

Table PR-2
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 Funding Project and Sum of Total (2011-2020) in Financial Table
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	F2519
Install 69-kV bus tie breaker at Delta Substation	2011	2011	2	reliability (C1), operating flexibility	Proposed	F3066
Rebuild Y-33 Brodhead to South Monroe 69-kV line	2011*	2011	3	reliability (B2, 69B2, 69B3)	Planned	F2526

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 2012

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2011-2020) in Financial Table
Construct 115-kV line from new Woodmin Substation to the Clear Lake Substation	2012	2012	1	T-D interconnection	Planned	F2495
Uprate overhead portions of Straits-McGulpin 138-kV circuits #1 & #3 to 230 F degree summer emergency ratings	2012	2012	2	reliability (B2)	Proposed	F2874
Install second 138/69-kV transformer and a 138-kV ring bus at Chandler Substation	2012	2012	2	reliability (69B3)	Proposed	F3040
Replace five 69-kV breakers at Delta Substation	2012	2012	2	stability, operating flexibility	Proposed	F3066
Relocate Engadine 69-kV load	2011	2012	2	reliability (69B2)	Proposed	F3073
Rebuild 2.37 miles of 69 kV from Sunset Point to Pearl Ave with 477 ACSR	2011	2012	4	reliability (69B2, 69B3)	Planned	F1361
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
Rebuild part of the Y-8 Dane-Dam Heights 69-kV line*	>2026	2012	3	reliability, asset renewal, potential T-D interconnection	Planned	F1602

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

Table PR-4
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 Funding Project and Sum of Total (2011-2020) in Financial Table
Rebuild M38-Atlantic 69-kV line	2011	2013	2	reliability (69B2)	Planned	F3268
Construct 345-kV line from Rockdale to Cardinal	2013*	2013	3	reliability (B2, C5)	Planned	F1435
Construct a 345-kV bus and install a 345/138 kV 500 MVA transformer at Cardinal Substation	2013*	2013	3	reliability (B2, C5)	Planned	F1435
Install 2-16.33 MVAR 69-kV capacitor banks at Nine Springs Substation	2008*	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	2008*	2013	3	reliability (69B2)	Proposed	F2088
Rebuild Pleasant Prairie 345-kV bus	2013	2013	5	operating flexibility	Proposed	F3165

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

Table PR-5
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 Funding Project and Sum of Total (2011-2020) in Financial Table
Construct Monroe County-Council Creek 161-kV line and Timberwolf 69-kV switching station	2013	2014	1	economics, reliability (B2, C3)	Proposed	F2454
Install a 161/138-kV transformer at Council Creek Substation	2013	2014	1	economics, reliability (B2, C3)	Proposed	F2454
Uprate Council Creek-Petenwell 138-kV line	2013	2014	1	economics, reliability (B2)	Proposed	F2454
Rebuild Straits-Pine River lines 6904/5 for 138 kV and operate at 69 kV	2014	2014	2	reliability (B2)	Proposed	F2833
Install power flow control at Straits 138-kV Substation	2010	2014	2	reliability (B1)	Proposed	F2894
Energize Hiawatha-Indian Lake at 138 kV	2014	2014	2	reliability (B2)	Proposed	F3068
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), economics	Proposed	F3077
Construct 18th Road 138/69-kV Substation and install two 138/69-kV transformers	2014	2014	2	reliability (69B3)	Proposed	F3077
Install 1-8.16 MVAR 69-kV capacitor banks at 18th Road	2014	2014	2	reliability (69B3)	Proposed	F3077
Construct Pleasant Prairie-Zion Energy Center 345-kV line	2017	2014	5	economics	Proposed	F3123

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

Table PR-6
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 Funding Project and Sum of Total (2011-2020) in Financial Table
Reconfigure Petenwell 138-kV bus	2011	2015	1	operating flexibility	Provisional	F3046
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Ripon 69-kV Substation	>2026	2015	1	reliability (69B2)	Provisional	F2477
Replace Petenwell 138/69-kV transformer	2018	2015	1	reliability (A, 69B2)	Provisional	F3036
Construct a new Arnold 345-kV Substation and install a 345/138-kV transformer	2015	2015	2	reliability (B1)	Proposed	F3080
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	>2026	2015	3	reliability (69B2)	Provisional	F2518
Uprate 6927 West Middleton-Stage Coach 69-kV line to 106 MVA SE	>2026	2015	3	reliability (69B2, 69B3)	Provisional	F3103
Install 3-75 MVAR capacitor banks at Bluemound Substation	>2026	2015	5	reliability (B1)	Provisional	F2650
Construct 138-kV lines to serve Milwaukee County T-D interconnection	2015	2015	5	T-D interconnection	Proposed	F3093

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New to this 10-Year Assessment

Table PR-7
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 Funding Project and Sum of Total (2011-2020) in Financial Table
Replace existing 56 MVA Harrison 138/69-kV transformer with a 100 MVA transformer	>2026	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), condition	Proposed	F2836
Rebuild Arcadian-Waukesha 138-kV lines KK9942/KK9962	2016	2016	5	reliability (B2)	Proposed	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 2017

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2011-2020) in Financial Table
Replace 138/69-kV transformer at Metomen Substation	2017	2017	1	reliability (A, 69B3)	Proposed	F1867
Uprate Castle Rock-Mckenna 69-kV line	2024	2017	1	reliability (69B2, 69B3)	Provisional	F2491
Construct Fairwater-Mackford Prairie 69-kV line	>2026	2017	1	economics, reliability (69B2)	Provisional	F2105
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	>2026	2017	1	economics, reliability (69B2)	Provisional	F2105
Install 2-24.5 Mvar 138-kV capacitor bank and 1-18 Mvar 69-kV capacitor bank at Brick Church substation	>2026	2017	3	reliability (69B2)	Provisional	F2404

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Table PR-9
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 Funding Project and Sum of Total (2011-2020) in Financial Table
Install a second 138/69-kV transformer at Wautoma Substation	>2026	2018	1	reliability (A, 69B2)	Provisional	F2480
Convert Necedah distribution substation from 69 kV to 138 kV	>2026	2018	1	reliability (69B2, 69B3)	Provisional	F2560
Replace existing Caroline 115/69-kV transformer	>2026	2018	1	reliability (69B3)	Provisional	F3113
Uprate the 6986 Royster to Sycamore 69-kV line to 115 MVA	2018	2018	3	reliability (69B3)	Provisional	F2471
Install a second 100 MVA 138/69 kV transformer at Hillman Substation	>2026	2018	3	reliability (69B2, 69B3)	Provisional	F0339
Install a second 138/69-kV transformer at Spring Green with a 100 MVA summer normal rating	>2026	2018	3	reliability (69B3)	Provisional	F2445
Uprate Y87 North Monroe-South Monroe 69-kV line to 115 MVA SE	>2026	2018	3	reliability (69B2)	Provisional	TBD
Construct Badger Coulee 345-kV line	2018	2018	3	policy benefits	Proposed	F3105
Convert Forest Junction - Howards Grove and a portion of the Howards Grove - Holland 138-kV circuits to 345-kV	2018	2018	4	new generation	Proposed	F3064
Barnhart Substation: Construct new 345/138-kV substation with new 500 MVA 345/138-kV transformer	2018	2018	4	new generation	Proposed	F3064
Branch River Substation: Construct new 345-kV switching station	2018	2018	4	new generation	Proposed	F3064
Uprate the Edgewater-Cedarsauk 345-kV circuit	2018	2018	4	new generation	Proposed	F3064
Construct a new Barnhart - Plymouth - Howards Grove - Erdman 138-kV circuit	2018	2018	4	new generation	Proposed	F3064
Point Beach Substation: Install new series 345-kV breaker for circuit Q-303	2018	2018	4	new generation	Proposed	F3064

Table PR-9
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 Funding Project and Sum of Total (2011-2020) in Financial Table
Construct new 138-kV bus and install a 138/69-kV 100 MVA transformer at South Lake Geneva Substation	>2026	2018	3	reliability (69B2)	Provisional	F2587
Construct new 138-kV line from North Lake Geneva to South Lake Geneva Substation	>2026	2018	3	reliability (69B2), T-D interconnection	Provisional	F2587
Rebuild Y-32 Colley Road-Brick Church 69-kV line	>2026	2018	3	reliability (B2, 69B3, 69C5, C3) condition	Provisional	F1670

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Table PR-10
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 Funding Project and Sum of Total (2011-2020) in Financial Table
Uprate Winneconne-Sunset Point 69-kV line Y-103	>2026	2019	1	reliability (69B2)	Provisional	F3062
Uprate Ripon-Northwest Ripon 69-kV line Y-93	>2026	2019	1	reliability (69B2)	Provisional	TBD
Construct 69-kV double-circuit line between McCue and Lamar substations	>2026	2019	3	reliability (A, 69B2)	Provisional	F2558
Install 2-16.33 MVAR 69-kV capacitor banks at Eden Substation	>2026	2019	3	reliability (A, B2)	Provisional	F2515
Construct Spring Valley-Twin Lakes-South Lake Geneva 138-kV line	2019	2019	3 & 5	T-D interconnection, reliability (69B2)	Provisional	F2570
Install 2-16.33 Mvar 69-kV capacitor banks at Dam Heights	>2026	2019	3	reliability (69B2)	Provisional	F2474

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

Table PR-11
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 Funding Project and Sum of Total (2011-2020) in Financial Table
Rebuild the Y-119 Sun Valley Tap to Oregon 69-kV line	>2026	2020	3	reliability, condition (69B3, 69C3)	Provisional	F2469
Construct Dubuque-Spring Green-Cardinal 345-kV line	2020	2020	3	policy benefits	Provisional	TBD
Construct Cardinal-Blount 138-kV line	>2026	2020	3	reliability (C5)	Provisional	F2466
Replace two existing 345/138-kV transformers at Arcadian Substation with 1-500 MVA transformer	2023	2020	5	reliability (B3)	Provisional	F2539
Install 4-49 MVAR 138-kV capacitor banks at Concord Substation	>2026	2020	3	reliability (B2)	Provisional	F2489
Construct a Lake Delton-Birchwood 138-kV line	>2026	2020	3	reliability (B2)	Provisional	F1638

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

Table PR-12
Transmission System Additions for 2021

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2011-2020) in Financial Table
Install 2-16.33 Mvar 69-kV capacitor banks at North Monroe	>2026	2021	3	reliability (B2)	Provisional	F2472
Install 1-16.33 MVAR 69-kV capacitor bank at Verona Substation	>2026	2021	3	reliability (A, B2, B3)	Provisional	F2520
Construct second Dunn Road-Egg Harbor 69-kV line	>2026	2021	4	reliability (69B2)	Provisional	F0181
Uprate Oak Creek-Bluemound 230-kV line	2021	2021	5	operating flexibility	Provisional	F3349
Uprate Y159 Brick Church-Walworth 69-kV line to 115 MVA	>2026	2021	3	reliability (69B2)	Provisional	F2153

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 2021

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2011-2020) in Financial Table
Install 2-16.33 Mvar 69-kV capacitor banks at Sun Prairie	>2026	2022	3	reliability (69B2, 69B3)	Provisional	F2475
Rebuild West Middleton-Pheasant Branch 69-kV line with double circuits to achieve a 240 MVA SE on each circuit	2022	2022	3	reliability (69B2)	Provisional	TBD
Construct Shoto to Custer 138-kV line	>2026	2022	4	reliability (69B2, 69B3)	Provisional	F2081
Install 138/69-kV transformer at Custer Substation	>2026	2022	4	reliability (69B2, 69B3)	Provisional	F2081
Upgrade Oak Creek-Pennsylvania 138-kV line	>2026	2022	5	reliability (B2)	Provisional	F2473
Construct a Hubbard-East Beaver Dam 138-kV line	>2026	2022	3	reliability (B2)	Provisional	F1640
Uprate X-67 Portage-Trienda 138-kV line to 373 MVA	>2026	2022	3	reliability (69B2)	Provisional	F2092
Install 2-12.25 MVAR 69-kV capacitor banks at Mazomanie Substation	>2026	2023	3	reliability (69B2)	Provisional	F2517
Replace two existing 138/69-kV transformers at Sunset Point Substation with 100 MVA transformers	>2026	2024	4	reliability (69B3)	Provisional	F2080
Replace two existing 138/69-kV transformers at Glenview Substation with 100 MVA transformers	>2026	2025	4	reliability (69B3)	Provisional	F2079
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	>2026	2025	3	reliability (B2)	Provisional	F2093
Reconductor Harbor-Kansas 138-kV line	2021	TBD	5	reliability	Provisional	TBD
Uprate Columbia 345/138-kV transformer T-22 to 527 MVA	>2026	TBD	3	reliability (B3)	Provisional	F2135

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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	Planned
Construct Monroe County-Council Creek 161-kV line and Timberwolf 69-kV switching station	2013	2014	1	economics, reliability (B2, C3)	Proposed
Install a 161/138-kV transformer at Council Creek Substation	2013	2014	1	economics, reliability (B2, C3)	Proposed
Uprate Council Creek-Petenwell 138-kV line	2013	2014	1	economics, reliability (B2)	Proposed
Reconfigure Petenwell 138-kV bus	2011	2015	1	operating flexibility	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	>2026	2015	1	reliability (69B2)	Provisional
Replace Petenwell 138/69-kV transformer	2018	2015	1	reliability (A, 69B2)	Provisional
Replace existing 56 MVA Harrison 138/69-kV transformer with a 100 MVA transformer	>2026	2016	1	reliability (A)	Provisional
Replace 138/69-kV transformer at Metomen Substation	2017	2017	1	reliability (A, 69B3)	Proposed
Uprate Castle Rock-Mckenna 69-kV line	2024	2017	1	reliability (69B2, 69B3)	Provisional
Construct Fairwater-Mackford Prairie 69-kV line	>2026	2017	1	economics, reliability (69B2)	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	>2026	2017	1	economics, reliability (69B2)	Provisional
Install a second 138/69-kV transformer at Wautoma Substation	>2026	2018	1	reliability (A, 69B2)	Provisional
Convert Necedah distribution substation from 69 kV to 138 kV	>2026	2018	1	reliability (69B2, 69B3)	Provisional
Replace existing Caroline 115/69-kV transformer	>2026	2018	1	reliability (69B3)	Provisional
Uprate Winneconne-Sunset Point 69-kV line Y-103	>2026	2019	1	reliability (69B2)	Provisional
Uprate Ripon-Northwest Ripon 69-kV line Y-93	>2026	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 69-kV bus tie breaker at Delta Substation	2011	2011	2	reliability (C1), operating flexibility	Proposed
Uprate overhead portions of Straits-McGulpin 138-kV circuits #1 & #3 to 230 F degree summer emergency ratings	2012	2012	2	reliability (B2)	Proposed
Install second 138/69-kV transformer and a 138-kV ring bus at Chandler Substation	2012	2012	2	reliability (69B3)	Proposed
Replace five 69-kV breakers at Delta Substation	2012	2012	2	stability, operating flexibility	Proposed
Relocate Engadine 69-kV load	2011	2012	2	reliability (69B2)	Proposed
Rebuild M38-Atlantic 69-kV line	2011	2013	2	reliability (69B2)	Planned
Rebuild Straits-Pine River lines 6904/5 for 138 kV and operate at 69 kV	2014	2014	2	reliability (B2)	Proposed
Install power flow control at Straits 138-kV Substation	2010	2014	2	reliability (B1)	Proposed
Energize Hiawatha-Indian Lake at 138 kV	2014	2014	2	reliability (B2)	Proposed
Uprate Munising-Seney-Blanney 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), economics	Proposed
Construct 18th Road 138/69-kV Substation and install two 138/69-kV transformers	2014	2014	2	reliability (69B3)	Proposed
Install 1-8.16 MVAR 69-kV capacitor banks at 18th Road	2014	2014	2	reliability (69B3)	Proposed
Construct a new Arnold 345-kV Substation and install a 345/138-kV transformer	2015	2015	2	reliability (B1)	Proposed
Uprate Pine River-Nine Mile 69-kV line 6923 to 167 degrees F and asset renewal for 6921/3	2016	2016	2	reliability (69B2), condition	Proposed

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
Rebuild Y-33 Brodhead to South Monroe 69-kV line	2011*	2011	3	reliability (B2, 69B2, 69B3)	Planned
Rebuild part of the Y-8 Dane-Dam Heights 69-kV line*	>2026	2012	3	reliability, asset renewal, potential T-D interconnection	Planned
Construct 345-kV line from Rockdale to Cardinal	2013*	2013	3	reliability (B2, C5)	Planned
Construct a 345-kV bus and install a 345/138 kV 500 MVA transformer at Cardinal Substation	2013*	2013	3	reliability (B2, C5)	Planned
Install 2-16.33 MVAR 69-kV capacitor banks at Nine Springs Substation	2008*	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	2008*	2013	3	reliability (69B2)	Proposed
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	>2026	2015	3	reliability (69B2)	Provisional
Uprate 6927 West Middleton-Stage Coach 69-kV line to 106 MVA SE	>2026	2015	3	reliability (69B2, 69B3)	Provisional
Install 2-24.5 Mvar 138-kV capacitor bank and 1-18 Mvar 69-kV capacitor bank at Brick Church substation	>2026	2017	3	reliability (69B2)	Provisional
Uprate the 6986 Royster to Sycamore 69-kV line to 115 MVA	2018	2018	3	reliability (69B3)	Provisional
Install a second 100 MVA 138/69 kV transformer at Hillman Substation	>2026	2018	3	reliability (69B2, 69B3)	Provisional
Install a second 138/69-kV transformer at Spring Green with a 100 MVA summer normal rating	>2026	2018	3	reliability (69B3)	Provisional
Uprate Y87 North Monroe-South Monroe 69-kV line to 115 MVA SE	>2026	2018	3	reliability (69B2)	Provisional
Construct Badger Coulee 345-kV line	2018	2018	3	policy benefits	Proposed

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	>2026	2018	3	reliability (69B2)	Provisional
Construct new 138-kV line from North Lake Geneva to South Lake Geneva Substation	>2026	2018	3	reliability (69B2), T-D interconnection	Provisional
Rebuild Y-32 Colley Road-Brick Church 69-kV line	>2026	2018	3	reliability (B2, 69B3, 69C5, C3) condition	Provisional
Construct 69-kV double-circuit line between McCue and Lamar substations	>2026	2019	3	reliability (A, 69B2)	Provisional
Install 2-16.33 MVAR 69-kV capacitor banks at Eden Substation	>2026	2019	3	reliability (A, B2)	Provisional
Construct Spring Valley-Twin Lakes-South Lake Geneva 138-kV line	2019	2019	3 & 5	T-D interconnection, reliability (69B2)	Provisional
Install 2-16.33 Mvar 69-kV capacitor banks at Dam Heights	>2026	2019	3	reliability (69B2)	Provisional
Rebuild the Y-119 Sun Valley Tap to Oregon 69-kV line	>2026	2020	3	reliability, condition (69B3, 69C3)	Provisional
Construct Dubuque-Spring Green-Cardinal 345-kV line	2020	2020	3	policy benefits	Provisional
Construct Cardinal-Blount 138-kV line	>2026	2020	3	reliability (C5)	Provisional
Install 4-49 MVAR 138-kV capacitor banks at Concord Substation	>2026	2020	3	reliability (B2)	Provisional
Construct a Lake Delton-Birchwood 138-kV line	>2026	2020	3	reliability (B2)	Provisional
Install 2-16.33 Mvar 69-kV capacitor banks at North Monroe	>2026	2021	3	reliability (B2)	Provisional
Install 1-16.33 MVAR 69-kV capacitor bank at Verona Substation	>2026	2021	3	reliability (A, B2, B3)	Provisional
Uprate Y159 Brick Church-Walworth 69-kV line to 115 MVA	>2026	2021	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
Install 2-16.33 Mvar 69-kV capacitor banks at Sun Prairie	>2026	2022	3	reliability (69B2, 69B3)	Provisional
Rebuild West Middleton-Pheasant Branch 69-kV line with double circuits to achieve a 240 MVA SE on each circuit	2022	2022	3	reliability (69B2)	Provisional
Construct a Hubbard-East Beaver Dam 138-kV line	>2026	2022	3	reliability (B2)	Provisional
Uprate X-67 Portage-Trienda 138-kV line to 373 MVA	>2026	2022	3	reliability (69B2)	Provisional
Install 2-12.25 MVAR 69-kV capacitor banks at Mazomanie Substation	>2026	2023	3	reliability (69B2)	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	>2026	2025	3	reliability (B2)	Provisional
Uprate Columbia 345/138-kV transformer T-22 to 527 MVA	>2026	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	2012	4	reliability (69B2, 69B3)	Planned
Construct Canal-Dunn Road 138-kV line	2012	2012	4	reliability (69A, 69B2, 69B3, 69C3)	Planned
Install 100 MVA 138/69-kV transformer at Dunn Road	2012	2012	4	reliability (69A, 69B2, 69B3, 69C3)	Planned
Convert Forest Junction - Howards Grove and a portion of the Howards Grove - Holland 138-kV circuits to 345-kV	2018	2018	4	new generation	Proposed
Barnhart Substation: Construct new 345/138-kV substation with new 500 MVA 345/138-kV transformer	2018	2018	4	new generation	Proposed
Branch River Substation: Construct new 345-kV switching station	2018	2018	4	new generation	Proposed
Uprate the Edgewater-Cedarsauk 345-kV circuit	2018	2018	4	new generation	Proposed
Construct a new Barnhart - Plymouth - Howards Grove - Erdman 138-kV circuit	2018	2018	4	new generation	Proposed
Point Beach Substation: Install new series 345-kV breaker for circuit Q-303	2018	2018	4	new generation	Proposed
Construct second Dunn Road-Egg Harbor 69-kV line	>2026	2021	4	reliability (69B2)	Provisional
Construct Shoto to Custer 138-kV line	>2026	2022	4	reliability (69B2, 69B3)	Provisional
Install 138/69-kV transformer at Custer Substation	>2026	2022	4	reliability (69B2, 69B3)	Provisional
Replace two existing 138/69-kV transformers at Sunset Point Substation with 100 MVA transformers	>2026	2024	4	reliability (69B3)	Provisional
Replace two existing 138/69-kV transformers at Glenview Substation with 100 MVA transformers	>2026	2025	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
Rebuild Pleasant Prairie 345-kV bus	2013	2013	5	operating flexibility	Proposed
Construct Pleasant Prairie-Zion Energy Center 345-kV line	2017	2014	5	economics	Proposed
Install 3-75 MVAR capacitor banks at Bluemound Substation	>2026	2015	5	reliability (B1)	Provisional
Construct 138-kV lines to serve Milwaukee County T-D interconnection	2015	2015	5	T-D interconnection	Proposed
Rebuild Arcadian-Waukesha 138-kV lines KK9942/KK9962	2016	2016	5	reliability (B2)	Proposed
Construct Spring Valley-Twin Lakes-South Lake Geneva 138-kV line	2019	2019	3 & 5	T-D interconnection, reliability (69B2)	Provisional
Replace two existing 345/138-kV transformers at Arcadian Substation with 1-500 MVA transformer	2023	2020	5	reliability (B3)	Provisional
Uprate Oak Creek-Bluemound 230-kV line	2021	2021	5	operating flexibility	Provisional
Upgrade Oak Creek-Pennsylvania 138-kV line	>2026	2022	5	reliability (B2)	Provisional
Reconductor Harbor-Kansas 138-kV line	2021	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 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 Cardinal	32.4	32.4	2013	2013	3
relieve overloads or low voltages under contingency (69B3), economics	Construct 18th Road-Chandler double circuit 138-kV lines and operate at 138/69	4	4	2014	2014	2
economics	Construct Pleasant Prairie-Zion Energy Center 345-kV line	7	7	2014	2014	5
T-D interconnection request	Construct 138-kV lines to serve Milwaukee County T-D interconnection request	2	2	2015	2015	5
economics, relieve overloads or low voltages under contingency (69B2)	Construct Fairwater-Mackford Prairie 69-kV line	4	4	>2026	2017	1
policy benefits	Construct Badger Coulee 345-kV line	118	118	2018	2018	3
accommodate new generation	Construct a new Barnhart - Plymouth - Howards Grove - Erdman 138-kV circuit	18	18	2018	2018	4
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	>2026	2018	3
T-D interconnection request,relieve overloads or low voltages under contingency (69B2)	Construct Spring Valley-Twin Lakes-South Lake Geneva 138-kV line	24	15	2019	2019	3 & 5
policy benefits	Construct Dubuque-Spring Green-Cardinal 345-kV line	80	80	2020	2020	3
relieve overloads or low voltages under contingency (B2)	Construct a Lake Delton-Birchwood 138-kV line	5	5	>2026	2020	3
relieve overloads or low voltages under contingency (69B2)	Construct second Dunn Road-Egg Harbor 69-kV line	12.66	12.66	>2026	2021	4
relieve overloads or low voltages under contingency (69B2, 69B3)	Construct Shoto to Custer 138-kV line	6.9	6.9	>2026	2022	4
relieve overloads or low voltages under contingency (B2)	Construct a Hubbard-East Beaver Dam 138-kV line	10	10	>2026	2022	3

**Table PR-20
Transmission Line Rebuild/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, 69B2, 69B3)	Rebuild Y-33 Brodhead to South Monroe 69-kV line	18	2011*	2011	3
relieve overloads or low voltages under contingency (69B2, 69B3)	Rebuild 2.37 miles of 69 kV from Sunset Point to Pearl Ave with 477 ACSR	2.37	2011	2012	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	>2026	2012	3
relieve overloads or low voltages under contingency (69B2)	Rebuild M38-Atlantic 69-kV line	22	2013	2013	2
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	2014	1
economics, relieve overloads or low voltages under contingency (B2)	Uprate Council Creek-Petenwell 138-kV line	32	2013	2014	1
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 (B2)	Energize Hiawatha-Indian Lake at 138 kV	40	2014	2014	2
relieve overloads or low voltages under contingency (69B2)	Uprate Munising-Seney-Blaney Park 69-kV line to 167 degrees F	52	2014	2014	2

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

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 (69B2), replace aging facilities	Uprate Pine River-Nine Mile 69-kV line 6923 to 167 degrees F and asset renewal for 6921/3	16.4	2016	2016	2
relieve overloads or low voltages under contingency (69B3)	Uprate the 6986 Royster to Sycamore 69-kV line to 115 MVA	3.35	2018	2018	3
accommodate new generation	Convert Forest Junction - Howards Grove and a portion of the Howards Grove - Holland 138-kV circuits to 345-kV	51	2018	2018	4
accommodate new generation	Uprate the Edgewater-Cedarsauk 345-kV circuit	33	2018	2018	4
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	>2026	2018	3
relieve overloads or low voltages under contingency (A, 69B2)	Construct 69-kV double-circuit line between McCue and Lamar substations	4.0	>2026	2019	3
relieve overloads or low voltages under contingency, replace aging facilities (69B3, 69C3)	Rebuild the Y-119 Sun Valley Tap to Oregon 69-kV line	11	>2026	2020	3
relieve overloads or low voltages under contingency (C5)	Construct Cardinal-Blount 138-kV line	5	>2026	2020	3
operating flexibility	Uprate Oak Creek-Bluemound 230-kV line	39	2021	2021	5
relieve overloads or low voltages under contingency (69B2)	Rebuild West Middleton-Pheasant Branch 69-kV line with double circuits to achieve a 240 MVA SE on each circuit	5	2022	2022	3
relieve overloads or low voltages under contingency	Reconductor Harbor-Kansas 138-kV line	8.4	2021	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 (69A, 69B2, 69B3, 69C3)	Install 100 MVA 138/69-kV transformer at Dunn Road	100	0	2012	2012	4
relieve overloads under contingency (B2, C5)	Construct a 345-kV bus and install a 345/138 kV 500 MVA transformer at Cardinal Substation	500	0	2013*	2013	3
economics, relieve overloads under contingency (B2, C3)	Install a 161/138-kV transformer at Council Creek Substation	100	0	2013	2014	1
relieve overloads under contingency (69B3)	Construct 18th Road 138/69-kV Substation and install two 138/69-kV transformers	120	N/A	2014	2014	2
relieve overloads under contingency (A, 69B2)	Replace Petenwell 138/69-kV transformer	60	33	2018	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 (A)	Replace existing 56 MVA Harrison 138/69-kV transformer with a 100 MVA transformer	100	56	>2026	2016	1
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	>2026	2018	1
relieve overloads under contingency (69B2, 69B3)	Convert Necedah distribution substation from 69 kV to 138 kV	N/A	0	>2026	2018	1
relieve overloads under contingency (69B3)	Replace existing Caroline 115/69-kV transformer	60	33	>2026	2018	1

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

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)	Install a second 100 MVA 138/69 kV transformer at Hillman Substation	100	0	>2026	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	>2026	2018	3
accommodate new generation	Barnhart Substation: Construct new 345/138-kV substation with new 500 MVA 345/138-kV transformer	500	0	2018	2018	4
accommodate new generation	Branch River Substation: Construct new 345-kV switching station	N/A	N/A	2018	2018	4
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	>2026	2018	3
relieve overloads under contingency (B3)	Replace two existing 345/138-kV transformers at Arcadian Substation with 1-500 MVA transformer	500	672	2023	2020	5
relieve overloads under contingency (69B2, 69B3)	Install 138/69-kV transformer at Custer Substation	100	0	>2026	2022	4
relieve overloads under contingency (69B3)	Replace two existing 138/69-kV transformers at Sunset Point Substation with 100 MVA transformers	200	142	>2026	2024	4

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

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)	Replace two existing 138/69-kV transformers at Glenview Substation with 100 MVA transformers	200	116	>2026	2025	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	>2026	2025	3
relieve overloads under contingency (B3)	Uprate Columbia 345/138-kV transformer T-22 to 527 MVA	527	400	>2026	TBD	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, 69B3)	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 (C1), operating flexibility	Install 69-kV bus tie breaker at Delta Substation	N/A	2011	2011	2
relieve overloads or low voltages under contingency (B2)	Upgrade overhead portions of Straits-McGulpin 138-kV circuits #1 & #3 to 230 F degree summer emergency ratings	N/A	2012	2012	2
stability, operating flexibility	Replace five 69-kV breakers at Delta Substation	N/A	2012	2012	2
relieve overloads or low voltages under contingency (69B2)	Relocate Engadine 69-kV load	N/A	2011	2012	2
relieve overloads or low voltages under contingency (69B2)	Install 2-16.33 MVAR 69-kV capacitor banks at Nine Springs Substation	32.66	2008*	2013	3
relieve overloads or low voltages under contingency (69B2)	Upgrade Fitchburg-Nine Springs 69-kV and Royster-Pflaum 69-kV lines and move AGA load to the Royster-Femrite 69-kV line	N/A	2008*	2013	3
operating flexibility	Rebuild Pleasant Prairie 345-kV bus	N/A	2013	2013	5
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 69-kV capacitor banks at 18th Road	8.16	2014	2014	2
operating flexibility	Reconfigure Petenwell 138-kV bus	N/A	2011	2015	1
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	>2026	2015	1

**Table PR-22
Substation Equipment Additions and Replacements (continued)**

Identified Need	Potential Additions or Replacements	Capacitor Bank Capacity (MVAR)	System Need Year	Projected In-service Year	Planning Zone
operating flexibility	Reconfigure Petenwell 138-kV bus	N/A	2011	2015	1
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	>2026	2015	1
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	>2026	2015	3
relieve overloads or low voltages under contingency (69B2, 69B3)	Uprate 6927 West Middleton-Stage Coach 69-kV line to 106 MVA SE	N/A	>2026	2015	3
relieve overloads or low voltages under contingency (B1)	Install 3-75 MVAR capacitor banks at Bluemound Substation	225	>2026	2015	5
relieve overloads or low voltages under contingency (B2)	Rebuild Arcadian-Waukesha 138-kV lines KK9942/KK9962	N/A	2016	2016	5
relieve overloads or low voltages under contingency (69B2, 69B3)	Uprate Castle Rock-Mckenna 69-kV line	8.5	2024	2017	1
economics, 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	>2026	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	>2026	2017	3
relieve overloads or low voltages under contingency (69B2)	Uprate Y87 North Monroe-South Monroe 69-kV line to 115 MVA SE	N/A	>2026	2018	3
accommodate new generation	Point Beach Substation: Install new series 345-kV breaker for circuit Q-303	N/A	2018	2018	4

**Table PR-22
Substation Equipment Additions and Replacements (continued)**

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)	Uprate Winneconne-Sunset Point 69-kV line Y-103	7.4	>2026	2019	1
relieve overloads or low voltages under contingency (69B2)	Uprate Ripon-Northwest Ripon 69-kV line Y-93	N/A	>2026	2019	1
relieve overloads or low voltages under contingency (A, B2)	Install 2-16.33 MVAR 69-kV capacitor banks at Eden Substation	32.66	>2026	2019	3
relieve overloads or low voltages under contingency (69B2)	Install 2-16.33 Mvar 69-kV capacitor banks at Dam Heights	32.66	>2026	2019	3
relieve overloads or low voltages under contingency (B2)	Install 4-49 MVAR 138-kV capacitor banks at Concord Substation	196	>2026	2020	3
relieve overloads or low voltages under contingency (B2)	Install 2-16.33 Mvar 69-kV capacitor banks at North Monroe	32.66	>2026	2021	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	>2026	2021	3
relieve overloads or low voltages under contingency (69B2)	Uprate Y159 Brick Church-Walworth 69-kV line to 115 MVA	N/A	>2026	2021	3
relieve overloads or low voltages under contingency (69B2, 69B3)	Install 2-16.33 Mvar 69-kV capacitor banks at Sun Prairie	32.66	>2026	2022	3
relieve overloads or low voltages under contingency (B2)	Upgrade Oak Creek-Pennsylvania 138-kV line	N/A	>2026	2022	5
relieve overloads or low voltages under contingency (69B2)	Uprate X-67 Portage-Trienda 138-kV line to 373 MVA	N/A	>2026	2022	3
relieve overloads or low voltages under contingency (69B2)	Install 2-12.25 MVAR 69-kV capacitor banks at Mazomanie Substation	24.5	>2026	2023	3