AE2-259

Network Upgrades - DPL

NUN	Description	Cost ($M)	Driver
n5119	Build a new 138 kV substation with a 3 position ring bus (with provisions to add a 4th position for PJM Queue Project AB2-032) off of the right-of-way for Circuit 13723 in Queen Anne's County, Maryland. Two of the positions on the ring bus will be transmission line terminals for the tie-in of Circuit 13723 to the substation. The third position will be a terminal configured for the interconnection of a generator	7.6	AB1-141
n5788	Substation reinforcements at Preston Substation and at Todd 69 kV Substations. The estimate to perform this work is $67,000 and will take approximately 1 year to complete. The new emergency rating would be 173 MVA.	0.1	AE1-087

Network Upgrades - DUKE

NUN	Description	Cost ($M)	Driver
n6634.5	Re-tune wave traps at two (Hillsboro and Clinton County 138 kV) substations and adjust relay settings at one.	0	AC2-061

Network Upgrades - EKPC

NUN	Description	Cost ($M)	Driver
n5780	Reconductor Stuart-Spurlock 345 kV line with twin bundle 1033 Curlew ACCR conductor	17	AE1-144
n5858	Increase MOT on Headquarters-Snow Hill 69kV line	0.25	AD2-048
n5859	Increase MOT on Snow Hill – Murphysville 69kV line	1.1	AD2-048
n6238	Increase the operating temperature of the 556.5 MCM ACSR/TW conductor from 212F to 302F at Central Haridn 69 kV substation	0.04	AF1-050
n6238.4	Replace the 750 MCM copper jumpers at the Central Hardin 69 kV substation using bundled 500 MCM copper or equivalent	0.01	AF1-050
n6238.5	Replace the 1200A disconnect switches W124-623 and W124-625 at Central Hardin 69 kV substation and W80-605 at the Kargle tap location	0.31	AF1-050
n6463.1	Increase MOT of Boone-Longbranch 138kV line section 954 MCM conductor to 275F (~2.25 miles).	0.2	AE2-138
n6463.2	Upgrade bus and jumpers associated with Boone 138 kV bus using 2-500 MCM 37 CU conductor or equivalent on the Boone Co - Longbranch 138 kV line.	0.17	AE2-138
n6480	Increase the maximum operating temperature of the 266 MCM ACSR conductor in the Murphysville-Plumville 69 kV line section to 266 degrees F (9.9 miles).	0.65	AE2-038

Network Upgrades - EKPC

NUN	Description	Cost ($M)	Driver
n6676.1	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 East Harrison 69 kV Switching station to accept the IC generator lead line/bus	0.73	AD2-048
n6676.2	EKPC to construct a new 69 kV switching station (East Harrison Switching) to facilitate connection of the Blue Moon Solar generation project (AD2-048)	2.77	AD2-048
n6676.3	EKPC to construct facilities (~250 feet) to loop the existing Cynthiana Tie-Headquarters 69 kV line section into the new East Harrison Switching substation	0.13	AD2-048
n6676.4	EKPC to modify relay settings at Renaker 69 kV substation for existing line to East Harrison 69 kV Switching station	0.01	AD2-048
n6676.5	EKPC to upgrade relays and modify relay settings at Headquarters 69 kV substation for existing line to East Harrison 69 kV Switching substation	0.01	AD2-048
n6676.6	EKPC to install OPGW in the Renaker-3M-Cynthiana Tie 69 kV line sections (9.3 miles)	0.45	AD2-048
n6954	Install a 138 kV steel isolation switch structure and associated 138kV isolation switch, conductor from the terminal structure to the POI, interconnection metering, fiber-optic connection, line differential relay panel, and telecommunications equipment to accept the IC generator lead line at Avon 138 kV substation	0.6978	AE2-339

Network Upgrades - EKPC

NUN	Description	Cost ($M)	Driver
n6955	Modify Avon 138 kV substation by installing two circuit breakers, A-frame structure and associated terminal switches, bus conductor, PTs, foundations, breaker relay panel for new bus position; a new steel structure (for repositioned Dale line); transfer existing conductor, OPGW fiber optic, and existing relay panel on Avon-Dale line at Avon Substation.	1.7632	AE2-339
n8076.1	Install a 69kV switch structure, associated switch, and 69kV breaker, disconnect switches, interconnect metering, relaying, and fiber at new AF1-038 switching station, to accept the IC's generator line.	1.55	AF1-038
n8076.2	AF1-038 69kV Interconnect Switching Station (North Russell County Switching) - Construct a new 69kV switching station to connect the Queue #AF1-038 solar generating facility.	6.11	AF1-038
n8076.3	Sewellton Junction-Windsor 69kV - construct a new loop-in tap line (~500ft) from EKPC's existing Sewellton Junction-Windsor 69kV line to the new AF1-038 69kV Interconnection switching station.	0.99	AF1-038
n8076.4	Sewellton Junction 69kV Substation - upgrade relays and modify relay settings.	0.345	AF1-038
n8076.5	Windsor 69kV Substation - upgrade relays and modify relay settings.	0.345	AF1-038
n8076.6	Install OPGW fiber on the 69kV line from Sewellton Junction to the new North Russell County Switching station, approximately 1mi in length.	0.57	AF1-038

Network Upgrades - EKPC

NUN	Description	Cost ($M)	Driver
n8077.1	New switching station (South Green County switching station) to interconnect customer facility	4.095	AF1-050
n8077.2	Loop-in tap line to new AF1-050 switching station from Summer Shade - Green County 161kV line	0.276	AF1-050
n8077.3	Replace existing and modify relay settings at Summer Shade 161kV substation	0.01	AF1-050
n8077.4	Upgrade relays and modify relay settings at Green County 161kV substation	0.01	AF1-050
n8077.5	Install OPGW between Green County - South Green County 161 kV Switching Stations	0.726	AF1-050
n8201	Increase the maximum operating temperature of the 266 MCM ACSR conductor in the 2Webb CR R T line section to 266 degrees Fahrenheit	0.135	AF1-038
n8504	Expansion of existing Avon 138 kV substation	5.006	AE2-339

Network Upgrades - JCPL

NUN	Description	Cost ($M)	Driver
n8499	Install an adjacent structure on the existing E707 Kittatinny-Newton 34.5kV line in order to accommodate the new tap installed on the M715 Kittatinny-Newton 34.5kV line. Install two SCADA-controlled in-line switches and extend distribution circuit to provide power to the switches.	2.7148	AG1-510
n5146	Gilbert 230 kV substation – Construct the new 230 kV line terminal at the new Gilbert 230 kV Substation for the new AB1-154 interconnection.	0.81	AB1-154
n5165	Re-conductor 0.4 miles of Gilbert-Springfield 230kV circuit replacing 1590 ACSR with 1590 ACSS.	0.81	AB1-154
n6587	Reconductor 0.08 miles of Oyster creek – Cedar 230 kV Line transmission line. Upgrade Cedar Terminal of Oyster Creek 230 kV Substation.	0.64519	AE1-020
n6865	Construct a tap and install 3-34.5 kV load-break air switches on the West Flemington Tap - Frenchtown Solar 2 portion of the East Flemington - Frenchtown (A729) 34.5 kV line.	0.403	AF2-192
n6866	Install FE owned 34.5 kV metering in the interconnection customer's substation for AF2-192.	0.27	AF2-192
n6867	Upgrade relaying at East Flemington 34.5 kV.	0.403	AF2-192
n6868	Upgrade relaying at Frenchtown 34.5 kV.	0.403	AF2-192

Network Upgrades - JCPL

NUN	Description	Cost ($M)	Driver
n7599	Reconductor (1) section of 4/0 CU sub conductor circular at Drakes town 115 kV with a conductor able to meet or exceed 254 MVA STE. Reconductor 14.18 miles of 556.5 ACSR 26/7 115 kV transmission line from Belvedere Tap to Drakes town with 795 ACSR or a conductor able to meet or exceed 254 MVA STE. Replace (1) 5 A thermal relay at Pequest River.	49.6295	AG1-348
n7600	Replace (1) 800 A Generic wave trap at Whippany 115 kV	0.1343	AG1-348
n8032.1	Tap the Larrabee-Point Pleasant No 1 34.5 kV Line approximately 1.9 miles from Larrabee and 3.9 miles from Allaire to the customer facility and build a single span to point of interconnection with customer.	2.2647	AG1-223
n8032.2	Review relay settings at Point Pleasant 34.5 kV	0.0439	AG1-223
n8032.3	Review relay settings at Larrabee 34.5 kV	0.0351	AG1-223
n8483.1	Tap the Pequest River-Washington 34.5kV line, approximately 2.2 miles from Pequest River and 5.6 miles from Washington. And install two (2) line switches with SCADA control. And provide 120 V power to the new switch structures	0.7921	AG1-348
n8483.2	Upgrade relay settings at Pequest River 34.5 kV substation	0.0753	AG1-348
n8483.3	Upgrade relay settings Washington 34.5 kV substation	0.0753	AG1-348

Network Upgrades - JCPL

NUN	Description	Cost ($M)	Driver
n8514.1	Install (2) 34.5 kV load-break air switches with SCADA control on the Larrabee-Point Pleasant B106 34.5 kV line approximately 1.9 miles from Larrabee and 3.9 miles from Allaire.	0.801415	AG1-223
n8514.2	Revise relay settings at Larrabee 34.5 kV	0.066673	AG1-223
n8514.3	Revise relay settings at Point Pleasant 34.5 kV	0.066673	AG1-223

Network Upgrades - MAIT

NUN	Description	Cost ($M)	Driver
n6919	Tap the existing Cambridge Springs 34.5kV line at an existing pole or interspersed pole on Penelec' s existing distribution circuit (00245-52) near pole X-67952, new SCADA recloser tap to interconnect queue project AF1-217. Install 34.5 kV metering in customer's facilities. The customer will have to provide Penelec with permanent access/roadway to this off-road location/equipment. The customer is responsible to build their own line from their site to Penelec's existing facilities.	0.1311	AF1-217
n6920	Edinboro South 34.5kV SS. Adjust Remote Relay and Metering Settings.	0.0107	AF1-217
n6921	Review customer drawings, create nameplates and update CD drawing at Edinboro 34.5 kV	0.0223	AF1-217
n8486.1	Install physical security devices and other construction work by FirstEnergy at new AE2-139 Interconnection Substation by developer.	1.1368	AE2-139
n8486.2	Estimated design, installation, and testing/commissioning for MPLS equipment for SCADA transport at AE2-139 230 kV Interconnect Substation.	0.2374	AE2-139
n8486.3	Install ADSS from East Towanda 230 kV substation to the new AE2-139 230 kV Interconnection substation.	0.4388	AE2-139
n8486.4	East Towanda-Marshall 230 kV: Cut the existing East Towanda – Marshall 230kV line approximately 4 miles from the Scotch Hollow Tap to create a loop into the new 3 breaker ring bus for AE2-139 interconnection.	1.5592	AE2-139
n8486.5	Marshall 230 kV Substation: Modify relay settings, drawings review and nameplate.	0.0742	AE2-139

Network Upgrades - MAIT

NUN	Description	Cost ($M)	Driver
n8486.6	East Towanda 230 kV Substation: Modify relay settings, drawings review and nameplate.	0.0734	AE2-139
n8486.7	Scotch Hollow 230 kV Substation: Modify relay settings, drawings review and nameplate.	0.0747	AE2-139
n8486.8	Grover 230 kV Substation: Relay settings, drawings review and nameplate.	0.0744	AE2-139
n8496.1	Lucerne 115 kV Substation: Convert Lucerne Substation to a four breaker (future six breaker) bus.	10.4961	AF1-272
n8496.2	Lucerne-Shelocta 115kV Line: Re-terminate the Lucerne- Shelocta 115kV line to accommodate the new Lucerne 115 kV substation layout	0.6392	AF1-272
n8496.3	East Pike-Lucerne 115 kV Line: Re-terminate the East Pike-Lucerne 115kV line to accommodate the new Lucerne 115 kV substation layout	1.0317	AF1-272
n8496.4	East Pike 115 kV Substation: Replace (1) 115kV line trap and line tuner with (1) wideband line trap and line tuner for the Glory line terminal	0.6317	AF1-272
n8496.5	Glory 115 kV Substation: Replace (1) 115kV line trap and line tuner with (1) wideband line trap and tuner	0.6367	AF1-272
n8496.6	Shelocta 115 kV: Install (1) PCM 5350 for the Lucerne 115kV line	0.4608	AF1-272

Network Upgrades - OVEC

NUN	Description	Cost ($M)	Driver
n6759.2	Replace 2, 1600 A switches at Dearborn and 4 switches at Pierce on the Dearborn - Pierce 345 kV line	9	AF1-202
n7881	Perform a sag study on the Dearborn – Pierce 345kV line transmission line. OVECs cost estimate for performing the sag study is $125K. Sag study results (from AE2-297 Fac Study) show the need to replace 16 tangent structures, 3 dead end structures, and conductor over one Ohio river crossing. Cost estimate is $11.383 M. New SE rating to be 1165 MVA	11.38	AE2-297

Network Upgrades - PENELEC

NUN	Description	Cost ($M)	Driver
n8488	Install 34.5 kV Potential Transformer and replace Oil Creek phase and RC relays with SEL-351S at Titusville 34.5 kV Substation	0.649	AF2-235
n8489.1	Replace 34.5kV South Troy line relaying and controls and install (1) 34.5kV PT.	0.5466	AF2-238
n8489.2	Revise relay settings at South Troy 34.5 kV substation	0.0568	AF2-238
n8497	Revise relay settings as needed on 34.5 kV Turner St line.	0.0805	AG1-100
n4287	Install 34.5kV tap, radio controlled switch and associated equipment at North Meshoppen 34.5kV and Tunkahannock 34.5kV substations	0.1	Z1-038
n4997	Replace the disconnect switch at the Sabinsville 115 kV substation.	0.09	AA2-081
n7127.2	Reconductor 13.01 miles of line East Towanda to Canyon 230kV line. Replace transmission line drop at East Towanda.	89.224154	AE2-139
n7127.3	Replace disconnect switch at Canyon 230 kV substation	1.05697	AE2-139

Network Upgrades - PENELEC

NUN	Description	Cost ($M)	Driver
n7127.4	Replace line trap at East Towanda 230 kV substation	0.225	AE2-139
n7127.5	Adjust/replace metering and line relaying at East Towanda 230 kV substation	0.5	AE2-139
n7202	Reconductor 0.1 miles of the Chapman to AA2-000 Tap 230 kV Line.	0.45	AE2-139
n7995	AE2-117: Tap the Warrior Ridge-Williamsburg 46kV line to provide interconnection facilities to the customer substation, approximately 2.5 miles from the Alexandria substation. Install SCADA controlled MOAB switches on either side of tap location.	1.0047	AE2-117
n7996	Williamsburg 46 kV: Replace existing line relaying and control panel for Tyrone North – Warrior Ridge line exit with (1) standard prewired relaying panel.	0.2508	AE2-117
n7997	Warrior Ridge 46 kV: Replace existing line relaying and control panel for Tyrone North – Williamsburg line exit with (1) standard prewired relaying panel.	0.2508	AE2-117
n7998	Tyrone North 46 kV: Replace existing line relaying and control panel for Warrior Ridge - Williamsburg line exit with (1) standard prewired relaying panel.	0.2508	AE2-117

Network Upgrades - PPL

NUN	Description	Cost ($M)	Driver
n6096	Modify the existing Branchburg 500kV circuit breaker protection and control scheme & Branchburg- Breinigsville 500 kV tie breaker protection and control scheme	0.155	AD2-171
n6595	Relay Modifications at the Harwood 69 kV Substation	0.16	AE2-046
n7923	Harwood 69 kV: Model IC in CAPE and conduct a wide area short circuit study two busses away from the IC facilities. Identify affected relays and revise settings as needed. Conduct a detailed review of the IC relay settings and engineering packaged submitted by IC to the PPL EU. Modify relays accordingly.	0.123	AE2-046
n8446.1	Modify relays at Dauphin 69kV Substation	0.137	AF2-082
n8446.2	Modify relays at Sunbury 69kV Substation	0.137	AF2-083
n8446.4	Install a new single circuit, custom foundation, custom steel pole, full terminal deadend structure (PCO) between Sunbury - Dauphin 69 kV line. The PCO structure must be outside of the Project Developer's Substation fenced area.	0.01	AF2-084

Network Upgrades - PSEG

NUN	Description	Cost ($M)	Driver
n5264	TOSCO_2-VFT 2 230 kV line Rebuild with paired 1033 ACSS	5.01	AB2-055
n6092	Install attachment facility line and associated hardware to accept the Interconnection Customer generator lead line terminating at the AD2-171 Interconnection substation and install revenue metering.	2.062	AD2-171
n6093	Install a new 500kV three breaker ring bus substation along the Alburtis- Branchburg 500kV Line	31.2	AD2-171
n6094	Loop the Branchburg - Alburtis 500kV circuit into the AD2-171 interconnection switching station	36.286	AD2-171
n6095	Modify the existing Alburtis 500kV circuit breaker protection and control scheme & tie breaker protection and control scheme	0.155	AD2-171
n7137	Reconductor METUCHEN - NEWDOVR_H 230 kV transmission line to 1080MVA SER	12.88	AF2-415
n8511	Install New relays at Bergen 138 kV to accommodate the AF2-415 generator lead line	0.076	AF2-415

Contact

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Revision History

- 10/03/2024 – V1 – Original version posted to PJM.com
- 10/03/2024 – V2 – Updated net increase in total network upgrade cost estimate and removed network upgrade n6630 due to duplication

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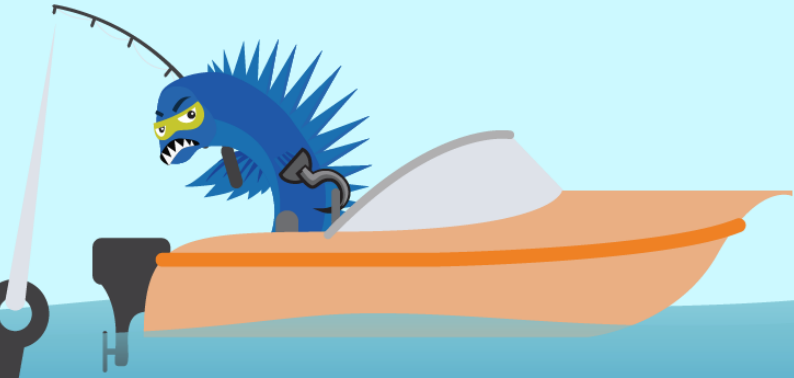

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