

**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 Public Utilities Commission for a Route Permit for the Big Stone Transmission Project in Western Minnesota) **and**
) **OAH No. 12-2500-17038-2**
) **MPUC Dkt. No. TR-05-1275**
)

**Surrebuttal Statement of
David A. Schlissel
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 12, 2008

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

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

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

5 A. I am testifying on behalf of Fresh Energy, Izaak Walton League of America –
6 Midwest Office, Wind on the Wires, Union of Concerned Scientists, and
7 Minnesota Center for Environmental Advocacy (“Joint Intervenors”).

8 **Q. Have you testified previously in this Proceeding?**

9 A. Yes. I filed testimony in this proceeding on November 17 and 29, 2006,
10 December 21, 2007, and January 14, 2008.

11 **Q. What is the purpose of your supplemental statement?**

12 A. The purpose of this surrebuttal statement is to respond to the testimony filed by
13 the Applicants rebuttal witnesses on November 6, 2008.

14 **Assessment of Risks**

15 **Q. Do you agree with Boston Pacific’s conclusion that given the uncertainties**
16 **surrounding the nature and cost of CO₂ and other greenhouse gas**
17 **regulations, construction costs and future natural gas and coal prices, “all**
18 **resource options must be assessed under a range of futures to assure**
19 **ratepayers will get the best deal possible no matter how the future unfolds?”¹**

20 A. Yes.

¹ Boston Pacific Report, at page 3.

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1 **Q. Have the Big Stone II Applicants presented any evidence that they have**
2 **assessed their resource options under a reasonable range of future CO₂**
3 **prices, construction costs and natural gas and coal prices?**

4 A. No. As I have previously testified, the Big Stone II Applicants have not
5 considered reasonable ranges of future CO₂ prices and power plant construction
6 costs in their analyses. For example, except for MDU, the Applicants considered
7 at most a \$9/ton CO₂ emissions price in their modeling analyses. MDU did not
8 assume any CO₂ emissions price in its modeling analyses.

9 **Q. Do you have any comment on Boston Pacific's observation that to actually**
10 **manage risks it would go beyond assessing risk to actually assigning it to a**
11 **party able to do something about it?**²

12 A. Yes. I agree with Boston Pacific's observation. If Otter Tail Power actually has
13 confidence in its currently projected Big Stone II construction cost and its view of
14 likely future CO₂ costs, the company would be willing to bear the risk that
15 construction costs and CO₂ costs are higher than it now claims. But Otter Tail
16 Power clearly does not have confidence in its own cost estimates because it is
17 unwilling to bear those risks. Instead, it would have the Minnesota Commission
18 grant it a blank check and allow the Company to pass all of the risks associated
19 with the Big Stone II project onto its ratepayers.

20 **Q. Have you seen any recent instances where state regulatory commissions have**
21 **rejected proposed power plants because of the risks associated with federal**
22 **regulation of greenhouse gases or rising construction costs or have assigned**
23 **some of those risks to the plant's proponents?**

24 A. Yes. In April of this year, the Virginia State Corporation Commission rejected a
25 proposed integrated gasification combined cycle ("IGCC") coal plant citing

² Id., at page 4.

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1 uncertainties of costs, technology, and unknown federal mandates.³ The
2 Commission found that the Company’s (APCo) cost estimate for project was “not
3 credible” -- it had not been updated since November 2006.⁴

4 The Commission also concluded that “... APCo has no fixed price contract for
5 any appreciable portion of the total construction costs; there are no meaningful
6 price or performance guarantees or controls for this project at this time. This
7 represents an extraordinary risk that we cannot allow the ratepayers of Virginia in
8 APCo’s service territory to assume.”⁵

9 It also noted the uncertainties surrounding federal regulation of carbon emissions
10 and carbon capture and sequestration technology and costs and observed that the
11 Company was asking for a “blank check.”⁶ On this basis, the Commission
12 concluded that “We cannot ask Virginia ratepayers to bear the enormous costs –
13 and potentially huge costs – of these uncertainties in the context of the specific
14 Application before us.”⁷

15 In July 2008, the Texas PUC placed a cap on the construction costs and the CO2
16 emissions allowance costs that the Southwestern Electric Power Company
17 (“SWEPCO”) can recover from its Texas ratepayers for its share of the proposed
18 Turk coal-fired power plant. For example, the Texas PUC noted the following
19 concerning plant capital costs:

20 The estimated cost of the Turk Plant, with September 2008 as the
21 anticipated start of construction, is \$1.522 billion. The
22 Commission determines that it is unreasonable to expect Texas
23 retail consumers to be responsible for the Texas jurisdictional
24 allocation of any additional costs that exceed \$1.522 billion. This
25 cap on the capital costs of the Turk Plant limits the financial risk to
26 Texas ratepayers arising out of uncertainties identified in the

³ Final Order in Case No. PUE-2007-00068, April 14, 2008. Available at
http://scc.virginia.gov/newsrel/e_apfrate_08.aspx.

⁴ Id., at pages 4 to 5.

⁵ Id., at page 5.

⁶ Id., at page 10.

⁷ Id., at page 10.

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1 testimony including, but not limited to, the following: increased
2 material and labor costs because of delays; costs as a result of
3 changes in certification or approval of the Turk Plant by other
4 jurisdictions; changes in the currently proposed ownership
5 participation; and additional costs of plant construction, including
6 those associated with the use of ultra-supercritical technology.⁸

7 The Commission similarly capped the carbon mitigation costs that Texas
8 ratepayers would have to bear:

9 The Commission carefully studied the various price tags for carbon
10 mitigation in the record that may be attributable to the energy
11 generated from the Turk Plant. The amounts range from as low as
12 \$13 to \$15 per ton of CO₂ emissions to as high as \$70 per ton. The
13 average numbers for a coal plant range from \$40 to \$45 per ton.
14 The lower numbers in this vast range are predictions of allowances
15 to be mandated in the early phases of federal regulations on carbon
16 dioxide emissions, growing to the larger numbers where the trade-
17 off between a carbon “tax” and the implementation of carbon
18 sequestration and capture technologies on coal and gas plants
19 would occur sometime in the future. Based on these estimates and
20 predictions, the Commission seeks to place a limit on the extent to
21 which the Turk Plant’s costs of carbon mitigation will be passed on
22 to Texas retail ratepayers. It is unreasonable to expect the retail
23 ratepayers to be responsible for these costs that exceed \$28 per ton
24 of CO₂ emissions through the year 2030. To the extent that carbon
25 legislation or implementation of mitigation technology results in
26 costs that exceed that amount per ton, those costs shall not be
27 borne by Texas ratepayers.⁹

28 **Greenhouse Gas Regulation**

29 **Q. Do you agree with Boston Pacific’s conclusion that resource choices must be**
30 **assessed over a range of possible future CO₂ prices?**

31 **A. Yes.**

⁸ August 12, 2008 Order in Texas Public Utility Commission Docket No. 33891, at page 6.

⁹ Id., at page 7.

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1 **Q. Do you agree with the range of CO₂ emissions prices (or taxes) that Boston**
2 **Pacific recommends be used to analyze resource choices?**

3 A. Yes. In general, I agree with the range of CO₂ emissions prices recommended by
4 Boston Pacific except that the low end of that range (\$8/ton in 2012, escalating at
5 the rate of inflation) is too low and would not reduce greenhouse gas emissions in
6 the amounts and the time that the scientific community agrees is necessary to
7 avoid the most harmful impacts of climate change.

8 **Q. How does the range of CO₂ emissions prices that Boston Pacific recommends**
9 **compare to Synapse's currently recommended range of CO₂ prices?**

10 A. This past July, Synapse revised the range of CO₂ emissions prices that we
11 recommend be used in resource planning. The new 2008 Synapse Low CO₂ Price
12 Forecast starts at \$10/ton in 2013, in 2007 dollars, and increases to approximately
13 \$23/ton in 2030. This represents a \$15/ton levelized price over the period 2013-
14 2030, in 2007 dollars.

15 The new 2008 Synapse High CO₂ Price Forecast starts at \$30/ton in 2013, in 2007
16 dollars, and rises to approximately \$68/ton in 2030. This High Forecast represents
17 a \$45/ton levelized price over the period 2013-2030, also in 2007 dollars.

18 Synapse also has prepared a new 2008 Mid CO₂ Price Forecast that starts close to
19 the low case, at \$15/ton in 2013 in 2007 dollars, but then climbs to \$53/ton by
20 2030. The levelized cost of this mid CO₂ price forecast is \$30/ton in 2007 dollars.

21 In levelized terms, the two ranges of CO₂ emissions prices, that is, Boston Pacific
22 and Synapse, are reasonably consistent. In levelized terms, Boston Pacific's range
23 of recommended CO₂ emissions prices is between a low end of \$7.07/ton, in 2007
24 dollars, to a high end of \$53.03/ton, also in 2007 dollars. In levelized terms,
25 Synapse's recommended CO₂ emissions prices are between \$15/ton and \$45/ton,
26 all in 2007 dollars.

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1 **Q. Please explain why Synapse decided to revise the range of CO₂ prices that it**
2 **recommends be used in resource planning.**

3 A. Significant developments in the past two years led Synapse to re-examine and
4 revise the CO₂ price forecasts we had developed in 2006 to ensure that these
5 forecasts reflect an appropriate level of financial risk associated with greenhouse
6 gas emissions.¹⁰ Most importantly, the political support for serious climate change
7 legislation has expanded significantly in Federal and State governments, as well
8 as in the public at large, as the scientific evidence of climate change has become
9 more certain. Concurrently, the new greenhouse gas regulation bills under
10 consideration in the 110th U.S. Congress contain emissions reductions that are
11 significantly more stringent than would have been required by proposals
12 introduced in earlier years. Moreover, an increasing number of states have
13 adopted policies, either individually and/or as members of regional coalitions, to
14 reduce greenhouse gas emissions. In addition, in the past two years, additional
15 information has been developed regarding technology innovations in the areas of
16 renewables, energy efficiency, and carbon capture and sequestration, leading to
17 greater clarity about the cost of emissions mitigation; however, cost estimates for
18 many of these technologies are still in the early stages. Taken together these
19 developments lead to higher financial risks associated with future greenhouse gas
20 emissions and justify the use of higher projected CO₂ emissions allowance prices
21 in electricity resource planning and selection for the period 2013 to 2030.

22 **Q. How do the CO₂ prices recommended by Synapse and Boston Pacific for use**
23 **in resource planning compare to other analyses of future CO₂ costs?**

24 A. As part of our work at Synapse we have reviewed the results of the modeling
25 analyses that have been undertaken to evaluate the CO₂ emissions allowance
26 prices that likely would result from the adoption and implementation of the major

¹⁰ See the July 2008 report *Synapse 2008 CO₂ Price Forecasts*, a copy of which is attached as Joint Intervenors Exhibit JI-50-A, at pages 3 through 10.

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1 greenhouse gas regulatory legislation that has been introduced in the current U.S.
2 Congress. These modeling analyses include:

- 3 • The Energy Information Administration of the U.S. Department of
4 Energy's ("EIA") assessment of the *Energy Market and Economic*
5 *Impacts of S. 280, the Climate Stewardship and Innovation Act of 2007*
6 (July 2007).¹¹
- 7 • The October 2007 Supplement to the EIA's assessment of the *Energy*
8 *Market and Economic Impacts of S. 280, the Climate Stewardship and*
9 *Innovation Act of 2007*.¹²
- 10 • The EIA's assessment of the *Energy Market and Economic Impacts of S.*
11 *1766, the Low Carbon Economy Act of 2007* (January 2008).¹³
- 12 • The EIA's assessment of the *Energy Market and Economic Impacts of S.*
13 *2191, the Lieberman-Warner Climate Security Act of 2007* (April 2008).¹⁴
- 14 • The U.S. Environmental Protection Agency's ("EPA") *Analysis of the*
15 *Climate Stewardship and Innovation Act of 2007 – S. 280 in 110th*
16 *Congress* (July 2007).¹⁵
- 17 • The EPA's *Analysis of the Low Carbon Economy Act of 2007 – S. 1766 in*
18 *110th Congress* (January 2008).¹⁶
- 19 • The EPA's *Analysis of the Lieberman-Warner Climate Security Act of*
20 *2008 – S. 2191 in 110th Congress* (March 2008).¹⁷
- 21 • *Assessment of U.S. Cap-and-Trade Proposals* by the Joint Program at the
22 Massachusetts Institute of Technology ("MIT") on the Science and Policy
23 of Global Change (April 2007).¹⁸
- 24 • *Analysis of the Cap and Trade Features of the Lieberman-Warner Climate*
25 *Security Act – S. 2191* by the Joint Program at MIT on the Science and
26 Policy of Global Change (April 2008).¹⁹

11 Available at [http://www.eia.doe.gov/oiaf/servicerpt/csia/pdf/sroiaf\(2007\)04.pdf](http://www.eia.doe.gov/oiaf/servicerpt/csia/pdf/sroiaf(2007)04.pdf).

12 Available at http://www.eia.doe.gov/oiaf/servicerpt/biv/pdf/s280_1007.pdf

13 Available at [http://www.eia.doe.gov/oiaf/servicerpt/lcea/pdf/sroiaf\(2007\)06.pdf](http://www.eia.doe.gov/oiaf/servicerpt/lcea/pdf/sroiaf(2007)06.pdf)

14 Available at [http://www.eia.doe.gov/oiaf/servicerpt/s2191/pdf/sroiaf\(2008\)01.pdf](http://www.eia.doe.gov/oiaf/servicerpt/s2191/pdf/sroiaf(2008)01.pdf).

15 Available at <http://www.epa.gov/climatechange/economics/economicanalyses.html>.

16 Available at <http://www.epa.gov/climatechange/economics/economicanalyses.html>.

17 Available at <http://www.epa.gov/climatechange/economics/economicanalyses.html>.

18 Available at http://web.mit.edu/globalchange/www/MITJPSPGC_Rpt146.pdf.

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

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- 1 • *The Lieberman-Warner America’s Climate Security Act: A Preliminary*
2 *Assessment of Potential Economic Impacts, prepared by the Nicholas*
3 *Institute for Environmental Policy Solutions, Duke University and RTI*
4 *International (October 2007)*²⁰
- 5 • *U.S. Technology Choices, Costs and Opportunities under the Lieberman-*
6 *Warner Climate Security Act: Assessing Compliance Pathways, prepared*
7 *by the International Resources Group for the Natural Resources Defense*
8 *Council (May 2008).*²¹
- 9 • *The Lieberman-Warner Climate Security Act – S. 2191, Modeling Results*
10 *from the National Energy Modeling System – Preliminary Results, Clean*
11 *Air Task Force (January 2008).*²²
- 12 • *Economic Analysis of the Lieberman-Warner Climate Security Act of 2007*
13 *Using CRA’s MRN-NEEM Model, CRA International, April 2008.*²³
- 14 • *Analysis of the Lieberman-Warner Climate Security Act (S. 2191) using*
15 *the National Energy Modeling System (NEMS/ACCF/NAM), a report by*
16 *the American Council for Capital Formation and the National Association*
17 *of Manufacturers, NMA, March 2008.*²⁴

18 In total, these modeling analyses examined more than 75 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
22 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;
26 and the presence or absence of a “safety valve” price.

27 The results of these modeling analyses are presented in Figures 1 and 2 below,
28 along with the CO₂ prices recommended by Synapse and Boston Pacific. Figure 1
29 presents the annual CO₂ prices, in 2007 dollars, from the scenarios in each

²⁰ Available at <http://www.nicholas.duke.edu/institute/econsummary.pdf>.

²¹ Available at http://docs.nrdc.org/globalwarming/glo_08051401A.pdf.

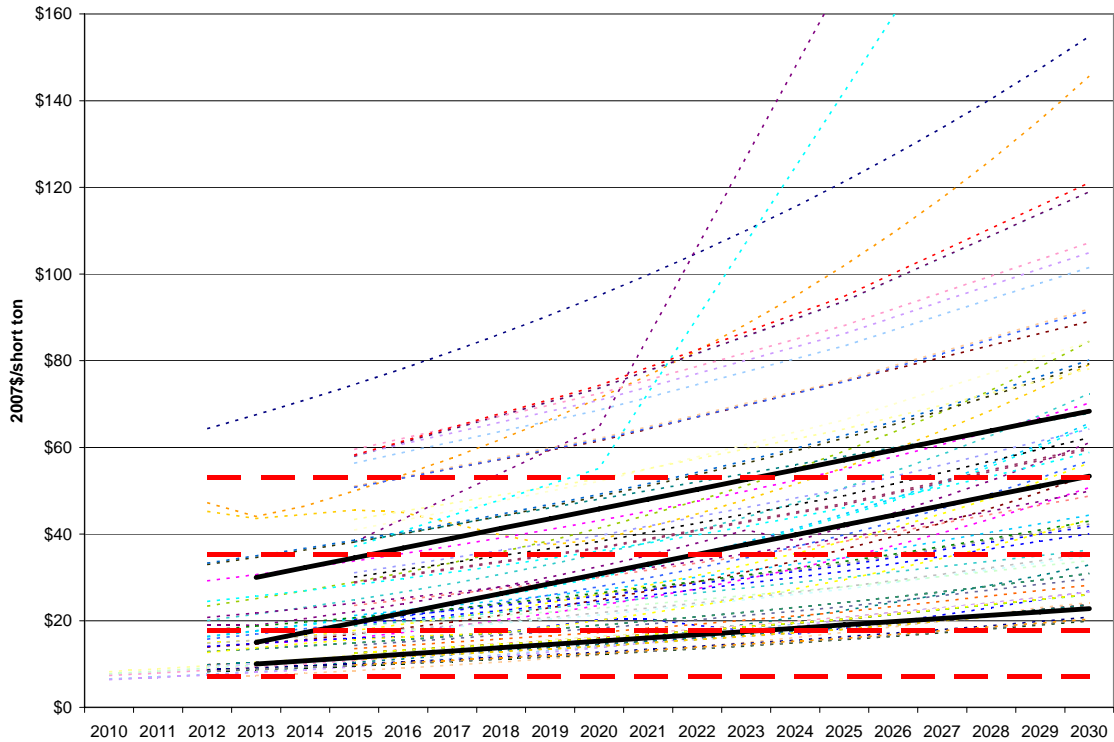
²² Available at <http://lieberman.senate.gov/documents/catflwca.pdf>.

²³ Available at http://www.nma.org/pdf/040808_crai_presentation.pdf.

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1 modeling analysis. Figure 2 then presents the ranges of levelized CO₂ prices
2 developed in each modeling analysis.

3 **Figure 1: CO₂ Prices Recommended by Synapse and Boston Pacific vs.**
4 **Results of Modeling Analyses of Major Bills in Current U.S.**
5 **Congress – Annual CO₂ Prices (in 2007 dollars)**

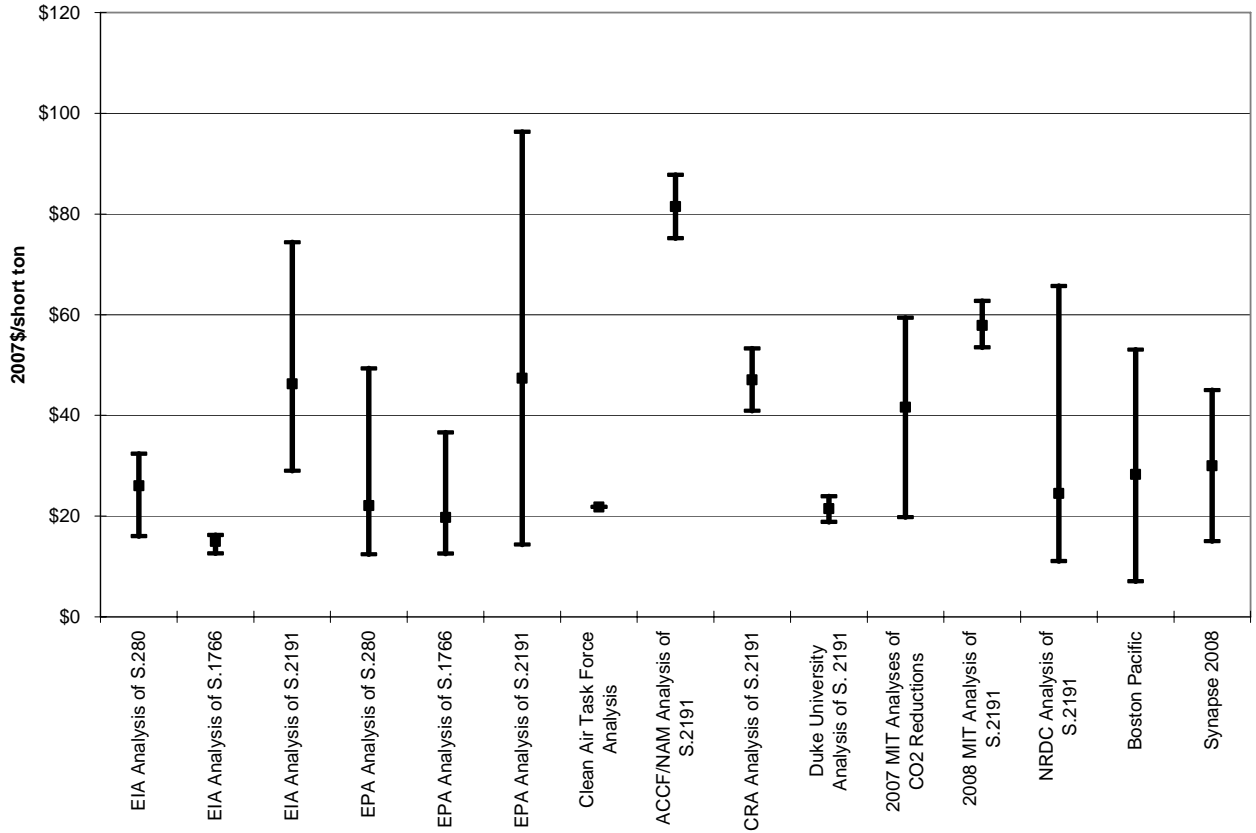


6
7 Boston Pacific's recommended CO₂ emissions prices are the horizontal dashed
8 lines in Figure 1. Synapse's recommended CO₂ emissions prices are the solid
9 lines.

²⁴ Available at <http://www.accf.org/pdf/NAM/fullstudy031208.pdf>.

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1 **Figure 2: CO₂ Prices Recommended by Synapse and Boston Pacific vs.**
 2 **Results of Modeling Analyses of Major Bills in Current U.S.**
 3 **Congress – Levelized CO₂ Prices (2013-2030, in 2007 dollars)**



4
 5 As can be seen, the ranges of CO₂ prices recommended by Synapse and Boston
 6 Pacific are very reasonable compared to the full range of CO₂ emissions
 7 allowance prices that could result from adoption of the major greenhouse gas
 8 regulatory legislation that has been introduced in the current U.S. Congress. In
 9 fact, there are a significant number of possible scenarios where CO₂ emissions
 10 allowance prices could be substantially higher than the high ends of the price
 11 ranges that Synapse and Boston Pacific have recommended be used in resource
 12 planning assessments.

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1 **Q. What is the likely effect of the recent presidential and congressional elections**
2 **on the prospects for federal CO₂ emissions regulation?**

3 A. Although it is obviously far too early to make any definitive predictions, it
4 certainly does appear that the new President and the new Congress will seek to
5 expeditiously take aggressive actions to address the threat of climate change.

6 For example, during a January 2008 with the San Francisco Chronicle newspaper,
7 Senator Obama described his overall policy towards regulation of CO₂ emissions:

8 EDITORIAL WRITER: Senator, you introduced a bill promoting
9 coal-conducted fuels, and then you said you'd only support them if
10 they emitted fewer greenhouse gases in gasoline. Now, all the
11 scientific evidence points to coal being dirtier than pretty much
12 anything else, so how are you going to score your support for coal
13 with the need to fight global warming?

14 OBAMA: Well, I've already – I've already done it. You know I
15 voted against the Clear Skies bill – in fact, I was the deciding vote.
16 Despite the fact that I'm a coal state, and that half of my state
17 thought I'd thoroughly betrayed them, because I think clear air is
18 critical, and global warming is critical. But, this notion of no coal, I
19 think is an illusion. Because the fact of the matter is, is that, right
20 now, we are getting a lot of our energy from coal, and China's
21 building its coal-power plant once a week. So, what we have to do,
22 then, is we have to figure out how we can use coal without
23 emitting greenhouse gases and carbon, and how we can sequester
24 that carbon and capture it. If we can't, then, you know, we're
25 gonna still be working on alternatives.

26 EDITORIAL WRITER: Alternatives including coal, or what?

27 OBAMA: Let me sort of describe my overall policy. I mean, what
28 I've said is that we would put a cap-and-trade system in place that
29 is more – that is as aggressive, if not more aggressive, than
30 anybody else's out there. I was the first to call for a 100 percent
31 auction on the cap-and-trade system, which means that every unit
32 of carbon or greenhouse gases was emitted would be charged to
33 the polluter. That will create a market in which whatever
34 technologies are out there that are being presented, whatever power
35 plants that are being built, that they would have to meet the rigors

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1 of that market and the ratcheted-down caps that are placed --
2 imposed every year.

3 So, if somebody wants to build a coal power plant, they can. It's
4 just that, it will bankrupt them because they're going to be charged
5 a huge sum for all that greenhouse gas that's being emitted. That
6 will also generate billions of dollars that we can invest in solar,
7 wind, biodiesel, and other alternative energy approaches. The only
8 thing that I've said, with respect to coal – I haven't been some coal
9 booster – what I have said is, that, for us to take coal off the table
10 as an ideological matter, as opposed to saying, if technology allows
11 us to use coal in a clean way, we should pursue it. You, that I think
12 is the right approach.²⁵

13 More recently, in October 2008, one of Senator Obama's senior energy advisors,
14 Jason Grumet told Bloomberg that, if elected, he would "move quickly" to
15 address climate change.²⁶ Grumet further said that Senator Obama would classify
16 carbon dioxide as a dangerous pollutant that can be regulated should he win the
17 election on November 4th, which he has now done, opening the way for new rules
18 on greenhouse gas emissions. In particular, President Obama would direct the
19 Environmental Protection Agency to initiate rulemakings under the 1990 Clean
20 Air Act to set emissions limits on power plants and manufacturers.

21 **Q. The Boston Pacific Report references the market clearing prices for CO₂**
22 **emissions obtained in the recent Regional Greenhouse Gas Initiative**
23 **("RGGI") auction.²⁷ Do the results of the recent RGGI CO₂ emissions**
24 **allowance auction provide any significant insights into what the prices of**
25 **CO₂ emissions allowances would be in a nationwide cap-and-trade system?**

26 **A.** No. There are several reasons why the results of the recent RGGI auction of
27 emissions allowances are not instructive as to what emissions prices would be
28 under a federal cap-and-trade program. Allowance prices under a cap and trade

²⁵ See <http://mediamatters.org/items/200811030006> and
<http://www.youtube.com/watch?v=IEU1ElkjLE&feature=related>.
²⁶ http://www.bloomberg.com/apps/news?pid=20601087&sid=a2RHIj_6hvV0&refer=home
²⁷ Boston Pacific Report, at page 9.

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1 program will be affected by many factors, such as geographic scope, sector
2 coverage, stringency, use of flexibility mechanisms, portfolio of policy tools, and
3 technological innovation. The RGGI program differs from a likely federal
4 program in many ways such as those described below.

5 First, the RGGI program is limited in geography and in coverage. The RGGI
6 states are adjacent geographically to regions that currently do not have carbon
7 constraints -- for example, Pennsylvania, Ohio and Virginia. Generators in those
8 regions can sell electricity into RGGI, diluting the effectiveness of the emissions
9 cap. Further, the RGGI cap applies only to the electric sector, not multiple
10 sectors. These factors would lower the cost of emissions allowances below what
11 they would be in a more comprehensive program. Most legislative proposals for a
12 federal program have been more expansive, covering the entire nation as well as
13 multiple sectors; and any federal program that is enacted can be expected to be
14 broad in geography and coverage.

15 Second, the baseline cap under the RGGI agreement was initially set at “current”
16 emissions, defined as the highest of 2000 to 2004, and budgets were set
17 approximately 2-4% higher than actual current emissions. Legislative proposals
18 for a federal program have all included more stringent long-term emission
19 reduction targets than those contained in RGGI, and the trend in legislative
20 proposals is toward greater stringency. Any meaningful federal cap-and-trade
21 program is likely to include more aggressive emissions limits than those
22 contained in RGGI. Allowance prices under a more aggressive emission
23 reduction target will be higher than those under a less aggressive emission
24 reduction target, all other things being equal.

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1 **Q. Do you agree with Boston Pacific’s observation that the use of a \$30/ton CO₂**
2 **price in one of Applicant witness Grieg’s levelized busbar analyses was a**
3 **“good step forward but did not go far enough?”²⁸**

4 A. No. I certainly do support the use of a \$30/ton CO₂ price as being within a
5 reasonable range of possible future CO₂ emissions prices. However, Mr. Grieg’s
6 analysis was heavily biased in favor of Big Stone II by a number of assumptions
7 such as the use of a \$30/ton CO₂ price that was flat in nominal terms (that is, did
8 not increase over time) and the assumption that a \$30/ton CO₂ price would
9 increase natural gas prices by 17 percent. Thus, I can’t agree that Mr. Grieg’s
10 analyses represented a “good step forward.”

11 **Construction Costs**

12 **Q. Do you agree with Boston Pacific’s conclusion that the Applicants’ latest**
13 **construction cost estimate is below even the low end of a reasonable range of**
14 **installed costs for a new coal-fired facility?²⁹**

15 A. Yes.

16 **Q. Do you have any comment on Boston Pacific’s estimate that the possible**
17 **range of installed costs for a new coal-fired facility would be from \$2,600 per**
18 **kW to \$3,000 per kW?³⁰**

19 A. Yes. As shown in Table 1 below, the most recent evidence shows that the current
20 construction cost estimates for some proposed coal-fired power plants have been
21 significantly above \$3,000 per kW. Based on this evidence, it reasonable to
22 expect that the cost of building the Big Stone II Project might reach or exceed
23 \$3,500 per kW instead of the \$3,000 per kW high end recommended by Boston
24 Pacific.

²⁸ Boston Pacific Report, at page 5.

²⁹ Boston Pacific Report, at pages 5-6.

³⁰ Boston Pacific Report, at pages 5 to 6.

Joint Intervenors Exhibit JI-50
Cases OAH No. 12-2500-17037-2, MPUC Dkt No. CN-05-619 and
OAH No. 12-2500-17038-2, MPUC Dkt. No. TR-05-1275
Rebuttal Testimony of David A. Schlissel

1 **Table 1: Recent Coal Power Plant Construction Cost Estimates (in**
2 **nominal dollars, without financing costs)**

Plant	Owner	Date of Estimate	Total Cost (Billions)	Size (MW)	Announced Cost/kW	Cost/kW Scaled to 500 MW Plant Size
Big Stone II	OTP, MDU, CMMPA, MRES, Heartland	June-06	\$1.27	500	\$2,545	\$2,540
Karn-Weadock	Consumers Energy	September-07	\$2.21	800	\$2,765	\$3,184
Turk	SWEPCO	Spring-08	\$1.52	600	\$2,537	\$2,679
Meigs County	AMP-Ohio	October-08	\$3.26	960	\$3,394	\$4,127
Marshalltown	Iowa Power & Light	September-08	\$2.23	630	\$3,538	\$3,792
Nelson Dewey 3	Wisconsin Power & Light	September-08	\$1.26	326	\$3,865	\$3,400
Columbia 3	Wisconsin Power & Light	September-08	\$1.28	326	\$3,936	\$3,462

3
4 Consumers Energy’s proposed Karn-Weadock unit and SWEPCO’s Turk unit are
5 the only power plants in Table 1, other than Big Stone II, with estimated
6 construction cost of less than \$3,394 per kW. However, I understand that
7 SWEPCO already has purchased the equipment and many of the materials for the
8 Turk Plant – therefore, its cost is not expected to increase as much as the costs of
9 plants, like Big Stone II, that are not as far advanced in the contract and
10 purchasing process. Also, the Consumers Energy Company has told the Michigan
11 PSC that the estimated cost of its proposed Karn-Weadock plant has increased
12 above \$2,795 per kW and that a new cost estimate will be released early next
13 year.

14 The estimated costs of the other plants are all in the range of \$3,394 to \$3,936 per
15 kW, in as-spent nominal year dollars.

16 **Q. Just to be clear, are all of the plant costs in Table 1 on the same basis as the**
17 **range of possible coal plant construction costs discussed by Boston Pacific?**

18 A. Yes. The plant costs in Table 1 are in nominal year dollars and include escalation
19 but not financing costs.

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1 **Q. What types of coal-fired power plants are included in Table 1?**

2 A. The proposed Marshalltown, Meigs County, Turk and Karn-Weadock plants
3 would be supercritical units. The Nelson Dewey 3 plant would be a circulating
4 fluid bed unit. The Columbia 3 plant would be a subcritical unit.

5 **Q. Where in the U.S. would these plants be located?**

6 A. The Marshalltown plant would be located about 60 miles northeast of Des
7 Moines, IA. The Nelson Dewey and Columbia plants would be located in
8 southwestern Wisconsin. The Meigs County plant would be located in
9 southeastern Ohio. The Karn-Weadock plant would be located in western
10 Michigan. And the Turk Plant would be located in southwestern Arkansas.

11 **Q. Have any of the plants listed in Table 1 actually begun construction?**

12 A. I believe not except that SWEPCO has said that it was planning to begin
13 construction of the Turk Plant this fall.

14 **Q. Please explain why you have included a column for “size adjusted cost” in**
15 **Table 1.**

16 A. It is generally accepted that there are economies of scale in the construction of
17 power plants such that the per kW costs of larger will be lower than the per kW
18 costs of building smaller power plants. I have presented “size-adjusted” costs for
19 each of the power plants in Table 1 to show that, except for the Turk and Karn-
20 Weadock plants, the estimated construction costs would still be significantly
21 higher than \$3,000 per kW if they were being proposed as 500 MW units, that is,
22 the same size as Big Stone II. This evidence supports my conclusion that it
23 reasonable to expect that the cost of building a new 500 MW pulverized coal plant
24 like Big Stone II will reach or exceed \$3,500 per kW.

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1 In making these cost adjustments I have used the EPRI formula presented by
2 Applicant witness Rolfes in his April 23, 2008 Prefiled Rebuttal Testimony before
3 the North Dakota Public Service Commission.³¹

4 **Q. Have you seen any other significant evidence concerning recent increases in**
5 **estimated coal-fired power plant construction costs?**

6 A. Yes. Many power plant construction projects have announced cost increases and
7 schedule delays in the past couple of years.³²

8 The cost increases announced for two of these projects, in particular, suggest that
9 even plants that are much further along in the design, procurement and
10 construction process than Big Stone II are not immune to rising costs. For
11 example, in April 2008, Duke Energy Indiana announced an 18 percent increase
12 in the estimated cost of its proposed Edwardsport IGCC coal plant just since the
13 spring of 2007. Duke indicated that higher than expected costs had been
14 experienced when the Company actually began final procurement of equipment
15 for the plant. Duke also said that “the increase in the cost estimate is driven by
16 factors outside the Company’s control, including unprecedented global
17 competition for commodities, engineered equipment and materials, and increased
18 labor costs.”³³ Duke also noted in its Petition to the Indiana Utility Regulatory
19 Commission that this projected increase in cost “is consistent with other recent
20 power plant project cost increases across the country.”³⁴

21 At the same time, Kansas City Power & Light recently announced a 15 percent
22 price increase for the Iatan 2 power plant that has been under construction for
23 several years and is scheduled to be completed by 2010. The company also has

³¹ Prefiled Rebuttal Testimony of Mark Rolfes, North Dakota Public Service Commission Case Nos. PU-06-481 and PU-06-482, at pages 2 and 3.

³² See the July 2008 *Coal-Fired Power Plant Construction Cost Report*, included as Joint Intervenors Exhibit JI-50-B.

³³ Verified Petition in Indiana Utility Regulatory Commission Cause No. 43114 IGCC-1, filed on May 1, 2008, at pages 3-4

³⁴ Id., at page 7.

Joint Intervenors Exhibit JI-50
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1 announced that it may have to increase the cost estimate again after further
2 engineering review is completed. This example shows that even coal-fired power
3 plants that are under construction are not immune to further cost increases.

4 **Q. What is your conclusion concerning the coal construction costs that are**
5 **prudent for the Big Stone II Applicants to use in their resource planning**
6 **analyses?**

7 A. Given the announced prices of comparable pulverized coal power plants
8 scheduled to be built in the same relative geographical region of the country and
9 in the same relative timeframe, I believe it is reasonable at this time to expect that
10 the construction cost of the Big Stone II plant could increase to as high as \$3,500
11 per kW or even higher (perhaps to \$3,700 to \$4,000 per kW).

12 **Q. Do you agree with the ranges of natural gas and wind power plant**
13 **construction costs that Boston Pacific has recommended by used in resource**
14 **planning analyses?**³⁵

15 A. Yes.

16 **Relationship Between Greenhouse Gas Regulation and Natural Gas**
17 **Prices**

18 **Q. Boston Pacific has discussed the possible impact of climate change legislation**
19 **on natural gas costs.**³⁶ **What impact does Synapse believe the enactment of**
20 **CO₂ emissions regulations could have on natural gas prices?**

21 A. It is possible that natural gas demand could be higher due to CO₂ emission
22 regulations and, as a result, natural gas prices could be expected to be somewhat
23 higher than otherwise would be the case. However, the effect is very complicated
24 and will depend on a number of factors such as how much new natural gas
25 capacity is built as a result of the higher coal-plant operating costs due to the CO₂

³⁵ Boston Pacific Report, at page 6.

³⁶ Boston Pacific Report, at page 24.

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1 emission allowance prices, how much additional DSM and renewable alternatives
2 are added to the U.S. system, the levels and prices of any incremental natural gas
3 imports or developed in the U.S., and changes in the dispatching of the electric
4 system. Indeed, depending on future circumstances there may be some periods in
5 which the prices of natural gas may be lower as a result of CO₂ regulations. Thus
6 it is very difficult to determine, at this time, the amount by which natural gas
7 prices might be raised due to CO₂ emission regulations.

8 **Q. Has Synapse examined the impact that the enactment of CO₂ emissions**
9 **regulations might have on natural gas prices?**

10 A. Yes. As I discussed in my January 14, 2008 Supplemental Testimony on MRES
11 Issues³⁷ and in the Supplemental Statement I presented at the January 24, 2008
12 hearing, we have investigated the publicly available evidence to examine what
13 relationship can be expected to exist between the adoption of climate change
14 legislation and natural gas prices.

15 **Q. Have you continued your investigations of the possible relationship between**
16 **the adoption of climate change legislation and natural gas prices since you**
17 **testified in this proceeding last January?**

18 A. Yes. As I noted above, we have reviewed the results of the modeling analyses that
19 have been undertaken to evaluate the CO₂ emissions allowance prices that likely
20 would result from the enactment of the major greenhouse gas regulatory
21 legislation that has been introduced in the current U.S. Congress.³⁸ As part of this
22 work, we have looked at the available data on the impact that enactment of CO₂
23 regulatory legislation could have on natural gas prices.

³⁷ Joint Intervenors Exhibit JI-38, at pages 11-16.

³⁸ In fact, seven of the 14 analyses of proposed climate change legislation that we have reviewed had not been issued at the time I last testified in this proceeding in late January of this year.

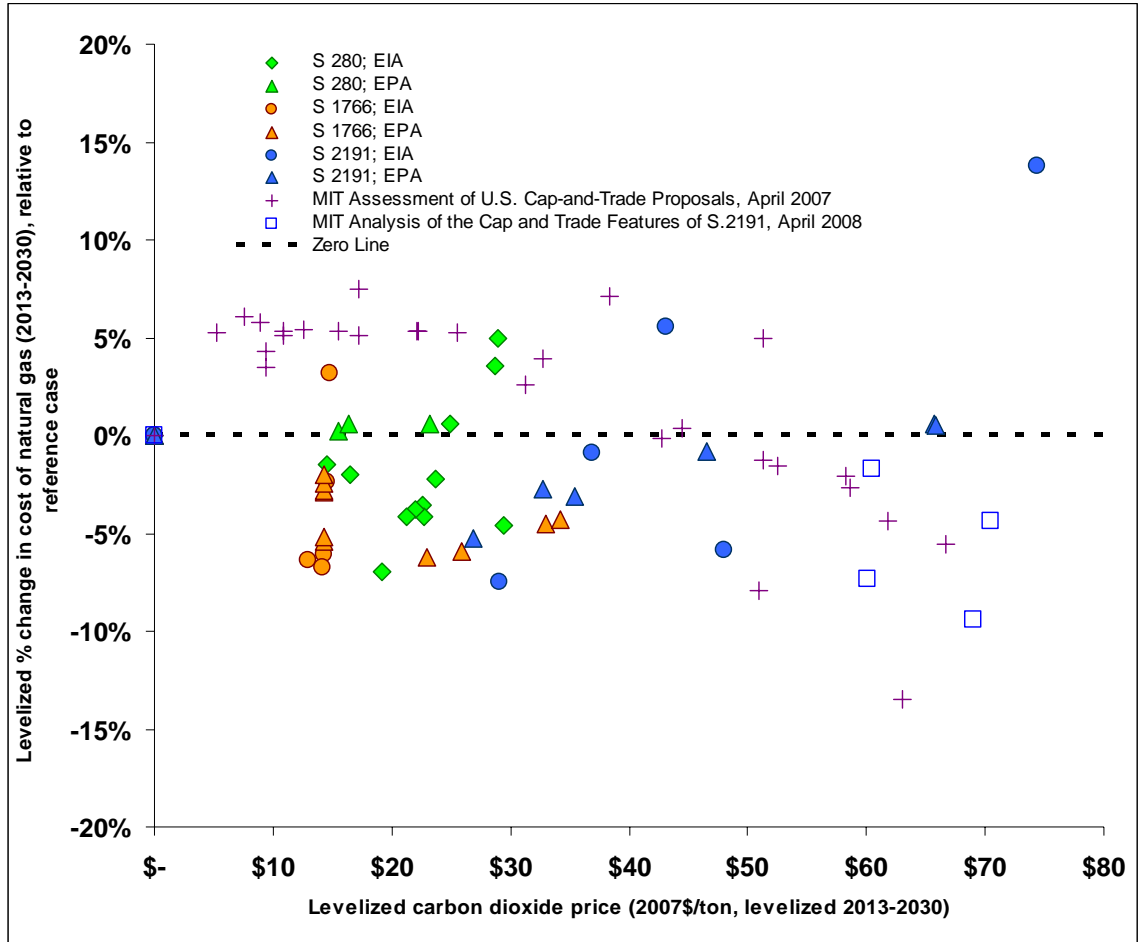
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1 **Q. What were the results of this review?**

2 A. Figure 3 below shows the levelized percentage changes in natural gas prices from
3 the base case forecasts with no CO₂ prices versus the levelized CO₂ prices for
4 various scenarios modeled by the Joint Program at the Massachusetts Institute of
5 Technology (“MIT”) on the Science and Policy of Global Change, the U.S. EPA,
6 and the Energy Information Administration (“EIA”) of the Department of Energy
7 of climate change proposals in the current U.S. Congress: Senate Bill S.280 (the
8 McCain-Lieberman bill), Senate Bill S.1766 (the Bingaman-Specter bill) and
9 Senate Bill S.2191 (the Lieberman-Warner bill).

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Figure 3: The Relationship Between CO₂ Emissions Allowance Prices and Natural Gas Prices



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This analysis shows that for the ranges of CO₂ emissions prices recommended by Boston Pacific and Synapse (that is between \$8/ton and \$50/ton on a levelized basis) the evidence concerning the impact of the enactment of CO₂ regulatory legislation on natural gas prices is inconclusive: that is, there is no clear evidence that CO₂ prices in this range will have a positive impact on natural gas prices. The data certainly does not support the assumption made by Applicant witness Grieg in the levelized busbar analysis in his January 2008 testimony in this proceeding that \$30/ton CO₂ emissions allowance prices would cause natural gas prices to rise by 17 percent in each year of the analysis.

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1 **Q. What is your conclusion concerning the impact that federal regulation of**
2 **greenhouse gas regulation might have on natural gas prices?**

3 A. The Big Stone II Applicants would have the Commission believe that the
4 adoption of a greenhouse gas regulatory regime that would lead to relative minor
5 CO2 emissions prices will have a significant upward impact on natural gas prices.
6 However, there is no consistent evidence that this will happen.

7 **Q. Does this complete your rebuttal testimony?**

8 A. Yes.

