

Table AR-1
Transmission System Additions – Asset Renewal Line Work

System Additions	Projected In-Service Year	Planning Zone	Need Category	Cost Estimate - Refer to Funding Project and Sum of Total (2009-2018) in Asset Renewal Financial Table
Rebuild Plainfield-Chaffee Creek 69-kV line Y-90	2010	1	Improve condition and increase reliability performance of existing line	F1699
Rebuild Auburndale-Sigel 69-kV line Y-107	2010	1	Improve condition and increase reliability performance of existing line	F1732
Rebuild Rocky Run-Arpin 345-kV line W-8	2010	1	Improve condition and increase reliability performance of existing line	F2252
Rebuild Deer Trail-Whitcomb 69-kV line Y-86	2010	1	Improve condition and increase reliability performance of existing line	F2410
Rebuild Mauston-Hilltop 69-kV line Y-89	2010	1	Improve condition and increase reliability performance of existing line	F2345
Rebuild Wautoma-Berlin 69-kV line Y-95	2011	1	Improve condition and increase reliability performance of existing line	F2386
Re-insulate Winneconne-Berlin 69-kV line Y-80	2012	1	Improve condition and increase reliability performance of existing line	TBD
Re-insulate Harrison-Iola 69-kV line Y56 CWEC Iola Tap	2012	1	Improve condition and increase reliability performance of existing line.	TBD
Rebuild North Point-Rocky Run 115-kV line T-20	2016	1	Improve condition and increase reliability performance of existing line.	TBD

*Table AR-1
Transmission System Additions – Asset Renewal Line Work (continued)*

System Additions	Projected In-Service Year	Planning Zone	Need Category	Cost Estimate - Refer to Funding Project and Sum of Total (2009-2018) in Asset Renewal Financial Table
Rebuild Wautoma-Portage 69-kV line Y17	2017	1	Improve condition and increase reliability performance of existing line	TBD
Planning to reconfigure with Fairwater/Ripon to North Randolph, 69-kV line Y26	2018	1	Improve condition and increase reliability performance of existing line	TBD
Rebuild Whiting Avenue-Plover 115-kV line B-106	2019	1	Improve condition and increase reliability performance of existing line	TBD
Replace select poles on Coyne-Saratoga 115-kV line T-72	2020	1	Improve condition and increase reliability performance of existing line	TBD
Re-insulate top phase and add additional arresters on Chandler-Forsyth 69-kV line (Chandler line)	2010	2	Improve condition and increase reliability performance of existing line	F2786
Improve clearances, install arresters on portions of line, replace select components on Roberts-9 Mile 69-kV line 6952	2011	2	Improve condition and increase reliability performance of existing line	F2037
Re-insulate and improve grounding on Munising-Forsyth 138-kV line (Munising 138 line)	2012	2	Improve condition and increase reliability performance of existing line	TBD
Reinsulate, add arresters, replace select poles on Munising-Gwinn 69-kV line (Autrain line)	2013	2	Improve condition and increase reliability performance of existing line	TBD
Reinsulate, add arresters, replace select poles on Blaney Park-Munising 69-kV line (Inland line)	2014	2	Improve condition and increase reliability performance of existing line	TBD

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System Additions	Projected In-Service Year	Planning Zone	Need Category	Cost Estimate - Refer to Funding Project and Sum of Total (2009-2018) in Asset Renewal Financial Table
Re-insulate Portage-9 Mile 69-kV lines 6901/6902	2014	2	Improve condition and increase reliability performance of existing line	TBD
Re-insulate and install arresters on KI Sawyer-Gwinn 69-kV line (Sawyer line)	2014	2	Improve condition and increase reliability performance of existing line	TBD
Install new cross arms on Atlantic-M38 69-kV line (Atlantic 69 line)	2014	2	Improve condition and increase reliability performance of existing line	TBD
Replace select poles and cross arms on Rexton-Hiawatha 69-kV line ESE_6908	2015	2	Improve condition and increase reliability performance of existing line	TBD
Replace underground cable on Magazine-Nine Mile/Three Mile 69-kV line ESE_6903	2015	2	Improve condition and increase reliability performance of existing line	TBD
Replace select poles and re-insulate Conover-Mass 69-kV line 6530	2018	2	Improve condition and increase reliability performance of existing line	TBD
Replace select poles and re-insulate Powers-Chalk Hill 69-kV line 6910	2018	2	Improve condition and increase reliability performance of existing line	TBD
Replace one circuit with new 3C XPLE submarine cable on McGulpin-Straits 138-kV line 9901	2020	2	Improve condition and increase reliability performance of existing line	TBD
Replace one circuit with new 3C XPLE submarine cable on McGulpin-Straits 138-kV line 9903	2020	2	Improve condition and increase reliability performance of existing line	TBD

Table AR-1
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System Additions	Projected In-Service Year	Planning Zone	Need Category	Cost Estimate - Refer to Funding Project and Sum of Total (2009-2018) in Asset Renewal Financial Table
Remove the wishbone arms and install HLP insulators on Venture-Janesville 138-kV line X-24	2009	3	Improve condition and increase reliability performance of existing line	F2761
Rebuild Miner-Hillman 69-kV line Y-130	2010	3	Improve condition and increase reliability performance of existing line	F2346
Rebuild Forward-Rock Branch 69-kV line Y-135	2010	3	Improve condition and increase reliability performance of existing line	F1715
Rebuild Stage Coach-Spring Green 69-kV line Y-62	2010	3	Improve condition and increase reliability performance of existing line	F1656
Rebuild Dane-Dam Heights 69-kV line Y-8	2010	3	Improve condition and increase reliability performance of existing line	F1602
Rebuild Boscobel-Gran Grae 69-kV line Y-40	2010	3	Improve condition and increase reliability performance of existing line	F1444
Install anti-galloping and grounding improvements on Columbia-South Fond Du Lac 345-kV line W5	2011	3	Improve condition and increase reliability performance of existing line	TBD
Rebuild Pardeeville Tap-North Randolph/Rio 69-kV line Y-64	2011	3	Improve condition and increase reliability performance of existing line	F2389
Replace underground cable on East Towne-Sycamore 69-kV line 6987	2012	3	Improve condition and increase reliability performance of existing line.	TBD

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Transmission System Additions – Asset Renewal Line Work (continued)*

System Additions	Projected In-Service Year	Planning Zone	Need Category	Cost Estimate - Refer to Funding Project and Sum of Total (2009-2018) in Asset Renewal Financial Table
Replace underground cable on East Towne to Sycamore 69-kV line 6988	2012	3	Improve condition and increase reliability performance of existing line.	TBD
Replace underground with overhead cable on Pheasant Branch-West Middleton 69-kV line 6963	2012	3	Improve condition and increase reliability performance of existing line	TBD
Rebuild Portage-Dam Heights 69-kV line Y16	2013	3	Improve condition and increase reliability performance of existing line.	TBD
Rebuild Rubicon-Concord 138-kV line 9061	2013	3	Improve condition and increase reliability performance of existing line	TBD
Rebuild Eden-Hillman 69-kV line Y105	2018	3	Improve condition and increase reliability performance of existing line.	TBD
Replace underground cable on Stagecoach-West Middleton 69-kV line 6927	2019	3	Improve condition and increase reliability performance of existing line	TBD
Rebuild and reconductor Sauk Trail-20 th Street 138-kV line X-37	2009	4	Improve condition and increase reliability performance of existing line.	F2684
Re-insulate South Fond du Lac-Edgewater 345-kV line W1	2010	4	Improve condition and increase reliability performance of existing line	F2765
Replace shield wire on Stiles-Pulliam 138-kV lines KK64441-64451	2011	4	Improve condition and increase reliability performance of existing line	F2383

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System Additions	Projected In-Service Year	Planning Zone	Need Category	Cost Estimate - Refer to Funding Project and Sum of Total (2009-2018) in Asset Renewal Financial Table
Rebuild Mears-Woodenshoe 138-kV line A-79	2012	4	Improve condition and increase reliability performance of existing line	TBD
Rebuild Sunset Point-Mears 138-kV line MCRG21	2012	4	Improve condition and increase reliability performance of existing line	TBD
Rebuild Highway V-Oak Street 69-kV line Z-26	2013	4	Improve condition and increase reliability performance of existing line	TBD
Rebuild Manrap-Wesmark 69-kV line R-44	2013	4	Improve condition and increase reliability performance of existing line	TBD
Rebuild Finger Road-Highway V 69-kV line U-47	2014	4	Improve condition and increase reliability performance of existing line	TBD
Rebuild Sawyer-Dykesville 69-kV line DYKY21	2015	4	Improve condition and increase reliability performance of existing line	F2801
Replace the submarine cable on First Avenue-Redwood 69-kV line T-46	2015	4	Improve condition and increase reliability performance of existing line	TBD
Rebuild Neevin-Butte Des Morts 138-kV line 43021	2015	4	Improve condition and increase reliability performance of existing line	TBD
Rebuild Pioneer-Sobieski 69-kV line E-83 Tap	2016	4	Improve condition and increase reliability performance of existing line	TBD

*Table AR-1
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System Additions	Projected In-Service Year	Planning Zone	Need Category	Cost Estimate - Refer to Funding Project and Sum of Total (2009-2018) in Asset Renewal Financial Table
Rebuild Sobieski-Bayport 69-kV line T-98	2016	4	Improve condition and increase reliability performance of existing line	TBD
Rebuild Danz-Finger Road 69-kV line L-64	2016	4	Improve condition and increase reliability performance of existing line	TBD
Rebuild Woodenshoe-Neevin 138-kV line 80952	2016	4	Improve condition and increase reliability performance of existing line	TBD
Replace underground cable on University-Danz Avenue 69-kV line O-15	2017	4	Improve condition and increase reliability performance of existing line	TBD
Rebuild Butte des Morts-North Appleton 138-kV line 6853	2017	4	Improve condition and increase reliability performance of existing line	TBD
Rebuild Custer-New Holstein 69-kV line P-68	2019	4	Improve condition and increase reliability performance of existing line	TBD
Rebuild Goodman-Caldron Falls 69-kV line J-88	2019	4	Improve condition and increase reliability performance of existing line	TBD
Replace select poles on Howard-Pulliam 138-kV line D-82	2019	4	Improve condition and increase reliability performance of existing line	TBD
Replace underground cable on Erdman-Lodestar 138-kV line X-48	2019	4	Improve condition and increase reliability performance of existing line	TBD

*Table AR-1
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System Additions	Projected In-Service Year	Planning Zone	Need Category	Cost Estimate - Refer to Funding Project and Sum of Total (2009-2018) in Asset Renewal Financial Table
Replace underground cable on Edgewater-Erdman 69-kV line Y-31	2021	4	Improve condition and increase reliability performance of existing line	TBD
Shield wire replacement Norwich-43 rd St Terminal 138-kV line NWHG61	2012	5	Improve condition and increase reliability performance of existing line	TBD
Re-insulate Racine-Somers 138-kV line 1645	2012	5	Improve condition and increase reliability performance of existing line	TBD
Re-insulate Racine-Kenosha 138-kV line 1651	2012	5	Improve condition and increase reliability performance of existing line	TBD
Replace shield wire on Granville-Tosa 138-kV line 3452	2013	5	Improve condition and increase reliability performance of existing line	TBD
Replace shield wire on Butler-Bluemound 138-kV line 5061	2013	5	Improve condition and increase reliability performance of existing line	TBD
Replace shield wire on Tosa-Bluemound 138-kV line 5041	2013	5	Improve condition and increase reliability performance of existing line	TBD
Rebuild St. Martins-Edgewood 138-kV line 3013	2014	5	Improve condition and increase reliability performance of existing line	TBD
Rebuild and add breaker on Edgewood-Mukwonago 138-kV line 671K61	2014	5	Improve condition and increase reliability performance of existing line	TBD

*Table AR-1
Transmission System Additions – Asset Renewal Line Work (continued)*

System Additions	Projected In-Service Year	Planning Zone	Need Category	Cost Estimate - Refer to Funding Project and Sum of Total (2009-2018) in Asset Renewal Financial Table
Rebuild Hartford-St. Lawrence 138-kV line 8031	2014	5	Improve condition and increase reliability performance of existing line	TBD
Rebuild Cooney-Concord 138-kV line 9042	2014	5	Improve condition and increase reliability performance of existing line	TBD
Rebuild Summit-Waukesha 138-kV line 7021	2015	5	Improve condition and increase reliability performance of existing line	TBD
Rebuild Summit-Merrill Hills 138-kV line 3551	2017	5	Improve condition and increase reliability performance of existing line	TBD
Rebuild Albers-Paris 138-kV line 3124	2018	5	Improve condition and increase reliability performance of existing line	TBD

*Table AR-2
Asset Renewal Transformer Replacements*

System Upgrade	Projected In-Service Year	Voltage	Planning Zone	Need Category	Cost Estimate – Refer to <i>Funding Project</i> and Sum of Total (2009-2018) in Asset Renewal Financial Table
Council Creek T31	2010	138/69-kV	1	Improve condition, reliability	F2340
North Fond du Lac T31 and T32	2010	138/69-kV	4	Improve condition, reliability	F2343
Ellinwood T2	2011	138/69-kV	4	Improve condition, reliability	F2024
Aurora T3	2011	138/69-kV	1	Improve condition, reliability	F2419
Bluemound T3	2011	230/138-kV	5	Improve condition, reliability	F2604
Bluemound T1	2012	230/138-kV	5	Improve condition, reliability	F2799
Edgewater T31 and T32	2012	138/69-kV	4	Improve condition, reliability	TBD
North Appleton T3	2012	345/138-kV	4	Improve condition, reliability	TBD
Replace two transformers	2013	138/69-kV	various	Improve condition, reliability	TBD
Replace two transformers	2014	138/69-kV	various	Improve condition, reliability	TBD
Replace one transformer	2014	345/138-kV	various	Improve condition, reliability	TBD
Replace two transformers	2015	138/69-kV	various	Improve condition, reliability	TBD
Replace two transformers	2016	138/69-kV	various	Improve condition, reliability	TBD
Replace one transformer	2016	345/138-kV	various	Improve condition, reliability	TBD
Replace two transformers	2017	138/69-kV	various	Improve condition, reliability	TBD
Replace two transformers	2018	138/69-kV	various	Improve condition, reliability	TBD
Replace one transformer	2018	345/138-kV	various	Improve condition, reliability	TBD
Replace two transformers	2019	138/69-kV	various	Improve condition, reliability	TBD
Replace two transformers	2020	138/69-kV	various	Improve condition, reliability	TBD
Replace one transformer	2020	345/138-kV	various	Improve condition, reliability	TBD

Table AR-3
Transmission System Additions – Asset Renewal Circuit Breakers

System Additions	Projected In-Service Year	Planning Zone	Need Category	Cost Estimate - Refer to Funding Project and Sum of Total (2009-2018) in Asset Renewal Financial Table
Circuit breaker replacements	2010	Various	CT Deficiency, Control scheme incompatibility (2 units) 69 kV	Various
Circuit breaker replacements	2010	Various	End of life, parts obsolescence (1 unit) 69 kV	Various
Circuit breaker replacements	2010	Various	Mechanism design issues (2 units) 69 kV	Various
Circuit breaker replacements	2010	Various	Type S bushings (1 unit) 69 kV	Various
Circuit breaker replacements	2010	Various	Type U bushings (29 units) 69 kV	Various
Circuit breaker replacements	2010	Various	End of life, part obsolescence (4 units) 138 kV	Various
Circuit breaker replacements	2010	Various	Type U bushings (17 units) 138 kV	Various
Circuit breaker replacements	2010	Various	CT deficiency, control scheme incompatibility (1 unit) 230 kV	Various
Circuit breaker replacements	2010	Various	Type U bushing (9 units) 230 kV	Various

Table AR-3
Transmission System Additions – Asset Renewal Circuit Breakers (continued)

System Additions	Projected In-Service Year	Planning Zone	Need Category	Cost Estimate - Refer to Funding Project and Sum of Total (2009-2018) in Asset Renewal Financial Table
Circuit breaker replacements	2010	Various	EPA SF6 emission reduction (2 units) 345 kV	Various
Circuit breaker replacements	2011	Various	Mechanism design issues (4 units) 69 kV	Various
Circuit breaker replacements	2011	Various	Type U bushings (26 units) 69 kV	Various
Circuit breaker replacements	2011	Various	End of life, parts obsolescence (1 unit) 138 kV	Various
Circuit breaker replacements	2011	Various	Type U bushings (18 units) 138 kV	Various
Circuit breaker replacements	2011	Various	CT deficiency, control scheme incompatibility (2 units) 230 kV	Various
Circuit breaker replacements	2011	Various	Over duty rating (2 units) 230 kV	Various
Circuit breaker replacements	2012	Various	End of life, parts obsolescence (2 units) 69 kV	TBD
Circuit breaker replacements	2012	Various	Type U bushings (40 units) 69 kV	TBD

Table AR-3
Transmission System Additions – Asset Renewal Circuit Breakers (continued)

System Additions	Projected In-Service Year	Planning Zone	Need Category	Cost Estimate - Refer to Funding Project and Sum of Total (2009-2018) in Asset Renewal Financial Table
Circuit breaker replacements	2012	Various	Type U bushings (8 units) 138 kV	TBD
Circuit breaker replacements	2012-2020	Various	End of life, parts obsolescence (12 units) 69 kV	TBD
Circuit breaker replacements	2012-2020	Various	Mechanism design issues (64 units) 69 kV	TBD
Circuit breaker replacements	2012-2020	Various	End of life, parts obsolescence (13 units) 138 kV	TBD
Circuit breaker replacements	2012-2020	Various	Over duty rating (4 units) 138 kV	TBD
Circuit breaker replacements	2012-2020	Various	Bushing flange oil leak (27 units) 345 kV	TBD
Circuit breaker replacements	2012-2020	Various	End of life, parts obsolescence (8 units) 345 kV	TBD
Circuit breaker replacements	2012-2020	Various	EPA SF6 emission reduction (8 units) 345 kV	TBD