BEFORE THE
PUBLIC SERVICE COMMISSION OF WISCONSIN

Application of Wisconsin Power & Light Company and Wisconsin Electric Power Company for a Certificate of Authority to Install a Selective Catalytic Reduction System on Unit 5 at the Edgewater Generating Station, Sheboygan County, Wisconsin	)))))))	**DOCKET NO. 05-CE-137**

DIRECT TESTIMONY OF DAVID A. SCHLISSEL
ON BEHALF OF
JOHN MUIR CHAPTER OF THE SIERRA CLUB

PUBLIC VERSION
CONTAINS REDATED MATERIALS

DECEMBER 8, 2009

List of Exhibits

Exhibit 4.1 (DAS-1) Current Resume for David A. Schlissel

Exhibit 4.2 (DAS-2) *Strategic Energy Assessment: Energy 2014 – Ensuring the Availability, Reliability, and Sustainability of Wisconsin's Electric Energy Supply, Final Report*, April 2009, Docket 5-ES-104, pages V to XIV.

Exhibit 4.3 (DAS-3) *Synapse 2008 CO_2 Price Forecasts*, July 2008.

Exhibit 4.4 (DAS-4) WPL's Response to Sierra Club Interrogatory 5.

Exhibit 4.5 (DAS-5) WPL response to Sierra Club Data Request No. 9-SC/RFP-28.

Exhibit 4.6 (DAS-6) *Report and Recommendation Concerning the Little Gypsy Unit 3 Repowering Project*, submitted by Entergy Louisiana to the Louisiana Public Service Commission, April 1, 2009.

Exhibit 4.7 (DAS-7) Applicants' Exhibit 150 (RDB-1) Schedule 7 from Docket No. 6680-CE-170.

Exhibit 4.8 (DAS-8) CONFIDENTIAL: WPL response to Sierra Club Interrogatory No. 7.

Exhibit 4.9 (DAS-9) WPL response to Sierra Club Interrogatory No. 28.

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1. Introduction

Q. What are 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. 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.

Synapse's clients include state consumer advocates, public utilities commission staff, attorneys general, environmental organizations, federal government, state governments and utilities. A complete description of Synapse is available at our website, www.synapse-energy.com.

Q. 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 28 states to prepare expert testimony and analyses on engineering and economic issues related to electric utilities. My recent clients have included the General Staff of the Arkansas Public Service Commission, the U.S. Department of Justice, the Attorney General of the State of New York, cities and towns in Connecticut, New York and Virginia, state consumer advocates, and national and local environmental organizations.

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

A copy of my current resume is attached as Exhibit 4.1 (DAS-1).

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

A. I am testifying on behalf of the John Muir Chapter of the Sierra Club. ("Sierra Club")

Q. Have you testified previously before the Public Service Commission of Wisconsin ("PSCW")?

A. Yes. I have testified in PSCW Dockets Nos. 6630-CE-209, 6630-CE-197, 6690-UR-115, 05-EI-136, 6690-CE-187, 6630-EI-113, 6680-CE-170 and 5-CE-138.

Q. What is the purpose of your testimony?

A. Synapse was retained by the Sierra Club to assist in reviewing whether the proposed Selective Catalytic Reduction System ("SCR") at Edgewater Unit 5 is economic for the ratepayers of Wisconsin Power and Light Company ("WPL") and Wisconsin Electric Power Company ("WEPCO") (jointly "the Applicants") and should be approved. In particular, Synapse was asked to examine (1) the reasonableness of the Applicants' EGEAS modeling of the installation of the proposed SCR at Edgewater 5 and proposed alternatives to the project, (2) the reasonableness and feasibility of continuing to operate Edgewater Unit 5 and/or other coal-fired units owned by the Applicants in light of anticipated CO_2 emissions regulations and/or legislation and other regulatory emission reduction requirements and (3) the reasonableness of the Applicants' assumptions concerning future CO_2 prices and natural gas prices.

This testimony presents the results of our analyses.

Q. Please summarize your conclusions.

A. Our conclusions are as follows:

1. The WPL and WEPCO EGEAS modeling analyses are biased in favor of the addition of an SCR to Edgewater Unit 5 and the unit's continued operation by a number of unreasonable assumptions concerning future CO_2 prices and the impact that greenhouse gas regulation will have on natural gas prices.

2. WPL and WEPCO Applicants have modeled a number of Futures scenarios that include no monetization of CO_2. The Commission should give no weight to any EGEAS modeling scenario that does not include a future CO_2 cost in any year of the period 2010 through 2037.

3. In the Futures scenarios that include monetization of CO_2, WPL and WEPCO have modeled only low CO_2 prices. Relying on such low CO_2 prices is unreasonable given the uncertainty about the specific emissions caps and design features of future federal regulation of greenhouse gas emissions. It would be more reasonable to consider a range of future CO_2 prices such as the Synapse Mid, High and Low forecasts that reflect the potential for higher emissions costs than WPL and WEPCO have modeled.

4. WPL and WEPCO have arbitrarily increased natural gas prices in some of the Futures scenarios they modeled with CO_2 monetization to reflect what they claim would be the impact of federal regulation of greenhouse gases. Although it is possible that natural gas demand, and, consequently, natural gas prices could be higher due to greenhouse gas emissions regulations in some circumstances, the effect is very complicated and will depend on a number of factors. Therefore, it is very difficult to determine, at this time,

the amount by which natural gas prices might be raised, if at all, due to CO_2 emissions regulations or legislation.

5. The results of independent modeling analyses of the Waxman-Markey bill and other climate change legislation do not provide any evidence for the assumption that regulation of greenhouse gas emissions will increase natural gas prices by 10 percent or 30 percent in every year during the planning period 2014-2037. In fact, the modeling by the U.S. EPA, Energy Information Administration (EIA of the DOE) and others shows that there are many scenarios in which natural gas prices would *remain approximately the same or would decrease* as a result of federal regulation of greenhouse gas emissions. Even in those scenarios in which natural gas prices rise in some individual years as a result of greenhouse gas emissions, they do not increase by 10 percent or 30 percent in any single year, let alone in every year between 2015 and 2039, as WPL has assumed.

6. The combination of low CO_2 prices and much higher natural gas prices biases the WPL and WEPCO EGEAS modeling analyses in favor of coal (that is, the installation of the SCR and the continued operation of Edgewater Unit 5) and against natural gas-fired alternatives.

7. Instead of including increased spending on energy efficiency and DSM as one of the portfolio of alternatives to the installation of an SCR at Edgewater Unit 5, WPL and WEPCO have focused on a number of expensive, and in some cases very expensive, alternatives. It is unreasonable, and contrary to Wisconsin's Energy Priorities Law, to focus on these expensive supply-side options without considering that additional energy efficiency and DSM can offer less expensive alternatives, at least in large part, to the extent available for $154 million, the Applicants' estimated cost for the SCR at Edgewater Unit 5.

8. A plan that includes the sale of WEPCO's share of Edgewater Unit 5, the installation of an SCR, baghouse and scrubber on Edgewater Unit 5 and the retirement of Edgewater Unit 3 is the preferred alternative from an economic and environmental perspective. The Applicants have run EGEAS scenarios for the Intervenors that support this plan as a lower cost alternative to installing pollution controls on Edgewater Units 3 and 5.

9. On December 3, 2009, WEPCO filed supplemental testimony stating that "Using the latest fuel and load forecasts, it is not cost-effective for WE to spend $38 million on an SCR for Edgewater 5 regardless of the presence or absence of carbon constraints."[1]

Q. Were there other members of the Synapse project team who also assisted in the analyses undertaken by Synapse as part of its evaluation of the proposed emissions reduction project at Edgewater Unit 5?

A. Yes. Christopher James, Rachel Wilson, Dr. David White and Nick Doolittle from Synapse also were members of our project team. Copies of their resumes are available at www.synapse-energy.com.

FUTURE CO_2 EMISSIONS COSTS

Q. Have the Applicants adequately considered the potential financial risks of future CO_2 emissions in their modeling analyses?

A. No. In fact, the Applicants did not include any monetized value for CO_2 emissions in a large number of the alternate futures that they examine. For example, no monetized CO_2 values were assumed in any of the non-carbon-constrained scenarios presented by WEPCO or in the Futures 1, 3, 4, 8, and 9 analyses presented by WPL.

[1] Supplemental Direct Testimony of Jeff Knitter, at page SD2.2, lines 21 to 23.

At the same time, WPL and WEPCO, only considered very low CO_2 allowance price trajectories in the remaining scenarios that they examined. For example, in its Futures 2 and 5, WPL used a CO_2 price trajectory that begins with a $11.79/ton price in 2015 and that increases to $38.37/ton in 2025 and $51.12/ton in 2039 (all in nominal dollars).[2] WPL used even lower alternate CO_2 price trajectories in its Futures 6, 7, 9, 10, 11 and 12 EGEAS analyses that had CO_2 prices (i.e., average cost per ton of CO_2 emitted) of *only $.47 per ton* in 2014, increasing to $2.19 per ton in 2020, $10.89 per ton in 2030 and $20.90 per ton in 2037. WPL witness Bauer has testified that this second set of CO_2 prices was based on a methodology presented by WEPCO in Docket No. 6630-CE-302 (Glacier Hills Wind Park).

In its carbon constrained scenarios WEPCO used a set of CO_2 prices that began with a $1.89 average price per ton of CO_2 emitted in 2014, increasing to $5.91 per ton in 2020, $14.87 per ton in 2030 and $52.97 per ton in 2037.

As described below, these CO_2 allowance costs are well below current estimates from the Energy Information Administration of the U.S. Department of Energy ("EIA"), the Environmental Protection Agency ("EPA"), the Massachusetts Institute of Technology ("MIT") and other reputable sources. These are the sources that Synapse has used to derive our CO_2 price forecasts.

Q. How did you calculate the average allowance prices per ton of CO_2 that were used by WPL and WEPCO in their EGEAS runs?

A. WPL has provided the annual CO_2 allowance prices ($/ton) it used in its Futures 2 and 5 analyses.[3] The CO_2 prices used by WPL in Futures 6, 7, 10, 11 and 12 and the prices used by WEPCO were derived from information in each Company's EGEAS output files. Quite simply, the average price per ton figures cited in my previous answer are the result of dividing the annual total system CO_2 allowance costs provided in EGEAS by the company's total system CO_2 emissions for that

[2] Applicants Exhibit 1.5 (RDB-4).
[3] Id.

year. This information also is provided in the Applicants' respective EGEAS output report for each run.

Q. Is it reasonable to rely only on such low CO_2 prices in evaluating the economics of installing an SCR at Edgewater Unit 5 and continuing to operating the unit?

A. No. Relying only on scenarios that reflect either zero or very low CO_2 price trajectories, as WPL and WEPCO have done, is unreasonable. Given the uncertainty about the specific emission caps and design features of the future federal regulation of greenhouse gas emissions, it would have been reasonable to consider a far wider range of future CO_2 prices rather than the zero or very low price trajectories assumed by WPL and WEPCO.

Q. Should the Commission give any weight to the results of the modeling scenarios in which WPL and WEPCO did not assume any monetized value for CO_2 emissions?

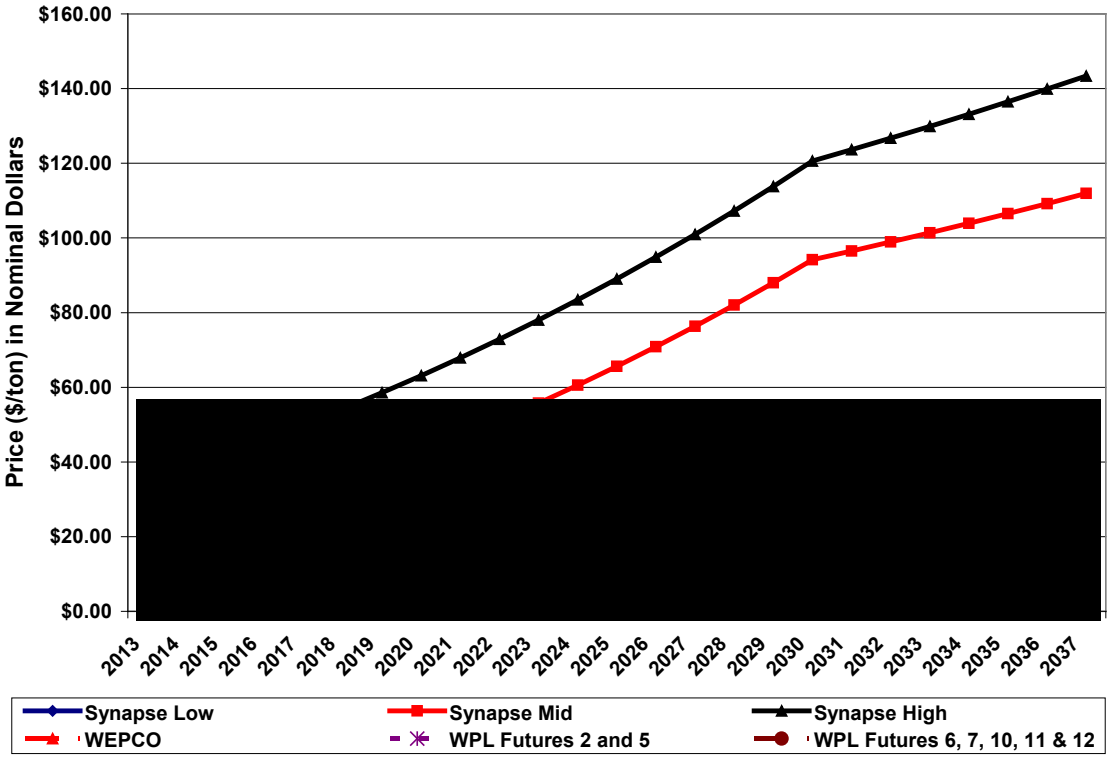
A. No. As the Commission indicated in its Strategic Energy Assessment for 2014, regulation of greenhouse gas emissions is inevitable and the Applicants' plans should include CO_2 monetization.[4] Given the trends in the legislation that has been introduced and considered in the U.S. Congress in recent years, it is unreasonable to assume that there will not be any regulation of CO_2 emissions (and, hence, no monetized values for CO_2 emission) at any time before the year 2037. There may be uncertainty over the specific monetized values for CO_2 emissions, but federal regulation of greenhouse gas emissions is a matter of when and how, not if.

[4] Exhibit 4.2 (DAS-2) *Strategic Energy Assessment: Energy 2014 – Ensuring the Availability, Reliability, and Sustainability of Wisconsin's Electric Energy Supply*, *Final Report*, April 2009, Docket 5-ES-104, at pages XI to XII.

Q. How does the monetized value that WPL and WEPCO have assumed for CO_2 emissions compare with other CO_2 price forecasts?

A. Figure 1 below compares the annual CO_2 emissions prices that WPL and WEPCO have assumed in their EGEAS modeling which include CO_2 monetization with the current Synapse Mid, High and Low CO_2 price forecasts.[5] These annual emissions prices are in nominal dollars.

Figure 1: WPL, WEPCO and Synapse CO_2 Prices



As can be seen, the annual CO_2 prices used by WPL in its Futures 2 and 5 EGEAS analyses approximate the Synapse Low CO_2 Prices. However, the CO_2 prices used by WEPCO in its carbon-constrained scenarios and by WPL in its Futures 6, 7, 10, 11 and 12 EGEAS analyses (represented by the two dashed lines

[5] The Synapse CO_2 price forecasts were developing by analyzing recent modeling performed by the EIA, EPA, MIT and others. Additional information about the Synapse CO_2 price forecasts is presented in Exhibit 4.3 (DAS-3).

at the bottom of Figure 1) are significantly lower than even the Synapse Low CO_2 price forecast.

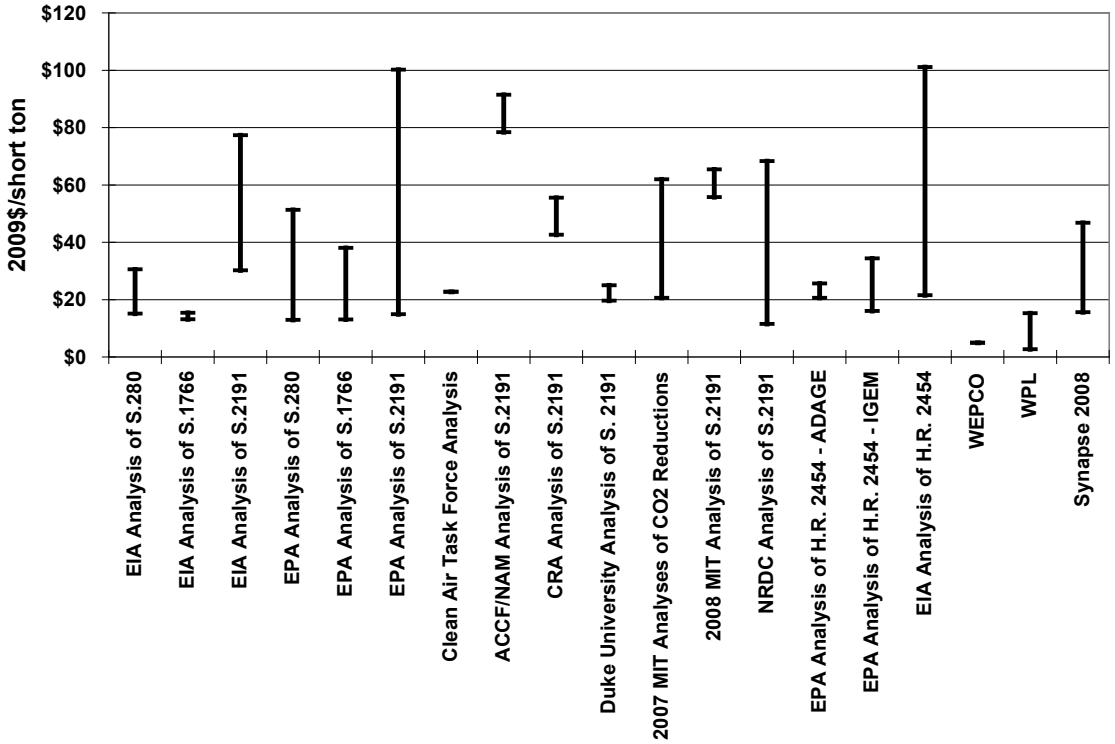
Figure 2, below, then compares the CO_2 emissions prices that WPL and WEPCO have assumed in their EGEAS modeling and the Synapse CO_2 price forecasts with the results of the independent modeling of the legislation that has been introduced in the U.S. Congress in recent years. The CO_2 emissions prices in Figure 2 are levelized prices in 2009 year dollars.

In this Figure:

- S.280 refers to the McCain Lieberman bill introduced in 2007 in the 110th U.S. Congress
- S.1766 refers to the Bingaman-Specter bill introduced in 2007 in the 110th U.S. Congress
- S. 2191 refers to the Lieberman-Warner bill introduced in 2007 in the 110th U.S. Congress
- HR. 2454 refers to the Waxman-Markey bill introduced in 2009 in the current 111th U.S. Congress

The modeling analyses in Figure 2 includes studies prepared by the U.S. EPA, the EIA, MIT, Duke University, the Clean Air Task Force, the American Council for Capital Formation and the National Association of Manufacturers, CRA-International, Inc, and the Natural Resources Defense Council ("NRDC").

Figure 2: WPL, WEPCO and Synapse CO_2 Prices Compared to Results of Modeling of Proposed Federal Legislation



As can be seen in Figure 2, the CO_2 prices used by WEPCO and WPL in their EGEAS modeling analyses are dramatically lower than the results of the modeling of recent climate change legislation considered in Congress.

Q. Does the comparison in Figure 2 include the results of the EPA and EIA modeling of H.R. 2454, the Waxman-Markey Bill?

A. Yes. Figure 2 includes the EPA and EIA modeling of H.R. 2454, the Waxman-Markey legislation (the 4th, 5th and 6th bars from the right end of Figure 2). This comparison clearly demonstrates that the CO_2 prices used by WPL and WEPCO in their modeling of Edgewater Unit 5 are extremely low compared to the range of CO_2 prices presented in the EIA and EPA modeling of H.R. 2454. Figure 2 also shows that the range of Synapse CO_2 is reasonable when compared to of the modeling of the EIA and EPA modeling of H.R. 2454.

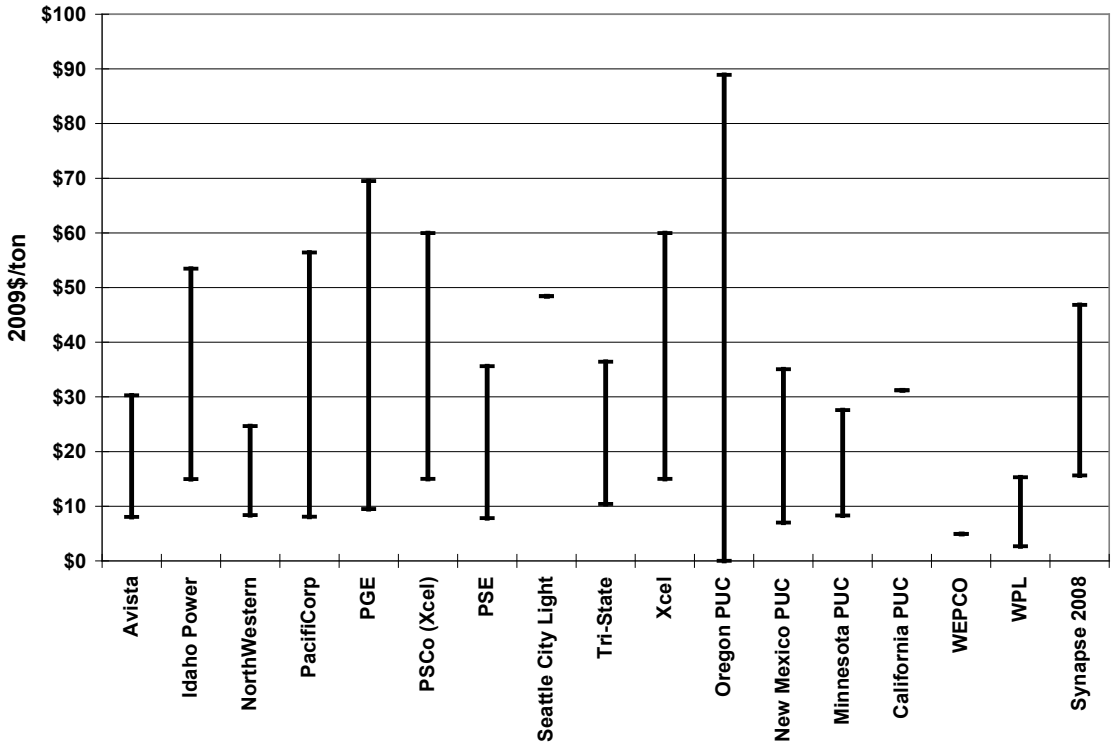
Q. Are the Synapse CO_2 prices reasonable when compared to the ranges of CO_2 prices that regulatory commissions and utilities use in resource planning?

A. Yes. The Synapse CO_2 prices have been used by a number of regulatory commissions around the nation including the New Mexico Public Regulation Commission, the Minnesota Public Utilities Commission and the California Public Utilities Commission.[6] In addition, other state regulatory commissions and an increasing number of utilities are using ranges of CO_2 prices in resource planning that are comparable to the Synapse CO_2 price forecasts.

Figure 3, below, presents some representative examples of the ranges of CO_2 prices that are being used in resource planning by commissions and utilities. Figure 3 shows that the Synapse CO_2 prices are comparable to, or lower than, the CO_2 prices used by these commissions and utilities.

[6] For example, the California PUC adopted the Synapse Mid CO_2 prices for a greenhouse gas added. See CPUC Resolution, E-4214, issued December 18, 2008, at pages 15 and 16.

Figure 3: WPL, WEPCO and Synapse CO_2 Prices Compared to Representative Examples of the CO_2 Prices Used in Resource Planning by Commissions and Utilities



Q. Have the Applicants acknowledged that the Synapse CO_2 price forecasts are reasonable for use in resource planning?

A. Yes. WPL has acknowledged that the Synapse CO_2 price forecasts are reasonable for resource planning:

> Future regulation of carbon dioxide and other greenhouse gas emissions continues to remain uncertain. Although future regulation appears likely, the details of future regulation such as the timing, goals and design of it are unknown. These details will affect the costs to comply. Even if these details were known, the costs to comply with the regulation would still remain uncertain. Costs to comply depend upon the actions available to regulated parties and the costs of those actions relative to the emission reductions achieved. Estimating costs, even a range of costs, is very subjective and speculative.

> Notwithstanding the issues associated with estimating costs that may be incurred under future regulation, numerous CO_2 price forecasts have been published. CO_2 price forecasts stemming from different parties, possible regulations, responses to regulations and models vary considerably. Synapse Energy Economics, Inc.'s 2008 CO_2 Price Forecasts provides a low, mid and high CO_2 allowance price forecast. **Synapse's forecasts are generally consistent with the results of analyses of legislative proposals and forecasts by regulatory commissions and utilities. Synapse indicates they believe these forecasts are appropriate for utility resource planning.**
>
> WPL believes that the range of costs represented by these three forecasts encompasses a range of costs that may be realized under future regulation of carbon dioxide emissions. (Emphasis added) [7]

Q. But isn't it correct that the Applicants did not include the Synapse Mid CO_2 price forecast in any modeling scenario?

A. That is correct. As shown in Figure 1, the CO_2 prices assumed by WPL in its Futures 2 and 5 EGEAS modeling analyses were only marginally higher than the Synapse Low Forecast. The remaining CO_2 prices assumed by WPL and the CO_2 prices assumed by WEPCO were significantly lower than even the Synapse Low Forecast. Consequently, other than in the runs that they ran for Intervenors Sierra Club, CUB and Clean Wisconsin, WPL and WEPCO have not examined the viability of continued operation of Edgewater Unit 5 with the proposed SCR or any other emissions reductions equipment under any higher set of CO_2 prices, including the Synapse Mid CO_2 price forecast.

Moreover, despite stating that it believes "that the range of costs represented by [the Synapse CO_2] forecasts encompasses a range of costs that may be realized under future regulation of carbon dioxide emissions," the Company nevertheless assumes annual CO_2 emissions allowance prices in the EGEAS analyses for its

[7] Exhibit 4.4 (DAS-4). WPL's Response to Sierra Club Interrogatory 5.

Futures 6, 7, 10, 11, and 12 that are significantly lower than even the Synapse Low prices. This can be seen in Figure 1 above.

Q. Is the methodology developed by WEPCO and used by both WEPCO and WPL in many of their EGEAS analyses a reasonable methodology for projecting CO_2 prices for use in resource planning?

A. No. The methodology is severely flawed in a number of ways. First, I am not aware of any serious climate change proposal that has been discussed in the U.S. Congress that would have a two-tiered CO_2 pricing structure as WPL and WEPCO have modeled. All of the Congressional greenhouse gas regulatory proposals that Synapse has reviewed have included a single CO_2 allowance pricing structure either in a cap-and-trade regime or as a carbon tax.

Second, by pricing the base CO_2 allowances so unreasonably low, WEPCO and WPL ignore the opportunity cost of the CO_2 emissions allowances. Although generators don't bear out-of-pocket costs for allowances they are given for free, using those allowances creates an opportunity cost because the generator is foregoing the income that it could otherwise earn from selling the allowances. Consequently, the opportunity cost of an allowance is equal to the value of not selling the allowance, i.e., the allowance's market price, even if the allowance is obtained for free. Quite simply, the opportunity cost measures the value that WEPCO and WPL could earn from selling allowances that they received free if they do not use those allowances themselves to generate power. This opportunity cost is the monetized value of the CO_2 allowances, not the very low values that the Applicants have assumed for CO_2 emissions under their assumed system emissions limits or caps.

Third, the only way that the average cost of the base allowances could be as low as WPL and WEPCO have used is if the companies are assuming that they will receive very large numbers of allowances free from the federal government. However, there are two problems with such an assumption: as discussed above,

WEPCO and WPL are ignoring the opportunity cost of any allowances received free from the federal government and there is great uncertainty as to what levels of emissions allowances actually will be distributed free to generators and load serving entities like WEPCO and WPL and for how many years.

Despite this uncertainty, both WEPCO and WPL assume that the will continue to receive the overwhelming number of the allowances under their assumed annual system emission limits free during the entire study period through 2037. This is an unreasonable assumption that favors the continued operation of Edgewater Unit 5.

For example, in order to have the very low base CO_2 emissions allowance prices it assumes in its Futures 6, 7, 10, 11 and 12 EGEAS analyses, given the market prices WPL is using for all of the allowances above the system limit would require that the Company receive 92.4 percent of its emissions allowances free in 2014, 82 percent free in 2025 and more than 67 percent free as late as 2037. But again, even if WPL does receive such large numbers of allowances free of charge from the federal government, the monetized value of each allowance would still be its opportunity cost or market price – not $0.

Q. Do WEPCO and WPL, in fact, assume that they could sell any excess CO_2 allowances that they receive from the federal government that they don't use themselves?

A. Yes. Each Company assumes that it would be able to sell any unused emissions allowances that it receives free from the federal government. Thus WPL and WEPCO both acknowledge the opportunity cost associated with such "free" allowances and, thereby, undermine the low CO_2 price forecasts they use in the their EGEAS modeling.

Q. Do the results of the WPL and WEPCO EGEAS analyses show that each company would achieve significant reductions in CO_2 emissions if they continue to operate Edgewater Unit 5?

A. No. Figure 4, below, compares the WEPCO's CO_2 emissions in 2005 and the annual CO_2 emissions from the Company's EGEAS runs for the two scenarios involving (1) adding controls and continuing to operate Edgewater Unit 5 and (2) retiring the unit. The blue line in Figure 4 represents the annual system CO_2 emissions limits that WEPCO has assumed would be in effect based on the final report of the Governor's Task Force on Global Warming.[8]

[8] The basis for WEPCO's assumed annual system CO_2 emissions limits was presented in Attachment B to the Company's response to CUB/CW Interrogatory-9.

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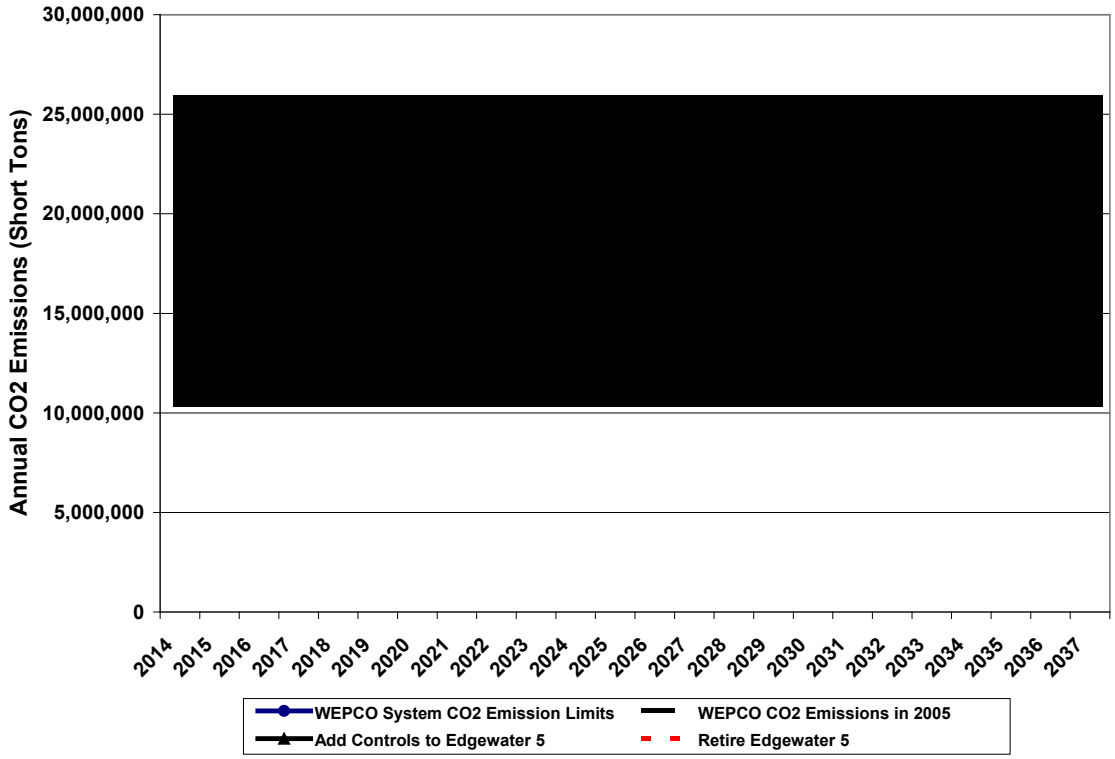
Figure 4: WEPCO Annual CO_2 Emissions from EGEAS Output Reports[9]

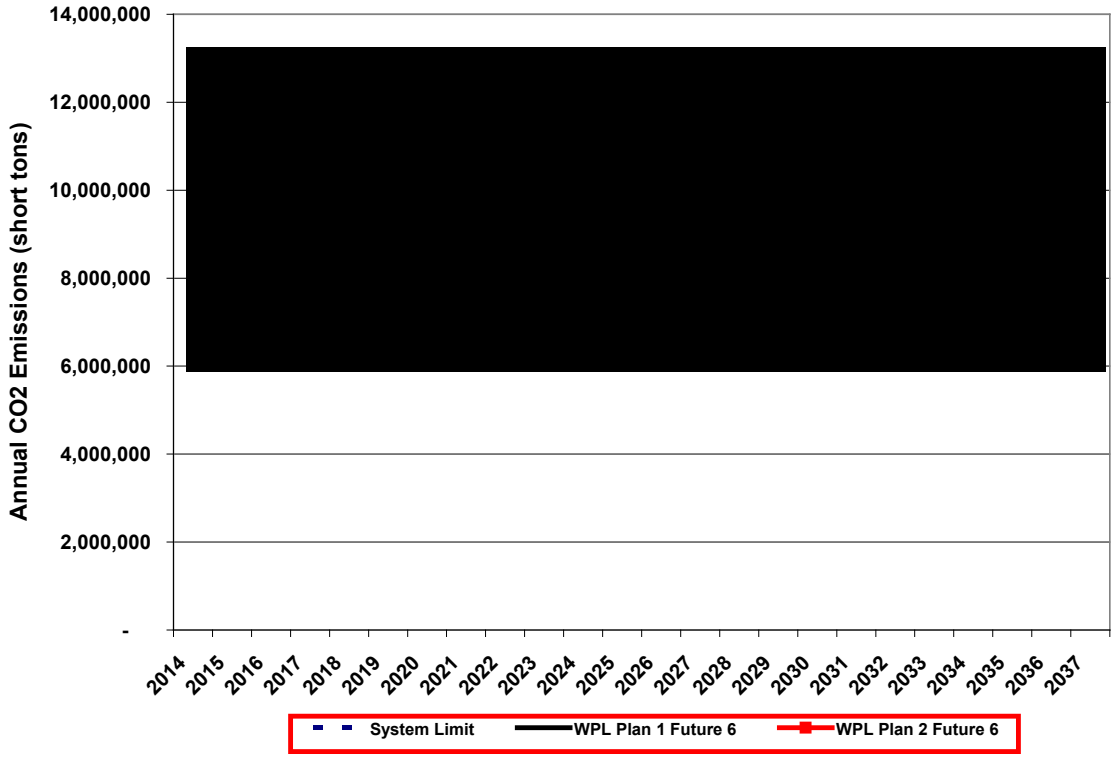


As can be seen, if it continues to operate Edgewater Unit 5, WEPCO will not achieve any actual reductions in its annual CO_2 emissions until 2032 and will never achieve emissions levels at or below its assumed future system emissions limits.

Figure 5, below, compares the annual CO_2 emissions from two of WPL's EGEAS runs for its Plan 1 (which includes the addition of SCR), Plan 2 (which reflects the retirement of Edgewater Unit 5) with the Future 6 assumptions and its assumed system limits, again based on the Global Warming Task Force recommendations. WPL's Future 6 was chosen as being representative of the results of the Company's EGEAS modeling results with monetized CO_2 values.

[9] The annual CO_2 emissions presented in Figure 4 are from WEPCO's E5CntlCO2 and E5RetCO2 EGEAS runs.

Figure 5: WPL Annual CO_2 Emissions for Plans 1 and 2 for its Assumed Future 6 EGEAS Analyses



As with WEPCO, WPL's own EGEAS runs suggest if it installs an SCR and continues to operate Edgewater Unit 5, it will not achieve any real reductions in CO_2 emissions through 2029 or 2030.

Q. What impact would the use of a more reasonable range of CO_2 prices have on the results of WPL's EGEAS modeling?

A. The use of a more reasonable range of CO_2 prices would reduce or eliminate altogether the NPV economic benefits shown in WPL Exhibit 1.2 (RDB-1) for Plan 1 (adding the SCR on Edgewater Unit 5) as compared to Plan 2 (retiring Unit 5) in Futures 2, 5, 6, 7, 10, 11 and 12. WPL Exhibit 1.2 also shows NPV economic benefits for Plan 3 (installing an SCR, baghouse and scrubber on Unit 5) versus Plan 2 in Futures 2, 5, 6, and 7.

All of these NPV economic benefits would be reduced significantly or eliminated altogether if a more reasonable range of CO_2 prices were used in WPL's EGEAS modeling. Plan 2 (retiring Unit 5) already is shown to be the lower cost option as compared to Plan 3 (installing the SCR, baghouse and scrubber) in WPL Futures 10, 11, and 12. The use of more reasonable CO_2 prices would increase the NPV economic benefits from Plan 2 versus Plan 3.

Q. Would the use of more reasonable CO_2 prices affect the results of the break-even analyses discussed by WPL witness Bauer?

A. Yes. The break-even analyses discussed by Mr. Bauer and provided in WPL's Third Supplemental Response to PSCW Staff DR 3.22 are biased by the use of unreasonably low CO_2 prices. The use of a more reasonable range of CO_2 prices would substantially change the results of these break-even analyses moving the "break-even" significantly further into the future.

Q. What impact would the use of a more reasonable range of CO_2 prices have on the results of WEPCO's EGEAS modeling?

A. The results of WEPCO's "Carbon Constrained" EGEAS modeling, as provided in the response to Data Request PSC 02.01, showed only very small NPV economic benefits to the installation of SCR as compared to retirement of the Edgewater 5 unit – and these were with extremely low CO_2 prices.

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(A)	(B)	(C)	(D)
			(C-B)
	Control Edge 5	Retire Edge 5	Delta
	(in 1000s)	(in 1000s)	(in 1000s)
Carbon Constrained Case - CO_2 Monetized Starting in 2014	$45,731.6	$45,770.5	$38.9
Carbon Constrained Case - High Gas	$46,545.7	$46,598.5	$52.8
Carbon Constrained Case - Low Gas	$44,859.9	$44,889.3	$29.4
Carbon Constrained Case - with SO_2 and NOx	$45,752.6	$45,769.3	$16.7

Table 1: NPV Results of WEPCO's Initial Carbon Constrained EGEAS Runs.

As Table 1 shows, even using very low CO_2 costs, WEPCO's EGEAS runs showed a benefit of only $38,000,000, or 0.09 percent of its total NPV costs, over the planning period. It can be expected that the use of more reasonable CO_2 prices would reverse these very small NPV benefits and make retirement of Edgewater Unit 5 the lower cost option in each case.

Q. Have you seen any new WEPCO EGEAS analyses examining the economics of installing an SCR on Edgewater Unit 5?

A. Yes. WEPCO filed the Supplemental Direct Testimony of Jeff Knitter on December 3, 2009. Mr. Knitter presented the results of new EGEAS runs that the Company has made in November 2009 based on updated fuel price and load projections.[10] For example, Mr. Knitter testified that the Company's natural gas price forecasts for the year 2012 had decreased from about $14/mmbtu when they prepared their initial EGEAS runs in this Docket last spring to about $7/mmbtu in WEPCO's September 2009 fuel forecast.

[10] Supplemental Direct Testimony of Jeff Knitter, at page SD2.1, lines 28-33.

Q. What are the results of WEPCO's updated EGEAS analyses?

A. As Mr. Knitter explains "it is not cost-effective for WE to spend $38 million on an SCR for Edgewater 5 regardless of the presence or absence of carbon constraints."[11]

The NPV results of WEPCO's updated "carbon constrained" EGEAS runs are presented in Table 2, below:

(A)	(B)	(C)	(D)
			(C-B)
	Control Edge 5	Retire Edge 5	Delta
	(in 1000s)	(in 1000s)	(in 1000s)
Carbon Constrained Case - CO_2 Monetized Starting in 2014	$37,374.0	$37,312.0	($62.0)
Carbon Constrained Case - High Gas	$38,088.0	$38,028.0	($60.0)
Carbon Constrained Case - Low Gas	$36,598.0	$36,532.0	($66.0)
Carbon Constrained Case - with SO_2 and NOx	$37,385.0	$37,312.0	($73.0)

Table 2: NPV Results of WEPCO's Updated Carbon Constrained EGEAS Runs.

Q. Are you reserving the right to file Supplemental Direct Testimony once you have had more of an opportunity to review the updated WEPCO EGEAS analyses?

A. Yes.

Q. What are your conclusions concerning the CO_2 prices assumed by the Applicants in their EGEAS modeling?

A. As I noted earlier, the Commission should not give any weight to any scenario that does not include any CO_2 prices – it is unreasonable to expect that there will not be any regulation of greenhouse gases at any time before 2037.

In addition, the CO_2 prices assumed by WPL and WEPCO are too low to use as the only CO_2 prices considered. Instead, WPL and WEPCO should have modeled a range of future CO_2 prices such as the Synapse Low, Mid and High forecasts.

By ignoring the potential for higher CO_2 prices, WPL and WEPCO have biased their EGEAS modeling analyses in favor of the installation of emissions controls and the continued operation of Edgewater Unit 5 because coal is the most carbon intensive fuel.[12]

IMPACT OF GREENHOUSE GAS REGULATION ON NATURAL GAS PRICES

Q. Have WPL and WEPCO adjusted natural gas and/or coal prices to reflect federal regulation of greenhouse gas emissions?

A. Yes. WPL has said that it increased natural gas prices by 30 percent beginning in 2013 in its Future 5 scenarios that include a monetized value for CO_2 emissions.[13] WPL also increased natural gas prices by 10 percent in its Future 12 EGEAS analyses and decreased natural gas prices by a similar 10 percent in its Future 11 EGEAS analyses.[14]

WEPCO has suggested that it increased natural gas prices by $1.00 per MMBtu to account for a carbon constrained environment.[15] Given the base gas price forecast used in WEPCO's initial EGEAS runs, this would amount to about an 8 percent increase in natural gas prices. However, the output files for WEPCO's EGEAS analyses do not offer evidence that it actually did increase the natural gas prices in

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[11] Id, at page SD2.2, lines 21-23.

[12] For example, a typical new combined cycle plant is expected to emit on the order of 1000 to 1200 lbs of CO_2 per MWh. The average CO_2 emissions from Edgewater Unit 5 were approximately 2000 lbs per MWh during 2007 and 2008.

[13] For example, see WPL's Response to Data Request No. 8-SC/INT-48.

[14] Exhibit 1.2 (RDB-1) and WPL's response to Sierra Club Discovery Request No. 8-SC/INT-48.

[15] WEPCO's response to CUB/CW Interrogatory 9, at page 6 of 7.

the carbon-constrained runs as compared to the prices used in the non-carbon-constrained runs.[16]

Q. Do you agree with the assumption by WPL that natural gas prices would increase by either 10 or 30 percent if the federal government adopts legislation or regulations to regulate and reduce greenhouse gas emissions?

A. No. It is possible that natural gas demand could be somewhat higher due to CO_2 emission regulations and, as a result, natural gas prices could be expected to be somewhat higher than otherwise would be the case. However, the effect is very complicated and will depend on a number of factors, such as how much new natural gas capacity is built as a result of the higher coal-plant operating costs due to the CO_2 emission allowance prices, how much additional DSM and renewable alternatives are added to the U.S. system, the levels and prices of any incremental natural gas imported into or developed in the U.S., and changes in the dispatching of the electric system. Indeed, depending on future circumstances there may be some periods in which the prices of natural gas may be lower as a result of CO_2 regulations. Thus it is very difficult to determine, at this time, the amount by which natural gas prices might be increased, if at all, due to the regulation of CO_2 emission.

In fact, as I will discuss below, the detailed modeling of proposed greenhouse gas legislation does not support any assumption that the price of natural gas would increase by 10 percent, let alone anything close to 30 percent, during every year of the period 2014 to 2037 as a result of a federal program for regulating greenhouse gas emissions.

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[16] We compared the natural gas prices in several pairs of WEPCO's EGEAS runs: E5CntlMR vs. E5CntlCO_2 and E5Ret vs. E5RetCO_2 but did not find any evidence that WEPCO actually did use higher natural gas prices in its Carbon Constrained EGEAS analyses.

Q. Was WPL able to provide copies of any studies or analyses, prepared by or for the Company, which have examined the impact that regulation of CO_2 emissions can be expected to have on natural gas prices?

A. No.[17]

Q. Has Synapse examined the impact that the enactment of CO_2 emissions regulations might have on natural gas prices?

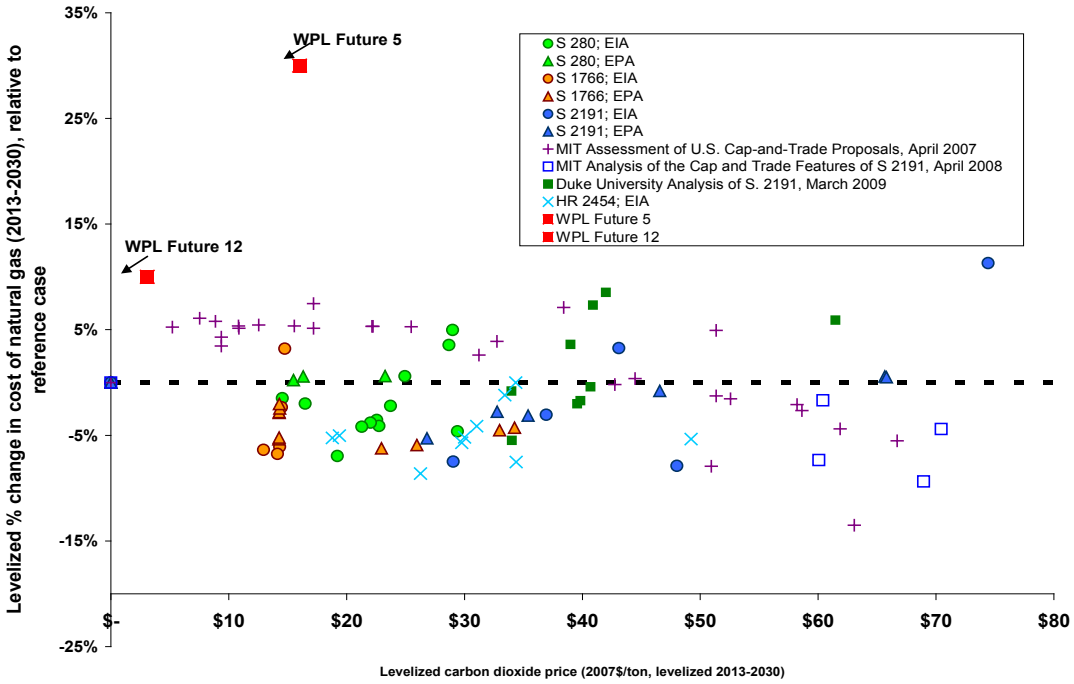
A. Yes. As part of our work on climate change issues, Synapse has reviewed the publicly available modeling results concerning the impact that adoption and implementation of CO_2 regulatory legislation could have on natural gas prices. The results of our review are presented in Figure 6, below.

More particularly, Figure 6 shows the levelized percentage changes in natural gas prices (i.e., increases or decreases from the base case that has no regulation of greenhouse gas emissions) in a large number of scenarios from the major climate change proposals that have been introduced in the U.S. Congress in recent years. Each data points shown in Figure 6 reflects the levelized change in the natural gas prices in a modeled scenario and the levelized CO_2 price for that scenario.

The levelized CO_2 prices and natural gas price changes presented in Figure 6 have been developed from the results of modeling by the Joint Program at MIT on the Science and Policy of Global Change, the U.S. EPA, and the EIA of the Department of Energy , and cover multiple climate change proposals in the 110th U.S. Congress: Senate Bill S.280 (the McCain-Lieberman bill), Senate Bill S.1766 (the Bingaman-Specter bill), Senate Bill S.2191 (the Lieberman-Warner bill) and House Bill 2454 in the 111th Congress (the American Clean Energy and Security Act of 2009, "Waxman-Markey").

[17] Exhibit 4.5 (DAS-5). WPL response to Sierra Club Data Request No. 9-SC/RFP-28.

Figure 6: The relationship between CO_2 emissions allowance prices and natural gas prices.



The red squares in Figure 6 reflect WPL's assumption in its Future 5 and Future 12 analyses that federal regulation of CO_2 emissions will lead to an increase in natural gas prices of 10 percent or 30 percent in each year of the study period.

As shown clearly in Figure 6, *none* of the results of any of the independent modeling analyses support WPL's assumption that regulation of CO_2 emissions will increase natural gas prices either 10 percent or 30 percent, especially not at the very low CO_2 prices that WPL has assumed in their EGEAS analyses in this proceeding. Instead, the modeling evidence suggests that federal regulation of greenhouse gas emissions can be expected to have a much smaller impact on natural gas prices than WPL has assumed in its EGEAS modeling. This is true even at CO_2 prices that are significantly higher than the CO_2 prices that WPL (and, perhaps, WEPCO, as well) has assumed in its EGEAS modeling.

In fact, the results of the modeling of a substantial number of the CO_2 regulation scenarios represented in Figure 6 suggest that the adoption of greenhouse gas

regulation would lead to lower natural gas prices as the demand for and the use of natural gas decline due to its greenhouse gas emissions. Thus, there is no credible modeling evidence to support WPL's assumption that federal regulation of greenhouse gas emissions would inevitably lead to anywhere near a 10 percent or a 30 percent increase in the price of natural gas, particularly at relatively low CO_2 prices. In fact, there is no clear evidence that CO_2 prices in the range that the Applicants have used in their EGEAS will push natural gas prices higher at all.

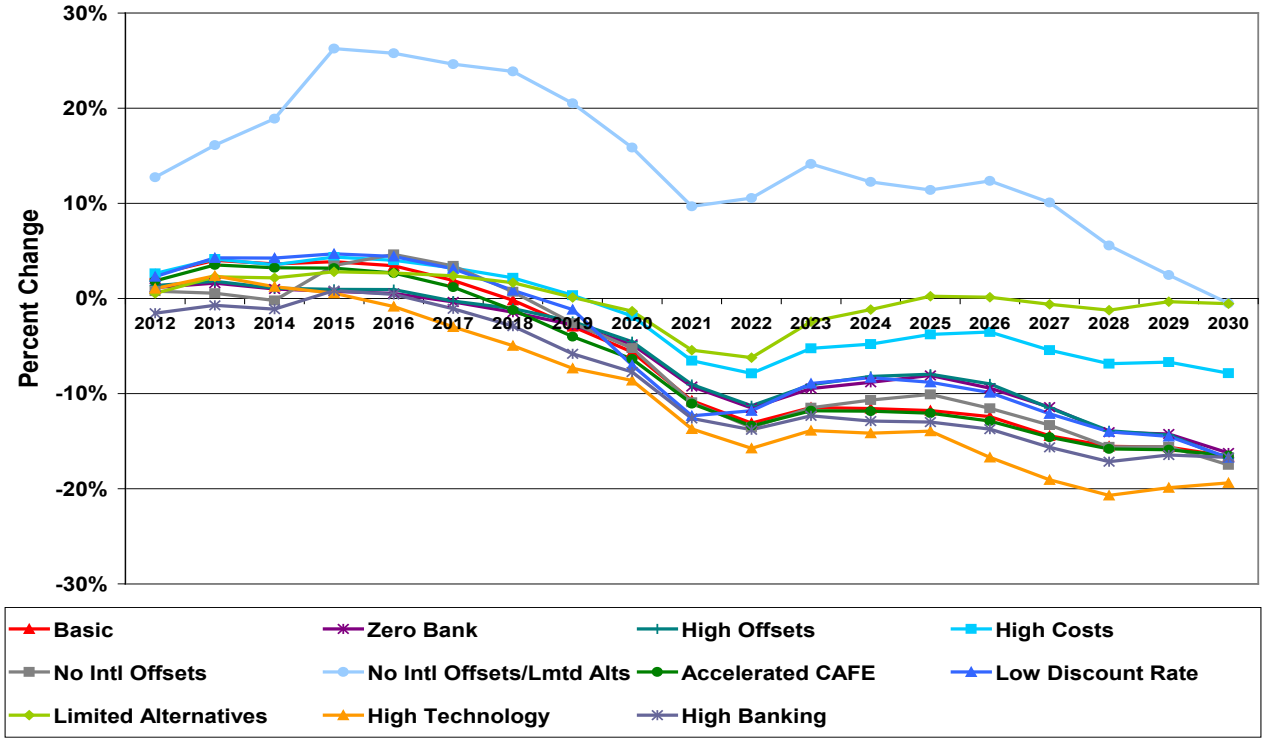
Q. Does Figure 6, above, include the recent modeling of the HR 2454, the Waxman-Markey legislation that has been approved by the U.S. House of Representatives?

A. Yes. The results of the recent EIA modeling of the Waxman-Markey bill are included in Figure 6.

Q. Have you seen any other evidence that suggests that federal regulation of greenhouse gas emissions will not cause natural gas prices to increase by 10 percent or 30 percent as WPL has assumed in its Future 5 and Future 12 EGEAS analyses?

A. Yes. Figure 7, below, presents the annual percentage changes in natural gas prices in each of the scenarios examined by the EIA in its recent modeling of the Waxman-Markey bill from the gas prices in the EIA's reference case without any regulation of CO_2 emissions. This information provides insight in the ranges of natural gas prices that could be expected from adoption of the Waxman-Markey bill.

Figure 7: Annual Changes in Natural Gas Prices from Reference Case in EIA Modeling of Proposed Waxman-Markey Legislation



As can be seen from Figure 7, under the Waxman-Markey bill that has been passed by the House of Representatives, natural gas prices would not increase by either or 10 percent or 30 percent in any of the years in any of the scenarios studied by the EIA except for a single scenario in which there would only be limited alternatives to using gas in place of coal and in which the use of international offsets would not be allowed. At most, natural gas prices would spike above 20% for four or five years even in this most limited scenario studied by the EIA. However, even in this extreme scenario, natural gas prices would not increase by 30 percent in any year through 2030.

In fact, Figure 7 shows that in many of the cases studied by the EIA, natural gas prices could be expected to decrease over time as a result of the federal regulation of greenhouse gas emissions.

Q. Would these results be any different if you just focused on the two scenarios examined by the EIA in which the number of new nuclear capacity additions was limited?

A. No. The results would be the same if we focused solely on the two Limited Alternatives scenarios examined by the EIA in its modeling of H.R. 2454. There still would not be any support for a claim that federal regulation of greenhouse gas emissions will increase natural gas prices by 10 percent, let alone 30 percent, in every year of the study period.

Q. But doesn't common sense suggest that regulating greenhouse gas emissions will lead to less coal-fired generation and more of a dependence on natural gas – thereby increasing the demand for and price of natural gas?

A. Not necessarily, especially over the mid-to-longer term. In fact, there are several reasons why federal regulation of greenhouse gas emissions may not lead to any meaningful increases in the price of natural gas. First, natural gas plants also emit CO_2. Thus, federal regulation of greenhouse gas emissions will create economic incentives to shift away from the use of natural gas to more carbon neutral options such as energy efficiency and renewable resources. This will act to reduce the demand for natural gas, as well as coal-fired generation.

It also is generally accepted that strategies for reducing our national greenhouse gas emissions will require implementing complementary policies adding large amounts of new wind and energy efficiency. Thus, legislative proposals for regulation of greenhouse gases, such as the Waxman-Markey bill, also include increased investments in these areas. Consequently, carbon legislation, when coupled with increasing amounts of new wind and energy efficiency, actually may lead to decreases in the demand for natural gas over the long term, and price reductions, contrary to what WPL has assumed.

For example, a recent study by the U.S. Department of Energy's National Renewable Energy Laboratory examined the costs and benefits of achieving 20

percent wind energy penetration by 2030.[18] One of the benefits that this DOE study found was that wind generation could displace up to 50 percent of the electricity that would be generated from natural gas – this, in turn, could translate into a reduction in national demand for natural gas of 11 percent.[19]

The identification of substantially increased natural gas supplies within the past year also will affect the impact that regulation of CO_2 emissions can be expected to have on natural gas prices. Indeed, the identification of these new supplies of natural gas has been described as a structural change in the natural gas market. This structural change has two important impacts on the resource planning for Edgewater Unit 5. First, as a result of the existing and expected supply glut, current and projected prices of natural gas have been reduced. At the same time, the dramatically increased supplies of natural gas that are being identified should be able to accommodate any increased demands from fuel switching as a result of federal regulation of greenhouse gas emissions without causing significant increases in natural gas prices.

The structural change in the natural gas markets already has had a significant impact on utilities' resource planning. For example, in early April of this year, Entergy Louisiana informed the Louisiana Public Service Commission of its intent to defer (and perhaps cancel) a proposal to retire an existing gas-fired power plant and, in its place, to build a new coal-fired unit. Entergy explained that it no longer believes that a new coal plant would provide economic benefits for its customers due to its current expectation that future gas prices would be much lower than previously anticipated:

> Perhaps the largest change that has affected the Project economics is the sharp decline in natural gas prices, both current prices and those forecasted for the longer-term. The prices have declined in

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[18] *20 Percent Wind Energy by 2030*, available at http://www.20percentwind.org/20p.aspx?page=Report.

[19] Id, at pages 16 and 154.

large part as a result of a structural change in the natural gas market driven largely by the increased production of domestic gas through unconventional technologies. The decline in the long-term price of natural gas has caused a shift in the economics of the Repowering Project, with the Project currently – and for the first time – projected to have a negative value over a wide range of outcomes as compared to a gas-fired (CCGT) resource.[20]

4. Recent Natural Gas Developments

Until very recently, natural gas prices were expected to increase substantially in future years. For the decade prior to 2000, natural gas prices averaged below $3.00/mmBtu (2006$). From 2000 through May 2007, prices increased to an average of about $6.00/mmBtu (2006$). This rise in prices reflected increasing natural gas demand, primarily in the power sector, and increasingly tighter supplies. The upward trend in natural gas prices continued into the summer of 2008 when Henry Hub prices reached a high of $131.32/mmBtu (nominal). The decline in natural gas prices since the summer of 2008 reflects, in part, a reduction in demand resulting from the downturn in the U.S. economy.

* * * *

However, the decline also reflects other factors, which have implications for long-term gas prices. During 2008, there occurred a seismic shift in the North American gas market. "Non-conventional gas" – so called because it involves the extraction of gas sources that previously were non-economic or technically difficult to extract – emerged as an economic source of long-term supply. While the existence of non-conventional natural gas deposits within North America was well established prior to this time, the ability to extract supplies economically in large volumes was not. **The recent success of non-conventional gas exploration techniques (e.g., fracturing, horizontal drilling) has altered the supply-side fundamentals such that there now exists an expectation of much greater supplies of economically priced natural gas in the long-run….**

* * * *

[20] Exhibit 305 (DAS-6). *Report and Recommendation Concerning the Little Gypsy Unit 3 Repowering Project*, submitted by Entergy Louisiana to the Louisiana Public Service Commission, April 1, 2009, at pages 6-8.

> Of course, it should be noted that it is not possible to predict natural gas prices with any degree of certainty, and [Entergy Louisiana] cannot know whether gas prices may rise again. Rather, based upon the best available information today, it appears that gas prices will not reach previous levels for a sustained period of time because of the newly discovered ability to produce gas through non-traditional recovery methods…[21] [Emphasis added]

Entergy's conclusion that there has been a seismic shift in the domestic natural gas industry was confirmed in early June 2009 by the release of a report by the American Gas Association and an independent organization of natural gas experts known as the Potential Gas Committee, the authority on gas supplies. This report concluded that the natural gas reserves in the United States are 35 percent higher than previously believed. The new estimates show "an exceptionally strong and optimistic gas supply picture for the nation," according to a summary of the report.[22]

A Wall Street Journal Market Watch article titled "U.S. Gas Fields From Bust to Boom" similarly reported that huge new gas fields have been found in Louisiana, Texas, Arkansas and Pennsylvania and cited one industry-backed study as estimating that the U.S. now has enough natural gas to satisfy nearly 100 years of current natural gas-demand.[23] It further noted that

> Just three years ago, the conventional wisdom was that U.S. natural-gas production was facing permanent decline. U.S. policymakers were resigned to the idea that the country would have to rely more on foreign imports to supply the fuel that heats half of American homes, generates one-fifth of the nation's electricity, and is a key component in plastics, chemicals and fertilizer.
>
> But new technologies and a drilling boom have helped production rise 11% in the past two years. Now there's a glut, which has

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[21] Id, at pages 17, 18 and 22.
[22] *Estimate Places Natural Gas Reserves 35 percent Higher*, New York Times, June 9, 2009.
[23] Available at http://online.wsj.com/article/SB12410459891270585.html.

> driven prices down to a six-year low and prompted producers to temporarily cut back drilling and search for new demand.[24]

The existence of higher natural gas reserves and the new recovery techniques discussed above should significantly reduce any impact on natural gas prices from the adoption of a federal program regulating greenhouse gas emissions.

Clearly, WPL wants the Commission to accept scenarios that include very low CO_2 prices and high natural gas prices that have been artificially increased by assuming that the low CO_2 prices will have a substantial (i.e., 10 or 30 percent) impact on natural gas prices. However, as I have shown above, such a combination of low CO_2 pries and much higher gas prices is not supported by any analysis and improperly biases WPL's EGEAS modeling in favor of coal and against natural gas alternatives.

Q. What assumption did WPL make in its 2008 EGEAS modeling in Docket No. 6680-CE-170 as to the impact that regulation of greenhouse gases would have on natural gas prices?

A. In the EGEAS modeling runs in Docket No. 6680-CE-170 that compared the conversion of the Neenah facility to a combined cycle unit to the building of the proposed Nelson Dewey 3 plant, WPL assumed that natural gas prices would be raised by 10 percent in scenarios with monetized CO_2 emissions values.[25] Now, only a year later, the same Company has assumed that the same set of CO_2 prices will lead to much higher 30 percent increases in natural gas prices.

Q. What are reasonable assumptions regarding the impact that CO_2 regulation will have on natural gas prices that should be used in the EGEAS modeling of the proposed SCR at Edgewater Unit 5?

A. The base case analysis should assume that CO_2 regulation will not have a measurable impact on natural gas prices. At the same time, I would suggest that

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[24] Id.

sensitivity cases be run which assume that gas prices might increase somewhat over time as a result of CO_2 regulation. As I testified in Docket No. 6680-CE-170, with the Synapse mid CO_2 prices, such sensitivity cases could assume that natural gas prices would be perhaps 5 percent higher than base case levels by 2015 or 2020 and 10 percent higher by 2025 or 2030. Although the results of the modeling that I have discussed suggests that natural gas prices actually could be lower over time as a result of CO_2 regulation, to be conservative I would recommend that such scenarios not be run at this time.

MODELING OF ENERGY EFFICIENCY

Q. Is there any evidence that WPL has appropriately modeled the potential reductions in its peak demands and energy requirements that can be achieved through aggressive energy efficiency and DSM efforts?

A. No. WPL has modeled only a relatively small amount of DSM and energy efficiency in its EGEAS analyses in this Docket. The energy efficiency and DSM modeled by WPL are significantly below the potential savings identified in the Energy Efficiency Potential Study that was prepared earlier this year by the Energy Center of Wisconsin for this Commission. That Study concluded that the cumulative energy efficiency savings for the State of Wisconsin could reach 13.0 percent of total electricity sales by 2018 and 12.9 percent of electricity peak demand.[26]

Q. Did WPL allow the EGEAS model to select additional energy efficiency or DSM as an alternative or part of a portfolio of alternatives to the installation of an SCR and the continued operation of Edgewater Unit 5?

A. No. The same amounts of energy efficiency and DSM were used in the plans which assumed the installation of the proposed SCR or the retirement of

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[25] Rebuttal Testimony of Randy Bauer in Docket No. 6680-CE-170, at page 17, lines 3-6.

[26] *Energy Efficiency and Customer-Sited Renewable Resource Potential in Wisconsin for the years 2012 and 2018*, Energy Center of Wisconsin, August 2009, at pages EE-20 and EE-21).

Edgewater Unit 5. Instead of assuming that additional investments in energy efficiency and DSM could be made in place of the SCR, WPL assumed the same amounts in each scenario.

Q. Is the failure to include additional spending on energy efficiency and/or DSM as one of the set of alternatives to the proposed SCR at Edgewater Unit 5 prudent?

A. No. Prudent planning would look at all cost-effective alternatives to the proposed SCR. From what I have seen, WPL and WEPCO have focused on expensive and very expensive supply side alternatives to the installation of an SCR at Edgewater Unit 5. It is unreasonable to focus on these expensive supply-side options without considering that additional energy efficiency and DSM can offer lower cost, and less emitting, alternatives, at least in large part, to the expenditure of what the Applicants now predict will be $154 million for an SCR.

Moreover, further diversifying the Applicants' portfolios to include additional demand side measures and renewable resources would be a sensible future investment that would reduce their ratepayers' exposure to the risks of higher rates and would provide a real "bridge" to a future with reduced greenhouse gas emissions. In fact, renewable generation resources, efficiency and natural gas all are preferred over the coal-fired plants such as Edgewater Unit 5 under the Wisconsin Energy Priorities Law:

> 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 energy resources.
>
> (c) Combustible renewable energy resources.
>
> (d) Non renewable combustible energy resources in the order listed.

1. Natural gas.
2. Oil or coal with a sulphur content of less than 1%.
3. All other carbon-based fuels.[27]

Consequently, under the Energy Priorities Law, WPL and WEPCO should be required to implement additional energy efficiency and demand side measures first, instead of prolonging the life of their coal plant, unless they can demonstrate that doing so is either not cost-effective or not technically feasible. However, the Applicants have not done so in this Docket. They have not shown that it is not technically feasible to achieve greater MW and MWh savings from energy efficiency and DSM beyond the relatively minor amounts they have assumed in their EGEAS modeling. Nor have they shown that installing the proposed SCR is more cost-effective than making additional investments in energy efficiency and DSM.

Q. Has WPL indicated that it would be possible to achieve greater energy efficiency savings than it has included in its resource planning?

A. Yes. In Docket No. 6680-CE-170, WPL offered to increase its energy efficiency savings by 50 percent as part of what it called a "Carbon Reduction Plan" if the Commission would approve construction of Nelson Dewey 3.[28]

Q. To which options are you referring when you say that WPL and WEPCO have considered some very expensive supply-side alternatives in their EGEAS modeling?

A. WEPCO included advanced coal as an option in its EGEAS modeling. WPL has included new pulverized coal units and new nuclear units as options in its EGEAS modeling. These new coal and nuclear units would be very expensive alternatives.

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[27] Wisconsin Statutes Section 1.12(4).

[28] Exhibit 4.7 (DAS-7). Applicants' Exhibit 150 (RBD-1) Schedule 7 from Docket No. 6680-CE-170.

Moreover, given the uncertainties associated with the construction cost and schedules for any new nuclear power plants, the new nuclear units assumed by WPL in its EGEAS modeling can reasonably be expected to cost far more and be available far later than WPL has assumed. This is especially true given (1) the nuclear industry's very poor record of projecting the construction costs of the existing generation of nuclear power plants (i.e., nuclear plants actually cost 200 to 300 percent more than had been projected at the start of construction), (2) the fact that no new nuclear units have been built in the United States in decades, (3) the significant cost increases and regulatory delays that are being announced to new nuclear plants that are already in the licensing/construction pipeline and (4) the significant problems that have been experienced by new nuclear plant construction projects overseas. It is very likely that a new nuclear plant will cost significantly more than WPL has assumed in their EGEAS modeling and that any new nuclear units in Wisconsin (or even outside the state but partly owned by Wisconsin utilities) will not be available until after 2025.

At the same time, given the uncertainties associated with construction costs and schedules for any new coal-fired power plants, the coal units included as options by WPL and WEPCO in their EGEAS modeling also can reasonably be expected to cost far more and be available far later than the companies have assumed.

THE RESULTS OF THE INTERVENOR PLANS MODELED BY WPL AND WEPCO

Q. Please describe the scenarios that WPL and WEPCO examined in response to requests from Intervenors Sierra Club, CUB and Clean Wisconsin.

A. Based on a series of discussions and correspondence with the Sierra Club, CUB and Clean Wisconsin, WPL and WEPCO each ran four separate Plans for each of three different Futures:

Intervenor Plan 1 (Plan 1-I) - Assumed the installation of an SCR on Edgewater Unit 5 by January 1, 2012 and a baghouse and scrubber by January 1,

2014. Plan 1 also assumed installation of a baghouse on Edgewater Unit 3 by January 1, 2014.

Intervenor Plan 2 (Plan 2-I) - Assumed that Edgewater Unit 5 is retired as of December 31, 2012.

Intervenor Plan 3 (Plan 3-I) – Assumed installation of an SNCR on Edgewater Unit 5 as of January 1, 2012 and a baghouse and scrubber by January 1, 2014. Edgewater Unit 3 assumed retired by January 1, 2012.

Intervenor Plan 4 (Plan 4-I) – Assumed that WEPCO sells its 25 percent share of Edgewater Unit 5 effective January 1, 2012 and that Edgewater Unit 3 also is retired effective January 1, 2012. Plan 4 also assumes that an SCR is installed on Edgewater Unit 5 by January 1, 2012 and that a baghouse and scrubber are installed on Unit 5 as of January 1, 2014.

Each of these Plans was evaluated in three different future scenarios: Among the modifications assumed in the Base Future was the use of the Synapse Mid CO_2 Price Forecast. Future A assumed the Synapse High CO_2 Price Forecast. Future B assumed the Synapse Low CO_2 Price Forecast.

Q. Intervenor Plan 1-I includes the installation of additional pollution control equipment on Edgewater Unit 5 and Unit 3 beyond an SCR. Do you know what is the basis for assuming such additional controls on Edgewater Unit 5?

A. Although I was not involved in formulating the plans submitted to WPL and WEPCO by Intervenors Sierra Club, CUB and Clean Wisconsin, I believe that the additional Edgewater Unit 5 pollution controls included in Intervenors Plan 1-I are those modeled by WPL in its Plan 3.

Q. Plan 1-I also includes a baghouse on Unit 3. Is it reasonable to expect that a baghouse will be required on that unit?

A. It is likely that some pollution control equipment to address mercury emissions at Unit 3 will be required and a baghouse will reduce mercury emissions from that

unit. The Wisconsin DNR has issued regulations under Chapter NR 446 that require mercury emissions to be reduced from coal-fired electric generating units. The regulations offer several possible pathways for affected resources to achieve compliance. The first option provides that by January 1, 2015, coal-fired units with a capacity between 25 MW and 150 MW (which include Edgewater Unit 3) would be required to reduce mercury emissions to a level that is determined by the DNR to the best available control technology ("BACT"). Another option provides a multi-pollutant pathway that extends compliance with the mercury standard until January 1, 2021. The multi-pollutant pathway requires sources that opt-in to demonstrate interim mercury reduction requirements in 2015 and 2018, and that the sources also meet required reductions for SO_2 and NOx.

During discovery, WPL indicated that it does not "plan to use the 'multipollutant' compliance approach at any of the units at the Edgewater Generating Station. WPL current plans to install mercury emission controls at the plant to support compliance with both the first (2010-2014) and the second (2015 and later) phases of the Wisconsin State Hg rule."[29] Therefore, WPL must meet the BACT requirement from Edgewater Unit 3 by 2015. In discovery, WPL also stated that a BACT analysis has not been performed to determine what pollution controls will be required at Unit 3.[30] A baghouse is a reasonable "placeholder" for the type of pollution control equipment that may ultimately be required.

Q. Are there other potential regulations that would require a baghouse be installed to control mercury at Edgewater Unit 3?

A. Yes. Anticipated EPA regulations to address toxic air pollutants, including mercury, are expected to require power plants to meet "maximum achievable control technology" or MACT. These rules could be more stringent than the Wisconsin mercury rule and require at least a baghouse at Edgewater Unit 3.

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[29] Exhibit 4.8 (DAS-8). CONFIDENTIAL, WPL response to Sierra Club Interrogatory No. 7.
[30] Exhibit 4.9 (DAS-9). WPL response to Sierra Club Interrogatory No. 28.

Q. Have the Applicants considered a more stringent mercury rule?

A. Not for this proceeding. However, in the Columbia Units 1 and 2 scrubber case, Docket No. 05-CE-138, WPL agreed that EPA is expected to issue a hazardous air pollutant "such as MACT [that] may require mercury emission controls with high mercury removal efficiencies to be installed …."[31]

Q. Is it reasonable to assume that a baghouse will be installed on Edgewater Unit 3?

A. Yes. Given the Wisconsin mercury rule and the likely more stringent reduction requirements that are anticipated from the EPA, to is reasonable to expect that a baghouse will be required to reduce the mercury emissions from Edgewater Unit 3, as Intervenors have done for their Plan 1-I.

Q. Have you seen any recent examples of utilities that are retiring existing coal units instead of retrofitting them with environmental controls?

A. Yes. On December 1, 2009, Progress Energy in North Carolina announced that it would close 1,500 MW of its existing coal-fired power plants in the Carolinas by 2017 rather than install pollution controls. On the following day, Exelon, based in Chicago, announced it would retire four coal-fired units near Philadelphia instead of installing pollution controls. The same week, Michael Morris of American Electric Power ("AEP") told a NARUC conference in Dallas, Texas, that AEP is going to retire 2,400 MW of existing coal units by 2015 and 5,700 MW by 2030.

Q: Intervenor Plan 3-I assumes retirement of Edgewater Unit 3. Is Edgewater Unit 3 a reasonable retirement option?

A: Yes. In its application to construct Nelson Dewey Unit 3, WPL proposed shutting down Edgewater unit 3 as part of its "carbon reduction plan" by 2013.[32] Based on

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[31] WPL witness Guelker in Docket No. 05-CE-138, at Hearing Transcript Page 2016, PSC Ref # 121371.

[32] Exhibit 4.7 (DAS-7). Applicants Exhibit 150 (RDB-1) Schedule 7 in Docket No. 6680-CE-170.

its filings, the company has considered retirement of this unit to be a reasonable option.[33]

Q. What were the economic results of the EGEAS runs that WPL ran for Intervenor Plans 1-I to 4-I in the Base Future and Futures A and B?

A. The economic results of WPL's Intervenor EGEAS runs are presented in Table 3, below:

	Base Future (Mid CO_2 Prices) (Thousands)	Future A (High CO_2 Prices) (Thousands)	Future B (Low CO_2 Prices) (Thousands)
Plan 1-I	$17,307	$16,216	$18,487
Plan 2-I	$17,315	$16,038	$18,909
Plan 3-I	$17,180	$16,059	$18,413
Plan 4-I	$17,159	$16,115	$18,321

Table 3: NPV Results of Intervenor EGEAS Scenarios Run by WPL

These results show:

- In each of the three future scenarios, Intervenor Plan 4-I, the sale of WEPCO's share of Edgewater 5 to WPL, the retirement of Edgewater Unit 3 and the installation of emissions control equipment on Edgewater Unit 5 by January 1, 2015 is a lower cost option than Plan 1-1, with installation of the SCR by January 1, 2012 and installation of the SO_2 and mercury emissions control equipment on Unit 5 by January 1, 2014.

- In the Future A scenario (with High CO_2 Prices), Plan 2-1, retirement of Edgewater Unit 5 is a lower cost option than Plan 1, continued operation with the emissions control equipment. In the Base Future scenario (with Mid CO_2 Prices), Plan 2-I has just about the same NPV as Plan 1-I. In the Future B scenario (Low CO_2 Prices), Plan 1-I is the lower cost option.

[33] Direct testimony of WPL witness Randy Bauer, Docket No. 6670-CE-170, Hr'g Tr at 1293, lines 20 to 23, PSC Ref #101341.

Q. Have you identified any significant problems with WPL's Intervenor EGEAS runs?

A. Yes. As shown in Figures 8A, 8B and 8C, below, WPL appears to have used the wrong CO_2 emissions prices in its Intervenor EGEAS runs. Apparently the Company used the Synapse Mid, High and Low CO_2 prices in constant 2007 dollars instead of converting those prices into nominal dollars.

Figure 8A: Synapse Mid CO_2 Prices vs. CO_2 Prices Used by WPL in its Base Future Analyses for Intervenors Sierra Club, CUB and Clean Wisconsin

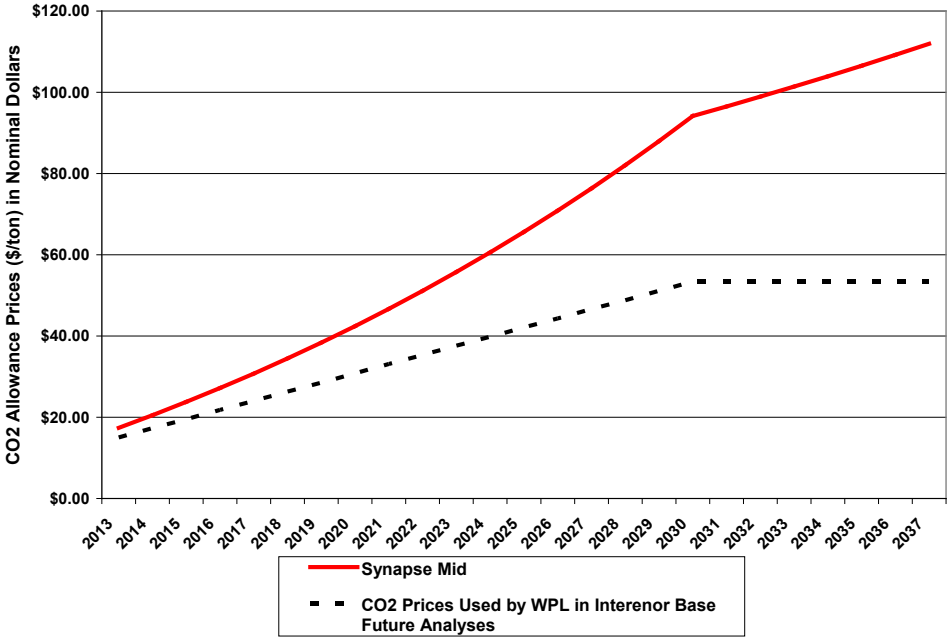

Figure 8B: Synapse High CO_2 Prices vs. CO_2 Prices Used by WPL in its Future A Analyses for Intervenors Sierra Club, CUB and Clean Wisconsin

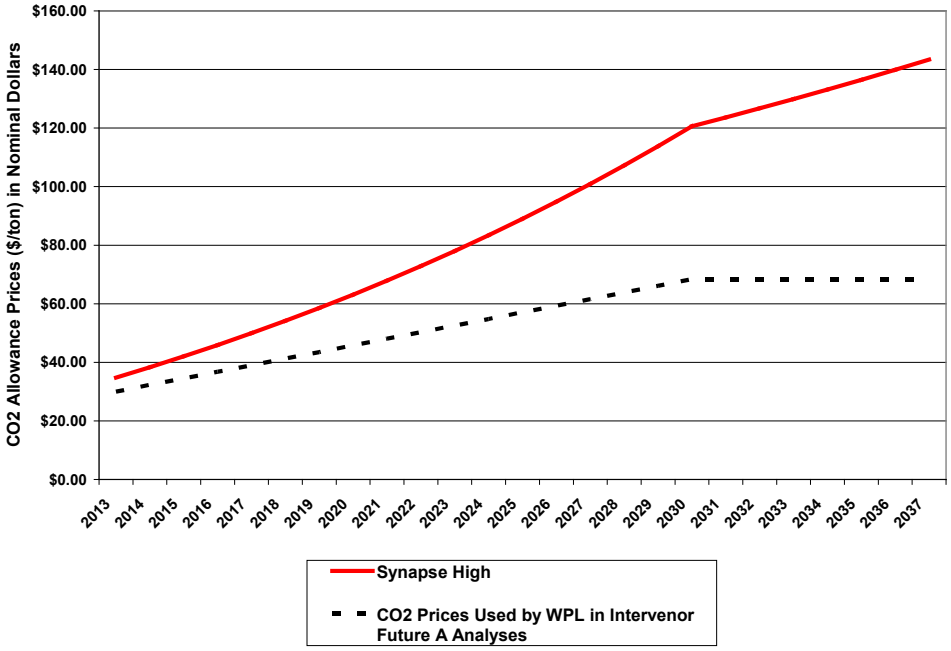

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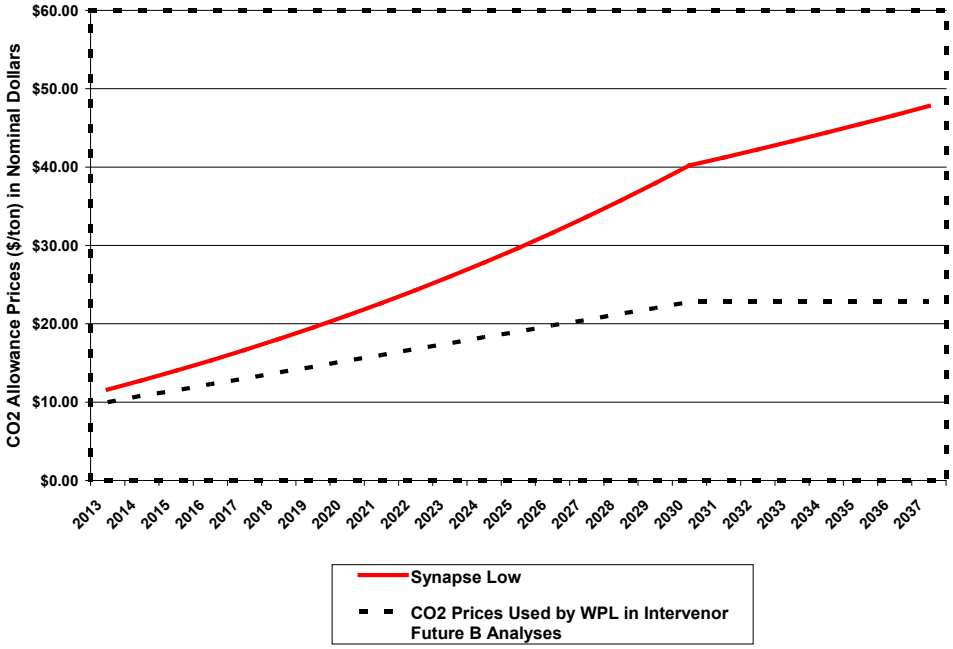
Figure 8C: Synapse Low CO_2 Prices vs. CO_2 Prices Used by WPL in its Base Future Analyses for Intervenors Sierra Club, CUB and Clean Wisconsin



Q. What impact did this mistake have on the results of WPL's Intervenor EGEAS runs?

A. WPL's Intervenor EGEAS analyses are biased in favor of the plan with the highest CO_2 emissions, that is, Plan 1-I, due to WPL's use of the Synapse CO_2 prices in 2007 dollars instead of nominal dollars. This means that the economic benefits for Intervenor Plan 4-I as compared to Plan 1-I, shown in Table 3 should be larger and the economic benefit shown for Plan 1-I as compared to Intervenor Plan 2-I is significantly overstated should be reduced if not eliminated altogether.

Q. What were the economic results of WEPCO's EGEAS runs for Intervenor Plans 1-I through 4-I with the Base Future and Futures A and B assumptions?

A. The economic results of WEPCO's Intervenor EGEAS runs are presented in Table 4, below:

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	Base Future (Mid CO_2 Prices) (Thousands)	Future A (High CO_2 Prices) (Thousands)	Future B (Low CO_2 Prices) (Thousands)
Plan 1-I	$51,698	$50,126	$50,384
Plan 2-I	$51,046	$49,925	$50,282
Plan 3-I	$51,693	$50,122	$50,380
Plan 4-I	$51,029	$49,906	$50,268

Table 4: NPV Results of Intervenor EGEAS Scenarios Run by WEPCO

These results show that:

- In each of the three future scenarios modeled, Plan 2-I, the retirement of Edgewater Unit 5 is a lower cost option than Plan 1-I with the continued operation of Unit 5 and the installation of the NOx, SO_2 and mercury emissions controls.

- In each of the three future scenarios, Plan 4-I is a lower cost option than Plan 1-I.

Q. Does this complete your testimony?

A. Yes.