American Transmission Co.
2004 10-Year Assessment Update
March 2005

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EXECUTIVE SUMMARY

This report is the update to American Transmission Co.'s 2004 10-Year Transmission System Assessment, which was issued in September 2004. This 2004 Update summarizes recent developments and current results of planning activities and analyses of the transmission facilities owned and service territory encompassed by ATC. This 2004 Update describes changes to the 2004 10-Year Assessment through 2015 based on updated information provided by local distribution companies, the latest transmission service and generation interconnection requirements, recent analyses conducted by ATC, input from various stakeholders at ATC-sponsored meetings, and other developments. This 2004 Update also provides the status of numerous projects that are part of ATC's transmission system expansion plan.

The updated information in this report provides further foundation for continued public discussions on ATC's transmission planning process, identified transmission system 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 under way at ATC. The ***Access Initiative*** commenced in early 2004 with the objective of determining 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 analyses and led discussions with various stakeholders on this topic during 2004, and this effort will continue during 2005 to further involve stakeholders outside of ATC's service territory.

ATC is beginning a second initiative in 2005, ***the 20-Year Analysis Initiative***. It has multiple objectives including evaluating the robustness of projects listed in this report, evaluating the merits of Access Initiative alternatives and obtaining a longer-term view of system limitations and needs. ATC plans to hold meetings during 2005 with interested stakeholders to discuss the scope of this effort and to present results of analyses that are conducted. Both of these initiatives are discussed in more detail in Section I of this report.

Based on anticipated changes to ATC's 10-year system expansion plan since the September 2004 Assessment was issued, ATC now forecasts the following:

Table ES-1
Summary of American Transmission Co.'s
2004 Transmission System Assessment Update

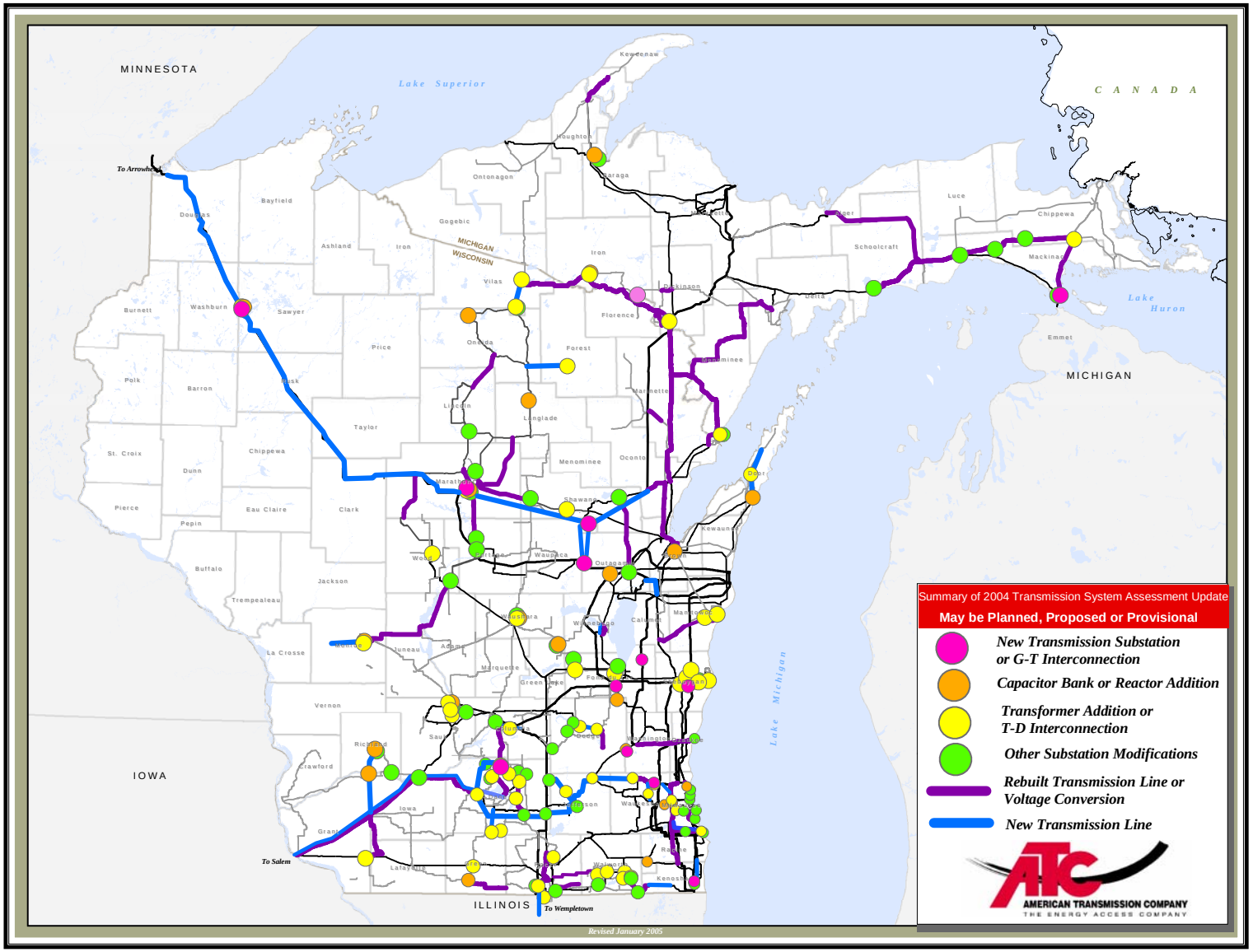
	2004 10-Year Assessment	**2004 Update**
	(September 2004)	(March 2005)
New Transmission Lines Requiring New Right-of-Way		
345 kV	9 lines / 344 miles	8 lines / 340 miles
138 kV	17 lines / 95 miles	17 lines / 95 miles
115 kV	5 lines / 52 miles	3 lines / 32 miles
69 kV	9 lines / 61 miles	7 lines / 53 miles
Transmission Lines to be Constructed, Rebuilt, Reconductored or Uprated on Existing Right-of-Way		
345 kV	9 lines / 178 miles	8 lines / 140 miles
161 kV	1 / 20 miles	1 / 20 miles
138 kV	51 lines / 892 miles	49 lines / 889 miles
115 kV	4 lines / 78 miles	4 lines / 78 miles
69 kV	10 lines / 63 miles	11 lines / 80 miles
New Transformers to be Installed		
(# of transformers / total increase in capacity)	41 transformers / 8,532 MVA	44 transformers / 8,467 MVA
New Capacitor Banks to be Installed		
(# of installations / capacity)	26 installations / 1,221 MVAR	24 installations / 1,047 MVAR

Details of the specific changes to ATC's plans from those listed in the September report are provided in Section III of this Update. Several changes are due to changes to planned generation projects. Other changes are attributable to further analyses of project alternatives done by ATC. Still other changes are due to updated information on ATC's existing transmission system.

In its 2004 Assessment, ATC reported that the capital cost of its construction plans over the next ten years is estimated to be approximately $2.8 billion, $2.1 billion of which is associated with the projects listed in the 2004 Assessment. The remaining $700 million consisted of costs for interconnection facilities for proposed generation projects not yet meeting the criteria for inclusion in the Assessment, transmission-distribution interconnections that don't require a regulatory filing or more than a few spans of transmission line construction, capital-related maintenance projects, protective relay replacements, and possible transmission projects not yet included in the Assessment. Though there are

numerous changes to projects reported in this 2004 Update, the net effect of the changes is that these capital cost estimates are still valid at this time.

Figure ES-1
Summary of American Transmission Co.'s 2004 10-Year Assessment Update



Section I

ATC's PUBLIC PLANNING PROCESS

Introduction

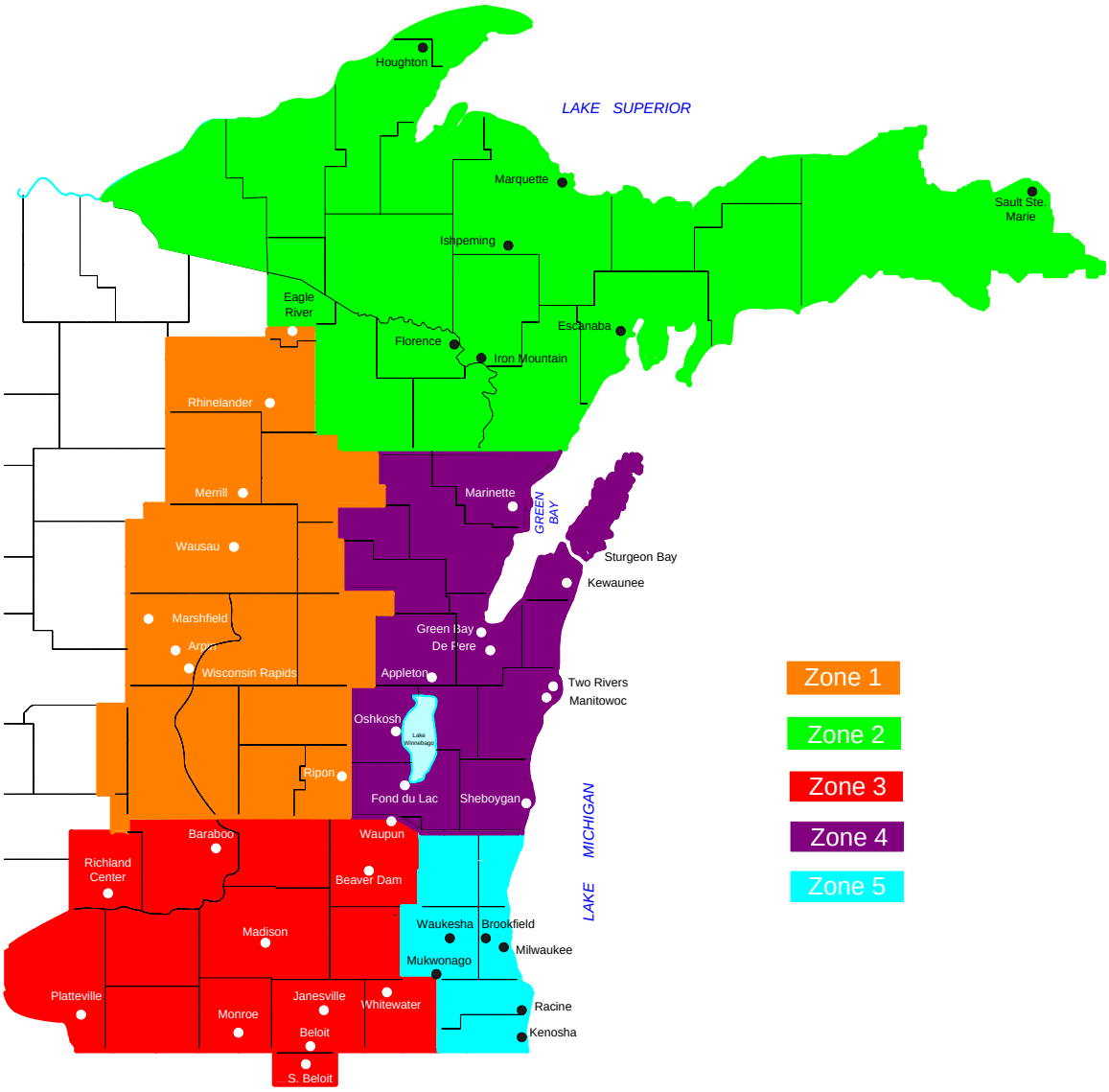
ATC's public planning process continues to be a very important part of its overall operations. ATC conducts extensive planning activities that take into account input provided through a variety of meetings and interactions with utility customers, generation developers, state and federal regulators, and other interested stakeholders.

For planning purposes, ATC divides its service territory into five planning zones representing distinct areas where needs are compiled and assessed. ATC's planning zones are shown graphically in Figure I-1 below.

Each year, ATC has held meetings in each zone to describe its planning process and the information presented in the latest 10-Year Assessment, and to solicit input on the process, needs, potential projects and associated right-of-way needs identified. The following Planning Zone meetings were held in 2004:

Zone 1	North-Central Wisconsin	Oct. 20	Stevens Point, Wis.
Zone 2	Upper Peninsula of Michigan and Northern Wisconsin	Oct.26	Iron Mountain, Mich.
Zone 3	South-Central and Southwest Wisconsin and South Beloit, Illinois	Nov. 3	Middleton, Wis.
Zone 4	Northeast Wisconsin	Oct.27	Green Bay, Wis.
Zone 5	Southeast Wisconsin	Nov. 8	Waukesha, Wis.
All Zones		Oct.19	Middleton, Wis.

Figure I-1
ATC Planning Zones



Customer/Stakeholder Input

At these meetings, stakeholders provided comments and expressed a wide range of opinions regarding the 2004 Assessment and related information presented by ATC. This section summarizes the feedback received from the zone meetings and from ATC customers. While ATC acknowledges the supportive or complimentary comments received and will strive to continue with efforts that customers and stakeholders indicated are of value, the focus of the feedback solicitation is on suggestions for improving the Assessment and the meetings themselves. The key or recurring comments include:

Prior notice for meetings

- Provide additional public notice for the meetings.
- Include more information on the subject of the meetings.
- Post information on ATC's Web site ahead of time.

Topics of interest for future meetings

- Provide more information on the routing and siting process.
- Provide updates on progress of projects.
- Address security of the transmission grid.
- Provide project schedule information.
- Discuss the concept of system expansion based on economic benefits as well as resolving reliability issues.
- Cost information:
  - Provide additional information on ATC's rate structure.
  - Address ATC revenue streams and expenses.
  - Address factors that impact costs and how they are mitigated
- Provide information about upcoming project meetings and open houses.
- Provide a description of how a line is constructed.
- Discuss how and why ATC was formed as well as its role in the electric utility industry.
- Address factors that can change expansion plans (new technology, new regulations, etc.)
- Address how local officials can work with ATC to resolve conflicts with landowners.
- Provide more project information.
  - Provide details of projects being constructed or soon to be under construction.
  - Discuss provisional projects to allow input on those projects.
- Provide general information about transmission lines.
  - Examples of what lines look like for different voltage levels.
  - Amount of right of way required for each type.
  - Use of right of way by landowners.
  - Effect of EMF interference.

Format of meetings

- Provide more time for discussion and questions.
- Design presentations in a more interactive format.
- Keep integrating PowerWorld demonstrations into presentation.
- Provide more visuals and walk around capability outside of presentation.

Comments on 10-Year Assessment

- Continue using CD format for full report.

Preview of 2005 Assessment

This section describes various developments that will be incorporated into the 2005 Assessment and the two planning initiatives that ATC will be undertaking during 2005.

Load Forecasts

Each year, distribution companies within ATC's service territory submit 10-year load forecasts. ATC uses these load forecasts to develop the transmission system models upon which the system assessments are based. In the 2004 Assessment, the average compounded peak demand growth rate within ATC's service territory, based on the forecasts provided by the local distribution companies, was projected to be just under 2 percent for the years 2004 through 2012. Based on the latest load forecast information provided, the average compounded peak demand growth rate within ATC's service territory for the years 2005 through 2014 is projected to be 2.3 percent. The primary driver for this increase is population growth in areas surrounding Milwaukee, Madison and Green Bay, and in areas along certain interstate corridors. This forecast will be the basis for the models developed to conduct studies for the 2005 Assessment.

Generation Developments

ATC's criteria for including planned or proposed generation projects are:

- studies for interconnecting such projects have been completed (stability and short circuit) and facilities required for interconnection have been determined, and
- studies for delivering the output of such projects have been completed, and facilities, if any, required for delivery have been determined, and the entity requesting delivery has accepted the terms of the delivery service.

Since the 2004 Assessment, several planned or proposed generation projects have met this criterion and are described below. These projects are summarized in Table I-1.

Table I-1
Planned or Proposed Generation
New to this Assessment

Project Description	Planning Zone
White Pine Mine Reactivation	2
Butternut	4
Navitas Blue Sky/Green Field	4
Sheboygan Energy Center	4
Kewaunee Uprate	4
Point Beach Uprate	4
Eurus	3/5

White Pine (Zone 2)

The White Pine Mine in Ontonagon County, Mich., is an existing generating unit that has not been used for utility purposes for several years. Transmission service for this generation has been approved and accepted as follows:

- 12 MW from January 2005 through December 2007
- 45 MW beginning January 2008 is being studied

The transmission projects required to provide transmission service are currently under study.

Butternut (Zone 4)

A new wind generation development is planned in Dodge County. Transmission service for this generation has been approved and accepted as follows:

- 40 MW beginning July 2005 until August 2005
- 84 MW beginning August 2005 until December 2005
- 124 MW beginning December 2005 until August 2006
- 123 MW beginning August 2006 until August 2007
- 135 MW beginning August 2007 until January 2010
- 150 MW beginning January 2010 and beyond

This wind generation will be interconnected to the existing Butternut-South Fond du Lac 138 kV line and will require construction of a new 138 kV switchyard. The transmission service was granted conditionally assuming that several projects already planned or proposed by ATC will be constructed and in service.

Navitas Blue Sky/Green Field (Zone 4)

A new wind generation development is planned in Fond du Lac County. Transmission service for this generation has been approved and accepted as follows:

- 160 MW expected to begin December 2005

This generation will be connected to the Forest Junction-Arcadian 345 kV line and will require construction of a new 345 kV switchyard. The transmission service was granted conditionally assuming that a new 345 kV line project already planned by ATC (Fox Energy-Forest Junction) will be constructed and in service by 2008.

Sheboygan Energy Center (Zone 4)

A new natural gas-fired plant is being constructed in Sheboygan County. Transmission service for this generation has been approved and accepted as follows:

- 300 MW beginning June 2005

This plant will be connected to the existing Point Beach-Granville 345 kV line, and will require construction of a new 345 kV switchyard. In addition, the

transmission service above has been granted conditionally assuming that several projects already planned or proposed by ATC will be constructed and in service.

Kewaunee (Zone 4)
The capacity of the Kewaunee Nuclear Plant has been increased from its previous rating of 535 MW. Transmission service for this generation has been approved and accepted as follows:

- 579 MW beginning January 2005 through December 2007
- 574 MW beginning January 2008 through December 2009
- 579 MW beginning January 2010

No new transmission facilities are required to provide the requested transmission service to accommodate this capacity uprate.

Point Beach (Zone 4)
The capacity of the Point Beach Nuclear Plant has been increased from its previous rating of 1,100 MW. Transmission service for this generation has been approved and accepted as follows:

- 1,126 MW beginning January 2005

No new transmission facilities are required to provide the requested transmission service to accommodate this capacity uprate.

Eurus (Zones 3/5)
A new wind generation is being constructed in Dodge County. Transmission service for this generation has been approved and accepted as follows:

- 55 MW beginning January 2005

This generation will be connected to the Rubicon-Hartford 138 kV line and requires a new 138 kV switchyard for that connection. In addition, the transmission service above has been granted conditionally assuming that several projects already planned or proposed by ATC will be constructed and in service.

It should be noted that though transmission service has been approved and accepted for various of the new generation projects above, such service may not commence on the dates indicated as certain of these plants are either under construction or have not begun construction, and hence, they may not be operational on the date for which transmission service has been approved.

Access Initiative
ATC commenced its Access Initiative in 2004 to determine the potential value of expanding the transmission system to provide ATC's customers with (i) greater access to low cost energy outside of ATC's service territory and (ii) improved ability to transfer energy within the ATC system where it is needed to serve retail customers. This section provides a summary of the efforts undertaken during

2004 and key findings from the analyses conducted, as well as ATC's plans for this initiative during 2005.

Summary of 2004 Efforts

ATC held eight meetings at or near its Pewaukee office during 2004 to discuss the Access Initiative with customers and stakeholders. At the first two meetings, ATC introduced the concepts it planned to explore, discussed factors it intended to take into consideration and listed preliminary alternatives it planned to evaluate, and then invited customer/stakeholder input. At subsequent meetings, ATC provided key results of analyses conducted, presented and refined a decision matrix developed to compare alternatives and solicited comments on what was presented. At the last two meetings held in 2004, ATC focused on soliciting input on what alternatives should be considered going forward. The 2004 meeting dates are listed below.

- April 7
- April 21 (Radisson Hotel)
- June 2
- July 7
- Aug. 3
- Sept. 1
- Oct. 1
- Dec. 1

Factors considered

ATC took into account all of the appropriate factors for conducting a *screening-level* evaluation of Access alternatives. ATC also utilized new analytical tools to further the understanding of the relative economic and technical merits of Access alternatives. The factors considered and the methods by which they were considered are listed below.

Economic factors

ATC developed capital costs estimates of Access alternatives and levelized annual carrying costs based on those estimates. These cost estimates, though high level, reflect the latest information available to ATC based on recent construction projects. ATC developed the levelized annual carrying costs using a simple fixed charge rate that accounts for the cost of borrowing the capital dollars, plus taxes and depreciation.

Offsetting these costs to varying degrees were projected reductions in energy production and transaction costs achieved with each of the project alternatives. ATC utilized PROMOD software (developed by New Energy Associates) that models the transmission system and determines the lowest-cost hourly generation dispatch without violating system planning criteria for facility overloads (i.e., ensuring that no transmission facilities are overloaded with one other facility out of service). The difference in energy production and transaction costs between the simulations with and without an Access alternative reflects the

projected energy cost savings. ATC simulated projected system conditions in 2012 to evaluate potential energy cost savings associated with each alternative.

In addition, the projected system loss reduction was determined and the value of the reduction in capacity losses (loss reduction during peak load conditions) and energy losses (loss reduction projected throughout the year) was estimated over a 20-year period.

Other factors considered
In addition to the economic factors described above, various technical and other factors were considered. These included:

- *transfer capability* – the increase in transfer capability projected to be achieved by each Access alternative. This projection reflects the maximum amount of power that can be imported into the ATC service territory during peak load conditions and is derived without regard to the economic feasibility of such transfers as in the case of the PROMOD simulations.
- *LMP comparability* – the average load-weighted locational marginal price (LMP) consisting of energy production, transactions, congestion and system losses for the six largest ATC customers over the study year (2012). This factor reflects how LMPs vary for these ATC customers with each Access alternative.
- *reliability-LOLE improvements* – a probabilistic reliability index, reflecting the reduction in loss of load expectation achieved by each Access alternative. This factor reflects how the increase in transfer capability associated with each Access alternative affects the ability of the generation fleet within the ATC service territory to meet the expected load within the ATC service territory.
- *reliability-EUE improvements* – a probabilistic reliability index, reflecting the reduction in expected unserved energy achieved by each Access alternative. This factor reflects how each Access alternative affects the ability of the ATC transmission system, another probabilistic reliability index, to meet the expected load within the ATC service territory without violating ATC's planning criteria for system voltages and facility loadings.
- *strategic benefits* – this factor encompassed six potential benefits:
  - providing backbone (345 kV) infrastructure
  - providing access to out-of-state renewable resources
  - improving local economic development potential
  - enhancing the value of other planned projects
  - providing benefits to neighboring systems
  - providing geographical diversity of the 345 kV network
- *system performance* – any improvements in angular stability limits and/or voltage security within the ATC system. This factor reflects to what extent system security is improved by an Access alternative.
- *operating flexibility* – the improvement in the ability of system operators to schedule outages, reconfigure the system during emergencies and/or reduce or eliminate the number or duration of use of operating guides.

- *societal impacts* – this factor consisted of estimating existing transmission corridor usage possible, new rights-of-way likely to be required, and the percentages of public and private land required for each Access alternative.
- *environmental impacts* – this factor consisted of estimating the relative impact of wetlands, river crossings, endangered species, state natural areas, state parks, national forests and parks, tribal lands and special waters areas impacted by each Access alternative.

Access alternatives considered

As ATC commenced the Access Initiative in early 2004, five representative Access alternatives were conceived to determine the relative merits of each. Those initial alternatives, listed below and shown in Figure I-2, were geographically diverse with the intention of determining which direction(s) are likely to provide the greatest economic and reliability benefit.

Initial Access alternatives

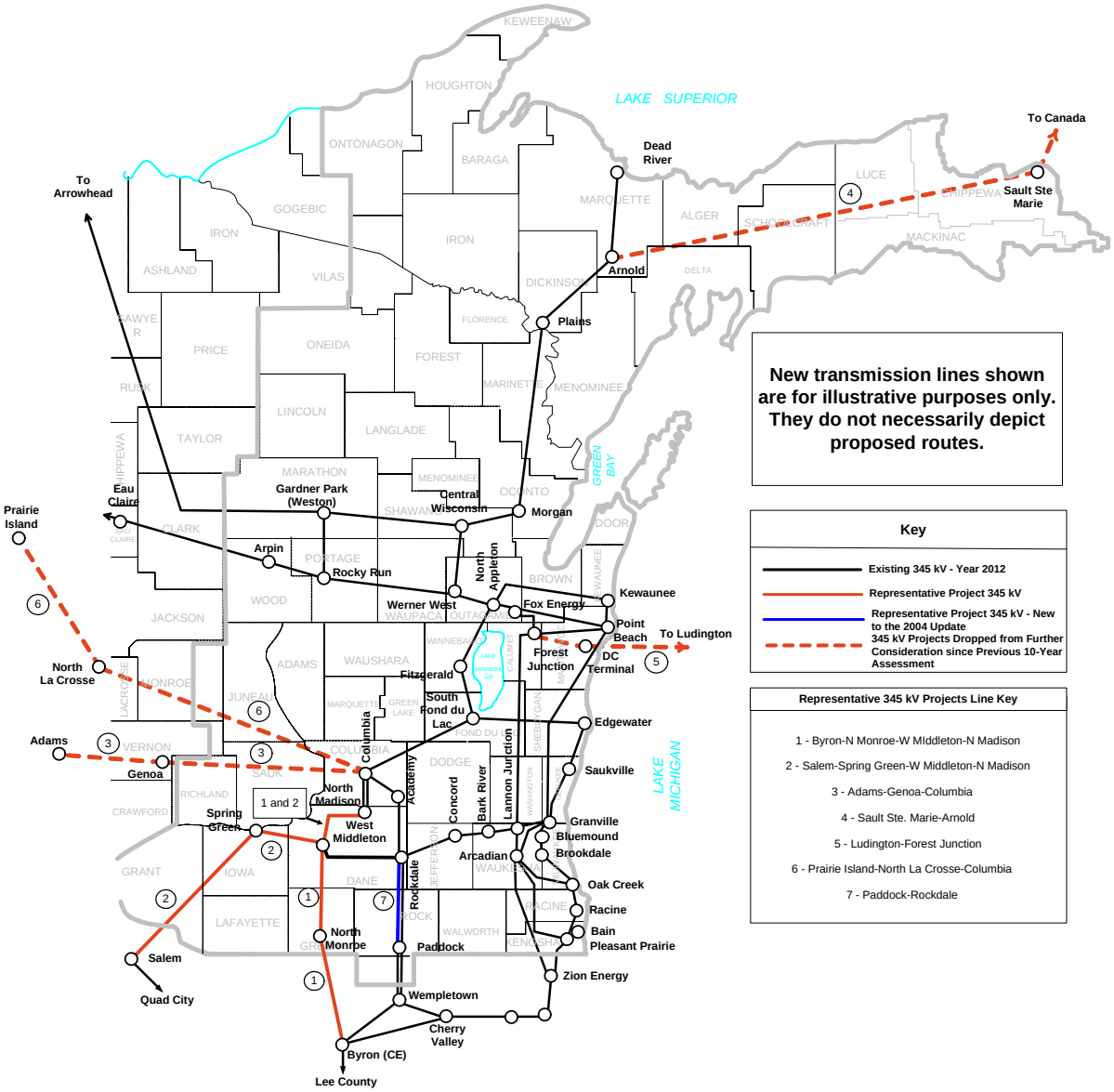
- **South:** a new Byron-North Monroe-West Middleton-North Madison 345 kV line
- **Southwest:** a new Salem-Spring Green-West Middleton-North Madison 345 kV line
- **West:** a new Adams-Genoa-Columbia 345 kV line
- **East:** a new 450 kV DC line from Ludington to a new substation on the western shore of Lake Michigan (Western Lakeshore) with AC/DC conversion stations at Ludington and Western Lakeshore, with a 345 kV line from Western Lakeshore to Forest Junction.
- **Northeast:** a new Sault Saint Marie-Arnold 345 kV with virtual back-to-back DC tie at Sault Saint Marie

After soliciting feedback from stakeholders and conducting comparative analyses, the list was expanded to include the following alternatives:

- **Low Voltage:** two lower voltage reinforcements (to fix the two most limiting constraints)
- **Low Voltage:** three lower voltage ties to neighboring systems
- **South:** a new Paddock-Rockdale 345 kV circuit
- **Southwest:** a new Salem-Spring Green-West Middleton-North Madison 345 kV line with an uprate of the Salem-Maquoketa 161 kV line
- **Southwest:** a new Salem-Spring Green-West Middleton-North Madison 345 kV line plus a new Hazelton-Salem 345 kV line
- **West:** a new Adams–Genoa–Columbia 345 kV line

After conducting the initial round of comparative analyses, ATC proposed eliminating the Northeast and East alternatives from further consideration. The stakeholders agreed with these eliminations. The resultant alternatives are shown in Figure I-2.

Figure I-2
Representative 345 kV Access Projects
for 2004 10-Year Assessment Update
American Transmission Company



Scenario/sensitivity analyses

A variety of scenarios and sensitivities were considered to evaluate the Access alternatives, as discussed below. Two analyses were conducted; PROMOD was used to determine how the alternatives compared for the various scenarios/sensitivities, and transfer capabilities were determined for each of the alternatives for each scenario.

- High and low internal generation scenarios were developed based on feedback provided by stakeholders. The high generation scenario involved reducing the peak load for the ATC service territory so that the internal

generation equaled 120 percent of the peak demand. This is functionally equivalent to adding generation but avoids potentially biasing the analysis, which can be influenced by the location of new generation. The low generation scenario involved adding only committed generation and retirement of select aging generators within the ATC service territory such that internal generation could meet 90 percent of the net firm peak demand.

- A high wind development scenario was developed based on feedback provided by stakeholders. This scenario assumed 1,500 MW of new wind generation would be developed in northern Iowa and southern Minnesota with appropriate transmission system additions in those states to ensure reliable delivery.
- High and low natural gas cost sensitivities were analyzed. This sensitivity assumed a 20 percent increase and 10 percent decrease in natural gas prices.
- PROMOD analyses were conducted assuming an unconstrained ATC system (no constraints to power transfers within ATC) for the base case to determine the potential "bound" on benefits to removing all constraints within the ATC system independently.

Summary of Key Findings

Several key findings were made based on the analyses conducted during 2004. Those findings are summarized below.

- New 345 kV lines to the south (Byron-North Madison) and southwest (Salem-North Madison) appeared to provide the greatest overall benefits when considering economic, technical and other factors.
- The alternatives to the south appeared to provide the highest level of energy production cost savings.
- The alternatives to the south and west appeared to provide the greatest level of comparability of access to the market for ATC customers.
- The alternatives to the northeast, west and south appeared to provide the greatest level of operating flexibility based on the factors considered.
- The alternatives to the south and southwest appeared to provide the greatest chronic limit relief.
- The alternatives to the southwest, west and south appeared to provide the greatest strategic benefits based on the factors considered.
- The alternatives to the south and northeast appeared to have the least environmental impact based on the high-level assessment performed and route assumptions made.
- The alternatives to the southwest and east appeared to have the least societal impacts based on the factors considered and route assumptions made.
- The alternatives to the south and southwest appeared to provide the greatest reliability benefits based on the factors considered.
- The alternatives to the west and southwest appeared to provide the greatest system performance benefits based on the factors considered.

- The alternatives to the south were generally the shortest in length and thus, had the lowest capital costs.

A decision matrix reflecting the findings above is provided in Table I-2.

Table I-2
American Transmission Co.'s Access Initiative Decision Matrix

			S	S	SW	SW	SW
		Base Case + two fixes	**Byron - N Madison**	***Paddock - Rockdale***	**Salem - N Madison**	***plus Salem - Maquoketa 161 kV fix (Iowa)***	***plus Hazleton - Salem 345 kV fix (Iowa)***
Mileage							
345 kV (or EHV DC) miles		49	143	84	202	202	278
138 kV or 161 kV miles		75	114	60	140	165	216
Economic Factors							
Estimated Cost ($M)		$19.50	$221.30	$59.30	$341.50	$348.88	$491.50
Annualized ($M/yr)		$1.76	$19.92	$5.34	$30.74	$31.40	$44.24
Market Savings ($M/yr)		$9.96	$14.64	$10.16	$6.15	$14.64	$13.20
Net Savings ($M/yr)		$8.21	($5.28)	$4.82	($24.59)	($16.76)	($31.04)
Sensitivity (potential upper bound)							
3x Market Savings		29.9	43.9	30.5	18.5	43.9	39.6
3x Net Savings		28.1	24.0	25.1	(12.3)	12.5	(4.6)
Other Factors							
Transfer Capability (MW)	16%	3648	4787	4756	4766	4766	4835
LMP Comparability (w/ UP)	10%	8.0	9.0	9.0	5.0	9.0	10.0
Reliability (LOLE)	5%	4.0	10.0	10.0	10.0		
Reliability (EUE)	5%	0.0	10.0	0.0	9.0		
Strategic Benefits	24%	1.7	7.2	1.7	8.8		
System Performance	5%	9.0	9.0	10.0	10.0		
Operating Flexibility	5%	1.0	8.0	4.0	7.0		
Constructability							
Societal Impacts	15%	10.0	5.0	9.0	7.0		
Environmental Impacts	15%	10.0	4.0	9.0	3.0		
NET SCORE	**100%**	**5.4**	**7.3**	**5.2**	**7.5**		

Planned 2005 Activities

Based on the findings above, ATC is planning to perform the following activities during 2005:

- Conduct more detailed analyses of the impacts of projects to the south and southwest (the preferred alternatives).
- Coordinate technical studies with MISO and neighboring utilities.
- Conduct more detailed analyses of other associated reinforcement projects and their alternatives.
- Evaluate the implications of the "narrowly constrained area" designation for the ATC service territory within MISO for the preferred alternatives.
- Refine the project "packages" (preferred alternatives and associated reinforcements).
- Select a preferred and alternate project packages and determine ultimate termination points for the package projects.
- Compile relevant information on preferred package to facilitate future pre-certification efforts.

ATC plans to host six meetings during 2005 to work toward completing the activities above. Certain of these meetings may be held other than in Pewaukee to accommodate various stakeholders. The 2005 meeting schedule is:

- Feb. 14
- April 11
- June 20
- Aug. 29
- Oct. 10
- Dec. 5

20-Year Analysis Initiative

In the course of conducting analyses of various areas of the ATC system, ATC has found it necessary in certain instances to extend the analytical timeframe beyond the customary ten-year planning period to gain additional insights as to the robustness of alternative reinforcement projects under consideration. In certain of these instances, some very valuable insights have been gained. Those types of insights are the impetus behind a new initiative ATC will pursue in 2005, which we refer to as our "20-Year Analysis" initiative.

The purpose of the 20-Year Analysis is multifold:

- evaluate the robustness of certain projects that were listed in the 2004 Assessment and are proposed to be completed in the next 5-10 years,
- evaluate the reliability merits of Access Initiative alternatives from a longer-term perspective, and
- obtain a longer-term perspective of system limitations and needs.

From this analysis, ATC hopes to gain some measure of confidence that capital investments being made over the next ten years will dovetail with longer-term needs, and to potentially revise expansion plans appropriately to the extent that nearer-term projects are found to be inadequate or sub optimal in meeting longer-term needs.

Planned 2005 Activities

There are three key activities associated with the 20-Year Analysis effort:

1. model building,
2. assessment of proposed reinforcements and
3. development of plans to meet longer-term needs.

These activities are expected to be ongoing throughout 2005, as described below.

Model building

The first and most complex aspect of the 20-Year Analysis is developing a viable model that simulates conditions on the electric system 20 years into the future. ATC is in the process of doing this, though this effort is expected to take several months. ATC's proposed approach is to start with the 2013 summer peak load model used in its 2004 Assessment, updated to reflect the latest information on new generation and transmission service reservations. From there, ATC plans to develop models of every other year (i.e., 2015, 2017, etc.) to the year 2025. This involves projecting summer peak loads beyond 2013. ATC plans to start with the most recent load forecast at each substation provided by ATC's distribution customers. The composite system-wide average compounded growth rate from that forecast is 2.29 percent. For this effort, ATC plans to scale all substation loads such that the composite system-wide average growth rate is 2.0 percent. This assumption will produce more conservative results than if the higher growth rate was used. ATC also plans to add proposed and certain provisional system reinforcements to the models simulating 2015 and beyond in the year needed.

ATC is not planning to add generation to these models that have not already been announced by their developers and studied by ATC. This will result in the generation resources within the ATC system being insufficient to meet the projected demand, probably as soon as 2015. To address this load/resource issue, ATC plans to utilize resources from outside the ATC system, making use of the import capability of the ATC system. Further, ATC plans to add, as a proxy, one of the Access alternatives by 2015 to provide ample import capability. In addressing the load/resource imbalance in this fashion, ATC will effectively stress the transmission system, operate the existing generation fleet within the ATC system closer to historical patterns and avoid masking potential limitations within the ATC system by assuming fictitious new generation at particular locations within the ATC system. It is anticipated, however, that even with over 4,000 MW of import capability, developing a model for the later years (2021 and beyond) may be difficult or impossible without operating virtually all of the

generation within the ATC system or adding new, unidentified generation. ATC will involve stakeholders in the discussion of how to best develop viable models, particularly for these outlying years and, at the suggestion of its customers, has solicited long-range resource plans from its customers.

Assessment of proposed reinforcements
As models for years 2015 and beyond are being developed, proposed and provisional projects previously identified by ATC will be included in the models and evaluated to determine the robustness of these reinforcement projects. ATC anticipates that in certain instances the areas where these future projects are to be located will require additional reinforcements to meet the growing load. In those instances, ATC will develop alternative reinforcements to determine if the system needs can be addressed more efficiently than with multiple projects every few years.

In addition, ATC plans to use the model developed for 2019 to evaluate the longer-term reliability performance of the Access project alternatives. This evaluation will provide an additional perspective from which to compare the Access alternatives beyond what has been done to date.

Development of plans to meet longer term needs
In the course of evaluating various projects identified in the 2004 Assessment, ATC anticipates that this longer-term perspective may result in some proposed or provisional projects being revised or replaced by other project alternatives. ATC plans to identify those potential project changes, but whether the original project ultimately is revised or replaced will require some judgment and not just the results of the 20-Year Analysis. ATC acknowledges that the certainty of the assumptions made to conduct this analysis and the results of the analysis should be viewed with an appropriate level of skepticism, particularly in areas where new generation is more likely to be developed in the future. In other instances, insights gained from the analysis could change ATC's current expansion plans and those changes will be reported in the 2005 Assessment Update, which will be released early in 2006.

MISO Day 2 Market Start-up

The Midwest Independent Transmission System Operator will begin operating under its Day 2 market structure on April 1 of this year. This market structure will significantly change the way in which transmission service for wholesale electricity supply is provided. Under the current market structure, when entities want to buy or sell power, whether from a new or existing power plant, transmission service is requested by market entities via the web-based Open Access Same-time Information System (OASIS). Requests made involving transmission service into or through the ATC service territory are ultimately approved or rejected by MISO. If the requested service is granted, the entities involved have the right to implement their transaction based on the nature of the service granted. If system security becomes compromised after the service is

granted, depending on the nature of the service granted, (i) the service may be curtailed or interrupted, in priority order, to ensure system security is maintained, or (ii) the system may be reconfigured or generation may be redispatched out of economic order, to ensure system security and maintain the service granted. Under the new market structure, if system security becomes compromised, a 'congestion' charge, based on the difference in marginal costs of energy (referred to as the "locational marginal price", or LMP) between the buyer and seller, may be charged to allow the transaction to continue. Entities will be allocated a certain amount of 'firm transmission rights' (FTRs) that will effectively act as hedges against being charged for congestion.

Transaction implications
As noted above, the nature in which transmission service will be granted will fundamentally change under the Day 2 market structure. Rather than invoking curtailments or interruptions through transmission loading relief procedures, as is done currently, any transactions for which FTRs have not been allocated will be subject to congestion charges. For new transactions that do not have associated FTRs, system reinforcements may be warranted if it is determined that one or more "flowgates" (one or more transmission facilities that may constrain transactions) would be adversely affected and system security would be unacceptably compromised, or congestion charges may be imposed at a level which may affect the public interest.

Generation delivery implications
The nature in which transmission service is provided for new generation will also change. Currently, a new generator or the customer of the generator requests transmission service for a specified amount, for a specified period, to a specified service territory. Studies are conducted to determine whether any system impacts could be expected to occur, and if so, additional studies are conducted to determine what facilities would need to be constructed or operating procedures would need to be implemented to grant the service to the specified customer. Under the Day 2 market, MISO will be implementing a new method currently in use by PJM – another regional transmission organization– that tests whether a generator is deliverable to the system, rather than to a specific customer(s), which could result in congestion charges being assessed for delivery of the output of a power plant to the customers in its own service territory.

Narrowly constrained area designation
In light of the constraints to importing power into the ATC system that currently exist, FERC's order regarding the Day 2 market start-up allows for the ATC system to be designated as a narrowly constrained area. This designation, in effect through 2009, effectively shields certain existing capacity resources outside of ATC that are utilized by ATC customers to meet their capacity requirements from congestion charges. MISO will designate a "market monitor" to periodically assess this situation and determine whether the narrowly

constrained area designation continues to be warranted. ATC is actively seeking to better understand the criteria that the market monitor will employ to make these assessments and what measures that ATC can take that will be most effective in addressing and removing the need for this treatment.

Effect on ATC expansion planning

Based on what ATC understands to date about the Day 2 market structure, dramatic changes to expansion planning in the near term are not expected. However, there are numerous uncertainties about the evolution of this market that could have a profound effect on certain aspects of expansion planning. Those uncertainties include:

- what criteria will be used to define the narrowly constrained area designation,
- how and if system expansion creates new FTRs, and how those newly created FTRs would be allocated,
- what kind of cost-sharing mechanism, if any, will be employed for expansion projects that benefit more than one transmission owner, and
- whether congestion charges will provide a realistic signal to expand the transmission system to relieve congestion.

Section II
STATUS OF PROJECTS

This section identifies transmission projects that were completed in 2004 or early 2005, are under construction or are in the regulatory approval stage. This section also provides a list of projects for which ATC expects to file construction applications during 2005. In addition, ATC has maintained a list of projects listed in prior 10-Year Assessments that have been completed and/or contemplated since 2001. The status of these projects is shown graphically in this section. Finally, a summary of the capital costs associated with ATC's projects listed in the 2004 10-Year Assessment and in this Update is provided in this section.

Table II-1 lists the projects completed since the 2004 10-Year Assessment was issued in September 2004. These projects are shown in Figure II-1 for geographical reference.

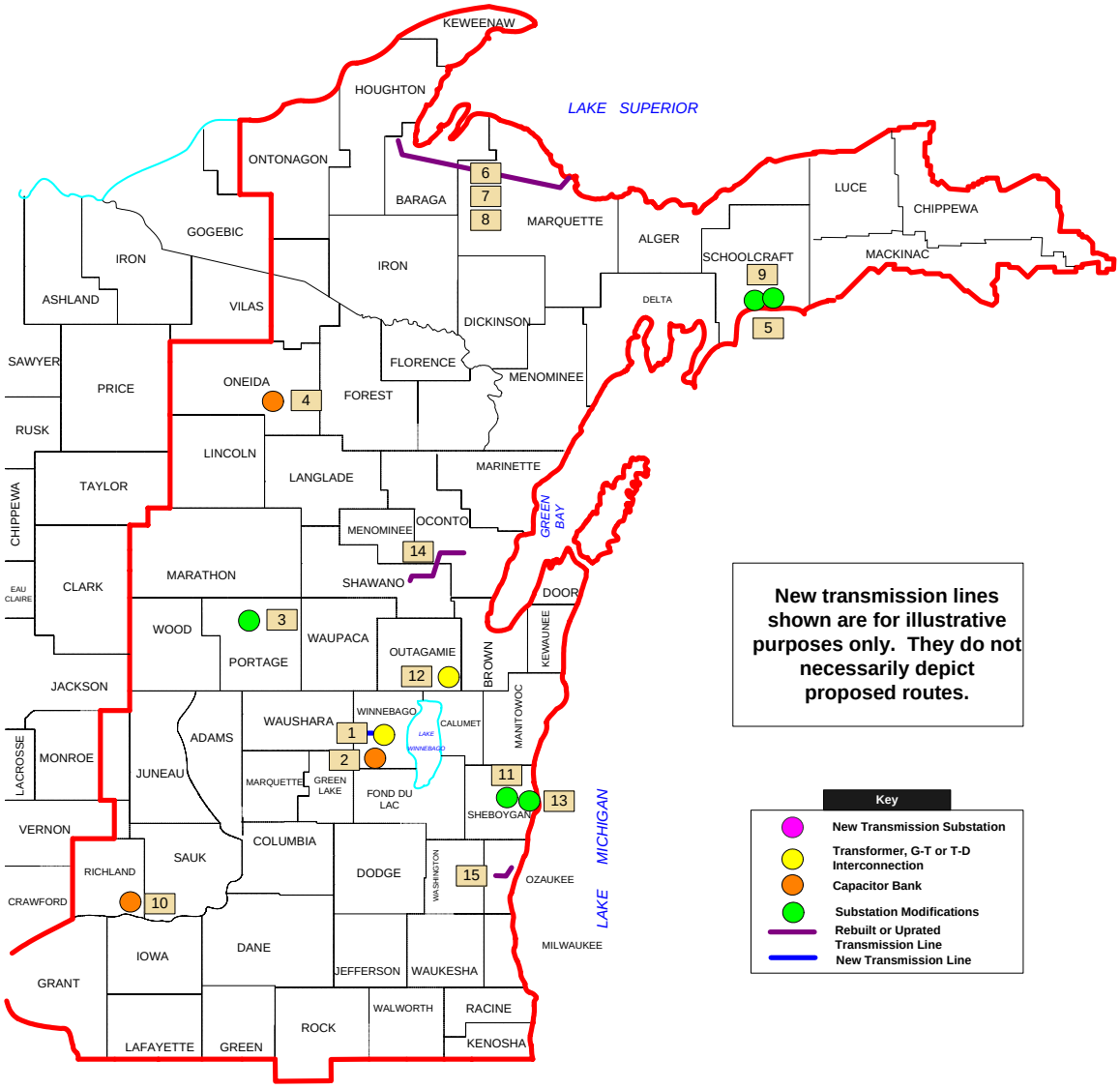
Table II-1
Projects Completed Since September 2004 10-Year Assessment

Reference Number	*Completed Additions*	*Planning Zone*
1	Construct an Omro Industrial-Berlin/Omro 69 kV line	1
2	Install 4.1 MVAR capacitor bank at Ripon 69 kV	1
3	Upgrade Rocky Run-Northpoint 115 kV line terminal equipment at Northpoint	1
4	Move 10 MVAR capacitor bank from Highway 8 to Hodag 115 kV	1
5	Rebuild Indian Lake to Glen Jenks to four circuits; two 138 kV, two 69 kV	2
6	Uprate Cedar-Freeman 138 kV line (167 degrees)	2
7	Uprate Freeman-Presque Isle 138 kV line (167 degrees)	2
8	Uprate Presque Isle-Cedar 138 kV line (167 degrees)	2
9	Expand Indian Lake 69 kV to accommodate Indian Lake-Glen Jenks 69 kV line	2
10	Install 16.32 MVAR capacitor bank at Lone Rock	3
11	Retap metering CT at Lodestar 138 kV	4
12	Construct new Fox Energy 345 kV switchyard	4
13	Replace two 800 A line traps at Edgewater 138 kV	4
14	Uprate Morgan-White Clay 138 kV line	4
15	Rebuild Port Washington-Saukville single circuit 138 kV line	5

Of the projects listed in Table II-1, two were needed to accommodate new generation (#12 and 15). One project was needed to accommodate T-D

interconnection requests (#1). Four projects were needed to address chronic transmission service limitations (#5, 9, 13 and 14). The remaining eight projects were needed to address reliability issues.

Figure II-1
Projects Completed Since 2004 10-Year Assessment



Projects Under Construction

ATC is currently constructing or is in the construction planning stage for the following projects:

Table II-2
Projects Currently Under Construction

Construct a tap to Belle Plain from the Badger-Caroline 115 kV line
Install 8.2 and 16.3 MVAR capacitor banks at Council Creek 138 kV
Rebuild Skanawan-Highway 8 115 kV line to double circuit 115 kV
Upgrade Bunker Hill-Pine 115 kV line terminal equipment at Pine
Reconductor Wien-McMillan 115 kV line (ATC, MEWD)
Expand Cranberry 115 kV substation to accommodate new Eagle River municipal distribution transformer
Replace 138/69 kV transformer at Sigel
Construct Hiawatha-Engadine 69 kV line
Rebuild from Nordic to Randville of single-circuit 69 kV line to double-circuit 69 kV
Rebuild and convert one Hiawatha-Indian Lake 69 kV circuit to double-circuit 138 kV standards, string one circuit initially and operate at 69 kV
Construct second Wempletown-Paddock 345 kV circuit; reconfigure the existing Paddock-Rockdale 345 kV circuit
Replace metering CT at Sheboygan Falls 69 kV
Construct a Fox Energy-Forest Junction 345 kV line
Replace 345/138 kV transformer at Edgewater
Rebuild existing West Marinette-Menominee 69 kV line to double-circuit 138/69 kV
Convert Menominee-Rosebush 69 kV line to 138 kV
Rebuild/reconductor Rosebush-Amberg 138 kV line
Rebuild Paris-St. Martins 138 kV line
Construct a Waukesha-Duplainville-Sussex 138 kV line
Rebuild the Port Washington 138 kV switchyard (ring bus) to accommodate IC027 generation
Reconductor Port Washington-Saukville double-circuit 138 kV line
Rebuild Plains-Amberg double-circuit 138 kV line
Construct new Gardner Park 345/115 kV substation
Construct Gardner Park-Stone Lake 345 kV line
Construct a 345 kV switching station at new Sheboygan Energy Center; loop existing Point Beach-Granville line into the new Sheboygan Energy Center switching station
Construct North Appleton 345 kV double-breaker ring bus configuration

Projects with Pending Applications

ATC has filed either CA or CPCN applications with the Public Service Commission of Wisconsin requesting authority to construct several projects. Those projects that are awaiting a PSCW order are listed in Table II-3.

Table II-3
Projects Awaiting Regulatory Approval

Project Description	*In-Service Year*	*Planning Zone*
Rebuild the Morgan-Falls-Pioneer-Stiles 138 kV line	2005	4
Rebuild Turtle-Bristol 69 kV line to 138 kV and operate at 69 kV	2006	3
Construct new line from West Darien to Southwest Delavan at 138 kV, operate at 69 kV	2006	3
Build new breaker and a half 345/138 kV substation on site adjacent to existing North Madison substation and replace existing transformers with two new 500 MVA units	2006	3
Reconfigure 345 kV bus at Columbia	2006	3
Convert Columbia-North Madison 138 kV line to 345 kV	2006	3
Construct Gardner Park-Central Wisconsin 345 kV line	2009	1
Construct Werner West 345/138 kV substation	2006	4
Construct Werner West-Clintonville 138 kV line	2009	4
Construct Werner West 345/138 kV substation	2006	4

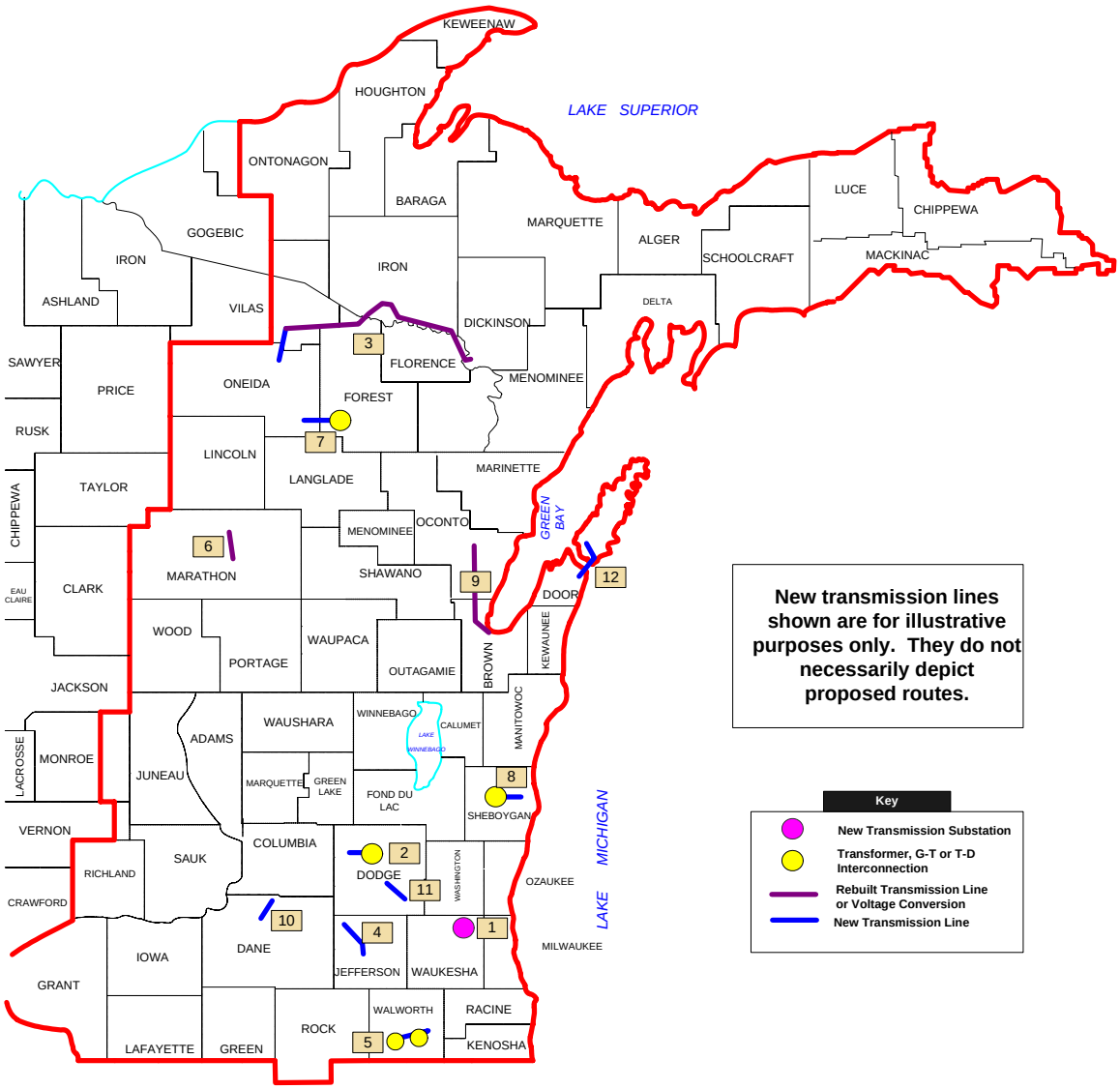
Project Applications to be Filed in 2005

ATC has already filed or expects to file applications with the PSCW during 2005 for the projects listed in Table II-4, and are graphically represented in Figure II-2.

Table II-4
Project Regulatory Filings in 2005

Reference Number	Project Name	Filing	To be filed	In-Service Year
1	Construct Lannon Junction 345/138 kV substation	CA	April	2007
2	Construct North Beaver Dam - East Beaver Dam 138 kV line	CPCN	February	2006
3	Construct Cranberry-Conover 138 kV line and rebuild/convert Conover-Plains 69 kV to 138 kV	CPCN	May	2008
4	Construct Jefferson-Stoney Brook 138 kV line	CPCN	March	2008
5	Construct Southwest Delavan-North Shore-Bristol 138 kV	CPCN	April	2007
6	Rebuild Weston-Sherman St.-Hilltop 115 kV line to double-circuit 115 kV	CA	April	2007
7	Construct Venus-Metonga 115 kV line	CPCN	June	2007
8	Construct double-circuit 138 kV line from Forest Junction -Charter Steel 138 kV line to Plymouth T-D substation	CPCN	3rd quarter	late 2006
9	Rebuild/convert Pulliam-Pioneer 69 kV line to 138 kV	CA	September	2007
10	Construct North Madison-Waunakee 138 kV line	CPCN	September	2008
11	Construct Rubicon-Hustisford 138 kV line	CPCN	October	2008
12	Rebuild Canal-Dunn Road 69 kV line to double-circuit 138-69 kV line	CA	December	2007

Figure II-2
CA OR CPCN PROJECTS
TO BE FILED by ATC IN 2005



<u>Status of Projects</u>

In ATC's Assessment and Updates, projects are identified that address reliability issues, transmission service issues, generation interconnections, distribution interconnections or a combination of two or more of these. In general, these projects address system performance issues related to ATC's system planning criteria. ATC has numerous other projects under way or under evaluation that address other issues including obsolete substation equipment, line facilities in poor condition, line relocations and distribution interconnections that involve less

than one mile of new transmission line construction. The projects discussed in Section III include only those projects addressing system performance issues.

To provide an understanding of the status of the various future projects, ATC developed project status designations for its 2004 10-Year Assessment: *Planned, Proposed* and *Provisional*. These designations are defined as follows:

Planned projects
- planning is complete
- regulatory approvals, if required, have been applied for and are pending approval or orders have been issued
- may be under construction or in the construction planning stage
- typically included in power flow models used to analyze transmission service requests

Proposed projects:
- planning is not complete – alternatives are still being evaluated
- regulatory approvals have not yet been sought
- represents ATC's preliminary preferred project alternatives from a system performance perspective
- typically not included in power flow models used to analyze transmission service requests

Provisional projects:
- planning is not complete
- regulatory approvals have not been sought
- addresses an identified need but does not necessarily represent ATC's preferred project alternative
- not included in power flow models used to analyze transmission service requests

In prior Assessments and Updates, ATC identified or assumed responsibility for approximately 240 projects that address system performance issues. Figure II-3 illustrates the status of all Planned, Proposed and Provisional projects. Regarding Figure II-3, it should be noted that:

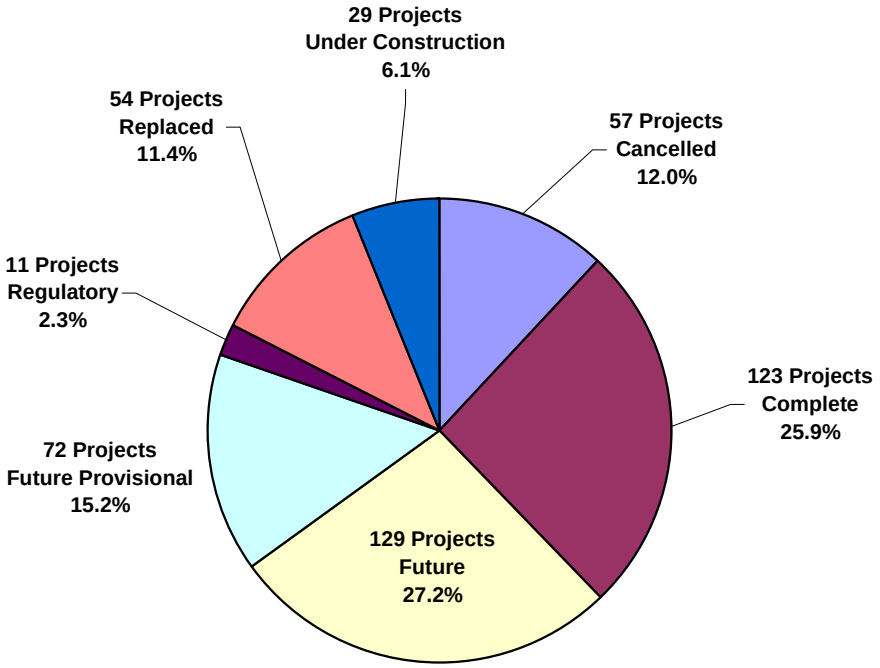
- ATC has completed 123 projects and another 29 are under construction. Notable projects most recently completed are listed earlier in this section. Projects under construction range from capacitor bank installations to the Arrowhead-Gardner Park (Weston) transmission line project.
- More than 50 projects have been replaced with alternate project solutions. It is not unusual for the status of certain projects to change or evolve since customer needs and uses of the transmission system are continually changing.
- ATC cancelled 57 projects that were identified in previous Assessments. These projects were no longer needed due to changing conditions and needs

and up-to-date information. Most of these were relatively minor projects, involving only replacement of equipment at existing substations.

- ATC revised the scopes of over 54 projects that were identified in previous Assessments. This is typically due to changing system and customer needs and system conditions.
- Approximately 200 future projects are in various stages of evaluation or development.

Figure II-3

American Transmission Company - Number of Projects by Status
10-Year Assessments 2001-2004 Update
Planned, Proposed and Provisional Projects



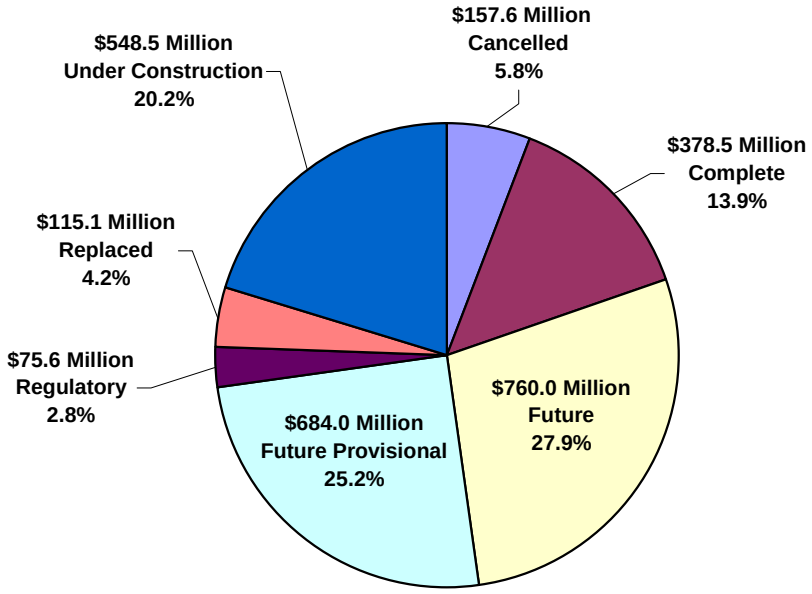
Project Capital Cost Summary

The estimated capital costs for all of the projects reflected in Figure II-3 are shown in Figure II-4. This figure shows that the combined capital costs for projects that are completed, cancelled, replaced, pending regulatory approval, and under construction account for roughly 47 percent of the estimated capital costs, with future projects accounting for the remaining 53 percent. This compares with 59 percent and 41 percent, respectively, from the 2004 10-Year Assessment. However, for this Update ATC is including (Future) Provisional projects, which account for the difference.

The estimated capital costs depicted in Figure II-4 are based only on those projects listed in the previous Assessments that affect system performance. The total estimated capital cost of those projects reported in the 2004 Assessment was approximately $2.1 billion. Other anticipated projects, including substation equipment replacements, pole and conductor replacements, most distribution interconnections, road relocations and generation interconnections not included in the 2004 Assessment, make up the remaining $700 million of the $2.8 billion in capital expenditures that ATC is projecting over the next ten years. The cost estimates included in Figure II-4 do not include estimates for Provisional projects from the 2004 Assessment. It should be noted that with each annual Assessment and Update, the next ten years shift by a year, and projects are being revised, replaced, cancelled and added. Thus, the $2.8 billion in capital expenditures, which has held constant over the last two years, may change with each new 10-Year Assessment period.

Figure II-4

American Transmission Company - Cost of Projects by Status
10-Year Assessments 2001-2004 Update
Planned, Proposed and Provisional Projects



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Section III

CHANGES TO THE 2004 10-YEAR ASSESSMENT

This section describes the changes made by ATC to certain planned, proposed and provisional transmission projects listed in the 2004 Assessment. These changes are based a variety of factors, including regulatory changes, updated information provided by the local distribution companies, up-to-date transmission service requirements, interconnection requests, recent analyses conducted by ATC and input from various stakeholders at ATC-sponsored meetings. The changes in transmission projects proposed by ATC from the 2004 Assessment are summarized in Table III-1 and are reflected in Figures III-1 through III-5 for Zones 1-5, respectively. The entire 2004 Assessment Update project list (2005-2015) is found in Tables III-2 through III-12.

The rationale for several of the project changes listed in Table III-1 is self-explanatory. For certain projects, however, a more detailed description of the changes and rationale for the changes is provided following Figure III-5.

Included in Table III-3 are several projects that are being deferred by ATC that represent projects for which capital costs were planned to be incurred during 2005. Due to resource limitations, these projects are being deferred to 2006. For each of these projects, the risk of deferral has been assessed and determined to be manageable during 2005 by way of special operating procedures.

Table III-1			
Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects to the 2004 10-Year Assessment Update			
PROJECTS CANCELLED	**Former In-Service Date**	**Planning Zone**	**Reason for Removal**
Construct Clear Lake-Arnett Road 115 kV line	2006	1	Customer T-D request resolved with distribution expansion
Construct St. Germain-Boulder Junction 115 kV line	2008	1	Customer T-D request resolved with distribution expansion
Install Antigo capacitor banks	2006	1	Replaced with Summit Lake capacitor banks
Uprate Twin Falls North-South 69 kV bus tie (replace jumpers)	2008	2	Revised load/model/rating information
Convert Straits-St Ignace 69 kV to 138 kV	2013	2	Revised configuration of the planned Mackinac substation
Construct 138 kV bus and install a 138/69 kV, 50 MVA transformer at St Ignace	2013	2	Revised configuration of the planned Mackinac substation
Uprate Academy to Fall River 69 kV line to 72 MVA	2004	3	Another alternative selected (Columbia-Rio)
Reconductor the underground segment of Ramsey-Harbor 138 kV line	2009	5	Generation restudy results
Construct Oak Creek-Racine 345 kV line with 4 mi new structures and conductor, plus convert 9.6 miles 138 kV line KK812 to 345 kV	2014	5	Generation restudy results
Expand Oak Creek 138 kV switchyard to reconnect units #6	2014	5	Generation restudy results
Construct 345 kV Bluemound switchyard to accommodate 1-345 kV line and a 500 MVA 345/138 kV transformer	2014	5	Generation restudy results
Convert and reconductor Oak Creek-Bluemound 230 kV line K862 to 345 kV and loop into Arcadian 345 kV substation	2014	5	Generation restudy results

Table III-1 (continued)			
Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects to the 2004 10-Year Assessment Update			
PROJECTS DEFERRED	**New date**	**Planning Zone**	**Reason for Deferral**
Reconductor Weston-Northpoint 115 kV line	2006	1	Originally 2005; construction outage scheduling
Install 2-16.3 MVAR capacitor banks at Wautoma 138 kV	2007	1	Originally 2006; restudy results
Construct new Mackinac 138 kV substation (replaces 138 kV bus at Straits)	2006	2	Originally 2005; additional design issues to be resolved
Rebuild Nordic-Randville 69 kV line to double circuit 69 kV	2006	2	Originally 2004; additional design issues to be resolved
Rebuild Hiawatha-Indian Lake 69 kV line	early 2006	2	Originally mid-2005; resource limitations and significant capital cost savings by extending construction period
Deferred and Under review: remove Niagara Tap from Plains-Amberg 138 kV line and connect to new line from Plains	2006	2	Originally 2005; changed from *Proposed* to *Provisional*
Construct Columbia-Rio 69 kV line	2006	3	Originally 2005; time & resource constraints
Install 2-16.3 MVAR capacitor bank at Canal 69 kV	2006	4	Originally 2005; additional study results indicated deferral is feasible
Status change of replacement of 138/69 kV transformers at Edgewater, S. Sheboygan Falls and Mullet River	2006	4	Originally 2005; study work complete; changed from *Proposed* to *Planned*
Sussex-Duplainville 138 kV line	August 2005	5	Originally mid-2005; construction delays
Uprate Kansas-Ramsey6 138 kV line	2010	5	Originally 2009; needed for second new unit at Elm Road
Construct Oak Creek-Brookdale 345 kV line	2013	5	Originally 2010; not needed until phase 3 based on revised stability and transmission service studies for new Elm Road generation, status changed from Proposed to Provisional
Construct Oak Creek-St. Martins 138 kV line	2013	5	Originally 2010; needed only if Oak Creek-Brookdale 345 kV line is needed; status changed from Proposed to Provisional
Construct Brookdale-Granville 345 kV line	2013	5	Originally 2010; not needed until phase 3 based on revised stability and transmission service studies for new Elm Road generation; status changed from Proposed to Provisional
Restring Bluemound-Butler 138 kV on Brookdale-Granville 345 kV line	2013	5	Originally 2010; needed only if Brookdale-Granville 345 kV line is needed; status changed from Proposed to Provisional
String new Butler-Tamarack 138 kV on Brookdale-Granville 345 kV line	2013	5	Originally 2010; needed only if Brookdale-Granville 345 kV line is needed; status changed from Proposed to Provisional
Replace 22-138 kV overdutied breakers at Harbor, Everett and Haymarket	2014	5	Originally 2011; status changed from Proposed to Provisional

Table III-1 (continued)			
Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects to the 2004 10-Year Assessment Update			
OTHER PROJECT CHANGES AND POSSIBLE CHANGES	**Date**	**Planning Zone**	**Reason for Change or Update**
Possible acceleration of in-service year of uprate of Weston-Black Brook 115 kV line	2009	1	Originally 2011; may be done in conjunction with Gardner Park-Central Wisconsin 345 kV line project
Arrowhead-Gardner Park capacitor bank changes	2006/8	1	Arrowhead-Gardner Park 345 kV line restudy results
Possible deferral of Iron River-Plains portion of Conover-Iron River-Plains 69 kV line rebuild and conversion to 138 kV	2009	2	Viable from a reliability perspective; would allow for more flexibility in staging construction
Increase Conover 138/69 kV transformer size from 50 MVA to 60 MVA	2009	2	Conform with standard 138/69 kV transformer size
Increase Iron River 138/69 kV transformer size from 50 MVA to 60 MVA	2009	2	Conform with standard 138/69 kV transformer size
Possible acceleration of in-service date of Hiawatha-Pine River-Mackinac 69 kV line conversion to 138 kV	2006	2	Possible acceleration from 2009 to 2006; reduce construction cost as crews will be mobilized in the area
Acceleration of in-service date of string second Hiawatha-Indian Lake 138 kV circuit	2005	2	Possible acceleration from 2009 to 2006; reduce construction cost as crews will be mobilized in the area
Possible acceleration of in-service date of Relocate Rexton 69 kV tap	2006	2	Possible acceleration from 2009 to 2006; reduce construction cost as crews will be mobilized in the area
Possible acceleration of in-service date of Relocate Trout Lake 69 kV tap	2006	2	Possible acceleration from 2009 to 2006; reduce construction cost as crews will be mobilized in the area
Move 36 MVAR capacitor bank installation at Hartford to new Butler Ridge substation (between Hartford and Rubicon)	2005	3	Relocated to Butler Ridge to simplify design and lower capital cost
Updated: Construct new Sugar River-Lincoln-Southeast Fitchburg 138 kV line	2009	3	Originally 2010; additional alternatives and stakeholder input to be considered
Under review: construct new 138 kV bus and install a 138/69 kV transformer at South Lake Geneva	2009	3	Originally 2008; additional alternatives and stakeholder input to be considered
Under review: construct new 138 kV line from South Lake Geneva to White River substation	2009	3	Originally 2008; additional alternatives and stakeholder input to be considered
Under review: construct new 69 kV line from South Lake Geneva to Lake Shore substation	2013	3	Originally 2009; additional alternatives and stakeholder input to be considered
Under review: convert South Lake Geneva to Twin Lakes 69 kV line to 138 kV	2013	3	Additional alternatives and stakeholder input to be considered
Under review; construct new 138 kV from Twin Lakes to Spring Valley	2013	3	Additional alternatives and stakeholder input to be considered
Under review: construct new 138 kV bus and install a 138/69 kV transformer at Sugar River	2009	3	Originally 2010; additional alternatives and stakeholder input to be considered

Table III-1 (continued)			
Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects to the 2004 10-Year Assessment Update			
OTHER PROJECT CHANGES AND POSSIBLE CHANGES (continued)	**Date**	**Planning Zone**	**Reason for Change or Update**
Change second West Middleton-Walnut 69 kV circuit (2012) to new West Middleton-Blount 138 kV circuit in 2014	2014	3	Result of additional analyses done with stakeholder group
Under review: rebuild/convert Pulliam-Pioneer 69 kV line to 138 kV	2007	4	Status changed from *Provisional* to *Proposed*
Possible acceleration of in-service date of rebuild of Crivitz-High Falls double circuit 69 kV line	2009	4	Result of further analyses
Possible deferral of installation of two 16.3 MVAR capacitor banks at Apple Hills 138 kV	2014	4	Result of further analyses
Under review: construct a Northside-City Limits 138 kV line	2014	4	Additional alternatives and stakeholder input to be considered
Possible acceleration of in-service date of a new Ellinwood-Sunset Point 138 kV circuit	2014	4	Additional alternatives and stakeholder input to be considered
Change: Construct double-circuit 138 kV line from Forest Junction/Charter Steel to Howards Grove	2005	4	Originally 2006; customer in-service date accelerated
Change: Rebuilding 2.37 miles of 69 kV from Sunset Point-Pearl Ave with 477 ACSR	2007	4	Originally reconductor; changed to rebuild. Result of detailed structure design investigation
Reconductor the Port Washington-Saukville double-circuit 138 kV line	2005	5	Originally was rebuild/reconductor; now is reconductor project.
Increase capacitor bank installation at Burlington from one 50 MVAR bank to two 27 MVAR banks	2006	5	Conform with standard capacitor bank sizes; deferred from 2005 to 2006 based on resource limitations; customer measures being implemented to allow deferral
Under review: reconfigure 345 kV bus at Pleasant Prairie	2006	5	Originally 2005; may push back to 2006. Additional alternatives and stakeholder input to be considered
Increase capacitor bank installation at Moorland from one 40 MVAR bank to two 27 MVAR banks	2005	5	Conform with standard capacitor bank sizes
Under review: Install 200 MVAR capacitor bank at Bluemound	2006	5	Optimizing location and size of banks
Under review: replace seven 138 kV overdutied breakers at Bluemound	2009	5	Fault model and study results being re-evaluated

Table III-1 (continued)			
Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects to the 2004 10-Year Assessment Update			
NEW PROJECTS	**In-Service Date**	**Planning Zone**	**Reason for Project**
Increase size of Summit Lake cap bank from 11.3 to 16.9 MVAR	2006	1	Result of additional analyses; replaces Antigo capacitor bank
Rebuild Atlantic-Osceola 69 kV line (Laurium #1)	2006	2	Condition, maintenance
Construct a new Brule substation	2007	2	Condition, maintenance
Construct Butler Ridge 138 kV substation	2005	3	New generation interconnection
Rebuild Verona-Oregon 69 kV line	2006	3	Condition
Install a series reactor on Highway V 138 kV	2006	4	Address chronic transmission system limiter
Replace wave trap at White Clay 138 kV	2005	4	Address chronic transmission system limiter
Uprate the North Appleton-Rocky Run 345 kV line	2005	4	Result of the detailed analysis and the decrease in line ratings based on the new ATC standard
Construct North Appleton 345 kV double breaker ring bus configuration	2006	4	Operations, maintenance and stability
Construct Sheboygan Energy Center switching station; loop in Point Beach-Granville 345 kV line	2005	4	New generation interconnection
Construct Forward Energy Center 138 kV substation on the Butternut-South Fond du Lac line	2005	4	New generation interconnection
Construct Cypress 345 kV substation on the Forest Junction-Arcadian line	2005	4	New generation interconnection
Install two 345 kV line terminations at Pleasant Prairie and loop Zion-Arcadian 345 kV line into Pleasant Prairie substation	2013	5	Elm Road generation restudy
Uprate Oak Creek-Root River 138 kV line	2010	5	Elm Road generation restudy
Uprate Oak Creek-Nicholson 138 kV line	2010	5	Elm Road generation restudy
Install a series reactor at Cornell 138 kV	2006	5	Reliability of downtown Milwaukee
Uprate Oak Creek-Ramsey 138 kV line	2009	5	Elm Road generation restudy
Replace relaying on 230 kV circuits at Oak Creek	2009	5	Elm Road generation restudy
Construct 345 kV bus at Bain	2007	5	Reliability

Zone 1

Cancelled Projects

Install capacitor bank at Antigo substation
This project has been replaced with an increase of the Summit Lake capacitor bank. See New Projects below.

Construct Clear Lake-Arnett Road 115 kV line
This project was proposed in response to a request by WPS for a new distribution (T-D) interconnection at a new substation called Arnett Road. Based on further analysis by WPS, they have decided to withdraw this interconnection request and implement a 46 kV distribution solution that still meets their reliability needs for the Woodruff-Lac Du Flambeau area.

Construct St. Germain-Boulder Junction 115 kV line
Included in the withdrawn Arnett Road T-D interconnection request, WPS has determined based on additional analysis that it would be more cost effective to serve this area with a 46 kV system solution used for the Arnett Road project.

Deferred Projects

Reconductor Weston-Northpoint 115 kV line
The in-service date for this project was set to be complete prior to the anticipated extended construction outages needed on the Weston-Rocky Run 345 kV line associated with the Arrowhead-Gardner Park 345 kV line construction. A construction plan has been developed that will no longer require extended construction outages on the Weston-Rocky Run 345 kV line, thus the in-service date for this project has been deferred from 2005 to 2006, which will allow for a more feasible project implementation.

Install two 16.3 MVAR capacitor banks at Wautoma
The in-service date for this project has been changed from 2006 to 2007 based on additional analysis indicating no operating risk if deferred.

Other Project Changes

Possible acceleration of in-service year of uprate of Weston-Black Brook 115 kV line:
The majority of the Weston-Blackbrook line is constructed for 345 kV but operated at 115 kV. The portions not constructed to 345 kV standards are the facilities directly outside of the Weston generating plant. These same facilities also limit this circuit's normal and emergency ratings. ATC has proposed in its application to construct the Gardner Park-Central Wisconsin 345 kV project to construct that project for double-circuit 345 kV along the portion that would parallel the Weston-Blackbrook line. If that application is approved by the PSCW, ATC could effectively eliminate the existing rating limit on the Weston-Blackbrook line and facilitate conversion to 345 kV operation in the future, if warranted. The Gardner Park-Central Wisconsin 345 kV line has a December 2009 in-service

date. Therefore, if the project was implemented as described above, the uprate of the Weston-Blackbrook circuit would be moved up from 2011 to 2009.

Arrowhead-Gardner Park reactive support:
In the 2004 10-Year Assessment, ATC specified that the following capacitor banks would be needed to support the transfer capability target associated with the Arrowhead-Gardner Park project:

- Four 40 MVAR capacitor banks at Arrowhead 230 kV
- Three 75 MVAR capacitor banks at Stone Lake 345 kV
- Six 34 MVAR capacitor banks at Gardner Park 115 kV

Since the release of the 2004 10-Year Assessment, ATC has reassessed the reactive support requirements for the Arrowhead-Gardner Park 345 kV line in an effort to optimize the capacitor size and location. The completed steady state and voltage stability studies indicated the following capacitor installations as the configurations providing the most system benefits:

- Two 75 MVAR capacitor banks at Arrowhead 345 kV
- One 75 MVAR capacitor bank at Stone Lake 345 kV
- Three 50 MVAR capacitor banks at Gardner Park 115 kV
- One new 50 MVAR capacitor bank at Arpin 138 kV

New Projects
Summit Lake capacitor bank: increase size of Summit Lake cap bank from 11.3 to 16.9 MVAR
In the 2004 10-Year Assessment, ATC initially listed a project for a new capacitor bank installation at the Antigo substation. Based on further studies of the Rhinelander Loop, ATC has determined it is more cost effective to increase the size of the existing Summit Lake capacitor bank from 11.3 MVAR to 16.9 MVAR and still address the steady state and voltage stability issues of the Rhinelander Loop. Thus, the Antigo capacitor bank project has been cancelled and a new project to increase the size of the existing Summit Lake capacitor bank has been created.

Zone 2

Cancelled Projects
Uprate Twin Falls North - South 69 kV bus tie
This 2008 provisional project has been cancelled due to the validation of the equipment ratings yielding a higher available rating than previously modeled.

Convert Straits-St. Ignace 69 kV to 138 kV
This 2013 provisional project has been cancelled due to the revised configuration for the proposed Mackinac substation.

Construct 138 kV bus and install a 138/69 kV transformer at St. Ignace
This 2013 provisional project has been cancelled due to the revised configuration for the proposed Mackinac substation.

Deferred Projects
Nordic-Randville 69 kV line
This 2004 planned project has been deferred to 2006 to allow for the resolution of design issues.

Construct new Mackinac 138 kV substation (replaces 138 kV bus at Straits)
This 2005 proposed project has been deferred to 2006 to allow for the resolution of design issues. The initial reason for this project was to improve reliability and maintenance flexibility at the Straits substation. Eventually this substation will facilitate 138 kV plans for the east portion of the Upper Peninsula.

Rebuild Hiawatha-Indian Lake 69 kV line
This mid-2005 planned project has been deferred to early 2006 due to resource limitations and to realize significant capital cost savings by extending the construction period.

Other Project Changes
Reconfigure Niagara Tap
This proposed project for 2005 has changed from proposed to provisional status with a deferral to 2006.

Iron River-Plains 69 kV line rebuild and conversion to 138 kV
This portion of the proposed Conover-Iron River-Plains 69 kV line rebuild and conversion to 138 kV may be deferred from 2008 to allow for more flexibility in the staging of the construction.

Conover 138/69 kV transformer
This 2008 proposed transformer project has changed in capacity from 50 MVA to 60 MVA to conform to ATC 138/69 kV transformer size standards.

Iron River 138/69 kV transformer
This 2008 proposed transformer project has changed in capacity from 50 MVA to 60 MVA to conform to ATC 138/69 kV transformer size standards.

Hiawatha-Pine River-Mackinac 69 kV line conversion to 138 kV
This proposed project may change from 2009 to 2006 to take advantage of reduced construction costs as crews will be mobilized in the area.

Relocate Rexton 69 kV tap
This proposed project may change from 2009 to 2006 to take advantage of reduced construction costs as crews will be mobilized in the area.

Relocate Trout Lake 69 kV tap
This proposed project may change from 2009 to 2006 to take advantage of reduced construction costs as crews will be mobilized in the area.

String second Hiawatha-Indian Lake line
This proposed project may change from 2009 to early 2006 to take advantage of reduced construction costs as crews will be mobilized in the area. The two circuits would be operated at 69 kV and as one circuit, however, until the conversion to 138 kV is completed in 2009.

New Projects
Rebuild Atlantic-Osceola 69 kV line (Laurium #1)
This new 2006 planned project is driven by maintenance and condition issues associated with the existing facilities.

Construct a new Brule substation
This new 2007 planned project is driven by maintenance and condition issues associated with the existing facilities.

Zone 3

Cancelled Projects
Uprate Academy to Fall River 69 kV line
This 2005 project has been cancelled due to the extensive work (total rebuild) required to accomplish this uprate and the fact that the new Columbia to Rio 69 kV line (in service 2006) will eliminate the need for this uprate.

Construct new 69 kV line from Brooklyn/Oregon to Sugar River Substation
See “Southern Dane Region” discussion under “Other Project Changes” discussion below.

Other Project Changes
General
In Zone 3, several alternative selection processes are ongoing. These alternative selection processes, which involve regional studies and cooperative planning with stakeholders, will determine the projects to be implemented in several regions within Zone 3.

Southern Dane Region
Construct New Sugar River-Lincoln-Southeast Fitchburg (Oak Ridge) 138 kV line
This 2009 proposed project has been moved forward to 2009 from 2010. The reason for this change is that the previous suite of projects has been reanalyzed to determine the most optimum combination of projects for the Southern Dane and Northern Rock and Green County region. Numerous problems can be resolved with the rebuild of the Oregon-Verona line in conjunction with a 138/69 kV transformer at the proposed Sugar River substation.

Eastern Walworth/Western Kenosha Counties
The projects currently being contemplated consist of the following:

- construct a new 138 kV line from South Lake Geneva to White River substation;
- construct a new 138 kV bus and install a 138/69 kV transformer at South Lake Geneva;
- construct a new 69 kV line from South Lake Geneva to Lake Shore substation;
- rebuild and convert the South Lake Geneva to Twin Lakes 69 kV line to 138 kV;
- construct a new 138 kV line from Twin Lakes to Spring Valley.

The alternative selection process to assess these provisional projects is anticipated to begin this year. An overarching needs assessment for the region will be performed and performance of various alternatives to address the needs will be conducted.

Hartford/Butler Ridge Capacitor Bank
Continued load growth in Washington County has resulted in chronic low voltage on the transmission system in that area. To allow time for implementation of long-term system additions, two 18 MVAR capacitor banks had been proposed for installation at Hartford. The engineering analysis found space limitations at Hartford. With the nearby planned Butler Ridge substation still in the design stages, it was determined that electrically Butler Ridge was a good site for the capacitor bank installation (one 36 MVAR bank), replacing the Hartford project.

New Projects
Southern Dane County
Rebuild Oregon to Verona 69 kV (line Y119)
This project, in conjunction with the Sugar River to Oak Ridge 138 kV line, replaces the construction of a new 69 kV line from Oregon to Sugar River. The Oregon-Verona line is in poor condition and rebuilding this line will alleviate the maintenance concerns while providing voltage relief in the Oregon and Stoughton areas. Combining this project with the new 138 kV line to Sugar River appears to be the best combination of projects to meet the area needs in a cost-effective manner with the least public impact. Further evaluation is ongoing.

Construct Butler Ridge 138 kV substation
This new substation is required to interconnect the proposed Butler Ridge Wind Farm. This project was anticipated but was not confirmed at the date of the 2004 10-Year Assessment. Since that time a generation interconnection study and a transmission service study have been completed and an Interconnection Agreement has been signed to proceed with the project.

Zone 4

Deferred Projects

Install two 16.3 MVAR capacitor bank at Canal 69 kV (2006)
This project is planned to boost the voltage in the area to acceptable levels and reduce the loading on the 138/69 kV transformer at Canal until additional reinforcements are implemented in the area. Recent additional study results showed that the need/in-service years could be deferred to 2006 without unduly compromising reliable service in the area.

Other Project Changes

Replacement of 138/69 kV transformers at Edgewater, S. Sheboygan Falls and Mullet River (2006)
This proposed project has changed from proposed to planned status. The project would address a number of impending transformer overloads identified in the 2005 analysis. These transformers are scheduled to be replaced prior to the summer 2006.

Rebuild/convert Pulliam-Suamico-Sobieski-Pioneer 69 kV line to 138 kV (2008)
This project has changed from provisional to proposed status. Upon more detailed analysis, ATC has determined that rebuilding/converting the Pulliam-Suamico-Sobieski-Pioneer 69 kV line to 138 kV would provide significant system benefits:

- It would address the condition issue of the Pulliam-Suamico-Sobieski 69 kV line. The vintage of this portion of the line dates back to 1911 and the remaining conductor life is estimated to be zero.
- ATC outage statistics indicated that the Sobieski-Pioneer-Lena-Pound-Crivitz 69 kV line (E-83) is one of the worst performers. The length of Sobieski-Pioneer 69 kV line is roughly one third of the total length of E-83. Thus, the project would reduce the exposure to the outages.
- It would accommodate the potential Suamico T-D interconnection, which would require a new substation due to the size limitation of the existing 69 kV substation.
- It would significantly reduce the potential risk of the widespread power outage that interrupted service for customers in the northeastern Wisconsin and the western Upper Peninsula in 2003.
- It would reduce the uneconomic generation redispatch required during non-peak load conditions.
- It would address the potential Pulliam-Stiles 138 kV line overloads during non-peak periods until the Morgan-Werner West 345 kV line is in place.
- It would provide operational/maintenance flexibility during the replacement of the copper weld shield wire on Pulliam-Stiles 138 kV lines.
- It would provide a network service to Bayport, Suamico and Sobieski, which are radially served from Pulliam under normal conditions.

- It would provide another critical segment of south-north transmission system in northern Wisconsin.

Rebuild of Crivitz-High Falls double circuit 69 kV lines (2009)
The provisional project is currently under investigation. The project had been proposed to address potential overloads on the Crivitz-High Falls 69 kV line or Pioneer-Sandstone 69 kV line, and low voltages at Upper Peshtigo area under single contingency conditions. There is a potential for possible acceleration of in-service date from 2009 to an earlier year.

Installation of two 16.3 MVAR capacitor bank at Apple Hills (2014)
Further investigation is required to assess the need and in-service date of this project. This project was originally proposed in the 2003 10-Year Assessment to address potential low-voltage issues in the Appleton area under the contingency of Apple Hills-North Appleton 138 kV line during certain generation patterns.

Construct North Side-City Limits 138 kV line (2014)
Further investigation is required to assess the need and in-service date of this project. This project was originally proposed in the 2003 10-Year Assessment to address potential line overloads and low voltages in the Appleton area under single contingency conditions during certain generation patterns.

String a new Ellinwood-Sunset Point 138 kV line (2014)
This provisional project is currently under investigation and the in-service date could possibly be accelerated from 2014. The project had been proposed to address potential overloads on the Ellinwood 138/69 kV T1 transformer and Ellinwood-12th 69 kV line under single contingency conditions under certain generation patterns.

Construct double circuit 138 kV line from Forest Junction/Charter Steel to Howards Grove (2005)
The in-service year of the project has been changed from 2006 to 2005 to meet the requested T-D interconnection date. This project interconnects a new Alliant Howards Grove T-D substation with the transmission system.

Rebuilding 2.37 miles of 69 kV line from Sunset Point to Pearl Avenue with 477 ACSR (2007)
Originally, the project involved reconductoring the Sunset Point-Pearl Ave 69 kV line with 477 ACSR with in-service year of 2007. The project has been changed from reconductoring to rebuilding the 69 kV line with 477 ACSR based on more detailed engineering study. The structures are currently at 80-90 percent of their capacity. With the proposed 477 ACSR conductor, only a couple of the structures will be able to support the bigger conductor. The project would address the potential Sunset Point-Pearl Ave 69 kV line overload under single contingency condition.

New Projects

Install a series reactor at Highway V (2006)

The rating of the Highway V-Preble 138 kV line (X-154) is currently limited by the line conductor. The X-154 line is a chronic limiter to transmission service, both presently and in the future. Given the location of this line, rebuilding or reconductoring the line poses complex construction issues. The addition of the series reactor will divert transmission flows on to parallel circuits, permitting greater utilization of the transmission system without significant investment. In the meantime, other advanced technologies are being studied as alternatives to the series reactor at Highway V.

Replace an 800-amp wave trap at White Clay 138 kV (2005)

Upon the completion of the uprate of the White Clay-Morgan 138 kV line (early 2005), a wave trap at White Clay will be the most limiting piece of equipment on this line and results in system limitations under non-peak load conditions. The removal of this limiter will result in reduced line loading under single or double contingency conditions and increased transfer capability between Wisconsin and Michigan.

Uprate the North Appleton-Rocky Run 345 kV line (2005)

Recent review of the rating of the North Appleton-Rocky Run 345 kV line resulted in a significant reduction in its rating (from 679 MVA to 589 MVA, summer emergency). This rating change can result in this line limiting imports into the ATC system and in overloads of the line during non-peak periods once it is looped into the planned Werner West substation in 2006.

Construct North Appleton 345 kV double breaker ring bus configuration (2006)

Currently, this project is under construction with the in-service year of 2006. The project will modify the existing 345 kV bus system into a double breaker ring bus. The project will address the following issues:

- The interconnection study for the Fox Energy 670 MW generation in conjunction with the 43 MW increase of the Kewaunee Nuclear Plant identified numerous system upgrades (system stability and breaker duty) required for the existing system.
- The condition of the existing 345 kV high side circuit switchers (switchers 6815 and 6833) for two of the 345/138 kV transformers at North Appleton are older, difficult to maintain and unreliable.
- Outages for breaker maintenance at North Appleton are very difficult to schedule due to the existing straight bus configuration. Converting the existing 345 kV facilities to the double breaker ring bus configuration will provide operational and maintenance flexibility.

Construct Sheboygan Energy Center switching station and loop the Point Beach-Granville 345 kV line into the new switching station (2005)

A new 300 MW power plant is under construction in Sheboygan County. Interconnection studies have been completed for 300 MW of capacity in 2005. A

transmission service study for the plant output has been completed, and the requested service approved and accepted. ATC will construct the following transmission facilities to support this new generation.

- A new 345 kV switchyard will be located at the power plant site to connect the generators and to connect two 345 kV lines
- ATC will loop the existing Point Beach-Granville 345 kV line into the new switchyard.

Construct Forward Energy Center 138 kV substation on the Butternut-South Fond du Lac 138 kV line (2005)
A new 200 MW wind farm has been proposed in Dodge and Fond du Lac counties with a scheduled in-service date of June 2005. Interconnection studies have been completed for this generation, and transmission service studies for 150 MW of the plant output have been completed. ATC will construct the following transmission facilities to support this new generation.

- A new 138 kV switch yard will be located at the wind farm site to connect the generators and to connect two 138 kV lines
- ATC will loop the existing South Fond du Lac-Butternut 138 kV line into the new switchyard.

Construct Cypress 345 kV substation on the Forest Junction-Arcadian 345 kV line (2005)
A new 160 MW wind farm is planned in Fond du Lac County. A transmission service study for 160 MW of the plant output has been completed, and the requested service approved and accepted. ATC will construct the following transmission facilities to support this new generation.

- A new 345 kV switchyard will be located at the wind farm site to connect the generators and two 345 kV lines
- ATC will loop the existing Forest Junction-Arcadian 345 kV line into the new switchyard.

Zone 5

Cancelled Projects

- *Construct Oak Creek-Racine 345 kV line with 4 miles of new structures and conductor, plus convert 9.6 miles of an existing Oak Creek-Racine 138 kV line to 345 kV*
- *Expand Oak Creek 138 kV switchyard to reconnect unit #6*
- *Construct 345 kV Bluemound switchyard to accommodate one 345 kV line and a 345/138 kV transformer*
- *Convert and reconductor Oak Creek-Bluemound 230 kV line (K862) to 345 kV and loop into Arcadian 345 kV substation*

The four projects above have been cancelled because a re-study of Oak Creek Phases II and III shows these projects are no longer needed. The re-study

consisted of additional stability analysis initiated by the customer's submittal of actual modeling data to replace initial approximate data.

Reconductor underground segment of Ramsey5-Harbor 138 kV line
This project is no longer required because the overload on the underground section of line is resolved by looping this line into the Norwich and Kansas substations. Looping of this line into these two substations provides parallel paths for the power to flow and results in reduced flow on the underground section. This line is to be split at the Norwich terminal (overhead to underground interface) and the overhead section from Ramsey5 rerouted overhead into Norwich Substation creating a Ramsey5-Norwich line. A new short section of overhead line is to be routed from the underground section at the Norwich terminal to the Kansas substation using a vacant position on existing structures creating a Kansas-Harbor line.

Deferred Projects

- *Construct an Oak Creek-Brookdale (Hale) 345 kV line installing 4 miles of new structures, converting 16.2 miles of non-operative 230 kV line and 5 miles of existing 138 kV line.*
- *Construct a Brookdale (Hale) -Granville 345 kV line converting/reconductoring 5.6 miles of existing 138 kV line, rebuilding 7 miles of 138 kV double-circuit tower line and converting/reconductoring 3 miles of 138 kV line on existing 345 kV structures.*
- *Construct Oak Creek-St Martins 138 kV circuit #2 by constructing 4 miles of new line and installing conductor on 12.6 miles conductor on existing towers.*
- *Restring Bluemound-Butler 138 kV line (KK5051) on new 345 kV structures installed with new Brookdale-Granville 345 kV circuit.*
- *Construct Butler-Tamarack (Carmen) 138 kV line on new 345 kV structures installed with Brookdale (Hale) -Granville 345 kV line.*
- *Construct a 345/138 kV switchyard at Brookdale (Hale) to accommodate two 345 kV lines, a 345/138 kV transformer, four 138 kV lines and two 138/26.2 kV transformers.*

The in-service year for the above six projects has been deferred from 2010 to coincide with a third new unit at Oak Creek, assumed to be 2013. This change is due in part to the change in the in-service date of the units at Oak Creek and in part to the results of the re-study conducted for Oak Creek Phases II and III. The restudy shows these projects are not required with the second 650 MW unit (Phase II), but are required with the installation of the third 650 MW unit (Phase III) at Oak Creek. The status of the third new unit at Oak Creek is uncertain at this time. As such, ATC is changing the status of this project from *Proposed* to *Provisional*.

Uprate Kansas-Ramsey6 138 kV line
The need for this project was previously eliminated with the looping of Ramsey5-Harbor line into Norwich and Kansas substations as part of the re-study done for

Oak Creek Phase I. However, the need and in-service date for this project has been reinstated with the re-study done for Oak Creek Phase II. The project has been deferred from 2009 to 2010 because of the deferral of the Oak Creek-Brookdale (Hale)–Granville 345 kV line from Oak Creek Phase II to Phase III.

Replace 22 138 kV overdutied breakers at Harbor, Everett and Haymarket substations
The in-service year for this project has been deferred from 2011 to coincide with the third new unit at Oak Creek – now assumed to be 2013. The short circuit re-study for Phase III of the Oak Creek generation has not been started. The results of this re-study could possibly reduce the number of breakers needing replacement. The status of the third block of generation for Phase III is uncertain at this time. As such, ATC is changing the status of this project from *Proposed* to *Provisional*.

Other Project Changes
Replace seven 138 kV overdutied breakers at Bluemound
The short circuit re-study for Phase I of the Oak Creek generation project is currently under way and could possibly reduce the number of breakers needing replacement. The customer initiated the re-study following reception of actual generator, exciter and governor plus power system stabilizer design data for the proposed units. The change in the actual generator data, coupled with deferral or the elimination of projects associated with Phase I from previous studies, may reduce the need to replace some or all of these breakers.

Port Washington – Saukville Double Circuit Project
The new generation at Port Washington scheduled to be in service in 2005 required the line conductor on all three of the Port Washington 138 kV circuits be replaced with a larger conductor. Preliminary studies called for both the single-circuit and double-circuit lines to be rebuilt. Detailed engineering analysis confirmed the single-circuit line needed to be rebuilt. However, the analysis found that many of the existing structures on the double-circuit line were sufficient for the larger conductors. Fourteen structures on the double-circuit line required replacement.

Burlington capacitor banks
Continued load growth in the Burlington area is resulting in sagging 138 kV bus voltages at Burlington and Tichigan, particularly under contingency conditions. Preliminary studies found 50 MVARs were needed to improve the area voltage. Detailed studies found that two MVAR capacitor banks resulted in more flexibility for system operators. In addition, switching the smaller banks in and out of service caused less system disturbance than larger capacitor banks.

Reconfigure 345 kV bus at Pleasant Prairie
The existing 345 kV bus is comprised of four bus sections connecting two generators, three 345 kV lines and two short line connections to 345/138 kV

transformers at Bain. Bain transformer #5 and Pleasant Prairie generator #2 are connected to Pleasant Prairie bus section #4. If Pleasant Prairie bus breaker 34 should operate, this would isolate generator # 2 on the Bain transformer. While the Bain transformer has a short-term rating capable of handling the output of generator #2, the long-term emergency rating of the transformer requires the generator back down significantly. Several alternatives are under consideration for a long-term solution. Some of the possibilities include moving the Racine 345 kV line to Pleasant Prairie bus section #4 and Bain transformer #5 to Pleasant Prairie bus section #3. A second alternative is converting the Pleasant Prairie 345 kV straight bus to a ring bus. Other alternatives include building a 345 kV bus at Bain.

Moorland capacitor banks
Contingency analysis has determined an outage of the Arcadian-Moorland 138 kV line at time of system peak will result in unacceptably low voltage. Preliminary studies found 50 MVARs were needed to improve the area voltage. Detailed studies found that 2 27 MVAR capacitor banks would result in less voltage flicker during switching procedures and provided more flexibility for system operators.

Bluemound capacitors
System studies have shown that the voltage on the Bluemound 230kV bus at time of system peak can be below 95 percent under intact system conditions. However, the Bluemound 138kV bus voltage remains above 95 percent. The low 230 kV voltage points out a need for additional VAR support in the area. Installing 200 MVARs of capacitors at Bluemound is a provisional project. A more comprehensive VAR support plan is needed for the greater Milwaukee area. Installing capacitors at Bluemound would be a part of the overall VAR support plan.

New Projects
Uprate Oak Creek-Root River 138 kV line
Uprate Oak Creek-Nicholson 138 kV line
Uprate Oak Creek-Ramsey6 138 kV line

The three projects listed above have been added because of the re-study results for Oak Creek Phase II. The re-study results show the Oak Creek-Brookdale (Hale)-Granville 345 kV proposed for Phase II was not required until Phase III. Consequently, the above three 138 kV lines need to be uprated in Phase II to eliminate overloads on these lines.

Install two 345 kV lines terminating at Pleasant Prairie and loop Zion-Arcadian 345 kV line into Pleasant Prairie Substation.
The above project has been added because of the re-study results for Oak Creek Phase III. The re-study results show this project is required for stability purposes

for Phase III. This project is a part of the preferred plan of three alternative plans studied for Phase III. Another six projects associated with the Oak Creek-Brookdale (Hale)-Granville 345 kV line, which was deferred from Phase II to Phase III, form the remainder of the preferred plan. The status of Phase III is uncertain at this time. As such, ATC is showing the status of this project as *Provisional*.

Cornell reactor
The downtown area of Milwaukee is served by 138 kV underground lines. Underground lines inherently have low impedance resulting in heavier flows. Because of the heavy flows, the transmission system is normally operated open between Cornell and Center substations. While this reduces heavy flows in the area, it also reduces the reliability of the area by creating radial systems. Installing a series reactor on the Cornell-Fiebrantz-Center 138 kV line will increase the line impedance significantly, reducing power flow, and enabling operating the line normally closed. This will improve the reliability of the area transmission system. This project is scheduled to be in service for summer 2006.

Table III-2
Transmission System Additions for 2005

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Capital Cost Estimate (in Millions)
Install16.3 MVAR capacitor bank at Council Creek 138 kV and increase size of existing 69 kV capacitor from 5.4 MVAR to 10.8 MVAR	2004	2005	1	reliability	Planned	2.3
Rebuild Skanawan-Highway 8 115 kV line to double-circuit 115 kV	2005	2005	1	reliability	Planned	8.9
Upgrade Bunker Hill-Pine 115 kV line terminal equipment at Pine	2005	2005	1	reliability	Planned	0.5
Reconductor Wien-McMillan 115 kV line (ATC,MEWD)	2005	2005	1	reliability	Planned	3
Expand Cranberry 115 kV substation to accommodate New Eagle River Muni distribution transformer	2005	2005	1	T-D interconnection	Planned	0.3
Replace 138/69 kV transformer at Sigel	2008	2005	1	reliability, condition	Planned	1
Construct Hiawatha-Engadine 69 kV line	2004	2005	2	reliability	Planned	0
Rebuild and convert one Hiawatha-Indian Lake 69 kV circuit to double-circuit 138 kV standards, string one circuit initially and operate at 69 kV	2004	2005	2	reliability, service limitation	Planned	18
Construct second Wempletown-Paddock 345 kV circuit; reconfigure the existing Paddock-Rockdale 345 kV circuit	2005	2005	3	reliability, service limitation	Planned	5.6
Uprate Portage-Columbia double-circuit 138 kV line terminal equipment	2004	2005	3	reliability	Planned	0.4
Uprate North Lake Geneva to Lake Geneva 69 kV line to 72 MVA	2004	2005	3	reliability	Proposed	0.1
Uprate Brick Church to Walworth 69 kV line to 48 MVA	2004	2005	3	reliability	Proposed	0.1
Uprate Colley Road to Brick Church 69 kV line to 72 MVA	2004	2005	3	reliability	Proposed	0.1
Uprate Brick Church to Katzenberg 69 kV line to 93 MVA	2004	2005	3	reliability	Proposed	0.1
Uprate Lone Rock to Spring Green 69 kV line to 72 MVA	2004	2005	3	reliability	Proposed	0.1

Table III-2
Transmission System Additions for 2005 (continued)

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Capital Cost Estimate (in Millions)
Uprate Sun Prairie to Gaston Road 69 kV line to 48 MVA	2004	2005	3	reliability	Proposed	0.1
Uprate Lewiston to Kilbourn 138 kV line to 286 MVA	2004	2005	3	reliability	Proposed	0.1
Uprate North Beaver Dam to South Beaver Dam 69 kV line to 72 MVA	2004	2005	3	reliability	Proposed	0.1
Uprate South Beaver Dam to Juneau 69 kV line to 72 MVA	2004	2005	3	reliability	Proposed	0.1
Uprate Colorado to Sun Prairie 69 kV line to 72 MVA	2004	2005	3	reliability	Proposed	0.1
Construct 138 kV bus at Kegonsa and terminate both Christiana-Fitchburg circuits into Kegonsa	2005	2005	3	reliability, new generation	Planned	6.5
Uprate Dane to Waunakee and Waunakee to Huiskamp 69 kV lines	2004	2005	3	reliability	Proposed	0.75
Uprate West Middleton-Pheasant Branch 69 kV line	2004	2005	3	reliability	Proposed	1.0
Construct Butler Ridge substation	2005	2005	3	new generation	Planned	1.9
Replace 200 A metering CT at Sheboygan Falls 69 kV	2003	2005	4	reliability	Planned	0.1
Construct a tap to Belle Plain from the Badger-Caroline 115 kV line	2004	2005	4	T-D interconnection	Planned	1.1
Replace an 800 A wave trap at White Clay 138 kV	2005	2005	4	reliability	Planned	0.1
Uprate the North Appleton-Rocky Run 345 kV line	2005	2005	4	reliability	Planned	1.1
Rebuild the Morgan-Falls-Pioneer-Stiles 138 kV line	2003	2005	4	service limitation, facility condition	Proposed	6.3

Table III-2
Transmission System Additions for 2005 (continued)

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Capital Cost Estimate (in Millions)
Construct a Fox Energy-Forest Junction 345 kV line	2005	2005	4	new generation	Planned	4.5
Replace 345/138 kV transformer at Edgewater	2005	2005	4	reliability	Planned	3.5
Rebuild existing West Marinette-Menominee 69 kV line to double-circuit 138/69 kV	2005	2005	4	reliability, service limitation	Planned	6.9
Convert Menominee-Rosebush 69 kV line to 138 kV	2005	2005	4	reliability, service limitation	Planned	11.4
Rebuild/reconductor Rosebush-Amberg 138 kV line	2005	2005	4	reliability, service limitation	Planned	6.8
Construct double-circuit 138 kV line from Forest Junction/Charter Steel to Howards Grove	2005	2005	4	T-D interconnection	Planned	8.2
Construct a 138 kV substation at a new Forward Energy Center; loop existing Butternut-South Fond du Lac line into Forward Energy Center	2005	2005	4	new generation	Proposed	3.2
Construct a 345 kV substation at new Cypress; loop existing Forest Junction-Arcadian line into new Cypress	2005	2005	4	new generation	Planned	5.3
Construct a 345 kV switching station at new Sheboygan Energy Center; loop existing Point Beach-Granville line into new Sheboygan Energy Center	2005	2005	4	new generation	Planned	6.8
Install 1-36 MVAR capacitor bank at Butler Ridge 138 kV	2005	2005	5	reliability	Planned	1.2
Rebuild Paris-St. Martins 138 kV line	2005	2005	5	reliability, condition	Planned	4.5
Construct a Waukesha-Duplainville-Sussex 138 kV line	2005	2005	5	T-D interconnection	Planned	11.3

Table III-2
Transmission System Additions for 2005 (continued)

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Capital Cost Estimate (in Millions)
Rebuild the Port Washington 138 kV switchyard (ring bus) to accommodate IC027 generation	2005	2005	5	new generation	Planned	6.5
Reconductor Port Washington-Saukville Double-circuit 138 kV line	2005	2005	5	new generation	Planned	2.0
Install 2-27 MVAR capacitor bank at Moorland 138 kV	2004	2005	5	reliability	Planned	0.7
Rebuild Plains-Amberg double circuit 138 kV line	1996	2005	2 & 4	reliability, service limitation, condition	Planned	13.5

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Table III-3
Transmission System Additions for 2006

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Capital Cost Estimate (in Millions)
Reconductor Weston-Northpoint 115 kV line	2005	2006	1	achieve transfer capability associated with Arrowhead-Gardner Park, reliability, new generation	Planned	4.0
Uprate Metomen-N Fond du Lac 69 kV line terminal equipment	2006	2006	1	reliability	Proposed	0.3
Construct new Gardner Park 345/115 kV substation	2006	2006	1	service limitation, reliability, import capability and Weston stability	Planned	Included in Arrowhead-Gardner Park estimate
Replace 345/115 kV 200 MVA transformer at Weston with two 500 MVA units at the Gardner Park substation	2005	2006	1	service limitation, reliability, import capability and Weston stability	Planned	Included in Arrowhead-Gardner Park estimate
Construct Gardner Park-Stone Lake 345 kV line	1997	2006	1	service limitation, reliability, import capability and Weston stability	Planned	262.1
Install a 345/161 kV transformer at Stone Lake (temporary installation for construction outages)	2006	2006	1	reliability	Planned	Included in Arrowhead-Gardner Park estimate
Upgrade Weston-Kelly 115 kV line conductor clearances to 300F	2006	2006	1	new generation, reliability	Planned	1.7
Install 3-50 MVAR capacitor banks at Gardner Park 115 kV	2006	2006	1	achieve transfer capability associated with Arrowhead-Gardner Park	Proposed	Included in Arrowhead-Gardner Park estimate
Increase size of existing Summit Lake 115 kV capacitor bank from 11.3 to 16.9 MVAR	2006	2006	1	reliability	Proposed	1.0

Table III-3
Transmission System Additions for 2006 (continued)

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Capital Cost Estimate (in Millions)
Rebuild Atlantic-Osceola 69 kV line (Laurium #1)	2006	2006	2	reliability, condition	Planned	3.0
Rebuild from Nordic to Randville substation (5 miles) of single-circuit 69 kV line to double-circuit 69 kV	2005	2006	2	reliability, condition	Planned	1.6
Remove Niagara Tap from 138 kV Plains-Amberg line and connect to new 138 kV line from Plains	2005	2006	2	reliability, operations	Provisional	1.6
Construct Mackinac 138 kV substation (new Straits substation)	2005	2006	2	reliability, service limitation	Proposed	5
Install 2-5.4 MVAR capacitor banks at Iron River 69 kV	2005	2005	2	reliability	Proposed	0.7
Construct new 69 kV line from Columbia to Rio to feed the proposed Wyocena substation	2004	2006	3	T-D interconnection, reliability	Planned	1.3
Rebuild Turtle-Bristol 69 kV line to 138 kV and operate at 69 kV	2004	2006	3	condition, reliability, new generation	Planned	5.9
Construct new line from West Darien to Southwest Delavan at 138 kV, operate at 69 kV	2005	2006	3	T-D interconnection	Planned	4.3
Construct new line from Southwest Delavan to Delavan or Bristol at 138 kV, operate at 69 kV	2005	2006	3	T-D interconnection	Proposed	4.3

Table III-3
Transmission System Additions for 2006 (continued)

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Capital Cost Estimate (in Millions)
Build new breaker and a half 345/138 kV substation on site adjacent to existing North Madison substation and replace existing transformers with two new 500 MVA units	2006	2006	3	reliability, new generation	Planned	19.0
Reconfigure 345 kV bus at Columbia	2006	2006	3	reliability, new generation	Planned	3.3
Convert Columbia-North Madison 138 kV line to 345 kV	2005	2006	3	reliability, new generation	Planned	6.0
Install 2-16.3 MVAR capacitor bank at Canal 69 kV	2006	2006	4	reliability	Planned	1.1
Construct a 345/138 kV switchyard at a new Werner West SS; 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	2004	2006	4	reliability, service limitation	Proposed	13.5
Replace the two existing 33 MVA 138/69 kV transformers at Edgewater with two 60 MVA transformers	2003	2006	4	reliability	Planned	2.4
Replace the existing 46.7 MVA 138/69 kV transformer at South Sheboygan Falls with 100 MVA transformer	2003	2006	4	reliability	Planned	1.3
Replace the existing 46.7 MVA 138/69 kV transformer at Mullet River with 100 MVA transformer	2003	2006	4	reliability	Planned	1.3
Construct a Martin Road-South Fond du Lac/Ohmstead 138 kV line	2006	2006	4	T-D interconnection	Planned	1.6
Construct North Appleton 345 kV double breaker ring bus configuration	2006	2006	4	operations, maintenance and stability	Planned	8.4
Install a series reactor at Highway V 138 kV	2004	2006	4	reliability, service limitation	Proposed	1.5
Install 200 MVAR capacitor bank at Bluemound	2006	2006	5	reliability	Provisional	4

Table III-3
Transmission System Additions for 2006 (continued)

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Capital Cost Estimate (in Millions)
Install 2-27 MVAR capacitor banks at Burlington 138 kV	2005	2006	5	reliability	Proposed	1.0
Reconfigure 345 kV bus at Pleasant Prairie	2004	2006	5	reliability	Proposed	0.4
Install series reactor at Cornell	2006	2006	5	reliability, service limitation	Proposed	1.2
Rebuild Stiles-Amberg double-circuit 138 kV line	1996	2006	2 & 4	reliability, service limitation, condition	Planned	20.0

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New to this 10-Year Assessment

Table III-4
Transmission System Additions for 2007

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Capital Cost Estimate (in Millions)
Install 2-16.3 MVAR capacitor banks at Wautoma 138 kV	2007	2007	1	reliability	Proposed	0.5
Construct Venus-Metonga 115 kV line	2007	2007	1	T-D interconnection	Proposed	5.0
Rebuild Weston-Sherman St. and Sherman St-Hilltop 115 kV lines as double circuits with a new Weston-Hilltop 115 kV line	2007	2007	1	new generation, reliability	Proposed	7.5
Relocate Cedar substation (North Lake)	2005	2007	2	reliability, condition	Proposed	9.5
Construct a new Brule substation	2007	2007	2	reliability, condition	Proposed	4.2
Rebuild Verona-Oregon 69 kV line Y119	2007	2007	3	reliability	Proposed	5.0
Uprate Rockdale to Jefferson 138 kV line	2007	2007	3	reliability, service limitation	Planned	0.3
Uprate Rockdale to Boxelder 138 kV line	2007	2007	3	reliability, service limitation	Planned	0.3
Construct a Jefferson-Lake Mills-Stony Brook 138 kV line	2006	2007	3	reliability, T-D interconnection	Proposed	11.3
Convert Kegonsa-McFarland-Femrite 69 kV line to 138 kV	2007	2007	3	reliability, new generation	Proposed	3.4
Construct Sprecher-Femrite 138 kV line	2007	2007	3	reliability, new generation	Proposed	7.4
Install 138/69 kV transformer at Femrite	2007	2007	3	reliability, new generation	Proposed	3.5
Install 138/69 kV transformer at Reiner	2007	2007	3	reliability, new generation	Proposed	3.5
Convert Sycamore-Reiner-Sprecher from 69 kV to 138 kV	2007	2007	3	reliability	Proposed	2.5
Construct double-circuit 138 kV line from Forest Junction/Howards Grove/Charter Steel to Plymouth #4	2007	2007	4	T-D interconnection	Proposed	3.5
Uprate North Appleton-Lawn Rd-White Clay 138 kV line	2007	2007	4	reliability	Planned	0.5
Rebuild 2.37 miles of 69 kV from Sunset Point to Pearl Ave with 477 ACSR	2007	2007	4	reliability	Proposed	0.8
Construct 138 kV line from Canal to Dunn Rd	2007	2007	4	reliability	Proposed	4.2
Install 60 MVA 138/69 kV transformer at Dunn Rd	2007	2007	4	reliability	Proposed	2.2

Table III-4
Transmission System Additions for 2007 (continued)

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Capital Cost Estimate (in Millions)
Rebuild/convert Pulliam-Pioneer 69 kV line to 138 kV	2007	2007	4	reliability, service limitation	Proposed	23.5
Construct a 345 kV bus at Bain	2005	2007	5	reliability	Provisional	3.0
Construct a new Lannon Junction substation at intersection of Granville-Arcadian 345 kV, Forest Junction-Arcadian 345 kV, Sussex-Tamarack 138 kV and Sussex-Germantown 138 kV lines; install a 345/138 kV, 500 MVA transformer	2007	2007	5	reliability	Proposed	17.7

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

Table III-5
Transmission System Additions for 2008

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Capital Cost Estimate (in Millions)
Upgrade Kelly-Whitcomb 115 kV line conductor clearances to 300F	2008	2008	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned	1.1
Construct Stone Lake-Arrowhead 345 kV line	1997	2008	1	service limitation, reliability, import capability and Weston stability	Planned	158.2
Install two 75 MVAR capacitor bank at Arrowhead 230 kV	2008	2008	1	achieve transfer capability associated with Arrowhead-Gardner Park	Proposed	Included in Arrowhead-Gardner Park estimate
Install one 75 MVAR capacitor bank and one 45 MVAR inductor at Stone Lake 345 kV	2008	2008	1	achieve transfer capability associated with Arrowhead-Gardner Park	Proposed	Included in Arrowhead-Gardner Park estimate
Install one 50 MVAR capacitor bank at Arpin	2008	2008	1	achieve transfer capability associated with Arrowhead-Gardner Park	Proposed	Included in Arrowhead-Gardner Park estimate
Construct the new permanent Stone Lake 345/161 kV substation	2008	2008	1	reliability, import capability and Weston stability	Proposed	6
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Berlin 69 kV	2008	2008	1	reliability	Provisional	0.4
Install second 345/138 kV transformer at Plains	2008	2008	2	reliability	Provisional	4.6
Install/upgrade capacitor bank at South Monroe 69 kV to 24 MVAR	2008	2008	3	reliability	Proposed	0.5
Construct a Rubicon-Hustisford 138 kV line	2008	2008	3	reliability	Proposed	4.8
Rebuild Hustisford-Horicon 69 kV to 138 kV	2008	2008	3	reliability	Proposed	2.7
Construct 138/69 kV substation at a site near Horicon and install a 138/69 kV transformer	2008	2008	3	reliability	Proposed	2.8

Table III-5
Transmission System Additions for 2008 (continued)

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Capital Cost Estimate (in Millions)
Convert Rock River to Bristol to Elkhorn 138 kV operation; rebuild Bristol with a new 138 kV bus	2008	2008	3	reliability	Proposed	5.5
Construct a new 138 kV line from North Madison to Waunakee	2005	2008	3	reliability	Proposed	6.5
Construct a new 138/69 kV substation near Waunakee and install a 100 MVA 138/69 kV transformer	2005	2008	3	reliability	Proposed	1.0
Install capacitor banks at Richland Center 69 kV	2008	2008	3	reliability	Provisional	0.5
Install capacitor banks at Muscoda 69 kV	2008	2008	3	reliability	Provisional	0.5
Reconductor Pulliam- Danz 69 kV line	2008	2008	4	reliability	Proposed	2.2
Reconductor Danz-Henry Street 69 kV line	2008	2008	4	reliability	Proposed	0.1
Reconductor Pulliam-Van Buren 69 kV line	2008	2008	4	reliability	Proposed	0.1
Expand the Menominee 69 kV substation and install 138 kV terminals. Loop the West Marinette-Bay De Noc 138 kV line into the substation	2008	2008	4	reliability	Proposed	0.1
Install 138/69 kV transformer at the expanded Menominee substation	2008	2008	4	reliability	Proposed	0.1
Reconductor Pleasant Valley-Saukville 138 kV line	2008	2008	5	new generation	Proposed	3
Reconductor Pleasant Valley-St Lawrence 138 kV line	2008	2008	5	new generation	Proposed	2.8
Reconductor Cornell-Range Line 138 kV line	2008	2008	5	new generation	Proposed	6.0
Construct Cranberry-Conover 138 kV line	2008	2008	1 & 2	reliability, transfer capability	Proposed	7.0
Install 138/115 kV 150 MVA transformer at Cranberry	2008	2008	1 & 2	reliability, transfer capability	Proposed	2.8
Rebuild/convert Conover-Iron River-Plains 69 kV line to 138 kV	2008	2008	1 & 2	reliability, transfer capability	Proposed	27.0

Table III-5
Transmission System Additions for 2008 (continued)

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Capital Cost Estimate (in Millions)
Construct 138 kV bus and install a 138/69 kV, 60 MVA transformer at Conover	2008	2008	1 & 2	reliability, transfer capability	Proposed	2.9
Construct 138 kV bus and install a 138/69 kV, 60 MVA transformer at Iron River	2008	2008	1 & 2	reliability, transfer capability	Proposed	2.9

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New to this 10-Year Assessment

Table III-6
Transmission System Additions for 2009

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Capital Cost Estimate (in Millions)
Replace 138/69 kV transformer at Metomen	2009	2009	1	reliability	Provisional	2.0
Construct Gardner Park-Central Wisconsin 345 kV line	2009	2009	1	service limitation, reliability, import capability and Weston stability	Proposed	86.6
Construct new Central Wisconsin 345 kV substation	2009	2009	1	service limitation, reliability, import capability and Weston stability	Proposed	10.5
Uprate Saratoga-Baker 115 kV line terminal equipment at Saratoga	2009	2009	1	reliability	Provisional	0.1
Construct Monroe County-Council Creek 161 kV line	2009	2009	1	access initiative, reliability	Provisional	16.7
Install a 161/138 kV transformer at Council Creek	2009	2009	1	access initiative, reliability	Provisional	2.5
Uprate Council Creek-Petenwell 138 kV line	2009	2009	1	access initiative, reliability	Provisional	4.4
Rebuild/reconductor Petenwell-Saratoga 138 kV line	2009	2009	1	access initiative, reliability	Provisional	7.6
Relocate 69 kV Rexton tap to 69 kV Hiawatha-Pine River line (6909)	2009	2009	2	condition	Proposed	0.3
Relocate 69 kV Trout Lake tap to 69 kV Hiawatha-Pine River line (6909)	2009	2009	2	condition	Proposed	0.3
Construct Mackinac 138 kV substation additions (portions may be earlier for maintenance issues)	2009	2009	2	reliability, service limitation	Proposed	1.9
Rebuild Hiawatha-Pine River-Mackinac 69 kV to 138 kV	2009	2009	2	reliability, condition	Proposed	40.1

Table III-6
Transmission System Additions for 2009 (continued)

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Capital Cost Estimate (in Millions)
Construct 138 kV bus and install two 138/69 kV, 50 MVA transformers at Pine River	2009	2009	2	reliability	Proposed	6.1
String second Hiawatha-Indian Lake 138 kV circuit on existing structures	2009	2009	2	reliability, service limitation	Planned	0.2
Convert rebuilt Hiawatha-Indian Lake circuit (operated at 69 kV) to 138 kV	2009	2009	2	reliability, service limitation	Planned	2.1
Construct 138 kV ring bus at Hiawatha SS	2009	2009	2	reliability, service limitation	Planned	1.9
Install 138 kV substation modifications at Indian Lake substation	2009	2009	2	reliability, service limitation	Planned	1.9
Construct new 138 kV bus and install a 138/69 kV 100 MVA transformer at South Lake Geneva	2009	2009	3	reliability	Provisional	6.0
Construct new 138 kV line from South Lake Geneva to White River	2009	2009	3	reliability, T-D interconnection	Provisional	6.0
Construct new 138 kV bus and 138/69 kV 100 MVA transformer at Sugar River substation	2009	2009	3	reliability	Provisional	1.4
Construct new Sugar River-Lincoln-Southeast Fitchburg 138 kV line	2009	2009	3	reliability	Provisional	5.1
Install a second 138/69 kV transformer at Hillman	2009	2009	3	reliability	Proposed	3.9
Install a 69 kV 16.32 MVAR capacitor bank at Kilbourn Substation	2009	2009	3	reliability	Provisional	0.5
Rebuild Crivitz-High Falls 69 kV double-circuit line	2009	2009	4	reliability	Provisional	5.6
Install 28.8 MVAR capacitor bank at Butternut 138 kV	2009	2009	4	reliability	Proposed	1
String a new 138 kV line from Clintonville-Werner West primarily on Morgan-Werner West 345 kV structures	2004	2009	4	reliability, service limitation	Proposed	Included in Morgan-Werner estimate

Table III-6
Transmission System Additions for 2009 (continued)

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Capital Cost Estimate (in Millions)
Construct Morgan-Werner West 345 kV line	2004	2009	4	reliability, service limitation	Proposed	99.7
Reconductor Oak Creek-Ramsey 138 kV line	2009	2009	5	new generation	Proposed	0.4
Reconductor Oak Creek-Allerton 138 kV line	2009	2009	5	new generation	Proposed	2.0
Replace relaying on 230 kV circuits at Oak Creek	2009	2009	5	new generation	Proposed	3.0
Loop Ramsey5-Harbor 138 kV line into Norwich and Kansas to form a new line from Ramsey-Norwich and Harbor-Kansas 138 kV lines	2009	2009	5	new generation	Provisional	4.1
Expand Oak Creek 345 kV switchyard to interconnect one new generator	2009	2009	5	new generation	Proposed	18.8
Install two 345 kV series breakers at Pleasant Prairie on lines to Racine (L631) and Zion (L2221)	2009	2009	5	new generation	Proposed	2.1
Replace seven 138 kV overdutied breakers at Bluemound	2009	2009	5	new generation	Proposed	2.4
Replace two 345 kV circuit breakers at Pleasant Prairie on the Racine and Zion lines with IPO breakers and upgrade relaying	2009	2009	5	new generation	Proposed	2.1
Construct Rockdale-Concord 345 kV line in parallel with existing 138 kV on existing double-width right-of-way	2007	2009	3 & 5	reliability, service limitation	Proposed	46.5
Construct a 345 kV bus and install a 345/138 kV, 500 MVA transformer at Concord	2007	2009	3 & 5	reliability	Proposed	6.1

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New to this 10-Year Assessment

Table III-7
Transmission System Additions for 2010

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Capital Cost Estimate (in Millions)
Uprate Wautoma-Berlin 69 kV line terminal equipment at Wautoma	2010	2010	1	reliability	Provisional	0.1
Install a 69 kV bus and 138/69 kV 100 MVA transformer at Northwest Beloit	2010	2010	3	reliability	Provisional	2.0
Reroute Paddock to Shirland Avenue 69 kV line into and out of Northwest Beloit	2010	2010	3	reliability	Provisional	0.5
Loop the Femrite to Royster 69 kV line into AGA Gas	2010	2010	3	reliability	Provisional	1.5
Convert Hillman to Eden 69 kV line to 138 kV	2010	2010	3	reliability	Proposed	13.0
Reconnect the 138/69 kV transformers at Kilbourn on separate breakers to operate individually and replace the 47 MVA transformer with a 93 MVA transformer	2010	2010	3	reliability	Provisional	2.0
Rebuild Brodhead to South Monroe 69 kV line using 477 ACSR	2010	2010	3	reliability	Provisional	4.0
Install a second 138/69 kV transformer at North Monroe	2010	2010	3	reliability	Provisional	2.0
Convert Waunakee-Blount 69 kV line to 138 kV	2010	2010	3	reliability	Proposed	20.0
Expand 345 kV to 6 positions at Paddock	2010	2010	3	Access initiative	Provisional	1.5
Expand 138 kV to 7 positions at Paddock	2010	2010	3	Access initiative	Provisional	0.8
Install second 345/138 kV transformer at Paddock (500 MVA normal/625 MVA emergency)	2010	2010	3	Access initiative	Provisional	3.0
Rebuild Paddock-Town Line Road 138 kV to double circuit 1600 Amps minimum summer emergency each	2010	2010	3	Access initiative	Provisional	5.5

Table III-7
Transmission System Additions for 2010 (continued)

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Capital Cost Estimate (in Millions)
Reconductor Town Line Road-Russell 138 kV to 1600 Amps minimum summer emergency	2010	2010	3	Access initiative	Provisional	2.3
Rebuild/convert New Holstein-St Nazianz-Custer-Lakefront to 138 kV (1225 Amps minimum)	2010	2010	4	Access initiative	Provisional	7.7
Rebuild Tecumseh Rd-New Holstein to Double-circuit 138/69kV, where 69kV will serve Gravesville via New Holstein	2010	2010	4	Access initiative	Provisional	2.4
Install 47 MVA 138/69 kV transformer at Custer	2010	2010	4	Access initiative	Provisional	3.1
Install 100 MVA 138/69 kV transformer at Lakefront	2010	2010	4	Access initiative	Provisional	2.5
Uprate Kansas-Ramsey6 138 kV line	2009	2010	5	new generation	Proposed	0.1
Install second 500 MVA 345/138 kV transformer at Oak Creek	2010	2010	5	new generation	Proposed	8.4
Expand 345 kV switchyard at Oak Creek to interconnect one new generator	2010	2010	5	new generation	Proposed	4.2
Uprate Oak Creek-Root River 138 kV line	2010	2010	5	new generation	Proposed	0.4
Uprate Oak Creek-Nicholson 138 kV line	2010	2010	5	new generation	Proposed	1.2
Convert Bark River-Lannon Junction 138 kV line to 345 kV	2009	2010	3 & 5	reliability, new generation	Proposed	0.6
Construct a Concord-Bark River 345 kV line	2009	2010	3 & 5	reliability, new generation	Proposed	33.6
Construct a 345 kV bus and install a 345/138 kV, 500 MVA transformer at Bark River	2009	2010	3 & 5	reliability, new generation	Proposed	6.1

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New to this 10-Year Assessment

Table III-8
Transmission System Additions for 2011

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Capital Cost Estimate (in Millions)
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Ripon 69 kV	2011	2011	1	reliability	Proposed	0.4
Uprate Weston-Black Brook 115 kV line – scope TBD	2011	2011	1	reliability	Provisional	1.5
Construct 345 kV line from Rockdale to West Middleton	2011	2011	3	reliability	Proposed	38.4
Construct a 345 kV bus and install a 345/138 kV 500 MVA transformer at West Middleton	2011	2011	3	reliability	Proposed	12
Install a 138/69 kV transformer and 69 kV bus at Yahara River substation	2011	2011	3	reliability	Provisional	1.8
Loop the Deforest to Token Creek 69 kV line into the Yahara River substation	2011	2011	3	reliability	Provisional	0.7
Constuct a Lake Delton-Birchwood 138 kV line	2011	2011	3	reliability	Provisional	3.0
Install a second 138/69 kV transformer at McCue substation	2011	2011	3	reliability	Provisional	2.0
Construct a second Dunn Rd-Egg Harbor 69 kV line	2011	2011	4	reliability	Proposed	6.2

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Table III-9
Transmission System Additions for 2012

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Capital Cost Estimate (in Millions)
Uprate Whitcomb-Deer Trail 69 kV line terminal equipment at Whitcomb	2012	2012	1	reliability	Provisional	1.0
Rebuild Blaney Park-Munising 69 kV to 138 kV	2012	2012	2	reliability, condition	Provisional	19.3
Rebuild and convert West Middleton-Spring Green 69 kV line to 138 kV	2012	2012	3	reliability	Provisional	20.0
Construct West Middleton-Stagecoach double-circuit 138/69 kV line	2012	2012	3	reliability	Provisional	3.0
Construct 69 kV line Eden through Muscoda to Richland Center	2012	2012	3	reliability	Provisional	12.0
Move Lone Rock 69 kV phase shifter to Richland Center	2012	2012	3	reliability	Provisional	0.5
Replace 300 A metering CT at Edgewater 69 kV	2012	2012	4	reliability	Proposed	0.1
Replace 300 A metering CT at Riverside 69 kV	2012	2012	4	reliability	Proposed	0.1
Expand 345 kV switchyard at Bain and string Bain-Racine 345 kV circuit	2012	2012	5	Access initiative, reliability	Provisional	5.5

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New to this 10-Year Assessment

Table III-10
Transmission System Additions for 2013

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Capital Cost Estimate (in Millions)
Replace 138/69 kV transformer at Wautoma	2013	2013	1	reliability	Provisional	1.2
Rebuild/convert Chalk Hills-Chandler 69 kV to 138 kV operation	2013	2013	2	reliability	Provisional	25.1
Install 2-5.4 MVAR capacitor banks at M-38 69 kV	2013	2013	2	reliability	Provisional	0.3
Install two additional 5.4 MVAR capacitor banks at Iron River 69 kV	2013	2013	2	reliability	Provisional	0.3
Construct new 69 kV line from South Lake Geneva to Lake Shore substation	2013	2013	3	T-D interconnection	Provisional	2.4
Convert South Lake Geneva to Twin Lakes 69 kV line to 138 kV	2013	2013	3	reliability	Provisional	3.0
Construct new 138 kV line from Twin Lakes to Spring Valley	2013	2013	3	reliability	Provisional	15.0
Construct a Horicon-East Beaver Dam 138 kV line	2013	2013	3	reliability	Provisional	6.0
Expand Oak Creek 345 kV switchyard to interconnection three new generators plus one new 345 kV line and 138 kV switchyard to accommodate new St. Martins line	2013	2013	5	new generation	Provisional	21.5
Construct a 345/138 kV switchyard at Brookdale to accommodate two 345 kV lines, a 500 MVA 345/138 kV transformer and four 138 kV lines plus two138-26.2 kV transformers	2013	2013	5	new generation	Provisional	14.8
Install two 345 kV line terminations at Pleasant Prairie and loop Zion-Arcadian 345 kV line into Pleasant Prairie substation	2013	2013	5	new generation	Provisional	6.0
Construct an Oak Creek-Brookdale 345 kV line installing 4 miles new structures, converting 16.2 miles of non-operative 230 kV and 5 miles 138 kV	2010	2013	5	new generation	Provisional	17.3

Table III-10
Transmission System Additions for 2013 (continued)

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Capital Cost Estimate (in Millions)
Construct Oak Creek-St Martins 138 kV circuit #2 installing 16.6 miles conductor on existing towers	2010	2013	5	new generation	Provisional	3.4
Construct a Brookdale-Granville 345 kV line converting/reconductoring 5.6 miles 138 kV, rebuilding 7 miles 138 kV double-circuit tower line and converting/reconductoring 3 miles 138 kV on existing 345 kV structures	2010	2013	5	new generation	Provisional	19.3
Restring Bluemound-Butler 138 kV line (KK5051) on new 345 kV structures installed with Brookdale-Granville line	2010	2013	5	new generation	Provisional	1.1
String Butler-Tamarack (Carmen) 138 kV line on new 345 kV structures installed with Brookdale-Granville line	2010	2013	5	new generation	Provisional	1.0

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

Table III-11
Transmission System Additions for 2014

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Capital Cost Estimate (in Millions)
Uprate Metomen-Ripon 69 kV line - scope TBD	2014	2014	1	reliability	Provisional	1.5
Construct West Middleton-Blount 138 kV line	2014	2014	3	reliability	Provisional	11.0
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	2014	2014	3	Access initiative	Provisional	310.0
Construct West Middleton-N Madison 345 kV line	2014	2014	3	reliability, Access initiative	Provisional	21.0
Install 2-16.3 MVAR capacitor bank at Apple Hills 138 kV	2014	2014	4	reliability	Proposed	1.2
Construct a Northside-City Limits 138 kV line	2014	2014	4	reliability	Provisional	3.1
String a new Ellinwood-Sunset Pt 138 kV line on existing structures	2014	2014	4	reliability	Provisional	2.5
Replace 22-138 kV overdutied breakers at Harbor, Everett and Haymarket substations	2014	2014	5	new generation	Provisional	7.6

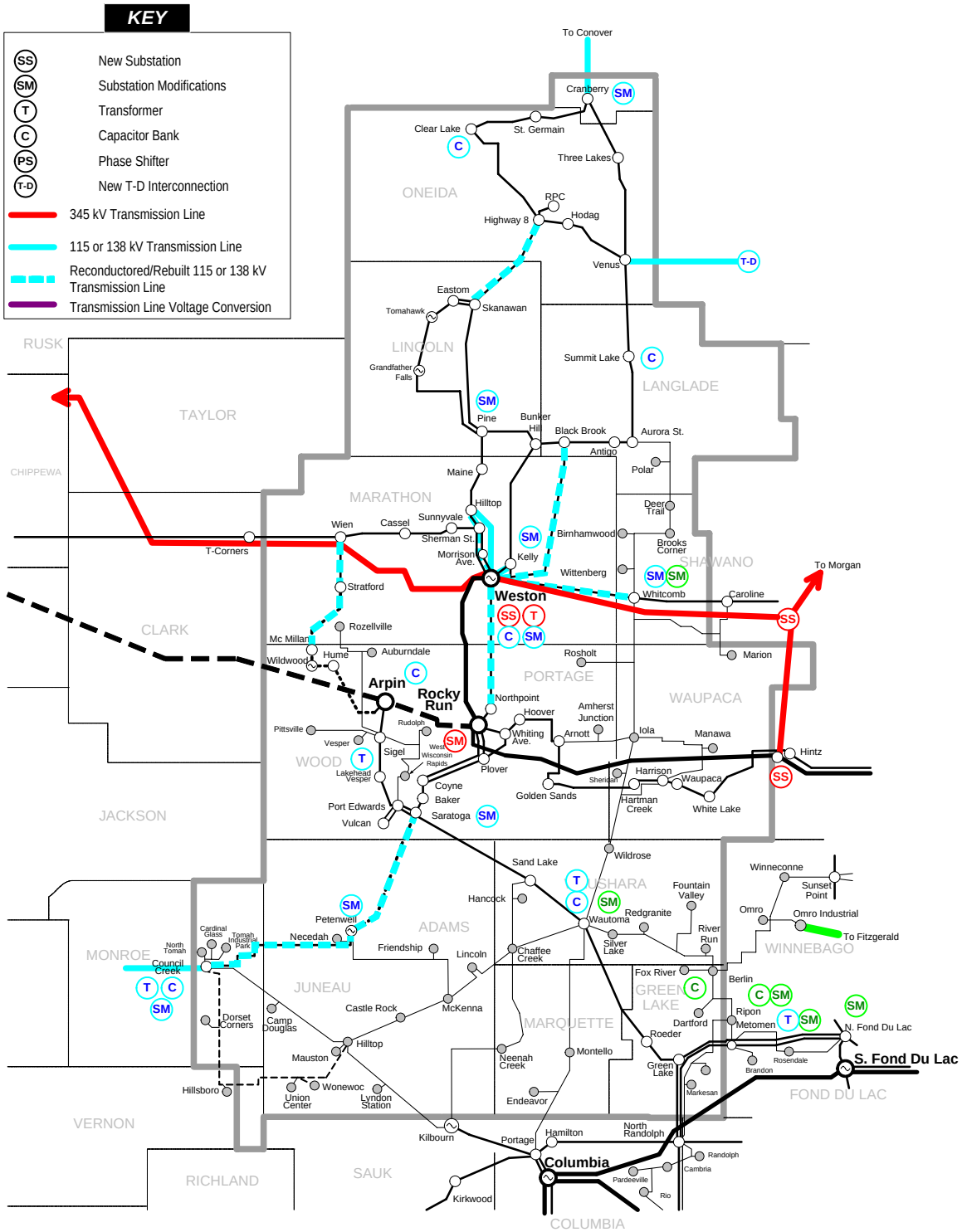
Defined in Previous 10-Year Assessment
Revised in scope from Previous 10-Year Assessment
New to this 10-Year Assessment

Table III-12
Transmission System Additions for 2015

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Capital Cost Estimate (in Millions)
Construct Fitzgerald-Omro Industrial 69 kV line	2015	2015	1	reliability	Provisional	5.3
Install additional 13.6 MVAR capacitor bank at Clear Lake 115 kV	2015	2015	1	reliability	Provisional	0.5

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

Figure III-1
Zone 1 - Transmission System Solutions



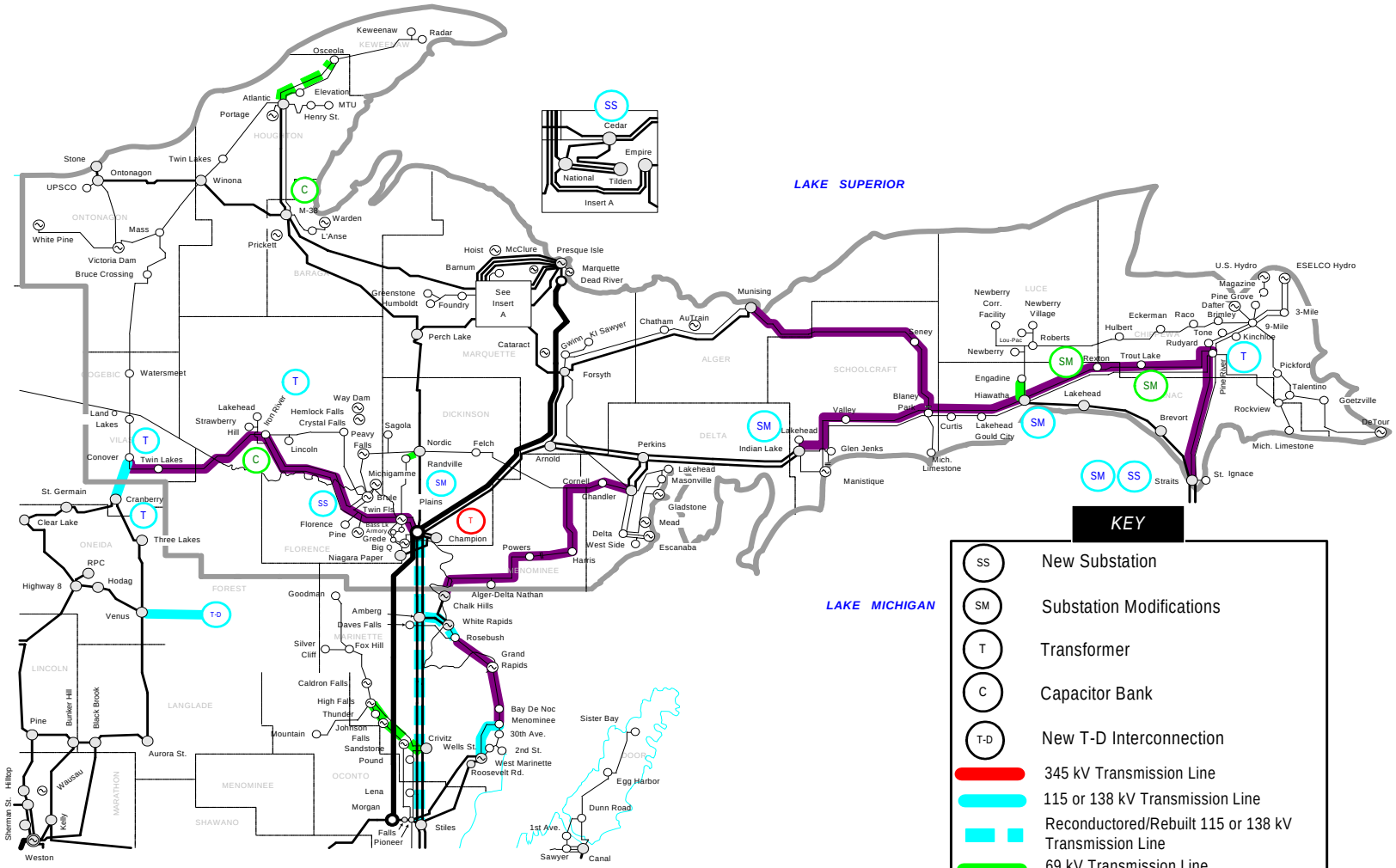


Figure III-2
Zone 2 - Transmission System Solutions

Figure III-3
Zone 3 - Transmission System Solutions

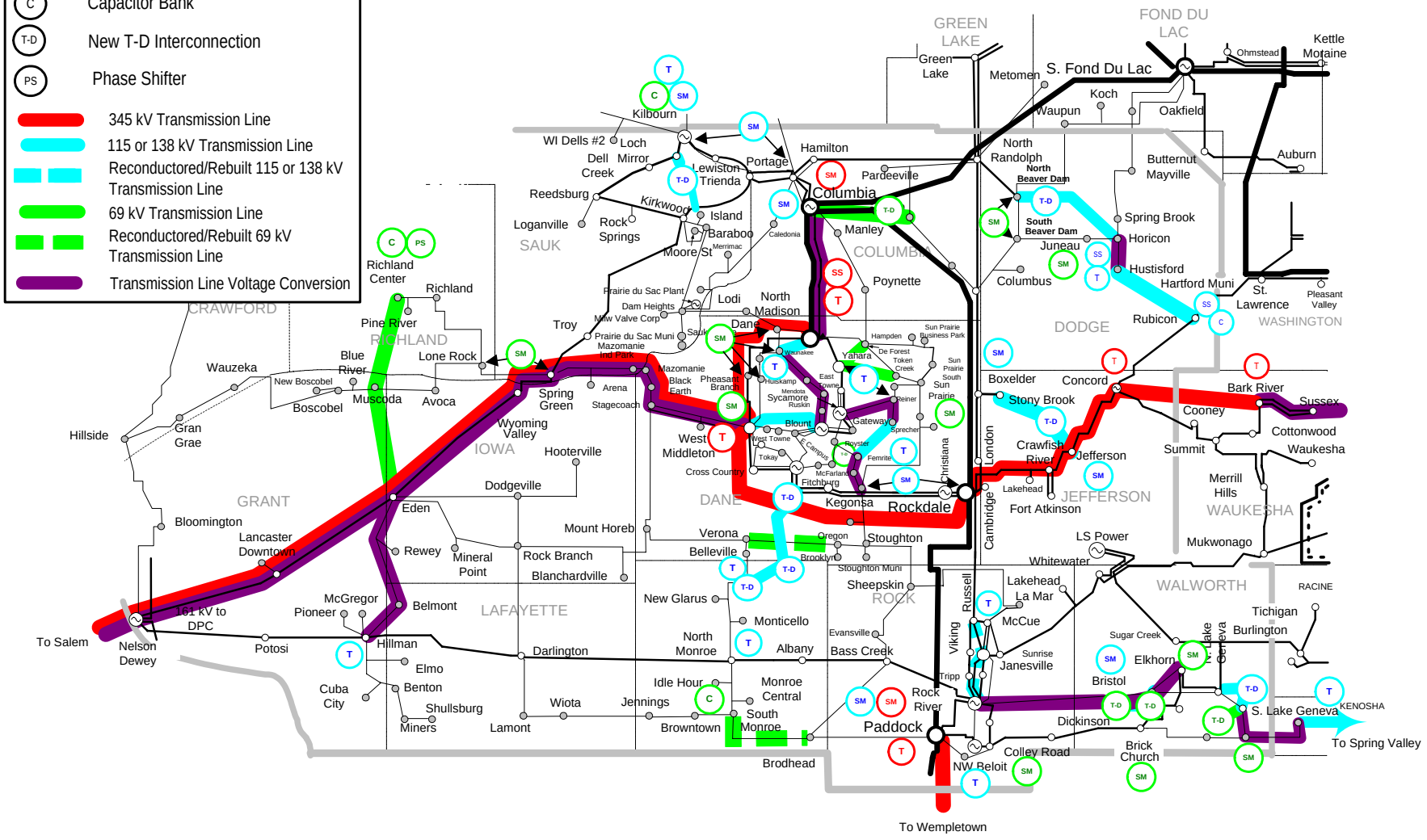


Figure III-4
Zone 4 - Transmission System Solutions

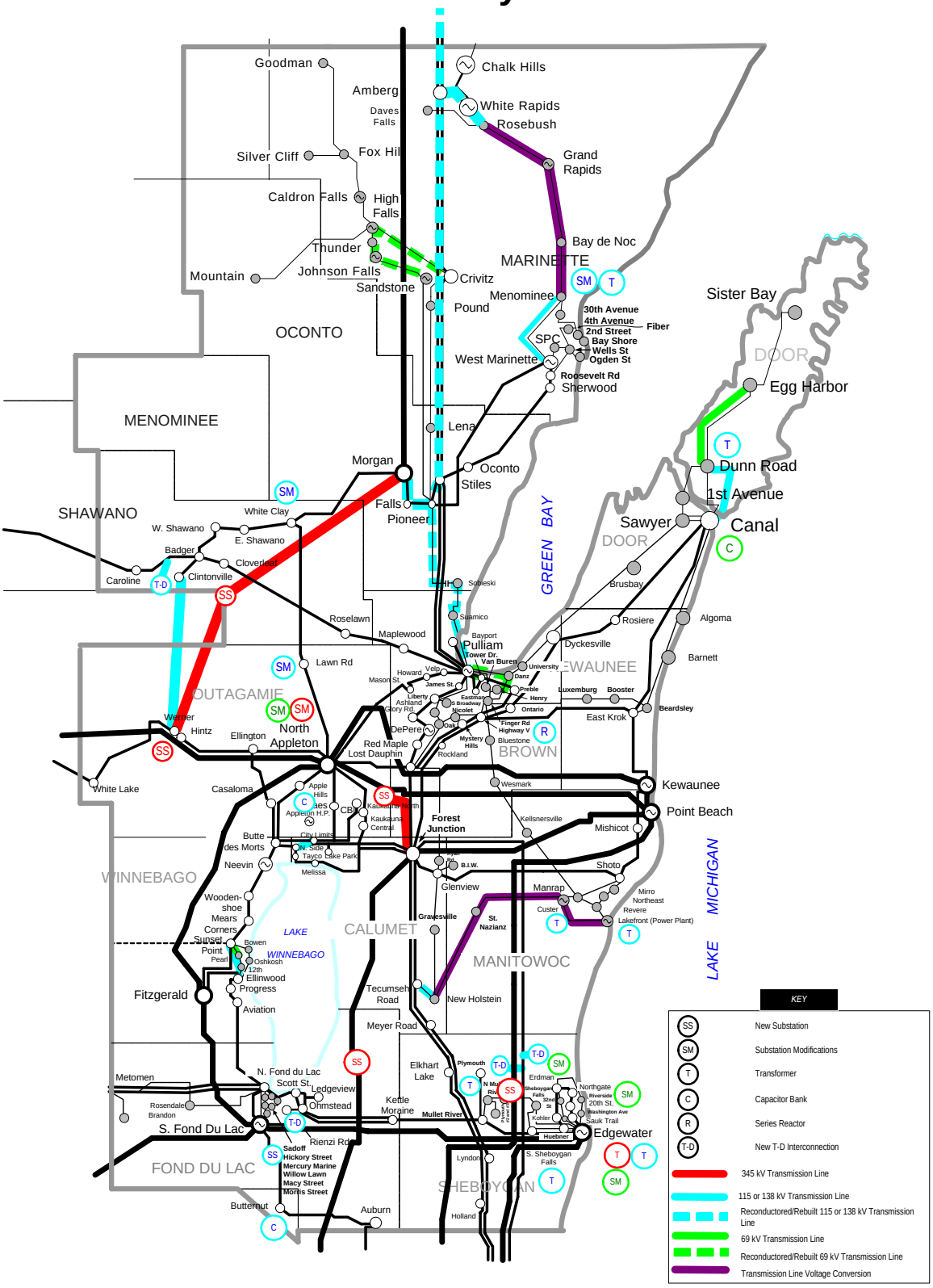


Figure III-5
Zone 5 - Transmission System Solutions