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October 10, 2006

The Honorable Steve M. Mihalchick  
Administrative Law Judge  
Office of Administrative Hearings  
100 Washington Square, Ste 1700  
Minneapolis, MN 55401-2138

RE: In the Matter of a Petition by Excelsior Energy, Inc. for Approval of a Power Purchase Agreement Under Minnesota Stat. 216B.1694, Determination of Lease Cost Technology And Establishment of a Clean Energy Technology Minimum Under Minn. Stat. 216B.1693;  
OAH Docket No: 12-2500-17260-2  
MPUC Docket No: E6472/M-05-1993

Dear Judge Mihalchick:

Enclosed for filing in the above referenced docket, please find the Public Rebuttal Testimony and Exhibits of Eilon Amit filed on behalf of the Minnesota Department of Commerce.

The Department is also filing a copy of this document electronically. Also enclosed is an affidavit of service.

Very truly yours,

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Enc.  
c(w/enc.): All Parties of Record

BEFORE THE MINNESOTA OFFICE OF ADMINISTRATIVE HEARINGS  
100 Washington Square, Suite 1700  
Minneapolis MN 55401-2138

FOR THE MINNESOTA PUBLIC UTILITIES COMMISSION  
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Thomas Pugh

Chair  
Commissioner  
Commissioner  
Commissioner  
Commissioner

IN THE MATTER OF A PETITION BY  
EXCELSIOR ENERGY, INC. FOR APPROVAL  
OF A POWER PURCHASE AGREEMENT  
UNDER MINN. STAT. §216b.1694,  
DETERMINATION OF LEAST COST  
TECHNOLOGY, AND ESTABLISHMENT OF  
A CLEAN ENERGY TECHNOLOGY  
MINIMUM UNDER MINN. STAT. §216b.1693

Docket No. E6472/M-05-1993

**REBUTTAL TESTIMONY AND EXHIBITS OF EILON AMIT**

**ON BEHALF**

**OF THE MINNESOTA DEPARTMENT OF COMMERCE**

**PUBLIC DOCUMENT – TRADE SECRET DATA HAS  
BEEN EXCISED**

OCTOBER 10, 2006

REBUTTAL TESTIMONY OF EILON AMIT  
EXCELSIOR ENERGY, INC.

DOCKET NO. E6472/M-05-1993

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1 **I. BACKGROUND**

2 **Q. Please state your name.**

3 A. My name is Dr. Eilon Amit.

4

5 **Q. Are you the same Dr. Amit who previously filed Direct Testimony in this**  
6 **proceeding?**

7 A. Yes, I am.

8

9 **Q. What is the purpose of your rebuttal testimony?**

10 A. • I update my cost comparisons as follows:

11 1. I estimate the cost of the PPA, for the East Range site.

12 2. I estimate the costs of the 450 MW PPA for both the West Range site and the  
13 East Range site.

14 3. I include transmission costs for the alternative plants used for cost comparison  
15 in my Direct Testimony.

16 • I discuss in more details the specific risk allocation of the PPA between Excelsior  
17 and Xcel and its effects on Xcel's ratepayers.

18 • I include a discussion of sequestration of CO<sub>2</sub> by Excelsior.

19

20 **II. COST COMPARISON UPDATE**

21 A. *THE COSTS OF THE EAST SITE PPA*

22 **Q. Dr. Amit, please discuss the cost of the East Site 598 MW PPA.**

1 A. Based on information received from Excelsior, I calculated the average price per MWh  
2 and the levelized price per MWh for the East Site 598 MW PPA. These prices include an  
3 assumed fuel mix of 75 percent Coal and 25 percent Pet Coke and transmission  
4 interconnection costs but do not include any transmission costs for transmission upgrades  
5 beyond the point of delivery to the Forbes substation. Also, these prices do not include  
6 the costs of sequestration of CO<sub>2</sub>.

7  
8 **Q. Please state these costs.**

9 A. The average costs per MWh for the East Site PPA are \$110.80 per MWh and the  
10 levelized costs for the East Site PPA are \$101.86 per MWh. These calculations are  
11 summarized in DOC Exhibit No. \_\_\_\_ (REA-1). Assuming no change in emissions per  
12 MWh from the information provided for the West Range site the emission costs for the  
13 East Site PPA are \$3.45 per MWh. The levelized emission costs are \$3.05 per MWh.

14  
15 **Q. Dr. Amit what are the East Site PPA costs including the emission costs?**

16 A. The average costs, for the East Site PPA, including emission costs are \$114.25 per MWh.  
17 The levelized costs for the East Site PPA, including levelized emission costs are \$104.91  
18 per MWh.

19  
20 **Q. Do these costs include transmission costs to provide the power to Xcel Energy's  
21 (Xcel's) customers?**

22 A. No. I will incorporate such transmission costs in another section of this rebuttal  
23 testimony.

1 B. *THE COSTS OF THE WEST SITE 450 MW PPA*

2 **Q. Dr. Amit, please discuss the costs of the West Site 450 MW PPA.**

3 A. Based on information received from Excelsior I calculated both the average price and the  
4 levelized price for the West Site 450 MW PPA. These prices assume a fuel mix of 75  
5 percent PRB Coal and 25 percent Pet Coke but do not include any transmission costs for  
6 transmission upgrades beyond the point of delivery at the Blackberry substation.

7  
8 **Q. Please state these costs.**

9 A. The average costs per MWh for the West Site 450 MW PPA are \$127.15 per MWh, and  
10 the levelized costs are \$117.82 per MWh. The calculations of these costs are summarized  
11 in DOC Exhibit No. \_\_\_\_ (REA-2) page 1 of 2. Assuming no change in emissions per  
12 MWh from the information provided in the initial petition, the emission costs for the  
13 West Site 450 MW PPA are \$3.45 per MWh (DOC Exhibit No. \_\_\_\_ EA-3), and the  
14 levelized emission costs are \$3.05 per MWh.

15  
16 **Q. Dr. Amit, what are the West Site 450 MW PPA costs including emission costs?**

17 A. The average costs per MWh for the West Site 450 MW PPA, including emission costs are  
18 \$130.60 per MWh and the levelized costs, including emission costs, are \$120.87 per  
19 MWh. Again, these costs only include transmission cost for delivery to the Blackberry  
20 substation but not delivery to Xcel's load center.

1 C. *THE COSTS OF THE EAST SITE 450 MW PPA*

2 Q. **Dr. Amit, please summarize the costs for the East Site 450 MW PPA.**

3 A. The average costs are \$137.94 per MWh and the levelized costs are \$127.71 per MWh.  
4 (DOC Exhibit No. \_\_\_\_ (REA-2), page 2 of 2). The average costs including emission  
5 costs are \$141.39 per MWh and the levelized costs, including emission costs, are \$130.76  
6 per MWh.

7  
8 D. *SUMMARY OF UPDATED COST COMPARISONS*

9 Q. **Based on your updated costs analyses and your cost analyses in your Direct  
10 Testimony, please provide a summary of your cost comparisons.**

11 A. Table 1 below provides a summary of my cost (price) comparison analyses.

12  
13 **Table 1: Cost (Price) Comparison Including Emission Costs, Excluding Transmission Costs**

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27

<u>Alternative</u>	<u>Average Annual Price (\$/MWh)</u>	<u>Levelized Price (\$/MWh)</u>
Excelsior Energy		
West Site (603 MW)	104.33	96.04
East Site (598 MW)	114.25	104.91
West Site (450 MW)	130.60	120.87
East Site (450 MW)	141.39	130.76
Big Stone II SuperCritical	81.91	77.88
	<b>[TRADE SECRET DATA HAS</b>	
Comanche 3 SuperCritical	<b>BEEN EXCISED]</b>	
Sherco 4 SuperCritical	68.23	64.55

28 The costs for Excelsior Energy and Sherco 4 do not include the costs of needed  
29 transmission network upgrades. The cost for Big Stone II includes some, but not all of  
30 the transmission upgrades. The costs for Comanche 3 includes the transmission  
31 upgrades.

1 | *E. TRANSMISSION COSTS*

2 | **Q. Please discuss the transmission costs associated with Excelsior and the alternatives**  
3 | **you have previously discussed.**

4 | A. I start my discussion with Excelsior Energy, followed by Sherco 4 and Big Stone II.

5 |  
6 | *1. Excelsior Energy*

7 | **Q. Please continue.**

8 | A. To deliver energy and capacity from its West Site or East site, the transmission network  
9 | for either site will have to be upgraded.

10 |         Excelsior Energy plans to build a 603 MW plant for the West Site or 598 MW  
11 | plant for the East Site even if only a 450 MW PPA is approved. Therefore, the  
12 | transmission upgrade costs are expected to be the same regardless of the size of the PPA  
13 | proposed by Excelsior.

14 |  
15 | **Q. Are there specific issues that make it difficult to estimate the costs of transmission**  
16 | **upgrades for Excelsior?**

17 | A. Yes. At this point it is unclear which transmission services would be requested by  
18 | Excelsior. The most likely services could be either Network Resource Interconnection  
19 | Service (NIRS) or a Local Capacity Resource (LCR) service. The costs of these two  
20 | options may be significantly different.



1 **Q. Are there any cost estimates available for the needed transmission upgrades?**

2 A. Yes. Xcel's witness, Richard Gonzales, provides testimony on the costs of the needed  
3 transmission updates. Mr. Gonzales estimates that the transmission upgrades needed, to  
4 allow Excelsior to deliver its energy and capacity to Xcel's load center, would cost \$180  
5 million. This amount is in 2006 dollars. Assuming an inflation rate of 2.5 percent and  
6 completion of the upgrade in 2011, the upgrades would cost about \$204 million in 2011  
7 dollars.

8  
9 **Q. Would these costs be fully charged to Xcel's ratepayers?**

10 A. No. The costs may be born by Xcel's ratepayers and other users of the MISO  
11 transmission system. The exact allocation of these costs would depend on the type of  
12 transmission services ultimately received by Excelsior, and the MISO policies at the time  
13 the services are provided. However, regardless of the cost allocation of the transmission  
14 upgrades, all of these costs should be fully considered by the Commission in this  
15 proceeding since these costs are relevant factors in the Commission's decisions in this  
16 proceeding, as the Commission has already indicated.

17  
18 2. *Potential Sherco 4*

19 **Q. Please discuss the costs of the transmission upgrades needed for Sherco 4.**

20 A. Based on Xcel's response to the Department's Information Request No. 110, the  
21 transmission upgrades estimated as needed for a potential Sherco 4 would cost \$91  
22 million in 2006 dollars. Again, adjusting for 2.5 percent annual inflation, the 2011  
23 transmission costs for Sherco 4 would be about \$119.60 million.

1 3. *Big Stone II*

2 **Q. Please discuss the transmission costs for Big Stone II.**

3 A. The updated costs for Big Stone II (Tables 5 and 6 of my Direct Testimony) include the  
4 incremental transmission costs of upgrading the transmission lines from 230 kV to 345  
5 kV. However, the updated costs do not include the initial transmission upgraded costs.  
6 Based on the Big Stone II filing in Docket No. CN-05-619, Exhibit 30-A, these costs are  
7 \$78,535,000 in 2005 dollars. Adjusting these costs to 2011, they would be \$105,761,396.

8  
9 *F. COST COMPARISONS INCLUDING TRANSMISSION COSTS*

10 **Q. Dr. Amit, please summarize your cost comparisons including transmission costs.**

11 A. The transmission costs discussed above must be converted to costs per MWh. Table 2  
12 below summarizes the conversions.

13  
14 **Table 2: Transmission Cost Per MWh**

15  
16  
17  
18  
19

<u>Alternative</u>	<u>Total Transmission Costs</u>	<u>2011-2036 Generation (1,000 MWh)</u>	<u>Transmission Cost per MWh</u>
Excelsior Energy			
West Site (603 MW)	\$204,000,000	115,960	\$1.76
East Site (598 MW)	\$204,000,000	112,719	\$1.81
West Site (450 MW)	\$204,000,000	85,643	\$2.38
East Site (450 MW)	\$204,000,000	85,627	\$2.38
Big Stone II Super Critical	\$105,761,000	120,257	\$0.88
Sherco 4 Super Critical	\$119,000,000	139,438	\$0.85

20  
21  
22  
23  
24  
25  
26

27 The costs for the West and East sites 450 MW PPA assume that the transmission  
28 upgrade costs are fully included in the PPAs. Depending on how these costs are shared  
29 between the 450 MW PPAs and the approximately additional 150 MW, the transmission  
30 costs included in the PPA may be lower.

1 **Q. Dr. Amit, what are the costs of the Excelsior PPAs and the comparison alternatives**  
2 **including transmission costs?**

3 A. Table 3 below summarizes these costs.

4  
5 **Table 3: Cost (Price) Comparison Including Emission and Transmission Costs**

<u>Alternative</u>	<u>Average Price (\$/MWh)</u>	<u>Levelized Price (\$/MWh)</u>
Excelsior Energy		
West Site (603 MW)	106.09	97.80
East Site (598 MW)	116.06	106.72
West Site (450 MW)	132.98	123.25
East Site (450 MW)	143.77	133.14
Big Stone II Super Critical	82.79	78.76
	<b>[TRADE SECRET DATA HAS</b>	
Comanche 3 Super Critical	<b>BEEN EXCISED]</b>	
Sherco 4 Super Critical	69.08	65.40

19  
20 **III. DETAILED ANALYSIS OF THE PPA RISK ALLOCATION**

21 **Q. What is the purpose of this section of your testimony?**

22 A. The purpose of this section of my testimony is to analyze in detail the PPA's allocation of  
23 financial and operational risks across Excelsior, Xcel and Xcel's ratepayers.

24  
25 **Q. Dr. Amit, did you not discuss this issue in your Direct Testimony?**

26 A. Yes, I did. In my Direct Testimony, I concluded that the PPA does not appropriately  
27 protect Xcel and Xcel's ratepayers from financial and operational risks. However, in this  
28 testimony I discuss specific features of the PPA in more detail. I first discuss the fuel  
29 mix risk, followed by capacity payment risks, variable operational and maintenance  
30 (O&M) risks, and fixed O&M risks.

1           1.       *Fuel Mix Risks*

2       **Q. Dr. Amit, please explain your concern with the fuel mix issue.**

3       A. I have already discussed this issue in part on pages 9 through 12 of my Direct Testimony.  
4           However, it should also be noted that the adjustment of capacity payments, as described  
5           in Article 8.1 of the PPA, applies only when the facility can only operate using 100  
6           percent natural gas. Therefore, the adjustment of capacity payment as provided in Article  
7           8.1 of the PPA does not apply if the fuel mix is anything less than 100 percent natural gas  
8           (such as 99 percent natural gas). As I discussed on page 10, lines 26 through 34 of my  
9           Direct Testimony, if a significant amount of natural gas is used in the facility, Xcel and  
10          Xcel's ratepayers would be forced to pay for more expensive energy, when cheaper  
11          energy may be available. Such a situation represents an inappropriate shift of risk away  
12          from Excelsior to Xcel and Xcel's ratepayers.

13  
14       **Q. Dr. Amit, how do you propose to account for such an inappropriate risk allocation?**

15       A. I recommend that the first paragraph of Article 8.3 be amended as follows. Use the  
16          following language: "Regardless of the actual fuel mix used in the facility, NSP shall pay  
17          seller monthly for fuel as if the fuel mix used in the facility is 75 percent PRB Coal and  
18          25 percent Pet Coke blend." Delete the following language: "NSP shall pay seller  
19          monthly for all fuel (solid fuel and natural gas) consumed at the facility."

20  
21           2.       *Capacity Payments Risks*

22       **Q. Dr. Amit, do you have any concern about the capacity payment formula, other than**  
23       **the fuel payments you discussed earlier?**

1 A. Yes, I do.

2

3 **Q. Please explain.**

4 A. The capacity payments are defined by the following formula:

5 Monthly Capacity Payment = RCx CP x CAF

6 Where:

7 RC = Reference Capacity, CP = Capacity Price and

8 CAF = Capacity Availability Factor

9 = [AE + SME – (AENG)(NGF)] / (PE x RUF), where:

10

11 AE = Available Energy;

12 SME = Scheduled Maintenance Energy;

13 AENG = Available Energy on Natural Gas (=0 if natural  
14 gas usage is less than 100 percent);

15 NGF = Natural Gas Factor;

16 PE = Period Energy; and

17 RUF = Ramp-Up Factor.

18

19 Based on the above definitions and assuming the Scheduled Maintenance Energy  
20 (SME) and the Ramp-Up Factor (RUF) do not vary significantly with the fuel mix, the  
21 capacity availability factor (CAF) and the reference capacity RC remain the same  
22 regardless of the fuel mix (unless the Facility uses only natural gas). Therefore, if for  
23 example, the fuel mix is 95 percent natural gas and 5 percent PRB coal, the Monthly  
24 Capacity payments will be the same as the ones for fuel mix of 75 percent PRB coal and  
25 25 percent Pet Coke blend.

26

27 **Q. Why are such capacity payments inappropriate?**

28 A. They are inappropriate because, once again, the PPA's risks are unfairly shifted away  
29 from Excelsior to Xcel and Xcel's ratepayers. This risk shift occurs in two ways. First,  
30 as the natural gas component of the fuel mix increases relative to the coal component,

1 energy becomes more expensive, and therefore, the capacity costs should be lower  
2 respectively. For example, as shown in the Direct Testimony of Xcel's witness, Karen T.  
3 Hyde, on page 17, typical gas-fired combined cycle capacity charges are much lower than  
4 the capacity charges proposed by the PPA. As indicated above, the capacity formula  
5 does not decrease the monthly capacity payment if the amount of natural gas is anything  
6 less than 100 percent.

7 Second, as the fuel mix changes, the net available capacity changes as well. For  
8 example, if the fuel mix is 100 percent natural gas, the available capacity would go down  
9 to 503 MW. However, under the formula above, the reference capacity may still be as  
10 high as 598 MW. Thus, the proposed PPA requires Xcel (and Xcel's ratepayers) to pay  
11 for significant levels of capacity that may not be available.

12  
13 **Q. Dr. Amit, do you propose changes to the monthly capacity payment formula?**

14 A. Yes, I do. Both the Reference Capacity (RC), and the Capacity Price (CP) should be  
15 related to the actual monthly fuel mix. Any increase in the natural gas component in the  
16 fuel mix should result in lower RC and CP levels in the monthly capacity payments  
17 formula.

18  
19 **Q. Dr. Amit, do you have any other concerns regarding the capacity cost component of  
20 the PPA's price?**

21 A. Yes, I do. The Capacity Price Component (CP) of the monthly capacity charge is  
22 proposed to be adjusted by the 10 year treasury index upon final certification of the EPC.  
23 Such certification may not happen prior to 2008. Based on forecasted treasury rates for

1 2008, the CP component of the capacity price will be adjusted by a factor of 1.0722  
2 (Schedule I of the PPA). Therefore, the CP component maybe as high as [TRADE  
3 **SECRET DATA HAS BEEN EXCISED**] per kW-month  
4 instead of [TRADE **SECRET DATA HAS BEEN EXCISED**]

5 Per kW-month. As in the case of the O&M cost component to be discussed later,  
6 the capacity charge is open-ended and the risk of potentially higher capacity charges is  
7 inappropriately shifted away from Excelsior to Xcel and its ratepayers.

8  
9 *3. Operation and Maintenance (O&M) Risks*

10 *a. Variable O&M*

11 **Q. Please discuss the O&M risks.**

12 A. The variable O&M cost recovery will be adjusted annually under the proposed PPA by  
13 the implicit price deflator for the gross domestic product, and is also subject to change  
14 every five years, starting from the beginning of the first year of commercial operation.  
15 Thus, Xcel and its ratepayers are fully responsible for the inflation risk and for the risk of  
16 increased variable O&M cost, every five years, due to Excelsior's management decisions.

17  
18 **Q. Is this risk allocation reasonable?**

19 A. No, it is not. First, the inflation risk should be shared by Excelsior and Xcel and its  
20 Ratepayers and should not be fully born by Xcel and its ratepayers. Second, the price  
21 component of the variable O&M should not be open-ended, as proposed by the PPA,  
22 because it is devoid of any financial incentive to minimize these costs and exposes Xcel  
23 and its ratepayers to inappropriate risks.





1 financial instruments such as letters of credit or escrow accounts to protect Xcel's  
2 ratepayers from the project's complete or partial liquidation.

3 To reasonably protect Xcel's ratepayers from the financial risks of the PPA, the  
4 Department recommends that the PPA include financial warranties to protect Xcel's  
5 ratepayers from event of dissolution or bankruptcy of the project.

6 3. The PPA includes the following specific provisions that inappropriately shift  
7 the risks away from Excelsior to Xcel and Xcel's ratepayers.

8 a. Fuel Risk

- 9 • Xcel and Xcel's ratepayers bear all the risk of higher-than-  
10 expected fuel costs due to changes in the fuel mix.
- 11 • When the fuel mix includes significant portions of natural gas  
12 (anything less than 100 percent), Xcel and Xcel's ratepayer  
13 would have to pay fuel charges that are too high and do not  
14 appropriately reflect the market cost of energy.

15 b. Capacity Payments Risks

- 16 • The capacity payment formula in the PPA results in inappropriate  
17 transfer of risk from Excelsior to Xcel and Xcel's ratepayers  
18 because:
  - 19 - The capacity price component, CP, does not vary with a  
20 significant fuel mix change; and
  - 21 - The reference Capacity Factor, CF does not vary with a  
22 significant fuel mix change which may reduce actual  
23 capacity significantly.

- The CP component is open-ended and shifts all the inflation risks to Xcel and Xcel's ratepayers.

c. O&M Risks

- The Variable and Fixed O&M cost recovery components of the proposed PPA are both open-ended and are fully adjusted annually by an inflation rate factor. Moreover, the O&M charges can change every five years, at the discretion of Excelsior. Therefore, the risk of higher O&M charges due to inflation or due to Excelsior's management decisions are inappropriately allocated solely to Xcel and Xcel's ratepayers.

#### **IV. FINANCIAL IMPLICATIONS OF THE PPA**

**Q. Please explain the issue of financial implications of the PPA.**

A. The cost of the PPA, which is a major component of the public interest determination, includes direct and indirect costs. The direct costs are measured by the price of the PPA. The indirect costs include, among other things, the additional financial costs that may be borne by Xcel directly and Xcel's ratepayers indirectly, as a result of the PPA. These costs may be very significant.

**Q. Please explain the type of financial costs that may be borne by Xcel and its ratepayers as a result of the PPA.**

A. There are two kinds of financial costs that may be borne by Xcel and its ratepayers as a result of the PPA: direct and indirect costs.

1 **Q. What are the direct costs?**

2 A. The direct costs are the payments that Xcel must make to Excelsior for the purchases of  
3 capacity and energy.

4

5 **Q. What are the indirect costs?**

6 A. The indirect costs are measured by the impacts of the PPA on Xcel's financial health.

7

8 **Q. Please explain.**

9 A. The proposed PPA requires Xcel to make monthly capacity payments for a 25-year  
10 period. Such payments have the same characteristics as a long-term debt payment  
11 obligation because the Company has a contractual obligation to pay Excelsior a fixed  
12 dollar amount for the next 25 years as long as the Excelsior plant performs according to  
13 the conditions set in the PPA.

14

15 **Q. Are these fixed payments considered long-term debt in the Company's balance**  
16 **sheets?**

17 A. No, they are not. However, credit rating agencies consider such payments to be  
18 equivalent to long-term debt and adjust the Company's credit rating to reflect such  
19 additional fixed payments obligations. Moreover, investors are well aware of such fixed  
20 payment obligations and adjust their risk valuation of the Company accordingly.

21

22 **Q. Dr. Amit, how are these fixed capacity payments converted into their debt**  
23 **equivalent value?**

1 A. Different credit rating companies may use different conversion methods. A reasonable  
2 way to convert fixed capacity payments is to calculate the Net Present Value (NPV) of  
3 these obligations for each year of the contract and then apply some adjustment factor  
4 between zero and 100 percent to those NPVs. The adjustment factor reflects the specific  
5 terms of the PPA. The less flexible the PPA terms are, the higher is the adjustment factor  
6 and the more the payments are like long-term debt.

7  
8 **Q. What is the general adjustment factor for Xcel for its existing PPAs?**

9 A. Standard and Poor (S&P), a well known credit rating company, applies a 30 percent  
10 adjustment factor to Xcel (i.e., 30 percent of Xcel's NPV obligations are converted into  
11 long-term debt).

12  
13 **Q. Dr. Amit, did you calculate the PPA's debt equivalent based on the S&P  
14 methodology?**

15 A. No, I did not. However, Xcel's witness, George E. Tyson, II filed testimony on this issue  
16 and provided an estimate of the PPA's debt-equivalent amount.

17  
18 **Q. What was his estimate of the debt-equivalent associated with the PPA?**

19 A. After applying a 50 percent adjustment factor, to account for the higher risks of this PPA  
20 as compared to the existing Xcel's PPA, Mr. Tyson estimated the imputed debt to be  
21 approximately \$1.9 billion.

1 **Q. Dr. Amit, do you agree with his estimate of \$1.9 billion of imputed debt?**

2 A. Yes, I do. Based on my review of his testimony, I conclude that Mr. Tyson's analysis  
3 and calculations are appropriate.  
4

5 **Q. Dr. Amit, what are the financial consequences of such additional debt-equivalent**  
6 **obligations for Xcel?**

7 A. The additional debt-equivalent obligations are very significant. Based on Xcel Energy's  
8 last rate case (Docket No. E002/GR-05-1428), its projected 2006 long-term debt is  
9 approximately \$1.9 billion. Therefore, the imputed long-term debt from the proposed  
10 PPA would double Xcel's long-term debt obligations.

11 As a result, Xcel's capital structure including the proposed PPA's imputed debt  
12 would be as follows:  
13

<u>Component</u>	<u>Percentage Capitalization</u>
Long-Term Debt	62.35%
Short-Term Debt	1.91%
Common Equity	35.74%

14  
15  
16  
17  
18  
19 The very high long-term debt ratio and the very low common equity ratio would  
20 significantly increase both Xcel's cost of common equity and cost of long-term debt.

21 Based on Mr. Tyson's testimony, Exhibit \_\_\_\_ (GET-1), Schedule 5, page 1,  
22 when including the PPA's imputed debt, Xcel's financial ratios for year-end 2006 would  
23 be:

Funds from Operations/Interest (FFO/Interest)	3.2 x
Funds from Operations/Debt (FFO/Debt)	18.2%
Debt/Total Capital	63.3%

1                   Based on S&P Credit Metrics, these financial ratios may result in a credit rating  
2 for Xcel of BB, which is considered speculative and would thus have serious financial  
3 effects on Xcel.  
4

5 **Q. How would the deterioration of Xcel's financial ratios impact Xcel's cost of service?**

6 A. It is hard to quantify the exact impact of the deteriorating financial ratios on Xcel's cost  
7 of service. However, it is reasonable to assume that both Xcel's cost of common equity  
8 and cost of long-term debt will increase significantly.  
9

10 **Q. Could Xcel mitigate the impacts of the increased imputed debt by issuing more**  
11 **shares of common stock?**

12 A. Xcel could issue additional common stock to restore its capital structure to the pre-PPA  
13 conditions. However, it will require a new common stock issuance of about \$1.9 billion.  
14 Such an issuance may significantly dilute Xcel's earning per share which would cause  
15 further deterioration of Xcel's financial position.  
16

17 **Q. Dr. Amit, please summarize the impact of the PPA on Xcel's financial situation.**

18 A. The PPA would result in a very significant increase in Xcel imputed debt (about \$1.9  
19 billion). This imputed long-term debt would double Xcel's existing long term debt. As a  
20 result, Xcel's credit rating may be significantly reduced. Moreover, Xcel's financial risk  
21 would be significantly increased. The lower credit rating and higher financial risk would  
22 significantly increase Xcel's cost of long term debt, cost of common equity and overall  
23 cost of capital. When considering the public interest associated with the proposed PPA,

1 these higher costs of capital and the negative financial impacts of the proposed PPA on  
2 Xcel should be considered as well.

3  
4 **V. SEQUESTRATION OF CARBON DIOXIDE (CO<sub>2</sub>)**

5 **Q. Dr. Amit, please explain the issue of sequestration of Carbon Dioxide (CO<sub>2</sub>).**

6 A. The IGCC technology allows pre-combustion capture and sequestration of CO<sub>2</sub> while  
7 conventional coal power plants only allow CO<sub>2</sub> reduction post combustion. Once the  
8 CO<sub>2</sub> is captured prior to combustion it must be stored or used (like to push oil to the  
9 surface) in an appropriate geological structure. The pre-combustion capture of CO<sub>2</sub> may  
10 allow significant reduction of CO<sub>2</sub> emissions in comparison to emission reductions from  
11 a conventional or supercritical coal plant.

12  
13 **Q. Does the proposed PPA include the cost of sequestration?**

14 A. No, it does not.

15  
16 **Q. Please explain.**

17 A. The plant proposed by Excelsior Energy does not include facilities or equipment to  
18 capture or sequester CO<sub>2</sub>. While the plant could accommodate such facilities and  
19 equipment in the future, Excelsior did not provide any specific plans regarding  
20 sequestration of CO<sub>2</sub>.

1 **Q. Why is sequestration such an important issue?**

2 A. The most significant potential environmental benefit of an IGCC plant versus a  
3 supercritical plant is the IGCC's potential of pre-combustion removal of CO<sub>2</sub>. Without  
4 sequestration of CO<sub>2</sub>, the environmental benefits of an IGCC plant over a supercritical  
5 plant may not be significant.

6  
7 **Q. Is it possible to estimate the cost of sequestration for Excelsior?**

8 A. It is possible to estimate sequestration costs for Excelsior. However, sequestration  
9 requires a specific plan that details the storage location, the length of pipeline to transport  
10 the CO<sub>2</sub>, the percentage of CO<sub>2</sub> to be captured and the equipment required for such  
11 sequestration. Absent such detailed plans, any estimate should be considered to be a very  
12 rough estimate.

13  
14 **Q. Are there any cost estimates available at this time?**

15 A. Yes. In response to Information Request No. 9 from IWLA, Fresh Energy and MCEA,  
16 Excelsior states that the cost of the pipeline needed to transport the captured CO<sub>2</sub> is  
17 approximately \$450 million in 1997 dollars. Additionally, the cost of equipment needed  
18 to capture the CO<sub>2</sub> is approximately \$360 million in 2000 dollars. Adjusting these  
19 estimates for annual inflation rate of 2.5 percent, the cost of sequestration in 2011 dollars  
20 would be:

21	Pipeline Cost:	$\$450 \times 1.412 = \$635.4$ million
22	Capital Equipment:	$\$360 \times 1.312 = \$472.3$ million
23	Total Sequestration Cost	= \$1.1077 billion



1 The coefficients 1.412 and 1.312 represent 14 years and 11 years inflation factors,  
2 respectively.

3  
4 **Q. Please provide the PPA's costs including the sequestration cost estimate.**

5 A. Table 4 summarizes the PPAs costs including sequestration.

6  
7 **Table 4: PPAs Costs Including Sequestration Costs**

8  
9

<u>Alternative</u>	<u>Average Sequestration Cost Per MWh</u>	<u>Average Total Cost Per MWh</u>	<u>Levelized Cost Per MWh</u>
Excelsior Energy			
West Site (603 MW)	\$9.29	\$115.38	\$107.09
East Site (598 MW)	\$9.55	\$125.61	\$116.27
West Site (450 MW)	\$12.58	\$145.56	\$135.83
East Site (450 MW)	\$12.58	\$156.35	\$145.72

10  
11  
12  
13  
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15  
16  
17

18 **Q. Please summarize your analysis of sequestration.**

19 A. Based on my review and analysis of Excelsior's filing I conclude that:

- 20
- Without sequestration of CO<sub>2</sub> the environmental benefits of the Excelsior  
21 proposed plant may not be significant in comparison to a supercritical coal  
22 plant.
  - Excelsior does not have any specific plans for sequestration of CO<sub>2</sub>.
  - Excelsior's PPA costs for the West or East sites and for 450 MW, 598 MW  
23 or 603 MW do not include sequestration costs.
  - Based on the information provided by Excelsior, the cost of sequestration  
24 may vary from over \$9 per MWh to over \$12.50 per MWh.  
25  
26  
27

1 **VI. CONCLUSION**

2 **A. GENERAL CONCLUSIONS**

- 3 1. The statues governing this PPA are Minn. Stat. 216B.1693 and 216B.1694.
- 4 2. The Commission provided guidance and directives, specifically; the following
- 5 questions should be developed in the record to recommend to the Commission
- 6 whether they should:
- 7 (1) approve, disapprove, amend or modify the terms and conditions of a proposed
- 8 power purchase agreement that Excelsior has submitted to Xcel Energy under
- 9 Minn. Stat. 216B.1694;
- 10
- 11 (2) determine that the coal-fueled Integrated Gasification Combined Cycle
- 12 (IGCC) power plant that Excelsior plans to construct in northern Minnesota is,
- 13 or is likely to be, a least cost resource, obligating Xcel to use the plant's
- 14 generation for at least two percent of the energy supplied to its retail
- 15 customers, under Minn. Stat 216B.1693; and
- 16
- 17 (3) determine that, under the terms of Minn. Stat. 216B.1693, at least 13% of the
- 18 energy supplied to Xcel's retail customers should come from the IGCC plant
- 19 by 2013.
- 20

21 **B. CONCLUSTIONS REGARDING THE PPAs**

- 22 1. Excelsior filed a PPA for 603 MW and the 450 MW amount cited in the statute.
- 23 Based on Excelsior's filing, the Department provides a cost analysis comparison for
- 24 both levels.
- 25
- 26 2. An evaluation of these PPAs should use the same criteria as used to evaluate other
- 27 PPA's. A PPA is in the public interest if:
- 28 (1) the ratepayers are appropriately protected from the operational risks associated
- 29 with the PPA;

- 1 (2) The ratepayers are appropriately protected from the financial risks of the PPA;  
 2 and  
 3 (3) The purchase price to be paid by Xcel for the electric energy and capacity is  
 4 reasonable, when considered in combination with other socioeconomic factors  
 5 that may be beneficial.  
 6 (4) Based on its review and analyses of the PPAs, the Department concludes that  
 7 Xcel's ratepayers are not appropriately protected from the financial and  
 8 business risks of the PPAs.  
 9 (5) The proposed PPAs would result in a very significant increase of Xcel's cost  
 10 of debt, cost of common equity and overall cost of capital.  
 11 (6) Table 5 below provides a summary of my cost (price) comparison analysis.

12 **Table 5: Cost (Price) Comparison Including Emission and Transmission Costs**

13

14

15

16 <u>Alternative</u>	17 <u>Average Price (\$/MWh)</u>	18 <u>Levelized Price (\$/MWh)</u>
19 Excelsior Energy		
20 West Site (603 MW)	106.09	97.80
21 East Site (598 MW)	116.06	106.72
22 West Site (450 MW)	132.98	123.25
23 East Site (450 MW)	143.77	133.14
24 Big Stone II Super Critical	82.77	78.76
25 Comanche 3 Super Critical	<b>[TRADE SECRET DATA HAS BEEN EXCISED]</b>	
26 Sherco 4 Super Critical	69.08	65.40

27

- 28 (7) Excelsior does not have specific plans for the sequestration of CO<sub>2</sub>. However,  
 29 based on the information provided by Excelsior, the cost of sequestration  
 30 would be significant. Table 6 below summarizes these estimated costs.

1 **Table 6: PPAs Costs Including Sequestration Costs, Emission Costs and Transmission Cost**

2

3

4

5

6

<u>Alternative</u>	<u>Average Sequestration Cost Per MWh</u>	<u>Average Total Cost Per MWh</u>	<u>Levelized Cost Per MWh</u>
Excelsior Energy			
West Site (603 MW)	\$9.29	\$115.38	\$107.09
East Site (598 MW)	\$9.55	\$125.61	\$116.27
West Site (450 MW)	\$12.58	\$145.56	\$135.83
East Site (450 MW)	\$12.58	\$156.35	\$145.72

7

8

9

10

11

12 **C. CONCLUSIONS REGARDING THE DETERMINATION OF WHETHER OR NOT THE**

13 **PROPOSED IGCC IS A LEAST-COST RESOURCE**

14 1. Based on my review and analysis of Excelsior’s proposed IGCC, I continue to

15 conclude that it does not meet the provisions of Minn. Stat. 216B.1693 as being

16 likely to be least-cost resource.

17

18 **Q. Dr. Amit, does this complete your testimony?**

19 A. Yes, it does.

		Excelsior average annual prices East Site						
YEAR	Revenues 1000 \$	generation 1000 MWh	Price par MWh	Npv (9.75%) of revenues	Levelized Factor	Levelized price	Npv (9.75%) Levelized price	
1	2	3	4	5	6	7	8	
1	2011	106234.70	782	135.85	106234.70	1.00	101.86	101.86
2	2012	429529.14	3231	132.94	391370.51	0.91	101.86	92.81
3	2013	441928.00	3700	119.44	366895.56	0.83	101.86	84.57
4	2014	455226.93	4203	108.31	344361.32	0.76	101.86	77.06
5	2015	467372.16	4644	100.64	322140.05	0.69	101.86	70.21
6	2016	470108.16	4608	102.02	295239.96	0.63	101.86	63.97
7	2017	470860.20	4596	102.45	269441.70	0.57	101.86	58.29
8	2018	475057.57	4691	101.27	247693.46	0.52	101.86	53.11
9	2019	478796.40	4644	103.10	227465.03	0.48	101.86	48.39
10	2020	482943.92	4633	104.24	209052.78	0.43	101.86	44.09
11	2021	486830.52	4644	104.83	192013.83	0.39	101.86	40.18
12	2022	490714.92	4596	106.77	176351.62	0.36	101.86	36.61
13	2023	494943.24	4596	107.69	162069.41	0.33	101.86	33.36
14	2024	500176.32	4704	106.33	149232.79	0.30	101.86	30.39
15	2025	504152.64	4644	108.56	137056.19	0.27	101.86	27.69
16	2026	508615.80	4620	110.09	125985.89	0.25	101.86	25.23
17	2027	513487.08	4644	110.57	115892.96	0.23	101.86	22.99
18	2028	518261.76	4608	112.47	106579.13	0.21	101.86	20.95
19	2029	522886.92	4596	113.77	97977.48	0.19	101.86	19.09
20	2030	528581.88	4691	112.68	90245.64	0.17	101.86	17.39
21	2031	533595.60	4644	114.90	83008.33	0.16	101.86	15.85
22	2032	539142.21	4633	116.37	76420.21	0.14	101.86	14.44
23	2033	544416.12	4644	117.23	70312.31	0.13	101.86	13.16
24	2034	549635.64	4596	119.59	64680.11	0.12	101.86	11.99
25	2035	555334.68	4596	120.83	59545.11	0.11	101.86	10.92
26	2036	421672.02	3531	119.42	41196.62	0.10	101.86	9.95
Average		480404.02	4335.35	112.01	174171.64	0.39	101.86	40.17
					Average price	110.81		
					Average NPV of price	40.17		

1. Source: Excelsior Energy's response to the DOC's Information Request No. 114
2. The discount rate is from the Economic Study in Big Stone II (Docket No. CON-05-619)
3. Average price =Average revenue/Average generation
4. Column 6 is the NPV of annual income stream of \$1
5. Column 7=(average of column 8)/(average of column 6)

Excelsior average annual prices  
West Site (450 MW)

	YEAR	Revenues 1000 \$	generation 1000 MWh	Price par MWh	Npv (9.75%) of revenues	Levelized Factor	Levelized price	Npv (9.75%) Levelized price
	1	2	3	4	5	6	7	8
1	2011	96857.64	594	163.06	96857.64	1	117.82	117.82
2	2012	389744.28	2454	158.82	355120.07	0.91	117.82	107.35
3	2013	394608.18	2811	140.38	327609.91	0.83	117.82	97.81
4	2014	401837.14	3194	125.81	303974.03	0.76	117.82	89.12
5	2015	411611.76	3528	116.67	283706.74	0.69	117.82	81.21
6	2016	409979.14	3502	117.07	257477.40	0.63	117.82	73.99
7	2017	411684.98	3493	117.86	235579.69	0.57	117.82	67.42
8	2018	421728.12	3564	118.33	219887.66	0.52	117.82	61.43
9	2019	420925.68	3528	119.31	199972.00	0.48	117.82	55.97
10	2020	422224.00	3520	119.95	182768.84	0.43	117.82	51.00
11	2021	423677.52	3528	120.09	167105.26	0.39	117.82	46.47
12	2022	426198.60	3492	122.05	153165.94	0.36	117.82	42.34
13	2023	429429.42	3493	122.94	140616.88	0.33	117.82	38.58
14	2024	440352.54	3574	123.21	131383.74	0.30	117.82	35.15
15	2025	439659.36	3528	124.62	119523.39	0.27	117.82	32.03
16	2026	441136.80	3510	125.68	109271.11	0.25	117.82	29.18
17	2027	446538.96	3528	126.57	100782.91	0.23	117.82	26.59
18	2028	446540.02	3502	127.51	91829.75	0.21	117.82	24.23
19	2029	450003.19	3493	128.83	84320.67	0.19	117.82	22.08
20	2030	461431.08	3564	129.47	78780.87	0.17	117.82	20.12
21	2031	461391.84	3528	130.78	71776.01	0.16	117.82	18.33
22	2032	463654.40	3520	131.72	65720.26	0.14	117.82	16.70
23	2033	469365.12	3528	133.04	60619.34	0.13	117.82	15.22
24	2034	469534.32	3492	134.46	55253.93	0.12	117.82	13.86
25	2035	473860.38	3493	135.66	50809.12	0.11	117.82	12.63
26	2036	365368.86	2682	136.23	35695.90	0.10	117.82	11.51
Average		418820.90	3293.96		153061.89	0.39	117.82	46.47
<b>Average price</b>						<b>127.15</b>		
<b>Average NPV of price</b>						<b>46.47</b>		

1. Source: Excelsior Energy's response to the DOC's Information Request No.14
- 2.The discount rate is from the economic study in Big Stone II (Docket No. CON-05-619)
- 3.Average price=Average revenue/Average generation
- 4.Column 6 is the NPV of annual income stream of \$1
- 5.Column 7=Average of column 8/average of column 6

Excelsior average annual prices  
East Site (450 MW)

	YEAR	Revenues 1000 \$	generation 1000 MWh	Price par MWh	Npv (9.75%) of revenues	Levelized Factor	Levelized price	Npv (9.75%) Levelized price
	1	2	3	4	5	6	7	8
1	2011	102600.86	593	173.02	102600.86	1	127.71	127.71
2	2012	429674.26	2542	169.03	391502.74	0.91	127.71	116.37
3	2013	424025.42	2807	151.06	352032.56	0.83	127.71	106.03
4	2014	434605.60	3190	136.24	328762.09	0.76	127.71	96.61
5	2015	444059.24	3524	126.01	306071.43	0.69	127.71	88.03
6	2016	446496.96	3497	127.68	280411.53	0.63	127.71	80.21
7	2017	447370.88	3488	128.26	256000.34	0.57	127.71	73.08
8	2018	450909.60	3560	126.66	235102.79	0.52	127.71	66.59
9	2019	454067.40	3524	128.85	215716.86	0.48	127.71	60.67
10	2020	457477.25	3515	130.15	198028.98	0.43	127.71	55.28
11	2021	460903.96	3524	130.79	181787.97	0.39	127.71	50.37
12	2022	464287.68	3488	133.11	166854.28	0.36	127.71	45.90
13	2023	467845.44	3488	134.13	153196.22	0.33	127.71	41.82
14	2024	472203.90	3570	132.27	140886.93	0.30	127.71	38.10
15	2025	475599.04	3524	134.96	129293.76	0.27	127.71	34.72
16	2026	479410.44	3506	136.74	118751.62	0.25	127.71	31.63
17	2027	483528.04	3524	137.21	109131.27	0.23	127.71	28.82
18	2028	487621.68	3497	139.44	100278.08	0.21	127.71	26.26
19	2029	491598.72	3488	140.94	92114.76	0.19	127.71	23.93
20	2030	496370.80	3560	139.43	84746.19	0.17	127.71	21.80
21	2031	500619.44	3524	142.06	77878.42	0.16	127.71	19.87
22	2032	505210.95	3515	143.73	71610.66	0.14	127.71	18.10
23	2033	507667.44	3524	144.06	65566.15	0.13	127.71	16.49
24	2034	514305.60	3488	147.45	60522.53	0.12	127.71	15.03
25	2035	519119.04	3488	148.83	55661.93	0.11	127.71	13.69
26	2036	393571.89	2679	146.91	38451.28	0.10	127.71	12.48
Average		454275.06	3293.35		165883.16	0.39	127.71	50.37
						<b>Average price</b>	<b>137.94</b>	
						<b>Average NPV of price</b>	<b>50.37</b>	

1. Source: Excelsior Energy's response to the DOC's Information Request No.14
- 2.The discount rate is from the economic study in Big Stone II (Docket No. CON-05-619)
- 3.Average price=Average revenue/Average generation
- 4.Column 6 is the NPV of annual income stream of \$1
- 5.Column 7=Average of column 8/average of column 6





**E6472/M-05-1993**

**In the Matter of a Petition by Excelsior Energy, Inc., ...  
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