

Table PR-2
Transmission System Additions for 2009

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 (2009-2018)</i> in <i>Financial Table</i>
Uprate the Chandler-Masonville 69-kV line summer normal and emergency ratings from 120 deg F to 167 deg F	2009	2009	2	reliability	Proposed	F2532
Install 1-4.08 MVAR capacitor bank at L'Anse 69 kV	2008	2009	2	reliability	Proposed	F1819
Construct ring bus at the Pine River 69-kV Substation and replace 1-5.4 MVAR capacitor bank with 2-4.08 MVAR banks	2008	2009	2	reliability, condition	Proposed	F1282
Install 1-8.16 MVAR capacitor banks at the M38 138-kV Substation	2009	2009	2	reliability	Proposed	F2485
Uprate Chandler-Cornell 69-kV line clearance from 120 to 167 deg F	2009	2009	2	reliability	Proposed	F2016
Install 1-8.2 MVAR capacitor bank at Hiawatha 138-kV Substation	2009	2009	2	reliability	Proposed	F2222
Install 1-4.08 MVAR capacitor banks at Osceola 69 kV	2009	2009	2	reliability	Proposed	F2468
Uprate the Chandler-Delta #1 69-kV line summer emergency rating from 120 deg F to 167 deg F	2009	2009	2	reliability	Proposed	F2534

Table PR-2
Transmission System Additions for 2009 (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 (2009-2018)</i> in Financial Table
Uprate the Chandler-Delta #2 69-kV line summer emergency rating to from 120 deg F 167 deg F	2009	2009	2	reliability	Proposed	F2535
Construct a Jefferson-Tyranena-Stony Brook 138-kV line	2006	2009	3	reliability	Planned	F0924
Uprate X-8 Rockdale to Boxelder 138-kV line	2008	2009	3	reliability	Planned	F0924
Uprate Y-41 Walworth- North Lake Geneva 69-kV to achieve a 69 MVA summer emergency rating	2009	2009	3	reliability	Planned	F2154
Install a second 138-kV reserve auxiliary transformer (RAT) at Kewaunee and remove tertiary auxiliary transformer (TAT)	2009	2009	4	reliability	Proposed	F2371

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 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 (2009-2018)</i> in <i>Financial Table</i>
Rebuild Arpin-Rocky Run 345-kV line	2010	2010	1	condition	Planned	F2252
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
Construct Brandon-Fairwater 69-kV line	2010	2010	1	T-D interconnection	Planned	F1844
Replace Metomen 69-kV breaker	2010	2010	1	reliability, condition	Planned	F2398
Rebuild/convert Conover-Plains 69-kV line to 138 kV	2010	2010	2	reliability, transfer capability	Planned	F1363
Construct 138-kV bus and install a 138/69-kV, 60 MVA transformer at Aspen Substation	2010	2010	2	reliability	Planned	F1363
Install 1-16.33 MVAR capacitor bank at Indian Lake 138-kV Substation	2010	2010	2	reliability	Proposed	F2223
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	Proposed	F2324
Uprate X-23 Colley Road-Marine 138-kV line terminals*	2014	2010	3	reliability	Proposed	F1670
Construct new Oak Ridge-Verona 138-kV line and install a 138/69-kV transformer at Verona with a 100 MVA summer normal rating	2009	2010	3	reliability	Planned	F1407

Table PR-3
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 (2009-2018)</i> in <i>Financial Table</i>
Upgrade Sheepskin capacitor bank from 10.8 MVAR to 16.2 MVAR	2009	2010	3	reliability	Planned	F2248
Construct second Paddock-Rockdale 345-kV line and replace 345/138-kV transformer T22 at Rockdale Substation	2010	2010	3	economics	Planned	F1981
Install 2-16.33 MVAR 69-kV capacitor banks at Spring Green Substation	2010	2010	3	reliability	Planned	F2327
Uprate the Royster Substation terminals	2010	2010	3	reliability	Planned	F2317
Uprate Point Beach-Sheboygan Energy Center 345-kV circuit L111 to 167 degrees F	2010	2010	4	economics	Proposed	F1988
Install 2-32 MVAR capacitor banks at Summit 138-kV Substation	2010	2010	5	reliability	Proposed	F2256
Expand 345-kV switchyard at Oak Creek to interconnect one new generator	2010	2010	5	new generation	Planned	F1729
Uprate Oak Creek-Root River 138-kV line	2010	2010	5	new generation	Planned	F2140
Uprate Oak Creek-Nicholson 138-kV line	2010	2010	5	new generation	Planned	F2112
Upgrade Bain-Albers 138-kV line	2010	2010	5	reliability	Proposed	F2461

Table PR-3
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 (2009-2018)</i> in <i>Financial Table</i>
Construct a 138-kV bus at Pleasant Valley Substation to permit second distribution transformer interconnection	2010	2010	5	T-D interconnection	Planned	F2086
Construct second Shorewood-Humboldt 138-kV underground cable*	2012	2010	5	reliability	Proposed	F2487

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 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 (2009-2018)</i> in <i>Financial Table</i>
Install 1-4.08 MVAR capacitor bank at North Bluff 69-kV Substation	2010	2011	2	reliability	Provisional	F2490
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	Proposed	F2628
Rebuild the Y-119 Verona to Oregon 69-kV line	2008	2011	3	reliability, condition	Proposed	F2469
Rebuild Y-33 Brodhead to South Monroe 69-kV line	2011	2011	3	generation interconnection, reliability	Planned	F2526
Uprate terminal limitations at McCue for the Y-79 McCue-Milton Lawns 69-kV line	2011	2011	3	reliability	Proposed	F2405
Install 2-24.5 MVAR 138-kV capacitor bank and 1-18 MVAR 69-kV capacitor bank at Brick Church substation	2011	2011	3	reliability	Provisional	F2404
Reconfigure Kewaunee 345/138-kV switchyard and install a second 500 MVA 345/138-kV transformer	2011	2011	4	reliability, condition	Proposed	F2437
Rebuild 2.37 miles of 69 kV from Sunset Point to Pearl Ave with 477 ACSR	2011	2011	4	reliability	Planned	F1361

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 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 (2009-2018)</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
Uprate overhead portions of Straits-McGulpin 138-kV circuits #1 & #3 to 230 F degree summer emergency ratings	2012	2012	2	reliability	Provisional	TBD
Rebuild/convert Straits-Pine River 138-kV lines 6904/5	2012	2012	2	reliability	Provisional	F2833
Install 138/69-kV 150 MVA transformer at Pine River	2012	2012	2	reliability	Provisional	F2834
Install 138/69-kV 150 MVA transformer at Nine Mile	2012	2012	2	reliability	Provisional	F2834
Install 138/69-kV 150 MVA transformer at Lakehead Rapid River	2012	2012	2	reliability	Provisional	TBD
Construct tap from the Kinross load to Pine River/Nine Mile 69-kV line	2012	2012	2	T-D interconnection, reliability	Provisional	F2836
Construct/convert Pine River-Nine Mile 138/69-kV double-circuit line	2012	2012	2	reliability	Provisional	F2836
Rebuild part of the Y-8 Dane-Dam Heights 69-kV line*	2015	2012	3	reliability, asset renewal, potential T-D interconnection	Provisional	F1602
Uprate Y-40 Gran Grae-Boscobel 69-kV line to achieve a 99 MVA summer emergency rating*	2017	2012	3	reliability	Proposed	F1444

Table PR-5
Transmission System Additions for 2012 (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 (2009-2018)</i> in Financial Table
Construct Canal-Dunn Road 138-kV line	2012	2012	4	reliability	Proposed	F1358
Install 60 MVA 138/69-kV transformer at Dunn Road	2012	2012	4	reliability	Proposed	F1358
Install 3-75 MVAR capacitor banks at Bluemound Substation	2012	2012	5	reliability	Proposed	F2650

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 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 (2009-2018)</i> in <i>Financial Table</i>
Construct Monroe County-Council Creek 161-kV line and Timberwolf 69-kV switching station	2013	2013	1	economics, reliability	Proposed	F2454
Install a 161/138-kV transformer at Council Creek Substation	2013	2013	1	economics, reliability	Proposed	F2454
Uprate Council Creek-Petenwell 138-kV line	2013	2013	1	economics, reliability	Proposed	F2849
Upgrade Mckenna 6.3 MVAR capacitor bank to 12.25 MVAR and install a second new 12.25 MVAR capacitor bank	2013	2013	1	reliability	Provisional	F2519
Install second Chandler 138/69-kV transformer	2013	2013	2	reliability	Provisional	TBD
Increase ground clearance of M38-Atlantic 69-kV line from 120 to 167 degrees F	2009	2013	2	reliability	Provisional	TBD
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	Proposed	F2088
Rebuild Y-32 Colley Road-Brick Church 69-kV line	2013	2013	3	reliability, condition	Provisional	F1670
Install 2-16.33 MVAR 69-kV capacitor banks at Nine Springs Substation	2013	2013	3	reliability	Proposed	F2088
Install a 138/69-kV transformer at Bass Creek Substation	2010	2013	3	reliability	Proposed	F1869

Table PR-6
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 (2009-2018)</i> in <i>Financial Table</i>
Uprate X-12 Town Line Road-Bass Creek 138-kV line to 300 deg F	2010	2013	3	reliability	Proposed	F1869
Construct 345-kV line from Rockdale to West Middleton	2013	2013	3	reliability	Planned	F1435
Construct a 345-kV bus and install a 345/138 kV 500 MVA transformer at West Middleton Substation	2013	2013	3	reliability	Planned	F1435
Uprate Y-61 Sheepskin-Dana 69-kV line to 95 MVA	2013	2013	3	reliability	Proposed	F2583
Uprate Arcadian-Waukesha 138-kV lines KK9942/KK9962	2010	2013	5	reliability	Provisional	F2142
Replace two existing 345/138-kV transformers at Arcadian Substation with 1-500 MVA transformer	2010	2013	5	reliability	Provisional	F2539

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 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 (2009-2018)</i> in <i>Financial Table</i>
Construct a 69-kV line from SW Ripon to the Ripon-Metomen 69-kV line	2014	2014	1	T-D interconnection	Provisional	F2053
Uprate Munising-Seney-Blaney Park 69-kV line to 167 degrees F	2014	2014	2	reliability	Provisional	TBD
Construct Gwinn-Forsyth second 69-kV line	2014	2014	2	reliability	Provisional	TBD
Install 2-16.33 MVAR 69-kV capacitor banks and 2-24.5 MVAR 138-kV capacitor banks at Femrite Substation	2014	2014	3	reliability	Provisional	F2516
Install 1-16.33 MVAR 69-kV capacitor bank at Verona Substation	2014	2014	3	reliability	Provisional	F2520

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 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 (2009-2018)</i> in <i>Financial Table</i>
Replace the existing 46 MVA Hillman 138/69-kV transformer with a 100 MVA transformer	2015	2015	3	reliability	Provisional	F0339
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	2015	2015	3	reliability	Provisional	F2518
Upgrade Columbia 345/138-kV transformer T-22 to 527 MVA	2015	2015	3	reliability	Provisional	F2135
Upgrade Oak Creek-Pennsylvania 138-kV line	2015	2015	5	reliability	Provisional	F2473

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 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 (2009-2018)</i> in <i>Financial Table</i>
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Ripon 69-kV Substation	2016	2016	1	reliability	Provisional	F2477
Install a second 138/69-kV transformer at Spring Green with a 100 MVA summer normal rating	2016	2016	3	reliability	Provisional	F2445
Uprate X-67 Portage-Trienda 138-kV line to 373 MVA	2016	2016	3	reliability	Provisional	F2092
Construct new 138-kV line from North Lake Geneva to South Lake Geneva Substation	2016	2016	3	reliability, T-D interconnection	Provisional	F2587
Construct new 138-kV bus and install a 138/69-kV 100 MVA transformer at South Lake Geneva Substation	2016	2016	3	reliability	Provisional	F2587
Install 2-16.33 MVAR 69-kV capacitor banks at Eden Substation	2016	2016	3	reliability	Provisional	F2515
Install 4-49 MVAR 138-kV capacitor banks at Concord Substation	2016	2016	3	reliability, economics	Provisional	F2489
Uprate the 6986 Royster to Sycamore 69-kV line to 115 MVA	2016	2016	3	reliability	Provisional	F2471
Install 2-16.33 MVAR 69-kV capacitor banks at Sun Prairie	2016	2016	3	reliability	Provisional	F2475
Replace two existing 138/69-kV transformers at Glenview Substation with 100 MVA transformers	2016	2016	4	reliability	Provisional	F2079

Table PR-9
Transmission System Additions for 2016 (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 (2009-2018)</i> in <i>Financial Table</i>
Construct second Dunn Road-Egg Harbor 69-kV line	2016	2016	4	reliability	Provisional	F0181

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 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 (2009-2018)</i> in <i>Financial Table</i>
Install a second 138/69-kV transformer at Wautoma Substation	2017	2017	1	reliability	Provisional	F2480
Replace 138/69-kV transformer at Metomen Substation	2017	2017	1	reliability	Proposed	F1867
Uprate Castle Rock-Mckenna 69-kV line	2017	2017	1	reliability, economic benefits	Provisional	F2491
Uprate Y159 Brick Church-Walworth 69-kV line to 115 MVA	2017	2017	3	reliability	Provisional	F2153
Construct West Middleton-Blount 138-kV line	2017	2017	3	reliability	Provisional	F2466
Construct a Lake Delton-Birchwood 138-kV line	2017	2017	3	reliability	Provisional	F1638
Install 2-12.25 MVAR 69-kV capacitor banks at Mazomanie Substation	2017	2017	3	reliability	Provisional	F2517
Construct 69-kV double-circuit line between McCue and Lamar substations	2017	2017	3	reliability		F2558

Table PR-10
Transmission System Additions for 2017 (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 (2009-2018)</i> in <i>Financial Table</i>
Install 2-16.33 MVAR 69-kV capacitor banks at Dam Heights	2017	2017	3	reliability	Provisional	F2474

Defined in Previous 10-Year Assessment
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New to this 10-Year Assessment

Table PR-11
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 (2009-2018)</i> in <i>Financial Table</i>
Convert Necedah distribution substation from 69 kV to 138 kV	2018	2018	1	reliability	Provisional	F2560
Construct Fairwater-Mackford Prairie 69-kV line	2018	2018	1	reliability	Provisional	F2105
Install 2-16.33 Mvar 69-kV capacitor banks at North Monroe	2018	2018	3	reliability	Provisional	F2472
Construct Spring Valley-Twin Lakes-South Lake Geneva 138-kV line	2018	2018	3	T-D interconnection, reliability	Provisional	F2570
Replace two existing 138/69-kV transformers at Sunset Point Substation with 100 MVA transformers	2018	2018	4	economic benefits	Provisional	F2080

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 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 (2009-2018)</i> in <i>Financial Table</i>
Construct a Horicon-East Beaver Dam 138-kV line	2019	2019	3	reliability	Provisional	F1640
Install 2-32 MVAR capacitor banks at Mukwonago 138-kV Substation	2019	2019	5	reliability	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 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 (2009-2018)</i> in <i>Financial Table</i>
Install 28.8 MVAR capacitor bank at Butternut 138-kV Substation	2020	2020	4	reliability	Provisional	F1403
Uprate the Melissa-Tayco to 229 MVA (300F)	2020	2020	4	reliability, economics	Provisional	F2434
Install 138/69-kV transformer at Custer Substation	2020	2020	4	reliability, economics	Provisional	F2081
Construct Shoto to Custer 138-kV line	2020	2020	4	reliability, economics	Provisional	F2081
Rebuild/Convert Bayport-Suamico-Sobieski-Pioneer 69-kV line to 138 kV	2020	2020	4	reliability, condition	Provisional	F1619
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	2021	2021	1	reliability	Provisional	F2105
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	2021	2021	3	reliability	Provisional	F2093
Install 2-16.33 MVAR 69-kV capacitor banks at Rio	2022	2022	3	reliability	Provisional	F2557
Install a 12.2 MVAR capacitor bank at Hilltop 69-kV Substation	2023	2023	1	reliability	Provisional	F2476

Table PR-13
Transmission System Additions beyond 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 (2009-2018)</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
Rebuild Arpin-Rocky Run 345-kV line	2010	2010	1	condition	Planned
Construct 69-kV line from new Warrens Substation to the Council Creek-Tunnel City 69-kV line	2010	2010	1	T-D interconnection	Planned
Construct Brandon-Fairwater 69-kV line	2010	2010	1	T-D interconnection	Planned
Replace Metomen 69-kV breaker	2010	2010	1	reliability, condition	Planned
Construct 115-kV line from new Woodmin Substation to the Clear Lake Substation	2012	2012	1	T-D interconnection	Proposed
Construct Monroe County-Council Creek 161-kV line and Timberwolf 69-kV switching station	2013	2013	1	economics, reliability	Proposed
Install a 161/138-kV transformer at Council Creek Substation	2013	2013	1	economics, reliability	Proposed
Uprate Council Creek-Petenwell 138-kV line	2013	2013	1	economics, reliability	Proposed
Upgrade Mckenna 6.3 MVAR capacitor bank to 12.25 MVAR and install a second new 12.25 MVAR capacitor bank	2013	2013	1	reliability	Provisional
Construct a 69-kV line from SW Ripon to the Ripon-Metomen 69-kV line	2014	2014	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	2016	2016	1	reliability	Provisional

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
Install a second 138/69-kV transformer at Wautoma Substation	2017	2017	1	reliability	Provisional
Replace 138/69-kV transformer at Metomen Substation	2017	2017	1	reliability	Proposed
Uprate Castle Rock-Mckenna 69-kV line	2017	2017	1	reliability, economic benefits	Provisional
Convert Necedah distribution substation from 69 kV to 138 kV	2018	2018	1	reliability	Provisional
Construct Fairwater-Mackford Prairie 69-kV line	2018	2018	1	reliability	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	2021	2021	1	reliability	Provisional
Install a 12.2 MVAR capacitor bank at Hilltop 69-kV Substation	2023	2023	1	reliability	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
Uprate the Chandler-Masonville 69-kV line summer normal and emergency ratings from 120 deg F to 167 deg F	2009	2009	2	reliability	Proposed
Install 1-4.08 MVAR capacitor bank at L'Anse 69 kV	2008	2009	2	reliability	Proposed
Construct ring bus at the Pine River 69-kV Substation and replace 1-5.4 MVAR capacitor bank with 2-4.08 MVAR banks	2008	2009	2	reliability, condition	Proposed
Install 1-8.16 MVAR capacitor banks at the M38 138-kV Substation	2009	2009	2	reliability	Proposed
Uprate Chandler-Cornell 69-kV line clearance from 120 to 167 deg F	2009	2009	2	reliability	Proposed
Install 1-8.2 MVAR capacitor bank at Hiawatha 138-kV Substation	2009	2009	2	reliability	Proposed
Install 1-4.08 MVAR capacitor banks at Osceola 69 kV	2009	2009	2	reliability	Proposed
Uprate the Chandler-Delta #1 69-kV line summer emergency rating from 120 deg F to 167 deg F	2009	2009	2	reliability	Proposed

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 the Chandler-Delta #2 69-kV line summer emergency rating to from 120 deg F 167 deg F	2009	2009	2	reliability	Proposed
Rebuild/convert Conover-Plains 69-kV line to 138 kV	2010	2010	2	reliability, transfer capability	Planned
Construct 138 kV bus and install a 138/69 kV, 60 MVA transformer at Aspen Substation	2010	2010	2	reliability	Planned
Install 1-16.33 MVAR capacitor bank at Indian Lake 138-kV Substation	2010	2010	2	reliability	Proposed
Install 1-4.08 MVAR capacitor bank at North Bluff 69-kV Substation	2010	2011	2	reliability	Provisional
Uprate overhead portions of Straits-McGulpin 138-kV circuits #1 & #3 to 230 F degree summer emergency ratings	2012	2012	2	reliability	Provisional
Rebuild/convert Straits-Pine River 138-kV lines 6904/5	2012	2012	2	reliability	Provisional
Install 138/69-kV 150 MVA transformer at Pine River	2012	2012	2	reliability	Provisional
Install 138/69-kV 150 MVA transformer at Nine Mile	2012	2012	2	reliability	Provisional
Install 138/69-kV 150 MVA transformer at Lakehead Rapid River	2012	2012	2	reliability	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
Construct tap from the Kinross load to Pine River/Nine Mile 69-kV line	2012	2012	2	T-D interconnection, reliability	Provisional
Construct/convert Pine River-Nine Mile 138/69-kV double-circuit line	2012	2012	2	reliability	Provisional
Install second Chandler 138/69-kV transformer	2013	2013	2	reliability	Provisional
Increase ground clearance of M38-Atlantic 69-kV line from 120 to 167 degrees F	2009	2013	2	reliability	Provisional
Uprate Munising-Seney-Blaney Park 69-kV line to 167 degrees F	2014	2014	2	reliability	Provisional
Construct Gwinn-Forsyth second 69-kV line	2014	2014	2	reliability	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
Construct a Jefferson-Tyrannena-Stony Brook 138-kV line	2006	2009	3	reliability	Planned
Uprate X-8 Rockdale to Boxelder 138-kV line	2008	2009	3	reliability	Planned
Uprate Y-41 Walworth- North Lake Geneva 69-kV to achieve a 69 MVA summer emergency rating	2009	2009	3	reliability	Planned
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	Proposed
Uprate X-23 Colley Road-Marine 138-kV line terminals	2014	2010	3	reliability	Proposed
Construct new Oak Ridge-Verona 138-kV line and install a 138/69-kV transformer at Verona with a 100 MVA summer normal rating	2009	2010	3	reliability	Planned
Upgrade Sheepskin capacitor bank from 10.8 MVAR to 16.2 MVAR	2009	2010	3	reliability	Planned
Construct second Paddock-Rockdale 345-kV line and replace 345/138-kV transformer T22 at Rockdale Substation	2010	2010	3	economics	Planned
Install 2-16.33 MVAR 69-kV capacitor banks at Spring Green Substation	2010	2010	3	reliability	Planned
Uprate the Royster Substation terminals	2010	2010	3	reliability	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
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	Proposed
Rebuild the Y-119 Verona to Oregon 69-kV line	2008	2011	3	reliability, condition	Proposed
Rebuild Y-33 Brodhead to South Monroe 69-kV line	2011	2011	3	generation interconnection, reliability	Planned
Uprate terminal limitations at McCue for the Y-79 McCue-Milton Lawns 69-kV line	2011	2011	3	reliability	Proposed
Install 2-24.5 MVAR 138-kV capacitor bank and 1-18 MVAR 69-kV capacitor bank at Brick Church substation	2011	2011	3	reliability	Provisional
Rebuild part of the Y-8 Dane-Dam Heights 69-kV line	2015	2012	3	reliability, asset renewal, potential T-D interconnection	Provisional
Uprate Y-40 Gran Grae-Boscobel 69-kV line to achieve a 99 MVA summer emergency rating	2017	2012	3	reliability	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	Proposed
Rebuild Y-32 Colley Road-Brick Church 69-kV line	2013	2013	3	reliability, condition	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 2-16.33 MVAR 69-kV capacitor banks at Nine Springs Substation	2013	2013	3	reliability	Proposed
Install a 138/69-kV transformer at Bass Creek Substation	2010	2013	3	reliability	Proposed
Uprate X-12 Town Line Road-Bass Creek 138-kV line to 300 deg F	2010	2013	3	reliability	Proposed
Construct 345-kV line from Rockdale to West Middleton	2013	2013	3	reliability	Planned
Construct a 345-kV bus and install a 345/138 kV 500 MVA transformer at West Middleton Substation	2013	2013	3	reliability	Planned
Uprate Y-61 Sheepskin-Dana 69-kV line to 95 MVA	2013	2013	3	reliability	Proposed
Install 2-16.33 MVAR 69-kV capacitor banks and 2-24.5 MVAR 138-kV capacitor banks at Femrite Substation	2014	2014	3	reliability	Provisional
Install 1-16.33 MVAR 69-kV capacitor bank at Verona Substation	2014	2014	3	reliability	Provisional
Replace the existing 46 MVA Hillman 138/69-kV transformer with a 100 MVA transformer	2015	2015	3	reliability	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	2015	2015	3	reliability	Provisional
Uprate Columbia 345/138-kV transformer T-22 to 527 MVA	2015	2015	3	reliability	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 a second 138/69-kV transformer at Spring Green with a 100 MVA summer normal rating	2016	2016	3	reliability	Provisional
Uprate X-67 Portage-Trienda 138-kV line to 373 MVA	2016	2016	3	reliability	Provisional
Construct new 138-kV line from North Lake Geneva to South Lake Geneva Substation	2016	2016	3	reliability, T-D interconnection	Provisional
Construct new 138-kV bus and install a 138/69-kV 100 MVA transformer at South Lake Geneva Substation	2016	2016	3	reliability	Provisional
Install 2-16.33 MVAR 69-kV capacitor banks at Eden Substation	2016	2016	3	reliability	Provisional
Install 4-49 MVAR 138-kV capacitor banks at Concord Substation	2016	2016	3	reliability, economics	Provisional
Uprate the 6986 Royster to Sycamore 69-kV line to 115 MVA	2016	2016	3	reliability	Provisional
Install 2-16.33 MVAR 69-kV capacitor banks at Sun Prairie	2016	2016	3	reliability	Provisional
Uprate Y159 Brick Church-Walworth 69-kV line to 115 MVA	2017	2017	3	reliability	Provisional
Construct West Middleton-Blount 138-kV line	2017	2017	3	reliability	Provisional
Construct a Lake Delton-Birchwood 138-kV line	2017	2017	3	reliability	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 2-12.25 MVAR 69-kV capacitor banks at Mazomanie Substation	2017	2017	3	reliability	Provisional
Construct 69-kV double-circuit line between McCue and Lamar substations	2017	2017	3	reliability	Provisional
Install 2-16.33 MVAR 69-kV capacitor banks at Dam Heights	2017	2017	3	reliability	Provisional
Install 2-16.33 MVAR 69-kV capacitor banks at North Monroe	2018	2018	3	reliability	Provisional
Construct Spring Valley-Twin Lakes-South Lake Geneva 138-kV line	2018	2018	3	T-D interconnection, reliability	Provisional
Construct a Horicon-East Beaver Dam 138-kV line	2019	2019	3	reliability	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	2021	2021	3	reliability	Provisional
Install 2-16.33 MVAR 69-kV capacitor banks at Rio	2022	2022	3	reliability	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
Install a second 138-kV reserve auxiliary transformer (RAT) at Kewaunee and remove tertiary auxiliary transformer (TAT)	2009	2009	4	reliability	Proposed
Uprate Point Beach-Sheboygan Energy Center 345-kV circuit L111 to 167 degrees F	2010	2010	4	economics	Proposed
Reconfigure Kewaunee 345/138-kV switchyard and install a second 500 MVA 345/138-kV transformer	2011	2011	4	reliability, condition	Proposed
Rebuild 2.37 miles of 69 kV from Sunset Point to Pearl Ave with 477 ACSR	2011	2011	4	reliability	Planned
Construct Canal-Dunn Road 138-kV line	2012	2012	4	reliability	Proposed
Install 60 MVA 138/69-kV transformer at Dunn Road	2012	2012	4	reliability	Proposed
Replace two existing 138/69-kV transformers at Glenview Substation with 100 MVA transformers	2016	2016	4	reliability	Provisional
Construct second Dunn Road-Egg Harbor 69-kV line	2016	2016	4	reliability	Provisional
Replace two existing 138/69-kV transformers at Sunset Point Substation with 100 MVA transformers	2018	2018	4	economic benefits	Provisional
Install 28.8 MVAR capacitor bank at Butternut 138-kV Substation	2020	2020	4	reliability	Provisional

Table PR-17 (continued)
Zone 4 Transmission System Additions

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional
Uprate the Melissa-Tayco to 229 MVA (300F)	2020	2020	4	reliability, economics	Provisional
Install 138/69-kV transformer at Custer Substation	2020	2020	4	reliability, economics	Provisional
Construct Shoto to Custer 138-kV line	2020	2020	4	reliability, economics	Provisional
Rebuild/Convert Bayport-Suamico-Sobieski-Pioneer 69-kV line to 138 kV	2020	2020	4	reliability, condition	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
Install 2-32 MVAR capacitor banks at Summit 138-kV Substation	2010	2010	5	reliability	Proposed
Expand 345-kV switchyard at Oak Creek to interconnect one new generator	2010	2010	5	new generation	Planned
Uprate Oak Creek-Root River 138-kV line	2010	2010	5	new generation	Planned
Uprate Oak Creek-Nicholson 138-kV line	2010	2010	5	new generation	Planned
Upgrade Bain-Albers 138-kV line	2010	2010	5	reliability	Proposed
Construct second Shorewood-Humboldt 138-kV underground cable	2012	2010	5	reliability	Proposed
Install 3-75 MVAR capacitor banks at Bluemound Substation	2012	2012	5	reliability	Proposed
Uprate Arcadian-Waukesha 138-kV lines KK9942/KK9962	2010	2013	5	reliability	Provisional
Replace two existing 345/138-kV transformers at Arcadian Substation with 1-500 MVA transformer	2010	2013	5	reliability	Provisional

Table PR-18 (continued)
 Zone 5 Transmission System Additions

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional
Upgrade Oak Creek-Pennsylvania 138-kV line	2015	2015	5	reliability	Provisional
Install 2-32 MVAR capacitor banks at Mukwonago 138-kV Substation	2019	2019	5	reliability	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			
relieve overloads or low voltages under contingency	Construct a Jefferson-Tyranena-Stony Brook 138-kV line	13.9	13.9	2006	2009	3
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 Brandon-Fairwater 69-kV line	4	4	2010	2010	1
relieve overloads or low voltages under contingency	Construct new Oak Ridge-Verona 138-kV line and install a 138/69-kV transformer at Verona with a 100 MVA summer normal rating	6.1	3	2009	2010	3
T-D interconnection request	Construct 115-kV line from new Woodmin Substation to the Clear Lake Substation	7.5	7.5	2012	2012	1
T-D interconnection request, relieve overloads or low voltages under contingency	Construct tap from the Kinross load to Pine River/Nine Mile 69-kV line	2	2	2012	2012	2
relieve overloads or low voltages under contingency	Construct 345-kV line from Rockdale to West Middleton	32.4	32.4	2013	2013	3
T-D interconnection request	Construct a 69-kV line from SW Ripon to the Ripon-Metomen 69-kV line	1.5	1.5	2014	2014	1
relieve overloads or low voltages under contingency, T-D interconnection request	Construct new 138-kV line from North Lake Geneva to South Lake Geneva Substation	5.1	5.1	2016	2016	3
relieve overloads or low voltages under contingency	Construct second Dunn Road-Egg Harbor 69-kV line	12.66	12.66	2016	2016	4
relieve overloads or low voltages under contingency	Construct a Lake Delton-Birchwood 138-kV line	5	5	2017	2017	3
relieve overloads or low voltages under contingency	Construct Fairwater-Mackford Prairie 69-kV line	0	5	2018	2018	1
T-D interconnection request,relieve overloads or low voltages under contingency	Construct Spring Valley-Twin Lakes-South Lake Geneva 138-kV line	24.0	15	2018	2018	3
relieve overloads or low voltages under contingency	Construct a Horicon-East Beaver Dam 138-kV line	10	10	2019	2019	3
relieve overloads or low voltages under contingency, economics	Construct Shoto to Custer 138-kV line	9.94	9.94	2020	2020	4

**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
asset renewal	Rebuild Arpin-Rocky Run 345-kV line	20	2010	2010	1
relieve overloads or low voltages under contingency, transfer capability	Rebuild/convert Conover-Plains 69-kV line to 138 kV	71	2010	2010	2
economics	Construct second Paddock-Rockdale 345-kV line and replace 345/138-kV transformer T22 at Rockdale Substation	30	2010	2010	3
accommodate new generation	Uprate Oak Creek-Nicholson 138-kV line	6.8	2010	2010	5
relieve overloads or low voltages under contingency	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, asset renewal	Rebuild the Y-119 Verona to Oregon 69-kV line	11	2008	2011	3
generation interconnection, relieve overloads or low voltages under contingency	Rebuild Y-33 Brodhead to South Monroe 69-kV line	18	2011	2011	3
relieve overloads or low voltages under contingency	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	Rebuild/convert Straits-Pine River 138-kV lines 6904/5	50	2012	2012	2
relieve overloads or low voltages under contingency	Construct/convert Pine River-Nine Mile 138/69-kV double-circuit line	40	2012	2012	2
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
relieve overloads or low voltages under contingency	Construct Canal-Dunn Road 138-kV line	7.64	2012	2012	4
economics, relieve overloads or low voltages under contingency	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	Uprate Council Creek-Petenwell 138-kV line	32	2013	2013	1

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

Identified need	Lines to be rebuilt/reconstructed on existing ROW	Approx. mileage of rebuilt, reconstructed or updated lines	System need year	Projected In-service year	Planning zone
relieve overloads or low voltages under contingency	Increase ground clearance of M38-Atlantic 69-kV line from 120 to 167 degrees F	22	2009	2013	2
relieve overloads or low voltages under contingency, asset renewal	Rebuild Y-32 Colley Road-Brick Church 69-kV line	19.7	2013	2013	3
relieve overloads or low voltages under contingency	Construct Gwinn-Forsyth second 69-kV line	1	2014	2014	2
relieve overloads or low voltages under contingency	Upgrade the 6986 Royster to Sycamore 69-kV line to 115 MVA	3.35	2016	2016	3
relieve overloads or low voltages under contingency	Construct West Middleton-Blount 138-kV line	5	2017	2017	3
relieve overloads or low voltages under contingency	Construct 69-kV double-circuit line between McCue and Lamar substations	4.0	2017	2017	3
relieve overloads or low voltages under contingency, asset renewal	Rebuild/Convert Bayport-Suamico-Sobieski-Pioneer 69-kV line to 138 kV	21.2	2020	2020	4
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	Construct 138 kV bus and install a 138/69 kV, 60 MVA transformer at Aspen Substation	60	0	2010	2010	2
relieve overloads under contingency, 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	Install 138/69-kV 150 MVA transformer at Pine River	150	0	2012	2012	2
relieve overloads under contingency	Install 138/69-kV 150 MVA transformer at Nine Mile	150	0	2012	2012	2
relieve overloads under contingency	Install 138/69-kV 150 MVA transformer at Lakehead Rapid River	150	0	2012	2012	2
relieve overloads under contingency	Install 60 MVA 138/69-kV transformer at Dunn Road	60	0	2012	2012	4
economics, relieve overloads under contingency	Install a 161/138-kV transformer at Council Creek Substation	100	0	2013	2013	1
relieve overloads under contingency	Install second Chandler 138/69-kV transformer	0	40	2013	2013	2
relieve overloads under contingency	Install a 138/69-kV transformer at Bass Creek Substation	100	0	2010	2013	3
relieve overloads under contingency	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	Replace two existing 345/138-kV transformers at Arcadian Substation with 1-500 MVA transformer	500	672	2010	2013	5
relieve overloads under contingency	Replace the existing 46 MVA Hillman 138/69-kV transformer with a 100 MVA transformer	47	0	2015	2015	3
relieve overloads under contingency	Uprate Columbia 345/138-kV transformer T-22 to 527 MVA	527	400	2015	2015	3
relieve overloads under contingency	Install a second 138/69-kV transformer at Spring Green with a 100 MVA summer normal rating	100	0	2016	2016	3
relieve overloads under contingency	Construct new 138-kV bus and install a 138/69-kV 100 MVA transformer at South Lake Geneva Substation	100	0	2016	2016	3
relieve overloads under contingency	Replace two existing 138/69-kV transformers at Glenview Substation with 100 MVA transformers	200	116	2016	2016	4

**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	Install a second 138/69-kV transformer at Wautoma Substation	100	0	2017	2017	1
relieve overloads under contingency	Replace 138/69-kV transformer at Metomen Substation	100	47	2017	2017	1
relieve overloads under contingency	Convert Necedah distribution substation from 69 kV to 138 kV	N/A	N/A	2018	2018	1
economic benefits	Replace two existing 138/69-kV transformers at Sunset Point Substation with 100 MVA transformers	200	142	2018	2018	4
relieve overloads under contingency, economics	Install 138/69-kV transformer at Custer Substation	100	0	2020	2020	4
relieve overloads under contingency	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	2021	2021	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	Uprate the Chandler-Masonville 69-kV line summer normal and emergency ratings from 120 deg F to 167 deg F	N/A	2009	2009	2
relieve overloads or low voltages under contingency	Install 1-4.08 MVAR capacitor bank at L'Anse 69 kV	4.08	2008	2009	2
relieve overloads or low voltages under contingency, asset renewal	Construct ring bus at the Pine River 69-kV Substation and replace 1-5.4 MVAR capacitor bank with 2-4.08 MVAR banks	2.76	2008	2009	2
relieve overloads or low voltages under contingency	Install 1-8.16 MVAR capacitor banks at the M38 138-kV Substation	8.16	2009	2009	2
relieve overloads or low voltages under contingency	Uprate Chandler-Cornell 69-kV line clearance from 120 to 167 deg F	N/A	2009	2009	2
relieve overloads or low voltages under contingency	Install 1-8.2 MVAR capacitor bank at Hiawatha 138-kV Substation	8.2	2009	2009	2
relieve overloads or low voltages under contingency	Install 1-4.08 MVAR capacitor banks at Osceola 69 kV	4.08	2009	2009	2
relieve overloads or low voltages under contingency	Uprate the Chandler-Delta #1 69-kV line summer emergency rating from 120 deg F to 167 deg F	N/A	2009	2009	2
relieve overloads or low voltages under contingency	Uprate the Chandler-Delta #2 69-kV line summer emergency rating to from 120 deg F 167 deg F	N/A	2009	2009	2
relieve overloads or low voltages under contingency	Uprate X-8 Rockdale to Boxelder 138-kV line	N/A	2008	2009	3
relieve overloads or low voltages under contingency	Uprate Y-41 Walworth-North Lake Geneva 69-kV to achieve a 69 MVA summer emergency rating	N/A	2009	2009	3
relieve overloads or low voltages under contingency	Install a second 138-kV reserve auxiliary transformer (RAT) at Kewaunee and remove tertiary auxiliary transformer (TAT)	N/A	2009	2009	4
T-D interconnection request	Construct a 138-kV bus at Pleasant Valley Substation to permit second distribution transformer interconnection	N/A	2010	2010	5
relieve overloads or low voltages under contingency, asset renewal	Replace Metomen 69-kV breaker	N/A	2010	2010	1
relieve overloads or low voltages under contingency	Install 1-16.33 MVAR capacitor bank at Indian Lake 138-kV Substation	16.33	2010	2010	2
relieve overloads or low voltages under contingency	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

**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	Uprate X-23 Colley Road-Marine 138-kV line terminals	N/A	2014	2010	3
relieve overloads or low voltages under contingency	Upgrade Sheepskin capacitor bank from 10.8 MVAR to 16.2 MVAR	5.4	2009	2010	3
relieve overloads or low voltages under contingency	Install 2-16.33 MVAR 69-kV capacitor banks at Spring Green Substation	32	2010	2010	3
relieve overloads or low voltages under contingency	Uprate the Royster Substation terminals	N/A	2010	2010	3
relieve overloads or low voltages under contingency	Install 2-32 MVAR capacitor banks at Summit 138-kV Substation	64	2010	2010	5
accommodate new generation	Expand 345-kV switchyard at Oak Creek to interconnect one new generator	N/A	2010	2010	5
accommodate new generation	Uprate Oak Creek-Root River 138-kV line	N/A	2010	2010	5
economics	Uprate Point Beach-Sheboygan Energy Center 345-kV circuit L111 to 167 degrees F	N/A	2010	2010	4
relieve overloads or low voltages under contingency	Upgrade Bain-Albers 138-kV line	N/A	2010	2010	5
relieve overloads or low voltages under contingency	Install 1-4.08 MVAR capacitor bank at North Bluff 69-kV Substation	4.08	2010	2011	2
relieve overloads or low voltages under contingency	Uprate terminal limitations at McCue for the Y-79 McCue-Milton Lawns 69-kV line	N/A	2011	2011	3
relieve overloads or low voltages under contingency	Install 2-24.5 MVAR 138-kV capacitor bank and 1-18 MVAR 69-kV capacitor bank at Brick Church substation	67	2011	2011	3
relieve overloads or low voltages under contingency	Install 3-75 MVAR capacitor banks at Bluemound Substation	200	2012	2012	5
relieve overloads or low voltages under contingency	Uprate overhead portions of Straits-McGulpin 138-kV circuits #1 & #3 to 230 F degree summer emergency ratings	N/A	2012	2012	2
relieve overloads or low voltages under contingency	Uprate Y-40 Gran Grae-Boscobel 69-kV line to achieve a 99 MVA summer emergency rating	N/A	2017	2012	3
relieve overloads or low voltages under contingency	Upgrade McKenna 6.3 MVAR capacitor bank to 12.25 MVAR and install a second new 12.25 MVAR capacitor bank	15.3	2013	2013	1
relieve overloads or low voltages under contingency	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

**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	Install 2-16.33 MVAR 69-kV capacitor banks at Nine Springs Substation	32.66	2013	2013	3
relieve overloads or low voltages under contingency	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	Uprate Y-61 Sheepskin-Dana 69-kV line to 95 MVA	N/A	2013	2013	3
relieve overloads or low voltages under contingency	Uprate Arcadian-Waukesha 138-kV lines KK9942/KK9962	N/A	2010	2013	5
relieve overloads or low voltages under contingency	Uprate Munising-Seney-Blanney Park 69-kV line to 167 degrees F	N/A	2014	2014	2
relieve overloads or low voltages under contingency	Install 2-16.33 MVAR 69-kV capacitor banks and 2-24.5 MVAR 138-kV capacitor banks at Femrite Substation	81.66	2014	2014	3
relieve overloads or low voltages under contingency	Install 1-16.33 MVAR 69-kV capacitor bank at Verona Substation	16.33	2014	2014	3
relieve overloads or low voltages under contingency	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	10.8	2015	2015	3
relieve overloads or low voltages under contingency	Upgrade Oak Creek-Pennsylvania 138-kV line	N/A	2015	2015	5
relieve overloads or low voltages under contingency	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	2016	2016	1
relieve overloads or low voltages under contingency	Uprate X-67 Portage-Trienda 138-kV line to 373 MVA	N/A	2016	2016	3
relieve overloads or low voltages under contingency	Install 2-16.33 MVAR 69-kV capacitor banks at Eden Substation	32.66	2016	2016	3
relieve overloads or low voltages under contingency, economics	Install 4-49 MVAR 138-kV capacitor banks at Concord Substation	196	2016	2016	3
relieve overloads or low voltages under contingency	Install 2-16.33 Mvar 69-kV capacitor banks at Sun Prairie	32.66	2016	2016	3
relieve overloads or low voltages under contingency, economic benefits	Uprate Castle Rock-Mckenna 69-kV line	N/A	2017	2017	1
relieve overloads or low voltages under contingency	Uprate Y159 Brick Church-Walworth 69-kV line to 115 MVA	N/A	2017	2017	3
relieve overloads or low voltages under contingency	Install 2-12.25 MVAR 69-kV capacitor banks at Mazomanie Substation	24.5	2017	2017	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	Install 2-16.33 Mvar 69-kV capacitor banks at Dam Heights	32.66	2017	2017	3
relieve overloads or low voltages under contingency	Install 2-16.33 Mvar 69-kV capacitor banks at North Monroe	32.66	2018	2018	3
relieve overloads or low voltages under contingency	Install 2-32 Mvar capacitor banks at Mukwonago 138-kV Substation	64	2019	2019	5
relieve overloads or low voltages under contingency	Install 28.8 MVAR capacitor bank at Butternut 138-kV Substation	28.8	2020	2020	4
relieve overloads or low voltages under contingency, economics	Uprate the Melissa-Tayco to 229 MVA (300F)	N/A	2020	2020	4
relieve overloads or low voltages under contingency	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	2021	2021	1
relieve overloads or low voltages under contingency	Install 2-16.33 Mvar 69-kV capacitor banks at Rio	32.66	2022	2022	3
relieve overloads or low voltages under contingency	Install a 12.2 MVAR capacitor bank at Hilltop 69-kV Substation	12.2	2023	2023	1