

Table PR-2
Transmission System Additions for 2010

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to <i>Funding Project</i> and <i>Sum of Total (2010-2019)</i> in <i>Financial Table</i>
Construct 69-kV line from new Warrens Substation to the Council Creek-Tunnel City 69-kV line	2010	2010	1	T-D interconnection	Planned	F2173
Install 2-8.0 MVAR capacitor bank at Indian Lake 69-kV Substation	2010	2010	2	reliability (B1)	Proposed	F2223
Install reactor at Straits Substation	2010	2010	2	reliability (B1)	Proposed	F2966
Uprate Y-61 McCue-Lamar 69-kV line to achieve 300 deg F line ratings and install 2-12.45 MVAR 69-kV capacitor banks at Lamar Substation	2008	2010	3	reliability (69B2)	Planned	F2324
Uprate the Royster Substation terminals	2010	2010	3	reliability (B2)	Planned	F2317
Uprate Y-61 Sheepskin-Dana 69-kV line to 95 MVA	2017	2010	3	reliability (69B2)	Planned	F1868
Uprate Y-40 Gran Grae-Boscobel 69-kV line to achieve a 99 MVA summer emergency rating*	2017	2010	3	reliability (B2, 69B2)	Planned	F1444
Construct a 138-kV bus at Pleasant Valley Substation to permit second distribution transformer interconnection	2010	2010	5	T-D interconnection	Planned	F2086

Table PR-2
Transmission System Additions for 2010 (continued)

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to <i>Funding Project</i> and <i>Sum of Total (2010-2019)</i> in <i>Financial Table</i>
Expand 345-kV switchyard at Oak Creek to interconnect one new generator	2010	2010	5	new generation	Planned	F1729
Construct second Shorewood-Humboldt 138-kV underground cable*	2012	2010	5	reliability (B2)	Proposed	F2487

Defined in Previous 10-Year Assessment
Revised in scope from Previous 10-Year Assessment
New to this 10-Year Assessment

Table PR-3
Transmission System Additions for 2011

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to <i>Funding Project</i> and <i>Sum of Total (2010-2019)</i> in <i>Financial Table</i>
Upgrade McKenna 69-kV 6.3 MVAR capacitor bank to 15.3 MVAR and upgrade Chaffee Creek 69-kV 8.1 MVAR bank to 14.4 MVAR	2011	2011	1	reliability (69B2, 69B3)	Proposed	F2519
Replace two overhead Blount-Ruskin 69-kV lines with one underground 69-kV line	2010	2011	3	Completion of earlier project per agreement with the City of Madison	Planned	F2628
Install 2-16.33 MVAR 69-kV capacitor banks at Spring Green Substation	2011	2011	3	reliability (A, 69B3)	Planned	F2327
Install 1-32.66 MVAR 138-kV capacitor bank at Femrite Substation	2011	2011	3	reliability (A, C5)	Planned	F2516
Install 1-32.66 MVAR 138-kV capacitor bank at Kegonsa Substation	2011	2011	3	reliability (A, C5)	Planned	F3008
Rebuild Y-33 Brodhead to South Monroe 69-kV line	2011	2011	3	reliability (B2, 69B2, 69B3)	Planned	F2526
Uprate terminal limitations at McCue for the Y-79 McCue-Milton Lawns 69-kV line	2011	2011	3	reliability (69B2)	Proposed	F2405
Rebuild 2.37 miles of 69 kV from Sunset Point to Pearl Ave with 477 ACSR	2011	2011	4	reliability (69B2, 69B3)	Planned	F1361

Table PR-3
Transmission System Additions for 2011 (continued)

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to <i>Funding Project</i> and <i>Sum of Total (2010-2019)</i> in <i>Financial Table</i>
Reconfigure Kewaunee 345/138-kV switchyard and install a second 500 MVA 345/138-kV transformer	2011	2011	4	reliability (C3), condition	Proposed	F2437

Defined in Previous 10-Year Assessment
Revised in scope from Previous 10-Year Assessment
New to this 10-Year Assessment

Table PR-4
Transmission System Additions for 2012

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to <i>Funding Project</i> and <i>Sum of Total (2010-2019)</i> in <i>Financial Table</i>
Construct 115-kV line from new Woodmin Substation to the Clear Lake Substation	2012	2012	1	T-D interconnection	Proposed	F2495
Install second 138/69-kV transformer and a 138-kV ring bus at Chandler Substation	2012	2012	2	reliability (69B3)	Proposed	F3040
Relocate Engadine 69-kV load	2012	2012	2	reliability (69B2)	Provisional	F3073
Upgrade 69-kV equipment at Delta Substation	2012	2012	2	reliability (C1), operating flexibility	Proposed	F3066
Rebuild part of the Y-8 Dane-Dam Heights 69-kV line*	2015	2012	3	reliability, asset renewal, potential T-D interconnection	Planned	F1602
Construct Canal-Dunn Road 138-kV line	2012	2012	4	reliability (69A, 69B2, 69B3, 69C3)	Planned	F1358
Install 100 MVA 138/69-kV transformer at Dunn Road	2012	2012	4	reliability (69A, 69B2, 69B3, 69C3)	Planned	F1358

Defined in Previous 10-Year Assessment
Revised in scope from Previous 10-Year Assessment
New to this 10-Year Assessment

Table PR-5
Transmission System Additions for 2013

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to <i>Funding Project</i> and <i>Sum of Total (2010-2019)</i> in <i>Financial Table</i>
Reconfigure Petenwell 138-kV bus	2013	2013	1	reliability (C1), operating flexibility	Provisional	F3046
Construct Monroe County-Council Creek 161-kV line and Timberwolf 69-kV switching station	2013	2013	1	economics, reliability (A, B2, C3)	Proposed	F2454
Install a 161/138-kV transformer at Council Creek Substation	2013	2013	1	economics, reliability (A, B2, C3)	Proposed	F2454
Uprate Council Creek-Petenwell 138-kV line	2013	2013	1	economics, reliability (B2)	Proposed	F2454
Install 2-16.33 MVAR 69-kV capacitor banks at Nine Springs Substation	2006	2013	3	reliability (69B2)	Proposed	F2088
Uprate Fitchburg-Nine Springs 69-kV and Royster-Pflaum 69-kV lines and move AGA load to the Royster-Femrite 69-kV line	2006	2013	3	reliability (69B2)	Proposed	F2088
Install a 138/69-kV transformer at Bass Creek Substation	2010	2013	3	reliability (69B2)	Planned	F1869
Uprate X-12 Town Line Road-Bass Creek 138-kV line to 300 deg F	2010	2013	3	reliability (69B2)	Planned	F1869

Table PR-5
Transmission System Additions for 2013 (continued)

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to <i>Funding Project</i> and <i>Sum of Total (2010-2019)</i> in <i>Financial Table</i>
Construct 345-kV line from Rockdale to West Middleton	2013	2013	3	reliability (B2, C5)	Planned	F1435
Construct a 345-kV bus and install a 345/138 kV 500 MVA transformer at West Middleton Substation	2013	2013	3	reliability (B2, C5)	Planned	F1435

Defined in Previous 10-Year Assessment
Revised in scope from Previous 10-Year Assessment
New to this 10-Year Assessment

Table PR-6
Transmission System Additions for 2014

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to <i>Funding Project</i> and <i>Sum of Total (2010-2019)</i> in <i>Financial Table</i>
Energize Hiawatha-Indian Lake at 138 kV	2014	2014	2	reliability (B2)	Provisional	F3068
Install power flow control at Straits 138-kV Substation	2010	2014	2	reliability (B1)	Provisional	F2894
Uprate overhead portions of Straits-McGulpin 138-kV circuits #1 & #3 to 230 F degree summer emergency ratings	2012	2014	2	reliability (B2)	Proposed	F2874
Rebuild Straits-Pine River lines 6904/5 for 138 kV and operate at 69 kV	2014	2014	2	reliability (B2)	Proposed	F2833
Uprate Munising-Seney-Blaney Park 69-kV line to 167 degrees F	2014	2014	2	reliability (69B2)	Provisional	F3071
Construct 18th Road-Chandler double circuit 138-kV lines and operate at 138/69	2014	2014	2	reliability (69B3)	Provisional	F3077
Construct 18th Road 138/69-kV Substation and install two 138/69-kV transformers	2014	2014	2	reliability (69B3)	Provisional	F3077
Install 1-8.16 MVAR 138-kV capacitor bank at 18th Road	2014	2014	2	reliability (69B3)	Provisional	F3077

Table PR-6
Transmission System Additions for 2014 (continued)

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to <i>Funding Project</i> and <i>Sum of Total (2010-2019)</i> in <i>Financial Table</i>
Rebuild the Y-119 Verona to Oregon 69-kV line	2008	2014	3	reliability, condition (69B3, 69C3)	Proposed	F2469
Install 3-75 MVAR capacitor banks at Bluemound Substation	2012	2014	5	reliability (B1)	Provisional	F2650

Defined in Previous 10-Year Assessment
Revised in scope from Previous 10-Year Assessment
New to this 10-Year Assessment

Table PR-7
Transmission System Additions for 2015

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to <i>Funding Project</i> and <i>Sum of Total (2010-2019)</i> in <i>Financial Table</i>
Replace Petenwell 138/69-kV transformer	2015	2015	1	reliability (A, 69B2)	Provisional	F3036
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Ripon 69-kV Substation	2015	2015	1	reliability (69B2)	Provisional	F2477
Construct a 69-kV line from SW Ripon to the Ripon-Metomen 69-kV line	2015	2015	1	T-D interconnection	Provisional	TBD
Construct a new Arnold 345-kV Substation and install a 345/138-kV transformer	2015	2015	2	reliability (B1)	Provisional	F3080
Uprate 6927 West Middleton-Stage Coach 69-kV line to 106 MVA SE	2015	2015	3	reliability (69B2, 69B3)	Provisional	F3103
Replace two existing 345/138-kV transformers at Arcadian Substation with 1-500 MVA transformer	2010	2015	5	reliability (B3)	Provisional	F2539
Uprate Arcadian-Waukesha 138-kV lines KK9942/KK9962	2010	2015	5	reliability (B2)	Provisional	F2142

Defined in Previous 10-Year Assessment
Revised in scope from Previous 10-Year Assessment
New to this 10-Year Assessment

Table PR-8
Transmission System Additions for 2016

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to <i>Funding Project</i> and <i>Sum of Total (2010-2019)</i> in <i>Financial Table</i>
Replace existing 56 MVA Harrison 138/69-kV transformer with a 100 MVA transformer	2016	2016	1	reliability (A)	Provisional	F3063
Uprate Pine River-Nine Mile 69-kV line 6923 to 167 degrees F and Asset Renewal for 6921/3	2016	2016	2	reliability (69B2)	Proposed	F2836
Construct new 138-kV bus and install a 138/69-kV 100 MVA transformer at South Lake Geneva Substation	2016	2016	3	reliability (69B2)	Proposed	F2587
Construct new 138-kV line from North Lake Geneva to South Lake Geneva Substation	2016	2016	3	reliability (69B2), T-D interconnection	Proposed	F2587

Defined in Previous 10-Year Assessment
Revised in scope from Previous 10-Year Assessment
New to this 10-Year Assessment

Table PR-9
Transmission System Additions for 2017

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to <i>Funding Project</i> and <i>Sum of Total (2010-2019)</i> in <i>Financial Table</i>
Replace 138/69-kV transformer at Metomen Substation	2017	2017	1	reliability (A, 69B3)	Proposed	F1867
Uprate Castle Rock-McKenna 69-kV line	2016	2017	1	reliability (69B2, 69B3)	Provisional	F2491
Install a second 138/69-kV transformer at Wautoma Substation	2018	2017	1	reliability (A, 69B2)	Provisional	F2480
Construct 69-kV double-circuit line between McCue and Lamar substations	2017	2017	3	reliability (A, 69B2), economics	Provisional	F2558
Install 2-24.5 MVAR 138-kV capacitor bank and 1-18 MVAR 69-kV capacitor bank at Brick Church substation	2017	2017	3	reliability (69B2)	Provisional	F2404

Defined in Previous 10-Year Assessment
Revised in scope from Previous 10-Year Assessment
New to this 10-Year Assessment

Table PR-10
Transmission System Additions for 2018

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to <i>Funding Project</i> and <i>Sum of Total (2010-2019)</i> in <i>Financial Table</i>
Replace existing Caroline 115/69-kV transformer	2018	2018	1	reliability (69B3)	Provisional	TBD
Construct Fairwater-Mackford Prairie 69-kV line	2019	2018	1	reliability (69B2)	Provisional	F2105
Convert Necedah distribution substation from 69 kV to 138 kV	2018	2018	1	reliability (69B2, 69B3)	Provisional	F2560
Reconfigure the North Randolph-Ripon 69-kV line to form a second Ripon-Metomen 69-kV line and retire the circuit between Metomen and the Mackford Prairie tap	2019	2018	1	reliability (69B2)	Provisional	F2105
Rebuild Y-32 Colley Road-Brick Church 69-kV line	2013	2018	3	reliability (B2, 69B3, 69C5, C3), condition	Provisional	F1670
Install a second 100 MVA 138/69 kV transformer at Hillman Substation	2018	2018	3	reliability (69B2, 69B3)	Provisional	F0339
Install a second 138/69-kV transformer at Spring Green with a 100 MVA summer normal rating	2018	2018	3	reliability (69B3)	Provisional	F2445
Uprate Y87 North Monroe-South Monroe 69-kV line to 115 MVA SE	2018	2018	3	reliability (69B2)	Provisional	TBD

Table PR-10
Transmission System Additions for 2018 (continued)

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to <i>Funding Project</i> and <i>Sum of Total (2010-2019)</i> in <i>Financial Table</i>
Install 1-16.33 MVAR 69-kV capacitor bank at Verona Substation	2018	2018	3	reliability (A, B2, B3)	Provisional	F2520
Install 2-16.33 MVAR 69-kV capacitor banks at North Monroe	2018	2018	3	reliability (B2)	Provisional	F2472
Construct Spring Valley-Twin Lakes-South Lake Geneva 138-kV line	2018	2018	3 & 5	T-D interconnection, reliability (69B2)	Provisional	F2570
Construct second Dunn Road-Egg Harbor 69-kV line	2018	2018	4	reliability (69B2)	Provisional	F0181

Defined in Previous 10-Year Assessment
Revised in scope from Previous 10-Year Assessment
New to this 10-Year Assessment

Table PR-11
Transmission System Additions for 2019

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to <i>Funding Project</i> and <i>Sum of Total (2010-2019)</i> in <i>Financial Table</i>
Uprate Ripon-Northwest Ripon 69-kV line Y-93	2019	2019	1	reliability (69B2)	Provisional	TBD
Uprate Winneconne-Sunset Point 69-kV line Y-103	2019	2019	1	reliability (69B2)	Provisional	F3062
Install 1-8.16 MVAR capacitor bank at Boscobel 69-kV Substation and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	2019	2019	3	reliability (69B2)	Provisional	F2518
Uprate the 6986 Royster to Sycamore 69-kV line to 115 MVA	2019	2019	3	reliability (69B3)	Provisional	F2471
Install 2-16.33 MVAR 69-kV capacitor banks at Eden Substation	2019	2019	3	reliability (A, B2)	Provisional	F2515
Install 4-49 MVAR 138-kV capacitor banks at Concord Substation	2021	2019	3	reliability (B2)	Provisional	F2489
Uprate Y159 Brick Church-Walworth 69-kV line to 115 MVA	2021	2019	3	reliability (69B2)	Provisional	F2153
Install 2-16.33 MVAR 69-kV capacitor banks at Dam Heights	2021	2019	3	reliability (69B2), asset renewal, potential T-D interconnection	Provisional	F2474

Defined in Previous 10-Year Assessment
Revised in scope from Previous 10-Year Assessment
New to this 10-Year Assessment

Table PR-12
Transmission System Additions for 2020

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to <i>Funding Project</i> and <i>Sum of Total (2010-2019)</i> in <i>Financial Table</i>
Construct Cardinal-Blount 138-kV line	2020	2020	3	reliability (C5)	Provisional	F2466
Install 2-16.33 MVAR 69-kV capacitor banks at Sun Prairie	2020	2020	3	reliability (69B2, 69B3)	Provisional	F2475
Install 2-12.25 MVAR 69-kV capacitor banks at Mazomanie Substation	2020	2020	3	reliability (69B2)	Provisional	F2517
Construct a Lake Delton-Birchwood 138-kV line	2022	2020	3	reliability (B2)	Provisional	F1638
Replace two existing 138/69-kV transformers at Glenview Substation with 100 MVA transformers	2020	2020	4	reliability (69B3)	Provisional	F2079
Upgrade Oak Creek-Pennsylvania 138-kV line	2021	2020	5	reliability (B2)	Provisional	F2473
Install 2-32 Mvar capacitor banks at Mukwonago 138-kV Substation	2021	2020	5	reliability (B2)	Provisional	F2493

Defined in Previous 10-Year Assessment
Revised in scope from Previous 10-Year Assessment
New to this 10-Year Assessment

Table PR-13
Transmission System Additions beyond 2020

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to <i>Funding Project</i> and <i>Sum of Total (2010-2019)</i> in <i>Financial Table</i>
Uprate X-67 Portage-Trienda 138-kV line to 373 MVA	2022	2022	3	reliability (69B2)	Provisional	F2092
Construct a Hubbard-East Beaver Dam 138-kV line	2022	2022	3	reliability (B2)	Provisional	F1640
Construct Shoto to Custer 138-kV line	2022	2022	4	reliability (69B2, 69B3)	Provisional	F2081
Install 138/69-kV transformer at Custer Substation	2022	2022	4	reliability (69B2, 69B3)	Provisional	F2081
Replace two existing 138/69-kV transformers at Sunset Point Substation with 100 MVA transformers	2024	2024	4	reliability (69B3)	Provisional	F2080
Construct a 345-kV bus, install a 345/138-kV 500 MVA transformer at North Randolph and loop the Columbia to South Fond Du Lac 345-kV line into the substation	2025	2025	3	reliability (B2)	Provisional	F2093
Increase ground clearance of M38-Atlantic 69-kV line from 120 to 167 degrees F and asset renewal	2009	TBD	2	reliability (69B2)	Provisional	TBD
Construct Gwinn-Forsyth second 69-kV line	2016	TBD	2	reliability (69B2)	Provisional	TBD
Uprate Columbia 345/138-kV transformer T-22 to 527 MVA	TBD	TBD	3	reliability (B3)	Provisional	F2135

Table PR-13
Transmission System Additions beyond 2020 (continued)

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to <i>Funding Project</i> and <i>Sum of Total (2010-2019)</i> in <i>Financial Table</i>
Reconductor Ramsey-Harbor 138-kV line	TBD	TBD	5	reliability	Provisional	TBD

Defined in Previous 10-Year Assessment
Revised in scope from Previous 10-Year Assessment
New to this 10-Year Assessment

Table PR-14
Zone 1 Transmission System Additions

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional
Upgrade McKenna 6.3 MVAR capacitor bank to 15.3 MVAR and upgrade Chaffee Creek 8.1 MVAR bank to 14.4 MVAR	2011	2011	1	reliability (69B2, 69B3)	Proposed
Construct 115-kV line from new Woodmin Substation to the Clear Lake Substation	2012	2012	1	T-D interconnection	Proposed
Reconfigure Petenwell 138-kV bus	2013	2013	1	reliability (C1), operating flexibility	Provisional
Construct Monroe County-Council Creek 161-kV line and Timberwolf 69-kV switching station	2013	2013	1	economics, reliability (A, B2, C3)	Proposed
Install a 161/138-kV transformer at Council Creek Substation	2013	2013	1	economics, reliability (A, B2, C3)	Proposed
Uprate Council Creek-Petenwell 138-kV line	2013	2013	1	economics, reliability (B2)	Proposed
Replace Petenwell 138/69-kV transformer	2015	2015	1	reliability (A, 69B2)	Provisional
Construct a 69-kV line from SW Ripon to the Ripon-Metomen 69-kV line	2015	2015	1	T-D interconnection	Provisional
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Ripon 69-kV Substation	2015	2015	1	reliability (69B2)	Provisional
Replace existing 56 MVA Harrison 138/69-kV transformer with a 100 MVA transformer	2016	2016	1	reliability (A)	Provisional
Replace 138/69-kV transformer at Metomen Substation	2017	2017	1	reliability (A, 69B3)	Proposed

Table PR-14 (continued)
Zone 1 Transmission System Additions

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional
Uprate Castle Rock-McKenna 69-kV line	2016	2017	1	reliability (69B2, 69B3)	Provisional
Install a second 138/69-kV transformer at Wautoma Substation	2018	2017	1	reliability (A, 69B2)	Provisional
Replace existing Caroline 115/69-kV transformer	2018	2018	1	reliability (69B3)	Provisional
Construct Fairwater-Mackford Prairie 69-kV line	2019	2018	1	reliability (69B2)	Provisional
Convert Necedah distribution substation from 69 kV to 138 kV	2018	2018	1	reliability (69B2, 69B3)	Provisional
Reconfigure the North Randolph-Ripon 69-kV line to form a second Ripon-Metomen 69-kV line and retire the circuit between Metomen and the Mackford Prairie tap	2019	2018	1	reliability (69B2)	Provisional
Uprate Ripon-Northwest Ripon 69-kV line Y-93	2019	2019	1	reliability (69B2)	Provisional
Uprate Winneconne-Sunset Point 69-kV line Y-103	2019	2019	1	reliability (69B2)	Provisional

Table PR-15
Zone 2 Transmission System Additions

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional
Install 2-8.0 MVAR capacitor bank at Indian Lake 69-kV Substation	2010	2010	2	reliability (B1)	Proposed
Install reactor at Straits Substation	2010	2010	2	reliability (B1)	Proposed
Install second 138/69-kV transformer and a 138-kV ring bus at Chandler Substation	2012	2012	2	reliability (69B3)	Proposed
Relocate Engadine 69-kV load	2012	2012	2	reliability (69B2)	Provisional
Upgrade 69-kV equipment at Delta Substation	2012	2012	2	reliability (C1), operating flexibility	Proposed
Energize Hiawatha-Indian Lake at 138 kV	2014	2014	2	reliability (B2)	Provisional
Install power flow control at Straits 138-kV Substation	2010	2014	2	reliability (B1)	Provisional

Table PR-15 (continued)
Zone 2 Transmission System Additions

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional
Uprate overhead portions of Straits-McGulpin 138-kV circuits #1 & #3 to 230 F degree summer emergency ratings	2012	2014	2	reliability (B2)	Proposed
Rebuild Straits-Pine River lines 6904/5 for 138 kV and operate at 69 kV	2014	2014	2	reliability (B2)	Proposed
Uprate Munising-Seney-Blaney Park 69-kV line to 167 degrees F	2014	2014	2	reliability (69B2)	Provisional
Construct 18th Road-Chandler double circuit 138-kV lines and operate at 138/69	2014	2014	2	reliability (69B3)	Provisional
Construct 18th Road 138/69-kV Substation and install two 138/69-kV transformers	2014	2014	2	reliability (69B3)	Provisional
Install 1-8.16 MVAR 138-kV capacitor bank at 18th Road	2014	2014	2	reliability (69B3)	Provisional
Construct a new Arnold 345-kV Substation and install a 345/138-kV transformer	2015	2015	2	reliability (B1)	Provisional
Uprate Pine River-Nine Mile 69-kV line 6923 to 167 degrees F and Asset Renewal for 6921/3	2016	2016	2	reliability (69B2)	Proposed
Construct Gwinn-Forsyth second 69-kV line	2016	TBD	2	reliability (69B2)	Provisional
Increase ground clearance of M38-Atlantic 69-kV line from 120 to 167 degrees F and minimum asset renewal	2009	TBD	2	reliability (69B2)	Provisional

Table PR-16
Zone 3 Transmission System Additions

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional
Uprate Y-61 McCue-Lamar 69-kV line to achieve 300 deg F line ratings and install 2-12.45 MVAR 69-kV capacitor banks at Lamar Substation	2008	2010	3	reliability (69B2)	Planned
Uprate the Royster Substation terminals	2010	2010	3	reliability (B2)	Planned
Uprate Y-61 Sheepskin-Dana 69-kV line to 95 MVA	2017	2010	3	reliability (69B2)	Planned
Uprate Y-40 Gran Grae-Boscobel 69-kV line to achieve a 99 MVA summer emergency rating*	2017	2010	3	reliability (B2, 69B2)	Planned
Replace two overhead Blount-Ruskin 69-kV lines with one underground 69-kV line	2010	2011	3	Completion of earlier project per agreement with the City of Madison	Planned
Install 2-16.33 MVAR 69-kV capacitor banks at Spring Green Substation	2011	2011	3	reliability (A, 69B3)	Planned
Install 1-32.66 MVAR 138-kV capacitor bank at Femrite Substation	2011	2011	3	reliability (A, C5)	Planned
Install 1-32.66 MVAR 138-kV capacitor bank at Kegonsa Substation	2011	2011	3	reliability (A, C5)	Planned
Rebuild Y-33 Brodhead to South Monroe 69-kV line	2011	2011	3	reliability (B2, 69B2, 69B3)	Planned
Uprate terminal limitations at McCue for the Y-79 McCue-Milton Lawns 69-kV line	2011	2011	3	reliability (69B2)	Proposed
Rebuild part of the Y-8 Dane-Dam Heights 69-kV line*	2015	2012	3	reliability, asset renewal, potential T-D interconnection	Planned

Table PR-16 (continued)
Zone 3 Transmission System Additions

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional
Install 2-16.33 MVAR 69-kV capacitor banks at Nine Springs Substation	2006	2013	3	reliability (69B2)	Proposed
Uprate Fitchburg-Nine Springs 69-kV and Royster-Pflaum 69-kV lines and move AGA load to the Royster-Femrite 69-kV line	2006	2013	3	reliability (69B2)	Proposed
Install a 138/69-kV transformer at Bass Creek Substation	2010	2013	3	reliability (69B2)	Planned
Uprate X-12 Town Line Road-Bass Creek 138-kV line to 300 deg F	2010	2013	3	reliability (69B2)	Planned
Construct 345-kV line from Rockdale to West Middleton	2013	2013	3	reliability (B2, C5)	Planned
Construct a 345-kV bus and install a 345/138 kV 500 MVA transformer at West Middleton Substation	2013	2013	3	reliability (B2, C5)	Planned
Rebuild the Y-119 Verona to Oregon 69-kV line	2008	2014	3	reliability, condition (69B3, 69C3)	Proposed
Uprate 6927 West Middleton-Stage Coach 69-kV line to 106 MVA SE	2015	2015	3	reliability (69B2, 69B3)	Provisional

Table PR-16 (continued)
Zone 3 Transmission System Additions

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional
Construct new 138-kV bus and install a 138/69-kV 100 MVA transformer at South Lake Geneva Substation	2016	2016	3	reliability (69B2)	Proposed
Construct new 138-kV line from North Lake Geneva to South Lake Geneva Substation	2016	2016	3	reliability (69B2), T-D interconnection	Proposed
Construct 69-kV double-circuit line between McCue and Lamar substations	2017	2017	3	reliability (A, 69B2), economics	Provisional
Install 2-24.5 MVAR 138-kV capacitor bank and 1-18 MVAR 69-kV capacitor bank at Brick Church substation	2017	2017	3	reliability (69B2)	Provisional
Rebuild Y-32 Colley Road-Brick Church 69-kV line	2013	2018	3	reliability (B2, 69B3, 69C5, C3) condition	Provisional
Install a second 100 MVA 138/69 kV transformer at Hillman Substation	2018	2018	3	reliability (69B2, 69B3)	Provisional
Install a second 138/69-kV transformer at Spring Green with a 100 MVA summer normal rating	2018	2018	3	reliability (69B3)	Provisional
Uprate Y87 North Monroe-South Monroe 69-kV line to 115 MVA SE	2018	2018	3	reliability (69B2)	Provisional
Install 1-16.33 MVAR 69-kV capacitor bank at Verona Substation	2018	2018	3	reliability (A, B2, B3)	Provisional
Install 2-16.33 MVAR 69-kV capacitor banks at North Monroe	2018	2018	3	reliability (B2)	Provisional
Construct Spring Valley-Twin Lakes-South Lake Geneva 138-kV line	2018	2018	3 & 5	T-D interconnection, reliability (69B2)	Provisional

Table PR-16 (continued)
Zone 3 Transmission System Additions

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional
Install 1-8.16 MVAR capacitor bank at Boscobel 69-kV Substation and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	2019	2019	3	reliability (69B2)	Provisional
Uprate the 6986 Royster to Sycamore 69-kV line to 115 MVA	2019	2019	3	reliability (69B3)	Provisional
Install 2-16.33 MVAR 69-kV capacitor banks at Eden Substation	2019	2019	3	reliability (A, B2)	Provisional
Install 4-49 MVAR 138-kV capacitor banks at Concord Substation	2021	2019	3	reliability (B2)	Provisional
Uprate Y159 Brick Church-Walworth 69-kV line to 115 MVA	2021	2019	3	reliability (69B2)	Provisional
Install 2-16.33 MVAR 69-kV capacitor banks at Dam Heights	2021	2019	3	reliability (69B2), asset renewal, potential T-D interconnection	Provisional
Construct Cardinal-Blount 138-kV line	2020	2020	3	reliability (C5)	Provisional
Install 2-16.33 MVAR 69-kV capacitor banks at Sun Prairie	2020	2020	3	reliability (69B2, 69B3)	Provisional
Install 2-12.25 MVAR 69-kV capacitor banks at Mazomanie Substation	2020	2020	3	reliability (69B2)	Provisional
Construct a Lake Delton-Birchwood 138-kV line	2022	2020	3	reliability (B2)	Provisional
Uprate X-67 Portage-Trienda 138-kV line to 373 MVA	2022	2022	3	reliability (69B2)	Provisional

Table PR-16 (continued)
Zone 3 Transmission System Additions

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional
Construct a Hubbard-East Beaver Dam 138-kV line	2022	2022	3	reliability (B2)	Provisional
Construct a 345-kV bus, install a 345/138-kV 500 MVA transformer at North Randolph and loop the Columbia to South Fond Du Lac 345-kV line into the substation	2025	2025	3	reliability (B2)	Provisional
Uprate Columbia 345/138-kV transformer T-22 to 527 MVA	TBD	TBD	3	reliability (B3)	Provisional

Table PR-17
Zone 4 Transmission System Additions

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional
Rebuild 2.37 miles of 69 kV from Sunset Point to Pearl Ave with 477 ACSR	2011	2011	4	reliability (69B2, 69B3)	Planned
Reconfigure Kewaunee 345/138-kV switchyard and install a second 500 MVA 345/138-kV transformer	2011	2011	4	reliability (C3), condition	Proposed
Construct Canal-Dunn Road 138-kV line	2012	2012	4	reliability (69A, 69B2, 69B3, 69C3)	Proposed
Install 100 MVA 138/69-kV transformer at Dunn Road	2012	2012	4	reliability (69A, 69B2, 69B3, 69C3)	Proposed
Construct second Dunn Road-Egg Harbor 69-kV line	2018	2018	4	reliability (69B2)	Provisional
Replace two existing 138/69-kV transformers at Glenview Substation with 100 MVA transformers	2020	2020	4	reliability (69B3)	Provisional
Construct Shoto to Custer 138-kV line	2022	2022	4	reliability (69B2, 69B3)	Provisional
Install 138/69-kV transformer at Custer Substation	2022	2022	4	reliability (69B2, 69B3)	Provisional
Replace two existing 138/69-kV transformers at Sunset Point Substation with 100 MVA transformers	2024	2024	4	reliability (69B3)	Provisional

Table PR-18
Zone 5 Transmission System Additions

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional
Construct a 138-kV bus at Pleasant Valley Substation to permit second distribution transformer interconnection	2010	2010	5	T-D interconnection	Planned
Expand 345-kV switchyard at Oak Creek to interconnect one new generator	2010	2010	5	new generation	Planned
Construct second Shorewood-Humboldt 138-kV underground cable*	2012	2010	5	reliability (B2)	Proposed
Install 3-75 MVAR capacitor banks at Bluemound Substation	2012	2014	5	reliability (B1)	Provisional
Replace two existing 345/138-kV transformers at Arcadian Substation with 1-500 MVA transformer	2010	2015	5	reliability (B3)	Provisional
Uprate Arcadian-Waukesha 138-kV lines KK9942/KK9962	2010	2015	5	reliability (B2)	Provisional
Construct Spring Valley-Twin Lakes-South Lake Geneva 138-kV line	2018	2018	3 & 5	T-D interconnection, reliability (69B2)	Provisional
Upgrade Oak Creek-Pennsylvania 138-kV line	2021	2020	5	reliability (B2)	Provisional
Install 2-32 MVAR capacitor banks at Mukwonago 138-kV Substation	2021	2020	5	reliability (B2)	Provisional
Reconductor Ramsey-Harbor 138-kV line	TBD	TBD	5	reliability	Provisional

**Table PR-19
Identified Needs and Transmission Lines Requiring New Right-of-Way**

Identified need	Potential solutions	Approx. line mileage		System need year	Projected In-service year	Planning zone
		Total	New ROW			
T-D interconnection request	Construct 69-kV line from new Warrens Substation to the Council Creek-Tunnel City 69-kV line	4.5	4.5	2010	2010	1
T-D interconnection request	Construct 115-kV line from new Woodmin Substation to the Clear Lake Substation	7.5	7.5	2012	2012	1
relieve overloads or low voltages under contingency (B2, C5)	Construct 345-kV line from Rockdale to West Middleton	32.4	32.4	2013	2013	3
relieve overloads or low voltages under contingency (69B3)	Construct 18th Road-Chandler double circuit 138-kV lines and operate at 138/69	4	4	2014	2014	2
T-D interconnection request	Construct a 69-kV line from SW Ripon to the Ripon-Metomen 69-kV line	1.5	1.5	2015	2015	1
relieve overloads or low voltages under contingency (69B2), T-D interconnection request	Construct new 138-kV line from North Lake Geneva to South Lake Geneva Substation	3.4	3.4	2016	2016	3
relieve overloads or low voltages under contingency (69B2)	Construct Fairwater-Mackford Prairie 69-kV line	5	5	2019	2018	1
relieve overloads or low voltages under contingency (69B2)	Construct second Dunn Road-Egg Harbor 69-kV line	12.66	12.66	2018	2018	4
T-D interconnection request,relieve overloads or low voltages under contingency (69B2)	Construct Spring Valley-Twin Lakes-South Lake Geneva 138-kV line	24.0	15	2018	2018	3 & 5
relieve overloads or low voltages under contingency (69B2, 69B3)	Construct Shoto to Custer 138-kV line	6.9	6.9	2022	2022	4
relieve overloads or low voltages under contingency (B2)	Construct a Hubbard-East Beaver Dam 138-kV line	10	10	2022	2022	3
relieve overloads or low voltages under contingency (B2)	Construct a Lake Delton-Birchwood 138-kV line	5	5	2022	2020	3

Table PR-20
Transmission Line Rebuilds/Reconductors, New Circuits and Voltage Conversions on Existing Right-of-Way

Identified need	Lines to be rebuilt/reconducted on existing ROW	Approx. mileage of rebuilt, reconducted or uprated lines	System need year	Projected In-service year	Planning zone
relieve overloads or low voltages under contingency (B2)	Construct second Shorewood-Humboldt 138-kV underground cable	0.75	2012	2010	5
Completion of earlier project per agreement with the City of Madison	Replace two overhead Blount-Ruskin 69-kV lines with one underground 69-kV line	2	2010	2011	3
relieve overloads or low voltages under contingency (B2, 69B2, 69B3)	Rebuild Y-33 Brodhead to South Monroe 69-kV line	18	2011	2011	3
relieve overloads or low voltages under contingency (69B3)	Rebuild 2.37 miles of 69 kV from Sunset Point to Pearl Ave with 477 ACSR	2.37	2011	2011	4
relieve overloads or low voltages under contingency (69A, 69B2, 69B3, 69C3)	Construct Canal-Dunn Road 138-kV line	7.64	2012	2012	4
relieve overloads or low voltages under contingency, asset renewal, potential T-D interconnection request	Rebuild part of the Y-8 Dane-Dam Heights 69-kV line	5	2015	2012	3
economics, relieve overloads or low voltages under contingency (B2, C3)	Construct Monroe County-Council Creek 161-kV line and Timberwolf 69-kV switching station	17.9	2013	2013	1
economics, relieve overloads or low voltages under contingency (C1)	Uprate Council Creek-Petenwell 138-kV line	32	2013	2013	1
relieve overloads or low voltages under contingency (B2)	Energize Hiawatha-Indian Lake at 138 kV	40	2014	2014	2
relieve overloads or low voltages under contingency (B2)	Rebuild Straits-Pine River lines 6904/5 for 138 kV and operate at 69 kV	25.3	2014	2014	2
relieve overloads or low voltages under contingency (69B2)	Uprate Munising-Seney-Blanney Park 69-kV line to 167 degrees F	52	2014	2014	2
relieve overloads or low voltages under contingency, replace aging facilities (69B3, 69C3)	Rebuild the Y-119 Verona to Oregon 69-kV line	11	2008	2014	3
relieve overloads or low voltages under contingency (69B2)	Uprate Pine River-Nine Mile 69-kV line 6923 to 167 degrees F and minimum Asset Renewal for 6921/3	16.4	2016	2016	2
relieve overloads or low voltages under contingency (A, 69B2)	Construct 69-kV double-circuit line between McCue and Lamar substations	4.0	2017	2017	3

**Table PR-20
Transmission Line Rebuilds/Reconductors, New Circuits and Voltage Conversions on
Existing Right-of-Way**

Identified need	Lines to be rebuilt/reconducted on existing ROW	Approx. mileage of rebuilt, reconducted or uprated lines	System need year	Projected In-service year	Planning zone
relieve overloads or low voltages under contingency (B2, 69B3, 69C5, C3) replace aging facilities	Rebuild Y-32 Colley Road-Brick Church 69-kV line	19.7	2013	2018	3
relieve overloads or low voltages under contingency (69B3)	Uprate the 6986 Royster to Sycamore 69-kV line to 115 MVA	3.35	2019	2019	3
relieve overloads or low voltages under contingency (C5)	Construct Cardinal-Blount 138-kV line	5	2020	2020	3
relieve overloads or low voltages under contingency (69B2)	Increase ground clearance of M38-Atlantic 69-kV line from 120 to 167 degrees F and minimum asset renewal	22	2009	TBD	2
relieve overloads or low voltages under contingency (69B2)	Construct Gwinn-Forsyth second 69-kV line	1	2016	TBD	2
relieve overloads or low voltages under contingency	Reconductor Ramsey-Harbor 138-kV line	8.4	TBD	TBD	5

**Table PR-21
New Substations, Transformer Additions and Replacements**

Identified need	Potential additions or replacements	Transformer Capacity (MVA)		System need year	Projected In-service year	Planning zone
		Install	Replace			
relieve overloads under contingency (69B3)	Install second 138/69-kV transformer and a 138-kV ring bus at Chandler Substation	60	0	2012	2012	2
relieve overloads under contingency (C3), replace aging facilities	Reconfigure Kewaunee 345/138-kV switchyard and install a second 500 MVA 345/138-kV transformer	500	0	2011	2011	4
relieve overloads under contingency (69A, 69B2, 69B3, 69C3)	Install 100 MVA 138/69-kV transformer at Dunn Road	100	0	2012	2012	4
economics, relieve overloads under contingency (B2, C3)	Install a 161/138-kV transformer at Council Creek Substation	100	0	2013	2013	1
relieve overloads under contingency (69B2)	Install a 138/69-kV transformer at Bass Creek Substation	100	0	2010	2013	3
relieve overloads under contingency (B2, C5)	Construct a 345-kV bus and install a 345/138 kV 500 MVA transformer at West Middleton Substation	500	0	2013	2013	3
relieve overloads under contingency (69B3)	Construct 18th Road 138/69-kV Substation and install two 138/69-kV transformers	120	0	2014	2014	2
relieve overloads under contingency (B2)	Install 138/69-kV 150 MVA transformer at Nine Mile	150	0	2014	2014	2
relieve overloads under contingency (B2)	Install 138/69-kV 150 MVA transformer at Pine River	150	0	2014	2014	2
relieve overloads under contingency (A, 69B2)	Replace Petenwell 138/69-kV transformer	60	33.0	2015	2015	1
relieve overloads under contingency (B1)	Construct a new Arnold 345-kV Substation and install a 345/138-kV transformer	500	0	2015	2015	2
relieve overloads under contingency (B3)	Replace two existing 345/138-kV transformers at Arcadian Substation with 1-500 MVA transformer	500	672	2010	2015	5
relieve overloads under contingency (A)	Replace existing 56 MVA Harrison 138/69-kV transformer with a 100 MVA transformer	100	56	2016	2016	1
relieve overloads under contingency (69B2)	Construct new 138-kV bus and install a 138/69-kV 100 MVA transformer at South Lake Geneva Substation	100	0	2016	2016	35
relieve overloads under contingency (A, 69B3)	Replace 138/69-kV transformer at Metomen Substation	100	47	2017	2017	1
relieve overloads under contingency (A, 69B2)	Install a second 138/69-kV transformer at Wautoma Substation	100	0	2018	2017	1
relieve overloads under contingency (69B3)	Replace existing Caroline 115/69-kV transformer	60	33	2018	2018	1

**Table PR-21
New Substations, Transformer Additions and Replacements**

Identified need	Potential additions or replacements	Transformer Capacity (MVA)		System need year	Projected In-service year	Planning zone
		Install	Replace			
relieve overloads under contingency (69B2, 69B3)	Convert Necedah distribution substation from 69 kV to 138 kV	N/A	N/A	2018	2018	1
relieve overloads under contingency (69B2, 69B3)	Install a second 100 MVA 138/69 kV transformer at Hillman Substation	100	0	2018	2018	3
relieve overloads under contingency (69B3)	Install a second 138/69-kV transformer at Spring Green with a 100 MVA summer normal rating	100	0	2018	2018	3
relieve overloads under contingency (69B3)	Replace two existing 138/69-kV transformers at Glenview Substation with 100 MVA transformers	200	116	2020	2020	4
relieve overloads under contingency (69B2, 69B3)	Install 138/69-kV transformer at Custer Substation	100	0	2022	2022	4
relieve overloads under contingency (69B3)	Replace two existing 138/69-kV transformers at Sunset Point Substation with 100 MVA transformers	200	142	2024	2024	4
relieve overloads under contingency (B2)	Construct a 345-kV bus, install a 345/138-kV 500 MVA transformer at North Randolph and loop the Columbia to South Fond Du Lac 345-kV line into the substation	500	0	2025	2025	31
relieve overloads under contingency (B3)	Uprate Columbia 345/138-kV transformer T-22 to 527 MVA	527	400	TBD	TBD	31

**Table PR-22
Substation Equipment Additions and Replacements**

Identified need	Potential additions or replacements	Capacitor bank Capacity (MVAR)	System Need Year	Projected In-Service Year	Planning Zone
relieve overloads or low voltages under contingency (B1)	Install 2-8.0 MVAR capacitor bank at Indian Lake 69-kV Substation	16.33	2010	2010	2
relieve overloads or low voltages under contingency (B1)	Install reactor at Straits Substation	N/A	2010	2010	2
relieve overloads or low voltages under contingency (B2)	Uprate overhead portions of Straits-McGulpin 138-kV circuits #1 & #3 to 230 F degree summer emergency ratings	N/A	2012	2010	2
relieve overloads or low voltages under contingency (69B2)	Uprate Y-61 McCue-Lamar 69-kV line to achieve 300 deg F line ratings and install 2-12.45 Mvar 69-kV capacitor banks at Lamar Substation	24.9	2008	2010	3
relieve overloads or low voltages under contingency (B2)	Uprate the Royster Substation terminals	N/A	2010	2010	3
relieve overloads or low voltages under contingency (69B2)	Uprate Y-61 Sheepskin-Dana 69-kV line to 95 MVA	N/A	2017	2010	3
relieve overloads or low voltages under contingency (B2, 69B2)	Uprate Y-40 Gran Grae-Boscobel 69-kV line to achieve a 99 MVA summer emergency rating*	N/A	2017	2010	3
T-D interconnection request	Construct a 138-kV bus at Pleasant Valley Substation to permit second distribution transformer interconnection	N/A	2010	2010	5
accommodate new generation	Expand 345-kV switchyard at Oak Creek to interconnect one new generator	N/A	2010	2010	5
relieve overloads or low voltages under contingency (69B2)	Upgrade McKenna 6.3 MVAR capacitor bank to 15.3 MVAR and upgrade Chaffee Creek 8.1 MVAR bank to 14.4 MVAR	29.7	2011	2011	1
relieve overloads or low voltages under contingency (A, 69B3)	Install 2-16.33 MVAR 69-kV capacitor banks at Spring Green Substation	32.66	2011	2011	3
relieve overloads or low voltages under contingency (A, C5)	Install 1-32.66 MVAR 138-kV capacitor bank at Femrite Substation	32.66	2011	2011	3
relieve overloads or low voltages under contingency (A, C5)	Install 1-32.66 MVAR 138-kV capacitor bank at Kegonsa Substation	32.66	2011	2011	3
relieve overloads or low voltages under contingency (69B2)	Uprate terminal limitations at McCue for the Y-79 McCue-Milton Lawns 69-kV line	N/A	2011	2011	35
relieve overloads or low voltages under contingency (69B2)	Relocate Engadine 69-kV load	N/A	2012	2012	2
relieve overloads or low voltages under contingency (C1)	Reconfigure Petenwell 138-kV bus	N/A	2013	2013	1

**Table PR-22
Substation Equipment Additions and Replacements**

Identified need	Potential additions or replacements	Capacitor bank Capacity (MVAR)	System Need Year	Projected In-Service Year	Planning Zone
relieve overloads or low voltages under contingency (69B2)	Install 2-16.33 MVAR 69-kV capacitor banks at Nine Springs Substation	32.66	2006	2013	3
relieve overloads or low voltages under contingency (69B2)	Uprate Fitchburg-Nine Springs 69-kV and Royster-Pflaum 69-kV lines and move AGA load to the Royster-Femrite 69-kV line	N/A	2006	2013	3
relieve overloads or low voltages under contingency (69B2)	Uprate X-12 Town Line Road-Bass Creek 138-kV line to 300 deg F	N/A	2010	2013	3
relieve overloads or low voltages under contingency (B1)	Install power flow control at Straits 138-kV Substation	N/A	2010	2014	2
relieve overloads or low voltages under contingency (69B3)	Install 1-8.16 MVAR 138-kV capacitor banks at 18th Road	8.16	2014	2014	2
reliability (C1), operating flexibility	Upgrade 69-kV equipment at Delta Substation	N/A	2012	2012	2
relieve overloads or low voltages under contingency (B1)	Install 3-75 MVAR capacitor banks at Bluemound Substation	225	2012	2014	5
relieve overloads or low voltages under contingency (69B2)	Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Ripon 69-kV Substation	12.3	2015	2015	1
relieve overloads or low voltages under contingency (69B2, 69B3)	Uprate 6927 West Middleton-Stage Coach 69-kV line to 106 MVA SE	N/A	2015	2015	3
relieve overloads or low voltages under contingency (B2)	Uprate Arcadian-Waukesha 138-kV lines KK9942/KK9962 (What the gens will they be available talk to WE)	N/A	2010	2015	5
relieve overloads or low voltages under contingency (69B2, 69B3)	Uprate Castle Rock-Mckenna 69-kV line	N/A	2016	2017	1
relieve overloads or low voltages under contingency (69B2)	Install 2-24.5 Mvar 138-kV capacitor bank and 1-18 Mvar 69-kV capacitor bank at Brick Church substation	67	2017	2017	35
relieve overloads or low voltages under contingency (69B2)	Reconfigure the North Randolph-Ripon 69-kV line to form a second Ripon-Metomen 69-kV line and retire the circuit between Metomen and the Mackford Prairie tap	N/A	2019	2018	1
relieve overloads or low voltages under contingency (69B2)	Uprate Y87 North Monroe-South Monroe 69-kV line to 115 MVA SE	N/A	2018	2018	3
relieve overloads or low voltages under contingency (A, B2, B3)	Install 1-16.33 MVAR 69-kV capacitor bank at Verona Substation	16.33	2018	2018	3
relieve overloads or low voltages under contingency (B2)	Install 2-16.33 Mvar 69-kV capacitor banks at North Monroe	32.66	2018	2018	3

**Table PR-22
Substation Equipment Additions and Replacements**

Identified need	Potential additions or replacements	Capacitor bank Capacity (MVAR)	System Need Year	Projected In-Service Year	Planning Zone
relieve overloads or low voltages under contingency (69B2)	Install 1-8.16 MVAR capacitor bank at Boscobel 69-kV Substation and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	10.92	2019	2019	3
relieve overloads or low voltages under contingency (A, B2)	Install 2-16.33 MVAR 69-kV capacitor banks at Eden Substation	32.66	2019	2019	3
relieve overloads or low voltages under contingency (B2)	Install 4-49 MVAR 138-kV capacitor banks at Concord Substation	196	2021	2019	35
relieve overloads or low voltages under contingency (69B2)	Uprate Y159 Brick Church-Walworth 69-kV line to 115 MVA	N/A	2021	2019	35
relieve overloads or low voltages under contingency (69B2)	Uprate Ripon-Northwest Ripon 69-kV line Y-93	N/A	2019	2019	1
relieve overloads or low voltages under contingency (69B2)	Uprate Winneconne-Sunset Point 69-kV line Y-103	N/A	2019	2019	1
reliability (69B2), asset renewal, potential T-D interconnection	Install 2-16.33 Mvar 69-kV capacitor banks at Dam Heights	32.66	2021	2019	31
relieve overloads or low voltages under contingency (69B2, 69B3)	Install 2-16.33 Mvar 69-kV capacitor banks at Sun Prairie	32.66	2020	2020	3
relieve overloads or low voltages under contingency (69B2)	Install 2-12.25 MVAR 69-kV capacitor banks at Mazomanie Substation	24.5	2020	2020	3
relieve overloads or low voltages under contingency (B2)	Upgrade Oak Creek-Pennsylvania 138-kV line	N/A	2021	2020	5
relieve overloads or low voltages under contingency (B2)	Install 2-32 Mvar capacitor banks at Mukwonago 138-kV Substation	64	2021	2020	5
relieve overloads or low voltages under contingency (69B2)	Uprate X-67 Portage-Trienda 138-kV line to 373 MVA	N/A	2022	2022	31

Table PR-23**Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2010 10-Year Assessment**

PROJECTS CANCELED	Former In-Service Date	Planning Zone	Reason for Removal
Install 1-4.08 MVAR capacitor bank at North Bluff 69-kV Substation	2011	2	Updated load/model information
Rebuild/convert Bayport – Suamico – Sobieski – Pioneer 69-kV line to 138 kV	2020	4	Updated load/model information
Install 28.8 MVAR capacitor bank at Butternut 138-kV Substation	2020	4	Updated load/model information
Uprate the Melissa-Tayco to 229 MVA (300F)	2020	4	Updated load/model information
Install 2-16.33 MVAR 69-kV capacitor banks at Rio	2022	3	Updated load/model information
Install 2-16.33 MVAR 69-kV capacitor banks and 2-24.5 MVAR 138-kV capacitor banks at Femrite Substation	2014	3	Replaced with a similar Femrite capacitor bank project
Install a 12.2 MVAR capacitor bank at Hilltop 69-kV Substation	2023	1	Updated load/model information
Rebuild Pine River-Nine Mile lines 6921 and 6923 to 138/69-kV double-circuit line	2012	2	Uncertain status of Kinross load
Install 138/69-kV 150 MVA transformer at Nine Mile	2012	2	Uncertain status of Kinross load
Install 138/69-kV 150 MVA transformer at Pine River	2012	2	Uncertain status of Kinross load
Construct tap from Kinross load to Pine River/Nine Mile 69-kV line	2012	2	Uncertain status of Kinross load
PROJECTS DEFERRED	New Date	Planning Zone	Reason for Deferral
Install 2-16.33 MVAR 69-kV capacitor banks at Spring Green Substation	2011	3	Was 2010; resource scheduling requirements
Install second 138/69-kV transformer and a 138-kV ring bus at Chandler Substation	2012	2	Was 2011 and a transformer at Lakehead; delay due to resource scheduling requirements
Rebuild Straits-Pine River lines 6904/5 for 138 kV and operate at 69 kV	2014	2	Was 2012; uncertain status of Kinross load

Table PR-23**Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2010 10-Year Assessment**

PROJECTS DEFERRED	New date	Planning Zone	Reason for Deferral
Uprate overhead portions of Straits-McGulpin 138-kV circuits #1 & #3 to 230 F degree summer emergency ratings	2014	2	Was 2012; resource scheduling requirements
Rebuild the Y-119 Verona to Oregon 69-kV line	2014	3	Was 2011; updated load information and pending rating validation
Install 3-75 MVAR capacitor banks at Bluemound Substation	2014	5	Was 2012; updated load/model information
Uprate Arcadian-Waukesha 138-kV lines KK9942/KK9962	2015	5	Was 2013; updated load/model information
Construct a 69-kV line from SW Ripon to the Ripon-Metomen 69-kV line	2015	1	Was 2014; customer postponed interconnection
Replace two existing 345/138-kV transformers at Arcadian Substation with 1-500 MVA transformer	2015	5	Was 2013; updated load/model information
Install 2-24.5 Mvar 138-kV capacitor bank and 1-18 Mvar 69-kV capacitor bank at Brick Church substation	2017	3	Was 2011; updated study results
Install a second 100 MVA 138/69 kV transformer at Hillman Substation	2018	3	Was 2015 replace existing xfmr; updated load/model information
Rebuild Y-32 Colley Road-Brick Church 69-kV line	2018	3	Was 2013; updated study results
Install a second 138/69-kV transformer at Spring Green with a 100 MVA summer normal rating	2018	3	Was 2016; updated load/model information
Install 1-16.33 MVAR 69-kV capacitor bank at Verona Substation	2018	3	Was 2014; updated load/model information
Construct second Dunn Road-Egg Harbor 69-kV line	2018	4	Was 2016; updated load/model information
Uprate Y159 Brick Church-Walworth 69-kV line to 115 MVA	2019	3	Was 2017; updated load/model information
Uprate the 6986 Royster to Sycamore 69-kV line to 115 MVA	2019	3	Was 2016; updated load/model information
Install 2-16.33 MVAR 69-kV capacitor banks at Dam Heights	2019	3	Was 2017; updated load/model information
Install 4-49 MVAR 138-kV capacitor banks at Concord Substation	2019	3	Was 2016; updated load/model information

Table PR-23**Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2010 10-Year Assessment**

PROJECTS DEFERRED (continued)	New date	Planning Zone	Reason for Deferral
Install 2-16.33 MVAR 69-kV capacitor banks at Eden Substation	2019	3	Was 2016; updated load/model information
Install 1-8.16 MVAR capacitor bank at Boscobel 69-kV Substation and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	2019	3	Was 2015; updated load/model information
Construct a Lake Delton-Birchwood 138-kV line	2020	3	Was 2017; updated load/model information
Construct Cardinal-Blount 138-kV line	2020	3	Was 2017; updated load/model information
Install 2-16.33 MVAR 69-kV capacitor banks at Sun Prairie	2020	3	Was 2016; updated load/model information
Install 2-12.25 MVAR 69-kV capacitor banks at Mazomanie Substation	2020	3	Was 2017; updated load/model information
Replace two existing 138/69-kV transformers at Glenview Substation with 100 MVA transformers	2020	4	Was 2016; updated load/model information
Upgrade Oak Creek-Pennsylvania 138-kV line	2020	5	Was 2015; updated load/model information
Install 2-32 MVAR capacitor banks at Mukwonago 138-kV Substation	2020	5	Was 2019; updated load/model information
Construct a Hubbard-East Beaver Dam 138-kV line	2022	3	Was 2019, was Horicon-East Beaver Dam; updated load/model information
Uprate X-67 Portage-Trienda 138-kV line to 373 MVA	2022	3	Was 2016; updated load/model information
Construct Shoto to Custer 138-kV line	2022	4	Was 2020; updated load/model information
Install 138/69-kV transformer at Custer Substation	2022	4	Was 2020; updated load/model information
Replace two existing 138/69-kV transformers at Sunset Point Substation with 100 MVA transformers	2024	4	Was 2018; updated load/model information

Table PR-23

Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2010 10-Year Assessment

PROJECTS DEFERRED (continued)	New date	Planning Zone	Reason for Deferral
Construct a 345-kV bus, install a 345/138-kV 500 MVA transformer at North Randolph and loop the Columbia to South Fond Du Lac 345-kV line into the substation	2025	3	Was 2021; updated load/model information
Increase ground clearance of M38-Atlantic 69-kV line from 120 to 167 degrees F and minimum asset renewal	TBD	2	Was 2013; updating study results
Construct Gwinn-Forsyth second 69-kV line	TBD	2	Was 2014; updating study results
Uprate Columbia 345/138-kV transformer T-22 to 527 MVA	TBD	3	Was 2015; updated load/model information
OTHER PROJECT CHANGES AND POSSIBLE CHANGES	Date	Planning Zone	Nature of Change or Update
Uprate Y-40 Gran Grae-Boscobel 69-kV line to achieve a 99 MVA summer emergency rating	2010	3	Was 2017; advanced to uprate in conjunction with another project
Uprate Y-61 Sheepskin-Dana 69-kV line to 95 MVA	2010	3	Was 2017; advanced to uprate in conjunction with another project
Upgrade McKenna 6.3 MVAR capacitor bank to 15.3 MVAR and upgrade Chaffee Creek 8.1 MVAR bank to 14.4 MVAR	2011	1	Was two banks at McKenna in 2013; advanced due to updated scope of project and related study results
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Ripon 69-kV Substation	2015	1	Was 2016; updated load/model information
Install 2-8.0 MVAR capacitor bank at Indian Lake 69-kV Substation	2010	2	Was 1-16.33 MVAR capacitor banks
Rebuild part of the Y-8 Dane-Dam Heights 69-kV line	2012	3	Was provisional status, now proposed

Table PR-23**Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2010 10-Year Assessment**

NEW PROJECTS	In-Service Date	Planning Zone	Reason for Project
Install reactors at Straits Substation	2010	2	reliability
Install 1-32.66 MVAR 138-kV capacitor bank at Femrite Substation	2011	3	reliability
Install 1-32.66 MVAR 138-kV capacitor bank at Kegonsa Substation	2011	3	reliability
Upgrade 69-kV equipment at Delta Substation	2012	2	reliability, operating flexibility
Relocate Engadine 69-kV load	2012	2	reliability
Reconfigure Petenwell 138-kV bus	2013	1	reliability, operating flexibility
Install power flow control at Straits 138-kV Substation	2014	2	reliability
Energize Hiawatha-Indian Lake at 138 kV	2014	2	reliability
Construct 18th Road-Chandler double circuit 138-kV lines and operate at 138/69	2014	2	reliability
Construct 18th Road 138/69-kV Substation and install two 138/69-kV transformers	2014	2	reliability
Install 1-8.16 MVAR 138-kV capacitor banks at 18th Road	2014	2	reliability
Replace Petenwell 138/69-kV transformer	2015	1	reliability
Construct a new Arnold 345-kV Substation and install a 345/138-kV transformer	2015	2	reliability
Uprate 6927 West Middleton-Stage Coach 69-kV line to 106 MVA SE	2015	3	reliability
Replace existing 56 MVA Harrison 138/69-kV transformer with a 100 MVA transformer	2016	1	reliability
Uprate Pine River-Nine Mile 69-kV line 6923 to 167 degrees F and asset renewal for 6921/3	2016	2	reliability, condition
Replace existing Caroline 115/69-kV transformer	2018	1	reliability

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Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2010 10-Year Assessment

NEW PROJECTS (continued)	In-Service Date	Planning Zone	Reason for Project
Uprate Y87 North Monroe-South Monroe 69-kV line to 115 MVA SE	2018	3	reliability
Uprate Winneconne-Sunset Point 69-kV line Y-103	2019	1	reliability
Uprate Ripon-Northwest Ripon 69-kV line Y-93	2019	1	reliability