PUBLIC SERVICE COMMISSION OF WISCONSIN

FINAL

STRATEGIC ENERGY ASSESSMENT

ENERGY 2016

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MADISON, WISCONSIN

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TO THE READER

This is the sixth biennial Strategic Energy Assessment (SEA) issued by the Public Service Commission of Wisconsin (Commission or PSC), an independent state regulatory agency, whose authority and responsibilities include regulatory oversight of electric service in Wisconsin.

The SEA provides a picture of past and future electric energy needs and sources of supply. It brings to light issues that may need to be addressed to ensure the availability, reliability, and sustainability of Wisconsin's electric energy capacity and supply.

UNDERSTANDING THE SEA—KEY TIPS AND PROCESSES

While the Commission is required to prepare this technical document for comments by parties involved in the electric industry, it also intends that the SEA be available to the general public having an interest in reliable, reasonably priced electric energy. To assist the general public, definitions of key terms and acronyms used within the electric industry and this report are included in the appendix of this document.

The Commission is required to hold a public hearing before issuing a final SEA. A copy of the notice providing information on the hearing is available for review on the Commission's website at: http://psc.wi.gov. The Commission must also make an environmental assessment on the SEA before the final report is issued. The assessment is also available on the Commission's website.

Written comments and comments presented at the public hearing have been used to prepare the final SEA. Questions regarding the final SEA or requests for additional copies should be directed to Project Coordinator Amy Pepin at (608) 267-7972. Questions from the legislature and the media may be directed to Lee Sensenbrenner, Director of Public Affairs, at (608) 266-9600.

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STRATEGIC ENERGY ASSESSMENT

2010-2016 Electricity Issues

STUDY SCOPE

The Public Service Commission of Wisconsin (Commission or PSC) is required by Wis. Stat. § 196.491 to prepare a biennial Strategic Energy Assessment (SEA) that evaluates the adequacy and reliability of Wisconsin's current and future electrical capacity and supply.

The SEA intends to identify and describe:

- All large electric generating facilities for which an electric utility or merchant plant developer plans to commence construction within seven years;
- All high-voltage transmission lines for which an electric utility plans to commence construction within seven years;
- Any plans for assuring that there is an adequate ability to transfer electric power into or out of eastern Wisconsin, and the state as a whole, in a reliable manner;
- The projected demand for electric energy and the basis for determining the projected demand;
- Activities to discourage inefficient and excessive energy use;
- Existing and planned generation facilities that use renewable energy sources; and
- Regional and national policy proposals that could have direct and material impacts on Wisconsin's energy supply, delivery, and rates.

The SEA is required by statute to assess:

- The adequacy and reliability of purchased generation capacity and energy to serve the needs of the public;
- The extent to which the regional bulk-power market is contributing to the adequacy and reliability of the state's electrical supply;
- The extent to which effective competition is contributing to a reliable, low-cost, and environmentally sound source of electricity for the public; and
- Whether sufficient electric capacity and energy will be available to the public at a reasonable price.

The SEA must also consider the public interest in economic development, public health and safety, protection of the environment, and diversification of energy supply sources.

METHODOLOGY AND LIMITATION

Under statutory and administrative code requirements, every electricity provider and transmission owner must file specified historic and forecasted information. The SEA must be distributed to interested parties for comments. Subsequent to hearings and receipt of written comments, the final SEA is issued. In addition, an environmental assessment, which includes a discussion of generic issues and environmental impacts, will be issued in connection with the SEA.

This sixth SEA covers the years 2010 through 2016. During the past year, eleven large Wisconsin-based investor-owned utilities, cooperatives, municipal electric companies, and other electricity and transmission providers submitted historic information regarding statewide demand, generation, out-of-state sales and purchases, transmission capacity, and energy efficiency efforts. In addition, these entities provided forecasted information through 2016.

The SEA is an informational report that provides the public and stakeholders with information about relevant trends, facts, and issues affecting the state's electric industry. The SEA is not a prescriptive report, meaning that the ideas, facts, projects, and policy discussions contained in this report will not be used as the basis for ordering action by the Commission. State law precludes such action, specifically Wis. Stat. § 196.491(3)(dm). Should a specific topic warrant further attention with the intent of Commission action, the Commission must take additional steps as authorized by law.

EXECUTIVE SUMMARY

Demand and Supply of Electricity

- The recent economic downturn has translated into lower peak demand growth in Wisconsin. While the state's utilities put 2010 peak demand growth at 2.75 percent, the projection falls in years 2011 to 2016 to approximately 1.00 percent per year. In the last SEA, peak growth demand was projected at 2.10 percent per year. This reduction reflects the significant effect the recession will likely have on short-term energy sales. The longer-term picture is unclear.

- The increased presence of renewable projects in Wisconsin continues to change generation mix proportions in the state.

- Despite the added renewable energy in Wisconsin's generation mix, Wisconsin continues to be heavily reliant on coal as its primary energy source in actual energy generation.

Market Analysis and Planning Reserve Margin Forecasts

- In earlier SEAs published in the 1990s, planning reserve margins had been a concern. Actual planning reserve margins fell to less than 10 percent on multiple occasions in that decade, prompting the Commission to mandate that utilities maintain a higher planning reserve margin. The economic downturn in the past two years, coupled with the state's generation construction in the past several years, creates a current state of excess capacity.

- Wisconsin now has a comfortable planning reserve margin. Adequacy and reliability are expected to remain robust, with a planning reserve margin forecast through 2016 above 15 percent.

- The Commission's recent reduction of the reserve margin requirements will allow margins to come down in the near future. Excess reserves may increase the opportunity for Wisconsin utilities to export power in the regional market. While this market is still evolving, the opportunity exists for excess generation sales to benefit ratepayers. Wisconsin must continue to track and investigate policies at the regional level that will benefit Wisconsin ratepayers.

While Wisconsin is enjoying sufficient capacity, the other half of the power picture—moving energy from the generation source to customers—is an ongoing challenge. The Commission is currently participating in multiple regional transmission studies that explore not only possible future transmission scenarios, but how the cost may be shared among states that benefit from the additional transmission capacity.

Rates

- Energy rates continue to increase across customer classes both in Wisconsin and the Midwest in general. Rate increases are generally driven by sales decline, fuel price volatility and purchased power costs, as well as the high fixed-cost nature of the utility business.

- Rate increases can be frustrating for Wisconsin consumers who undertake efforts to conserve energy. Proactive customers can mitigate some bill impacts from rate increases with energy conservation and energy efficiency.

- The Commission must continue to investigate ways to mitigate energy rates to ensure Wisconsin remains competitive in a global marketplace.

Energy Efficiency and Renewable Resources

- The Commission continues to work on examining the funding and structure of the energy efficiency and renewable resource programs in Wisconsin under 2005 Wisconsin Act 141 (Act 141). The Commission will continue to consider cost-effective energy efficiency and renewable resource programs as set forth in Act 141.

- An energy efficiency potential study conducted by the Energy Center of Wisconsin (ECW) in 2009 indicates that by 2012, Wisconsin could obtain annual energy savings equivalent to 1.6 percent of electric usage and peak demand. The current energy efficiency spending targets achieve annual net reductions of approximately 0.6 percent of energy usage.

- The ECW potential study results were used to inform the Commission's recent energy efficiency quadrennial planning process under Act 141 to establish priorities, set overall energy efficiency savings targets and set funding levels to reach these targets.

- The statutes require Wisconsin's electric providers to sell a certain percentage of renewable energy. Approximately 10 percent of all electricity sales in Wisconsin must be from renewable resources by 2015. Wisconsin is well on its way towards achieving this standard. All electric providers and aggregators were Renewable Portfolio Standard (RPS) compliant as of the latest full data year on this topic (2009), as over 6 percent of all electrical energy sold in Wisconsin was generated from renewable resources.

Update on Legislative Proposals

- The Wisconsin legislature debated, but did not pass, legislation known as the Clean Energy Jobs Act (AB 649/SB 450) during the 2009-2010 session. This proposal would have increased the state RPS, expanded energy efficiency funding, and removed the existing legal restrictions on nuclear power generation in Wisconsin. Since the legislation did not pass, the PSC will continue to move forward on energy issues consistent with current law.

- At the federal level, the PSC will continue monitoring legislative and administrative actions, including the potential for federal energy legislation as well as the promulgation of U.S. Environmental Protection Agency (EPA) rules that may impact Wisconsin utilities.

INDIVIDUAL COMMISSIONER COMMENTS—COMMISSIONER AZAR'S COMMENT

In the last SEA, I included a separate statement on the need for the Commission and Wisconsin's utilities to consider energy policy from a broader perspective. Our current piecemeal approach of reviewing plans utility-by-utility, often on a case-by-case basis, can frustrate the overall goal of building energy infrastructure that is safe, reliable, and the most cost-effective it can be. A proper analysis of the electric industry in Wisconsin can no longer be accomplished by simply looking at each utility or simply looking within this state's borders.

Just as the planning for Wisconsin's utilities no longer stops at the Wisconsin border, the same goes for Wisconsin businesses. However, unlike our utilities, Wisconsin businesses face global competition. To stay competitive, Wisconsin businesses must have access to reliable electricity for a competitive price. If the state's utilities do not provide our businesses with reliable electricity at a reasonable price, those businesses may leave the state. As ***public*** utilities, Wisconsin's electric providers need to act in the best long-term interests of this state while simultaneously satisfying their shareholders. This is no easy task.

As WPPI stated in its comments, Wisconsin utilities need to be nimble and creative. I believe the Commission must also be nimble and creative, and we must also be proactive. In addition to the rate pressures described above, the electric industry, which is not known for dramatic changes, is in a time of transformation. This Commission must prepare for fundamental changes that now seem inevitable. To be proactive, I believe this Commission must recognize, among other things, the increasing commingling between state and federal jurisdiction over power and the impact of regional energy markets on our utilities and their customers. Our work is no longer confined to 610 N. Whitney Way. To protect the interests of Wisconsin, we must continue our advocacy at the Midwest ISO in Indianapolis and at the Federal Energy Regulatory Commission in Washington D.C.

The Commission could choose to use this Strategic Energy Assessment as a strategic tool, as requested by commenters to this SEA. Not only would it provide guidance to the regulated community, but it would allow the Commission to deliberate on and agree to a roadmap for the near future. Prior to the drafting of the next SEA, I hope the Commissioners can have an open discussion about what should be included within the SEA. At that time, we could hear stakeholder thoughts and could address many of the diverse—and sometimes competing—requests made by the commenters to this SEA.

ELECTRIC DEMAND AND SUPPLY CONDITIONS IN WISCONSIN

Overview

An electricity provider is defined for SEA purposes in Wisconsin Administrative Code as any entity that owns, operates, manages, or controls or who expects to own, operate, manage, or control electric generation greater than 5 megawatts (MW) in Wisconsin. Figure 1 shows generators greater than 9 MW. Electricity providers also include those entities providing retail electric service or that self-generate electricity for internal use with any excess sold to a public utility.

Major retail electricity providers and/or transmission owners that submitted demand and supply data for this SEA include: American Transmission Company LLC (ATC), Great Lakes Utilities (GLU), Madison Gas and Electric Company (MGE), Manitowoc Public Utilities (MPU), Northern States Power-Wisconsin (NSPW) (d/b/a Xcel Energy, Inc. (Xcel)), Superior Water, Light and Power Company (SWL&P), Wisconsin Electric Power Company (WEPCO) (d/b/a We Energies), Wisconsin Power and Light Company (WP&L) (d/b/a Alliant Energy), and Wisconsin Public Service Corporation (WPSC).

These providers were required to include supply and demand data for any wholesale requirements that they may have under contract. This action streamlined data reporting and reflected current market activities. Demand and supply data were also provided by Dairyland Power Cooperative (DPC) and Wisconsin Public Power, Inc. (WPPI) on behalf of their member cooperatives and municipal utilities.

Table 1 shows the aggregated responses of the entities providing data for this SEA. The current planning reserve margin requirement for the Midwest Independent Transmission System Operator, Inc. (Midwest ISO) footprint is 15.4 percent; yet this margin is affected by diversity factors. Diversity factors take into account that peak load will likely occur on different days or at different hours within the Midwest ISO footprint. After considering diversity factors, a planning reserve margin of 11.94 percent for each load serving entity is sufficient by Midwest ISO's standards to meet demand while maintaining reliability. Data for later years should be considered preliminary, because of the longer-term outlook and the very nature of contracting for supply arrangements.

Figure 1 Map of Major Electric Generation Facilities in Wisconsin (capacity greater than 9 MW)

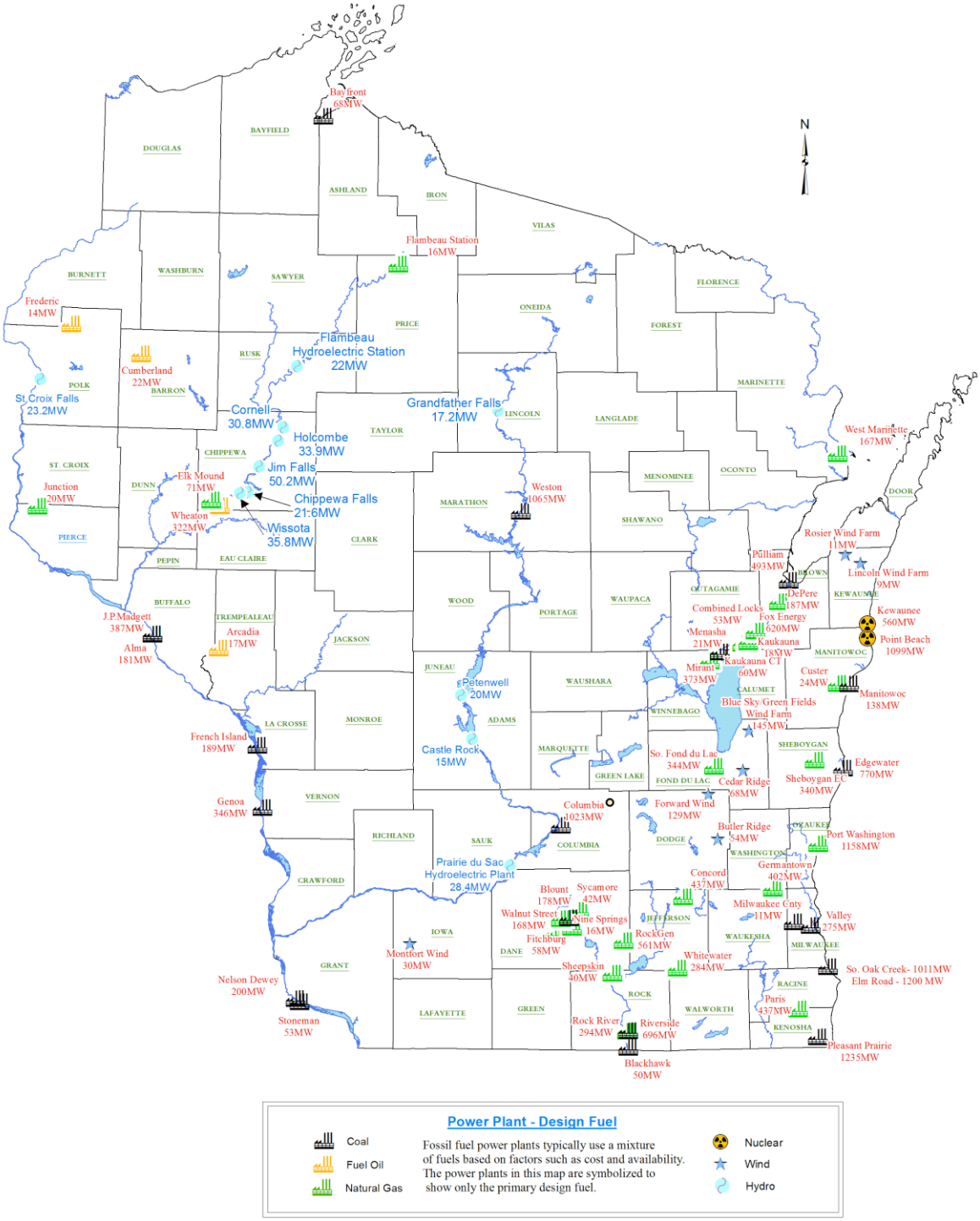


Table 1 Aggregated Responses of Entities Providing Data for this SEA

Summer Peak Electric Demand (MW)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
				Forecasted Planning Values						
Date of Peak Load	July 31									
Date of Peak Load	Aug. 1	July 17	June 23							
Peak Load Data and Forecast [non-coincident]	14,535	13,309	13,761	14,345	14,545	14,766	15,005	15,156	15,321	15,491
Direct Load Control Program	(88)	(51)	(60)	(193)	(208)	(209)	(214)	(215)	(215)	(208)
Interruptible Load	(164)	0	0	(665)	(684)	(611)	(639)	(641)	(689)	(634)
Capacity Sales Incl. Reserves	926	699	623	599	634	589	519	519	514	514
Capacity Purchases Incl. Reserves	(652)	(624)	(659)	(556)	(596)	(601)	(601)	(611)	(621)	(626)
Miscellaneous Demand Factors	(555)	(103)	(105)	(117)	(117)	(117)	(52)	(52)	(52)	(52)
Adjusted Electric Demand	14,002	13,230	13,560	13,413	13,574	13,817	14,018	14,156	14,258	14,485
Electric Power Supply (MW)										
Owned Generating Capacity [in-, or used, for Wis. cust.]	12,831	12,524	13,368	13,400	13,647	14,071	14,085	14,680	14,745	14,783
Merchant Power Plant Capacity Under Contract [in, or used, for Wis. cust.]	3,518	3,960	3,485	3,560	3,647	3,399	2,691	2,120	1,887	1,639
New Owned or Leased Capacity/Additions	0	559	0	542	610	128	697	173	152	118
Net Purchases W/O Reserves	287	(145)	(1,546)	(402)	(645)	(58)	120	115	226	207
Miscellaneous Supply Factors	(234)	(153)	(161)	(451)	(144)	(161)	(83)	(82)	(88)	(82)
Electric Power Supply	16,402	16,745	15,146	16,649	17,115	17,379	17,510	17,006	16,922	16,665
Calculated Data										
Reserve Margin	17.1%	26.6%	11.7%							
Planning Reserve Margin				24.1%	26.1%	25.8%	24.9%	20.1%	18.7%	15.1%
Transmission Data										
Resources Utilizing PJM/WUMS-Midwest ISO Interface	940	600	600	600	600	441	232	232	232	232

As shown in Table 1, peak reserve margins reached above 17 percent in 2007 and nearly 27 percent in 2008, demonstrating that Wisconsin has strong energy reserves to handle peak demand in its recent past. The reserve margin in 2009 represents a unique year in the data, as the reserve margin fell to 11.7 percent. The primary driver of the lower reserve margin in 2009 appears in Table 1 within the "*net purchases w/o reserves*" row of data. To provide net purchase history context for 2007 in Wisconsin, its utilities were net purchasers overall; however, 2008 began a period where the utilities, on a statewide basis, were net *sellers*. Sales of electric power from Wisconsin utilities increased substantially in 2009, resulting in net sales of 1,546 MW. Because sales result in a reduction of the amount of reserves available, the 11.7 percent reserve margin value for 2009 likely understates the supply adequacy for Wisconsin in that particular year. Future forecast years suggest fewer expected net sales compared to 2009. The "*merchant power plant capacity under contract*" row also declines in the later forecast years, as a result of some of the contracts expiring. Realistically however, the decision to either enter contracts to sell excess capacity, or to extend or renew the existing capacity contracts is likely to be weighed by the utilities in real time.

Examining both peak demand figures for the recent past, and reserve margin forecasts in the future confirm that Wisconsin has largely operated with a healthy level of reserves during the summer peak in recent history and is expected to continue to do so into the near future. Reserve margin forecasts for 2010 through 2014 exceed 20 percent; they are expected to dip below 20 percent beginning in 2015. As is addressed later in this SEA, the PSC has opened a docket to further explore Wisconsin's generation capacity where the PSC will more thoroughly examine the appropriate levels of generation capacity needed in Wisconsin.

Utilities' Perspectives—Peak Demand and Supply

DEMAND

The Commission compiled substantial information on peak electric demand and energy use for this report. Demand is a measure of instantaneous use measured in MW. Energy is a measure of electricity volume used in megawatt hours (MWh) over a period of time. Demand for electricity fluctuates both throughout the day and throughout the year. In any day there are peak hours of demand. In the summer, the demand usually has one peak in the afternoon hours. In the winter, it is common to have a morning and an evening peak. Over the course of a year, demand for electricity is typically highest in the summer, smaller in the winter and lowest in the spring and autumn "shoulder" months. Table 2 shows historic monthly peaks since 1999 and forecasted monthly peaks.

The peak load data presented in Tables 1 and 2 does not necessarily show the same MW because different utilities may have different months in which their highest peak occurs. Table 1 shows the total of each utility's maximum peak within the year; Table 2 shows the maximum within a month. For example, if Utility A has peaks of 100 MW in July and 80 MW in August, and Utility B has peaks of 90 MW in July and 120 MW in August, Table 1 would show that the peak is 220 MW for the year, but Table 2 would show peaks of 190 MW for July and 200 MW for August.

Table 2 Assessment of Electric Demand and Supply Conditions — Monthly Non-Coincident Peak Demands (MW)

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Historical												
1999	10,492	9,531	9,540	8,850	9,108	11,554	13,120	11,331	11,402	9,167	9,953	10,881
2000	10,245	10,004	9,367	9,125	9,986	10,924	11,727	12,726	11,778	9,559	10,082	10,937
2001	10,300	10,032	9,722	9,179	9,742	11,800	13,575	13,870	10,898	9,684	9,805	10,268
2002	10,286	9,965	10,111	9,924	10,381	12,782	13,518	13,454	13,211	10,445	10,080	10,857
2003	10,739	10,498	10,291	9,602	9,048	12,725	13,319	13,694	11,937	10,136	10,450	11,302
2004	10,924	10,384	10,091	9,400	10,273	12,486	12,958	12,437	12,161	9,902	10,557	11,478
2005	11,127	10,678	10,433	9,610	10,000	14,020	13,832	14,323	13,224	11,912	10,833	11,581
2006	10,622	10,556	10,174	9,550	11,527	12,559	15,006	14,507	11,060	10,320	10,909	11,553
2007	10,958	11,419	10,682	9,946	11,343	13,834	14,163	14,461	13,693	12,033	11,091	11,503
2008	11,249	11,167	10,437	9,899	9,583	12,283	13,256	12,883	13,111	10,216	10,279	11,438
2009	11,255	10,667	10,232	9,196	9,592	13,675	11,036	12,780				
Forecasted												
2009									12,370	10,201	10,551	11,253
2010	10,983	10,719	10,246	9,639	10,246	13,004	14,296	14,054	12,387	10,219	10,507	11,145
2011	11,071	10,840	10,354	9,744	10,360	13,204	14,516	14,243	12,562	10,342	10,619	11,253
2012	11,181	10,834	10,469	9,858	10,486	13,411	14,711	14,446	12,746	10,429	10,718	11,382
2013	11,343	11,037	10,583	9,987	10,656	13,571	14,923	14,677	12,846	10,532	10,843	11,510
2014	11,443	11,133	10,672	10,070	10,770	13,718	15,103	14,827	12,982	10,635	10,922	11,622
2015	11,533	11,234	10,778	10,165	10,872	13,878	15,290	14,984	13,119	10,729	11,013	11,725
2016	11,611	11,210	10,859	10,247	10,957	14,028	15,426	15,132	13,264	10,786	11,088	11,824

Using the projections provided by the entities submitting data for this SEA, this pattern of winter and summer peaks is expected to continue into the future. While actual demand will remain dependent upon weather, the overall statewide trend is expected to show continued growth in peak demand. The current recession is likely to have a significant effect on energy sales in the short-term, while the long-term effect remains less clear. This SEA demonstrates Wisconsin utilities' combined estimates for 2010—which are impacted by the most recent economic and unusual weather effects—compared to future forecasted years, where these impacts are unknown.

In 2010, the utilities estimate that the non-coincident peak will increase approximately 2.75 percent from the previous year's average; yet in 2009, Wisconsin endured the brunt of the recent recession, and also experienced an unseasonably cool summer. This likely fueled lower than average non-coincident peaks in 2009, and the 2010 increase may reflect a return to more typical non-coincident levels. The data provided by the utilities included an additional adjustment after the 2010 estimated "recovery", putting estimates for 2011 through 2016 at approximately 1.00 percent per year. Peak demand is much more responsive to weather than total energy use is, and it is not clear at this time that the recession will have the same percentage impact on peak demand that it has on total energy sales. In the last SEA in docket 5-ES-104, the state's utilities forecasted approximately 2.10 percent growth per year through 2014. The current SEA shows lower forecasts for peak demand growth.[1]

Programs to Control Peak Electric Demand

The state's utilities have two forms of peak load management: direct load control and interruptible load. Peak load management is removing load from the system at times when utility resources for generation are not able to meet customer demand for energy. These programs were traditionally expected to be used primarily in the summer months, usually on very hot days when demand for electricity is at its highest. In recent years, under certain circumstances, when the winter peak demand for electricity outpaced available generation, these programs have been used to assure a balance between demand and available supply.

[1] These are utility forecasts; PSC staff does not do an independent demand or energy forecast.

Table 3 Available Amounts of Programs and Tariff to Control Peak Load (MW)

Year	Direct Load Control (MW)	Interruptible Load (MW)
Historical		
1999	173	773
2000	169	664
2001	185	637
2002	200	582
2003	186	554
2004	193	629
2005	225	693
2006	282	830
2007	246	776
2008	222	655
2009	241	675
Forecasted		
2010	193	665
2011	208	684
2012	209	611
2013	214	639
2014	215	641
2015	215	689
2016	208	634

Direct load management gives the utilities the ability to take electric demand, such as residential air conditioners, off the system. When utilities implement direct load control, affected customers who volunteered to participate in the program receive a credit on their utility bill. Prior SEAs and Table 1 show that direct load control has been used very sparingly from 2007 through 2009; between 51 and 88 MW of direct load control were called upon. As shown in Table 3, the MW of direct load control available to utilities is much greater than what was called upon.

The second form of load management is the use of interruptible load for industrial customers. An industrial customer choosing an interruptible load tariff receives a lower electric energy rate in cents per kilowatt hour (kWh) by agreeing that load may be interrupted during periods of peak demand on the system. A utility will notify an industrial customer on an interruptible load tariff that its load will be taken off the system at a specific time. Again, the actual MW of load that is interrupted in a given year is less than the MW of load that is covered by interruptible tariffs.

In any given year, the need to utilize this form of load control will depend upon generation supply that is available on the days when peak demand happens or when available generation is tight due to planned or unexpected (forced) outages. By 2016, interruptible load is expected to be approximately 4.0 percent of projected electric power supply.

Peak Supply Conditions—Generation and Transmission

As indicated in Table 4, the 2009 reserve margin was 11.7 percent. Even with the growth in peak summer demand indicated by the utilities through 2016, planning reserve margins are expected to remain above the 15.4 percent requirement through 2015, meaning that generation adequacy has been successfully addressed for the near future.

However, when reserve margins are in excess of 20 percent, there is reason for concern. Wisconsin has been in a period of construction in the recent past related both to reliability and the need for additional renewable generation to satisfy RPS requirements. These newer and more efficient plants may prove to be valuable in the market for energy. However, this level of excess capacity requires consideration of different options for less efficient plants. Looking at other options, including potential retirements, should be done with an eye towards long-term cost savings. The Commission is currently engaged in further analysis of Wisconsin's capacity situation in docket 5-EI-150. This docket, addressing excess capacity in Wisconsin, may include modeling to identify economic outcomes of different policy potentials. While the docket itself will not address the retirement of any specific plant, the information produced may be beneficial as the PSC considers issues in the future.

Table 4 Forecast Planning Reserve Margins from SEA[2]

Planning Year	Final SEA 2000	Final SEA 2002	Final SEA 2004	Final SEA 2006	Final SEA 2008	Final SEA 2010
2001	18.0					
2002	17.4					
2003		19.1				
2004		20.9	18.3			
2005			17.4			
2006			15.0			
2007			16.1	18.2		
2008			12.8	18.9	30.9	
2009			10.0	16.4	16.3	11.7
2010			11.0	17.5	18.7	24.1
2011				17.2	20.9	26.1
2012				17.4	18.5	25.8
2013					14.4	24.9
2014					11.0	20.1
2015						18.7
2016						15.1

[2] The SEA was expanded to cover seven years of forecast data in 2004; prior SEAs only examined two years.

Table A-01 in Appendix A of this report shows new generation facilities and upgrades expected to be in operation or under construction by 2016. It does not include the utilities' listed retirements, as the timing of these is more uncertain. It also does not include 3 to 5 MW de-ratings of coal units due to installation of additional air pollutant controls.

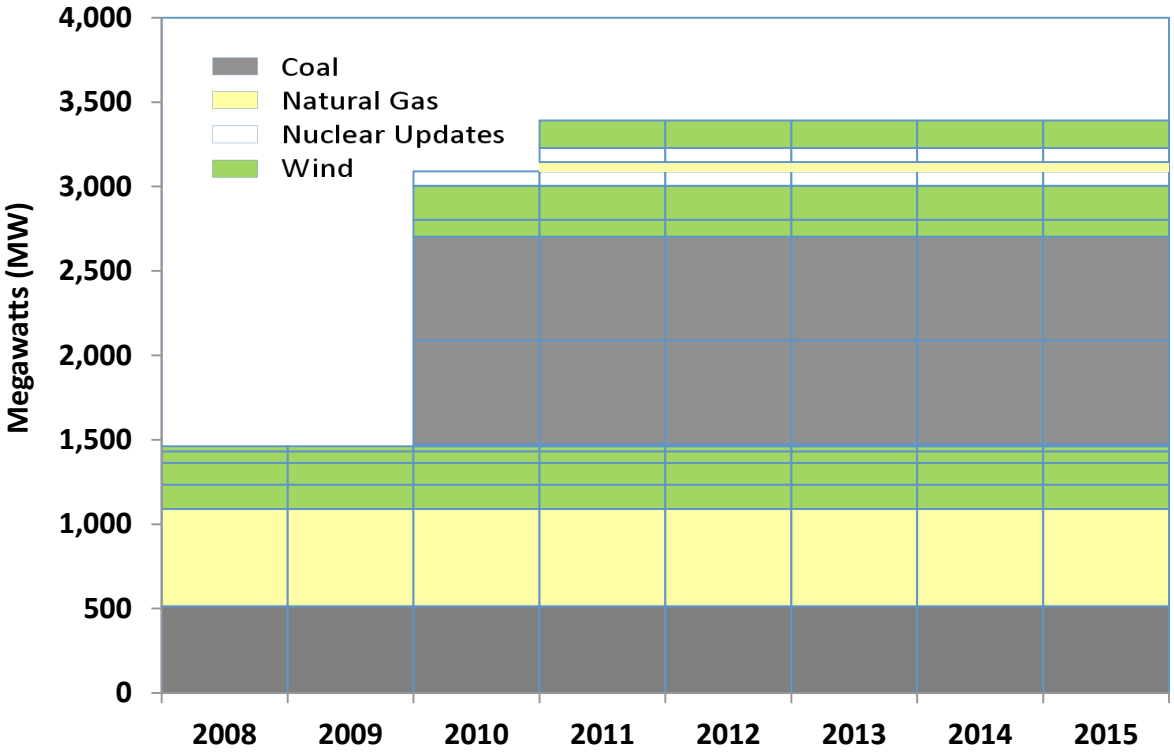
New Generation[3]

Between 2008 and this final SEA, over 3,100 MW of additional new generation capacity for Wisconsin utilities has been brought into service. Units that became operational during that time include: Weston Unit 4, Port Washington Units 1 and 2, Blue Sky/Green Field Wind Project, Forward Wind Project, Cedar Ridge Wind Project, Top of Iowa 3 Wind Project, Concord Units 3 and 4 upgrades, Crane Creek Wind Project, Elm Road Units 1 and 2, and the Bent Tree Wind Project. While past SEAs have reflected a multi-year expansion period in which Wisconsin addressed previous capacity challenges, the current SEA marks a notable slowing in new planned generation.

Wisconsin utilities have prioritized generation construction and now enjoy a healthy planning reserve margin and adequate capacity. More recently, they are also balancing newly added capacity against an economic downturn and subsequent slowing of energy demand growth. Additionally, for the first time in SEA history, the majority of expected or planned new generation facilities are renewable energy projects. Recent examples include WP&L's Bent Tree Wind Project (approved, 200 MW), WEPCO's Glacier Hills Wind Project (expected, 162 MW), and its Rothschild biomass facility (pending, 50 MW). When looking at the entire new generation picture between 2008 and 2016 as demonstrated in Figure 2, the remaining projects include likely future upgrades to Point Beach Units 1 and 2 and four renewable energy projects WEPCO has indicated that it plans to pursue; however, no formal applications have been filed with the Commission.

[3] As is also noted in the introduction of this SEA, identification in the SEA of any application pending before the PSC or applications that the PSC anticipates receiving in the near future cannot be construed as any indication of the PSC's potential approval or denial of those applications.

Figure 2 New Utility Owned or Leased Generation Capacity 2008-2016



2011, WEPCO, Glacier Hills Wind Park, 162 MW

2011, FPL, Point Beach Unit 2, Uprate, 85 MW

2011, Marshfield, Combustion Turbine, 55 MW

2010, FPL, Point Beach Unit 1, Uprate, 85 MW

2010, WP&L, Bent Tree Wind, 200 MW, (Minnesota)

2010, WPSC, Crane Creek Wind Farm, 100 MW, (Iowa)

2010, WEPCO, Elm Road SCPC Coal Unit 2, 615 MW

2010, WEPCO, Elm Road SCPC Coal Unit 1, 615 MW

2009, WEPCO, Concord Uprates, 12 MW

2008, MGE, Top of Iowa Wind, 30 MW

2008, WP&L, Cedar Ridge Wind, 68 MW

2008, Invenergy, Forward Wind, 99 MW

2008, WEPCO, Blue Sky Green Field Wind, 145 MW

2008, WEPCO, Port Washington Unit 1, Combined Cycle, 575 MW

Current Generation Fleet

Figures 3 and 4 indicate the mix of generation available to Wisconsin utilities for the current SEA. Roughly 44 percent of Wisconsin's nameplate capacity is available through coal, with natural gas combustion turbine and combined cycle facilities providing over one-third of Wisconsin's nameplate capacity. The increased presence of renewable projects in Wisconsin continues to change generation mix proportions in the state.

Figure 3 **Wisconsin Generation Capacity by Fuel, January 2011—includes generating units operated by IOUs, cooperatives, municipals, non-utilities, and merchants; total in-service nameplate and uprate capacity (MW)**

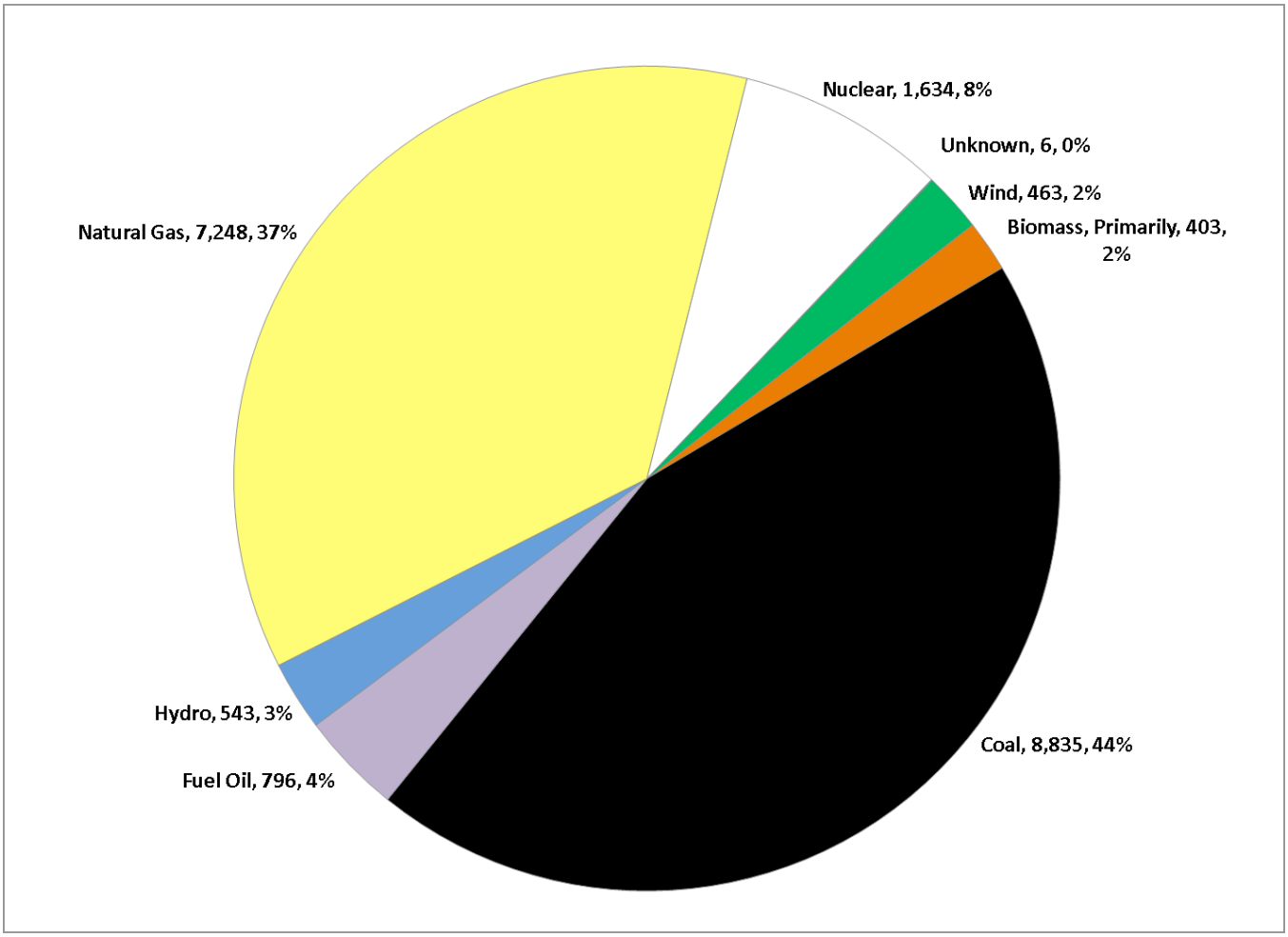
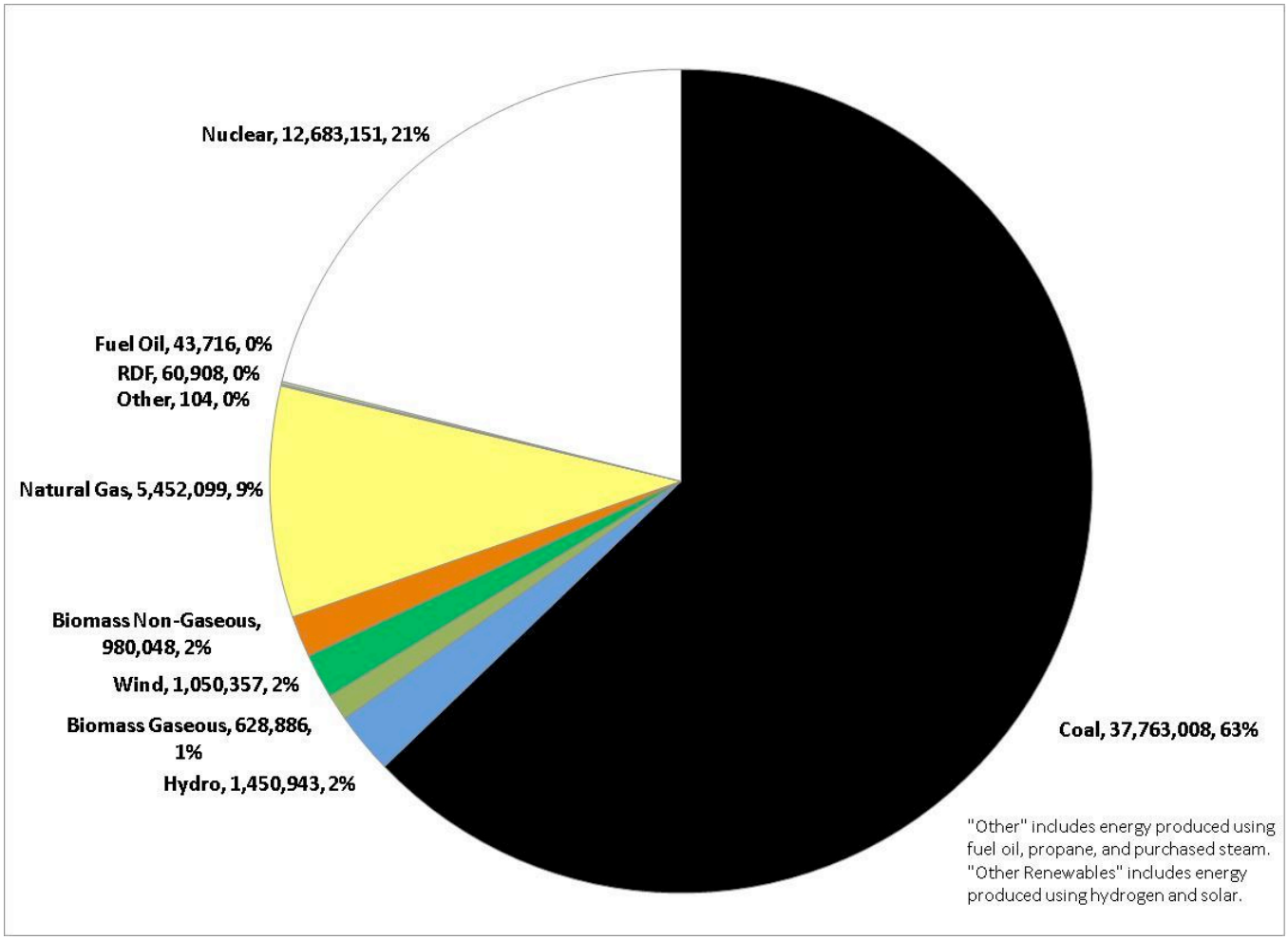


Figure 4 indicates actual generation by fuel from most recent data. Wisconsin's actual energy generation proportions differ greatly from the state's nameplate capacity. Approximately two-thirds of actual generation is supplied from coal and only about 9 percent of actual generation comes via natural gas sources. The current SEA displays more generation coming from coal than the last SEA. In addition to its increased use of coal, Wisconsin utilities generate more energy from nuclear and renewable energy sources when compared to the previous SEA.

Figure 4 **Wisconsin Energy Generated by Fuel, 2009—includes generating units operated by IOUs, cooperatives, municipals, non-utilities, and merchants (MWh)**



Emission Control and Generation Facility Upgrades

Wisconsin generators continue to face the task of updating their current coal facilities to comply with emissions requirements. Table 5 indicates the current status of completed and expected major emission control projects at Wisconsin's power plants. The status of emission control projects at Columbia Units 1 and 2 has moved from not having filed an application in the previous SEA to "pending" in the current SEA. In addition, the Edgewater Unit 5 selective catalytic reduction (SCR) project is underway.

Table 5 Major Emissions Control Projects* at Wisconsin Utilities' Power Plants

Unit Name	Utility Owner	Project Status	Type of Emission Control**	Year of Commercial Operation
Pleasant Prairie 1	WE	Complete	SCR/FGD	1980
Pleasant Prairie 2	WE	Complete	SCR/FGD	1985
Oak Creek 5	WE	Under Construction	SCR/FGD	1959
Oak Creek 6	WE	Under Construction	SCR/FGD	1961
Oak Creek 7	WE	Under Construction	SCR/FGD	1965
Oak Creek 8	WE	Under Construction	SCR/FGD	1967
Edgewater 5	WP&L/WE	Under Construction	SCR	1985
Columbia 1	WP&L/WPSC/MGE	Application Pending	FGD	1975
Columbia 2	WP&L/WPSC/MGE	Application Pending	FGD	1978
Nelson Dewey 1	WP&L	Application Pending; Inactive	FGD	1959
Nelson Dewey 2	WP&L	Pending	FGD	1962
Weston 3	WPSC	Pending	FGD	1981

* Major emissions control projects only include projects over $25 million. Table does not include combustion control projects for NO_x, and does not include activated carbon control projects for mercury.

** Selective catalytic reduction (SCR) and selective non-catalytic reduction (SNCR) are methods of chemically converting NO_x emissions into other substances. Flue gas desulfurization (FGD) refers to methods of chemically transforming SO_2 emissions into other substances. All are chemical methods of converting air pollutants to more benign and/or manageable substances.

MGE currently anticipates Blount Units 3, 4, and 5 will be retired in 2013. In addition, Blount Units 6 and 7 are operated as natural gas units only as of April 2010.

In December 2005, the Nuclear Regulatory Commission (NRC) granted a license extension to Point Beach Nuclear Power Plant Units 1 and 2, which authorizes the Point Beach facility to operate until at least 2030. The Kewaunee Nuclear Power Plant will soon file a similar extension request with the NRC. If NRC grants the extension, the Kewaunee facility will likely operate in Wisconsin through 2033.

The Commission recently opened a generic docket to address excess capacity issues in the state. Given the age of Wisconsin generating facilities—some of which are highlighted in Table 5—the docket may tackle issues such as evaluation of older, less-efficient units in a greenhouse gas context, or with a focus on maintenance costs or fuel-switching current units to gain new efficiencies rather than planning to build new generation units in the future. Wisconsin's aging generation fleet, the EPA's December 2009 endangerment finding and resulting carbon regulation may change the Wisconsin perspective on its generation mix in the coming years.

The Generation Picture

Wisconsin has come through a cycle of building new generation capacity in order to adequately address past capacity shortages and now enjoys a healthy planning reserve. As is the case with most cycles, Wisconsin utilities face a new challenge—this time, having what appears to be excess capacity, due in part to volatile economic times, that has led to decreased energy demand in the state.

Within this challenge lies a potential opportunity for Wisconsin in the Midwest ISO regional energy market. Since Wisconsin has been at the front edge of a construction cycle, the newer units in Wisconsin may have an efficiency benefit over generation located in other parts of the Midwest ISO footprint. Other states may not be as well-positioned with capacity in their near futures, and Wisconsin utilities may increasingly serve as energy exporters if other states become capacity-strapped in the future. Nonetheless, additional analysis is needed to identify realistic assumptions about the benefits that may flow to ratepayers from this excess capacity. Of course, this analysis may show that excess capacity is not economical for Wisconsin which may encourage other actions by Wisconsin utilities.

It cannot be overlooked that Wisconsin utilities still generate a strong majority of our state's electricity (and any potential exports) through coal generation facilities. Depending on the future of environmental regulation, Wisconsin utilities will have to respond with new or retrofitted generation facilities that fit possible emission restrictions.

TRANSMISSION SYSTEM PLANS, ISSUES, AND DEVELOPMENTS

Locations and Descriptions of Proposed Transmission Projects

By state statute, this SEA is required to report all transmission lines designed to operate at voltages above 100 kilovolts (kV) on which transmission providers propose to begin construction before 2016, subject to Commission approval. ATC, a stand-alone transmission company created in 2001, is the largest transmission provider in Wisconsin; data for this SEA was also provided by DPC and Xcel. "Construction" means building new lines, rebuilding existing lines, or upgrading existing lines. Building new lines requires new transmission structures, and likely requires new right-of-way (ROW).

Beyond new construction, the Commission also oversees rebuilding or upgrading existing lines, which may also require new structures or new ROW. To rebuild a line means to modify or replace an existing line; in other words, to keep it at the same voltage and improve its capacity to carry power through new hardware or design. To upgrade an electric line means to modify or replace an existing line, but at a higher voltage. An upgrade also improves the line's capacity to carry power. Both rebuilding and upgrading may require some (or many) new, taller structures. New ROW may also be needed if the new structures require a wider ROW, or if the line route requires relocation to reduce environmental impacts. Either way, rebuilt or upgraded transmission lines usually need significantly less new ROW than new lines.

The primary reasons for needing additional transmission lines may include one or more of the following:

- Growth in an area's electricity use, which often requires new distribution substations and new lines to connect them to the existing transmission system, or needed increased capacity of existing transmission lines;
- Aging of existing facilities that has resulted in reduced reliability due to poor condition;
- Maintenance of system operational security for the loss of any one transmission or generation element;
- Increased power transfer capability or access;
- Increased access to support the expanded use of renewable energy;

- Generation interconnection agreements and transmission service requirements for proposed (or approved) new power plants; and
- Maintenance of transmission system reliability and performance.

In general, the higher a line's voltage, the more power it can carry and losses are reduced. As a consequence, the higher-voltage transmission lines are important in delivering large amounts of power on a regional basis, and the lower-voltage lines primarily deliver power over a more limited area. The ability to deliver power reliably to local substations and the ability to import power from, or export to, other regions are both important functions in providing adequate, reliable service to customers.

Table A-02 in Appendix A shows new electric transmission lines on which construction is expected to start by 2016 if approved by the Commission. Table A-03 in Appendix A lists proposed high-voltage transmission projects that primarily involve new ROW. This table provides further detail on the proposed transmission lines listed in Table A-02. Most of the other lines in Table A-02 are proposed to primarily use existing electric transmission line ROW.

Transmission Planning in the Midwest

In this SEA, Commission staff note that transmission planning is becoming more and more regional, or "big picture" in scope. Wisconsin belongs to regional transmission operator Midwest ISO, and its reliability territory, displayed below in Figure 5, covers a large portion of the Midwest. In this current SEA period, the Commissioners and Commission staff have been actively participating in several regional transmission planning initiatives that are summarized in the following several pages, beginning with an explanation of Midwest ISO Transmission Planning.

Additionally, there are planning efforts looking at a wider scope than the regional energy markets. Funded by a U.S. Department of Energy (DOE) grant, the Eastern Interconnection States' Planning Council (EISPC) is a group of state officials engaged in a planning effort for the eastern U.S. Wisconsin is well represented in this endeavor by Commissioner Azar, who is the first President of the EISPC organization. This effort is explained in more detail below.

Figure 5 Midwest ISO Reliability Coordination Area

MIDWEST ISO TRANSMISSION PLANNING—OBJECTIVES AND SCOPE[4]

The Midwest ISO regional transmission planning process is an ongoing comprehensive expansion plan for both the reliability and economic needs of 13 states and one Canadian province.

The five Midwest ISO planning principles are as follows:

- Make the benefits of a competitive energy market available to customers by providing access to the lowest possible energy costs;
- Provide a transmission infrastructure that safeguards local and regional reliability;
- Support state and federal renewable energy objectives by planning for access to all such resources (*e.g.* wind, biomass, demand-side management);
- Create a mechanism to ensure that investment implementation occurs in a timely manner; and
- Develop a transmission system scenario model and make it available to state and federal energy policy makers to provide context and information regarding potential policy choices.

The Midwest ISO scope of operations includes approximately 159,000 MW of generation from 5,575 generating units in the reliability footprint with a peak load of approximately 136,520 MW. Wisconsin represents about 12 percent of the Midwest ISO system. The region membership has

[4] This section of this SEA relies significantly on documents produced and made available from Midwest ISO.

34 transmission owners and 98 non-transmission owners. The membership covers 920,000 square miles with 51,700 miles of transmission lines ranging from 69 kV to 500 kV.

MIDWEST ISO WHOLESALE ENERGY AND DEMAND RESPONSE RESOURCES

The Midwest ISO wholesale energy market accepts load bids net of demand response from retail electricity providers and generation or price responsive demand offers from resource owners. The Midwest ISO uses this information to establish the clearing price for the wholesale energy market. Clearing prices are set at various nodes and include an energy price, a congestion cost, and a loss component. These three items are utilized by the Midwest ISO to centrally dispatch resources to match load in a manner that maintains electric system reliability and simultaneously sends price signals about where generation or transmission is needed or demand could be reduced.

The Midwest ISO energy and ancillary services market and resource adequacy structure provide several options for the participation of demand response resources. The most common demand response resources, direct load control programs for residential air conditioners and industrial and commercial interruptible load programs, receive credit as capacity resources under the provisions of the Midwest ISO resource adequacy program. Put another way, a demand response resource is a tool that can be used to reduce the forecasted peak load. Since capacity expansion is based largely on peak load requirements, demand response resources can have the effect of reducing the amount of generating resources that are needed to provide reliable electricity. Aside from this long-term benefit, demand response programs can also participate in the Midwest ISO's daily energy market as "price sensitive loads." These programs can be called upon to reduce loads when price spikes occur in the energy market, thus helping to diminish high energy prices and reduce utility expenses.

Midwest ISO also allows utilities to nominate loads or customer-owned generation resources that are not designated as capacity resources under the resource adequacy structure to participate as "emergency demand response" resources which would be called on only during system emergencies. This program increases system reliability and provides customers an opportunity to receive compensation for voluntarily reducing loads or operating generation during system emergencies.

The Commission is currently developing a report on demand response in Wisconsin as part of docket 5-UI-116.

More facts about Midwest ISO and its scope, services, ongoing studies, and more can be found at its website: http://www.midwestiso.org/home.

TRANSMISSION PLANNING EFFORTS IMPACTING WISCONSIN

There are a number of transmission expansion planning efforts that could impact Wisconsin. Many of these are described in detail in this section. The broadest planning effort is that involving the EISPC, which considers the entire eastern interconnection. The eastern interconnection is a large geographic area includes 39 states as well as the District of Columbia and several Canadian provinces and territories. EISPC is a first of its kind effort to coordinate among the states and to look at the eastern interconnection as a whole, rather than in smaller sections. The EISPC process is a part of a larger effort that includes the planning authorities and other stakeholders in the eastern interconnection.

EISPC is not developing a specific transmission plan that will be implemented. Rather, EISPC is studying a number of scenarios for a variety of potential futures. Through this planning exercise, policy makers will be informed of the potential outcomes of differing policy decisions.

At the regional level, the Organization of MISO States (OMS) continues to be engaged in planning efforts in the Midwest. Additionally, a subset of OMS states were previously engaged in the Upper Midwest Transmission Development Initiative (UMTDI). Finally, there are a number of individual transmission development initiatives being put forth by utilities. While any individual proposal will have to go through the transmission planning process at Midwest ISO as well as gain approval from regulatory agencies, the PSC needs to continue following individual proposals that could impact Wisconsin energy delivery and pricing.

Some of the regional transmission efforts are described further here.

MIDWEST ISO TRANSMISSION EXPANSION PLAN (MTEP)

Midwest ISO's MTEP process provides an annual report which identifies a number of transmission projects that are being planned or alternatives being considered. The planning effort is a collaboration of Midwest ISO's planning staff and its many stakeholders, including utilities and independent power producers throughout the footprint. The MTEP09 report cycle analysis contained 274 new projects, with $903 million of incremental transmission infrastructure investment, that are approved by the Midwest ISO Board for implementation.

In December 2010, Midwest ISO approved the MTEP10 cycle report. MTEP10 contains 230 new reliability projects with $680 million of incremental transmission infrastructure investment. The reliability projects are largely located outside of Wisconsin, but will have some rate impacts since reliability projects have some percentage of cost sharing. Some MTEP10 projects were identified through analysis involved in developing the Regional Generation Outlet study (RGOS) that is described below.

MTEP10 includes a new category of transmission infrastructure called "Multi-Value Projects" (MVP). This new category was approved by the Federal Energy Regulatory Commission (FERC) for cost

sharing of the entire project cost across the Midwest ISO region. A number of parties, including the PSC, have requested that FERC reconsider its approval of this cost-sharing mechanism. The final outcome of this cost-sharing proposal is yet to be determined.

Despite the uncertainty of the final elements of the MVP cost-sharing proposal, MTEP10 approved a number of MVPs, none of which are located in Wisconsin. The MVPs approved in MTEP10 are all in Michigan, and total approximately $510 million. Given the cost-sharing proposal approved by FERC, a portion of these costs will likely be paid by Wisconsin customers. The PSC is not opposed to cost-sharing proposals in general, but is seeking reconsideration at FERC to ensure that the cost-sharing method is equitable, and accounts for all of the beneficiaries of new transmission infrastructure.

Project types in the MTEP process can fit into the six categories listed and defined below:

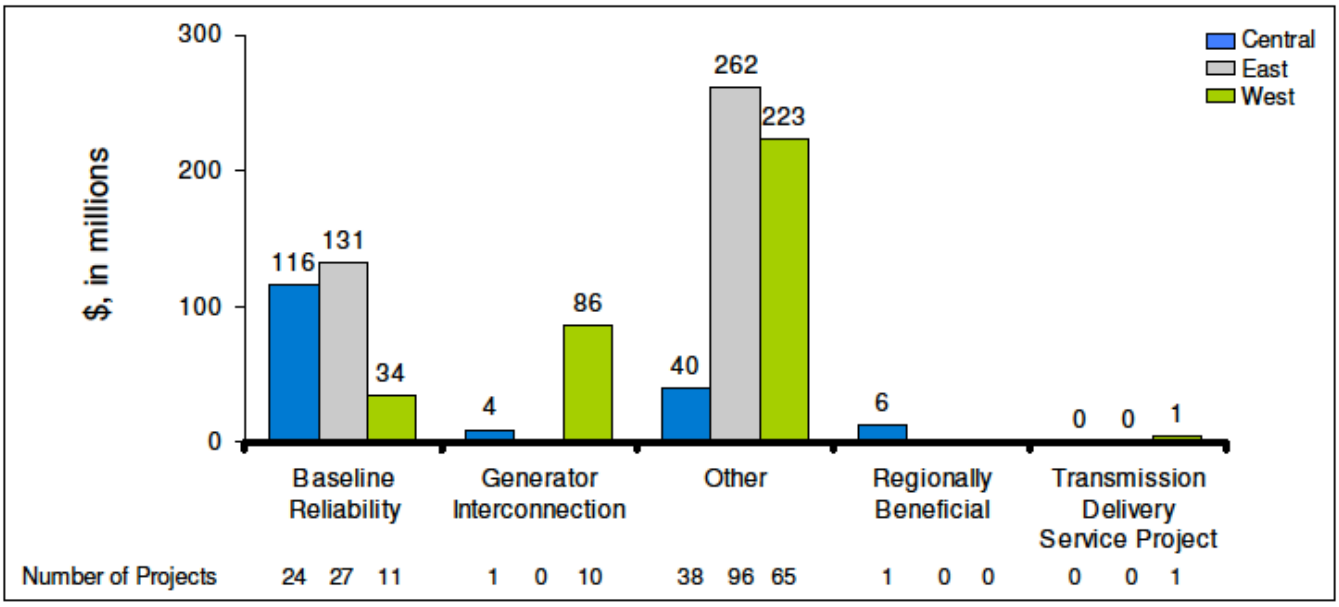
- Baseline Reliability – projects required to meet North American Electric Reliability Corporation (NERC) reliability standards;
- Generation Interconnection – projects required to reliably connect new generation to the transmission grid;
- Other – a wide range of projects that are designed for local economic or similar benefit. This includes projects that do not meet the reliability or regionally economic beneficial qualifications for cost sharing;
- Transmission Service Delivery Request – projects for transmission service directly assigned to the requestor;
- Regionally Beneficial Project – a project that is 345 kV or higher that provides economic benefits that exceed certain cost-benefit ratios and driven by planned in-service dates. Such projects tend to increase the robustness and efficiency of trading in the wholesale energy market; and
- MVPs – high-voltage transmission designed to meet federal or state policy goals.

Many projects are categorized as baseline reliability projects, generation interconnection projects, or "other" projects.

Figure 6 projects a total of approximately 3,350 miles of new or upgraded lines in the 2009 to 2019 time period. The MVP designation did not exist at the time that MTEP09 was adopted. The generation interconnection projects in Figure 6 are primarily for 11 wind projects totaling 1,100 MW.

More information on new or upgraded transmission lines by state or information on projects and cost sharing eligibility are available in the MTEP 09 and MTEP10 reports.

Figure 6 MTEP09 Projects and Costs[5]



In addition to projects approved by the Midwest ISO board, the MTEP planning process further includes projects which are still in a planning process or under Midwest ISO review, and projects which are in the early planning stages and have not been yet reviewed for effectiveness. For more information on the MTEP planning process, the complete 2009 and 2010 reports can be found at the Midwest ISO website: http://www.midwestiso.org.

MIDWEST ISO REGIONAL GENERATION OUTLET STUDY (RGOS)

In addition to more comprehensive regional studies, Midwest ISO also produces more targeted studies to address specific issues such as: congestion, narrowly congested areas, narrowly constrained areas, and RPS in the Midwest, as well as queue-related and operational studies. In recent years, many states have enacted RPS or renewable energy goals. In the Midwest, these RPS laws vary in their requirements and timing, but generally start around the year 2010 and continue to 2025. As a result of the RPS requirements, it is estimated that an additional 25 gigawatts (GW) of wind will be needed beyond the approximately 8 GW installed in Midwest ISO as of July 2010. Given the current generation queue process, a balanced transmission plan is needed to provide a cost-effective build-out for the next 5 to 15 years and beyond. One example is the RGOS, which Midwest ISO initiated in 2008, which was initiated in concert with the UMTDI discussed later. RGOS addressed several issues including:

[5] The Midwest ISO updated this information in MTEP10; however, the updated image reports this information on a state-by-state basis rather than a regional basis. The updated version of this graph is available in the MTEP10 report, which is available at https://www.midwestiso.org/Library/Repository/Study/MTEP/MTEP10/MTEP%2010%20Final%20Report.pdf.

- The backlog of 60,000 MW of wind requests in the interconnection queue—an amount of wind energy that is far more than needed to meet the states' RPS requirements;
- The varying state and federal energy policy and regulation;
- The ability of a large regional transmission system and organized market to enable the integration of intermittent generation resources such as wind;
- The more remote locations of the wind energy resources in relationship to the large energy usage requiring a different type of regional transmission system design; and
- The inability of the existing and short-term planned transmission system to deliver the amount of renewable energy required by the states in the five- to ten-year time frame with a coordinated plan.

The RGOS involves two phases of study and analysis. The Phase I RGOS study used 2008 requirements and included the western area of the Midwest ISO footprint including: Illinois, Iowa, Minnesota, North Dakota, South Dakota, and Wisconsin. The Phase I RGOS study analyzed renewable energy delivery by balancing wind energy locations against existing transmission capacity and load center locations. RGOS not only relied on Midwest ISO guidance, but also involved Midwest ISO stakeholders and Mid-Continent Area Power Pool (MAPP) and PJM Interconnection (PJM) transmission owners as participants.

As Phase I work was approaching completion, the final phase to complete the analysis for the remainder of Midwest ISO footprint was started. Relying on the experiences and design work of Phase I, Midwest ISO translated the transmission analysis and reliability solutions to its entire footprint. The Midwest ISO anticipates that renewable energy, especially wind, interconnected will continue to expand as states strive to meet their RPS requirements. Sample transmission options being considered in RGOS, including starter projects considered to be the backbone of the transmission system to deliver the wind and other up-to-date details can be viewed at its website: http://www.midwestmarket.org/page/Renewable%20Energy%20Study.

In late fall 2010, the UMTDI identified seven first mover projects for the renewable energy delivery as discussed later in this section.

EASTERN WIND INTEGRATION AND TRANSMISSION STUDY (EWITS)

The EWITS was completed in January 2010 after two and one-half years of effort. DOE commissioned the EWITS through its National Renewable Energy Laboratory (NREL). The investigation began in 2007 and was unique in its scope, scale, and depth. The purpose was to answer a series of questions posed by a variety of stakeholders concerning higher penetrations of wind, such as 20 to 30 percent of the energy source, in the Eastern Interconnection.

The following are key findings[6] from the EWITS:

- High penetrations of wind generation—20 to 30 percent of the electrical energy requirements of the Eastern Interconnection—are technically feasible with significant expansion of the transmission infrastructure.
- New transmission will be required for all the future wind scenarios in the Eastern Interconnection, including the Reference Case. Thus, planning for this transmission is imperative because it takes longer to build new transmission capacity than it does to build new wind plants.
- Without transmission enhancements, substantial curtailment (shutting down) of wind generation would be required for all of the 20 percent scenarios.
- Interconnection-wide costs for integrating large amounts of wind generation are manageable with large regional operating pools and significant market, tariff, and operational changes.
- Transmission helps reduce the impacts of the variability of wind, which reduces wind integration costs, increases reliability of the electrical grid, and helps make more efficient use of the available generation resources.
- Wind generation displaces carbon-based fuels, directly reducing CO_2 emissions. Emissions continue to decline as more wind is added to the supply picture.

The PSC does not have a formal position on this EWITS material, but presents it here in this final SEA in order to communicate that significant transmission planning is occurring in response to federal and state energy policy developments. The final EWITS report is available online at: http://www.nrel.gov/wind/systemsintegration/pdfs/2010/ewits_executive_summary.pdf.

UPPER MIDWEST TRANSMISSION DEVELOPMENT INITIATIVE (UMTDI)

In 2008, commissioners and governors from Iowa, Minnesota, North and South Dakota, and Wisconsin formed UMTDI. The goal of this effort was to identify regional planning and cost allocation issues related to delivering renewable energy from Plains states to the UMTDI states' load centers in order to meet applicable state RPS laws.

In the matter of cost allocation, UMTDI representatives decided to defer to the ongoing efforts of the Midwest ISO Regional Expansion Criteria and Benefits Task Force (RECB-TF), and the OMS Cost Allocation and Regional Planning (CARP) process.

UMTDI accomplishments during 2008-2010 were as follows:

- UMTDI served as a catalyst for current transmission policy development, including regional transmission planning and developing cost allocation approaches.

[6] National Renewable Energy Laboratory, *Eastern Wind Integration and Transmission Study: Executive Summary and Project Overview*. January 2010.

- The effort of the five UMTDI states to bring about solutions to transmission development issues, especially for renewable energy resources, has been a large step forward in regional cooperation.
- UMTDI identified renewable energy zones and adopted a five-state preference for Midwest ISO modeling and planning.
- UMTDI used an executive-driven management model with strong coordination and relationships between utility commissions and state energy office efforts in the five state area, advising the governors on important renewable energy and transmission project issues.
- UMTDI identified seven "first mover" or "no regrets" projects. In Wisconsin, there were two projects. The defined areas include: (1) Madison to La Crosse, and (2) Madison to Dubuque, Iowa.

UMTDI issued its final report in late fall 2010. More information on UMTDI is available online at: http://www.misostates.org/UMTDIList.htm.

EASTERN INTERCONNECTION PLANNING COLLABORATIVE (EIPC) AND EASTERN INTERCONNECTION STATES' PLANNING COUNCIL (EISPC)

Encompassing the broad geographic region from eastern Canada to the Gulf of Mexico and from the Rocky Mountains to the Atlantic Ocean, EIPC is a new effort being developed and led by 26 planning authorities from the U.S. and Canada to conduct transmission analyses at the interconnection level. Made possible by 2009 American Recovery and Reinvestment Act funds, the EIPC Collaborative plans to develop and analyze regional transmission infrastructure plans. The assumptions and scope of the plans will be developed through a process involving a variety of stakeholders, including state representatives through the EISPC. The development of these plans will continue through 2011. The resulting plans will not be mandatory and will not bind any future action. Instead, the plans are being developed to provide information about the infrastructure that may be necessary in the eastern interconnection under different futures. For up to date information about the evolving EIPC effort, visit its website: http://www.eipconline.com/.

DOE also awarded $14 million in funding to EISPC to assist the states in participating in the process that identifies the scope and assumptions that go into the studies conducted by the EIPC. The states are key stakeholders in the consensus-driven process. Among other things, EISPC is charged with identifying "energy zones" of interest for the development of low or no carbon electricity generation. Wisconsin Commissioner Lauren Azar is the first President of the EISPC. A new President will be elected in March 2011. Additional information about EISPC is available online at: http://www.eispc.org/.

MIDWEST ISO TRANSMISSION COST ALLOCATION

Along with efforts to improve, expand, and coordinate regional transmission planning efforts, corresponding efforts are underway to determine cost allocation strategies. The Midwest ISO formed the RECB-TF in 2005, and in 2009 named Wisconsin Commissioner Lauren Azar as its Chair. She

held the position until July 2010. Stakeholders include load serving entities, generating utilities, states, consumer interest groups, independent power producers, power marketers, transmission owners, wind developers, and environmental protection representatives. During 2009-2010, the RECB-TF was focused on cost allocation for wind generator interconnection projects, the integration of large quantities of renewable generation located remote from load, and whether present cost sharing arrangements for reliability and commercial-oriented transmission projects need modification.

Simultaneous with the RECB-TF, OMS has formed the companion group to address CARP which was comprised of state regulators from the OMS states. The goal of CARP began as an examination of regional planning from a state regulator perspective. Given the fact that regulators must consider the broad public interest and many stakeholders, CARP stood in contrast to some other planning efforts directed by specific stakeholders.

CARP and RECB-TF also addressed cost allocation issues, and from October 2009 largely focused on identifying a transmission cost allocation solution for the Midwest. Midwest ISO was ordered by FERC to identify a solution to issues surrounding generator interconnections for remotely located generation resources. FERC provided a deadline of July 15, 2010, for this cost allocation solution.

Both RECB-TF and CARP identified and advised Midwest ISO on its preferred cost allocation features. On July 15, 2010, Midwest ISO filed its required cost allocation proposal with FERC. The proposal has some components of the proposals developed by CARP and RECB-TF, but had important differences as well.

FERC approved the Midwest ISO proposal with only minor changes. Under the approved tariff, projects that meet the criteria to be MVPs (a new category of transmission projects identified in the tariff) would have costs allocated to retail load across the Midwest ISO footprint. This broad cost sharing is justified by the assumption that MVPs will provide many benefits to all Midwest ISO customers.

Generator interconnection projects would be paid for 100 percent by the interconnecting generator for connections below 345 kV, and 90 percent for 345 kV and above. The remaining 10 percent would be spread to retail loads throughout the Midwest ISO footprint. The goal of this cost allocation is to encourage new generators to site facilities close to existing transmission or to new MVP transmission infrastructure.

FERC approved the tariff in December 2010. FERC denied Midwest ISO's request that the tariff include provisions to charge a portion of the MVP costs to energy that is exported to PJM Interconnection. Since then, the PSC and other parties have requested rehearing on several issues, including the export fee issue. The PSC argued that retail loads benefiting from the MVP infrastructure should pay for that benefit. Therefore, the FERC order does not pass a cost causer standard established in FERC and court precedent. The PSC also asked for rehearing on other aspects of the FERC order.

While on one hand the MVP approach has the promise of bringing cleaner, renewable power to market, how the necessary transmission is paid for must be equitable between causers and beneficiaries. The present FERC-approved Midwest ISO MVP approach does not represent such a balance. The next step is for FERC to decide whether or not to have a rehearing. If FERC decides not to have a rehearing, then stakeholders will have to decide whether to litigate this matter.

ATC TRANSMISSION PLANNING

Wisconsin's largest transmission owner and operator—ATC—continues to do its own transmission planning. ATC annually produces a 10-Year Transmission System Assessment based on engineering studies of the Wisconsin and surrounding transmission system, looking for potential problems that may affect the future performance of the system. ATC's studies identify future projects needed to improve the adequacy and reliability of the electric transmission system. The major projects that ATC is planning for construction are listed in the appendix of this report.

In developing its annual 10-year transmission plans,[7] ATC considers many factors, including: (1) load growth; (2) new generation; (3) population trends; (4) electric reliability of the present grid; (5) the amount of congestion on the transmission grid; (6) pricing outcomes from the Midwest ISO's operation of the wholesale energy markets; (7) project economics; (8) age of assets; (9) siting, including the impact on the environment and communities involved; (10) expected changes in the transmission grid around Wisconsin; and (11) state and federal policy.

By law, ATC must operate the present and future transmission grid up to the electrical standards set by NERC. In performing its planning function, ATC takes input from all types of stakeholders, such as the public, utilities, communities, and Midwest ISO. ATC conducts its studies with review and oversight provided by Midwest ISO, FERC, NERC, and the PSC. Among utilities nationally, FERC has recognized ATC as one of the utilities with the best public planning practices.[8]

ATC is a for-profit transmission utility. ATC's transmission service rates are subject to the jurisdiction of FERC. Construction approval, siting of new transmission, and new project cost scrutiny are regulated by the PSC and by the Michigan PSC for the Upper Peninsula. Due to changes in law granting open access to the transmission system for all users, transmission planning has increasingly been taking on a regional character. Because of the regional nature of the grid, ATC must work in conjunction with neighboring transmission owners in other states and Midwest ISO to coordinate plans from numerous companies. ATC has been part of numerous collaborative planning processes in the Midwest, and the PSC plays an active role in monitoring ATC's activities to protect the public interest.

[7] ATC. *2009 10-Year Transmission System Assessment Summary Report*. Web. Accessed June 8, 2010. Available online at: http://www.atc10yearplan.com/documents/TYA-09.pdf.
[8] FERC, Order 890.

MARKET ANALYSIS AND PLANNING RESERVE MARGIN FORECASTS

This section provides an assessment of Wisconsin's electric industry as it addresses four concerns mandated by law. Wisconsin Stat. § 196.491(2)(a) specifically requires the SEA to assess: (1) theextent to which the regional bulk power market is contributing to the adequacy and reliability of the state's electrical supply; (2) the adequacy and reliability of purchased generation capacity and energy to serve the needs of the public; (3) the extent to which effective competition is contributing to a reliable, low cost, and environmentally sound source of electricity for the public; and (4) whether sufficient electric capacity and energy will be available to the public at a reasonable price. The following sections address these concerns. The analysis incorporates data submitted by the electricity providers for the SEA and other data collected by Commission staff.

Extent to which the Regional Bulk Power Market Contributes to the Adequacy and Reliability of the State's Electric Supply

Adequacy and reliability are expected to remain robust with an acceptable planning reserve margin forecast through 2016. Planning reserve margins are often finalized through capacity purchases made a short time ahead of any shortfall. In the earliest SEAs, planning reserve margins were a major concern. In the second half of the 1990s, actual reserve margins often fell to less than 10 percent. The lowest actual reserve margin fell to 6.7 percent in 1995. By contrast, the actual reserve margin in 2008 was 26.6 percent and for 2009 was 11.7 percent. The generally high reserve margins noted of late have come at a cost, and the Commission's recent lowering of the reserve margin requirements will help to balance cost with reliability. Higher planning reserves can also increase the opportunity for sales into the Midwest ISO market. Such sales can benefit ratepayers.

Sufficient capacity remains only half of the story. Getting the power from the generation source to customers is the second half. The current state of Wisconsin's transmission system was addressed in the previous section of this SEA.

Adequacy and Reliability of Purchased Generation Capacity and Energy to Serve Public Needs

Generation capacity and energy may be purchased from facilities located within or outside of Wisconsin. Given the current excess in Wisconsin's generating capacity, it is likely that purchased power is a lesser priority right now, though this may vary among Wisconsin utilities. NSPW and SWP&L have Minnesota-based affiliates, and much of their generation capacity and energy needs are met as though they were part of the affiliates' system. The utilities in eastern Wisconsin are not part of multi-state affiliate networks that utilize electricity across a multi-state system. Much of the discussion in the initial SEAs on purchased generation capacity and energy focused on imports of capacity and energy, specifically their availability in light of increasing transmission congestion.

When comparing the market for purchased generation capacity in 2010 to earlier time periods, more of the purchased capacity and energy will be from facilities in Wisconsin. The state's three nuclear units have been sold, and the former utility owners have entered into purchase power agreements (PPA) with the Independent Power Producers (IPP), who now own the units. While the capacity and energy come from the same unit, it is now purchased rather than owned. With these PPAs for nuclear baseload energy, more GWh of total energy will be purchased than in the past. For example, the current PPA between WPSC and Dominion is up for renewal during the current SEA. Additionally, while the PPA between WEPCO and NextEra Energy Point Beach, LLC, approved by the Commission in the Point Beach Sale docket, is valid until 2030 and 2033 for Units 1 and 2, respectively, portions of it may be amended during this current SEA or within future planning periods to address a capacity uprate for these units currently under consideration by NRC. The Commission will be monitoring these PPAs closely, as the market for purchased generation capacity and energy continues to evolve. The Commission continues to watch developments at Midwest ISO and how generation capacity and energy markets continue to change.[9]

Extent to which Effective Competition[10] Contributes to a Reliable, Low Cost, and Environmentally Sound Electricity Source

The issue of reliability has been addressed in the previous sections of this report. This section will deal with the low cost and environmentally sound provisions required by statute. The Midwest ISO Day 2 market sets day ahead and real time prices for energy on a location by location basis throughout the

[9] The PSC is monitoring closely a proposal by Midwest ISO for resource adequacy. This proposal could be construed as a movement towards a capacity market within Midwest ISO, which could have significant impacts on Wisconsin utilities and ratepayers. Through OMS, the PSC has indicated concern that a mandatory capacity market may actually be a detriment to Wisconsin ratepayers. The PSC will monitor this issue closely.

[10] Wis. Stat. § 196.491(2)(a)12. does not specifically identify what "effective competition" means. Since Wisconsin does not have retail competition, the SEA considers the impacts of the wholesale energy market operated by Midwest ISO. This does not indicate that the PSC believes that all markets operated by Midwest ISO provide "effective competition." Future SEAs may provide greater focus on markets such as the market for Financial Transmission Rights to identify whether Wisconsin is receiving sufficient benefits.

area served by Midwest ISO participants. All Wisconsin utilities—including WPPI and recently, DPC—are part of the Midwest ISO.

Figures 7 and 8 on the following page show the on-peak Locational Marginal Pricing (LMP) from January 1, 2008, through December 31, 2010, for two pairs of Midwest ISO price points—an Illinois hub price compared to load node price WEC.S, and a Minnesota hub price compared to load node price WPS.WPSM. WEC.S is the price node for the southern Wisconsin load of WEPCO, and is representative of LMPs for southern Wisconsin. WPS.WPSM is the price node for the Wisconsin load served by WPSC, and is representative of LMP for northern Wisconsin. The Minnesota and Illinois hub prices look at prices to the west and south of Wisconsin, respectively. The west and south are the two primary paths of imported power into Wisconsin.

At the inception of the Midwest ISO Day 2 market on April 1, 2005, both of the Wisconsin node prices were often out of step with prices to the west and to the south. This is an indication of transmission constraints that cause either congestion or loss charges to push the LMP apart. Because the energy charge component of the LMP is uniform throughout Midwest ISO, differing LMP prices are caused by either congestion and/or loss charges. As new transmission and generation have come online, many of the congestion and loss issues have been relieved.

Figure 7 Average Hourly Day Ahead LMP for WEC.S and Ill.Hub

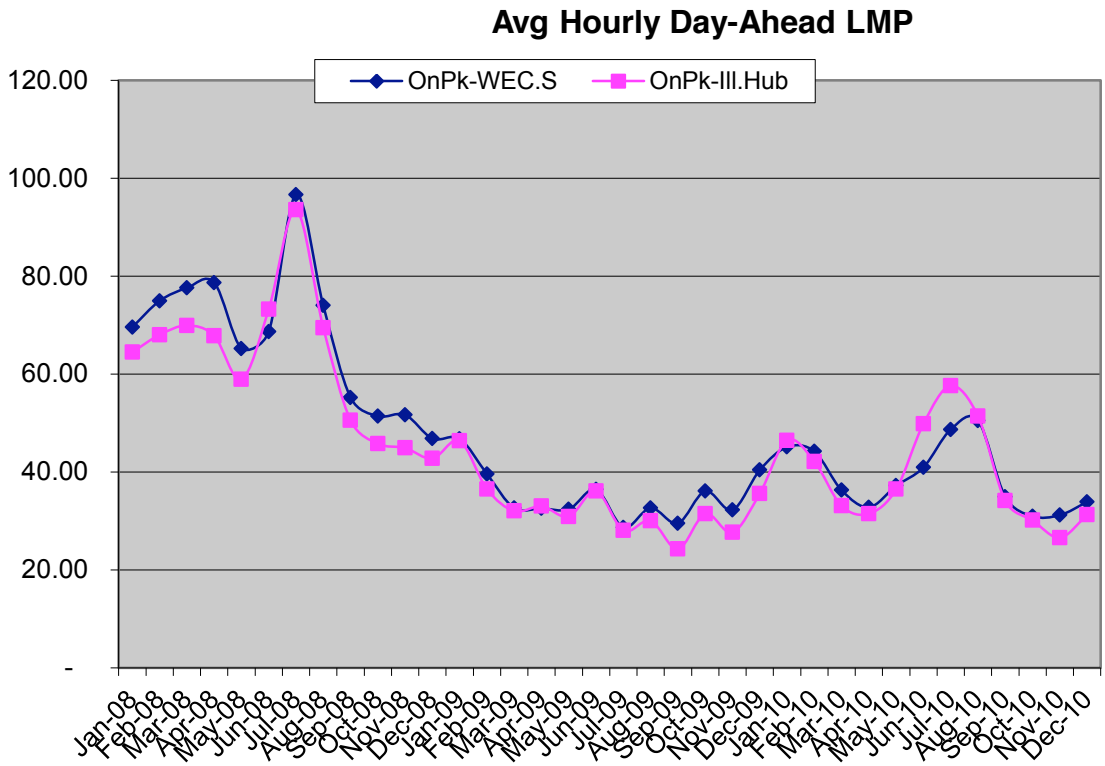
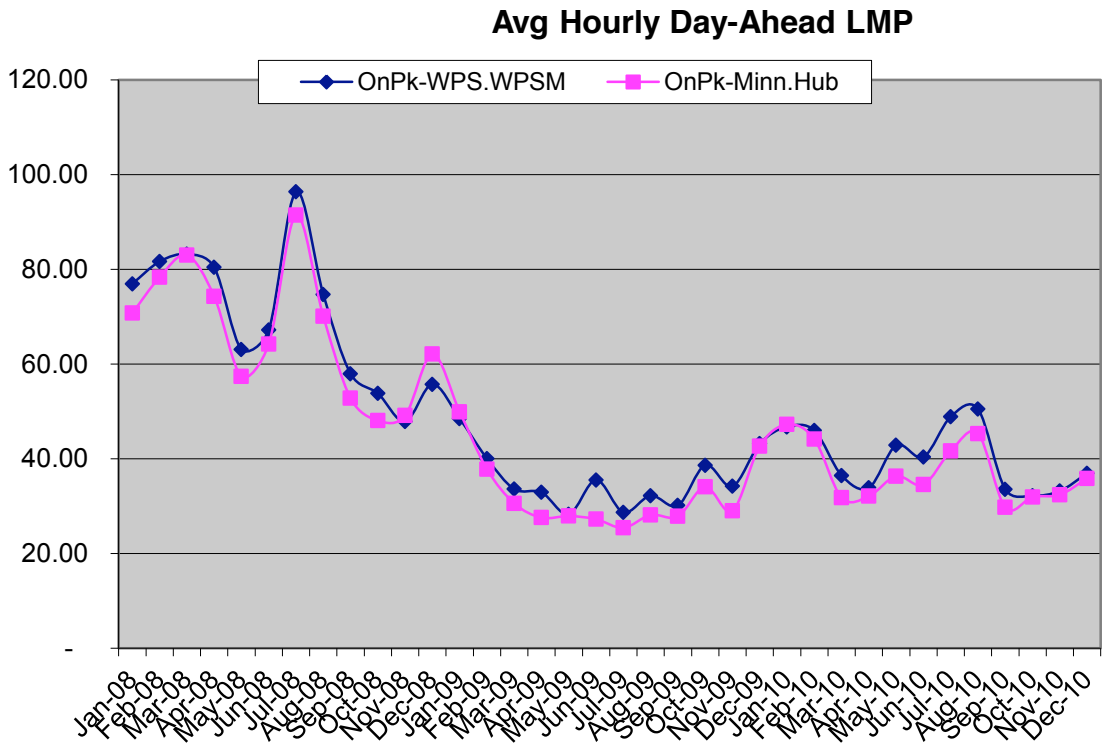


Figure 8 Average Hourly Day Ahead LMP for WPS.WPSM and Minn.Hub



The final topic in this section is an assessment of whether competitive markets are contributing to an environmentally sound source of electricity for the public. According to conventional economic theory, competitive markets will consider all direct economic costs and any indirect costs associated with externalities, such as pollutants, that have been regulated or monetized. In cases where legitimate externalities have not been factored in, any non-private costs associated with such externalities are ignored. There may be some exceptions where the public may be willing to pay a premium for goods or services that are perceived to be environmentally superior.

Competitive power markets have been contributing to an environmentally sound source in the cases of pollutants and externalities that are under public policy supervision. Examples include sulfur dioxide (SO_2), nitrogen oxide (NO_X), particulate pollution and mercury. However, this may not be the case for pollutants and legitimate externalities that are not under appropriate or adequate public policy supervision, such as greenhouse gas (GHG) or permanent nuclear waste disposal.

Assessment of Whether Sufficient Electric Capacity and Energy will be Available to the Public at a Reasonable Price

As noted in Table 1, planning reserve margins are projected to be at least 15 percent or more through 2016. The magnitude and the mix of new electric generation appear to answer the statutory concern about sufficient capacity in the affirmative. Wisconsin's electric generation future is in much better shape than it has been with respect to capacity and energy.

Emission reduction obligations are ongoing. In terms of installing pollution control equipment, maintaining affordable and reliable electric energy for Wisconsin is one consideration. The PSC will continue to monitor the likely next steps in NO_X, SO_2, and mercury emission controls, and will be ready to both provide technical assistance to the Department of Natural Resources (DNR) and report to the legislature on these issues as requested.

The state has implemented an RPS. This requirement will affect Wisconsin's optimal energy expansion path. Wind energy has accounted for most of the utilities' renewable energy and recent construction activity. Wind energy has very low marginal costs of generation, but has unpredictable availability. The varying availability of wind energy can be complemented by storage as well as rapidly available alternative generation capacity, such as natural gas-fired combustion turbines and combined-cycle units. This may imply higher capacity utilization for these units. Although there are limitations created with variable generation in planning efforts, it is possible to mitigate some of the variation.

A slowing in the rate of growth in energy consumption and the growth in peak demand has temporarily tempered the need for new capacity, especially peaking capacity. The Commission will continue to carefully weigh the need for new capacity, as well as the optimal generation mix, as we move forward. By law, the Commission must also ensure that the state's utilities comply with the state's RPS.

RATES

Direct rate comparisons between states and regions are increasingly difficult to make due to the complexities of energy regulation and the energy market in general. For example, rates can vary widely based on factors such as whether a state is in a construction cycle with generating facilities or expanding its transmission infrastructure. How a state and its regulated utilities are handling the accounting behind the rate setting process—for example, if cost deferrals are being approved—can affect the timing of rate impacts. Rates are also influenced by the various regulatory rate structures utilized in the Midwest. For example, Wisconsin has several vertically integrated utilities with regulated retail rates and a stand-alone transmission company, while other states do not share this structure. Some states use a deregulated retail structure. Fuel cost treatment also varies from state to state.

Wisconsin remains ahead of many other states with respect to its investment in new electric generation and transmission facilities needed to address future service reliability, and it is well positioned in the near future to meet its energy demand needs. Wisconsin entered the construction cycle earlier than other states in the Midwest partly because its economy was stronger than those in surrounding states. This required generation plants to be constructed in the late 1990s and early 2000s for which utilities now need to get cost recovery. These new cost competitive plants will be positioned to potentially sell any excess energy into the wholesale market benefitting retail customers. As is noted in Table 6, this construction cycle has had rate impacts on customers in Wisconsin. To ensure that Wisconsin ratepayers get the benefits of this capacity, the PSC will continue to evaluate the potential for selling energy into the Midwest ISO market.

In addition, federal policy changes in the late 1990s required open access to the transmission grid in the Midwest. This in turn caused more transmission system congestion for Wisconsin, which had to be addressed by the construction of new transmission facilities. The PSC continues to monitor transmission cost sharing in the Midwest ISO footprint.

According to the U.S. Energy Information Administration's (EIA) reported 2009 rate information in its Electric Power Monthly–January 2011 report, the U.S. average rates in the residential, commercial, and industrial classes all increased in the past year. The trend in Wisconsin rates generally matched its surrounding environment. Tables 6, 7, and 8 summarize average rates for residential, commercial, and industrial rates in the Midwest and the country.

Fuel prices and purchased power cost increases, generation and transmission construction costs, and lost sales as a result of the recession are the significant drivers of recent rate increases. Increases to customers' bills can be mitigated with energy conservation and efficiency and innovative rate options. For example, the Commission recently approved innovative rate programs for WP&L and WEPCO that are intended to promote increased economic development in the respective service territories[11]. Additionally, three community-based pilot programs are being implemented in the WPSC service territory to help identify the potential impacts of innovative rates and new technology. The pilot programs are a component of the PSC's approval of a decoupling program for WPSC. In addition, any selling of surplus energy to out-of-state utilities has the potential to help lower rates here, as indicated above.

Since the 2008 recession, most of Wisconsin's electric utilities have experienced a decline in electricity sales as a result of a slowdown in business and increased efforts to conserve on the part of all ratepayers. Several utilities have asked for, and some have received, rate increases due in large part to the decline in electricity usage during that time period. Many ratepayers have expressed their anger and frustration publicly and directly to the Commission about utilities raising rates during a time when they are using less in order to reduce their energy costs. Recent rate increases during a general usage downturn are confusing to customers and require an understanding of fixed and variable costs to ultimately provide motivation to conserve. It is also important to differentiate between a customer's rates and a customer's bill. Between the draft and final versions of the SEA, Tables 6 through 8 have been updated with the most recent EIA data available. These data were released in January 2011, and reflect rate data available through 2009.

Table 6 Residential Average Rates in the Midwest and U.S. (in cents)

	2002	2003	2004	2005	2006	2007	2008	2009
Illinois	8.40	8.38	8.37	8.34	8.56	10.33	11.07	11.27
Indiana	6.90	7.04	7.30	7.49	8.25	8.06	8.87	9.50
Iowa	8.30	8.57	8.96	9.36	9.77	9.41	9.49	9.99
Michigan	8.50	8.35	8.33	8.60	9.81	10.34	10.75	11.60
Minnesota	7.50	7.65	7.92	8.34	8.74	9.02	9.74	10.04
Missouri	7.10	6.96	6.97	7.08	7.62	7.72	8.00	8.54
Ohio	8.10	8.27	8.45	8.50	9.45	9.59	10.06	10.67
Wisconsin	8.10	8.67	9.07	9.64	10.50	10.72	11.51	11.94
Midwest Average	7.83	7.89	8.17	8.42	9.09	9.40	9.94	10.44
U.S. Average	8.43	8.70	8.97	9.42	10.47	10.65	11.26	11.51

Source: U.S. Department of Energy, Energy Information Agency, Electric Sales and Revenue Reports, January 2011.

[11] Commissioner Azar dissented with respect to WP&L's rate program for economic development. This rate program is the subject of a legal challenge.

Table 7 Commercial Average Rates in the Midwest and U.S. (in cents)

	2002	2003	2004	2005	2006	2007	2008	2009
Illinois	8.30	7.22	7.54	8.05	8.04	9.01	11.79	11.31
Indiana	6.00	6.13	6.31	6.54	7.23	7.16	7.82	8.32
Iowa	6.60	6.24	6.75	6.95	7.45	7.19	7.18	7.55
Michigan	7.50	7.55	7.57	8.09	8.51	8.98	9.20	9.24
Minnesota	5.90	6.12	6.31	6.56	7.10	7.47	7.88	7.92
Missouri	5.90	5.78	5.80	5.88	6.27	6.45	6.61	6.96
Ohio	7.70	7.60	7.75	7.92	8.44	8.64	9.22	9.65
Wisconsin	6.50	6.97	7.24	7.61	8.40	8.64	9.28	9.57
Midwest Average	6.84	6.66	6.91	7.20	7.68	7.94	8.62	8.82
U.S. Average	7.93	7.98	8.16	8.68	9.51	9.68	10.36	10.26

Source: U.S. Department of Energy, Energy Information Agency, Electric Sales and Revenue Reports, January 2011

Table 8 Industrial Average Rates in the Midwest and U.S. (in cents)

	2002	2003	2004	2005	2006	2007	2008	2009
Illinois	5.60	4.91	4.65	4.52	4.69	6.02	4.54	4.33
Indiana	4.00	3.92	4.13	4.40	4.99	4.98	5.46	5.81
Iowa	4.00	4.16	4.33	4.57	5.01	4.86	4.81	5.27
Michigan	4.90	4.96	4.92	5.58	6.05	6.52	6.74	6.99
Minnesota	4.20	4.36	4.63	5.06	5.27	5.78	5.87	6.26
Missouri	4.50	4.49	4.62	4.59	4.47	4.88	4.92	5.42
Ohio	4.70	4.79	4.89	5.03	5.60	5.78	6.19	6.71
Wisconsin	4.40	4.71	4.93	5.33	5.86	6.18	6.51	6.73
Midwest Average	4.56	4.51	4.64	4.89	5.24	5.63	5.63	5.94
U.S. Average	4.84	5.13	5.27	5.57	6.19	6.38	6.83	6.70

Source: U.S. Department of Energy, Energy Information Agency, Electric Sales and Revenue Reports, January 2011

The following non-energy related analogy may provide context to understanding the changes within the energy environment and better explain the conundrum. You own a car with a car payment of $300 per month. You drive 600 miles per month getting 30 miles per gallon of gasoline. In a typical month, your basic car costs for ownership and use includes $300 for the payment + $60 for gasoline (20 gallons at $3 per gallon). This makes your total monthly cost $360, or 60 cents per mile of driving. The next month, you drive your car just 300 miles. That month you pay $300 for the car payment + $30 for gasoline (10 gallons at $3 per gallon) = $330, or $1.10 per mile of driving. While your total car bill for the month went down as you drove only half of the distance of a typical month, your bill does not reduce by half. In fact, while your overall bill went down, the rate per mile went up.

This is similar to what can happen with lower usage, or increased energy efficiency, by electricity customers. Electric utilities are capital intensive—power plants and transmission lines are very

expensive to build. About 75 percent of a customer's electric bill is fixed—and covers infrastructure investment costs that do not vary with usage, like the costs of power plants and transmission lines. Regardless of usage, these costs need to be paid by ratepayers since prudent banks and shareholders will not knowingly invest in a business that cannot recover the cost of its product through customer sales. The remaining 25 percent of the bill represents fuel and other costs that do vary with usage. Therefore, reduced usage can mean the customer's rate goes up to pay the same fixed costs; however, spread over lesser usage, the customer's bill can go down because they are no longer paying the costs, like fuel, that vary with usage. In addition, in the long run, if new power plants can be delayed because conservation has reduced the need for the plants, future bills can be greatly reduced because of the enormous expense of the plants. This can especially benefit future generations, along with reduced emissions resulting from less power plant generation. The variable portion of a natural gas customer's bill is about 70 percent, meaning that energy efficiency can have an even greater impact on this customer's bill than it does for an electric customer.

A fictional, yet realistic energy example from Wisconsin may provide clarification. Consider that in April 2007, WP&L residential customer John Smith used 600 kWh per month and paid $66.28 for his electric bill. In April 2010, Mr. Smith's bill totaled $73.52 with the same usage of 600 kWh per month. This is a cumulative increase nearing 11 percent to John Smith's bill between 2007 and 2010, despite ***no change in energy use***. However, if Mr. Smith was able to reduce his usage by 2 percent per year for the three years covered in this example, his April 2010 electric bill would have increased by about 5 percent, or a more moderate 1.70 percent per year, for the three years.

By reducing electricity usage by 2 percent per year over the course of this example, this fictional customer's bill would have changed from its 2007 total of $66.28 to approximately $70 per month in 2010 with the same rate increases. For context, a 2 percent reduction in usage can be accomplished by switching three to four incandescent light bulbs with compact fluorescent lights.

The Commission remains committed to monitoring rate impacts on its Wisconsin consumers, and it continues to explore and welcome innovative rate structures. The Commission's recent decision involving economic development rates (WPL) is an example of such structures.

ENERGY EFFICIENCY AND RENEWABLE RESOURCES

Energy Efficiency

STATUS OF ENERGY EFFICIENCY EFFORTS

Conservation and energy efficiency efforts encourage customers to reduce their use of electricity. Conservation saves energy or reduces demand by reducing the level of energy services and generally involves behavioral changes such as turning off lights, changing thermostat settings, taking shorter showers, etc. Energy efficiency is the application of technologies that use less energy while producing the same or a better level of energy services. These technologies are generally long lasting and save energy whenever the equipment is in operation. Through the reduction in energy use, conservation and energy efficiency provide an important means for customers to control their electric bills. Conservation and energy efficiency have the additional benefit of reducing the need to build new power plants or transmission lines.

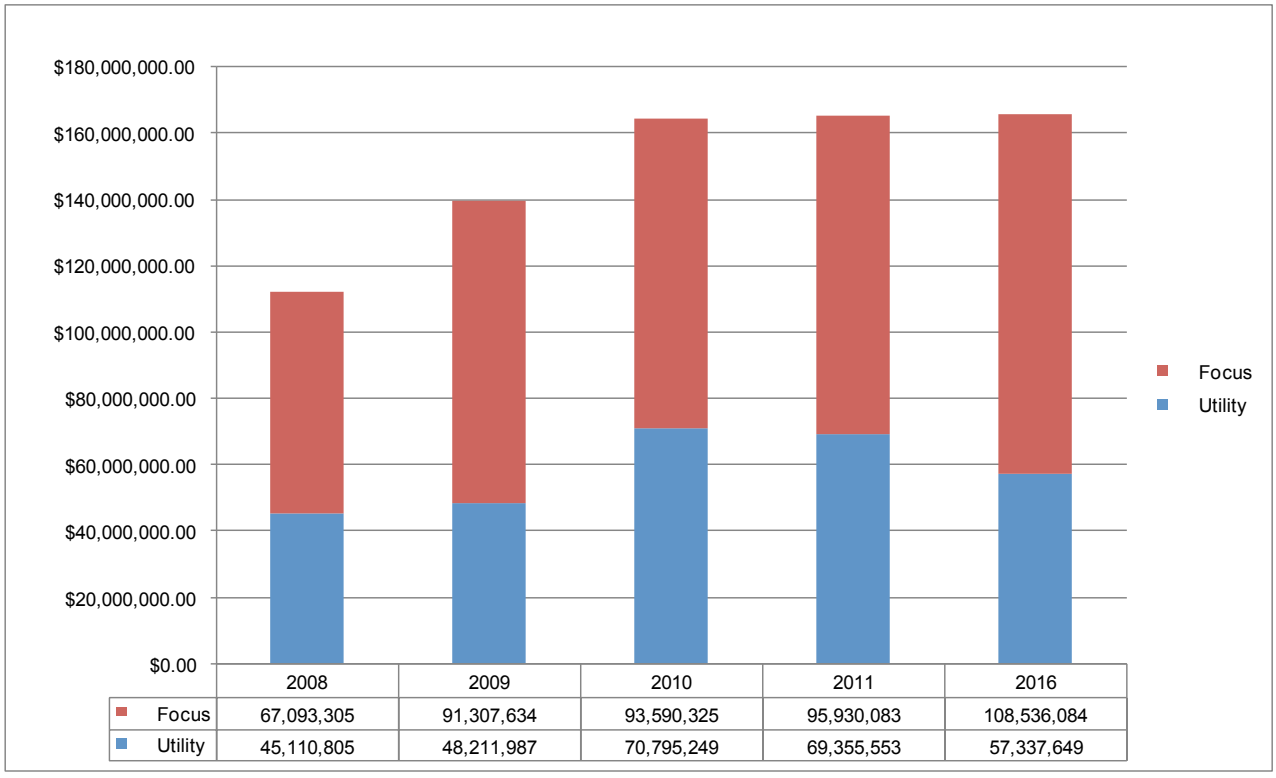
Prior to 2000, utilities had primary responsibility for energy efficiency services. 1999 Wisconsin Act 9 (Act 9) established a new mechanism, administered by the Department of Administration (DOA), for the funding and delivery of energy efficiency programs. Under Act 9, DOA contracted with third party program administrators for the development and delivery of statewide energy efficiency (Focus on Energy) programs. Energy efficiency programs through the DOA-administered Focus programs were first made available to ratepayers in 2001 and remained in place until July 1, 2007.

2005 Wisconsin Act 141 substantially revised the funding and structure of the statewide energy efficiency programs. Beginning July 1, 2007, the Focus on Energy programs are collectively funded by investor-owned utilities. In order to secure funding for the programs, the utilities directly contract with the program administrators. Funding of the Focus on Energy programs was increased to 1.2 percent of annual operating revenues. Act 141 also moved oversight of the Focus on Energy programs from DOA to the PSC.

Figures 9 through 11 provide the aggregate historical and projected electric conservation and energy efficiency expenditures, MW and MWh savings of Wisconsin utilities, and the Focus on Energy programs for calendar years 2008-2016. The charts include the aggregate expenditures and savings

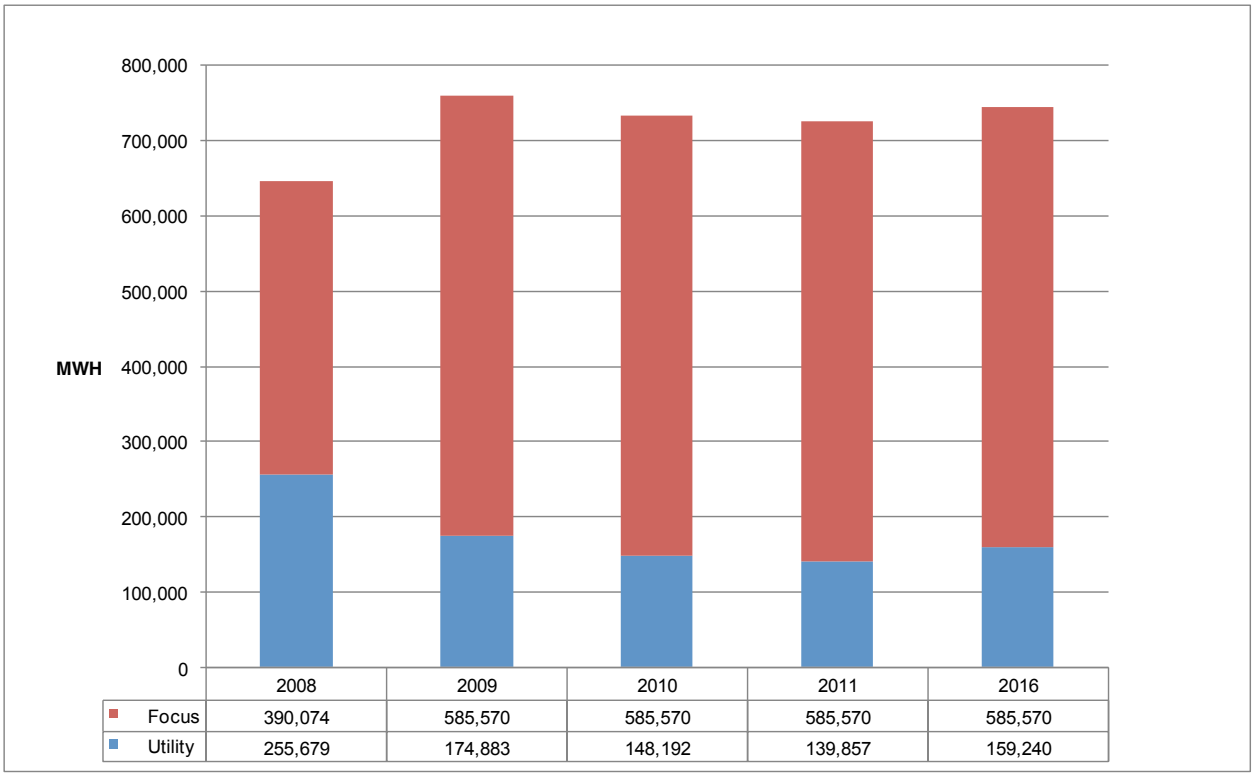
of the following utilities: MGE, NSPW, SWL&P, WEPCO, WP&L, and WPSC. Expenditures and savings for DPC and WPPI are also included. While utility customer service conservation expenditures are included, little or no savings are reflected for these activities because many of these services do not lend themselves to tracking and verifying the savings. Focus savings projections are based on the assumption of continued utility funding at a level of 1.2 percent of operating revenues. Focus on Energy expenditures are assumed to grow at an inflation rate of 2.5 percent per year. Because the expenditures only increase for inflation, energy savings and demand savings remain at the 2009 levels through 2016.

Figure 9 Annual Energy Efficiency Expenditures (2008-2016)



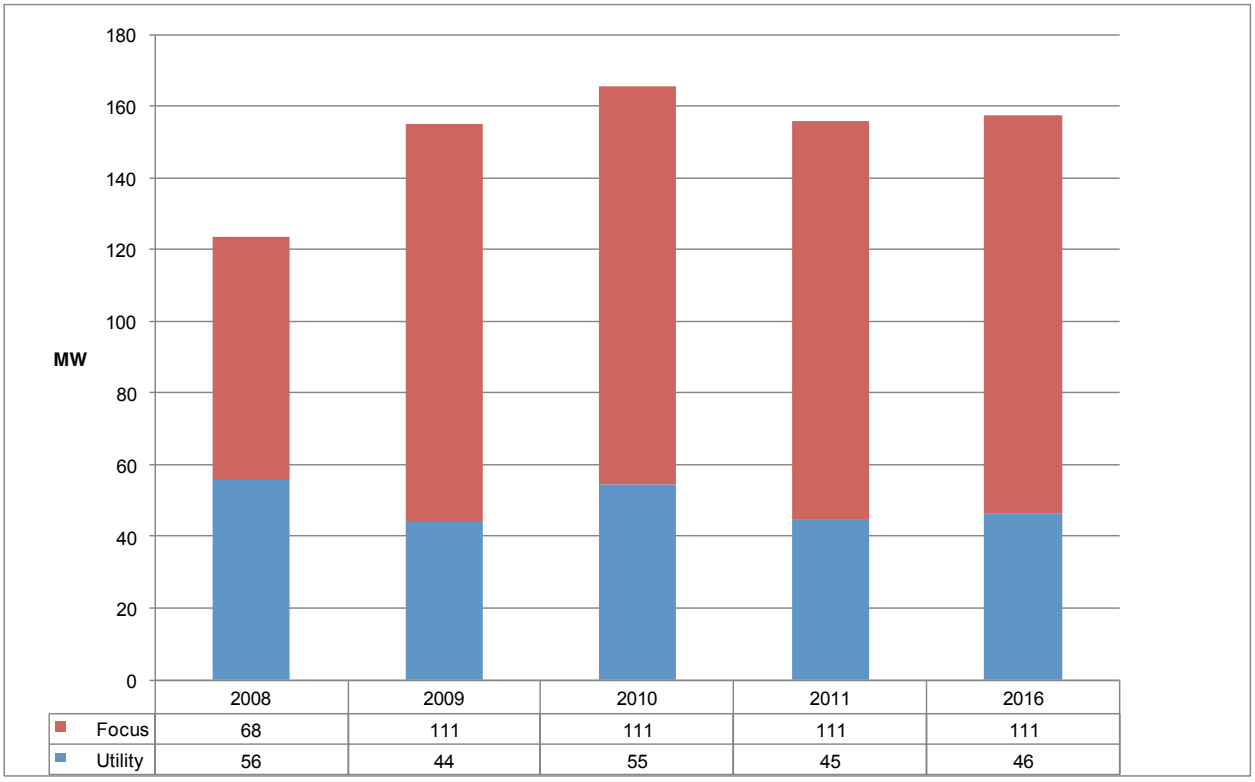
	2008	2009	2010	2011	2016
Focus	67,093,305	91,307,634	93,590,325	95,930,083	108,536,084
Utility	45,110,805	48,211,987	70,795,249	69,355,553	57,337,649

Figure 10 Annual Energy Savings (2008-2016)



	2008	2009	2010	2011	2016
Focus	390,074	585,570	585,570	585,570	585,570
Utility	255,679	174,883	148,192	139,857	159,240

Figure 11 Annual Demand Savings (2008-2016)



	2008	2009	2010	2011	2016
Focus	68	111	111	111	111
Utility	56	44	55	45	46

ANALYSIS OF ENERGY EFFICIENCY EFFORTS

In the past, Wisconsin business owners and residents have benefitted from a statewide energy efficiency program. However, as education levels and acceptance of energy efficiency grows in Wisconsin, there is more potential to recognize. Act 141 required the Commission—which has direct oversight of the Focus on Energy program—to conduct an energy efficiency quadrennial planning process. In this planning process, the Commission will establish priorities, set overall energy efficiency savings targets, and set funding levels to reach energy savings targets. To aid in this planning process, ECW recently (2009) completed an updated energy efficiency potential study for Wisconsin. In this recent study, ECW estimates Wisconsin could obtain annual energy savings equivalent to 1.6 percent of electric usage and peak demand by 2012. ECW did not develop quantitative estimates of potential energy savings and demand reduction from expansion of behavior based approaches or from deployment of advanced rate designs. The study indicated that such strategies could deliver additional savings to Wisconsin residents and businesses. The study also provided information regarding program designs and the level of resources required to capture the identified potential.

The concept of an energy savings target is a new idea for Wisconsin. In fact, the estimated level provided in the ECW potential study has not been achieved on a statewide basis by any current portfolio of programs. With the current level of funding, Focus on Energy programs are achieving annual net reductions at about 0.6 percent of electric usage. Given the level of success of the current Focus on Energy programs, program changes were made to ensure expenditures remained within the budget in 2010.

The Commission's first Quadrennial Planning Process, required under Act 141, concluded in November 2010. The Commission recommended the following savings targets, four-year goals, and annual budgets for the Focus on Energy program over the next four years. The Joint Finance Committee approved these recommendations in December 2010:

Table 9 Recommended Future Focus on Energy Targets, Goals, and Budgets

Year	Recommended Electric Targets		Recommended Natural Gas Targets		Recommended Funding Levels (Millions)
	Percentage Basis	Millions of kWh*	Percentage Basis	Millions of Therms*	
2011	0.75%	523	0.50%	18	$120
2012	1.00%	705	0.75%	27	$160
2013	1.25%	890	1.00%	35	$204
2014	1.50%	1,078	1.00%	35	$256
4-year Goal	**-**	**3,196**	**-**	**115**	**-**

Renewable Resources

GENERATION OF ELECTRICITY FROM RENEWABLE RESOURCES

The generation of electricity from renewable sources is expected to increase steadily during the planning period. This growth is expected to come from three areas—onsite customer generation, green pricing programs, and utility efforts to comply with the RPS. In 2009, over 4.1 million MWh or 6.29 percent of all electrical energy sold in Wisconsin was generated from renewable resources.

Currently, Wis. Stat. § 196.378(2) requires all retail electric providers to provide a minimum portion of their total retail sales from renewable resources. A renewable resource baseline was established for each electric provider. By 2010, each electric provider is required to increase its renewable energy percentage so that it is at least 2.0 percent above its baseline renewable percentage. By 2015, each electric provider is required to increase its renewable energy percentage an additional 4.0 percent above its baseline renewable percentage. The overall effect of this RPS is to require 10 percent of Wisconsin's total electric energy consumption in 2015 (and thereafter) to come from renewable resources. In 2009, all electric providers and aggregators were in compliance with the RPS.

In addition to renewable electricity, beginning in 2010, electric providers have several other non-electric renewable applications that they can use for RPS compliance. These non-electric renewable applications are eligible to be used by an electric provider to demonstrate RPS compliance when they are used by the electric provider, or a customer or member of the electric provider, and to the extent their use displaces the electric provider's, customer's, or member's use of electricity that is derived from conventional resources. Renewable non-electric applications that may be eligible for the RPS include applications of solar water heating and direct solar applications such as solar light pipe technology, ground source heat pumps, and combustible renewable fuels used to generate heat in place of electric heating.

Wisconsin electric providers use the Midwest Renewable Tracking System (M-RETS) to track their renewable energy and demonstrate RPS compliance. M-RETS is a regional electronic tracking and accounting system designed to support the growing market for renewable energy in the Midwest and to facilitate trading of renewable energy certificates (REC). M-RETS is used to demonstrate RPS compliance and to substantiate voluntary renewable energy claims in the participating Midwest states. In 2010, M-RETS began allowing electric providers and other users to export RECs to other regional renewable energy tracking systems and to facilitate REC trading among multiple regions of the U.S.

CUSTOMER SITED RENEWABLE GENERATION

Approximately 10 percent of statewide energy efficiency and renewable resource dollars (Focus on Energy) are specifically designated for renewable customer-sited measures. For the calendar year 2009, Focus on Energy renewables had a budget of about $7.9 million for electric and thermal measures. The budget for calendar year 2010 increased to approximately $8.4 million. Beginning in

calendar year 2010, the Renewable program was integrated into the Focus on Energy Business and Residential programs.

Technologies covered by the Focus on Energy program include:

- Anaerobic Digestion Biogas;
- Small Scale Wind;
- Biomass;
- Solar Electric; and
- Solar Heating.

Incentives to encourage greater use of these renewable technologies by utility customers include technical assistance, cash-back rewards, and implementation grants. In calendar year 2008, energy savings produced by the Focus on Energy Renewable program were about 4.6 million kWh and 1.47 million therms. In calendar year 2009, renewable energy savings roughly tripled, totaling nearly 13 million kWh and approximately 4.9 million therms.

UPDATE—IMPLEMENTATION OF THE TASK FORCE ON GLOBAL WARMING RECOMMENDATIONS

The PSC was charged with investigating a number of issues from the Governor's Task Force on Global Warming. In response, the PSC opened several generic dockets. For example, the PSC opened docket 5-EI-144 to explore the feasibility of offshore wind energy in the Great Lakes. Under the leadership of PSC Commissioner Lauren Azar, a "Wind on the Water" Study Group was formed to consider offshore wind issues such as available technology, available transmission, cost, environmental and legal issues, and community impact. The Study Group members represented utilities, environmental organizations, customer and community groups, American Indian tribes, and state agencies such as DNR, DOA, and the Board of Commissioners of Public Lands. The final report from the group reported that offshore wind projects in the Great Lakes are technologically feasible; however, there are significant technical, economic, environmental, and legal challenges that would need to be addressed.

A sampling of other key conclusions from the report includes:

- In the near term, the cost of energy generated from an offshore wind project will likely exceed the cost of energy generated from terrestrial wind projects, assuming no changes in current technology, or energy prices. As offshore wind technology and operational experience improve, the cost of energy for offshore wind may decrease.
- Offshore wind projects are technically feasible in the near shore areas of the Great Lakes with present day technology. There are significant technological challenges with the development of wind projects in deeper water locations where the best project sites may be located, based on wind resources and other considerations.
- Wisconsin's existing transmission system could support the development of smaller-scale offshore wind projects less than 600 MW that are located near a city without substantial upgrades to the system. However, projects larger than about 600 MW may require more substantial upgrades to the existing transmission system, including developing new transmission lines.

- While development of offshore wind in the Great Lakes represents a potential approach to meeting a portion of the state's long-term energy needs, the development of such projects will require a coordinated effort by state and federal agencies, local government, affected Indian tribes, and possibly the Wisconsin Legislature.

A final report on the investigation into Wisconsin's offshore wind feasibility in the Great Lakes is available on the PSC website.

A second example is found in docket 5-EI-145 which continued Wisconsin's exploration into the potential of geologic sequestration of CO_2 produced by Wisconsin's coal-fired power plants. A Study Group was assembled and included members from environmental groups, customer and labor groups, research institutions, electricity providers, and other state agencies. Led by Commissioner Mark Meyer, the group's charge was to look into the potential for carbon sequestration in Wisconsin, a process of capturing CO_2 produced by coal-fired power plants that would otherwise be released into the atmosphere and securely storing, or sequestering, the CO_2 underground. The group met several times to hear presentations by regional experts and review the latest research on this topic.

A sampling of other key conclusions from the report includes:

- Several promising technologies are being developed and tested for capturing CO_2 emissions from power plants.
- CO_2 can be captured either pre- or post-combustion, depending on the type of power plant, and compressed for transport and disposal.
- Long-distance transport of CO_2 is a proven, viable option with over 3,000 miles of pipeline already in use for this purpose nationwide.

A final report on Wisconsin's exploration of carbon sequestration and storage is available on the PSC website at: http://psc.wi.gov/apps35/ERF_view/viewdoc.aspx?docid=138951.

A third example is an ongoing docket investigating Demand Response in Wisconsin and its potential to benefit Wisconsin as a potential resource for customers and utilities. Commissioner Azar is leading this investigation, and a report on Demand Response in Wisconsin will be issued in 2011.

PUBLIC COMMENTS ON THE STRATEGIC ENERGY ASSESSMENT

As defined by statute, every SEA goes through specified steps. The Commission biennially drafts an SEA and environmental assessment and puts the document set out for public comment and review. The Commission gathers comments through its website, mail, fax, e-mail, and its public hearing on the SEA. Public comment impacts the final SEA the Commission ultimately releases. Further, it aids the Commission in planning its next SEA.

As in other years, this draft SEA garnered many public comments. Over 20 sets of comments were received from various individual rate payers, non-profit groups, and the utilities themselves. Many comments were individual in nature; for example, several parties took the opportunity to ask for priority consideration or policy support for their fuel of choice. A handful of commenters voiced support for increased reliance on nuclear energy. Others asked for an increase or decrease to our current renewable energy portfolio.

While there was a wide variety of individual input and ideas put forth, Commission staff note common themes among the public comments. Staff has made an attempt to synthesize these themes below. Readers are encouraged to review SEA public comments in their entirety available at http://www.psc.wi.gov under docket 5-ES-105.

ROBUST LONG-TERM PLANNING

Both individual comments from public citizens and comments representing non-profits and business groups called for a more robust planning process. Long-term planning definitions via the public vary widely. For example, Industrial Customers Groups (ICG) requested the Commission strive for finer granularity in its planning margin analysis and an overall focus on more utility specific data. Conversely, WPPI urges the Commission to expand the SEA to include a more extended discussion of electric industry policy issues in order to better address the increasingly complex issues facing regulators, utilities, and energy stakeholders. WPPI notes in its comments that since Wisconsin utilities' integration with the Midwest ISO in 2001, policy development is not solely state-specific. Policy is often driven by developments at the Midwest ISO headquarters in Carmel, Indiana and by Washington, DC, either via Congress or FERC.

Specifically, WPPI believes the SEA would benefit from a new section that more comprehensively addresses current and future "out of state" policy challenges. The section would supplement the more brief, dispersed discussions in the draft SEA on issues like Multi-value transmission projects (MVPs), regional transmission planning, transmission cost allocation, potential new environmental regulations, and wholesale market developments. Such a section could also address the implications of the mandatory capacity markets, demand response initiatives, NERC reliability standards, and other potential regional and national policy issues that affect planning.[12]

Other commenters echoed requests for more in-depth analysis on the before-mentioned topics. The following sections highlight some of the specific requests.

EXCESS CAPACITY

The Commission opened the Excess Capacity docket in 2010 (5-EI-150) to review Wisconsin's current capacity in greater detail and explore its current generation fleet within various future scenarios such as continued economic volatility, carbon constraints, or additional environmental regulations. Acknowledgement of this docket was included in the draft SEA. Public reaction received on this topic within the SEA ranged from asking for the docket to be closed (ICG) to careful cautions about how to best construct the investigation (Joint Utilities). Commenters (ICG, Joint Utilities) expressed concern about "shuttering coal plants". To quote ICG's comments: "…early retirement of coal units certainly is not the only alternative to address excess capacity".[13]

RATES

Many of the public comments on the SEA ask for more analysis on Wisconsin's utility rates. For example, substantial comments submitted by the Joint Public Intervenors (JPI) focus almost exclusively on utility rates. In particular, the JPI emphasize that there is an opportunity for the SEA and the Commission to expand on the public's understanding of rates and the components that lead to utility rate volatility. Within that context, the JPI suggest the following analyses[14] should be included in future SEAs:

- The SEA should calculate and report the expected impact on rates associated with meeting demand from differing resource plans.
- The SEA should include rate and bill information for the five major Investor-owned utilities in Wisconsin similar to what was included in past SEAs.

[12] Much of the material in this section borrows heavily from the filed WPPI comments in order to accurately represent them.
[13] *Joint Comments of Industrial Customers Groups*, page 4. Docket 5-ES-105.
[14] Analytic suggestions quoted directly from *Comments of Clean Wisconsin and the Citizens Utility Board on the Draft Strategic Energy Assessment*, page 1. Docket 5-ES-105.

- The SEA should include historic annual average fuel costs for all purchased fuels (coal, nuclear, natural gas, and biomass) and a projected annual average fuel cost for each fuel for each year during the SEA period.[15]

ICG also contributed robust comments on utility rates and future rate analysis. ICG urged the Commission to consider a more in-depth rate analysis over time and further requested specific discussion of the connection between rate impacts and the state's RPS and transmission tariffs.

ENERGY EFFICIENCY

Both JPI and ICG requested that the Commission expand its analysis on energy efficiency initiatives. ICG expressed concern about "the short-term, mid-term, and long-term impacts that increased energy efficiency is likely to have on retail rates".[16] JPI expresses the opinion that detailed bill information and analysis will increase customer clarity and provide transparent information regarding the impact of energy efficiency and load changes on electricity rates.

TRANSMISSION PLANNING/COST ALLOCATION

The Commission received comments which also detailed concern about how to best include transmission planning in the SEA, and how transmission tariffs may impact Wisconsin rates. Using a specific example, WPPI indicates the transmission section of the draft SEA only briefly discusses Midwest ISO's July 2010 filing on MVPs. The MVP process emerged only recently, and was pending FERC approval at the time the draft SEA was posted. ICG also expressed concern about the cost impact of Midwest ISO MVP projects.

WPPI's suggestion to include detail on MVP designated projects and potential cost impacts could not be produced in time for the final report; however, it may be considered in future SEAs. The Commission has additionally noted that discussion of Midwest ISO's mandatory capacity market proposal, continued monitoring of MTEP and RGOS planning efforts and analysis of Midwest ISO's market competitiveness would be useful to WPPI, and perhaps other stakeholders, in future SEAs.

[15] Comments filed by Clean Wisconsin also requested analysis detailing historic and projected annual average fuel costs. ICG specifically requested an analysis on "the 'true' cost of wind energy.

[16] *Joint Comments of Industrial Customers Groups*, page 4. Docket No. 5-ES-105.

Appendix A

Table A-01 New Utility-Owned or Leased Generation Capacity, 2010-2016

Year	Type of Load Served	Capacity (MW)	Name	New or Existing Site	Owner/ Leaser	Fuel	Location (County: Locality)	PSC Status & Docket #
2010	Base load[1]	615	Elm Road Unit 1 (lease)	Existing site	WEPCO	SCPC coal	Milwaukee: Oak Creek	Approved 05-CE-130
2010	Base load[1]	615	Elm Road Unit 2 (lease)	Existing site	WEPCO	SCPC coal	Milwaukee: Oak Creek	Approved 05-CE-130
2010	Peak load	55	Marshfield M-1	New site	Marshfield Utilities	Natural gas	Wood: Marshfield	Approved 3420-CE-111
2011	Non-dispatchable[2]	200	Bent Tree Wind Farm	New site	WPL	Wind	Minnesota	Approved 6680-CE-173
2011	Base load	80	Point Beach Unit 1 (lease)	Upgrade to existing unit	WEPCO	Nuclear	Manitowoc: Town of Two Creeks	NA
2012	Base load	80	Point Beach Unit 2 (lease)	Upgrade to existing unit	WEPCO	Nuclear	Manitowoc: Town of Two Creeks	NA
2012	Non-dispatchable[2]	135 to 162	Glacier Hillls Wind Farm (75-90 turbines)	New site	WEPCO	Wind	Columbia County: Towns of Randolph and Scott	Approved 6630-CE-302
2013	Base load	50	Biomass Facility	Existing paper mill site	WEPCO	Biomass	Marathon: Rothschild	Pending 6630-CE-305
2013	Non-dispatchable[2]	5	Solar Facility	To be determined	WEPCO	Solar	To be determined	No application filed
2014	Non-dispatchable[2]	100	Wind Facility	To be determined	WEPCO	Wind	To be determined	No application filed
2015	Non-dispatchable[2]	200	Wind Facility	To be determined	WEPCO	Wind	To be determined	No application filed
2015	Non-dispatchable[2]	7.5	Solar Facility	To be determined	WEPCO	Solar	To be determined	No application filed

1 Elm Road Generating Station Units 1 and 2 will each be rated at 615 MW. Wisconsin Electric will lease 515 MW from each unit. MG&E and WPPI will also lease portions.

2 Nameplate MW shown. Wind operates when the wind blows and solar when the sun shines. Wind MW counted as firm are 20% per year average or less (more wind in winter than summer). Solar 15% average (seasonal differences to be determined later).

Table A-02 New Transmission Lines[1] (on which construction is expected to start before December 31, 2016

PSC Status & Docket #	New Line or Rebuild/Upgrade[2]	Endpoints (Substations)	County	Voltage (kV)	Est. Cost (Millions)	Expected Construction	Expected In-Service	Substation Changes
American Transmission Company LLC (ATC)								
Application filed 137-CE-158	Replace existing 18 mile 69 kV line with 161 kV	Monroe Co. - Council Creek	**Monroe**	161	31.2	2012	2013	New switching station
Pre-application 137-CE-162	New lines/upgrades for Point Beach power plant upgrade	Barnhart-Branch River	**Calumet, Manitowoc, Sheboygan**	138 and 345	131-246	2014-2016	2017-2019	New transmission substation and switching station
Pre-application 137-CE-159	New 2 mile 138 kV line	96th St. - Milwaukee County (Western Milwaukee County Electirc Reliability Project)	**Milwaukee**	138	33-46	2014	2015	New Milwaukee County Substation
Pre-application 137-CE-160	New 150 mile 345 kV line	LaCrosse Area - North Madison (Badger - Coulee Project)	**Columbia, Dane, Juneau, LaCrosse, Monroe, Sauk**	345	425	2016	2018	Possible new or expanded substations
Pre-application 137-CE-161	New 6.5 mile 345 kV line	Pleasant Prairie - Zion (Illinois)	**Kenosha**	345	26	2014	2015	
Dairyland Power Cooperative (DPC), Northern States Power Company-Wisconsin (NSPW), and Wisconsin Public Power Incorporated (WPPI)								
Application filed 5-CE-136	New 40-55 mile 345 kV line (crossing the Mississippi River at Alma)	Hampton Corner (North Rochester-Twin Cities area) - La Crosse area	**Buffalo, Trempealeu, La Crosse**	345	194-224	2013	2016	Yes
Northern States Power Company-Wisconsin (NSPW)								
No application	New 17.5 mile 161 kV line	Stone Lake - Couderay	**Sawyer**	161	26.5	2011	2013	New Couderay 161/69 kV substation
No application	New 2-5 miles 69 kV	Lufkin Substation	**Eau Claire**	69	11.6	2011	2013	New 161/69 kV substation
No application	Rebuild 32-mile 115 kV line	Bay Front - Bayfield County border	**Bayfield**	115	16.0	2011	2012	Yes

1 Does not include lines approved by the Commission.
2 Rebuilds and upgrades, as well as new lines, may require new right-of-way.
3 Estimate of extent of new and expanded right-of-way (not certain). Does not include upgrades or rebuilds requiring no new right-of-way.

Table A-03 More Detailed Information for New Transmission Lines Proposed in Table A-02*

Project	Badger-Coulee
Description	New 345 kV transmission line
Length (miles)	Approximately 118
Screening Area	Approximately 4,822
Corridor-sharing Opportunities	Various federal, state, and county highways, existing transmission line, railroad, and pipeline ROW offer possible sharing opportunities.
Public Lands	Richard J Dorer SP (MN), O L Kipp SP (MN), Perrot SP (WI), Wildcat Mountain SP (WI), Rocky Arbor SP (WI), Mirror Lake SP (WI), Natural Bridge SP (WI), Devils Lake SP (WI), Bluemounds SP (WI), Lake Kegonsa SP (WI), Governor Nelson SP (WI), numerous county parks, state natural areas, wildlife areas, trails, and recreational areas are located throughout the screening area. The Upper Mississippi River National Wildlife and Fish Refuge, the Leopold Wetland Management District, and Ft McCoy Military Reservation are among the federal lands located in the screening area.
Sensitive Resources	Large, contiguous wetland areas are concentrated near the Mississippi and Wisconsin Rivers and their tributaries. Numerous Wisconsin State Natural Areas exist in the route screening area. The probability of encountering threatened, endangered, and rare species is high.
Cultural Resources	The Cultural Map of Wisconsin identifies numerous cultural resources within the screening area. The potential for encountering cultural and historic resources is high within the screening area.
Miscellaneous	Principal ecological landscapes include the southwest savanna, western coulee and ridges, central sand plains, and central sand hills in Wisconsin. The western portions of the screening area are located in Wisconsin's driftless area and the Mississippi River valley.

Project	Lufkin 161/69 kV Substation and Connection to Existing System
Description	A new 161/69 kV substation is proposed to be built near the intersection of NSPW's Shawtown-Naples 69 kV transmission line and DPC's Elk Mound to Alma 161 kV transmission line.
Length (miles)	2-5 miles of 69kV line
Screening Area	10 sq. miles - Overall study area is 5 miles by 2 miles, in SW Eau Claire County.
Corridor-sharing Opportunities	Existing 69 kV and 161 kV lines, railroad corridor, field lines, Highway 85.
Public Lands	Chippewa River Trail parallels Shawtown to Naples 69 kV transmission line.
Sensitive Resources	Prairie remnants in vicinity.
Cultural Resources	N/A
Miscellaneous	CPCN to be filed in 2010.

Project	Pleasant Prairie-Zion
Description	New 345 kV transmission line
Length (miles)	Approximately 6.4
Screening Area	Approximately 9.6
Corridor-sharing Opportunities	Existing 345 kV and 138 kV corridors, a railroad corridor, a state highway corridor, and a county highway corridor provide sharing opportunities.
Public Lands	There are no state owned lands over which any of the proposed routes cross. There is a former landfill site owned by the city of Kenosha that may require special consideration. Otherwise, the corridor sharing opportunities described above fall within State Highway and RR ROW.
Sensitive Resources	Smaller, isolated wetland areas as well as small tributaries to the Des Plaines River are found within the study area.
Cultural Resources	There are several cultural resources within the study corridors. The potential for encountering these cultural and historic resources is low to medium.
Miscellaneous	The possible routes identified traverse mainly industrial and agricultural land that include isolated pockets of wetland, including farmed wetlands.

Project	Stone Lake-Couderay 161 kV
Description	A new 161 kV transmission line that would be located between the Stone Lake 161 kV substation near Stone Lake, WI and the existing 69 kV Couderay substation near Radisson, WI.
Length (miles)	15-20 miles
Screening Area	200 sq. miles - Overall study area is 10 miles by 20 miles.
Corridor-sharing Opportunities	Existing 69 kV line, Stone Lake to Weston 345 kV line, oil pipelines, railroad, HWY 27.
Public Lands	Beverly Lake Wildlife Area
Sensitive Resources	Lac Courte Oreilles reservation lands, Couderay River
Cultural Resources	Due to the existing line passes through the Lac Courte Oreilles reservation, there is the potential for numerous cultural resources.
Miscellaneous	

Project	Western Milwaukee County Electric Reliability Project
Description	New 138 kV transmission line
Length (miles)	Approximately 2
Screening Area	Approximately 10
Corridor-sharing Opportunities	Existing transmission lines, city streets, and state highway offer possible corridor sharing opportunities.
Public Lands	DNR Forestry Education Center, Milwaukee County Grounds, and several county parks: Wisconsin Avenue, Cannon, and Gravel Sholes, Hansen Golf Course are located in the screening area.
Sensitive Resources	Rare Species Conservation Habitat, Underwood Creek/Parkway, Monarch Butterfly Habitat (nesting and foraging areas), and the Menomonee River are located in the screening area.
Cultural Resources	There are several known burial areas and numerous historic areas and buildings located in the screening area.
Miscellaneous	Milwaukee Regional Medical Center (MRMC) and MRMC Heliport are located in the screening area. Heavy residential development exists throughout study area. The proposed UWM research park; existing MMSD flood control facilities, Wauwatosa city landfill, and Wisconsin Lutheran College also are located in the screening area.

Glossary

Capacity	The maximum amount of power that a generating unit can create, usually measured in MW.
Capacity Factor	A calculation, expressed as a percentage such as 70 percent, representing the proportion of time in a year that a generating unit operates at its full electric generating output level.
Coincidental Peak Load	The sum of two or more peak loads that occur in the same time interval.
Demand and Energy Charge	The combined fixed costs for the right to obtain capacity as well as the energy charges that are incurred to produce electricity.
Electric Demand	The amount of instantaneous draw of power from the electric system, usually measured in MW.
Electric Energy	The amount of electricity used over a period of time, measured in MWh.
Energy Charge	The variable costs, including fuel, that are incurred to produce electricity.
Flow Gate	A particular section of the transmission system where energy is monitored for excessive flow.
Focus on Energy Program	Energy efficiency and conservation program administered by the state Department of Administration and funded by the state's electric and gas utilities.
Independent Power Producer (IPP)	A non-utility business that constructs and operates power plants, who sells the electrical output into the marketplace.
Marginal Energy Cost (MEC)	The cost of electric energy for the last unit produced, usually measured in $ per MWh. The MEC is usually comprised of fuel cost, and variable operation and maintenance costs.
Native Load	The amount of electric demand, representing the customers in its service territory that a utility is obligated to serve.
Non-Coincident Peak Demands	The sum of two or more peak loads on individual systems that do not occur in the same time interval. Meaningful only when considering loads within a limited period of time, such as a day, week, month, a heating or cooling season, and usually for not more than one year. Peak Demand of each utility added together to derive a statewide total.
Peak Electric Demand	The amount of instantaneous draw of power from the electric system at the moment of highest use, usually on a hot humid summer day.
Power Purchase Agreement (PPA)	A contract in which an electric generating company sells capacity and energy to a utility.
Therm	A unit used to measure the quantity of heat that equals 100,000 Btu.
Transfer Capability	The amount of electrical output measured in MW that can move over a set of high voltage transmission lines from one area to another.
Sales and Purchases on a Unit Basis	The exchange of electric power and energy from a dedicated generation plant.
Sales and Purchases on a System Basis	The exchange of electric power and energy from a provider's fleet of generation plants.
Simultaneous Transfer Capability	The amount of electrical output measured in MW that can move over all sets of high voltage transmission lines at the same time from one area to another.
With or Without Reserves	A contract specification for an exchange of power and energy in which the seller does or does not provide the additional capacity required so that the sale has the same high level of dispatch priority as native load.

Acronyms

§	Section
AC	Advisory Committee
Act 9	1999 Wisconsin Act 9
Act 141	2005 Wisconsin Act 141
ATC	American Transmission Company LLC
Btu	British thermal units
CARP	Cost Allocation and Regional Planning
CC	Combined-cycle
CEJA	Clean Energy Jobs Act
Commission	Public Service Commission of Wisconsin
CO	Carbon monoxide
CO_2	Carbon dioxide
CPCN	Certificate of Public Convenience and Necessity
CT	Combustion turbine
DNR	Department of Natural Resources
DOA	Department of Administration
DOE	U.S. Department of Energy
DPC	Dairyland Power Cooperative
DSM	Demand-side management
ECW	Energy Center of Wisconsin
EIA	U.S. Energy Information Administration
EIPC	Eastern Interconnection Planning Collaborative
EISPC	Eastern Interconnection States' Planning Council
EPA	U.S. Environmental Protection Agency
FERC	Federal Energy Regulatory Commission
FGD	Flue gas desulfurization
Focus	Focus on Energy
FPL	FPL Group, Inc
GHG	Greenhouse gas
GLU	Great Lakes Utilities
GW	Gigawatt
GWh	Gigawatt hour
IPP	Independent power producers
kV	Kilovolt
kW	Kilowatt
kWh	Kilowatt hour
LMP	Locational marginal pricing
LSE	Load serving entity
MAPP	Mid-Continent Area Power Pool
MGE	Madison Gas and Electric Company
Midwest ISO	Midwest Independent Transmission System Operator, Inc.
MPU	Manitowoc Public Utilities
M-RETS	Midwest Renewable Energy Tracking System
MTEP	Midwest ISO Transmission Expansion Plan
MTEP09	Midwest ISO Transmission Expansion Plan 2009
MTEP10	Midwest ISO Transmission Expansion Plan 2010
MVP	Multi-Value Project
MW	Megawatt
MWh	Megawatt hour
NERC	North American Electric Reliability Corporation
NO_2	Nitric oxide

NO_X	Nitrogen oxides
NRC	Nuclear Regulatory Commission
NREL	National Renewable Energy Laboratory
NSPW	Northern States Power-Wisconsin
OMS	Organization of MISO States
PPA	Purchase Power Agreement
PSC	Public Service Commission of Wisconsin
REC	Renewable energy certificate
RECB-TF	Regional Expansion Criteria and Benefits Task Force
RGOS	Regional Generation Outlet Study
ROW	Right-of-way
RPS	Renewable portfolio standard
SCPC	Super-critical pulverized coal
SCR	Selective catalytic reduction
SEA	Strategic Energy Assessment Report
SNCR	Selective non-catalytic reduction
SO_2	Sulfur dioxide
SO_X	Sulfur oxides
SWL&P	Superior Water, Light and Power Company
UMTDI	Upper Midwest Transmission Development Initiative
U.S.	United States
WEPCO	Wisconsin Electric Power Company
Wis. Admin. Code	Wisconsin Administrative Code
Wis. Stat.	Wisconsin Statutes
WP&L	Wisconsin Power and Light Company
WPPI	Wisconsin Public Power, Inc.
WPSC	Wisconsin Public Service Corporation
Xcel	Xcel Energy, Inc.