BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF SOUTH DAKOTA

In the Matter of the Application of Black Hills)Power, Inc. For Authority to Increase Its)Electric Rates)

DOCKET NO. EL09-018

DIRECT TESTIMONY OF DAVID A. SCHLISSEL ON BEHALF OF THE RESIDENTIAL CONSUMERS COALITION (Bobbie Handley, Lilias Jarding, Carla Kock, and the South Dakota Peace and Justice Center)

PUBLIC VERSION PROTECTED MATERIALS REDACTED

APRIL 30, 2010



Public Version – Protected Materials Redacted

	List of Exhibits
Exhibit DAS-1	Current Résumé for David A. Schlissel
Exhibit DAS-2	Climate Change and Power: Carbon Dioxide Emissions Costs and Electricity Resource Planning
Exhibit DAS-3	Synapse 2008 CO ₂ Price Forecasts
Exhibit DAS-4	Don't Get Burned, the Risks of Investing in New Coal-Fired Generating Facilities
Exhibit DAS-5	[CONFIDENTIAL] Attachment No. 37.1 to Black Hills Power's Response to Residential Consumers Coalition Data Request No. 37
Exhibit DAS-6	[CONFIDENTIAL] Attachment No. 24.1 to Black Hills Power's Response to Residential Consumers Coalition Data Request No. 24
Exhibit DAS-7	[CONFIDENTIAL] Attachment No. 56.1 to Black Hills Power's Response to Black Hills Industrial Intervenors Data Request No. 56

Public Version - Protected Materials Redacted

1 Q. What are your name, position and business address?

A. My name is David A. Schlissel. I am the President of Schlissel Technical
Consulting, Inc., 45 Horace Road, Belmont, MA 02478.

4 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.
- 17 I have testified before state regulatory commissions in Arizona, New Jersey,
- 18 California, Connecticut, Kansas, Texas, New Mexico, New York, Vermont, North
 19 Carolina, South Carolina, Maine, Illinois, Indiana, Ohio, Massachusetts, Missouri,
 20 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 DAS-1.
- 24 Q. On whose behalf are you testifying in this case?
- A. I am testifying on behalf of the Residential Consumers Coalition ("RCC").

Public Version - Protected Materials Redacted

- Q. Have you testified previously before the South Dakota Public Utilities
 Commission?
- 3 A. Yes. I have testified in Docket No. EL05-022.
- 4 Q. What is the purpose of your testimony?
- A. I have been asked to review the reasonableness of Black Hills Power's 2007
 Integrated Resource Plan ("IRP") and the Company's decision to build the Wygen
 III coal-fired power plant.
- 8 This testimony presents the results of my analyses.
- 9 Q. Please summarize your conclusions.
- 10 A. My conclusions are as follows:
- 111.The Base or Reference Case Carbon Dioxide ("Carbon" or "CO2") prices12used by Black Hills Power in the 2007 IRP were unreasonably low. The13CO2 prices that Black Hills Power has described as a "High CO2 Tax14Case" or the "Very High CO2 Case" actually were closer to what the15Company should have used as its Base or Reference Case prices.
- 162.Contrary to the testimony of Black Hills Power witness Tietjen, the17estimated carbon or CO2 prices used in the 2007 IRP have not been18validated by government agencies and are not reasonable from today's19perspective or at the time the IRP was prepared.
- 203.At the time that it decided to undertake the Wygen III project, Black Hills21Power was extremely dependent on coal-fired generation. Building22another coal-fired unit was a very risky decision in light of likely federal23regulation of greenhouse gas emissions. Black Hills Power remains24extremely dependent on coal-fired generation.
- 254.Black Hills Power projects that its annual CO2 emissions will26percent between 2005 and 2030. This is contrary to developing federal

\$	Black Docke Direct	Hills Power, Inc. et No. EL09-018 t Testimony of David A. Schlissel Public Version - Protected Materials Redacted		
1		climate change policies which project 42 percent reductions in CO ₂		
2		emissions during this same period.		
3	Q.	Did Black Hills Power adequately consider the potential financial risks of		
4		future CO ₂ emissions in its 2007 IRP?		
5	A.	No. The Reference Case CO ₂ prices (in the form of taxes) that Black Hills Power		
6		used in the 2007 IRP were unreasonably low. These CO ₂ allowance costs were		
7		well below then-current price projections from independent sources including: the		
8		Energy Information Administration of the U.S. Department of Energy ("EIA"),		
9		the U.S. Environmental Protection Agency ("EPA"), and researchers at the		
10		Massachusetts Institute of Technology ("MIT") and Duke University ("Duke").		
11	Q.	What is the basis for this conclusion?		
12	A.	Figure 1, below, compares the annual Reference Case and High CO_2 Case CO_2		
13		prices used in Black Hills Power's 2007 IRP with the results of the following		
14		modeling analyses that were available to Black Hills Power at the time it was		
15		preparing its 2007 IRP:		
16 17		• The EIA's assessment of the Energy Market and Economic Impacts of S. 280, the Climate Stewardship and Innovation Act of 2007 (July 2007). ¹		
18 19		• The EIA's October 2007 Supplement to the Energy Market and Economic Impacts of S. 280, the Climate Stewardship and Innovation Act of 2007. ²		
20 21		• The EPA's Analysis of the Climate Stewardship and Innovation Act of 2007 – S. 280 in 110th Congress (July 2007). ³		
22 23		• The Assessment of U.S. Cap-and-Trade Proposals by the Joint Program at MIT on the Science and Policy of Global Change (April 2007). ⁴		
24 25		• The Lieberman-Warner America's Climate Security Act: A Preliminary Assessment of Potential Economic Impacts, prepared by the Nicholas		

Available at http://www.eia.doe.gov/oiaf/servicerpt/csia/pdf/sroiaf(2007)04.pdf. Available at http://www.eia.doe.gov/oiaf/servicerpt/biv/pdf/s280_1007.pdf. Available at http://www.epa.gov/climatechange/economics/economicanalyses.html. Available at http://web.mit.edu/globalchange/www/MITJPSPGC_Rpt146.pdf.

Public Version - Protected Materials Redacted

1 2	Institute for Environmental Policy Solutions, Duke University and RTI International (October 2007). ⁵
3	The dashed lines in Figure 1 are the annual CO_2 prices that were developed in
4	each of the scenarios that were studied by the EIA, the EPA, MIT, and Duke. The
5	solid black lines are the Low, Mid and High CO ₂ price forecasts that were
6	developed by Synapse Energy Economics in 2006. The blue lines with the squares
7	represents Black Hills Power's Base CO ₂ price forecast. The orange line with
8	triangles represents the Company's High CO ₂ prices.



Figure 1:

10 11 Annual CO₂ Prices – Black Hills Power Reference Case and High CO₂ Prices vs. EPA, EIA, MIT and Duke Analyses and the Synapse Price Forecasts as of 2007



12

13

14

15

As can be seen from Figure 1, the Company's Reference Case CO_2 prices were lower than any of the projections from the EIA, the EPA, MIT or Duke and were comparable to the Synapse Low CO_2 prices.

5 Available at http://www.nicholas.duke.edu/institute/econsummary.pdf.

Public Version - Protected Materials Redacted

Figure 2, below, presents the same comparison except that the CO₂ prices are presented as the levelized costs for the years 2013 through 2030 (in 2007 dollars).
Again, it is clear that the Reference Case CO₂ prices used by Black Hills Power in its 2007 IRP were too low to be used as the main base case CO₂ prices in an IRP.



Levelized CO₂ Prices – Black Hills Power Reference Case CO₂ Prices vs. EPA, EIA, MIT and Duke Analyses and Synapse Price Forecasts as of 2007



8

1

2

3

4

5 6

7

9 Q. What was the impact of Black Hills Power's use of such low CO₂ prices in its
10 Reference Case analyses?

A. The use of such low CO₂ prices biased the analyses in favor of the most carbon
intensive alternative, the coal-fired power plant.

	Blac Dock Dire	k Hills Power, Inc. ket No. EL09-018 ct Testimony of David A. Schlissel Public Version - Protected Materials Redacted
1	Q.	What is the basis for the Synapse Low, Mid and High CO ₂ prices that you
2		have included in Figures 1 and 2?
3	A.	Synapse developed a set of three CO ₂ price trajectories (Low, Mid and High) in
4		2006 that we believed were appropriate for use in utility resource planning
5		analyses such as IRPs. The basis for these price trajectories is described in detail
6		in Exhibit DAS-2.
7	Q.	What would have been more reasonable CO ₂ prices for Black Hills Power to
8		have used in its IRP Reference Case analyses?
9	A.	Black Hills Power should have used a set of CO ₂ prices in its Reference Case
10		analyses similar to the Synapse Mid CO_2 Price Forecast. These two sets of CO_2
11		prices are compared in Figure 3 below:

1

2

3



4 Q. Should Black Hills Power have considered a range of CO₂ Prices in its 2007 5 IRP?

6 A. Yes. Black Hills Power could have used the Synapse Mid CO_2 Price Forecast as 7 its Base Case, with its own Reference Case CO_2 prices as a low sensitivity and its 8 High CO_2 Case prices as a high sensitivity (as it did). It is important and prudent 9 to consider such a range of possible CO_2 prices given the uncertainties associated 10 with the timing, stringency and design of federal regulation of greenhouse gases.

Q. Should the Commission given any weight to the IRP analyses that used Black Hills Power's Reference Case CO₂ prices?

A. Because they were so low, the Commission should only give minimal weight to
any analyses that used Black Hills Power's Reference Case CO₂ prices.

Public Version - Protected Materials Redacted

Q. Do you agree with the testimony of Black Hills Power witness Tietjen that the
 2007 IRP "bracketed the current estimates of carbon prices being made by
 3 governmental agencies?"

4 A. Although technically correct, Ms. Tietjen's testimony is misleading. It is correct 5 that the Reference Case CO_2 prices used by Black Hills Power in the 2007 IRP 6 were close to or below the lower end of the CO₂ prices developed through 2007 7 by government agencies and independent studies at MIT and Duke University (as 8 I have shown above) and that the High Case CO₂ prices used by the Company 9 were a reasonable set of high CO₂ prices. However, as I explained above, Black 10 Hills Power should not have used the Reference Case CO₂ prices for the main 11 base case analyses on which the Company would seek to rely. They were far too 12 low for that. Instead, the Reference Case CO₂ prices should have been used as a 13 low sensitivity, as I discussed previously, with a set of CO₂ prices similar to the 14 Synapse Mid CO₂ Price Forecast being used for the main base case analyses.

15 Q. Do you believe that the carbon prices used by Black Hills Power in its 2007 16 IRP are valid today?

- A. No. The Company's Reference Case CO₂ prices remain at or below both the
 carbon prices developed in federal and independent assessments of proposed
 climate change legislation and the prices being used by many utilities and state
 regulatory commissions in resource planning analyses.
- For example, Figure 4, below, compares the CO₂ emissions prices that Black Hills Power used in their 2007 IRP analyses and the current 2008 Synapse CO₂ price forecasts with the results of the independent modeling of the legislation that has been introduced in the U.S. Congress in recent years.
- 25 The modeling analyses in Figure 4 includes studies prepared by the EPA, the EIA,
- 26 MIT, Duke University, the Clean Air Task Force, the American Council for
- 27 Capital Formation, the National Association of Manufacturers, CRA-

	Р	ublic Version - Protected Materials Redacted
	Intern model	ational, Inc., and the Natural Resources Defense Council ("NRDC"). These ing analyses include:
	•	The EIA's assessment of the Energy Market and Economic Impacts of S. 280, the Climate Stewardship and Innovation Act of 2007 (July 2007). ⁶
	•	The EIA's October 2007 Supplement to the Energy Market and Economic Impacts of S. 280, the Climate Stewardship and Innovation Act of 2007. ⁷
	• • •	The EIA's assessment of the Energy Market and Economic Impacts of S. 1766, the Low Carbon Economy Act of 2007 (January 2008). ⁸
	•	The EIA's assessment of the Energy Market and Economic Impacts of S. 2191, the Lieberman-Warner Climate Security Act of 2007 (April 2008). ⁹
	•	The EIA's assessment of the Energy Market and Economic Impacts of H.R. 2454, the American Clean Energy and Security Act of 2009 (August 2009). ¹⁰
	•	The EPA's Analysis of the Climate Stewardship and Innovation Act of 2007 – S. 280 in 110 th Congress (July 2007). ¹¹
	•	The EPA's Analysis of the Low Carbon Economy Act of 2007 – S. 1766 in 110 th Congress (January 2008). ¹²
	•	The EPA's Analysis of the Lieberman-Warner Climate Security Act of 2008 – S. 2191 in 110 th Congress (March 2008). ¹³
	•	The EPA's Analysis of the American Clean Energy and Security Act of 2009, H.R. 2454 in the 111 th Congress (June 2009). ¹⁴
	•	Assessment of U.S. Cap-and-Trade Proposals by the Joint Program at MIT on the Science and Policy of Global Change (April 2007). ¹⁵
	•	Analysis of the Cap and Trade Features of the Lieberman-Warner Climate Security Act – S. 2191 by the Joint Program at MIT on the Science and Policy of Global Change (April 2008). ¹⁶
		a de la compañía de sera de la compañía de serán de la compañía de la compañía de la compañía de la compañía de A sera de la defensa de la compañía de sera de sera de la compañía de la compañía de la compañía de la compañía
6 7 8	Availa Availa Availa	ble at http://www.eia.doe.gov/oiaf/servicerpt/csia/pdf/sroiaf(2007)04.pdf. ble at http://www.eia.doe.gov/oiaf/servicerpt/biv/pdf/s280_1007.pdf. ble at http://www.eia.doe.gov/oiaf/servicerpt/lcea/pdf/sroiaf(2007)06.pdf.

⁹ Available at http://www.eia.doe.gov/oiaf/servicerpt/s2191/pdf/sroiaf(2008)01.pdf.

- ¹⁰ Available at http://www.eia.doe.gov/oiaf/servicerpt/hr2454/index.html.
- ¹¹ Available at http://www.epa.gov/climatechange/economics/economicanalyses.html.
- ¹² Available at http://www.epa.gov/climatechange/economics/economicanalyses.html.
- ³ Available at http://www.epa.gov/climatechange/economics/economicanalyses.html.
- Available at http://www.epa.gov/climatechange/economics/pdfs/HR2454_Analysis.pdf.
- ¹⁵ Available at http://web.mit.edu/globalchange/www/MITJPSPGC_Rpt146.pdf.

1

2

3

4

9

10

11

Public Version - Protected Materials Redacted

- The Lieberman-Warner America's Climate Security Act: A Preliminary Assessment of Potential Economic Impacts, prepared by the Nicholas Institute for Environmental Policy Solutions, Duke University and RTI International (October 2007).¹⁷
- U.S. Technology Choices, Costs and Opportunities under the Lieberman-Warner Climate Security Act: Assessing Compliance Pathways, prepared by the International Resources Group for the Natural Resources Defense Council (May 2008).¹⁸
 - The Lieberman-Warner Climate Security Act S. 2191, Modeling Results from the National Energy Modeling System Preliminary Results, Clean Air Task Force (January 2008).¹⁹
- Economic Analysis of the Lieberman-Warner Climate Security Act of 2007
 Using CRA's MRN-NEEM Model, CRA International (April 2008).²⁰
- Analysis of the Lieberman-Warner Climate Security Act (S. 2191) using the National Energy Modeling System (NEMS/ACCF/NAM), a report by the American Council for Capital Formation and the National Association of Manufacturers (March 2008).²¹
- 18 In total, these modeling analyses examined more than 85 different scenarios.
- 19 These scenarios reflected a wide range of assumptions concerning important
- 20 inputs such as: the "business-as-usual" emissions forecasts; the reduction targets
- 21 in each proposal; whether complementary policies such as aggressive investments
- in energy efficiency and renewable energy are implemented independent of the
- 23 emissions allowance market; the policy implementation timeline; program
- 24 flexibility regarding emissions offsets (perhaps international) and allowance
- 25 banking; assumptions about technological progress and the cost of alternatives;
- and the presence or absence of a "safety valve" price.
- As in Figure 1, above, the Black Hills Power Reference Case CO₂ prices in Figure
 4 are shown in blue with square symbols. The Company's High CO₂ Prices are

¹⁹ Available at http://lieberman.senate.gov/documents/catflwcsa.pdf.

¹⁶ Available at http://mit.edu/globalchange/www/MITJPSPGC_Rpt146_AppendixD.pdf.

¹⁷ Available at http://www.nicholas.duke.edu/institute/econsummary.pdf.

¹⁸ Available at http://docs.nrdc.org/globalwarming/glo_08051401A.pdf.

Available at http://www.nma.org/pdf/040808_crai_presentation.pdf.

Available at http://www.accf.org/pdf/NAM/fullstudy031208.pdf.

1

2

3

4

5

6

7

8

9

10

11

12

14 15

Public Version - Protected Materials Redacted

shown in orange with triangle symbols. The 2008 Synapse CO_2 Price Forecasts are in the solid black lines. All of the dashed lines represent the annual CO_2 Costs (in 2007 dollars per short ton) for each of the numerous scenarios studied in the EIA, EPA, MIT, Duke, and other assessments.

Figure 4:Annual Black Hills Power and Synapse 2008 CO2 Prices Compared
to Results of Modeling of Proposed Federal Legislation



As can be seen, the annual CO_2 costs used by Black Hills Power in its 2007 Reference Case IRP analyses are below the annual costs of all of the approximately 85 modeling scenarios that are included in Figure 4.

Figure 5, below, then presents the same comparison but in levelized prices for the years 2013 through 2030 (in 2009 dollars per short ton of CO_2).

13 In Figure 5:

• S.280 refers to the McCain-Lieberman bill introduced in 2007 in the 110th U.S. Congress.

Public Version - Protected Materials Redacted

2 3

1

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.
- 5 6

7

8

4

HR. 2454 refers to the Waxman-Markey bill introduced in 2009 in the current 111th U.S. Congress.





9

10 Figures 4 and 5 confirm that the Reference Case CO₂ prices used by Black Hills 11 Power were too low to represent base case assumptions. Instead, the Company 12 should have assumed a higher set of base case CO₂ prices for its Reference Case 13 analyses and kept its Reference Case CO₂ prices for a low CO₂ price sensitivity. 14 Based on the information in Figures 4 and 5, it now appears that the Company's 15 High CO₂ Case prices are probably more appropriate for the base case analyses 16 and another, higher, set of CO_2 prices should be used in a High CO_2 price 17 sensitivity.

Public Version - Protected Materials Redacted

- 1Q.Do Figures 4 and 5 include the modeling of the recent Waxman-Markey bill2that has been passed by the U.S. House of Representatives?
- A. Yes. The annual CO₂ prices from the recent modeling of the Waxman-Markey bill
 by the EIA and the EPA are included in Figure 4. In addition, the fourth through
 sixth bars from the right in Figure 5 provide the ranges of levelized CO₂ prices
 from that recent modeling of the Waxman-Markey bill.
- Q. How do the Reference Case CO₂ prices that Black Hills Power used in its
 base case IRP analyses compare to the CO₂ prices that other utilities and
 state regulatory commissions are using in resource planning?
- A. As can be seen from Figure 6, Black Hills Power's Reference Case CO₂ prices are
 at the low end of the ranges of CO₂ prices that other utilities and state regulatory
 commissions have been using in resource planning in recent years.



Figure 6:

Levelized Black Hills Power CO₂ Prices Compared to Prices Used by Other Utilities and State Regulatory Commissions in Resource Planning



16

Public Version - Protected Materials Redacted

1 2

3

Figure 7: Comparison of Legislative Climate Change Targets in the Current 111th U.S. Congress as of December 17, 2009

Net Emission Reductions Under Cap-and-Trade Proposals in the 111th Congress, 2005-2050 December 17, 2009



It is uncertain which, if any, of the specific climate change bills that have been
introduced to date in the Congress will be adopted. Nevertheless, the general trend
is clear; and it would be a mistake to ignore it in long-term decisions concerning
electric resources. Over time the proposals are becoming more stringent as
evidence of climate change accumulates and as the political support for serious
governmental action grows.

10 Q. What would Black Hills Power's annual CO₂ emissions be under its proposed
 11 IRP resource plan?

A. The Company's annual CO₂ emissions through 2030 under its IRP Resource Plan
are shown in Figure 8, below.

1

2

23

Public Version - Protected Materials Redacted

Figure 8:	Black Hills P	ower's Projected	Future Annu	al CO ₂ Emissions
	through 2030	²³ [CONFIDEN]	'IAL]	

3	
4	Consequently, Black Hills Power's CO ₂ emissions would be
5	percent through 2030 at the very time that the legislative proposals in Congress
6	would be mandating reductions in emissions. In other words, Black Hills Power's
7	CO ₂ emissions would be a second second second at a time when the
8	mandated levels of emissions were being reduced.

The source for Black Hills Power's recent CO_2 emissions is Attachment No. 37.1 to the Company's Response to RCC Data Request No. 37. A copy of this response is attached as Exhibit DAS-5 [Confidential]. The source for the Company's projected CO_2 emissions is Attachment No. 24.1 to its Response to RCC Data Request No. 24. A copy of this response is attached as Exhibit DAS-6 [Confidential].

Public Version - Protected Materials Redacted

- 1 **Q**. Was Black Hills Power heavily dependent on coal-fired generation even 2 before the Wygen III unit was built?
- 3 Yes. percent of the energy generated by Black Hills Power in 2006 A. came from coal-fired units.²⁴ 4 percent of the energy generated by the Company came from coal-fired units in 2007.²⁵ 5

6 Q. Is it prudent for a utility that is already extremely heavily dependent on coal 7 to add yet another coal-fired unit?

- 8 Α. No. Adding even more coal to its generation or fuel mix was not prudent given 9 the significant risks to which the owners of existing and new coal plants are being 10 exposed. These risks include the potential for federally mandated reductions in 11 greenhouse gas emissions, state actions that would adversely affect the need for 12 and the relative economics of coal-fired power plants, uncertainties related to 13 carbon capture and sequestration, more stringent regulation of non-greenhouse 14 gas emissions, and potential construction cost increases. These risks are discussed 15 in more detail in Don't Get Burned, the Risks of Investing in New Coal-Fired 16 Generating Facilities, a report that I co-authored in 2008. A copy of this report is 17 attached as Exhibit DAS-4.
- 18 Q. Does this complete your testimony?
- 19 Yes. A.

24 The data on the generation of each of the Company's units was provided in Attachment No. 56.1 to Black Hills Power's Response to Black Hills Industrial Intervenors Data Request No. 56. A copy of this response is attached as Exhibit DAS-7 [Confidential]. 25 <u>Id</u>.