



10-Year Assessment

An annual report summarizing proposed additions and expansions to the transmission system to ensure electric system reliability.

2006

November 2006 10-Year Assessment
www.atc10yearplan.com

About this report

Introduction

For the sixth year, we have produced a 10-Year Transmission System Assessment. This report covers the years 2006 through 2016. Our transmission planners, who are continually conducting engineering studies on the transmission system looking for potential problems that may affect the future performance of the system and impact reliability, develop the report.

We prepare and issue comprehensive planning reports at least annually with six month updates as needed.

Planning approach

Our approach to transmission planning is built upon two critical foundations – comprehensive engineering analyses and collaborative communications.

We are continually assessing and reassessing the needs of existing and anticipated system users, on both an individual and collective basis, according to accepted industry system performance criteria and practices. Our goal is to initially determine, and then evolve over time, the best set of transmission projects to address those needs. “Best” means striking the right balance among reliability, risk, cost and societal impact so that the resulting plan is publicly acceptable and constructible.

We evaluate transmission need drivers, including load growth forecasts and proposed new power plants, and use computer models to analyze problems and implications and identify potential solutions. We strive to design a portfolio of projects where each project addresses multiple needs, so that the set of needs in total can be met as efficiently as possible, and overall societal impacts can thus be minimized.

We work closely with the Midwest Independent System Operator (MISO) to integrate our local transmission planning and operating activities with those occurring on a regional and national basis. We also actively participate in regional planning forums and incorporate regional need drivers and implications of adjacent utilities’ activities into our local plans. We monitor industry developments, follow potential national energy legislation, and incorporate new tools, standards and practices into our planning approach as appropriate.

Our annual 10-Year Transmission System Assessment report is an important planning communication tool – presenting up-to-date results of our ongoing engineering analyses, including information on the array of needs driving system upgrades and the potential projects anticipated to best meet those needs. The report provides the baseline information necessary to facilitate future communications with and involvement by anyone interested in



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engaging further in either the general planning process or the subsequent, more specific and locally focused, routing and siting process for individual projects.

This analysis is iterative by nature, as situations can change at any time. We want to be able to take new information into account as quickly as possible and adjust our plans accordingly. We only will build transmission in response to specific identified needs – if the needs change or disappear, so do the corresponding transmission projects.

For more about ATC’s public outreach and siting process, go to [Routing & Siting](#).

Planning zones

For planning purposes, we divide our service area into five geographic areas or planning zones. For each zone, information is provided about the transmission issues, future growth considerations, environmental aspects and the major projects that ATC is planning or proposing over the next 10 years to strengthen the reliability of the transmission system and meet customer needs.



Executive Summary

American Transmission Company's 2006 10-Year Transmission System Assessment provides current results of planning activities and analyses of the company's transmission facilities service territory. These activities and analyses identify needs for transmission system enhancement and potential projects responsive to those needs. This 2006 report also describes changes to the 2005 10-Year Assessment Update through 2015, and in some areas 2016, based on updated information provided by local distribution companies, the latest transmission service requirements and generation interconnection requests, recent analyses conducted by ATC, input from various stakeholders at ATC-sponsored meetings and other developments.

The updated information in this report provides further foundation for continued public discussions on the transmission planning process, identified transmission needs and limitations, possible resolutions to those needs and coordination with other public infrastructure planning processes.

In addition to providing updated need and project information, this report presents additional information on two planning initiatives (Access and 20-Year Analysis) continuing at ATC.

Our Access Initiative

The Access Initiative commenced in early 2004 and was introduced as a topic in the 2004 10-Year Assessment Update. The objective is to determine the potential value of expanding the transmission system to provide ATC's customers with greater access to low cost energy outside of ATC's service territory and improved ability to transfer energy within the ATC system where it is needed to serve retail customers. ATC conducted considerable analysis and led discussions with various stakeholders on this topic during 2005, and this effort is continuing during 2006 to further involve stakeholders outside of ATC's service territory. On March of 2006, the Public Service Commission of Wisconsin (PSCW) released the *Commission Staff Final Report on Transmission Access* which states the "...Wisconsin ratepayers could benefit from expanded interstate transmission investment, particularly from investment in targeted smaller scale projects". The Access topic has had and will continue to have an even greater focus for discussion in future Assessments. For additional information on this topic, go to Our Access Initiative.

20-Year Analysis

ATC began the second initiative in 2005 and specifically *built upon the Fall 2005 10-Year Assessment results* deriving the analysis cases from the 2014 study case used in the 10-Year Assessment. This initiative had multiple objectives including:

- evaluating the robustness of projects listed in the 2005 10-Year Assessment,
- evaluating long-term needs of our system and determining if the 10-Year Assessment projects are aligned with these future needs,



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- determining the merits of Access Initiative alternatives,
- evaluating the impact specific generation retirements would have on system reliability and system expansion needs and
- identifying specific locations within our system where the future siting of new generation may provide significant system performance benefits.

The initial results on the 20-Year-Analysis were included in the March 2006 10-Year Assessment Update. However, the completed results only addressed the first three objectives listed above due to study time constraints, specially meeting the deadline of inclusion in the 10-Year Assessment Update, It is anticipated that this analysis be extended to evaluate the generation scenarios listed in the objectives above. ATC plans to hold meetings with interested stakeholders to discuss the scope of this effort and to present results of analyses that are conducted. For more on this topic, go to [20-Year Analysis](#).

Regional Analysis

In addition to providing updated need and project information, the 2006 report presents information on ATC planning involvement in regional transmission system studies. In addition to conducting transmission system planning studies internal to ATC, it is also involved in transmission planning studies to address regional needs that can impact the ATC system. Current studies in which ATC is involved include: *MISO Exploratory – Western RSG; Alliant Energy - Eastern Iowa Transmission Reliability Study; Capx 2020 and specifically the Rochester Public Utilities - Rochester Minnesota Reliability Study & Dairyland Power Cooperative - La Crosse Wisconsin Reliability Study; and State of Michigan – 21st Century Plan*. For more on this on these studies, go to [Regional Analysis](#).

Current Projections

Based on anticipated changes to the ATC 10-Year system expansion plan since the March 2006 10-Year Assessment Update, ATC now estimates 368 miles of new transmission lines on new rights-of-way, and improvements to 807 miles of lines on existing rights-of-way over the next ten years (refer to [Table ES-1](#)). A graphical representation of the transmission system reinforcements included in this years Assessment is shown in [Figure ES-1](#). Please refer to the tables in [Projects](#) for details on each of the particular projects reflected in this figure.

Details of the specific changes to ATC plans from those listed in the March 2006 Update report are provided in the [Summary of Changes](#) table. Several of the changes are due to proposed new generation projects meeting criteria for inclusion that will require the construction of new transmission facilities. Other changes are attributable to further analyses of project alternatives done by ATC. Still other changes are due to updated load forecast information provided by ATC customers.

Economic benefits

The transmission system has always played a dual role in facilitating:



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- 1) *Reliability* - the reliable transfer of energy from power plants to the distribution system and
- 2) *Economic Generation Dispatch* - access to the most economical mix of generated energy at any moment in time.

While the traditional reliability criteria have been at the heart of ATC's plans from the beginning, our Access Initiative in 2004 and 2005 began the formal process of evaluating transmission economic benefits. The operation of the MISO Day 2 Market which began April 1, 2005 has provided a new and continuous set of economic signals on the effectiveness of the transmission system in allowing the most economically beneficial mix of energy to flow from an extremely large portfolio of generators.

We have selected the Locational Marginal Price (LMP) of loads in the market as the screening indicator to track locations on the transmission system where constraints to the delivery of economic energy exist. The cost of congestion caused by these constraints can be evaluated to determine if transmission upgrades are justified.

Analysis of the first eleven months of market data showed that transmission system congestion and losses created a \$9.70/MWH or 19 percent premium in load LMP on our customers compared with three neighboring market hubs (MISO MN, MISO IL, and PJM Northern IL). Additional analysis is needed to determine how much of this premium our customers were able to recover through the refund of marginal losses, FTR hedges, and LMP payments to customer affiliated generators.

ATC is evaluating which of the constrained transmission elements contributing to the LMP differentials may be cost effective to relieve through transmission system upgrades based on the expected reduction on energy prices they would facilitate.

In addition to the economic benefit of reducing energy prices through the economic dispatch of generation, ATC is also evaluating these additional possible economic benefits from transmission upgrades:

- Reliability:** The economic value of transmission expansion contributing to decreasing the Loss of Load Expectation (LOLE) in a variety of future models.
- Competitiveness:** The economic value of ATC customers having unconstrained access to the MISO market. ATC customers currently operate in a Narrowly Constrained Area (NCA) under the scrutiny of the MISO Independent Market Monitor (IMM).
- Liquidity:** The economic value of energy trading financial hedging instruments which rely on the ATC customer load footprint having limited constraints, congestion and volatility relative to the broader MISO energy market.



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- ❑ Insurance and Risk Mitigation: The economic value of a more robust grid's ability to withstand or limit the Expected Unserved Energy (EUE) during an infrequently occurring simultaneous outage of generation or transmission elements beyond routine planning configurations. Scenarios for these infrequent events are gleaned from actual occurrences on the grid over the past ten to twenty years.
- ❑ Capacity (and other Ancillary Services): The economic value of the option of obtaining inexpensive capacity from outside the ATC footprint as the opportunity may arise from time to time based on generation building cycles and patterns in other areas.
- ❑ Emissions: The economic value of accessing alternate generation dispatch scenarios which may have varying emissions options.

These additional economic benefits of transmission are extremely difficult to quantify and will have differing values to differently-positioned ATC customers. The emergence of new and broader opportunities and risks in the fast moving energy market that our customers participate in makes working to quantify them as part of transmission system project evaluation a critical element in meeting the current and future transmission needs of our customers.



Capital Cost of ATC Expansion Plan

Based on this 2006 Assessment, the total cost estimate for necessary transmission system improvements is about \$3.1 billion over the next 10 years (through 2015). Included in this total cost is \$1.7 billion for projects specifically detailed in this Assessment. The remaining \$1.4 billion includes costs for interconnecting other proposed generators, asset renewal projects, infrastructure replacements and relocations, and other smaller network reliability improvements. The total \$3.1 billion in projects can be broken down into the following categories.

<i>Category</i>	<i>10-year capital estimate in billions</i>
10-Year Assessment projects	\$1.75
Maintenance	\$0.30
Generator interconnections	\$0.10
Distribution interconnections	\$0.17
Protection & control	\$0.12
Network	\$0.12
Unspecified network projects	\$0.45
Other *	\$0.08
Total expenditures 2006-2015	\$3.09

* Other includes Administration & General, Asset Acquisition, Asset Contribution, and Infrastructure Relocation.

In the 2005 Assessment Update, ATC estimated it would cost about \$3.5 billion over the next 10 years to construct the transmission system improvements necessary to meet current and projected needs. Projects totaling \$2.1 billion were specifically detailed in the 2005 Assessment; the remaining \$1.4 billion covered other projects as noted in the previous paragraph.

Considering the total costs in the last few assessments, there is a trend of decreasing cost for the projects specifically detailed in the Assessments. The issues that can influence the 10-year total cost up or down as each future assessment is completed can include the following factors:

- Refining the load forecasting process,
- Continuing changes in generation projects,
- Completing prior projects that improve reliability and renew assets,
- Improving resource planning to manage construction projects,
- Developing projects that are driven by economic benefits and



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- Dealing with increasing equipment costs.

The further study and information suggested by these factors has brought additional specificity to some of the need projections and estimates that were made in the 2005 Assessment Update. Considering all of this, ATC believes that a decrease in the total cost estimate for the necessary transmission system improvements is attributable to a decrease in projects driven by reliability and asset renewal. These projects are decreasing because of ATC's past and current strategic investment in these areas. As ATC continues to achieve a higher level of system reliability by implementing long-needed reliability based projects and renewing assets, total incremental cost is likely to decrease.

Referring to the breakdown of the 2006 Total Cost, Unspecified network projects are defined as those projects which may shift into the 10-year timeframe because of factors listed earlier, As a proxy for these projects ATC is using the combined costs of the Mill Road-Rockdale (approx. \$100 million) and Salem-Spring Green-West Middleton (approximately \$350 million) 345-kV line projects. This \$450 million represents anticipated costs from projects not defined in the Assessment but potentially driven by needs related to some combination of the following issues that we continue to analyze:

- Rockdale-Mill Road drivers
- Future large access projects and related low voltage projects
- Multiple outage impact solutions
- Additional eastern upper peninsula of Michigan projects.

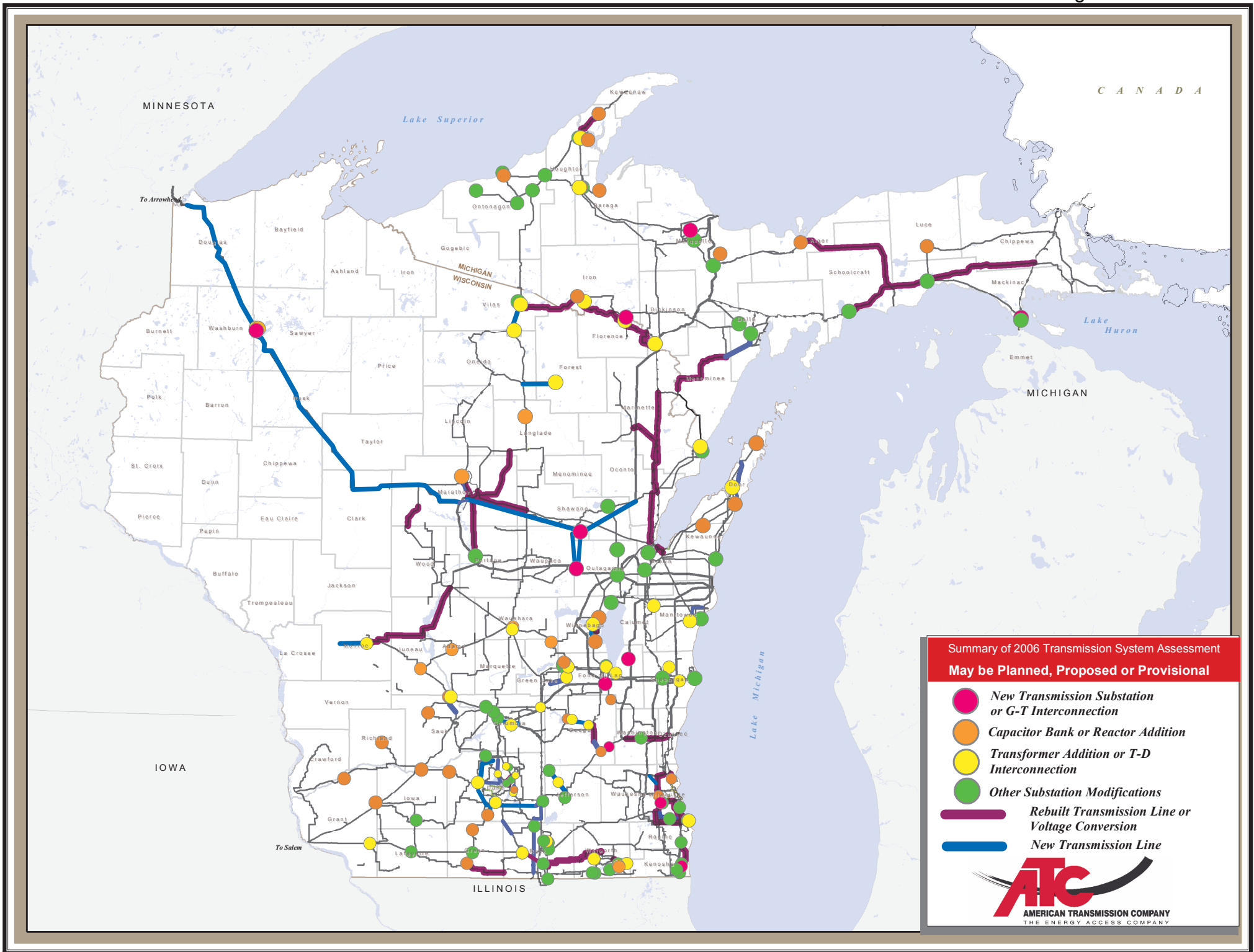
Future Assessments will continue to define these unspecified costs as issues are further defined in the continuing planning process.

Table 2006 Financial outlines the costs of both the Assessment projects and ATC construction projects overall.

Table ES-1
Summary of American Transmission Co.'s
2006 Transmission System Assessment

	2005 Update	2006 Assessment
	(March 2006)	(September 2006)
<i>New Transmission Lines Requiring New Right-of-Way</i>		
345 kV	7 lines / 330 miles	6 lines / 216 miles
138 kV	15 lines / 79 miles	15 lines / 78 miles
115 kV	2 lines / 26 miles	2 lines / 26 miles
69 kV	12 lines / 82 miles	7 lines / 40 miles
<i>Transmission Lines to be Constructed, Rebuilt, Reconductored or Upgraded on Existing Right-of-Way</i>		
345 kV	4 lines / 91 miles	3 lines / 98 miles
161 kV	1 / 20 miles	1 / 20 miles
138 kV	41 lines / 742 miles	31 lines / 511 miles
115 kV	4 lines / 78 miles	4 lines / 68 miles
69 kV	13 lines / 94 miles	12 lines / 145 miles
<i>New Transformers to be Installed</i>		
<i>(# of transformers / total increase in capacity)</i>	37 transformers / 6,834 MVA	37 transformers / 6,733 MVA
<i>New Capacitor Banks to be Installed</i>		
<i>(# of installations / capacity)</i>	38 installations / 1,329 MVAR	39 installations / 1,311 MVAR

Figure ES-1



Updated: 11/14/2006; Note that hardcopy of Summary Report reflects the alternate route for Paddock-Rockdale and this figure reflects the preferred route.

ATC 2006 10-Year Assessment, September 2006
Summary of Capital Expenditures (2006-2015)
10-Year Assessment Project Detail

Funding Project Number	10-Year Assessment Project Description	Sum of Previous Expenditures as of 12/31/05	Sum of Total 2006-2015	Sum of Total (2001-2015)
F0033	Construct a 345-kV bus at Bain	-	2,093,932	2,093,932
F0181	Construct a second Dunn Road-Egg Harbor 69-kV line	-	2,288,000	2,288,000
F0283	2009 Oak Creek/Elm Road generation-related projects	21,161,183	10,377,005	31,538,188
F0301	Gardner Park-Central Wisconsin 345-kV line	6,473,094	122,401,292	128,874,386
F0339	Install a second 138/69-kV transformer at Hillman	-	3,814,000	3,814,000
F0365	Rebuild Blaney Park-Munising 69 kV to 138 kV	-	49,652,264	49,652,264
F0373	Upgrade Kelly-Whitcomb 115-kV line conductor clearances to 300F	31,582	3,128,252	3,156,916
F0763	2010 Oak Creek/Elm Road generation-related projects	210,279	10,672,014	10,822,293
F0817	Replace 138/69-kV transformer at Wautoma	377,902	1,444,944	1,822,846
F0823	Construct Morgan-Werner West 345-kV line	5,390,670	134,378,847	139,769,517
F0833	Rebuild Weston-Sherman St. and Sherman St-Hilltop 115-kV lines as double circuits with a new Gardner Park-Hilltop 115-kV line	-	15,464,695	15,464,695
F0845	Reconductor Wien-McMillan 115-kV line (ATC,MEWD)	1,176,104	2,683,155	3,859,259
F0924	Construct a Jefferson-Stony Brook 138-kV line	-	21,401,783	21,401,783
F0930	Uprate Rockdale to Jefferson 138-kV line	118,035		118,035
F0956	Construct a Rubicon-Hustisford 138-kV line	-	17,027,101	17,027,101
F1164	Zone 4 CTs (Various)	45,526	319,763	365,289
F1165	Zone 5 CTs (Various)	-	365,632	365,632
F1191	Arrowhead-Gardner Park 345-kV Line - Wisconsin Only	123,831,066	182,527,486	306,358,552
F1195	Stone Lake Substation Modifications	646,426	9,968,880	10,615,306
F1196	Arrowhead Substation Modifications	1,712,914	25,541,944	27,254,858
F1241	Convert Kegonsa-McFarland-Femrite 69-kV line to 138 kV and new Femrite-Sprecher 138-kV line	866,219	16,934,862	17,801,081
F1269	Rebuild/convert Holmes-Chandler 69 kV to 138 kV operation	-	56,281,142	56,281,142
F1291	Construct Venus-Metonga 115-kV line	-	8,745,840	8,745,840
F1324	Reconductor St. Lawrence-Pleasant Valley-Saukville 138-kV line	4,863	9,593,038	9,597,901
F1325	Arrowhead-Gardner Park Environmental Impact Fee	3,508,680	15,658,020	19,166,700
F1353	String a new Ellinwood-Sunset Point 138-kV line on existing structures	407,959	5,402,501	5,810,460
F1355	Uprate Gardner Park-Black Brook 115-kV line - scope TBD	-	1,011,029	1,011,029
F1357	Rebuild Crivitz-High Falls 69-kV double circuit line	-	12,712,392	12,712,392
F1358	Construct 138-kV line from Canal to Dunn Road	-	6,855,715	6,855,715
F1361	Rebuild 2.37 miles of 69 kV from Sunset Point to Pearl Ave with 477 ACSR	9,714	945,866	955,580
F1363	Cranberry-Conover-Iron River-Plains Project	187,108	116,043,285	116,230,393
F1367	Construct Butler Ridge 138-kV Substation	72,575	2,744,466	2,816,489

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F1376	Install 1-8.16 MVAR capacitor bank at Lincoln 69 kV	21,813	840,454	862,268
F1393	Construct new 69-kV line from Columbia to Rio to feed the proposed Wycocena Substation	489,151	4,743,715	5,232,866
F1395	Zone 5 Capacitor Banks (Various)	1,301,145	1,854,494	3,155,639
F1403	Install 28.8 MVAR capacitor bank at Butternut 138 kV	-	596,084	596,084
F1406	Construct a Northside-City Limits 138-kV line	-	5,022,691	5,022,691
F1407	Oak Ridge-Verona 138-kV line	-	17,922,637	17,922,637
F1427	Uprate Metomen-North Fond du Lac 69-kV line terminal equipment	-	217,692	217,692
F1430	Reconnect the 138/69-kV transformers at Kilbourn on separate breakers to operate individually	612	403,795	404,407
F1431	Rebuild Plains-Stiles double circuit 138-kV line	28,888,217	29,024,911	57,913,128
F1432	Construct a 345/138-kV switchyard at a new Werner West Substation; install a 345/138-kV transformer. Loop existing Rocky Run to North Appleton 345 kV and existing Werner to White Lake 138-kV lines into Werner West	1,503,558	13,228,480	14,732,038
F1435	Construct 345-kV line from Rockdale to West Middleton	-	134,631,271	134,631,271
F1458	Construct West Middleton-North Madison 345-kV line	-	43,249,653	43,249,653
F1471	Install 2-16.3 MVAR capacitor bank at Canal 69 kV	105,368	1,728,775	1,834,143
F1476	Capacitor Banks -West Portfolio (Various)	394,991	14,642,683	15,037,674
F1513	Construct a 345-kV substation at new Cypress; loop existing Forest Junction-Arcadian line into new Cypress	1,310,288	4,018,476	5,328,764
F1546	Arrowhead-Gardner Park 345 kV Line - Minnesota	23,790,340	3,257,816	27,048,156
F1556	Stone Lake - Permanent Substation	-	5,268,098	5,268,098
F1561	Construct new 138-kV line from North Beaver Dam to East Beaver Dam Substation	131,527	1,908,283	2,033,909
F1568	Install second 345/138-kV transformer at Plains	-	5,408,326	5,408,326
F1601	Uprate North Appleton-Lawn Road-White Clay 138-kV line	15,132	580,881	596,013
F1605	Relocate Cedar substation (North Lake)	-	8,631,646	8,631,646
F1609	Construct new 138-kV line from South Lake Geneva to White River	-	2,500,000	2,500,000
F1619	Bayport-Pioneer Phase I	-	12,630,701	12,630,701
F1621	Expand the Menominee 69-kV Substation and install 138 kV terminals. Loop the West Marinette-Bay De Noc 138-kV line into the substation	-	3,994,629	3,994,629
F1622	Reconductor Pulliam-Danz 69-kV line	-	2,053,292	2,053,292
F1623	Reconductor Danz-Henry Street 69-kV line	-	162,895	162,895
F1624	Reconductor Pulliam-Van Buren 69-kV line	-	124,657	124,657

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F1626	Construct a new 138-kV line from North Madison to Huiskamp (was Waunakee)	-	11,410,016	11,410,016
F1637	Install a second 138/69-kV transformer at McCue Substation	-	2,810,967	2,810,967
F1638	Construct a Lake Delton-Birchwood 138-kV line	-	5,806,313	5,806,313
F1640	Construct a Horicon-East Beaver Dam 138-kV line	-	6,837,660	6,837,660
F1641	Install a 138/69-kV transformer and 69-kV bus at Yahara River Substation	-	5,575,452	5,575,452
F1642	Construct Huiskamp-Blount 138-kV line	-	18,930,000	18,930,000
F1643	Construct new Eagle River Muni distribution substation directly adjacent to the existing Cranberry 115 kV substation	149,483	2,612,560	2,762,043
F1659	Relocate Brule substation (Aspen)	57,613	7,586,725	7,644,338
F1667	Construct new line from Southwest Delavan to Bristol at 138 kV, operate at 69 kV	982	6,900,388	6,901,370
F1681	Replace the existing 46.7 MVA 138/69-kV transformer at South Sheboygan Falls with 100 MVA transformer	1,159	1,555,054	1,556,213
F1682	Construct double circuit 138-kV line from Forest Junction/Howards Grove/Charter Steel to Plymouth #4	-	2,078,591	2,078,591
F1684	Rebuild Atlantic-Osceola 69-kV line (Laurium #1)	53,102	9,306,346	9,359,448
F1685	Wien Substation Modifications for Arrowhead-Gardner Park	-	135,403	135,403
F1688	Install series reactor at Cornell	1,865	4,651,493	4,653,358
F1690	Convert Rock River to Bristol to Elkhorn 138-kV operation; rebuild Bristol with a new 138 kV bus	46,693	8,626,715	8,673,408
F1700	Reconductor Weston-Northpoint 115-kV line (Phase 2)	22,943	11,071,369	11,094,312
F1712	Kilbourn and Artesian capacitor banks	-	4,004,876	4,007,876
F1714	Replace the 1200 A breaker at Edgewater T22 345/138 kV	10,811	248,513	249,594
F1716	Construct a 138-kV substation at a new Forward Energy Center; loop existing Butternut-South Fond du Lac line into Forward Energy Center	4,846	3,217,152	3,221,998
F1727	Construct Monroe County-Council Creek 161-kV line	-	27,576,030	27,576,030
F1729	Elm Road TSR Phase II circuit breakers	-	2,357,175	2,357,175
F1731	Rebuild the Verona to Oregon 69-kV line Y119	24,947	7,011,055	7,036,002
F1735	White Pine Generating Projects	-	1,104,833	1,104,833
F1765	Uprate Lost Dauphin-North Appleton-Mason Street 138-kV line(s)	-	3,553,082	3,553,082
F1780	Increase ground clearance of Atlantic-Osceola (Laurium #2) 69-kV line from 120 to 167 degrees F	-	501,632	501,632
F1800	Uprate Lakefront-Revere 69-kV line	-	621,680	621,680

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F1816	Install 2-8.16 MVAR capacitor banks at Ontonagon 138 kV	-	1,947,607	1,947,607
F1819	Install 1-5.4 MVAR capacitor bank at L'Anse 69 kV	-	491,088	491,088
F1820	Install 1-5.4 MVAR capacitor bank at Munising 69 kV	-	461,655	461,655
F1830	Bayport-Pioneer Phase II	-	7,833,852	7,833,852
F1834	Rebuild Brodhead-South Monroe 69-kV line	-	1,215,784	1,215,784
F1836	Uprate McCue-Janesville 69-kV line	-	885,175	885,175
F1844	Construct Brandon-Fairwater 69-kV line	-	1,692,545	1,692,545
F1847	Construct a 69-kV line from SW Ripon to the Ripon-Metomen 69-kV line	-	583,607	583,607
F1848	Construct Evansville-Brooklyn 69-kV line	-	7,945,527	7,945,527
F1849	Install 1-5.4 MVAR capacitor bank at Roberts 69 kV	-	608,770	608,770
F1865	2013 Oak Creek/Elm Road generation-related projects	-	146,360,000	146,360,000
F1867	Replace 138/69-kV transformer at Metomen	-	1,444,944	1,444,944
F1868	Uprate projects West portfolio (Various)	-	461,245	461,245
F1869	Install transformer and bus at Bass Creek	-	5,959,606	5,959,606
F1871	Uprate Royster-Sycamore 69-kV line	-	762,864	762,864
F1899	Summit Lake capacitor bank	-	33,664	33,664
F1903	Ontonagon-Victoria-Mass-Winona-Atlantic 69-kV line clearance	6,924	301,682	308,606
F1920	Install 2-4.1 MVAR capacitor bank at Sister Bay 69 kV	-	1,039,199	1,039,199
F1923	Install 2-16.3 MVAR capacitor bank at Aviation	-	1,101,646	1,101,646
F1924	Install 2-16.3 MVAR capacitor bank at Mears Corners 138 kV	-	1,082,072	1,082,072
F1925	Install 2-16.3 MVAR capacitor bank at Rosiere 138 kV	-	1,197,331	1,197,331
F1981	Paddock-Rockdale 345-kV line	-	98,814,907	98,814,907
F2054	Wautoma capacitor banks	-	2,483,516	2,483,516
F2075	Rebuild Hiawatha-Pine River 6908	-	53,235,828	53,235,828
F2079	Replace Glenview transformer	-	3,442,062	3,442,062
F2080	Sunset Point transformer replacements	-	3,545,064	3,545,064
F2081	Shoto-Custer 138-kV line	-	14,111,774	14,111,774
F2082	Beardsley 69-kV breakers	-	781,012	781,012
F2084	Lake Geneva area uprates and capacitor banks (various)	-	5,795,946	5,795,946
F2085	Bluemound capacitor banks	-	4,184,491	4,184,491

*ATC 2006 10-Year Assessment, September 2006
Summary of Capital Expenditures (2006-2015)
10-Year Assessment Project Detail*

<i>Funding Project Number</i>	<i>10-Year Assessment Project Description</i>	<i>Sum of Previous Expenditures as of 12/31/05</i>	<i>Sum of Total 2006-2015</i>	<i>Sum of Total (2001-2015)</i>
F2086	Pleasant Valley T-D (second transformer)	-	2,158,853	2,158,853
F2087	Kenosha-Lakeview KK9341 rebuild	-	668,035	668,035
F2088	Nine Springs-Pflaum loop into Femrite Substation	-	5,313,834	5,313,834
F2092	Uprate Portage-Trienda 138-kV line	-	1,503,805	1,503,805
F2093	North Randolph 500 MVA transformer	-	9,718,088	9,718,088
F2095	Somers T-D Interconnection (rebuild Racine-Somers-Albers 138-kV line)	-	4,181,904	4,181,904
F2097	Brookdale T-D Interconnection	-	7,113,752	7,113,752
F2098	Uprate Portage-Trienda 138-kV line to 339 MVA	-	1,031,249	1,031,249
2006 TYA Totals Reported		\$224.6M	\$1,744.7M	\$1,969.3M
Plus Projects Completed Prior to 2006 TYA		\$746.0M		\$746.0M
Plus Projects Not in TYA (other capital expenditures)			\$1.4B	\$1.4B
Total ATC Capital Expenditures		\$970.6M	\$3.1B	\$4.1B

*Projects not yet reflected in the 10-year financial forecast
(in-service dates or costs yet to be determined as of 2006 10-Year Assessment publication)*

<i>Project</i>	<i>Planning zone</i>
Construct Fairwater-Mackford Prairie 69-kV line	1
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	1
Convert Indian Lake-Hiawatha 69-kV line to double-circuit 138-kV operation, construct new Hiawatha 138-kV Substation	2
Construct new Mackinac 138/69-kV Substation	2
Uprate overhead portions of Straits-McGulpin 138-kV circuits #1 & #3 to 230 F degree summer emergency ratings	2
Uprate Empire-Forsyth 138-kV line terminal equipment	2
Uprate Chandler-Cornell 69-kV line clearance from 120 to 167 deg F	2
Install 1-5.4 MVAR capacitor bank at MTU or Henry Street 69-kV Substation	2
Uprate M38 138/69-kV transformer	2
Install 2-8.16 MVAR capacitor banks at M38 69 kV	2
Install 2-5.4 MVAR capacitor banks at Osceola 69 kV	2
Increase ground clearance of M38-Atlantic 69-kV line from 120 to 167 degrees F	2
Construct a North Lake Geneva-White River 138-kV line	3
Construct West Middleton-Blount 138-kV line	3
Uprate Rock River 138/69-kV transformer to 65 MVA and uprate Rock River-Turtle 69-kV line to 94 MVA	3
Upgrade the 5.4 MVAR capacitor bank to 10.8 MVAR at New Glarus Substation	3

Table PR-23

Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2006 10-Year Assessment

PROJECTS CANCELLED	Former In-Service Date	Planning Zone	Reason for Removal
Uprate Wautoma-Berlin 69-kV line terminal equipment at Wautoma Substation	2010	1	New line or equipment ratings
Install additional 13.6 MVAR capacitor bank at Clear Lake 115-kV Substation	2015	1	Replaced with cap bank in Cranberry-Conover-Plains project
Uprate Rocky Run-Plover 115-kV line terminal equipment	2009	1	New line or equipment ratings
Uprate Metomen-Ripon 69-kV line - scope TBD	2014	1	Replaced project with a different solution for this area
Construct Fitzgerald-Omro Industrial 69-kV line	2015	1	Replaced project with a different solution for this area
Install second 50 MVAR capacitor bank at Arpin Substation	2008	1	Updated study results
Uprate Atlantic 138/69-kV transformer	2008	2	Revised rating information
Relocate 69-kV Rexton tap to 69-kV Hiawatha-Pine River line (6909)	2009	2	Replaced with 6908 rebuild project
Relocate 69-kV Trout Lake tap to 69-kV Hiawatha-Pine River line (6909)	2009	2	Replaced with 6908 rebuild project
Rebuild Hiawatha-Pine River-Mackinac 69 kV to 138 kV	2009	2	Eastern U.P. review in progress
Construct 138-kV bus and install one 138/69-kV, 50 MVA transformer at Pine River Substation	2009	2	Eastern U.P. review in progress
Install 138-kV substation modifications at Indian Lake Substation	2009	2	Part of Indian Lake-Hiawatha 138 kV project, date TBD
Install 2-5.4 MVAR capacitor banks at M-38 69-kV Substation	2015	2	Revised load/model information
Uprate Colley Road to Brick Church 69-kV line to 72 MVA	2006	3	Revised load/model information
Construct new 138-kV bus and 138/69 kV 100 MVA transformer at Montrose Substation	2009	3	Location changed to Verona Substation

Table PR-23

Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2006 10-Year Assessment

PROJECTS CANCELLED (continued)

	Former In-Service Date	Planning Zone	Reason for Removal
Loop the Femrite to Royster 69-kV line into AGA Gas Substation	2010	3	Replaced by looping Nine Springs to Pflaum 69-kV line into Femrite Substation
Install 4-25 MVAR capacitor banks at Trienda 138-kV Substation	2009	3	Replaced by installing 2-16.33 MVAR capacitor banks at Kilbourn 69-kV Substation and 2-24.5 MVAR capacitor banks at Artesian 138-kV Substation
Uprate Sun Prairie-Bird Street 69-kV line	2012	3	Revised load/model information
Salem-Spring Green-West Middleton 345-kV proxy for Large Access Project, includes rebuild Nelson Dewey-Spring Green-West Middleton 138/69-kV to double-circuit 345/138 kV	2013	3	This is the previous Access Initiative project which was replaced by second Paddock-Rockdale 345-kV project
Expand 345 kV to 6 positions at Paddock Substation	2013	3	This is the previous Access Initiative project which was replaced by second Paddock-Rockdale 345-kV project
Expand 138 kV to 7 positions at Paddock Substation	2013	3	This is the previous Access Initiative project which was replaced by second Paddock-Rockdale 345-kV project
Install second 345/138-kV transformer at Paddock (500 MVA normal/625 MVA emergency) Substation	2013	3	This is the previous Access Initiative project which was replaced by second Paddock-Rockdale 345-kV project
Rebuild Paddock-Town Line Road 138 kV to double-circuit 1600 Amps minimum summer emergency each	2013	3	This is the previous Access Initiative project which was replaced by second Paddock-Rockdale 345-kV project
Reconductor Town Line Road-Russell 138 kV to 1600 Amps minimum summer emergency	2013	3	This is the previous Access Initiative project which was replaced by second Paddock-Rockdale 345-kV project
Install a 69-kV bus and 138/69-kV 100 MVA transformer at Northwest Beloit Substation	2010	3	Revised load/model information
Reroute Paddock to Shirland Avenue 69-kV line into and out of Northwest Beloit Substation	2010	3	Revised load/model information
Convert Hillman to Eden 69-kV line to 138-kV operation	2011	3	Replaced by installing 2-16.33 MVAR capacitor banks at Eden 69-kV Substation
Rebuild and convert Stagecoach-Spring Green 69-kV line to 138 kV	2012	3	Revised load/model information
Construct West Middleton-Stagecoach double-circuit 138/69-kV line	2012	3	Revised load/model information

Table PR-23

Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2006 10-Year Assessment

PROJECTS CANCELLED (continued)	Former In-Service Date	Planning Zone	Reason for Removal
Construct 69-kV line Eden through Muscoda to Richland Center Substation	2012	3	Replaced by capacitor bank addition project at Boscobel Substation
Move Lone Rock 69-kV phase shifter to Richland Center Substation	2012	3	Replaced by capacitor bank addition project at Boscobel Substation
Convert South Lake Geneva to Twin Lakes 69-kV line to 138-kV operation	2013	3	Revised load/model information
Construct new 138-kV line from Twin Lakes to Spring Valley	2013	3	Revised load/model information
Install 1-16.32 MVAR capacitor bank at Burke 69-kV Substation	2014	3	Replaced by Yahara River transformer project
Replace the Colley Road 138/69-kV transformer	2015	3	Revised load/model information
Replace the Kilbourn Substation 47 MVA 138/69-kV transformer with a 100 MVA unit	2010	3	Revised line/equipment ratings
Construct new 69-kV line from South Lake Geneva to Lake Shore Substation	2013	3	Deferred to 2017 by several line uprate projects and capacitor bank project at South Lake Geneva Substation
Install a second 138/69-kV transformer at North Monroe Substation	2014	3	Deferred as a result of Bass Creek Substation transformer project
Replace the 300A current transformer at Sheboygan Falls 69-kV Substation	2013	4	Another project selected (driven by maintenance and protection)
Retap 400A primary CT at Edgewater Substation to 600A	2012	4	Updated rating information
Retap 48 MVA CT at South Sheboygan Falls 138/69-kV transformer	2010	4	Updated rating information
Replace 300 A metering CT at Edgewater 69-kV Substation	2013	4	Updated rating information
Replace 300 A metering CT at Riverside 69-kV Substation	2013	4	Updated rating information
Install a 12.2 MVAR capacitor bank at Hilltop 69-kV Substation	2016	1	Was 2012
Install 1-5.4 MVAR capacitor bank at Sawyer 69-kV Substation	TBD	2	Was 2006; best value planning process to determine scope

Table PR-23 (continued)

Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2006 10-Year Assessment

PROJECTS DEFERRED	New date	Planning Zone	Reason for Deferral
Convert Indian Lake-Hiawatha 69-kV line to double-circuit 138-kV operation, construct new Hiawatha 138-kV Substation	TBD	2	Was 2009; Eastern U.P. review in progress
Construct new Mackinac 138/69-kV Substation	TBD	2	Was 2009; Eastern U.P. review in progress
Install 1-5.4 MVAR capacitor bank at Munising 69-kV Substation	2008	2	Was 2006; revised load/model information
Relocate Cedar Substation (North Lake)	2008	2	Was 2007; construction timelines
Install 2-16.33 MVAR capacitor banks at South Monroe Substation	2008	3	Was 2007; resource constraints
Upgrade Brodhead-South Monroe 69-kV line	2007	3	Was 2006 and provisional; time and resource constraints
Install 2-8.16 MVAR capacitor banks at new Brewer 69-kV Substation	2009	3	Was Richland Center in 2008; revised load/model information
Convert Rock River to Bristol to Elkhorn 138-kV operation; rebuild Bristol with a new 138-kV bus	2009	3	Was 2008; regulatory application process.
Install 1-8.16 MVAR capacitor bank at Bosobel 69-kV Substation and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	2013	3	Was 2010; revised load/model information
Construct a Lake Delton-Birchwood 138-kV line	2013	3	Was 2011; revised load/model information
Install a second 138/69-kV transformer at McCue Substation	2014	3	Was Janesville transformer in 2011; revised load/model information, better system performance by installing a second transformer at McCue versus Janesville
Construct a Horicon-East Beaver Dam 138-kV line	2014	3	Was 2013; revised load/model information
Construct new 138-kV bus and install a 138/69-kV 100 MVA transformer at South Lake Geneva Substation	2016	3	Was 2010; deferred due to several line uprates and cap bank project at South Lake Geneva Substation
Construct new 138-kV line from South Lake Geneva to White River Substation	2016	3	Was 2010; deferred due to several line uprates and cap bank project at South Lake Geneva Substation
Upgrade the Royster to Sycamore 69-kV line to 115 MVA	2016	3	Was 2012; revised load/model information
Construct West Middleton-North Madison 345-kV line	2016	3	Was 2014; revised load/model information
Construct Evansville-Brooklyn 69-kV line	2016	3	Was 2011; deferred by Bass Creek Substation transformer project
Install 2-16.3 MVAR capacitor bank at Aviation Substation	2015	4	Was 2015
Construct a Northside-City Limits 138-kV line	2016	4	Was 2015

Table PR-23 (continued)

Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2006 10-Year Assessment

PROJECTS DEFERRED (continued)		New date	Planning Zone	Reason for Deferral
Rebuild/Convert Bayport-Suamico-Sobieski-Pioneer 69-kV line to 138 kV		2016	4	Was 2015
Construct a 345-kV bus at Bain Substation		2009	5	Was 2007
OTHER PROJECT CHANGES AND POSSIBLE CHANGES		Date	Planning Zone	Nature of Change or Update
Upgrade Mckenna 6.3 MVAR capacitor bank to 10.8 MVAR and install a second new 10.8 MVAR capacitor bank		2013	1	Was 1-10.8 capacitor bank in 2014
Install a second 138/69-kV transformer at Wautoma Substation		2015	1	Was transformer uprate only
Install 2-24.5 MVAR capacitor banks at Wautoma 138-kV Substation and one-16.33 MVAR capacitor bank at 69 kV		2007	1	Was proposed, now planned
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Berlin 69-kV Substation		2008	1	Was proposed, now planned
Construct Brandon-Fairwater 69-kV line		2008	1	Was provisional, now proposed
Install 1-5.4 MVAR capacitor bank at Roberts 69-kV Substation		2009	2	Was 2008; removal of Hiawatha-Engadine line
Install 2-5.4 MVAR capacitor banks at Osceola 69-kV Substation		TBD	2	Was proposed in 2008; revised load/model information
Uprate M38 138/69-kV transformer		TBD	2	Was 2012; revised load/model information
Install 2-8.16 MVAR capacitor banks at M38 69-kV Substation		TBD	2	Was proposed in 2012; revised load/model information
Install 1-5.4 MVAR capacitor bank at MTU or Henry Street 69-kV Substation		TBD	2	Was proposed in 2013; revised load/model information
Uprate Janesville-Parkview 69-kV line to 92 MVA		2007	3	Was McCue-Janesville (name change only)
Install 2-16.33 MVAR capacitor banks at Spring Green 69-kV Substation		2010	3	Was uprate existing 18-MVAR bank with a 50-MVAR bank
Construct West Middleton-Blount 138-kV line		2016	3	Was 2017
Uprate North Lake Geneva-Lake Geneva 69-kV line to 84 MVA		2007	3	Was provisional rebuild/uprate
Rebuild Brodhead to South Monroe 69-kV line		2008	3	Was provisional project in 2010

Table PR-23 (continued)

Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2006 10-Year Assessment

OTHER PROJECT CHANGES AND POSSIBLE CHANGES	Date	Planning Zone	Nature of Change or Update
Uprate Portage-Trienda 138-kV line to 339 MVA	2008	3	Was provisional project in 2010; now proposed in 2008
Uprate Darlington-Rock Branch 69-kV line	2008	3	Was provisional project in 2010; now proposed in 2008
Construct new Oak Ridge-Verona 138-kV line and install a 138/69-kV transformer at Verona Substation	2009	3	Was Montrose-Oak Ridge (name change only)
Install 2-16.33 MVAR 69 kV capacitor banks at Kilbourn Substation and install 2-24.5 MVAR 138-kV capacitor banks at Artesian Substation	2009	3	Was capacitors at Kilbourn Substation only
Construct a 345-kV substation at new Cypress; loop existing Forest Junction-Arcadian line into new Cypress Substation	2006	4	Was 2007
String a new Elinwood-Sunset Point 138-kV line on existing structures	2007	4	Was provisional, now planned
Install 200 MVAR capacitor bank at Bluemound Substation	2008	5	Was 2007
Replace CTs at Racine 345-kV Substation	2009	5	Was 2013
NEW PROJECTS	In-Service Date	Planning Zone	Reason for Project
Construct Fairwater-Mackford Prairie 69-kV line	2014	1	Replaces prior identified solution in the greater Berlin area
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	2014	1	Replaces prior identified solution in the greater Berlin area
Rebuild Hiawatha-Pine River 69-kV line ESE_6908	2009	2	Eastern U.P. reliability needs
Uprate overhead portions of Straits-McGulpin 138-kV circuits #1 & #3 to 230 F degree summer emergency ratings	TBD	2	Eastern U.P. studies identified these circuits as possible transfer capability limiters in 2010, date TBD
Uprate Empire-Forsyth 138-kV line terminal equipment	TBD	2	Eastern U.P. studies identified these circuits as possible transfer capability limiters in 2010, date TBD
Uprate Chandler-Cornell 69-kV line clearance from 120 to 167 deg F	TBD	2	Eastern U.P. studies identified these circuits as possible transfer capability limiters in 2010, date TBD
Uprate Rock River 138/69-kV transformer to 65 MVA and uprate Rock River-Turtle 69-kV line to 94 MVA	TBD	3	Improve reliability
Upgrade the 5.4 MVAR capacitor bank to 10.8 MVAR at New Glarus Substation	TBD	3	Improve reliability
Uprate Colley Road-Park Ave Tap 69-kV line to 95 MVA	2007	3	Improve reliability
Uprate Brick Church-Zenda 69-kV line to 115 MVA	2008	3	Improve reliability
Install 1-16.33 MVAR 69-kV capacitor bank at South Lake Geneva Substation	2008	3	Improve reliability

Table PR-23 (continued)

Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2006 10-Year Assessment

NEW PROJECTS (continued)	In-Service Date	Planning Zone	Reason for Project
Uprate Columbia 345/138-kV transformer T-22 to 527 MVA	2008	3	Improve reliability
Install 2-24.5 MVAR 138-kV capacitor banks at North Beaver Dam Substation	2009	3	Improve reliability
Uprate North Lake Geneva-Lake Geneva 69-kV line to 115 MVA	2009	3	Improve reliability
Uprate Walworth- North Lake Geneva 69-kV to 69 MVA	2009	3	Improve reliability
Construct second Paddock-Rockdale 345-kV line	2010	3	Improve reliability
Loop Nine Springs-Pflaum 69-kV line into Femrite Substation	2010	3	Improve reliability
Rebuild/reconductor Town Line Road-Bass Creek 138-kV line	2010	3	Improve reliability
Install the second 16.33 MVAR 69-kV capacitor bank at South Lake Geneva Substation	2010	3	Improve reliability
Uprate McCue-Milton Lawns 69-kV line	2011	3	Improve reliability
Uprate Brick Church-Walworth 69-kV line to 115 MVA	2012	3	Improve reliability
Construct North Lake Geneva-White River 138-kV line	2012	3	T-D interconnection
Uprate Sheepskin-Dana 69-kV line to 95 MVA	2013	3	Improve reliability
Install 2-16.33 MVAR 69-kV capacitor banks at Eden Substation	2014	3	Improve reliability
Install 2-16.33 MVAR 69-kV capacitor banks and 2-24.5 MVAR capacitor banks at Femrite Substation	2014	3	Improve reliability
Install 2-12.25 MVAR 69-kV capacitor banks at Mazomanie Substation	2014	3	Improve reliability
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	2014	3	Improve reliability
Uprate X-67 Portage-Trienda 138-kV line to 373 MVA	2014	3	Improve reliability
Install 2-16.33 MVAR capacitor banks at Montrose Substation	2014	3	Improve reliability
Install two 69-kV breakers at Beardsley Street Substation	2010	4	Improve reliability
Replace two existing 138/69-kV transformers at Glenview Substation with 100 MVA transformers	2014	4	Improve reliability
Replace two existing 138/69-kV transformers at Sunset Point Substation with 100 MVA transformers	2015	4	Improve reliability
Uprate Lakefront-Revere 69-kV line	2007	4	Improve reliability
Construct Shoto-Custer 138-kV line	2012	4	Improve reliability
Install 138/69-kV transformer at Custer Substation	2012	4	Improve reliability
Improve clearance on Kenosha-Lakeview 138-kV line KK9341	2006	5	Improve reliability
Construct a 138-kV bus at Hale Substation to permit third Brookdale distribution transformer interconnection	2009	5	T-D interconnection
Construct a 138-kV bus at Pleasant Valley Substation to permit second distribution transformer interconnection	2009	5	T-D interconnection

Table PR-23 (continued)

Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2006 10-Year Assessment

NEW PROJECTS (continued)	In-Service Date	Planning Zone	Reason for Project
A second distribution transformer at Somers Substation requires a rebuild of the Racine-Somers-Albers 138-kV line; extend Albers 138-kV bus to permit connecting the Racine-Somers-Albers radial line to the Albers 138-kV bus	2011	5	T-D interconnection