BEFORE THE
PUBLIC SERVICE COMMISSION OF WISCONSIN

Application of Wisconsin Public Service Corporation for a Certificate of Public Convenience and Necessity for Construction of a Large Electric Generating Plant with Associated Facilities, Known as Weston 4, at its Existing Weston Generating Station Located in Marathon County	)	**Docket No. 6690-CE-187**

Direct Testimony of
David A. Schlissel and Geoffrey L. Keith
Synapse Energy Economics, Inc.

On Behalf of the
Citizens Utility Board of Wisconsin

June 25, 2004

Q. Mr. Schlissel, please state your name, position and business address.

A. My name is David A. Schlissel. I am a Senior Consultant at Synapse Energy Economics, Inc, 22 Pearl Street, Cambridge, MA 02139.

Q. Mr. Keith, please state your name, position and business address.

A. My name is Geoffrey L. Keith. I am an Associate at Synapse Energy Economics, Inc., 22 Pearl Street, Cambridge, MA 02139.

Q. On whose behalf are you testifying in this case?

A. We are testifying on behalf of the Citizens Utility Board of Wisconsin ("CUB").

Q. Please describe Synapse Energy Economics.

A. Synapse Energy Economics ("Synapse") is a research and consulting firm specializing in energy and environmental issues, including electric generation, transmission and distribution system reliability, market power, electricity market prices, stranded costs, efficiency, renewable energy, environmental quality, and nuclear power.

Q. Mr. Schlissel, please summarize your educational background and recent work experience.

A. I graduated from the Massachusetts Institute of Technology in 1968 with a Bachelor of Science Degree in Engineering. In 1969, I received a Master of Science Degree in Engineering from Stanford University. In 1973, I received a Law Degree from Stanford University. In addition, I studied nuclear engineering at the Massachusetts Institute of Technology during the years 1983-1986.

Since 1983 I have been retained by governmental bodies, publicly-owned utilities, and private organizations in 24 states to prepare expert testimony and analyses on engineering and economic issues related to electric utilities. My clients have included the Staff of the California Public Utilities Commission, the Staff of the Arizona Corporation Commission, the Staff of the Kansas State Corporation Commission, the Arkansas Public Service Commission, municipal utility systems

in Massachusetts, New York, Texas, and North Carolina, and the Attorney General of the Commonwealth of Massachusetts.

I have testified before state regulatory commissions in Arizona, New Jersey, Connecticut, Kansas, Texas, New Mexico, New York, Vermont, North Carolina, South Carolina, Maine, Illinois, Indiana, Ohio, Massachusetts, Missouri, and Wisconsin and before an Atomic Safety & Licensing Board of the U.S. Nuclear Regulatory Commission.

A copy of my current resume is attached as Exhibit___SK-1.

Q. Have you previously submitted testimony before this Commission?

A. Yes. I submitted testimony in September 1994 in Public Service Commission of Wisconsin ("Commission") Docket Nos. 6630-CE-197 and 6630-CE-209 addressing the proposed replacement of the steam generators at the Point Beach Unit 2 Nuclear Generating Station; in Docket No. 6690-UR-115 concerning the reasonableness of Wisconsin Public Service Corporation's proposed funding plan for the Kewaunee Nuclear Power Plant; and in Docket No. 05-EI-136 concerning the proposed sale of the Kewaunee plant to Dominion Energy Kewaunee, Inc.

Q. Mr. Keith, please summarize your educational background and recent work experience.

A. I graduated from Brown University in 1994 with an M.A. in Environmental Studies. While at Brown I wrote my Masters thesis on the deregulation of the electric power industry. Before studying at Brown, I received a B.A. in English Literature from Tufts University and later did coursework in Chemistry and Physics at the Harvard University Extension School. Prior to joining Synapse, I worked as a Research Associate at the Rhode Island Division of Public Utilities and Carriers and as a Consultant at M. J. Bradley & Associates, a strategic environmental consulting firm with expertise in the energy sectors. I joined Synapse in 2001 and am now an Associate.

For nearly ten years, I have been analyzing the electric power industry, focusing on the effects of changing market structures and new environmental policy

initiatives. During my time with M. J. Bradley & Associates, I worked with large energy companies to assess market opportunities around clean power generation and to support proposed emission standards such as EPA's revised fine particulate and ozone standards and the federal "NO_x SIP Call." I also worked with northeastern environmental advocates to monitor the environmental impacts of electric restructuring and develop proposals to minimize adverse impacts.

At Synapse my work focuses on the assessment of energy and environmental policies, including new air regulations at the state and federal levels, renewable portfolio standards, emissions performance standards and information disclosure requirements. I perform both qualitative policy analysis and quantitative analysis using electric system dispatch modeling. I have performed dispatch modeling to analyze the costs and benefits of environmental and energy policies for clients such as the U.S. Environmental Protection Agency and the Ozone Transport Commission. In addition, I have reviewed corporate emissions compliance plans for state consumer advocates and other industry stakeholders.

A copy of my current resume is attached as Exhibit____SK-2.

Q. Mr. Keith, have you previously testified in any proceedings before this Commission?

A. No.

Q. What is the purpose of your testimony?

A. Synapse was asked by CUB to review Wisconsin Public Service Corporation's request for a Certificate of Public Convenience and Necessity ("CPCN") for the proposed Weston Unit 4 power plant, focusing in particular on the EGEAS analyses performed by WPS and the PSCW Staff.

Specifically, Synapse was funded to review supply alternatives to Weston 4 and alternative expansion scenarios. This testimony presents the results of our reviews.

Q. Please summarize your conclusions and recommendations in this investigation.

A. Our conclusions and recommendations are as follows:

1. Given the current age of WPS's existing coal generating units and the Company's need for new capacity in or about the year 2008, it appears that it would be reasonable for WPS to build a new baseload generating unit. However, the Commission should not issue a CPCN for Weston 4 based on the EGEAS analyses presented by WPS and the information in the Draft Environmental Impact Statement. Additional analyses need to be conducted to confirm WPS's conclusion that Weston 4 is the most appropriate alternative for meeting its customers' energy supply needs. This conclusion is based on the following findings.

2. The EGEAS analyses performed by both WPS and the PSCW staff both assume that WPS's existing power purchase contracts are terminated by the end of 2007. This assumption enhances the need for a new large generating unit in 2008 and advantages the economics of adding large increments of capacity like Weston 4.

3. The EGEAS analyses performed by both WPS and the PSCW staff both assume that Weston 4 would be able to operate at full power on a regular basis even though the transmission system upgrades necessary to enable Weston 4 to do so are not projected to be completed until the end of 2009, at the earliest. At the same time, neither the WPS nor the PSCW staff EGEAS analyses reflect any costs of these upgrades.

4. The WPS and PSCW staff EGEAS runs reflect several assumptions that disadvantage new wind facilities. For example, WPS and PSCW staff assume that new wind units will only be able to operate at 25 percent capacity factors.

5. WPS's EGEAS runs rely on estimates for the potential load and energy reductions from demand side management ("DSM") efforts from data that

are nine years old. Although PSCW staff assumes substantially higher potentially achievable load and energy savings from DSM, it too relies on studies that are nine years old. Consequently, the EGEAS runs of both WPS and the PSCW staff do not reflect the fact that the energy efficiency market has changed considerably in the past decade and that there may now be substantial amounts of other cost-effective DSM that could displace some of the need for new generating capacity.

6. Despite these factors favoring Weston 4, the present value revenue requirements of a number of alternative plans without Weston 4 in the PSCW staff EGEAS analyses are similar to the present value revenue requirements of the PSCW staff optimal cases including Weston 4.

7. Adding Weston 4 would further concentrate WPS's reliance on coal-fired generation and move the Company further from the goal of diversifying its fuel diversity. Adding Weston 4 also would result in greater air emissions than non-coal options and would expose WPS's ratepayers to the substantial risks of higher costs from CO_2 taxes or other coal regulations or industry events.

8. WPS and the PSCW staff should study new EGEAS scenarios that reflect the specific weaknesses in their previous analyses that we have identified in this testimony. These new scenarios should reflect combined sensitivities with more than one change from the base case assumptions. For example, PSCW staff has prepared three scenarios which examine the impact of higher Weston 4 capital costs, the effect of CO_2 monetization, and reduced wind costs. However, staff did not present a scenario which examined the combined effect of all three changes from its optimal base case. The Commission should require that such combined scenarios be examined in any new WPS and/or PSCW staff EGEAS analyses.

9. Whether or not it grants a CPCN for Weston 4, the Commission should work with the Wisconsin Department of Administration to see that new

studies of the potential for load and energy savings through DSM measures are completed as soon as possible.

10. If the Commission does grant a CPCN for Weston 4, it should make the issuance of that CPCN contingent upon WPS's agreement to retire at least 150 MW, if not more, of the older coal capacity on its system. At the same time, the Commission also should establish a proceeding to examine which of the older coal units on WPS's system should be retired and the appropriate timing of those retirements.

11. If the Commission does grant a CPCN for Weston 4 as a 500 MW unit, it should require that WPS retire some of its older generating units rather than sell 150 MW of the unit to the Dairyland Power Cooperative.

12. In order to protect ratepayers there are two other conditions that the Commission should include in any CPCN its issues for Weston 4.

First, if Weston 4 is not able to operate at its full rated capacity due to lack of necessary transmission infrastructure, ratepayer payments for the plant should be reduced accordingly until such time as the unit is able to operate at its full rated capacity on a regular basis.

Second, if the Commission issues a CPCN for a 500 MW Weston 4 and then Dairyland Power Cooperative does not purchase 150 MW of the unit, ratepayers should be held harmless for any costs of the Dairyland Power Cooperative option not being exercised. This would protect ratepayers if the Commission should not agree that the entire output of Weston 4 should be allocated to WPS under the assumption that WPS will retire older coal capacity and will need to replace it with the capacity that would otherwise be sold to Dairyland Power Cooperative.

Q. What is the context in which you are addressing the proposed Weston 4 project?

A. WPS must balance several important goals in managing its portfolio of generating resources.

- Ensure reliable and adequate power,
- Minimize costs to ratepayers through efficient and prudent generation planning,
- Maintain resource and fuel diversity – important to mitigate fuel price risk, regulatory risks such as environmental regulation,
- Minimize environmental impacts,
- Minimize risk to ratepayers of forecasting uncertainties – this means having capacity additions follow load growth closely – not overbuilding.

In addition to these goals, Wisconsin State law requires that the Company exercise a preference for certain resources and fuels over others to the extent that it is cost-effective, technically feasible and environmentally sound. Wis. Stat. § 1.12(4) establishes the following priorities:

> (4) PRIORITIES. In meeting energy demands, the policy of the state is that, to the extent cost-effective and technically feasible, options be considered based on the following priorities, in the order listed:
>
> (a) Energy conservation and efficiency.
>
> (b) Noncombustible renewable resources.
>
> (c) Combustible renewable energy resources.
>
> (d) Nonrenewable combustible energy resources in the order listed:
>
> 1. Natural gas.
>
> 2. Oil or coal with a sulfur content of less than 1 percent.
>
> 3. All other carbon-based fuels.

The Weston 4 project does not achieve these goals in several important ways.

1. It would use the fuel last on the energy priorities list.
2. It would move the company away from resource diversity, not toward it.
3. It would represent a very large increment of new capacity with the associated risk for ratepayers of very high reserve margins.
4. It would bring significant environmental impacts relative to other possible resources, including substantially higher air emissions, and necessitate the construction of significant new transmission facilities.

Because the W4 project fails to achieve a number of the key goals it is imperative that the Commission examine the project very closely and consider non-economic

factors, as well as the results of economic studies such as the EGEAS runs offered by WPS and the PSCW staff.

Q. Do you agree that given the existing age of WPS's baseload generating units, some increment of new baseload capacity is needed?

A. Yes. Given the current age of WPS's existing coal generating units and the Company's need for new capacity in or about 2008 we agree that it would be reasonable for WPS to build a new baseload generating unit.

Q. What action does WPS plan to take with regard to its existing power purchase agreements?

A. WPS currently has 250 MW of power purchase agreements. Both WPS and the PSCW Staff assume that all of these agreements are terminated by the end of 2007 even though we understand that at least some of the agreements could be renewed or extended.

Q. What impact does the assumption that these power purchase agreements all will be terminated by the end of 2007 have on the EGEAS analyses presented by WPS and the PSCW Staff?

A. This assumption increases the need for a new large generating unit in 2008 and advantages the economics of adding a larger increment of capacity like Weston 4 than might otherwise be the case.

Q. Is it reasonable for WPS and the PSCW to assume that the Company's existing power purchase agreements will be terminated by the end of 2007?

A. The question of whether the existing power purchase agreements should be terminated or renewed/extended should be an issue that would be examined in the WPS and PSCW Staff EGEAS analyses. Although it may be reasonable for WPS to terminate those agreements and build a larger increment of new capacity, or add several new increments of capacity, it also may be reasonable for WPS to retain one or more of the existing power purchase agreements as part of its supply portfolio. Unfortunately, it is not possible to evaluate this issue because both

WPS and the PSCW Staff apparently decided before they undertook their EGEAS runs that the power purchase agreements would be terminated by the end of 2007. This is not a reasonable planning approach.

Q. Are there any transmission system reinforcements that are required before Weston 4 can operate at full power on a regular basis?

A. Yes. The August 2003 Facility Study Report for Weston 4 prepared by the American Transmission Company ("ATC") found that Weston 4 would not be able to operate at full power unless a series of system reinforcements were in place. Some of these needed reinforcements have been previously planned by ATC regardless of Weston 4 approval.[1] Other reinforcements are required for Weston 4 to operate without restrictions.[2]

Most significantly, the required system reinforcements needed before Weston 4 can operate at full power without restrictions include three new 345 kV transmission lines and related equipment: (1) the Arrowhead-Weston 345kV transmission line project, (2) the Morgan-Werner West 345kV transmission line project, and (3) a 345 kV transmission line from the Weston substation to a new Central Wisconsin substation located on the Morgan-Werner West 345kV transmission line.

Q. What are the scheduled completion dates for each of these transmission lines?

A. According to ATC, the Arrowhead –Weston transmission line is scheduled for completion on June 30, 2008, one month after Weston 4, and the Morgan-Werner West transmission line is scheduled for completion on December 1, 2009, 18 months after Weston 4. The 345 kV transmission line from Weston to Central

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[1] ATC Facility Study Report for Weston 4, August 29, 2003, Table I.1 at page 6.(included as Appendix M to the CPCN Application)

[2] ATC Facility Study Report for Weston 4, August 29, 2003, Table I.2 at page 7. (included as Appendix M to the CPCN Application) Table I.2 at page 7.

Wisconsin was not a part of ATC's 2003 10-Year Assessment but it too is expected to be in service by the end of 2009.

Q. What would be the restrictions on the power output from Weston 4 until these 345 kV system reinforcements are in service?

A. It appears that Weston 4 will only be able to operate at 250 MW before the new Arrowhead-Weston 345 kV line is in service (currently projected for the end of June 2008) and at 400 MW before all of the three new 345 kV lines are completed.[3]

Q. Are there any interim measures that could be implemented that would allow Weston 4 to operate at full power before the completion of the proposed Weston to Central Wisconsin 345 kV transmission line?

A. The record is unclear on whether there are feasible interim measures that would allow Weston 4 to operate at full power on a regular basis before the proposed Weston to Central Wisconsin 345 kV transmission line is in service. On the one hand, the August 29, 2003 ATC Facility Study Report for Weston 4 indicates that there are special measures that could be implemented that would allow the elimination of the operating restrictions and allow full output from Weston 4.[4]

However, ATC has recently stated in its March 2004 Update to its 2003 10-Year Transmission System Assessment that "full [Weston 4] generator operation will not be allowed until all necessary 345 kV lines are placed in service."[5]

Q. Do the EGEAS runs performed by WPS and PSCW staff assume any restrictions on Weston 4's power level prior to the completion of these 345 kV system reinforcements?

A. No. The EGEAS runs all appear to assume that Weston 4 can operate at full power without restrictions as soon as it commences operation in June 2008. We

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[3] ATC Facility Study Report for Weston 4, August 29, 2003, at page 10.

[4] ATC Facility Study Report for Weston 4, August 29, 2003, at page 30.

[5] ATC *Updated 2003 10-Year Transmission System Assessment, March 2004, at page 24.*

have not seen any EGEAS runs that reflect any restrictions on Weston 4's power output before the new lines are all in service.

Q. What are the costs of those transmission system upgrades that are only needed in order to allow Weston 4 to operate at full power without restrictions?

A. ATC has estimated the costs of the five transmission system upgrades that are only necessary in order to allow Weston 4 to operate at full power as $108.4 million.[6] ATC has noted that these costs do not include redispatch costs or operating restriction costs.[7]

Q. Do the WPS or PSCW staff EGEAS runs include the costs of the transmission system reinforcements that only are needed in order to allow Weston 4 to operate at full power without restrictions?

A. No. WPS has said that it did not include in its EGEAS runs the costs of the five transmission system reinforcements that are only needed to allow Weston 4 to operate at full power without restrictions.[8] It appears that the PSCW staff also did not include these costs in its EGEAS analyses.

Q. Should these costs be included in the analysis of the economics of the various supply options?

A. Yes. The costs that are only needed in order to allow full power operation of Weston 4 without restrictions must be included in the EGEAS analyses to allow for a fair comparison to other alternatives.

Q. What cost does WPS assume for wind energy in its EGEAS modeling?

A. It is difficult to discern the total levelized costs of wind energy in the Company's EGEAS modeling. In Exhibit 8-4 of the *Need and Supply Planning Analysis*

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6 ATC Facility Study Report for Weston 4, August 29, 2003, Table I.2, at page 7.

7 Ibid.

8 WPS response to Data Request 3-CUB-1.

Report, WPS shows a total levelized cost of $36.1 per MWh. In response to data request 4-CUB-1, WPS stated that this figure is based on a capital recovery factor of 7.65 percent. However, WPS uses a ratebase method to recover capital costs in EGEAS and has not provided explanation of the equivalence of the cost of wind capacity in EGEAS with the levelized cost given in Exhibit 8-4 of the *Need and Supply Planning Analysis Report*. Our attempts to reconstruct a levelized cost equivalent from the EGEAS data gives a value in the $40 to $45 MWh range. But the basic question is, why if the levelized cost of wind as given in the report is so cheap compared to all other resources, is EGEAS not selecting more wind resources?

Q. Are the wind costs used in the model consistent with the current cost of new wind energy in Wisconsin?

A. We believe that the wind costs as represented in the EGEAS data are likely to be significantly higher than costs being quoted now by wind developers in Wisconsin. It is difficult to know exactly how WPS's costs compare with those quoted by developers because we do not know the actual levelized costs used in the model and because costs quoted by developers are usually confidential. Note that the appropriate costs for WPS to use in assessing wind as a new resource option are the lower of: (a) the costs currently being quoted by wind developers in Wisconsin and (b) the cost of wind energy built and financed by WPS. WPS's filing does not indicate whether the Company has benchmarked the costs used in the EGEAS model against market-based wind costs.

The responses to the wind RFP recently issued by We Energies provide a potential source of reliable, market-based information for the Commission. While the Commission may not be able to make the bids from this RFP public, they should certainly use it to benchmark WPS's wind costs in this proceeding and future proceedings. In addition, the Commission should require WPS to provide information that clarifies the range of actual levelized costs used for wind energy in the EGEAS model.

Q. Does WPS use a reasonable capacity factor for new wind generators in its EGEAS modeling?

A. No. We believe that the 25-percent capacity factor used by WPS for new wind generators is likely to understate the generation from new wind facilities. The company justifies the use of this figure citing the performance of its wind generators at Glenmore and Lincoln.[9] However, these facilities came on line in 1998 and 1999, respectively and the turbines installed there are of mid-1990s vintage. Wind technology has advanced considerably since these turbine models were developed, and it is highly unlikely that these turbines represent the technology that WPS would use if it were to add new wind capacity during the next several years.

The advances in turbine technology that are increasing wind capacity factors are higher hub heights, larger rotor diameters and the continuing improvement of variable-speed systems, designed specifically to capture more energy from moderate wind regimes such as much of Wisconsin. Turbines like GE's 1.5sl have hub heights in the range of 280 feet and rotor diameters in excess of 250 ft.[10] In contrast, the Vestas V-47 turbines at WPS's Lincoln site have hub heights of 213 ft and rotor diameters of 154 ft. The GE turbines can generate power in wind speeds as low as 9.8 ft per second (3 m/s), whereas the Vestas turbines begin generating at 13.1 ft/s (4 m/s). GE's variable-speed control system allows the turbine to operate at maximum efficiency across a range of wind speeds, while fixed-speed turbines only attain peak efficiency at one wind speed. These improvements in turbine performance can result in significant increases in annual capacity factor in moderate wind regimes.

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[9] *Need and Supply Planning Analysis Report*, p. 44.

[10] See the 1.5sl/1.5s wind turbine spec sheets at: www.gepower.com/prod_serv/products/wind_turbines/en/15mw/index.htm.

Q. Is it possible that the problems with WPS's wind costs and capacity factors could make a significant difference in the modeling results?

A. Yes. As we have noted, a number of the EGEAS modeling scenarios differ in costs by only a small amount in percentage terms. **One company scenario with additional wind resources (H2NWW) was actually cheaper than the optimal scenario through 2026.** Lower wind costs and a higher capacity factor could result in significant changes in the optimal scenario chosen by EGEAS. Moreover, getting the cost of new wind energy right in the EGEAS model is crucial to giving wind the close scrutiny required by Wisconsin's Energy Priority Law.

Q. Do you agree with the economic and environmental benefits for energy efficiency that PSCW staff has identified in the Draft Environmental Impact Statement?[11]

A. Yes. PSCW staff has accurately summarized the economic and environmental benefits that can be expected from energy efficiency efforts.

Q. Do you agree with PSCW staff's criticisms of WPS's analyses of the potential for energy efficiency?[12]

A. Yes. We agree that WPS's reliance on data that is ten or more years old is of concern because it can lead the Company to understate the potential for energy efficiency. Staff's observation that WPS likely understated the potential for energy efficiency in the industrial sector also is of concern because it could lead to overstating the need to build new generating capacity.

Q. Do you have any comment on PSCW Staff's criticism of its own energy efficiency analyses?

A. Yes. While PSCW Staff has identified significantly greater potential for load and energy savings due to energy efficiency measures than WPS, we are concerned

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[11] *Draft Environmental Impact Statement,* at pages 78 and 79.

[12] *Draft Environmental Impact Statement,* at pages 80.

that staff's analyses also are based on a study that was last updated in 1995. We agree with staff that:

> The energy efficiency market has changed considerably since the STEP Study was completed. Additional technologies are available, the cost of many technologies has decreased, and laws governing appliances and building shell efficiency have improved the market.[13]

We also are concerned that the STEP Study relied upon avoided energy and demand costs that appear to be outdated and that the Study did not address energy efficiency potential in the industrial section.

Q. What is the significance of the PSCW staff's criticisms of both WPS's and its own energy efficiency analyses?

A. Simply, there may be substantially more cost-effective energy efficiency potential in WPS's service territory than even the PSCW staff has considered in its EGEAS runs. The existence of such cost-effective energy efficiency potential could affect the PVRR of different capacity scenarios and the timing of Weston 4 and subsequent capacity additions.

Q. Do you have any criticisms of the manner in which WPS has modeled DSM expenditures in its EGEAS analyses?

A. Yes. The DSM programs as used by WPS in its EGEAS analyses are oddly designed. For example, as shown in Figures SK-1 and SK-2, the Moderate and the Very Aggressive DSM programs produce nearly the same energy savings by the final program year of 2015. However, the Very Aggressive program is much more expensive.

This appears to be because WPS's Very Aggressive DSM program spends a lot of money (apparently not very efficiently) in the early years and then declines rapidly. A better designed program would increase DSM expenditures over time, but at a more gradual rate, in order to achieve a larger, but more cost-effective, level of energy savings.

Figure SK-1: WPS Projected DSM Savings

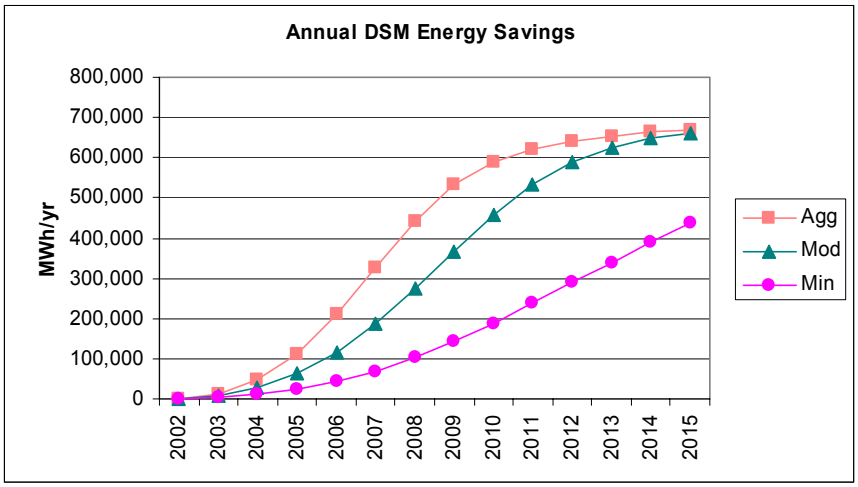
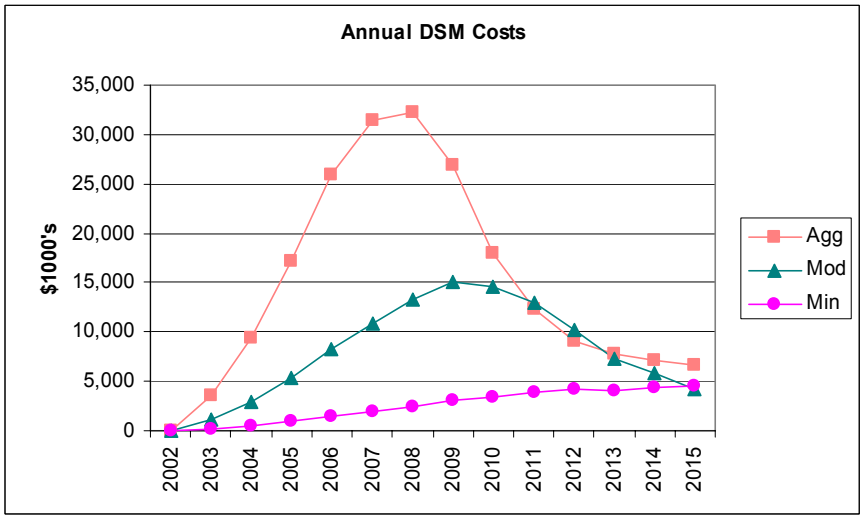


Figure SK-2: WPS Projected DSM Program Expenditures

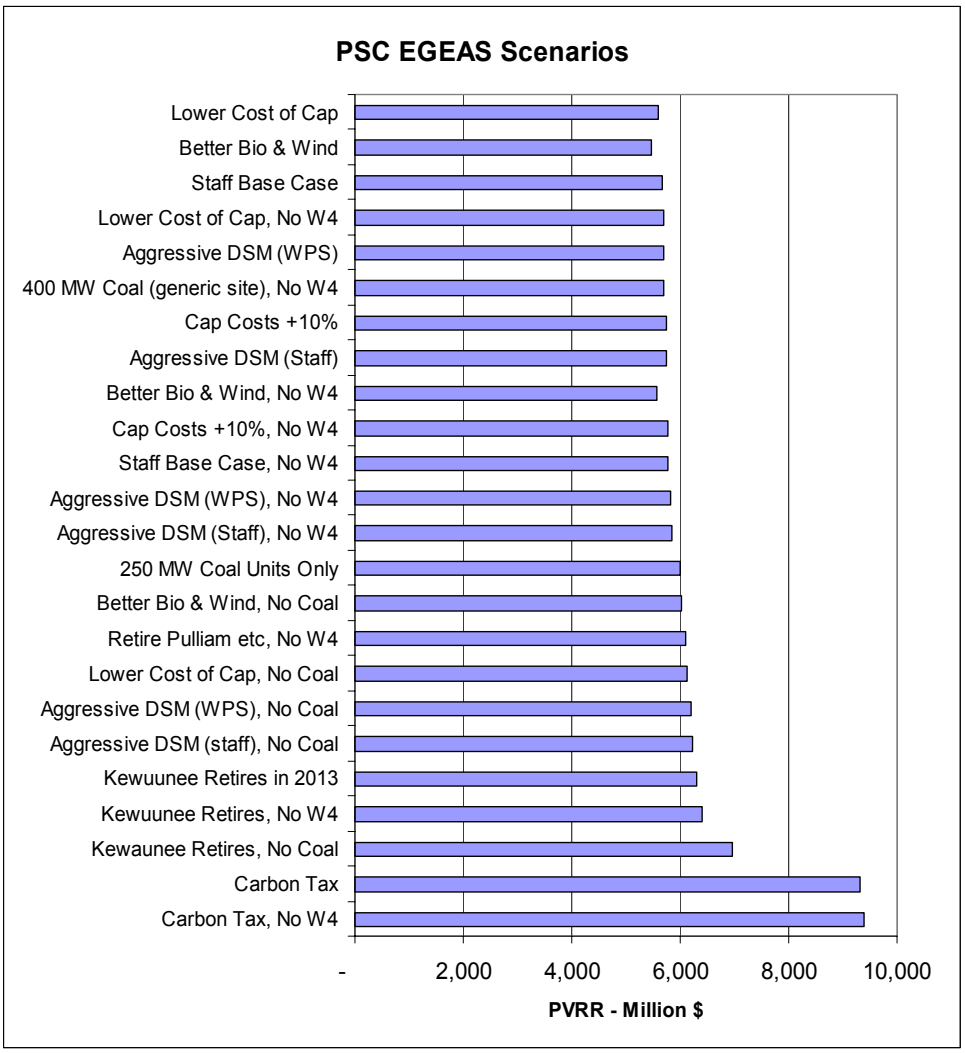


Q. Do the results of many of the PSCW Staff EGEAS runs have relatively close present value revenue requirements?

A. Yes. This is shown in Figure SK-3 below.

[13] *Draft Environmental Impact Statement,* at pages 82.

Figure SK-3: Results of PSCW Staff EGEAS Scenarios



Q. Have you seen any EGEAS runs that suggest that credible scenarios without Weston 4 have similar present value revenue requirements as plans with Weston 4?

A. Yes. PSCW Staff performed a number of EGEAS analyses in which the model was not allowed to select Weston 4. Table SK-1 compares the results of some of these scenarios with the results of Staff's Optimal Base Case (including Weston 4) and with a scenario in which the actual cost of Weston 4 is assumed to be 10 percent higher than current estimates.

Given the uncertainty of the model's representation of the economics and system operations, the uncertainty in the assumptions used in the modeling, and the long-

term nature of the EGEAS expansion plans, we believe that the PVRR of these pairs of EGEAS runs, one with Weston 4 and one without, are similar. As we discuss below, because of this relative similarity in PVRR, the PSCW Staff should re-run EGEAS using additional assumptions consistent with our findings. This would enable the Commission to determine whether Weston 4 is the most appropriate resource option for meeting WPS's energy supply needs in the 2008 timeframe.

Table SK-1: Comparison of Key PSCW Staff EGEAS Results

Scenario Without Weston 4	Scenario With Weston 4	Difference in PVRR (millions)	Difference in PVRR (%)
Staff Aggressive DSM, Weston 4 Not Allowed	Optimal Base Case	$192	3.4%
Staff Aggressive DSM, Weston 4 Not Allowed	Weston 4 Capital Costs +10%	$111	1.9%
Better Biomass and Wind, Weston 4 Not Allowed	Optimal Base Case	-$93	-1.6%
Better Biomass and Wind, Weston 4 Not Allowed	Weston 4 Capital Costs +10%	-$174	-3.0%
WPS Aggressive DSM, Weston 4 Not Allowed	Optimal Base Case	$158	2.8%
WPS Aggressive DSM, Weston 4 Not Allowed	Weston 4 Capital Costs +10%	$77	1.3%
CO_2 Monetization, Weston 4 Not Allowed	CO_2 Monetization, Base Case	$71	0.8%

Q. Did WPS also provide EGEAS runs that similarly excluded Weston 4?

A. No. Except for a series of all-gas alternatives, we have not seen any WPS-prepared EGEAS runs that prevented the model from selecting a new unit at the Weston site.

Q. Do you have any other observations regarding the EGEAS runs provided by WPS?

A. Yes. Our review of WPS's EGEAS runs suggests the following:

- A scenario in which 100 MW of wind capacity was added in 2008 has a PVRR that is only $9 million higher than a similar scenario without the wind capacity.[14]

- As noted earlier, WPS only assumes that only limited load and energy savings can be achieved through DSM.

- The results of WPS's analyses of the economics of adding only smaller coal units (i.e., less than 500 MW) seem to be heavily influenced by the selection of only one small coal plant over the entire 18 year planning horizon.[15] In fact, except for 119 MW of wind and farm digester capacity, all of the other generating additions in each of these runs is natural gas-fired, even in the high fuel cost cases.

  In addition, the EGEAS model adds significantly less capacity in each scenario when it is limited to any units larger than 250 MW. For example, in WPS's Optimized Mid-Fuel Base Case for Demand Case F2, EGEAS adds 1030 MW from two 515 MW coal plants by 2015. However, when the size of the new additions is limited to below 500 MW, the model only adds about 600 MW of new capacity by 2015 (with another 249 MW added in 2017).[16]

- In its CO_2 Monetization analyses (for demand case F2), the all-gas scenarios have PVRR that are only about $71 million, or 0.8%, higher than the Optimized Cases with Weston 4.[17]

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[14] WPS EGEAS cases H2NW vs. H2NWW. See Appendix B to WPS's CPCN Application, Exhibit 16-4, pages 5 and 6.

[15] For example, see Volume 1, Appendix B of WPS's CPCN Application, Exhibit 16-4, at pages 13, 14, 15 and 16.

[16] See Volume 1, Appendix B of WPS's CPCN Application, at Exhibit 16-4, at page 15.

[17] The results are very similar in the other demand cases examined by WPS.

Q. Should the Commission reject WPS's application for a CPCN for Weston 4 on the basis of the results presented in Figure SK-3, Table SK-1 and your review of WPS's EGEAS runs?

A. No. The results of the comparisons presented in Table SK-1 show that there are credible scenarios in which plans without Weston 4 would have PVRR reasonably close to the PVRR of PSCW Staff's optimal base case and the scenario in which the cost of Weston 4 is ten percent higher than currently forecast. However, we do not believe that the Commission should reject WPS's application for a CPCN solely on the basis of these results or on the weaknesses we have found in WPS's EGEAS modeling. Instead, we believe that the PSCW Staff should rerun its EGEAS analyses reflecting the following assumptions:

- The possible extension or renewal of some or all of WPS's existing power purchase agreements.
- Limitations on Weston 4's capability to operate at full power through the end of December 2009, if not later.
- Thirty percent wind unit capacity factors and the wind capital costs assumed in Staff's better biomass and wind scenarios.
- With and without Weston 4.
- With and without CO_2 and mercury monetization.
- With Staff's aggressive DSM projections.
- With and without a Weston 4 capital cost six to ten percent higher than currently forecast.

PSCW Staff should perform these analyses in EGEAS runs which examine <u>at the same time</u> the combined effect of more than one of these changes from the base case assumptions.

Q. Why do you believe that the PSCW Staff should rerun its EGEAS analyses to reflect a Weston 4 capital cost of six to ten percent higher than the currently forecast construction cost?

A. There are two reasons why we believe it is appropriate to consider a potentially higher capital cost for Weston 4 in the EGEAS runs. First, the PSCW

Engineering Staff believes that the potential cost overrun is about six percent for the Weston 4 project.[18]

In addition, we have assumed that the Weston 4 project, as proposed, will meet Clean Air Act and Clean Water Act standards. To the extent that there are any project additions or modifications that might be needed to meet these standards, the resulting additional capital costs and O&M expenditures need to be considered in the EGEAS runs.

Q. Are there any other EGEAS scenarios that the PSCW Staff should examine using these same assumptions?

A. Yes. As we will discuss below, PSCW Staff also should examine the PVRR effects of retiring some of WPS's older, least efficient coal-fired generating units.

Q. What effect would addition of Weston 4 have on WPS's fuel mix?

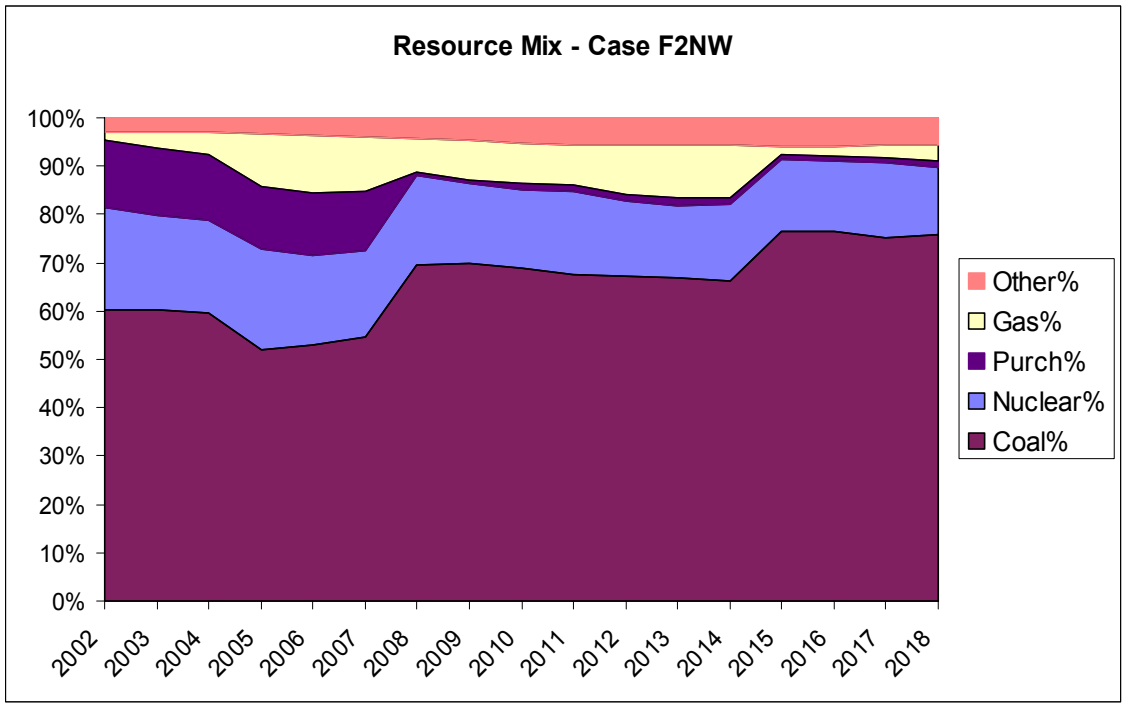
A. The addition of the Weston 4 unit would further concentrate WPS's reliance on coal and would move the Company away from increasing its fuel diversity.

For example, Figures 4-1 and 4-2 in the Draft Environmental Impact Statement show that the addition of Weston 4 would increase the percentage of WPS's capacity that is coal-fired from 57.3 percent in 2003 to 63.9 percent in 2010, despite the purchase of 235 MW from the natural-gas fired Fox Energy units. At the same time, the percentage of WPS capacity that represents renewable resources would decrease from 1.4 percent in 2003 to 1.2 percent in 2010.

The effect of adding Weston 4 is even more pronounced if we consider the percentage of the Company's total energy that would be generated by coal-fired units. For example, as shown in Figure SK-4 below, under WPS Plan F2NW the percentage of WPS's electricity that was generated at coal-fired facilities would increase from approximately 63 percent in 2002 to about 70 percent in 2018.

[18] Draft Environmental Impact Statement, at pages 51 and 52.

Figure SK-4: WPS Fuel Mix Based on MWH Generation



Q. What is the significance of this increasing WPS reliance on electricity generated at coal-fired units?

A. This increasing reliance on electricity from coal-fired generating units leaves WPS's ratepayers exposed to the substantial risk of CO_2 taxes or regulations or coal industry events that could dramatically raise the price of the electricity from these facilities. At the same time, air emissions can be expected to be significantly higher than they would be under alternative plans that included substantial amounts of DSM and wind capacity, as well as some smaller coal and/or natural gas-fired generating units.

Q. Have WPS and the PSCW staff studied the potential cost impact of the imposition of CO_2 taxes or regulations?

A. Yes. WPS studied the effect that imposition of a CO_2 tax would have on its optimal reference plan that includes Weston 4. In this scenario, the imposition of

the CO_2 tax increased the present value revenue requirements of the optimal reference scenario by $3.865 billion, or 62 percent.[19]

PSCW staff similarly studied a scenario with Weston 4 with carbon monetization. The PVRR for this scenario are $9,321 million which is $3,658 million, or about 65 percent, higher than the PVRR of the staff's optimal base case with Weston 4. Clearly, the actual impact that imposition of a CO_2 tax would have on WPS's ratepayers will depend on the timing and magnitude of the tax imposed, as well as on the amount of electricity that the Company uses from coal-fired or natural gas-fired facilities. Nevertheless, the scenarios studied by WPS and PSCW staff provide some insight into the possible magnitude of the risk that a CO_2 tax would pose for WPS's ratepayers and suggest that it would be prudent for the Company and the Commission to work towards reducing, rather than increasing, WPS's dependence on electricity from fossil-fuel fired generating units.

Q. Has PSCW staff monetized the mercury or particulate emissions as part of their EGEAS analyses?

A. It appears that neither the PSCW Staff nor WPS examined scenarios which monetized mercury or particulate emissions.

Q. Is it reasonable to expect that there will be future costs related to the reduction of mercury and particulate emissions from power plants?

A. Yes. For example, we understand that the Wisconsin Natural Resources Board has recently passed a rule that will require major utility coal burning power plants to reduce their mercury emissions by 40 percent by 2010 and 75 percent in 2015.

[19] This figure is derived, as follows: WPS Case H2NWC has a PVRR with middle fuel costs of $10, 102 million. This case includes Weston 4 and CO_2 monetization. WPS's optimal reference with Weston 4, Case H2NW, has a PVRR with middle fuel costs of $6,237 million. The difference between these two cases is $3,865 million, or 62 percent.

Q. What impact would the monetization of mercury and particulate emissions have on the results of the PSCW EGEAS analyses?

A. We expect that the monetization of mercury and particulate emissions would increase the PVRR of those runs with more coal-fired generation.

Q. If the Commission grants a CPCN for Weston 4 what additional actions should it take to decrease WPS's reliance on coal and reduce air emissions?

A. If the Commission does grant a CPCN for Weston 4, it should make the issuance of that CPCN contingent upon WPS's agreement to retire at least 150 MW, if not more, of the older coal capacity on its system. At the same time, the Commission also should establish a proceeding to examine which of the older coal units on WPS's system should be retired and the appropriate timing of those retirements.

Q. What WPS generating units are potential candidates for retirement when Weston 4 comes on-line?

A. Both WPS and PSCW staff have examined scenarios in which Pulliam Units 3-6 and Weston 1 are retired in 2008. According to WPS these units are between 54 and 61 years old and are the least efficient coal units on its system. Thus, they would appear to be candidates for retirement when Weston 4 commences commercial operations. Weston 2 also would be a candidate for possible retirement when Weston 4 is available.

Q. But doesn't the EGEAS modeling by WPS and PSCW staff show that the scenarios involving the retirement of Pulliam 3-6 and Weston 1 would have a higher PVRR than the base case scenarios which assume the continued operation of these units?

A. The EGEAS modeling by WPS and PSCW Staff does show that the PVRR of scenarios reflecting the retirement of Pulliam 3-6 and Weston 1 are approximately $280 million, or about five percent, higher than the PVRR of the Company and Staff optimal cases which reflect continued operation of these units. However, there are several factors which suggest that the PVRR of the Pulliam 3-6 and

Weston 1 retirement scenarios actually may be significantly closer to the continued operation cases:

- The PVRR differences between the retirement and continued operation scenarios decreases when CO_2 monetization is considered.[20] It is reasonable to expect that these PVRR differences would decrease even further if the possible costs of reducing mercury and particulates emissions also were considered.

- The retirement of Weston 1 (and perhaps Weston 2, as well) could resolve some of the transmission system constraints at the Weston site that will limit the output of Weston 4 until the three new 345 kV lines are available.

In addition, the EGEAS results do not consider the possible reductions in health care-related costs resulting from the retirement of aging, inefficient coal-fired units.

Q. Should the Commission require that WPS retire some of its older coal-fired units in place of selling 150 MW of Weston 4 to Dairyland Power Cooperative?

A. Yes. If the Commission certifies Weston 4 as a 500 MW unit, it should require that WPS retire some of its older generating units rather than sell 150 MW of the unit to the Dairyland Power Cooperative. The Commission should establish a proceeding to examine which specific units should be retired.

Q. Are there any other conditions that the Commission should impose if it issues a CPCN for Weston 4?

A. Yes. In order to protect ratepayers there are two other conditions that the Commission should include in any CPCN that it issues for Weston 4.

First, if Weston 4 is not able to operate at its full rated capacity due to lack of necessary transmission infrastructure, ratepayer payments for the plant should be

[20] See Volume 1, Appendix B of WPS's CPCN Application, at Exhibit 16-4, at page 17.

reduced accordingly until such time as the unit is able to operate at its full rated capacity on a regular basis.

Second, if the Commission issues a CPCN for a 500 MW Weston 4 and then Dairyland Power Cooperative does not purchase 150 MW of the unit, ratepayers should be held harmless for any costs of the Dairyland Power Cooperative option not being exercised. This would protect ratepayers if the Commission should not agree that the entire output of Weston 4 should be allocated to WPS under the assumption that WPS will retire older coal capacity and will need to replace it with the capacity that would otherwise be sold to Dairyland Power Cooperative.

Q. Have you examined the potential use of an Integrated Gasification Combined Cycle ("IGCC") facility as an alternative to Weston 4?

A. Yes. We have reviewed several recent studies that have examined the relative economic costs and environmental benefits of IGCC facilities.

We understand that IGCC technology holds the potential for significantly lower emissions than traditional pulverized coal facilities. However, due to the relative immaturity of the technology, IGCC facilities still have higher costs than other types of capacity. For this reason, we do not recommend it, at this time, as an alternative to Weston 4.

Nevertheless, we do believe that the Commission should continue to monitor the technology and, as it matures, should consider IGCC facilities for future capacity additions.

Q. Does this complete your testimony at this time?

A. Yes.