

BEFORE THE STATE OF MINNESOTA  
OFFICE OF ADMINISTRATIVE HEARINGS  
FOR THE MINNESOTA PUBLIC UTILITIES COMMISSION

In the Matter of the Application by Otter Tail Power )  
Company and Others for Certification of )  
Transmission Facilities in Western Minnesota ) OAH No. 12-2500-17037-2  
And ) MPUC Dkt. No. CN-05-619  
In the Matter of the Application to the Minnesota ) and  
Public Utilities Commission for a Route Permit for the ) OAH No. 12-2500-17038-2  
Big Stone Transmission Project in Western Minnesota ) MPUC Dkt. No. TR-05-1275  
)

Direct Testimony of  
David A. Schlissel and Anna Sommer  
Synapse Energy Economics, Inc.

On Behalf of  
Fresh Energy  
Izaak Walton League of America – Midwest Office  
Wind on the Wires  
Union of Concerned Scientists  
Minnesota Center for Environmental Advocacy

November 17, 2006

## TABLE OF CONTENTS

I.	QUALIFICATIONS.....	1
II.	SUMMARY AND PURPOSE OF TESTIMONY .....	3
III.	FEDERALLY MANDATED GREENHOUSE GAS REDUCTIONS CAN BE EXPECTED IN THE NEAR FUTURE .....	5
IV.	STATE AND REGIONAL ACTION .....	18
V.	THE USE OF CARBON DIOXIDE COSTS IN UTILITY PLANNING .....	21
VI.	THE APPLICANTS HAVE NOT ADEQUATELY CONSIDERED THE RISK OF GREENHOUSE GAS REGULATIONS IN THEIR ANALYSES OF THE BIG STONE II PROJECT AND ALTERNATIVES .....	27

### LIST OF JOINT INTERVENORS (“JI”) -1 EXHIBITS

Exhibit JI-1-A	Resume of David A. Schlissel.
Exhibit JI-1-B	Resume of Anna Sommer.
Exhibit JI-1-C	EIA Natural Gas Price Forecasts 1990-2006.
Exhibit JI-1-D	Applicants’ response to Interrogatory No. 18 of Joint Intervenors’ First Set and First Amended Set of Interrogatories in South Dakota Public Utilities Commission Case No. EL05-022, incorporated in Applicants’ response to Joint Intervenors’ Information Request No. 2 in Minnesota Public Utilities Commission Docket No. CN-05-619.
Exhibit JI-1-E	Descriptive Slide Prepared by Applicants.
Exhibit JI-1-F	Synapse Report: <i>Climate Change and Power: Carbon Dioxide Emissions Costs and Electric Resource Planning.</i>
Exhibit JI-1-G	Applicants’ response to Joint Intervenors’ First Set of Requests for Admission in South Dakota Public Utilities Commission Case No. EL05-022.

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1 **I. QUALIFICATIONS**

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

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

5 **Q. Ms. Sommer, please state your name position and business address.**

6 A. My name is Anna Sommer. I am a Research Associate at Synapse Energy  
7 Economics, Inc., 22 Pearl Street, Cambridge, MA 02139.

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

9 A. We are testifying on behalf of Fresh Energy, Izaak Walton League of America –  
10 Midwest Office, Wind on the Wires, Union of Concerned Scientists, and  
11 Minnesota Center for Environmental Advocacy (“Joint Intervenors”).

12 **Q. Please describe Synapse Energy Economics.**

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

18 Synapse’s clients include state consumer advocates, public utilities commission  
19 staff (and have included the Staff of the South Dakota Public Utilities  
20 Commission), attorneys general, environmental organizations, federal government  
21 and utilities.

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

24 A. I graduated from the Massachusetts Institute of Technology in 1968 with a  
25 Bachelor of Science Degree in Engineering. In 1969, I received a Master of  
26 Science Degree in Engineering from Stanford University. In 1973, I received a

1 Law Degree from Stanford University. In addition, I studied nuclear engineering  
2 at the Massachusetts Institute of Technology during the years 1983-1986.

3 Since 1983 I have been retained by governmental bodies, publicly-owned utilities,  
4 and private organizations in 28 states to prepare expert testimony and analyses on  
5 engineering and economic issues related to electric utilities. My clients have  
6 included the Staff of the Arizona Corporation Commission, the General Staff of  
7 the Arkansas Public Service Commission, the Staff of the Kansas State  
8 Corporation Commission, municipal utility systems in Massachusetts, New York,  
9 Texas, and North Carolina, and the Attorney General of the Commonwealth of  
10 Massachusetts.

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

16 A copy of my current resume is attached as Exhibit JI-1-A.

17 **Q. Have you previously submitted testimony before this Commission?**

18 A. No.

19 **Q. Ms. Sommer, please summarize your educational background and work  
20 experience.**

21 A. I am a Research Associate with Synapse Energy Economics. I provide research  
22 and assist in writing testimony and reports on a wide range of issues from  
23 renewable energy policy to integrated resource planning. My recent work includes  
24 preparing and presenting testimony on a utility proposal to build two coal-fired  
25 generating units in North Carolina, assisting in developing resource planning  
26 guidelines and suggestions for the state of Ohio, aiding a Florida utility in its  
27 integrated resource planning and evaluating the feasibility of carbon  
28 sequestration.

1 I also have participated in studies of proposed renewable portfolio standards in the  
2 United States and Canada. In addition, I have evaluated the equity of utility  
3 renewable energy solicitations in Nova Scotia and the feasibility and prudence of  
4 the sale and purchase of existing gas and nuclear capacity in Arkansas and Iowa.

5 Prior to joining Synapse, I worked at EFI and XENERGY (now KEMA  
6 Consulting) and Zilkha Renewable Energy (now Horizon Wind Energy). At  
7 XENERGY and Zilkha I focused on policy and economic aspects of renewable  
8 energy. While at Zilkha, I authored a strategy and information plan for the  
9 development of wind farms in the western United States.

10 I have testified before state regulatory commissions in South Dakota and North  
11 Carolina.

12 I hold a BS in Economics and Environmental Studies from Tufts University. A  
13 copy of my current resume is attached as Exhibit JI-1-B.

14 **Q. Ms. Sommer, have you previously submitted testimony before this**  
15 **Commission?**

16 A. No.

## 17 **II. SUMMARY AND PURPOSE OF TESTIMONY**

18 **Q. What is the purpose of your testimony?**

19 A. This testimony and that of our colleague Dr. Ezra Hausman presents the results of  
20 our investigation of whether the Applicants have appropriately reflected the  
21 potential for the regulation of greenhouse gases in choosing to build the proposed  
22 Big Stone II Project. This Project would include a generating facility in South  
23 Dakota and transmission lines and associated facilities in South Dakota and  
24 Minnesota.

1 **Q. Please summarize your conclusions on the issue of whether the Big Stone II**  
2 **Applicants have appropriately reflected the potential for the regulation of**  
3 **greenhouse gases in the design of the proposed project and in their economic**  
4 **analyses.**

5 A. Our conclusions on this issue are as follows:

- 6 1. Climate change is causing and can be expected in the future to cause  
7 significant environmental harm, as explained in detail in the Testimony of  
8 Dr. Ezra Hausman.
- 9 2. There is scientific consensus that emissions of carbon dioxide cause  
10 climate change.
- 11 3. The Applicants have proposed to build the Big Stone II Project which will  
12 include a generating facility in South Dakota and two transmission lines  
13 and associated facilities in Minnesota.
- 14 4. The construction of the transmission lines in Minnesota will enable the  
15 Big Stone II Project to emit more than 4.7 million tons of carbon dioxide  
16 annually.
- 17 5. As a result, the granting of a certificate of need to construct the  
18 transmission lines proposed as part of the Big Stone II Project will pose a  
19 serious threat to the environment.
- 20 6. The potential for the regulation of carbon dioxide emissions must be  
21 considered as part of any prudent evaluation of the economics of the Big  
22 Stone II Project and alternatives
- 23 7. However, the Applicants have not adequately analyzed the potential for  
24 future carbon regulations.
- 25 8. The externality values for carbon dioxide established by the Minnesota  
26 Public Utilities Commission and used in resource planning by some of the  
27 Applicants are meant to recognize “external” costs, or, in other words,  
28 costs that are not directly paid by utilities or their ratepayers. The

1 Minnesota Commission’s externality values are not reflective of the costs  
2 of complying with future greenhouse gas regulations that will be directly  
3 paid by the utilities or ratepayers.

4 9. Synapses Energy Economics has developed a greenhouse gas allowance  
5 price forecast that reflects a range of prices that could reasonably be  
6 expected through 2030.

7 10. Adopting Synapse’s range of carbon prices would increase the projected  
8 annual costs of the Big Stone II Project by \$37.6 million to \$147.6 million  
9 annually on a levelized basis.

10 **III. FEDERALLY MANDATED GREENHOUSE GAS REDUCTIONS CAN BE**  
11 **EXPECTED IN THE NEAR FUTURE**

12 **Q. Is it prudent to expect that a policy to address climate change will be**  
13 **implemented in the U.S. in a way that should be of concern to coal-dependent**  
14 **utilities in the Midwest?**

15 A. Yes. The prospect of global warming and the resultant widespread climate  
16 changes has spurred international efforts to work towards a sustainable level of  
17 greenhouse gas emissions. These international efforts are embodied in the United  
18 Nations Framework Convention on Climate Change (“UNFCCC”), a treaty that  
19 the U.S. ratified in 1992, along with almost every other country in the world. The  
20 Kyoto Protocol, a supplement to the UNFCCC, establishes legally binding limits  
21 on the greenhouse gas emissions of industrialized nations and economies in  
22 transition.

23 Despite being the single largest contributor to global emissions of greenhouse  
24 gases, the United States remains one of a very few industrialized nations that have  
25 not signed the Kyoto Protocol.<sup>1</sup> Nevertheless, individual states, regional groups

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<sup>1</sup> As we use the terms “carbon dioxide regulation” and “greenhouse gas regulation” throughout our testimony, there is no difference. While we believe that the future regulation we discuss here will govern emissions of all types of greenhouse gases, not just carbon dioxide (“CO2”), for the

1 of states, shareholders and corporations are making serious efforts and taking  
2 significant steps towards reducing greenhouse gas emissions in the United States.  
3 Efforts to pass federal legislation addressing carbon, though not yet successful,  
4 have gained ground in recent years. These developments, combined with the  
5 growing scientific understanding of, and evidence of, climate change as outlined  
6 in Dr. Hausman's testimony, mean that establishing federal policy requiring  
7 greenhouse gas emission reductions is just a matter of time. The question is not  
8 whether the United States will develop a national policy addressing climate  
9 change, but when and how. The electric sector will be a key component of any  
10 regulatory or legislative approach to reducing greenhouse gas emissions both  
11 because of this sector's contribution to national emissions and the comparative  
12 ease of regulating large point sources.

13 There are, of course, important uncertainties with regard to the timing, the  
14 emission limits, and many other details of what a carbon policy in the United  
15 States will look like.

16 **Q. If there are uncertainties with regard to such important details as timing,**  
17 **emission limits and other details, why should a utility engage in the exercise**  
18 **of forecasting greenhouse gas prices?**

19 A. First of all, utilities are implicitly assuming a value for carbon allowance prices  
20 whether they go to the effort of collecting all the relevant information and create a  
21 price forecast, or whether they simply ignore future carbon regulation. In other  
22 words, a utility that ignores future carbon regulations is implicitly assuming that  
23 the allowance value will be zero. The question is whether it's appropriate to  
24 assume zero or some other number. There is uncertainty in any type of utility  
25 forecasting and to write off the need to forecast carbon allowance prices because  
26 of the uncertainties is not prudent.

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purposes of our discussion we are chiefly concerned with emissions of carbon dioxide. Therefore, we use the terms "carbon dioxide regulation" and "greenhouse gas regulation" interchangeably. Similarly, the terms "carbon dioxide price," "greenhouse gas price" and "carbon price" are interchangeable.

1 For example, there are myriad uncertainties that utility planners have learned to  
2 address in planning. These include randomly occurring generating unit outages,  
3 load forecast error and demand fluctuations, and fuel price volatility and  
4 uncertainty. These various uncertainties can be addressed through techniques  
5 such as sensitivity and scenario analyses.

6 To illustrate that there is significant uncertainty in other types of forecasts, we  
7 think it is informative to examine historical gas price forecasts by the Energy  
8 Information Administration (EIA). Exhibit JI-1-C compares EIA forecasts from  
9 the period 1990 - 2006 with actual price data through 2005. The data, over more  
10 than a decade, shows considerable volatility, even on an annual time scale.<sup>2</sup> But  
11 the truly striking thing that jumps out of the figure is how wrong the forecasts  
12 have sometimes been. For example, the 1996 forecast predicted gas prices would  
13 start at \$2.61/MMBtu and remain under \$3/MMBTU through 2010, but by the  
14 year 2000 actual prices had already jumped to \$4.82/MMBTU and by 2005 they  
15 were up to \$8.09/MMBtu.

16 In view of the forecasting track record for gas prices one might be tempted to give  
17 up, and either throw darts or abandon planning altogether. But thankfully  
18 modelers, forecasters, and planners have taken on the challenge – and have  
19 improved the models over time, thereby producing more reliable (although still  
20 quite uncertain) price forecasts, and system planners have refined and applied  
21 techniques for addressing fuel price uncertainty in a rational and proactive way.

22 It is, therefore, troubling and wrong to claim that forecasting carbon allowance  
23 prices should not be undertaken as a part of utility resource decision-making  
24 because it is “speculative.”

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<sup>2</sup> Gas prices also show terrific volatility on shorter time scales (e.g., monthly or weekly prices).

1 **Q. Do the Applicants have any opinions or thoughts as to when carbon**  
2 **regulation will happen?**

3 A. No. Interrogatory 18 of Joint Intervenors' First Set and First Amended Set of  
4 Interrogatories in South Dakota Public Utilities Commission Case No. EL05-022  
5 asked each of the Applicants to state whether it:

6 believes it is likely that greenhouse gas regulation (ghg) will be  
7 implemented in the U.S. (a) in the next five years, (b) in the next ten  
8 years, and (c) in the next twenty years.<sup>3</sup>

9 None of the Applicants had any thoughts as to when or even if greenhouse gas  
10 regulation would occur. Two of the Applicants (Great River Energy (GRE) and  
11 Heartland Consumer Power District (HCPD)) claim to closely follow discussion  
12 of GHG regulation at the federal and State levels, but apparently had no opinions  
13 about what might result from such discussions.

14 In his Supplemental Direct Testimony, GRE witness Richard Lancaster now  
15 states that “[f]uture CO<sub>2</sub> regulation is likely, in my mind,”<sup>4</sup> but does not state in  
16 what timeframe. Nor does Mr. Lancaster include any value for CO<sub>2</sub> regulations  
17 above \$0/ton.<sup>5</sup>

18 **Q. If the Big Stone II Project were to be built, is carbon regulation an issue that**  
19 **could be reasonably dealt with in the future, once the timing and stringency**  
20 **of the regulation is known?**

21 A. Unfortunately, no. Unlike for other power plant air emissions like sulfur dioxide  
22 and oxides of nitrogen, there currently is no commercial or economical method  
23 for post-combustion removal of carbon dioxide from supercritical pulverized coal  
24 plants. The Big Stone II Applicants agree on that point. During the public hearing  
25 in South Dakota Public Utilities Commission Case No. EL05-022 that was held in

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<sup>3</sup> The Applicants' response to Interrogatory 18 in South Dakota Public Utilities Commission Case No. EL05-022, which was incorporated in their response to MCEA IR No. 2 in this proceeding, is attached as Exhibit JI-1-D.

<sup>4</sup> Supplemental Direct Testimony of Richard Lancaster, page 6, line 12.

<sup>5</sup> Applicants' response to MCEA et al., IR No. 180.

1 Milbank, South Dakota on September 13, 2005, the Applicants presented several  
2 slides on the expected combined emissions from Big Stone Units I & II. The  
3 descriptive slide for the CO<sub>2</sub> emissions chart submitted to the South Dakota PUC  
4 states there is “no commercially available capture and sequestration technology.”  
5 This slide is attached as Exhibit JI-1-E. Regardless of the uncertainty, this is an  
6 issue that needs to be dealt with before new resource decisions are made and  
7 before transmission lines are constructed to enable generation at those new  
8 resources.

9 Even if such technology were available, there is no indication that the Big Stone  
10 II Applicants have evaluated the possibility for carbon sequestration at or near the  
11 Big Stone site nor the economics of carbon capture at Big Stone Unit II.

12 **Q. Do other utilities have opinions about whether and when greenhouse gas**  
13 **regulation will come?**

14 A. Yes. A number of utility executives have argued that mandatory federal  
15 regulation of the emissions of greenhouse gases is inevitable.

16 For example, in April 2006, the Chairman of Duke Energy, Paul Anderson, stated:

17 From a business perspective, the need for mandatory federal policy  
18 in the United States to manage greenhouse gases is both urgent and  
19 real. In my view, voluntary actions will not get us where we need  
20 to be. Until business leaders know what the rules will be – which  
21 actions will be penalized and which will be rewarded – we will be  
22 unable to take the significant actions the issue requires.<sup>6</sup>

23 Similarly, James Rogers, who was the CEO of Cinergy and is currently CEO of  
24 Duke Energy, has publicly said “[I]n private, 80-85% of my peers think carbon  
25 regulation is coming within ten years, but most sure don’t want it now.”<sup>7</sup> Mr.  
26 Rogers also was quoted in a December 2005 *Business Week* article, as saying to

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<sup>6</sup> Paul Anderson, Chairman, Duke Energy, “Being (and Staying in Business): Sustainability from a Corporate Leadership Perspective,” April 6, 2006 speech to CERES Annual Conference, at: [http://www.duke-energy.com/news/mediainfo/viewpoint/PAnderson\\_CERES.pdf](http://www.duke-energy.com/news/mediainfo/viewpoint/PAnderson_CERES.pdf)

<sup>7</sup> “The Greening of General Electric: A Lean, Clean Electric Machine,” *The Economist*, December 10, 2005, at page 79.

1 his utility colleagues, “If we stonewall this thing [carbon dioxide regulation] to  
2 five years out, all of a sudden the cost to us and ultimately to our consumers can  
3 be gigantic.”<sup>8</sup>

4 Not wanting carbon regulation from a utility perspective is understandable  
5 because carbon price forecasting is not simple and easy, it makes resource  
6 planning more difficult and is likely to change “business as usual.” For many  
7 utilities, including the Big Stone II Applicants, that means that it is much more  
8 difficult to justify building a pulverized coal plant. Regardless, it is imprudent to  
9 ignore the risk.

10 Duke Energy is not alone in believing that carbon regulation is inevitable and,  
11 indeed, some utilities are advocating for mandatory greenhouse gas reductions. In  
12 a May 6, 2005, statement to the Climate Leaders Partners (a voluntary EPA-  
13 industry partnership), John Rowe, Chair and CEO of Exelon stated, “At Exelon,  
14 we accept that the science of global warming is overwhelming. We accept that  
15 limitations on greenhouse gases emissions [sic] will prove necessary. Until those  
16 limitations are adopted, we believe that business should take voluntary action to  
17 begin the transition to a lower carbon future.”

18 In fact, several electric utilities and electric generation companies have  
19 incorporated assumptions about carbon regulation and costs into their long term  
20 planning, and have set specific agendas to mitigate shareholder risks associated  
21 with future U.S. carbon regulation policy. These utilities cite a variety of reasons  
22 for incorporating risk of future carbon regulation as a risk factor in their resource  
23 planning and evaluation, including scientific evidence of human-induced climate  
24 change, the U.S. electric sector’s contribution to emissions, and the magnitude of  
25 the financial risk of future greenhouse gas regulation.

26 Some of the companies believe that there is a high likelihood of federal regulation  
27 of greenhouse gas emissions within their planning period. For example,

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<sup>8</sup> “The Race Against Climate Change,” *Business Week*, December 12, 2005, online at [http://businessweek.com/magazine/content/05\\_50/b3963401.htm](http://businessweek.com/magazine/content/05_50/b3963401.htm).

1 Pacificorp states a 50% probability of a CO<sub>2</sub> limit starting in 2010 and a 75%  
2 probability starting in 2011. The Northwest Power and Conservation Council  
3 models a 67% probability of federal regulation in the twenty-year planning period  
4 ending 2025 in its resource plan. Northwest Energy states that CO<sub>2</sub> taxes “are no  
5 longer a remote possibility.”<sup>9</sup>

6 Even those in the electric industry who oppose mandatory limits on greenhouse  
7 gas regulation believe that regulation is inevitable. David Ratcliffe, CEO of  
8 Southern Company, a predominantly coal-fired utility that opposes mandatory  
9 limits, said at a March 29, 2006, press briefing that “There certainly is enough  
10 public pressure and enough Congressional discussion that it is likely we will see  
11 some form of regulation, some sort of legislation around carbon.”<sup>10</sup>

12 **Q. Have any publicly owned utilities recognized that federal regulation of**  
13 **greenhouse gases is inevitable?**

14 A. Yes. Alan Richardson, president and CEO of the American Public Power  
15 Association told electric utility operators in Minnesota in August 2006 that “The  
16 issue is no longer whether there is a human contribution to global warming but the  
17 extent of that contribution.”<sup>11</sup> Mr. Richardson also noted that there is “an  
18 emerging public consensus and a building political directive that inaction is not a  
19 viable strategy.”

20 **Q. Why would electric utilities, in particular, be concerned about future carbon**  
21 **regulation?**

22 A. Electricity generation is very carbon-intensive. Electric utilities are likely to be  
23 one of the first, if not the first, industries subject to carbon regulation because of

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<sup>9</sup> Northwest Energy 2005 Electric Default Supply Resource Procurement Plan, December 20, 2005; Volume 1, p. 4.

<sup>10</sup> Quoted in “U.S. Utilities Urge Congress to Establish CO<sub>2</sub> Limits,” Bloomberg.com, <http://www.bloomberg.com/apps/news?pid=10000103&sid=a75A1ADJv8cs&refer=us>

<sup>11</sup> <http://www.sfgate.com/cgi-bin/article.cgi?file=/c/a/2006/08/24/MNGE7KO8FR1.DTL>

1 the relative ease in regulating stationary sources as opposed to mobile sources  
2 (automobiles) and because electricity generation represents a significant portion  
3 of total U.S. greenhouse gas emissions. A new generating facility may have a  
4 book life of twenty to forty years, but in practice, the utility may expect that that  
5 asset will have an operating life of 50 years or more. By adding new plants,  
6 especially new coal plants, a utility is essentially locking-in a large quantity of  
7 carbon dioxide emissions for decades to come. In general, electric utilities are  
8 increasingly aware that the fact that we do not currently have federal greenhouse  
9 gas regulation is irrelevant to the issue of whether we will in the future, and that  
10 new plant investment decisions are extremely sensitive to the expected cost of  
11 greenhouse gas regulation throughout the life of the facility.

12 **Q. Do others in the private sector, besides electric utilities, also believe that**  
13 **regulation of greenhouse gases is inevitable?**

14 A. Yes. Corporate leaders, investors, financial analysts and major corporations are  
15 increasingly anticipating and preparing for requirements to reduce greenhouse gas  
16 emissions.<sup>12</sup> For example, a recent survey of 31 multinational corporations by the  
17 Pew Center on Global Climate Change found that 90 percent expect the U.S.  
18 government to set standards for greenhouse gas emissions imminently.<sup>13</sup> About  
19 18 percent believe that federal standards will take effect before 2010; another 67  
20 percent believe those standards will take effect between 2010 and 2015.<sup>14</sup>

21 Investors and investment analysts also are anticipating the imminent  
22 establishment of federally mandated reductions in greenhouse gas emissions. For  
23 example, in October 2004, Fitch Ratings reported that over the next ten years, it  
24 expected that:

25 the power industry to face higher environmental standards for  
26 sulfur dioxide (SO<sub>2</sub>), nitrogen oxide (NO<sub>x</sub>) and mercury, as well as

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12 Exhibit JI-1-F, at pages 23-26.

13 <http://www.pewclimate.org/docUploads/PEW%5FCorpStrategies%2Epdf>, at page 1.

14 Ibid.

1 new rules for the emissions of greenhouse gases (GHGs). As the  
2 scientific debate has moved from the topic of “whether global  
3 warming exists) to a discussion of the magnitude of the problem,  
4 concerns about GHGs have expanded to a wider audience.  
5 Investors and insurance companies are becoming increasingly  
6 concerned about the financial effects of future environmental  
7 regulations on the power sector as a primary emitter of GHGs.  
8 Requirements to control the sources of global warming and  
9 enhanced regulation of other pollutants could increase the financial  
10 liability of coal-dependent power producers, thereby leading to  
11 lower returns and lower post-investment cash generation.<sup>15</sup>

12 Fitch Ratings has more recently been quoted as telling industry representatives  
13 that it believes that a federal law to cap CO<sub>2</sub> emissions is “imminent” and that  
14 “compliance costs could have a significant effect on the credit profiles of  
15 generators.”<sup>16</sup>

16 **Q. Have mandatory greenhouse gas emissions reductions programs begun to be**  
17 **examined and debated in the U.S. federal government?**

18 A. To date, the U.S. government has not required greenhouse gas emission  
19 reductions. However, a number of legislative initiatives for mandatory emissions  
20 reduction proposals have been introduced in Congress.<sup>17</sup> These proposals  
21 establish carbon dioxide emission trajectories below the projected business-as-  
22 usual emission trajectories, and they generally rely on market-based mechanisms  
23 (such as cap and trade programs) for achieving the targets. The proposals also  
24 include various provisions to spur technology innovation, as well as details  
25 pertaining to offsets, allowance allocation, restrictions on allowance prices and  
26 other issues. Through their consideration of these proposals, legislators are  
27 increasingly educated on the complex details of different policy approaches, and  
28 they are laying the groundwork for a national mandatory program. The federal  
29 proposals that would require greenhouse gas emission reductions that had been

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<sup>15</sup> *Status of Environmental Regulation*, Fitch Ratings Corporate Finance, October 12, 2004.

<sup>16</sup> *CO<sub>2</sub> Trading Plan could cost US utilities \$6bil/year: Fitch*, Platts, 7Nov2006,

<sup>17</sup> Exhibit JI-1-F, at pages 11- 16.

1 submitted in Congress through April 2006 are summarized in Table 5.1 in Exhibit  
2 JI-1-F.

3 Since April 2006, additional bills addressing climate change have been introduced  
4 in Congress. For example, Senators Carper (D-Del) and a bi-partisan group of  
5 senators, including Republican Senators Lamar Alexander (R-Tennessee),  
6 Lindsey Graham (R-South Carolina), Lincoln Chafee (R-Rhode Island) and Judd  
7 Gregg (R-New Hampshire), have introduced the Clean Air Planning Act of 2006.  
8 This measure would cap carbon dioxide emissions from power plants at 2006  
9 levels by 2010 and reduce these emissions to 2001 levels by 2015. The  
10 sponsorship of legislation by these Republican Senators shows that capping  
11 greenhouse gas emissions because of concerns over global warming is not a  
12 partisan issue.

13 Senators Kerry and Snowe also have introduced the “Global Warming Reduction  
14 Act of 2006,” S. 4039, which would establish an economy-wide cap and trade  
15 program with a goal of reducing emissions about 65% below 2000.<sup>18</sup> The  
16 Senators say the targets are set at levels that the best science available suggests  
17 will keep global temperatures below the danger point.

18 Also, Representative Waxman has introduced the “Safe Climate Act,” H.R. 5642,  
19 which also would establish an economy-wide cap and trade program and  
20 complimentary programs to avoid “dangerous, irreversible, warming of the  
21 climate.”<sup>19</sup> The proposal would freeze U.S. greenhouse gas emissions in 2010, at  
22 the 2009 levels, followed by annual emission reductions of roughly two percent  
23 per year through 2020, and annual reductions of about 5% thereafter. By 2050,  
24 emissions will be 80% lower than in 1990.<sup>20</sup>

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<sup>18</sup> “Senators Kerry and Snowe Introduce Landmark Bipartisan Climate Change Proposal,” press release, October 3, 2006 available at <http://kerry.senate.gov/v3/cfm/record.cfm?id=264368>

<sup>19</sup> Information available from Representative Waxman’s website at:  
<http://www.house.gov/waxman/safeclimate/index.htm>

<sup>20</sup> Representative Waxman’s bill attracted more than 100 co-sponsors. <http://thomas.loc.gov/cgi-bin/bdquery/z?d109:HR05642:@@@P>

1 The emissions reductions that would be required in these new bills are  
 2 summarized in Table 1 below:

3 **Table 1. Summary of Mandatory Emissions Targets in Proposals Discussed**  
 4 **in Congress**

<b>Proposed National Policy</b>	<b>Title or Description</b>	<b>Year Proposed</b>	<b>Emission Targets</b>	<b>Sectors Covered</b>
McCain Lieberman S.139	Climate Stewardship Act	2003	Cap at 2000 levels 2010-2015. Cap at 1990 levels beyond 2015.	Economy-wide, large emitting sources
McCain Lieberman SA 2028	Climate Stewardship Act	2003	Cap at 2000 levels	Economy-wide, large emitting sources
National Commission on Energy Policy (basis for Bingaman-Domenici legislative work)	Greenhouse Gas Intensity Reduction Goals	2005	Reduce GHG intensity by 2.4%/yr 2010-2019 and by 2.8%/yr 2020-2025. Safety-valve on allowance price	Economy-wide, large emitting sources
Jeffords S. 150	Multi-pollutant legislation	2005	2.050 billion tons beginning 2010	Existing and new fossil-fuel fired electric generating plants > 15 MW
Carper S. 843	Clean Air Planning Act	2005	2006 levels (2.655 billion tons CO2) starting in 2009, 2001 levels (2.454 billion tons CO2) starting in 2013.	Existing and new fossil-fuel fired, nuclear, and renewable electric generating plants > 25 MW
Feinstein	Strong Economy and Climate Protection Act	2006	Stabilize emissions through 2010; 0.5% cut per year from 2011-15; 1% cut per year from 2016-2020. Total reduction is 7.25% below current levels.	Economy-wide, large emitting sources
Rep. Udall - Rep. Petri	Keep America Competitive Global Warming Policy Act	2006	Establishes prospective baseline for greenhouse gas emissions, with safety valve.	Energy and energy-intensive industries
Carper S.2724	Clean Air Planning Act	2006	2006 levels by 2010, 2001 levels by 2015	Existing and new fossil-fuel fired, nuclear, and renewable electric generating plants > 25 MW
Kerry and Snowe S.4039	Global Warming Reduction Act	2006	No later than 2010, begin to reduce U.S. emissions to 65% below 2000 levels by 2050	Not specified
Waxman H.R. 5642	Safe Climate Act	2006	2010 – not to exceed 2009 levels, annual reduction of 2% per year until 2020, annual reduction of 5% thereafter	Not specified
Jeffords S. 3698	Global Warming Pollution Reduction Act	2006	1990 levels by 2020, 80% below 1990 levels by 2050	Economy-wide

1 **Q. Is it reasonable that the potential for passage of greenhouse gas regulations**  
2 **have improved as a result of the recent federal elections?**

3 A. Yes. Although there are an increasing number of Republican legislators who  
4 recognize the need for legislation to regulate the emissions of greenhouse gases,  
5 the results of the recent elections, in which control of both Houses of Congress  
6 shifted to Democrats, are likely to improve the chances for near-term passage of  
7 significant legislation.

8 For example, experts at an industry conference right after the elections expressed  
9 the opinion that now that Democrats have won control of Congress, electric  
10 utilities should expect a strong legislative push for mandatory caps on carbon  
11 dioxide emissions.<sup>21</sup> One observer expressed the opinion that the first climate bill  
12 that Democrats will take up when the new Congress convenes in January 2007 is  
13 the bill that Representative Waxman introduced that would cap emissions at  
14 current levels beginning in 2010 and ratchet them down to 80 percent below 1990  
15 levels by 2050.<sup>22</sup>

16 Senator McCain also has said that the McCain-Lieberman climate change bill will  
17 be re-introduced in Congress in late January 2007.<sup>23</sup> Senator McCain also  
18 indicated that he believed that the chances of Congress approving meaningful  
19 global warming legislation before 2008 were “pretty good” and that he believed  
20 that “we’ve reached a tipping point in this debate, and its long overdue.”<sup>24</sup>

21 At the same time, Senators Bingaman, Boxer and Lieberman sent a letter to  
22 President Bush on November 14, 2006, seeking the President’s commitment to  
23 work with the new Congress to pass meaningful climate change legislation in  
24 2007.<sup>25</sup> Senators Bingaman, Boxer and Lieberman in January will assume the

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21 *Mandatory US carbon caps coming following elections: observers*, Platts 9Nov2006.

22 Ibid.

23 “McCain Tees Up Global Warming Bill; Says Bush ‘Coming Around,’” *Energy Daily*, November 17, 2006.

24 Ibid.

25 Ibid.

1 chairmanship of, respectively, the Senate Energy and Natural Resources  
2 Committee, the Senate Environment and Public Works Committee and the Senate  
3 Homeland Security and Governmental Affairs Committee.

4 Nevertheless, our conclusion that significant greenhouse gas regulation is  
5 inevitable is not based on the results of any single election or on the fate of any  
6 single bill introduced in Congress.

7 **Q. Have recent polls indicated that the American people are increasingly in**  
8 **favor of government action to address global warming concerns?**

9 A. Yes. A summer 2006 poll by Zogby International showed that an overwhelming  
10 majority of Americans are more convinced that global warming is happening than  
11 they were even two years ago, and they are also connecting intense weather  
12 events like Hurricane Katrina and heat waves to global warming.<sup>26</sup> Indeed, the  
13 poll found that 74% of all respondents, including 87% of Democrats, 56% of  
14 Republicans and 82% of Independents, believe that we are experiencing the  
15 effects of global warming.

16 The poll also indicated that there is strong support for measures to require major  
17 industries to reduce their greenhouse gas emissions to improve the environment  
18 without harming the economy – 72% of likely voters agreed such measures  
19 should be taken.<sup>27</sup>

20 Other recent polls reported similar results. For example, a Time/ABC/Stanford  
21 University poll issued in the spring found 68 percent of Americans are in favor of  
22 more government action.<sup>28</sup> In addition, a September 2006 telephone poll,

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<sup>26</sup> “Americans Link Hurricane Katrina and Heat Wave to Global Warming,” Zogby International, August 21, 2006, available at [www.zogby.com/news](http://www.zogby.com/news).

<sup>27</sup> Ibid.

<sup>28</sup> “Polls find groundswell of belief in, concern about global warming.” Greenwire, April 21, 2006, Vol. 10 No. 9. See also Zogby’s final report on the poll which is available at <http://www.zogby.com/wildlife/NWFfinalreport8-17-06.htm>.

1 conducted by NYU's Brademas Center for the Study of Congress, reported that  
2 70% of those polled stated that they were worried about global warming.<sup>29</sup>

3 At the same time, according to a recent public opinion survey for the  
4 Massachusetts Institute of Technology, Americans now rank climate change as  
5 the country's most pressing environmental problem—a dramatic shift from three  
6 years ago, when they ranked climate change sixth out of 10 environmental  
7 concerns.<sup>30</sup> Almost three-quarters of the respondents felt the government should  
8 do more to deal with global warming, and individuals were willing to spend their  
9 own money to help.

#### 10 **IV. STATE AND REGIONAL ACTION**

11 **Q. Are any states developing and implementing climate change policies that will**  
12 **have a bearing on resource choices in the electric sector?**

13 A. Yes. States continue to be the leaders and innovators in developing and  
14 implementing policies that will affect greenhouse gas emissions.

15 On August 30, 2006, Governor Schwarzenegger and the California Legislature  
16 reached an agreement on AB32, the Global Warming Solutions Act.<sup>31</sup> The Act  
17 creates an economy-wide cap on greenhouse gas emissions and includes penalties  
18 for non-compliance. The cap limits California's greenhouse gas emissions at  
19 1990 levels by 2020. This is the first state to adopt a mandatory economy-wide  
20 greenhouse gas emissions limit. California has also adopted a law, SB 1368,  
21 directing the California Energy Commission to set a greenhouse gas performance  
22 standard for electricity procured by local publicly owned utilities, whether it is

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<sup>29</sup> Kaplun, Alex: "Campaign 2006: Most Americans 'worried' about energy, climate;" Greenwire, September 29, 2006.

<sup>30</sup> *MIT Carbon Sequestration Initiative, 2006 Survey*,  
<http://sequestration.mit.edu/research/survey2006.html>

<sup>31</sup> Governor Schwarzenegger press release, August 30, 2006. <http://gov.ca.gov/index.php?/press-release/3722/>. Pew Center on Climate Change, "Latest News" from the states [http://www.pewclimate.org/what\\_s\\_being\\_done/in\\_the\\_states/news.cfm](http://www.pewclimate.org/what_s_being_done/in_the_states/news.cfm)

1 generated within state borders or imported from plants in other states. The  
2 standard is to be adopted by June 30, 2007 and will apply to all new long-term  
3 electricity contracts. California is also exploring coordination of its statewide  
4 greenhouse gas reduction program with the Northeast's Regional Greenhouse Gas  
5 Initiative.

6 Similarly, in September 2006, the Governor of Arizona issued an Executive Order  
7 (2006-13) establishing a statewide goal to reduce Arizona's greenhouse gas  
8 emissions to 2000 levels by 2020, and 50% below this level by 2040.<sup>32</sup>

9 Other states have indirect policies that will impact future emissions of greenhouse  
10 gases. These indirect policies include the requirements by various states to either  
11 consider future carbon dioxide regulation or use specific "adders" for carbon  
12 dioxide in resource planning. They also include policies and incentives to  
13 increase energy efficiency and renewable energy use, such as renewable portfolio  
14 standards. Some of these requirements are at the direction of state public utilities  
15 commissions, others are statutory requirements.

16 But states are not just acting individually; there are a number of examples of  
17 innovative regional policy initiatives that range from agreeing to coordinate  
18 information (e.g., Southwest governors and Midwestern legislators) to  
19 development of a regional cap and trade program through the Regional  
20 Greenhouse Gas Initiative in the Northeast ("RGGI"). The objective of the RGGI  
21 is the stabilization of CO<sub>2</sub> emissions from power plants at current levels for the  
22 period 2009-2015, followed by a 10 percent reduction below current levels by  
23 2019.<sup>33</sup>

24 In an effort that could provide an important foundation for implementation of a  
25 national cap on greenhouse gases, representatives of 30 states have begun

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<sup>32</sup> Governor Napolitano Press release, September 8, 2006.  
[http://azgovernor.gov/dms/upload/NR\\_090806\\_CCAG.pdf](http://azgovernor.gov/dms/upload/NR_090806_CCAG.pdf)

Pew Center on Climate Change, "Latest News" from the states  
[http://www.pewclimate.org/whats\\_being\\_done/in\\_the\\_states/news.cfm](http://www.pewclimate.org/whats_being_done/in_the_states/news.cfm)

<sup>33</sup> Table 5.5, at page 21 of Exhibit JL-1-F.

1 discussions of a multi-state climate action registry. This effort builds on existing  
 2 registries in the Northeast and California. The group is discussing development  
 3 of common accounting practices and development of an internet-based  
 4 monitoring system for voluntary and mandatory greenhouse gas reporting.<sup>34</sup>

5 **Q. Have any states adopted direct policies that require specific emissions**  
 6 **reductions from electric sources?**

7 A. Yes. The states of Massachusetts, New Hampshire, Oregon and California have  
 8 adopted policies requiring greenhouse gas emission reductions from power  
 9 plants.<sup>35</sup>

10 **Q. Do any states require that utilities or default service suppliers evaluate costs**  
 11 **or risks associated with greenhouse gas emissions in long-range planning or**  
 12 **resource procurement?**

13 A. Yes. As shown in Table 2 below, several states require companies to account for  
 14 the emission of greenhouse gases in resource planning.

15 **Table 2. Requirements for Consideration of Greenhouse Gas Emissions in**  
 16 **Electric Resource Decisions**

Program type	State	Description	Date	Source
GHG value in resource planning	CA	PUC requires that regulated utility IRPs include carbon adder of \$8/ton CO <sub>2</sub> , escalating at 5% per year.	April 1, 2005	CPUC Decision 05-04-024
GHG value in resource planning	WA	Law requiring that cost of risks associated with carbon emissions be included in Integrated Resource Planning for electric and gas utilities	January, 2006	WAC 480-100-238 and 480-90-238
GHG value in resource planning	OR	PUC requires that regulated utility IRPs include analysis of a range of carbon costs	Year 1993	Order 93-695
GHG value in resource planning	NWPCC	Inclusion of carbon tax scenarios in Fifth Power Plan	May, 2006	NWPCC Fifth Energy Plan
GHG value in resource	MN	Law requires utilities to use PUC established environmental externalities	January 3, 1997	Order in Docket No. E-999/CI-93-583

<sup>34</sup> O'Donnel, Arthur; "Thirty states discuss proposed emissions registry," Greenwire, October 4, 2006.

<sup>35</sup> Exhibit JI-1-F, Table 5.3 on page 18.

planning		values in resource planning		
GHG in resource planning	MT	IRP statute includes an "Environmental Externality Adjustment Factor" which includes risk due to greenhouse gases. PSC required Northwestern to account for financial risk of carbon dioxide emissions in 2005 IRP.	August 17, 2004	Written Comments Identifying Concerns with NWE's Compliance with A.R.M. 38.5.8209-8229; Sec. 38.5.8219, A.R.M.
GHG in resource planning	KY	KY staff reports on IRP require IRPs to demonstrate that planning adequately reflects impact of future CO <sub>2</sub> restrictions	2003 and 2006	Staff Report On the 2005 Integrated Resource Plan Report of Louisville Gas and Electric Company and Kentucky Utilities Company - Case 2005-00162, February 2006
GHG in resource planning	UT	Commission directs PacifiCorp to consider financial risk associated with potential future regulations, including carbon regulation	June 18, 1992	Docket 90-2035-01, and subsequent IRP reviews
GHG in resource planning	MN	Commission directs Xcel to "provide an expansion of CO <sub>2</sub> contingency planning to check the extent to which resource mix changes can lower the cost of meeting customer demand under different forms of regulation."	August 29, 2001	Order in Docket No. RP00-787

1 **V. THE USE OF CARBON DIOXIDE COSTS IN UTILITY PLANNING**

2 **Q. What carbon dioxide values are being used by utilities in electric resource**  
 3 **planning?**

4 A. Table 3 below presents the carbon dioxide costs, in \$/ton CO<sub>2</sub>, that are presently  
 5 being used in the industry for both resource planning and modeling of carbon  
 6 regulation policies.

1

**Table 3. Carbon Dioxide Costs Used by Utilities**

Company	CO2 emissions trading assumptions for various years (\$2005)
PG&E*	\$0-9/ton (start year 2006)
Avista 2003*	\$3/ton (start year 2004)
Avista 2005	\$7 and \$25/ton (2010) \$15 and \$62/ton (2026 and 2023)
Portland General Electric*	\$0-55/ton (start year 2003)
Xcel Energy-PSCCo	\$9/ton (start year 2010) escalating at 2.5%/year
Idaho Power*	\$0-61/ton (start year 2008)
Pacificorp 2004	\$0-55/ton
Northwest Energy 2005	\$15 and \$41/ton
Northwest Power and Conservation Council	\$0-15/ton between 2008 and 2016 \$0-31/ton after 2016

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*\*Values for these utilities from Wiser, Ryan, and Bolinger, Mark. "Balancing Cost and Risk: The Treatment of Renewable Energy in Western Utility Resource Plans." Lawrence Berkeley National Laboratories. August 2005. LBNL-58450. Table 7.*

*Other values: PacifiCorp, Integrated Resource Plan 2003, pages 45-46; and Idaho Power Company, 2004 Integrated Resource Plan Draft, July 2004, page 59; Avista Integrated Resource Plan 2005, Section 6.3; Northwestern Energy Integrated Resource Plan 2005, Volume 1 p. 62; Northwest Power and Conservation Council, Fifth Power Plan pp. 6-7. Xcel-PSCCo, Comprehensive Settlement submitted to the CO PUC in dockets 04A-214E, 215E and 216E, December 3, 2004. Converted to \$2005 using GDP implicit price deflator.*

11

Q. How should utilities plan for and mitigate the risk of greenhouse gas regulation?

12

A. The key part of that question is "plan for the risk of greenhouse gas regulation."

13

Mitigating risk begins with the resource planning process and the decision as to

14

the demand-side and supply-side options that should be pursued. A utility that

15

chooses to go forward with a new, carbon intensive energy resource without

16

proper consideration of carbon regulation is imprudent. To give an analogy it

17

would be like choosing to build a gas-fired power plant without consideration of

18

the cost of gas because one believes that building the plant is "worth it" regardless

19

of what gas might cost.

20

A utility that desires to be prudent about the risk of carbon regulation would, at a

21

minimum, consider carbon regulation by developing an expected carbon price

22

forecast as well as reasonable sensitivities around that case.

1 **Q. Has Synapse developed a carbon price forecast that would assist the**  
2 **Commission in evaluating the Big Stone II Project?**

3 A. Yes. Our forecast is described in more detail in Exhibit JL-1-F, starting on page  
4 39.

5 During the decade from 2010 to 2020, we anticipate that a reasonable range of  
6 carbon emissions prices will reflect the effects of increasing public concern over  
7 climate change (this public concern is likely to support increasingly stringent  
8 emission reduction requirements) and the reluctance of policymakers to take steps  
9 that would increase the cost of compliance (this reluctance could lead to increased  
10 emphasis on energy efficiency, modest emission reduction targets, or increased  
11 use of offsets). We expect that the widest uncertainty in our forecasts will begin at  
12 the end of this decade, that is, from \$10 to \$40 per ton of CO<sub>2</sub> in 2020, depending  
13 on the relative strength of these factors.

14 After 2020, we expect the price of carbon emissions allowances to trend upward  
15 toward a marginal mitigation cost. This number will depend on currently  
16 uncertain factors such as technological innovation and the stringency of carbon  
17 caps, but it is likely that, by this time, the least expensive mitigation options (such  
18 as simple energy efficiency and fuel switching) will have been exhausted. Our  
19 projection for greenhouse gas emissions costs at the end of this decade ranges  
20 from \$20 to \$50 per ton of CO<sub>2</sub> emissions.

21 We currently believe that the most likely scenario is that as policymakers commit  
22 to taking serious action to reduce carbon emissions, they will choose to enact both  
23 cap and trade regimes and a range of complementary energy policies that lead to  
24 lower cost scenarios, and that technology innovation will reduce the price of low-  
25 carbon technologies, making the most likely scenario closer to (though not equal  
26 to) low our carbon cost scenario than our high carbon cost scenario. We expect  
27 that the probability of taking this path will increase over time, as society learns  
28 more about optimal carbon reduction policies.

29 After 2030, and possibly even earlier, the uncertainty surrounding a forecast of  
30 carbon emission prices will increase due to the interplay of factors such as the

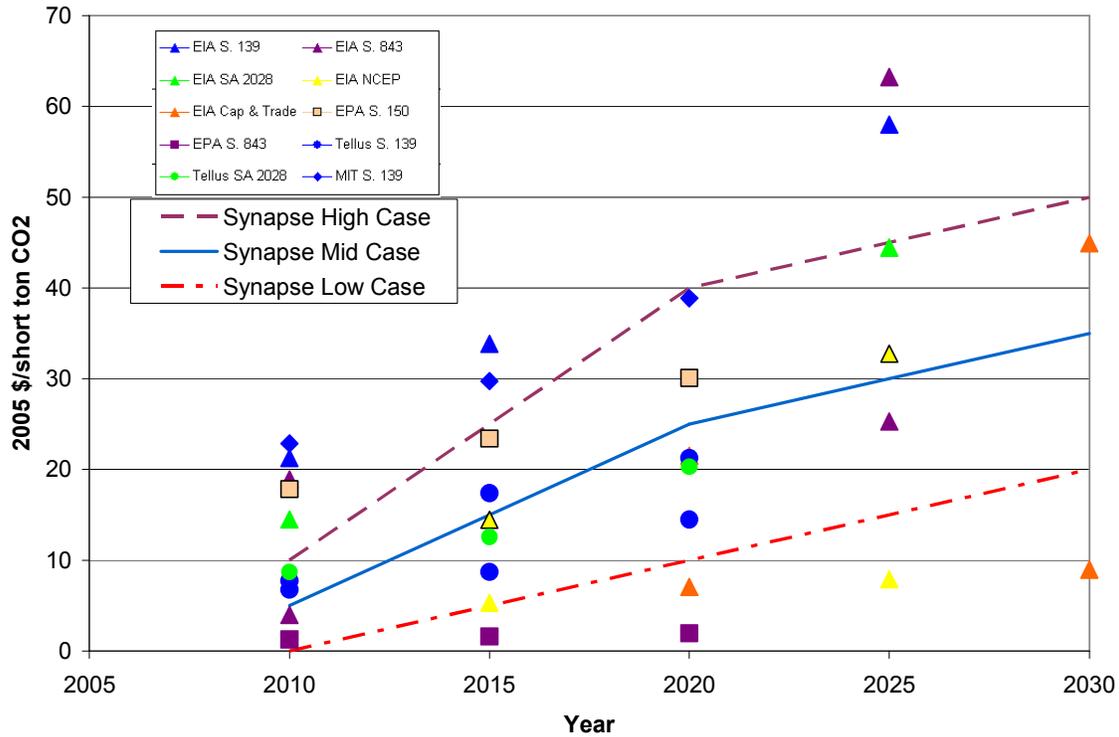
1 level of carbon constraints required and technological innovation. As discussed in  
2 Joint Intervenors - Exhibit 2, scientists anticipate that very significant emission  
3 reductions will be necessary, in the range of 80 percent below 1990 emission  
4 levels, to achieve stabilization targets that will keep global temperature increases  
5 to a somewhat manageable level. As such, we believe there is a substantial  
6 likelihood that response to climate change impacts will require much more  
7 aggressive emission reductions than those contained in U.S. policy proposals, and  
8 in the Kyoto Protocol, to date. If the severity and certainty of climate change are  
9 such that emissions levels 70-80% below current rates are mandated, this could  
10 result in very high marginal emissions reduction costs, though we have not  
11 quantified the cost of such deeper cuts on a per ton basis.

12 **Q. What is Synapse's forecast of carbon dioxide emissions prices?**

13 A. Synapse's forecast of future carbon dioxide emissions prices are presented in  
14 Figure 1 below. This figure superimposes Synapse's forecast on the results of  
15 other cost analyses of proposed federal policies:

1

**Figure 1. Synapse Carbon Dioxide Prices**



2

3 **Q. What is Synapse’s levelized carbon price forecast?**

4 A. Synapse’s forecast, levelized<sup>36</sup> over 20 years, 2011 – 2030, is provided in Table 4  
 5 below.

6

**Table 4. Synapse’s Levelized Carbon Price Forecast (2005\$/ton)**

Low Case	Mid Case	High Case
\$7.8	\$19.1	\$30.5

<sup>36</sup> A value that is “levelized” is the present value of the total cost converted to equal annual payments. Costs are levelized in real dollars (i.e., adjusted to remove the impact of inflation).

1     **Q.    The Minnesota Public Utilities Commission has established environmental**  
2     **externality values for a number of pollutants including CO<sub>2</sub>. Wouldn't it be**  
3     **sufficient and more efficient to simply use the CO<sub>2</sub> externality values? The**  
4     **effect is the same, to bias resource selection towards non-CO<sub>2</sub> emitting**  
5     **resources.**

6     A.    That would appear to be an easy solution, but the Minnesota Commission's  
7     externality values are meant to reflect external costs arising from damage to the  
8     environment caused by climate change (as a percentage of GDP). The  
9     Commission's order of January 3, 1997 explained:<sup>37</sup>

10            The environmental values for CO<sub>2</sub> quantified in this Order follow  
11            MPCA witness Ciborowski's general methodology. First, Ciborowski  
12            estimated **long-term global costs** based on the existing economic  
13            literature and **discounted** them to current values. Then, he divided  
14            that amount by the amount of long-term CO<sub>2</sub> emissions to arrive at an  
15            average cost per ton. Ciborowski essentially converted published  
16            damage estimates made by economists from percentages of gross  
17            domestic product (GDP) into costs per ton of CO<sub>2</sub>.

18            Clearly this order shows that the Minnesota environmental externality values  
19            contain no consideration of future carbon regulation and the *actual* costs that  
20            regulation would impose on utilities. Indeed, the range of CO<sub>2</sub> values adopted by  
21            the Minnesota Commission, \$0.35 – 3.64 per ton of CO<sub>2</sub> (2004\$), is much smaller  
22            than the range of Synapse's price forecasts.

23            In addition, among economists, the term externality is commonly understood to  
24            mean a cost that is not borne by the producer of the cost. By contrast, the costs of  
25            carbon regulation will be "internalized" or borne by the Applicants and/or their  
26            customers.

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<sup>37</sup> Page 27 of the Order Establishing Environmental Cost Values in Docket No. E-99/CI-93-583 issued January 3, 1997.

1 **VI. THE APPLICANTS HAVE NOT ADEQUATELY CONSIDERED THE**  
2 **RISK OF GREENHOUSE GAS REGULATIONS IN THEIR ANALYSES**  
3 **OF THE BIG STONE II PROJECT AND ALTERNATIVES**

4 **Q. Have the Big Stone II Applicants adequately considered the risk of**  
5 **greenhouse gas regulation?**

6 A. No. The Applicants' approach is what might be called keeping their heads in the  
7 sand and hoping that the problem of global warming goes away. For example, the  
8 Applicants could not answer basic questions about the United Nations Framework  
9 Convention on Climate Change. Request for Admission No. 22 in the Joint  
10 Intervenors' First Set of Requests for Admission in South Dakota Public Utilities  
11 Commission Case EL05-022 asked the Applicants to:

12 Admit that in 1992 the United Nations Framework Convention on  
13 Climate Change was adopted [IPCC 2005, p 5].

14 The Applicants responded by saying that:

15 Applicant has made reasonable inquiry and the information known to  
16 it is insufficient to enable Applicant to admit or deny this statement.

17 Similarly, Request for Admission No. 25 asked the Applicants to:

18 Admit that the most recent Assessment Report released by the IPCC is  
19 the Third Assessment Report (TAR), released in 2001, and that part of  
20 the TAR is the report of the Working Group I of the IPCC, entitled  
21 "Climate Change 2001: The Scientific Basis."

22 Again, the Applicants responded, in part:

23 Applicant has made reasonable inquiry and the information known to  
24 it is insufficient to enable Applicant to admit or deny this statement.

25 In twenty separate instances, the Applicants could not answer requests for  
26 admission requiring them to do nothing more than admit facts that could easily be  
27 verified by an internet search (starting with the internet addresses that Joint  
28 Intervenors in many cases provided in the questions) or by referring to the  
29 document(s) attached to the request. Attached as Exhibit JI-1-G is the Joint

1 Intervenors' First Set of Requests for Admission in South Dakota Public Utilities  
2 Case EL05-022 with these twenty responses highlighted.

3 **Q. How are such responses relevant to the issue of considering carbon**  
4 **regulation in resource planning?**

5 A. If a utility does not rely upon outside expertise to, at a basic level, advise the  
6 utility on future carbon regulation and second to forecast carbon allowance prices,  
7 it must rely upon its own knowledge and information gathering to do so. A major  
8 step in that process is to understand the various parties involved and what their  
9 recommendations mean to policymakers. Organizations such as the  
10 Intergovernmental Panel on Climate Change are well recognized and regarded  
11 and their thoughts on topics such as climate change do not go by the wayside.  
12 The inability to answer these basic questions, let alone put in the small effort that  
13 would be necessary to answer such questions, bodes poorly for the Applicants'  
14 decision-making.

15 **Q. GRE witness Lancaster has testified that he has “taken into account the**  
16 **impact that potential regulation of green-house gases may have on the**  
17 **economics of Big Stone II.”<sup>38</sup> Have you seen any evidence that GRE included**  
18 **any costs associated with the federal regulation of greenhouse gas emissions**  
19 **in its economic evaluations of Big Stone II?**

20 A. No. We have seen no evidence that GRE has considered the impact that potential  
21 regulation of greenhouse gases can be expected to have on the economics of Big  
22 Stone II. In fact, GRE has indicated that it included a \$0/ton value for CO<sub>2</sub> or  
23 greenhouse gas regulation or emissions allowance costs or prices.<sup>39</sup>

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<sup>38</sup> Applicants' Exhibit 36, at page 6, lines 9-14.

<sup>39</sup> Applicants' response to MCEA et al., IR No. 180.

1 **Q. Did any of the Applicants reflect any potential greenhouse gas regulations in**  
2 **their resource planning for Big Stone II?**

3 A. No. In certain instances they used the Minnesota Commission environmental  
4 externality value for carbon dioxide, which as we discussed above, is distinct  
5 from consideration of regulatory risk and uncertainty.

6 **Q. Has Xcel Energy addressed carbon risks in its resource planning process?**

7 A. Yes. In its November 1, 2006 Petition to the Commission to Initiate a Competitive  
8 Resource Acquisition Process for 375 MW Base Load Generation, Xcel Energy  
9 explained that it had incorporated a CO<sub>2</sub> value of \$9 per ton in the analysis for its  
10 application.<sup>40</sup> Xcel Energy noted that its approach went beyond application of  
11 the Commission's existing approved externalities values and instead modeled  
12 CO<sub>2</sub> externalities using a risk-weighted valuation of potential future climate  
13 change regulation.<sup>41</sup> The \$9/ton figure was based on a settlement involving a  
14 proposed generating project in Colorado but, Xcel Energy believed, was well  
15 supported for use in the Minnesota planning process as well.<sup>42</sup>

16 Xcel Energy also noted in its Petition that the Commission had directed it to  
17 discuss carbon risk analysis strategies in this filing, in its next resource plan, in  
18 future certificate of need filings, and in other proceedings involving the  
19 acquisition of generation resources.<sup>43</sup>

20 **Q. Do you believe that \$9/ton is a reasonable CO<sub>2</sub> value to use for resource**  
21 **planning decisions?**

22 A. As our forecasts of carbon prices show, we believe that \$9/ton may be  
23 appropriate for a short number of years. However, over time carbon prices will  
24 increase. Indeed, our Synapse expected CO<sub>2</sub> price in 2010 is \$0 to \$10/ton.

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<sup>40</sup> Xcel Petition at page 7-20.

<sup>41</sup> Ibid.

<sup>42</sup> Ibid.

<sup>43</sup> Ibid.

1           Our forecast of CO<sub>2</sub> prices assumes that the legislation controlling greenhouse gas  
2           emissions that will be implemented by the early part of the next decade will not  
3           be significantly different from the bills that have been introduced to date in  
4           Congress. While these bills may make significant strides towards lowering future  
5           CO<sub>2</sub> emissions, none is likely to put the country on the CO<sub>2</sub> emissions reductions  
6           trajectories that will be required to truly stabilize the concentrations of  
7           atmospheric CO<sub>2</sub>. Therefore, the atmospheric concentrations of carbon dioxide  
8           will continue to increase, global temperatures will continue to rise, and the  
9           evidence of the resulting adverse climate changes from those rising temperatures  
10          will become even more pronounced. As a result, the public and legislative debates  
11          on climate change and how to deal with the threat it poses will evolve, and the  
12          American public will demand stronger governmental action to address this threat.

13          For these reasons, it is reasonable to expect that the stringency of carbon  
14          regulations will increase in future years in order to achieve the emissions  
15          reductions sufficient to stabilize atmospheric concentrations of CO<sub>2</sub>. At the same  
16          time, future CO<sub>2</sub> prices can be expected to rise because increasing energy use will  
17          mean greater competition for a fixed or decreasing pool of emissions allowances.

18          We also believe that given the uncertainty surrounding regulation of greenhouse  
19          gas emissions, it is important to consider a range of possible carbon prices, and  
20          not just a single value. Therefore, although the \$9/ton figure used by Xcel Energy  
21          is above the \$7.8/ton (2005\$) lower end of our levelized carbon price forecasts,  
22          we also believe that it is quite possible that carbon prices will be significantly  
23          higher than that figure.

1 **Q. Do you have any comments on the criticisms of your carbon price forecasts**  
2 **that the Big Stone II Applicants presented in their rebuttal testimony in**  
3 **South Dakota?**

4 A. Yes. The Applicants presented rebuttal testimony before the South Dakota  
5 Commission that challenged our forecast of carbon prices.<sup>44</sup> However, this  
6 rebuttal testimony was not credible for a number of reasons.

7 First, the Applicants' rebuttal testimony was based on their review of a single  
8 piece of proposed legislation, the Climate and Economy Insurance Act of 2005,  
9 that was discussed but never introduced in Congress. The Applicants appear to  
10 believe that this one piece of proposed legislation was the best indicator of what  
11 Congress might pass in the future and that politics and the will of the American  
12 people won't change even as the impacts of climate change become more  
13 apparent. In contrast to the Applicants, our carbon price forecasts were based on  
14 our reviews of a number of legislative proposals that were introduced in Congress  
15 and on the results of the modeling studies of the impact of proposed legislation on  
16 future carbon prices. Our carbon price forecasts are not tied to the fate of any  
17 single bill. Rather we believe that, overall, the bills that have been and that are  
18 being proposed in Congress are representative of the legislation that ultimately  
19 will be implemented.

20 Second, the Applicants repeatedly contradict themselves and confuse the  
21 externalities costs adopted by the Minnesota Commission with the future costs of  
22 federal regulation of greenhouse gas emissions. Our carbon price forecast is of  
23 federal regulatory costs, not the environmental costs of CO<sub>2</sub> emissions. Therefore,  
24 the Minnesota Commission's CO<sub>2</sub> externalities values do not set a cap on what  
25 will be the future cost of federal CO<sub>2</sub> emissions regulations.

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<sup>44</sup> Prefiled Rebuttal Testimony of Thomas A. Hewson, Jr., Applicants' Exhibit 30 in South Dakota Public Utilities Commission Case No. EL05-022.

1 **Q. How much additional CO2 will Big Stone II emit into the atmosphere?**

2 A. At its projected 88 percent capacity factor (i.e., 4856 GWH), Big Stone II will  
3 emit more than 4.7 million tons of CO2 annually.

4 **Q. Would incorporating Synapse's carbon price forecast have a material effect**  
5 **on the economics of building and operating the proposed Big Stone II**  
6 **Project?**

7 A. Yes. For example, the Applicants have claimed in Exhibit 47 that the busbar cost  
8 of Big Stone II will be \$69.62/MWh (2005\$) for investor-owned utilities (IOUs)  
9 and \$56.38/MWh (2005\$) for public power. The use of the Synapse middle CO2  
10 price forecast of an \$18.61/MWh increase in operating costs would represent a  
11 27% increase in cost per MWh of Big Stone II generation to the Big Stone II  
12 investor owned utilities and a 33% increase to the public power Applicants.

13 **Q. What would be the annual CO2 cost to the Big Stone II Applicants?**

14 A. Assuming an 88% average annual capacity factor, the range of annual, levelized  
15 cost to the Big Stone II Applicants of CO<sub>2</sub> regulation would be:

16 Low Case - 4,856,000 MWh · \$7.74/MWh = \$37,585,440

17 Mid Case - 4,856,000 MWh · \$19.60/MWh = \$95,177,600

18 High Case - 4,856,000 MWh · \$30.39/MWh = \$147,573,840

19 **Q. In the process of your investigation have you considered the interests of the**  
20 **Big Stone Applicants' ratepayers?**

21 A. Absolutely. Synapse regularly works for consumer advocates and has worked for  
22 over half of the members of the National Association of State Utility Consumer  
23 Advocates. Fundamentally, we believe that greenhouse gas regulation not only is  
24 an environmental issue; it also is a consumer issue in that it will have direct and  
25 tangible impacts on future rates.

1 **Q. Does this complete your testimony?**

2 A. No. We are preparing further testimony that we intend to submit on November  
3 29, 2006.

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