BEFORE THE
OHIO POWER SITING BOARD

In the Matter of An Application by American Municipal Power - Ohio, Inc. (AMP-Ohio) for a Certificate of Environmental Compatibility and Public Need for an Electric Generation Station and Related Facilities in Meigs County, Ohio	)	Case No. 06-1358-EL-BGN

DIRECT TESTIMONY OF DAVID A. SCHLISSEL
ON BEHALF OF
THE NATURAL RESOURCES DEFENSE COUNCIL, INC.
OHIO ENVIRONMENTAL COUNCIL, AND
THE SIERRA CLUB

PUBLIC VERSION
PROTECTED MATERIALS REDACTED

DECEMBER 3, 2007

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1. Introduction

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

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

Q. Please describe Synapse Energy Economics.

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

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

Q. Please summarize your educational background and recent work experience.

A. I graduated from the Massachusetts Institute of Technology in 1968 with a Bachelor of Science Degree in Engineering. In 1969, I received a Master of Science Degree in Engineering from Stanford University. In 1973, I received a Law Degree from Stanford University. In addition, I studied nuclear engineering at the Massachusetts Institute of Technology during the years 1983-1986.

Since 1983 I have been retained by governmental bodies, publicly-owned utilities, and private organizations in 28 states to prepare expert testimony and analyses on engineering and economic issues related to electric utilities. My recent clients have included the New Mexico Public Regulation Commission, the General Staff of the Arkansas Public Service Commission, the Staff of the Arizona Corporation Commission, the U.S. Department of Justice, the Commonwealth of

Massachusetts, the Attorneys General of the States of Massachusetts, Michigan, New York, and Rhode Island, the General Electric Company, cities and towns in Connecticut, New York and Virginia, state consumer advocates, and national and local environmental organizations.

I have testified before state regulatory commissions in Arizona, New Jersey, Connecticut, Kansas, Texas, New Mexico, New York, Vermont, North Carolina, South Carolina, Maine, Illinois, Indiana, Ohio, Massachusetts, Missouri, Rhode Island, Wisconsin, Iowa, South Dakota, Georgia, Minnesota, Michigan, Florida, North Dakota, Louisiana and Arkansas 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.

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

A. I am testifying on behalf of the Natural Resources Defense Council, Inc., the Ohio Environmental Council, and the Sierra Club. (hereinafter "Citizen Groups")

Q. Have you testified previously before this Board?

A. No.

Q. What is the purpose of your testimony?

A. Synapse was retained by the Citizen Groups to provide technical assistance in assessing American Municipal Power's proposed 960 MW coal-fired power plant in Meigs County, Ohio, (hereinafter "AMPGS" or "the proposed plant") and in presenting arguments regarding the costs (including construction costs and the cost of CO2 regulations) of the proposed plant and alternatives to the proposed plant.

This testimony presents the results of our analyses to date.

Q. Were there other members of the Synapse staff who also assisted in the analyses undertaken by Synapse as part of its evaluation of AMP's proposed plant?

A. Yes. Dr. David White, Michael Drunsic, Robin Maslowski, Jeremy Fisher, Allison Smith and Kenji Takahashi also were members of the Synapse team for this project. Copies of their resumes are available at www.synapse-energy.com. However, I am ultimately responsible for all the conclusions and opinions presented in this testimony.

Q. Please summarize your conclusions.

A. My conclusions are as follows:

1. AMP-Ohio has not adequately considered the risks associated with building a new coal-fired power plant in the resource planning analyses that included the AMPGS Project as part of the Power Supply Plans that were prepared in early 2007 for the AMP-Ohio member communities.

2. The most significant uncertainties and risks associated with the proposed AMPGS are the potential for future federal restrictions on CO_2 emissions and further increases in the project's capital cost.

3. Increasing numbers of proposed coal-fired power plants have been cancelled, delayed and rejected by state regulatory commissions or boards because of , at least in large part, the uncertainties and risks regarding future carbon regulations and construction costs.

4. In particular, it is important for AMP-Ohio and its member communities to examine their involvement in the AMPGS Project in light of coming federal regulation of greenhouse gas emissions. It would be imprudent for AMP-Ohio and its members to continue their participation in the Project without fully considering the risk of significantly higher CO_2 prices in its resource planning process. To reflect the uncertainties and risks, AMP-

Ohio should use a broad range of possible CO_2 prices in resource planning such as the forecasts presented by Synapse in this Case.

5. Soaring power plant construction costs also will have a significant impact on the results of properly performed resource planning. Actual and estimated power plant capital costs have been strongly affected by the domestic and international competition for design and construction resources, manufacturing capacity and commodities. It would be imprudent to not allow for the possibility that these same factors which have led to the skyrocketing of power plant construction costs in recent years will continue to significantly affect project costs during the design and construction of the proposed AMPGS Project.

6.

[REDACTED]

7. For this and other reasons, the Power Supply Plans prepared by AMP-Ohio and R.W. Beck for the AMP-Ohio member communities are severely flawed and biased in favor of the AMPGS Project.

[REDACTED]

8. The *Initial Project Feasibility Study* prepared for AMP-Ohio by R.W. Beck is similarly flawed and biased in favor of the AMPGS Project. That

study is not a resource plan and also does not show that the AMPGS Project should be part of a least-cost, least risk resource plan for the participating AMP-Ohio member communities. In particular, the *Initial Project Feasibility Study* does not appropriately consider the risks associated with future federal regulation of greenhouse gas emissions and future CO_2 prices.

9. For these reasons, the Ohio State Siting Board should reject AMP-Ohio's Application for a certificate of environmental compatibility and public need to construct and operate the proposed AMPGS Project. AMP-Ohio and its member communities should conduct new resource planning that more fully reflects the potential risks posed by federal regulation of greenhouse gas emissions and soaring power plant construction costs. These new resource plans should consider the potential for demand-side options to be a part of a least-cost, least- risk portfolio of alternatives to the proposed AMPGS Project.

Q. Please explain how you conducted your investigations in this proceeding.

A. We have reviewed AMP-Ohio's filing with the Power Siting Board, the June 2007 *Initial Project Feasibility Study* prepared by R.W. Beck, and other documents prepared by AMP-Ohio for distribution to potential AMPGS Project participant communities. We also have reviewed a number of the Power Supply Plans that were prepared by R.W. Beck for AMP-Ohio's member communities. In addition, we prepared 59 Interrogatories and Document Requests which the Citizen Groups submitted to AMP-Ohio to obtain copies of support workpapers and materials for costs used and the statements made in the *Initial Project Feasibility Study* and for the workpapers for the development of the February 2007 Power Supply Plans.

Q. Has AMP-Ohio provided all of the documents necessary to conducted a full investigation in this proceeding?

A. No. AMP-Ohio has refused to provide almost all of the documents that we requested, other than providing a limited number of narrative answers and promising to provide a few documents, some of which we received on December 1, 2007 and others of which have not yet been provided as this testimony is being finalized on December 3, 2007.

2. AMP-Ohio Has Not Adequately Considered The Risks Associated With Building A New Coal-Fired Generating Unit

Q. Why is it important that AMP-Ohio consider risk when evaluating the economics of building the proposed AMPGS Project?

A. Risk and uncertainty are inherent in all enterprises. But the risks associated with any options or plans need to be balanced against the expected benefits from each such option or plan.

In particular, parties seeking to build new generating facilities and the associated transmission face of a host of major uncertainties, including, for example, the expected cost of the facility, future restrictions on emissions of carbon dioxide, and future fuel prices. The risks and uncertainties associated with each of these factors needs to be considered as part of the economic evaluation of whether to pursue the proposed facility or other alternatives.

Q. What are the most significant fossil plant-specific uncertainties and risks associated with building new coal-fired generating plants like the AMPGS Project?

A. The most significant uncertainties and risks associated with building and operating new coal-fired generating plants like the proposed the AMPGS Project are the potential for future restrictions on CO_2 emissions and the potential for significant increases in the project's capital cost. However, there also are other

potential uncertainties and risks for new coal plants. These other uncertainties and risks include the potential for higher fuel prices, fuel supply disruptions that could affect plant operating performance and fuel prices, and the potential for increasing stringency of regulations of current criteria pollutants.

Q. Did R.W. Beck and AMP-Ohio adequately consider these uncertainties and risks in the resource planning analyses that led to the Power Supply Plans that were provided to each of the AMP-Member communities in February 2007?

A.

[REDACTED]

In other words, higher CO_2 prices, on their own, or in combination with increased plant construction costs, may make the proposed AMPGS Project less economic than other available alternatives and uneconomic for AMP-Ohio's member communities. The important reason to prepare sensitivities is to determine what changes in CO_2 prices and/or construction costs would make the Project

uneconomic and then to evaluate how likely those changes are. Unfortunately, the methodology used by R.W. Beck and AMP-Ohio in preparing the Power Supply Plans appears not to have allowed for these critical analyses.

Q. Has AMP-Ohio provided the workpapers associated with the development of the CO_2 prices and the AMPGS Project construction cost estimate used in the Power Supply Plans?

A. No. AMP-Ohio refused to provide these materials.[1]

Q. Does the *Initial Project Feasibility Study* remedy or correct for the flaws in the Power Supply Plans?

A. No. The analyses in the *Initial Project Feasibility Study* do not represent resource planning studies which examine whether the proposed AMPGS Project should be part of a least-cost, least-risk capacity expansion plan by looking that the costs and benefits of a range of supply-side and demand-side options. Instead, the *Initial Project Feasibility Study* only compares what it projects will be the cost of power from the AMPGS Project against the AMP-Ohio members' current costs of power and the alternative of buying power from the market. This is a far different analysis than should have been performed during the resource planning process for determining which supply-side and demand-side alternatives will provide power for the participating AMP-Ohio member communities at the least cost and with the least risk.

[1] AMP-Ohio's Response to Request No. 24 of Natural Resource Defense Council, et, al, First Set of Interrogatories and Request for Production of Documents. (hereinafter "Citizen Groups"). Copies of AMP-Ohio's Responses are provided in Exhibit DAS-2.

Q. Does the risk analysis presented in the *Initial Project Feasibility Study* provide an adequate consideration of the risks and uncertainties associated with the proposed AMPGS Project?

A. No. AMP-Ohio has refused to provide any of the workpapers related to R.W. Beck's derivation of the CO_2 prices in used in *Initial Project Feasibility Study,* including the *Analysis of Potential Project Risks* that it includes.[2] However, it is clear from the documents that we have seen that the forecast CO_2 prices that R.W. Beck used in the *Initial Power Feasibility Study* are extremely low and narrow. As I will demonstrate later in this testimony, given the reductions in CO_2 emissions that will be necessary to stabilize atmospheric temperatures, the proposals that are currently under consideration in Congress, and the substantial uncertainty surrounding the ultimate timing and design of federal carbon regulations, it is necessary to use a higher and much broader range of CO_2 prices in resource planning than R.W. Beck and AMP-Ohio have considered. It also is necessary to perform sensitivities reflecting that power plant construction costs will continue to soar as they have in recent years.

Q. Have other companies provided sensitivity analyses for key input parameters in their Integrated Resource Plans or in the modeling analyses presented in support of requests to build and operate new generating facilities?

A. Yes. We have seen such sensitivity analyses for key input parameters in many of the power plant cases in which we have been involved in recent years.

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[2] AMP-Ohio's Responses to Requests Nos. 9, 31, and 48 of the Citizen Groups (See Exhibit DAS-2).

Q. Have you seen any recent instances in which companies have decided not to undertake new coal-fired power plants because of concerns over increasing construction costs and/or the potential for federal regulation of greenhouse gas emissions?

A, Yes. In just the past few months, a number of companies have announced that they will not pursue new coal-fired generating facilities. For example, in its recently-filed Resource Plan in Colorado, Xcel Energy announced that:

> In sum, in light of the now likely regulation of CO_2 emissions in the future due to a broader interest in climate change issues, the increased costs of constructing new coal facilities, and the increased risk of timely permitting to meet planned in-service dates, Public Service does not believe it would be prudent to consider at this time any proposals for new coal plants that do not include CO_2 capture and sequestration.[3]

Idaho Power Company similarly has concluded that:

> Due to escalating construction costs, the transmission cost associated with a remotely located resource, potential permitting issues, and continued uncertainty surrounding GHG laws and regulations, IPC [Idaho Power Company] has determined that coal-fired generation is not the best technology to meet its resource needs in 2013. IPC has shifted its focus to the development of a natural gas-fired combined cycle combustion turbine located closer to its load center in southern Idaho.[4]

Minnesota Power Company also has announced that it was considering only carbon minimizing resources and would not consider a new coal resource without a carbon solution.[5] The Company also announced that in the long-term it would

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3 Public Service Company of Colorado, *2007 Colorado Resource Plan*, Volume 2 Technical Appendix, at page 2-34.

4 U.S. Securities and Exchange Commission Form 10-Q, Third Quarter of 2007, Idaho Power Company, at pages 49-50.

5 *Petition for Approval, Minnesota Power's 2008 Resource Plan*, Minnesota Public Utilities Commission Docket No. E015/RP-07-1357, dated October 31, 2007, at page 5.

consider pulverized coal and IGGC plants with proven carbon capture and CO_2 sequestration technologies.[6]

Avista Utilities also has announced that it will not pursue coal-fired power plants in the foreseeable future.

Q. Have any proposed coal-fired generating projects been cancelled or delayed as a result of concern over increasing construction costs or the potential for federal regulation of greenhouse gas emissions?

A. Yes. According to published reports, 16 coal-fired power plant projects have been cancelled within the past year and more than three dozen others have been delayed, in part, because of concern over rising construction costs and climate change. For example:

- Tenaska Energy cancelled plans to build a coal-fired power plant in Nebraska because of rising steel and construction prices. According to the Company's general manager of business development:

  .. coal prices have gone up "dramatically" since Tenaska started planning the project more than a year ago.

  And coal plants are largely built with steel, so there's the cost of the unit that we would build has gone up a lot... At one point in our development, we had some of the steel and equipment at some very attractive prices and that equipment all of a sudden was not available.

  We went immediately trying to buy additional equipment and the pricing was so high, we looked at the price of the power that would be produced because of those higher prices and equipment and it just wouldn't be a prudent business decision to build it.[7]

- Westar Energy announced in December 2006 that it was deferring site selection for a new 600 MW coal-fired power plant due to significant increases in the facility's estimated capital cost of 20 to 40 percent, over just 18 months. This prompted Westar's Chief Executive to warn: "When

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[6] Id. at page 6.
[7] Available at www.swtimes.com/articles/2007/07/09/news/news02.prt.

equipment and construction cost estimates grow by $200 million to $400 million in 18 months, it's necessary to proceed with caution."[8] As a result, Westar Energy has suspended site selection for the coal-plant and is considering other options, including building a natural gas plant, to meet growing electricity demand. The company also explained that:

> most major engineering firms and equipment manufacturers of coal-fueled power plant equipment are at full production capacity and yet are not indicating any plans to significantly increase their production capability. As a result, fewer manufacturers and suppliers are bidding on new projects and equipment prices have escalated and become unpredictable.[9]

- Xcel Energy announced in October 2007 that it was deferring indefinitely its plans to build an IGCC plant in Colorado because the development costs were higher than the utility originally expected.[10]

- TXU cancelled 8 of 11 proposed coal-fired power plants, in large part because of concern over global warming and the potential for federal legislation restricting greenhouse gas emissions.[11]

- Tampa Electric just cancelled a proposed integrated gasification combined cycle plant ("IGCC") due to uncertainty related to CO_2 regulations, particularly capture and sequestration issues, and the potential for related project cost increases. According to a press release, "Because of the economic risk of these factors to customers and investors, Tampa Electric believes it should not proceed with an IGCC project at this time," although it remains steadfast in its support of IGCC as a critical component of future fuel diversity in Florida and the nation.

- In June 2007, the Tondu Corp. announced that it was suspending plans to build a planned 600 MW IGCC facility citing high costs and other concerns related to technology and construction risks.

- Four public power agencies suspended permitting activities for the coal-fired Taylor Energy Center because of growing concerns about greenhouse gas emissions.[12]

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8 Available at http://www.westarenergy.com/corp_com/corpcomm.nsf/F6BE1277A768F0E4862572690055581C/$file/122806%20coal%20plant%20final2.pdf.

9 Id.

10 Denver Business Journal, October 30, 2007.

11 See www.marketwatch.com/news/story/txu-reversal-coal-plant-emissions.

12 See www.taylorenergycenter.org/s_16asp?n=40.

Q. Have you seen any instance where a participant in a jointly-owned coal-fired power plant project has withdrawn because of concern over increasing construction costs or potential CO_2 emissions costs?

A. Yes. Great River Energy ("GRE") just withdrew from the proposed Big Stone II coal-fired power plant project in South Dakota. According to GRE, four factors contributed most prominently to the decision to withdraw, including uncertainty about changes in environmental requirements and new technology and that fact that "The cost of Big Stone II has increased due to inflation and project delays."[13]

Q. Have any proposed coal-fired generating projects been rejected by state regulatory commissions due to concerns over increasing construction costs or the potential for federal regulation of greenhouse gas emissions?

A. Yes. A number of power plant projects have been approved by state regulatory commissions during 2007. However, since last December, proposed coal-fired power plant projects have been rejected by the Oregon Public Utility Commission, the Florida Public Service Commission, and the Oklahoma Corporation Commission. The North Carolina Utilities Commission rejected one of the two coal-fired plants proposed by Duke Energy Carolinas for is Cliffside Project.

The decision of the Florida Public Service Commission in denying approval for the 1,960 MW Glades Power Project was based on concern over the uncertainties over plant costs, coal and natural gas prices, and future environmental costs, including carbon allowance costs.[14] In addition, the Oklahoma Corporation Commission voted in September of this year to reject Public Service of Oklahoma's application to build a new coal-fired power plant.[15]

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13 See ww.greatriverenergy.com/press/news/091707_big_stone_ii.html.
14 Order No. PSC-07-0557-FOF-EI, Docket No. 070098-EI, July 2, 2007.
15 Cause No. PUD 200700012 signed Order No. 545240, October 2007.

The Minnesota Public Utilities Commission also has refused to approve an agreement under which Xcel Energy would have purchased power from a proposed IGCC facility due to concerns over the uncertainties surrounding the plant's estimated construction and operating costs and operating and financial risks.[16]

On October 18, 2007, the Kansas Department of Health and Environment rejected an application to build two 700 MW coal-fired units at an existing power plant site. In a prepared statement explaining the basis for this decision, Rod Bremby, Kansas's secretary of health and environment noted that "I believe it would be irresponsible to ignore emerging information about the contribution of carbon dioxide and other greenhouse gases to climate change and the potential harm to our environment and health if we do nothing."[17]

Q. Is it important to evaluate the uncertainties and risks associated with alternatives to the AMPGS Project as well?

A. Yes. The risks associated with building natural gas-fired alternatives include potential CO_2 emissions costs, possible capital cost escalation and fuel price uncertainty and volatility.

Renewable alternatives and energy efficiency also have some uncertainties and risks. These include potential capital cost escalation, contract uncertainty and customer participation uncertainty.

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[16] Order in Docket No. E-6472/M-05-1993, dated August 30, 2007, at pages 16-19.
[17] See www.kansascity.com/105/story/323833.html.

3. AMP-Ohio Has Not Adequately Considered The Risks Associated With Future Federally Mandated Greenhouse Gas Reductions

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

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

Despite being the single largest contributor to global emissions of greenhouse gases, the United States remains one of a very few industrialized nations that have not signed the Kyoto Protocol.[18] Nevertheless, individual states, regional groups of states, shareholders and corporations are making serious efforts and taking significant steps towards reducing greenhouse gas emissions in the United States. Efforts to pass federal legislation addressing carbon, though not yet successful, have gained ground in recent years. These developments, combined with the growing scientific understanding of, and evidence of, climate change mean that establishing federal policy requiring greenhouse gas emission reductions is just a matter of time. The question is not whether the United States will develop a

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18 As I use the terms "carbon dioxide regulation" and "greenhouse gas regulation" throughout our testimony, there is no difference. While I believe that the future regulation we discuss here will govern emissions of all types of greenhouse gases, not just carbon dioxide ("CO_2"), for the purposes of our discussion we are chiefly concerned with emissions of carbon dioxide. Therefore, we use the terms "carbon dioxide regulation" and "greenhouse gas regulation" interchangeably. Similarly, the terms "carbon dioxide price," "greenhouse gas price" and "carbon price" are interchangeable.

national policy addressing climate change, but when and how. The electric sector will be a key component of any regulatory or legislative approach to reducing greenhouse gas emissions both because of this sector's contribution to national emissions and the comparative ease of regulating large point sources.

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

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

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

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

Q. If the AMPGS Project were to be built, is carbon regulation an issue that definitely could be addressed in the future, and at a reasonable cost, once the timing and stringency of the regulation is known?

A. No. Unlike for other power plant air emissions like sulfur dioxide and oxides of nitrogen, there currently is no commercial or economical method for post-combustion removal of carbon dioxide from pulverized coal plants. Some technologies, such as the Powerspan technology discussed by AMP-Ohio are starting to be tested. However, it is expected to be years, if not decades, before there will be viable post-combustion technology for the removal and sequestration of greenhouse gas emissions from pulverized coal-fired power plants.

Q. Does AMP-Ohio agree with this assessment that there is currently no technically and commercially viable technology for carbon capture and sequestration for pulverized coal-fired power plants?

A. Yes.[19]

Q. Is this a generally accepted view in the industry?

A. Yes. For example, a witness for Dominion Virginia Power has recently testified that:

> carbon capture technology is not commercially viable or available at the present time. Furthermore, the successful integration of all of the technologies needed for a commercial-scale carbon capture and sequestration system has yet even to be demonstrated. As a result, it is not currently feasible to construct a power plant with technology that can capture and store carbon emissions.[20]

This conclusion is consistent with the general view in the electric industry.

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[19] AMP-Ohio's Response to Response to Request No. 41 of the Citizen Groups (provided in Exhibit DAS-2)

[20] Direct Testimony of Dominion Virginia Power witness James K. Martin in Virginia State Corporation Commission Case No. PUE-2007-00066, at page 7, line 11.

Even if such technology were available, retrofitting an existing coal plant with the technology for carbon capture and sequestration is expected to be very expensive, increasing the cost of generating power at the plant by perhaps as much as 68 to 80 percent or higher.

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

A. Yes. A increasing number of utility executives are agreeing that mandatory federal regulation of the emissions of greenhouse gases is inevitable.

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

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

Similarly, James Rogers, who was the CEO of Cinergy and is currently CEO of Duke Energy, has publicly said "[I]n private, 80-85% of my peers think carbon regulation is coming within ten years, but most sure don't want it now."[22] Mr. Rogers also was quoted in a December 2005 *Business Week* article, as saying to his utility colleagues, "If we stonewall this thing [carbon dioxide regulation] to five years out, all of a sudden the cost to us and ultimately to our consumers can be gigantic."[23]

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21 Paul Anderson, Chairman, Duke Energy, "Being (and Staying in Business): Sustainability from a Corporate Leadership Perspective," April 6, 2006 speech to CERES Annual Conference, at: http://www.duke-energy.com/news/mediainfo/viewpoint/PAnderson_CERES.pdf

22 "The Greening of General Electric: A Lean, Clean Electric Machine," *The Economist,* December 10, 2005, at page 79.

23 "The Race Against Climate Change," *Business Week*, December 12, 2005, online at http://businessweek.com/magazine/content/05_50/b3963401.htm.

Similarly, American Electric Power anticipates that the momentum in Congress is moving toward a mandatory federal greenhouse gas program that will set targets and timelines for future CO_2 emission reductions.[24]

Not wanting carbon regulation from a utility perspective is understandable because carbon price forecasting is not simple and easy, it makes resource planning more difficult and is likely to change "business as usual." For many parties, including AMP-Ohio, that means that it is much more difficult to justify building a pulverized coal plant. Regardless, it is imprudent to ignore the risk.

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

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

A. Electricity generation is very carbon-intensive. Electric utilities are likely to be one of the first, if not the first, industries subject to carbon regulation because of the relative ease in regulating stationary sources as opposed to mobile sources (automobiles) and because electricity generation represents a significant portion of total U.S. greenhouse gas emissions. A new generating facility may have a book life of twenty to forty years, but in practice, the utility may expect that that

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[24] For example, see the Testimony of Appalachian Power Company witness Dana E. Waldo in West Virginia Public Service Commission Case No. 06-0033-E-CN, at page 7, lines 15-18, and the Testimony of Appalachian Power Company witness Michael W. Renchek in West Virginia Public Service Commission Case No. 06-0033-E-CN, at page 6, lines 1-2, and page 9, lines 12-16.

asset will have an operating life of 50 years or more. By adding new plants, especially new coal plants, a utility is essentially locking-in a large quantity of carbon dioxide emissions for decades to come. In general, electric utilities are increasingly aware that the fact that we do not currently have federal greenhouse gas regulation is irrelevant to the issue of whether we will in the future, and that new plant investment decisions are extremely sensitive to the expected cost of greenhouse gas regulation throughout the life of the facility.

Q. What is your assessment of the potential for federal regulation of greenhouse gas emissions?

A. We at Synapse believe that it is not a question of "if" with regards to federal regulation of greenhouse gas emissions but rather a question of "when." However, we also agree that there are uncertainties as to the design, timing and details of the CO_2 regulations that ultimately will be adopted and implemented.

Q. What mandatory greenhouse gas emissions reductions programs have begun to be examined in the U.S. federal government?

A. To date, the U.S. government has not required greenhouse gas emission reductions. However, a number of legislative initiatives for mandatory emissions reduction proposals have been introduced in Congress. These proposals establish carbon dioxide emission trajectories below the projected business-as-usual emission trajectories, and they generally rely on market-based mechanisms (such as cap and trade programs) for achieving the targets. The proposals also include various provisions to spur technology innovation, as well as details pertaining to offsets, allowance allocation, restrictions on allowance prices and other issues. The federal proposals that would require greenhouse gas emission reductions that

had been submitted in the current U.S. Congress are summarized in Table 1 below.[25]

Table 1. Summary of Mandatory Emissions Targets in Proposals Discussed in the current U.S. Congress[26]

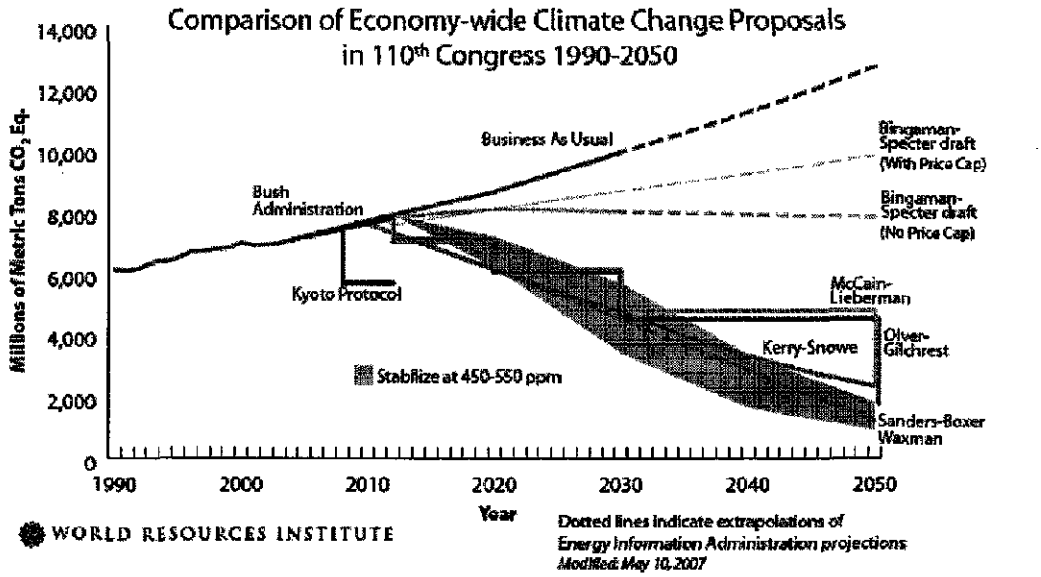
Proposed National Policy	Title or Description	Year Proposed	Emission Targets	Sectors Covered
Feinstein- Carper S.317	Electric Utility Cap & Trade Act	2007	2006 level by 2011, 2001 level by 2015, 1%/year reduction from 2016-2019, 1.5%/year reduction starting in 2020	Electricity sector
Kerry-Snowe	Global Warming Reduction Act	2007	2010 level from 2010-2019, 1990 level from 2020-2029, 2.5%/year reductions from 2020-2029, 3.5%/year reduction from 2030-2050, 65% below 2000 level in 2050	Economy-wide
McCain-Lieberman S.280	Climate Stewardship and Innovation Act	2007	2004 level in 2012, 1990 level in 2020, 20% below 1990 level in 2030, 60% below 1990 level in 2050	Economy-wide
Sanders-Boxer S.309	Global Warming Pollution Reduction Act	2007	2%/year reduction from 2010 to 2020, 1990 level in 2020, 27% below 1990 level in 2030, 53% below 1990 level in 2040, 80% below 1990 level in 2050	Economy-wide
Olver, et al HR 620	Climate Stewardship Act	2007	Cap at 2006 level by 2012, 1%/year reduction from 2013-2020, 3%/year reduction from 2021-2030, 5%/year reduction from 2031-2050, equivalent to 70% below 1990 level by 2050	US national
Bingaman–Specter S.1766	Low Carbon Economy Act	2007	2012 levels in 2012, 2006 levels in 2020, 1990 levels by 2030. President may set further goals ≥60% below 2006 levels by 2050 contingent upon international effort	Economy-wide
Lieberman-Warner S. 2191	America's Climate Security Act	2007	2005 level in 2012, 1990 level in 2020, 65% below 1990 level in 2050	U.S. electric power, transportation, and manufacturing sources.

[25] Table 1 is an updated version of Table ES-1 on page 5 of Exhibit DAS-4.

[26] More detailed summaries of the bills that have been introduced in the U.S. Senate in the 110th Congress are presented in Exhibit DAS-3.

The emissions levels that would be mandated by the bills that have been introduced in the current Congress are shown in Figure 1 below:

Figure 1: Emissions Reductions Required under Climate Change Bills in Current US Congress



The shaded area in Figure 1 above represents the 60% to 80% range of emission reductions from current levels that many now believe will be necessary to stabilize atmospheric CO_2 concentrations by the middle of this century.

Q. Is it reasonable to believe that the prospects for passage of federal legislation for the regulation of greenhouse gas emissions have improved as a result of last November's federal elections?

A. Yes. As shown by the number of proposals being introduced in Congress and public statements of support for taking action, there certainly are an increasing numbers of legislators who are inclined to support passage of legislation to regulate the emissions of greenhouse gases.

Nevertheless, my conclusion that significant greenhouse gas regulation in the U.S. is inevitable is not based on the results of any single election or on the fate of any single bill introduced in Congress.

Q. Are individual states also taking actions to reduce greenhouse gas emissions?

A. Yes. A number of states are taking significant actions to reduce greenhouse gas emissions.

For example, Table 2 below lists the emission reduction goals that have been adopted by states in the U.S. Regional action also has been taken in the Northeast and Western regions of the nation.

Table 2: Announced State and Regional Greenhouse Gas Emission Reduction Goals

State	GHG Reduction Goal	Western Climate Initiative member (15% below 2005 levels by 2020)	Regional Greenhouse Gas Initiative member (Cap at current levels 2009-2015, reduce this by 10% by 2019)
Arizona	2000 levels by 2020; 50% below 2000 levels by 2040	yes	
California	2000 levels by 2010; 1990 levels by 2020; 80% below 1990 levels by 2050	yes	
Connecticut	1990 levels by 2010; 10% below 1990 levels by 2020; 75-85% below 2001 levels in the long term		yes
Delaware			yes
Florida	2000 levels by 2017, 1990 levels by 2025, and 80 percent below 1990 levels by 2050		
Hawaii	1990 levels by 2020		
Illinois	1990 levels by 2020; 60% below 1990 levels by 2060		
Maine	1990 levels by 2010; 10% below 1990 levels by 2020; 75-80% below 2003 levels in the long term		yes
Maryland			yes
Massachusetts	1990 levels by 2010; 10% below 1990 levels by 2020; 75-85% below 1990 levels in the long term		yes
Minnesota	15% by 2015, 30% by 2025, 80% by 2050		
New Hampshire	1990 levels by 2010; 10% below 1990 levels by 2020; 75-85% below 2001 levels in the long term		yes
New Jersey	1990 levels by 2020; 80% below 2006 levels by 2050		yes
New Mexico	2000 levels by 2012; 10% below 2000 levels by 2020; 75% below 2000 levels by 2050	yes	
New York	5% below 1990 levels by 2010; 10% below 1990 levels by 2020		yes
Oregon	Stabilize by 2010; 10% below 1990 levels by 2020; 75% below 1990 levels by 2050	yes	
Rhode Island	1990 levels by 2010; 10% below 1990 levels by 2020; 75-80% below 2001 levels in the long term		yes
Utah		yes	
Vermont	1990 levels by 2010; 10% below 1990 levels by 2020; 75-85% below 2001 levels in the long term		yes
Washington	1990 levels by 2020; 25% below 1990 levels by 2035; 50% below 1990 levels by 2050	yes	

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

A. Yes. A summer 2006 poll by Zogby International showed that an overwhelming majority of Americans are more convinced that global warming is happening than they were even two years ago. In addition, Americans also are connecting intense weather events like Hurricane Katrina and heat waves to global warming.[27] Indeed, the poll found that 74% of all respondents, including 87% of Democrats, 56% of Republicans and 82% of Independents, believe that we are experiencing the effects of global warming.

The poll also indicated that there is strong support for measures to require major industries to reduce their greenhouse gas emissions to improve the environment without harming the economy – 72% of likely voters agreed such measures should be taken.[28]

Other recent polls reported similar results. For example, a recent Stanford University/Associated Press poll found that 84 percent of Americans believe that global warming is occurring, with 52 percent expecting the world's natural environment to be in worse shape in ten years than it is now.[29] Eighty-four percent of Americans want a great deal or a lot to be done to help the environment during the next year by President Bush, the Congress, American businesses and/or the American public. This represents ninety-two percent of Democrats and seventy-seven percent of Republicans.

At the same time, according to a recent public opinion survey for the Massachusetts Institute of Technology, Americans now rank climate change as

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27 "Americans Link Hurricane Katrina and Heat Wave to Global Warming," Zogby International, August 21, 2006, available at www.zogby.com/news.

28 Id.

29 *The Second Annual "America's Report Card on the Environment" Survey by the Woods Institute for the Environment at Stanford University in collaboration with The Associated Press,* September 25, 2007.

the country's most pressing environmental problem—a dramatic shift from three years ago, when they ranked climate change sixth out of 10 environmental concerns.[30] Almost three-quarters of the respondents felt the government should do more to deal with global warming, and individuals were willing to spend their own money to help.

Q. Has AMP-Ohio developed any projection of future CO_2 emissions allowance prices for use in its resource planning for the AMPGS Project?

A. Yes. It appears that R.W. Beck used two slightly different CO_2 forecasts in its development of the February 2007 Power Supply Plans for the AMP-Ohio members and in the June 2007 Initial Project Feasibility Study. These forecasts are presented in Table 3 below:

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

Table 3: CO_2 Price Forecasts in R.W. Beck Power Supply Plans and AMPGS Project *Initial Project Feasibility Study*[31]

	Expected CO_2 Prices *Initial Project Feasibility Study*	CO_2 Prices Power Supply Plans
	(Nom$	(Nom$
2010	$0.00	
2011	$0.00	
2012	$0.00	
2013	$3.36	
2014	$5.19	
2015	$7.08	
2016	$9.06	
2017	$11.14	
2018	$13.29	
2019	$13.61	
2020	$13.94	
2021	$14.27	
2022	$14.62	
2023	$14.97	
2024	$15.33	
2025	$15.69	
2026	$16.07	
2027	$16.46	
2028	$16.85	
2029	$17.26	
2030	$17.67	

Thus, the CO_2 prices used in the Development of the Power Supply Plans were [REDACTED] in the years 2013-2017 than the prices used in the June 2007 *Initial Project Feasibility Study*.

[31] The CO_2 prices shown in Table 3 are taken from the Assumptions Document for Developing Member Power Supply Plans in the February 17, 2007 *Power Supply Plan for City of Oberlin* and Table 4-7 of the *Initial Project Feasibility Study*.

Q. Have AMP-Ohio or R.W. Beck explained the differences between the CO_2 price forecast that was used in the Power Supply Plans and the one used in *Initial Project Feasibility Study*?

A. No. The Citizen Groups submitted a number of interrogatories and document requests seeking the workpapers and source documents which underlay the CO_2 price forecasts used by R.W. Beck in both the February 2007 Power Supply Plans and the June 2007 Initial Project Feasibility Study. AMP-Ohio refused to provide any of the requested materials except to refer us back to the June 2007 Initial Project Feasibility Study.[32] Instead of providing the requested supporting data and materials for the CO_2 price forecasts, AMP-Ohio only gave the following narrative answer:

> R.W. Beck developed the $5 - $15/ton range (in 2006$) in preparation for the AMP-Ohio Power Supply Study that began in the fall of 2006. The range was based on R.W. Beck's review of historical prices in Europe and certain studies and analysis available at that time including a study by the National Commission on Energy Policy (December 2004). The ultimate costs for CO_2 control will be influenced by several factors including the stringency of potential legislation, whether offsets from other sectors of the economy would be allowed to offset emissions from the power industry, the method of regulation (a cap and trade system or a tax), etc. Additionally, costs for Powerspan ECO_2 carbon dioxide capture technology has been estimated at approximately $20 per ton.[33]

Q. Did AMP-Ohio even identify the "historical prices in Europe" or the "certain studies and analysis" on which R.W. Beck relied beyond the December 2004 National Commission on Energy Policy study?

A. No.[34]

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32 See AMP-Ohio's responses to Requests 9, 24, 31a, 31, c, and 48a in Exhibit DAS-2.
33 AMP-Ohio's response to Request 9 in Exhibit DAS-2.
34 Id.

Q. Is the December 2004 National Commission on Energy Policy study on which AMP-Ohio says R.W. Beck relied still relevant today?

A. No. The proposal discussed in the December 2004 National Commission on Energy Policy ("NCEP") study upon which R.W. Beck says it relied no longer exists. The bills that have been introduced in the current Congress would mandate significantly larger reductions in CO_2 emissions than would have resulted from proposal that the National Commission studied in December 2004. Indeed, the National Commission itself has revised, and strengthened considerably, its own proposal for reducing CO_2 emissions.[35]

A graphical version of the difference between the April 2007 NCEP proposal and the proposal cited in the Commission's December 2004 study is shown in Figure 2 below.

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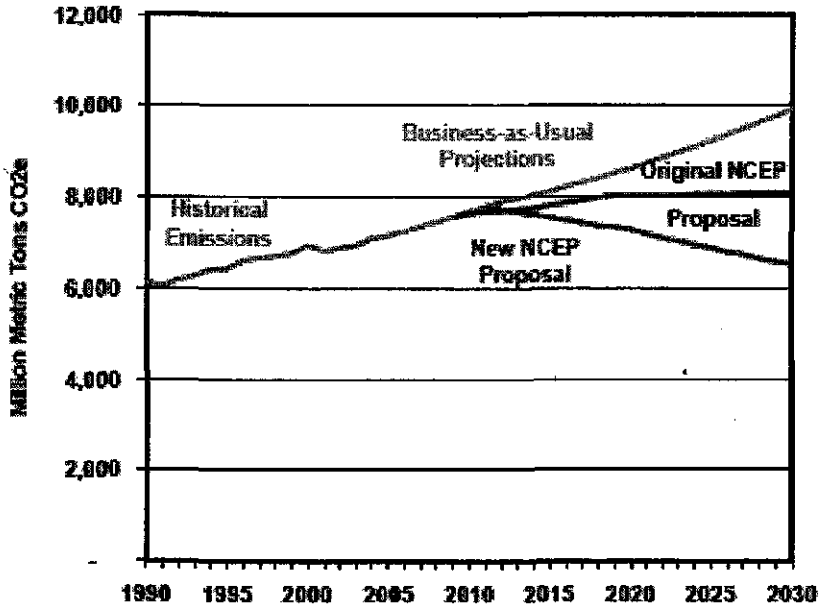
35 *Energy Policy Recommendations to the President and the 110th Congress*, National Commission on Energy Policy, April 2007, available on the Commission's website.

Figure 2: Original and Current NCEP Proposals[36]



For example, the original NCEP proposal included a safety valve price of $7/ton of CO_2, escalating at 5 percent per year, in nominal terms. This safety valve would represent a cap on CO_2 allowance prices. In April 2007, the NCEP revised its proposal, raising the safety valve price to $10/ton, escalating at 5 percent per year, in real not nominal terms. The actual legislation that Senator Bingaman introduced in July 2007 further increased raised the proposed safety value figure to $12/ton in 2012, escalating thereafter at 5 percent per year, in real terms.

Q. Has AMP-Ohio provided any assessments of the global warming legislation that has been proposed in the current 110th Congress?

A. No. AMP-Ohio refused to provide any such assessments.[37] AMP-Ohio also was unwilling or unable to provide any other assessments, evaluations or projections

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36 From the National Commission on Energy Policy, www.energycommission.org.
37 AMP-Ohio's Response to Request No. 1 in Exhibit DAS-2.

of future CO2 allowance prices other than the R.W. Beck Initial Project Feasibility Study.[38]

Q. AMP-Ohio claims, in support of the CO_2 costs used by R.W. Beck, that the "costs for [the] Powerspan ECO_2 carbon dioxide capture technology has been estimated at approximately $20 per ton."[39] Is this claim credible?

A. No. The Powerspan ECO_2 carbon dioxide capture technology has not been tested on any scale beyond the laboratory. Indeed, a 1 MW test of the technology at an operating power plant, producing 20 tons of CO_2 per day, will not even be started until 2008. It will be years before it is known whether the Powerspan ECO_2 carbon dioxide technology will even be technically and commercially viable. The $20/ton cost figure cited by AMP-Ohio appears to be based solely on unproven extrapolations from lab tests and not real world experience. AMP-Ohio does not even cite in what year's dollars this $20/ton figure is supposed to be. If the $20/ton figure only reflects the cost of capturing CO_2 at the plant even this low cost should be increased by perhaps another $5-$10/ton to reflect the estimated costs of transportation and sequestration.

Q. Are there significant uncertainties associated with the Powerspan ECO_2 carbon dioxide capture technology?

A. Yes. The engineering firm of Burns and Roe Enterprises, Inc, conducted an independent due diligence review of the proposed AMPGS Project for the City of Cleveland, Division of Cleveland Public Power. Burns and Roe's October 17, 2007 Consulting Engineer's Report noted that the use of the Powerspan's ECO-SO2 on the AMPGS Project would require scaling it up by a factor of ten from the Commercial Demonstration Unit that had been successfully operated at a power

[38] AMP-Ohio's Response to Request No. 2 in Exhibit DAS-2.
[39] AMP-Ohio's Response to Request No. 9 in Exhibit DAS-2.

plant.[40] Burns and Roe also expressed concern that there are a number of significant risks associated with Powerspan's ECO-SO_2 process and concluded that

> The scale-up of the ECO-SO_2 process and its operation is a major unknown risk. This is recognized in the RW Beck report, and it is noted that presently unknown issues can be accommodated by adjustments in the field and modifications to the equipment. However, the design and operational changes that may ultimately be needed can increase the capital cost and O&M cost to the point where this system is not as economic as the conventional wet FGD system.[41]

These same conclusions are even more applicable to the Powerspan ECO$_2$ carbon capture system which has only been tested in laboratory conditions and is not scheduled for a test on even a 1 MW scale at an operating power plant until sometime in 2008. Indeed, in its discussion of CO_2 control, Burns and Roe noted that the proposed Post-Combustion CO_2 capture technologies such as the ammonia absorption process being investigated by Powerspan, "need to be demonstrated at large scales before they can be recommended for retrofit or implementation."[42]

The amount of power that the ammonia absorption processes being investigated by Powerspan and Alstom.will require (i.e., the parasitic loads they will create) also represent major uncertainties.

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40 *Consulting Engineer's Report for the American Municipal Power Generating Station located in Meigs County, Ohio*, prepared for the Division of Cleveland Public Power, City of Cleveland, dated October 16, 2007, at pages 2-8 and 2-9.

41 Id, at pages 1-2 and 2-13.

42 Id, at page 5-4.

Q. Did AMP-Ohio provide any documents to support the claimed $20/ton cost for the Powerspan ECO_2 carbon dioxide capture technology?

A. No. The Citizen Groups asked AMP-Ohio several interrogatories and document requests seeking information with which we could evaluate the claimed $20/ton cost for the Powerspan ECO_2 carbon dioxide capture technology:

> Question 43: Please provide copies of any assessments or estimates, prepared by or for AMP-Ohio, of the potential costs of retrofitting the proposed plant for carbon capture and sequestration equipment (including all aspects of such retrofit, such as the need to increase generating capacity to account for parasitic load loss) when that technology becomes commercially viable.
>
> Question 44: Please provide copies of any assessments or estimates, prepared by or for AMP-Ohio, which have addressed or examined the operating costs, performance penalties, and/or additional fuel needs that can be expected to be experienced as a result of the addition and use of carbon capture and sequestration equipment.

AMP-Ohio either was unwilling or unable to provide the requested documentation. Instead, it provided the following narrative response and referred back to two earlier narrative responses that also contained absolutely no calculations, engineering or economic information supporting or justifying the $20/ton carbon dioxide capture cost estimate:

> See Responses to Requests 38 and 40. Legislation/regulations for CCS are not in effect. However, AMPGS has given consideration of the potential savings that could materialize with Powerspan. Based on estimates presented by Powerspan, the cost of an ammonia absorption system on a power plant equipped with the Powerspan SO_2 process comparable to AMPGS is estimated at approximately $20/ton.[43]

[43] AMP-Ohio's Response to Request 43 in Exhibit DAS-2.

Q. Have you seen any other estimates for the cost of carbon capture and sequestration at proposed pulverized coal plants such as the proposed AMPGS Project?

A. Yes. Hope has been expressed concerning potential technological improvements and learning curve effects that might reduce the estimated cost of carbon capture and sequestration. However, I have seen recent studies by objective sources that estimate that the cost of carbon capture and sequestration could increase the cost of producing electricity at pulverized coal-fired power plants by 60-80 percent, on a $/MWh basis.

For example, a very recent study by the National Energy Technology Laboratory ("NETL") projects that the cost of carbon capture and sequestration would be $75/tonne[44] of CO_2 avoided, in 2007 dollars, for pulverized coal plants.[45] This translates in to $65/ton of CO_2 avoided, in 2005 dollars.

The March 2007 "Future of Coal Study" from the Massachusetts Institute of Technology estimated that the cost of carbon capture and sequestration would be about $28/ton although it also acknowledged that there was uncertainty in that figure.[46] The tables in that study also indicated significantly higher costs for carbon capture for pulverized coal facilities, in the range of about $40/ton and higher.[47]

Similarly, in a recent proceeding at the West Virginia Public Service Commission, Appalachian Power Company has estimated the costs of electricity from a number of coal-fired technologies with and without carbon capture and

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44 A tonne or metric ton is a measurement of mass equal to 1,000 kilograms or 1.1 tons.
45 *Cost and Performance Baseline for Fossil Energy Plants*, National Energy Technology Laboratory, Revised August 2007, at page 27.
46 *The Future of Coal, Options for a Carbon-Constrained World*, Massachusetts Institute of Technology, March 2007, at page xi.
47 Id, at page 19.

sequestration.[48] Appalachian Power estimates that the cost of just capturing the CO_2 emissions from a new pulverized coal plant would be approximately $43-$46/MWh on a levelized basis.

Also, in its Consulting Engineer's Report for the Division of Cleveland Public Power, Burns and Roe cited estimated costs of capture of CO_2 at between $20 and $60/ton of CO_2 avoided.[49] This is within the general range of estimates that I have seen from the industry.

However, even when the technology for CO_2 capture matures, there will always be significant regional variations in the cost of storage due to the proximity and quality of storage sites.

Q. Is there any consensus when carbon capture and sequestration technology will become commercially viable for pulverized coal plants like the AMPGS Project?

A. No. I have seen estimates that carbon capture and sequestration technology may be proven and commercially viable from as early as 2015 to 2030 or later, if, indeed, it is ever proven to be technically and commercially viable.

For example, the February 2007 *Future of Coal* study from the Massachusetts Institute of Technology:

> Many years of development and demonstration will be required to prepare for its successful, large scale adoption in the U.S. and elsewhere. A rushed attempt at CCS [carbon capture and sequestration] implementation in the face of urgent climate concerns could lead to excess cost and heightened local

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[48] Appalachian Power Company witness Renchek's Exhibit MWR-4, revised, in West Virginia Case No. 06-0033-E-CN.

[49] *Consulting Engineer's Report for the American Municipal Power Generating Station located in Meigs County, Ohio*, prepared for the Division of Cleveland Public Power, City of Cleveland, dated October 16, 2007, at page 5-4.

environmental concerns, potentially lead to long delays in implementation of this important option.[50]

Q. Has AMP-Ohio provided any assessments of the potential or the feasibility of sequestering the CO_2 from the proposed AMPGS Project?

A. No. The Citizen Groups requested that information. However, AMP-Ohio was unwilling or unable to provide any such assessments of the potential for or feasibility of sequestering the CO_2 that would be produced at the proposed AMPGS Project.[51]

Q. Are the CO_2 price forecasts used by R.W. Beck in developing the Power Supply Plans for AMP-Ohio member communities and in the *Initial Project Feasibility Study* reasonable in light of the uncertainty surrounding future CO_2 costs and the stringent reductions in CO_2 emissions that would be required under the global warming bills that have been introduced in the current U.S. Congress?

A. No. First, the CO_2 price forecasts used in the February 2007 Power Supply Plans and in the *Initial Project Feasibility Study* are too low considering the proposals that are currently under review in Congress. In addition, given all of the uncertainties it would be prudent to review a wide range of forecasts in resource planning, not just a single price trajectory or a narrow range of forecasts.

Q. Has Synapse developed a carbon price forecast that would assist the Power Siting Board in evaluating the proposed the AMPGS?

A. Yes. Synapse's forecast of future carbon dioxide emissions prices are presented in Figure 3 below.

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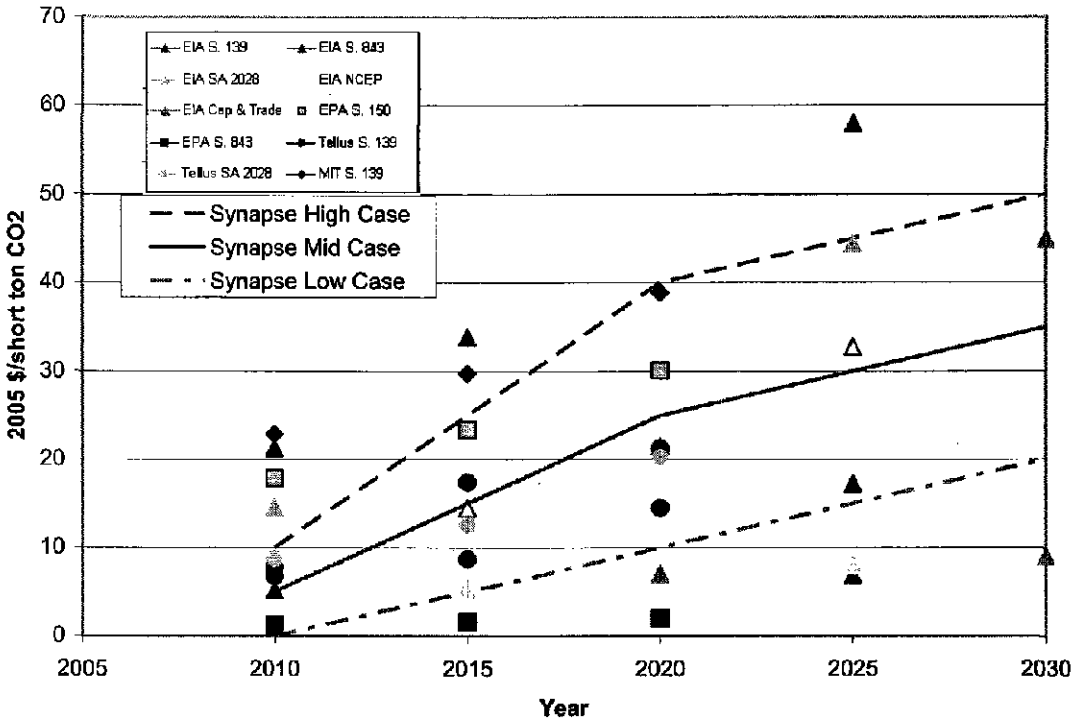
50 *The Future of Coal, Options for a Carbon-Constrained World, an Interdisciplinary MIT Study*, February 2007, at page 15.

51 AMP-Ohio's Response to Request No. 38 in Exhibit DAS-2.

Figure 3. Synapse Carbon Dioxide Prices



Q. What is Synapse's carbon price forecast on a levelized basis?

A. Synapse's forecast, levelized[52] over 20 years, 2011 – 2030, is provided in Table 4 below.

Table 4: Synapse's Levelized Carbon Price Forecast (2005$/ton of CO_2)

Low Case	Mid Case	High Case
$8.23	$19.83	$31.43

[52] A value that is "levelized" is the present value of the total cost converted to equal annual payments. Costs are levelized in real dollars (i.e., adjusted to remove the impact of inflation).

Q. When were the Synapse CO_2 emission allowance price forecasts shown in Figure 3 developed?

A. The Synapse CO_2 emission allowance price forecasts were developed in the Spring of 2006.

Q. How were these CO_2 price forecasts developed?

A. The basis for the Synapse CO_2 price forecasts is described in detail in Exhibit DAS-4, starting on page 41 of 63.

In general, the price forecasts were based, in part, on the results of economic analyses of individual bills that had been submitted in the 108th and 109th Congresses. We also considered the likely impacts of state, regional and international actions, the potential for offsets and credits, and the likely future trajectories of both emissions constraints and technological program.

Q. Are the Synapse CO_2 price forecasts shown in Figure 3 based on any independent modeling?

A. Yes. Although Synapse did not perform any new modeling to develop our CO_2 price forecasts, our CO_2 price forecasts were based on the results of independent modeling prepared at the Massachusetts Institute of Technology ("MIT"), the Energy Information Administration of the Department of Energy ("EIA"), Tellus, and the U.S. Environmental Protection Agency ("EPA").[53]

[53] See Table 6.2 on page 42 of 63 of Exhibit DAS-4.

Q. Do the triangles, squares, circles and diamond shapes in Figure 3 above reflect the results of all of the scenarios examined in the MIT, EIA, EPA and Tellus analyses upon which Synapse relied?

A. As a general rule, Synapse focused our attention either on the modeler's primary scenario or on the presented high and low scenarios to bracket the range of results.

For example, the blue triangles in Figure 3 represent the results from EIA's modeling of the 2003 McCain-Lieberman bill, S.139. Synapse used the results from EIA's primary case which reflected the bill's provisions that allowed: (a) allowance banking; (b) use of up to 15 percent offsets in Phase 1 (2010-2015) and up to 10 percent offsets in Phase II (2016 and later years). The S.139 case also assumed commercial availability of advanced nuclear plants and of geological carbon sequestration technologies in the electric power industry.

Similarly, the blue diamonds in Figure 3 represent the results from MIT's modeling of the same 2003 McCain-Lieberman bill, S.139. MIT examined 14 scenarios which considered the impact of factors such as the tightening of the cap in Phase II, allowance banking, availability of outside credits, and assumptions about GDP and emissions growth. Synapse included the results from Scenario 7 which included allowance banking and zero-cost credits, which effectively relaxed the cap by 15% and 10% in Phase I and Phase II, respectively. Synapse selected this scenario as the closest to the S.139 legislative proposal since it assumed that the cap was tightened in a second phase, as in Senate Bill 139.

At the same time, some of the studies only included a single scenario representing the specific features of the legislative proposal being analyzed. For example, the Amended 2003 McCain Lieberman bill (SA 2028) set the emissions cap at constant 2000 levels and allowed for 15 percent of the carbon emission reductions to be met through offsets from non-covered sectors, carbon sequestration and qualified international sources. EIA presented one scenario in its table for this

policy. The results from this scenario are presented in the green triangles in Figure 3.

Q. What factors will affect the cost of CO_2 emissions allowances?

A. Exhibit DAS-4 identifies a number of factors that will affect projected allowance prices. These factors include: the base case emissions forecast; whether there are complementary policies such as aggressive investments in energy efficiency and renewable energy independent of the emissions allowance market; the policy implementation timeline; the reduction targets in a proposal; program flexibility involving the inclusion of offsets (perhaps international) and allowance banking; technological progress; and emissions co-benefits.[54] In particular, Synapse anticipates that technological innovation will temper allowance prices in the out years of our forecast.

Q. Could carbon capture and sequestration be a technological innovation that might temper or even put a ceiling on CO_2 emissions allowance prices?

A. Yes.

Q. Do the Synapse CO_2 price forecasts reflect the potential for the inclusion of domestic offsets and, perhaps, international offsets in U.S. carbon regulation policy?

A. Yes. Even the Synapse high CO_2 price forecast is consistent with, and in some cases lower than, the results of studies that assume the use of some levels of offsets to meet mandated emission limits. For example, as shown in Figure 6 the highest price scenarios in the years 2015, 2020 and 2025 were taken from the EIA and MIT modeling of the original and the amended McCain-Lieberman proposals. Each of the prices for these scenarios shown in Figure 3 reflects the allowed use of offsets.

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[54] Exhibit DAS-4, at pages 46 to 49 of 63.

Q. How do the Synapse CO_2 price forecasts compare to AMP-Ohio's CO_2 price forecast?

A. The Synapse CO_2 price forecasts and the long-term CO_2 price forecast used in the June 2007 *Initial Project Feasibility Study* are shown in Figure 3 below:

Figure 4: Synapse and AMP-Ohio CO_2 Price Forecasts

Thus, the term CO_2 price forecasts used in both **[REDACTED]** and the June 2007 *Initial Project Feasibility Study* are very low compared to the Synapse forecasts.

Q. Do you believe that the Synapse CO_2 price forecasts remain valid despite being based, in part, on analyses from 2003-2005 which examined legislation that was proposed in past Congresses?

A. Yes. Synapse believes it is important for the Power Siting Board to rely on the most current information available about future CO_2 emission allowance prices, as long as that information is objective and credible. The analyses upon which Synapse relied when we developed our CO_2 price forecasts were the most recent analyses and technical information available when Synapse developed its CO_2

price forecasts in the Spring of 2006. However, new information shows that our CO_2 prices remain valid even though the original bills that comprised part of the basis for the forecasts expired at the end of the Congress in which they were introduced.

Most importantly, many of the new greenhouse gas regulation bills that have been introduced in Congress are significantly more stringent than the bills that were being considered prior to the spring of 2006. This increased stringency of current bills can be expected to lead to higher CO_2 emission allowance prices. The higher forecast natural gas prices that are being forecast today, as compared to the natural gas price forecasts from 2003 or 2004, also can be expected to lead to higher CO_2 emissions allowance prices.

Q. Do the Synapse carbon price forecasts presented in Figure 3 reflect the emission reduction targets in the bills that have been introduced in the current Congress?

A. No. Synapse developed our price forecasts late last spring and relied upon bills that had been introduced in Congress through that time. The bills that have been introduced in the current US Congress generally would mandate much more substantial reductions in greenhouse gas emissions than the bills that we considered when we developed our carbon price forecasts. Consequently, we believe that our forecasts are conservative but consistent with the climate change legislation that has been introduced in the current Congress.

Q. How do the Synapse and AMP-Ohio CO_2 price forecasts compare to the expected prices of CO_2 emissions allowances under the legislation currently being considered in the U.S. Congress?

A. Figure 5 below compares the Synapse and AMP-Ohio CO_2 price forecast used in the February 2007 Power Supply Plans to the projected prices of CO_2 emissions allowances developed in recent studies of the prices that would be needed to

achieve the emissions reduction targets in global warming legislation that has been introduced in the current Congress. These studies include:

- Analyses of Senate Bill S.280, the current McCain-Lieberman proposal, by the U.S. Environmental Protection Agency ("EPA") and the Energy Information Administration of the U.S. Department of Energy ("EIA").[55] The EPA examined seven different scenarios reflecting a range of assumptions concerning such important factors as the levels of offsets that would be allowed and the assumed levels of nuclear generation. The EIA examined eight different scenarios. Figure 5 shows the range of levelized costs in the scenarios studied by the EPA and the EIA.

- An Assessment of U.S. Cap-and-Trade Proposals was recently issued by the MIT Joint Program on the Science and Policy of Global Change. This Assessment evaluated the impact of the greenhouse gas regulation bills that are being considered in the current Congress. [56] The range of CO_2 costs for the three core scenarios studied by MIT are shown in Figure 5. These three scenarios analyzed (1) a reduction of greenhouse gas emissions of 80 percent from current levels by 2050; (2) a reduction of greenhouse gas emissions of 50 percent from current levels by 2050; and (3) stabilization of CO_2 emissions at year 2008 levels.

Figure 5 also includes the following:

- The safety valve prices in Senate Bill S. 1766, the Low Carbon Economy Act, which is the global warming legislation submitted in July by Senators Bingaman and Specter. The safety valve price in this proposal starts at $12/ton in 2012 and escalates at a real rate of 5 percent per year.

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55 *Energy Market and Economic Impacts of S. 280, the Climate Stewardship and Innovation Act of 2007,* Energy Information Administration, July 2007, Supplement to the Energy and Markets Impacts of S. 280, Energy Information Administration, October 2007, and *EPA Analysis of the Climate Stewardship and Innovation Act of 2007, S. 280 in 110th Congress*, July 16, 2007.

56 Twenty nine scenarios were modeled in the April 2007 MIT Assessment. These scenarios reflected differences in such factors as emission reduction targets (that is, reduce CO_2 emissions 80% from 1990 levels by 2050, reduce CO_2 emissions 50% from 1990 levels by 2050, or stabilize CO_2 emissions at 2008 levels), whether banking of allowances would be allowed, whether international trading of allowances would be allowed, whether only developed countries or the U.S. would pursue greenhouse gas reductions, whether there would be safety valve prices adopted as part of greenhouse gas regulations, and other factors.
In general, the ranges of the projected CO_2 prices in these scenarios were higher than the range of CO_2 prices in the Synapse forecast. For example, twelve of the 29 scenarios modeled by MIT projected higher CO_2 prices in 2020 than the high Synapse forecast. Fourteen of the 29 scenarios (almost half) projected higher CO_2 prices in 2030 than the high Synapse forecast. The full results of the MIT study are presented in Exhibit DAS-6.

- The range of CO_2 prices that the New Mexico Public Regulation Commission has ordered that utilities should consider a range of CO_2 prices in their resource planning.[57] This range runs from $8 to $40 per metric ton, beginning in 2010 and increasing at the overall 2.5 percent rate of inflation.
- The range of CO_2 prices that Xcel Energy has recently announced that it would use in its resource planning.[58]
- A CO_2 price forecast that the Indiana Utility Regulatory Commission recently found were reasonable for Duke Energy Indiana to use in its resource planning for a proposed IGCC power plant.[59]

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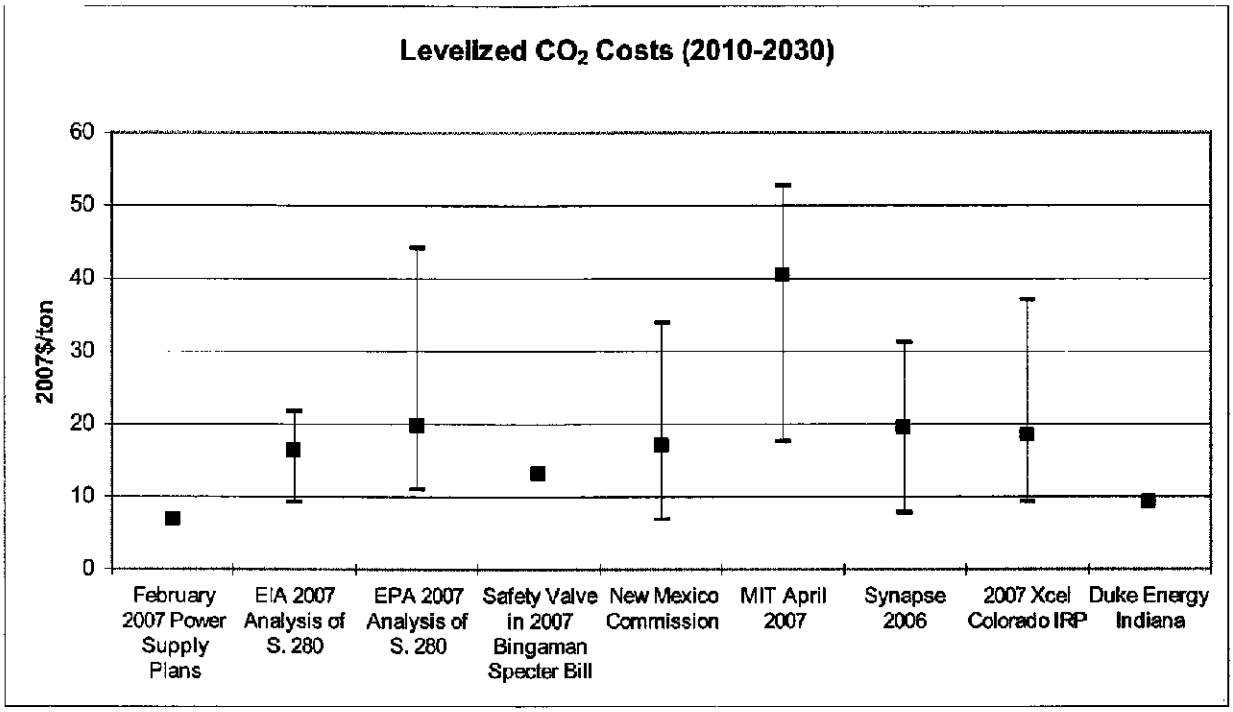
57 A copy of the New Mexico Commission's June 2007 Order is included as Exhibit DAS-5.

58 Public Service Company of Colorado, *2007 Colorado Resource Plan*, Volume 2 Technical Appendix, at page 2-30.

59 Order of the Indiana Utility Regulatory Commission in Cause 43114, dated November 20, 2007, at page 30.

Figure 5: Synapse and AMP-Ohio CO_2 Price Forecasts Used to Develop Power Supply Plans Compared to Other Recent Forecasts



Thus, on a levelized basis, the AMP-Ohio and R.W. Beck CO_2 price forecast used to develop the February 2007 Power Supply Plans for AMP-Ohio member communities is significantly lower than the ranges of CO_2 prices forecast by the EPA, EIA and MIT based on the legislative proposals in the current U.S. Congress and also is lower than recent forecasts of the New Mexico Public Regulation Commission and Xcel Energy. The AMP-Ohio and R.W. Beck CO_2 price forecast used to develop the Power Supply Plans also is lower than the recent Duke Energy Indiana forecast accepted by the Indiana Utility Regulatory Commission and the safety valve prices in Senate Bill S. 1766, the Bingaman-Specter global warming legislation.

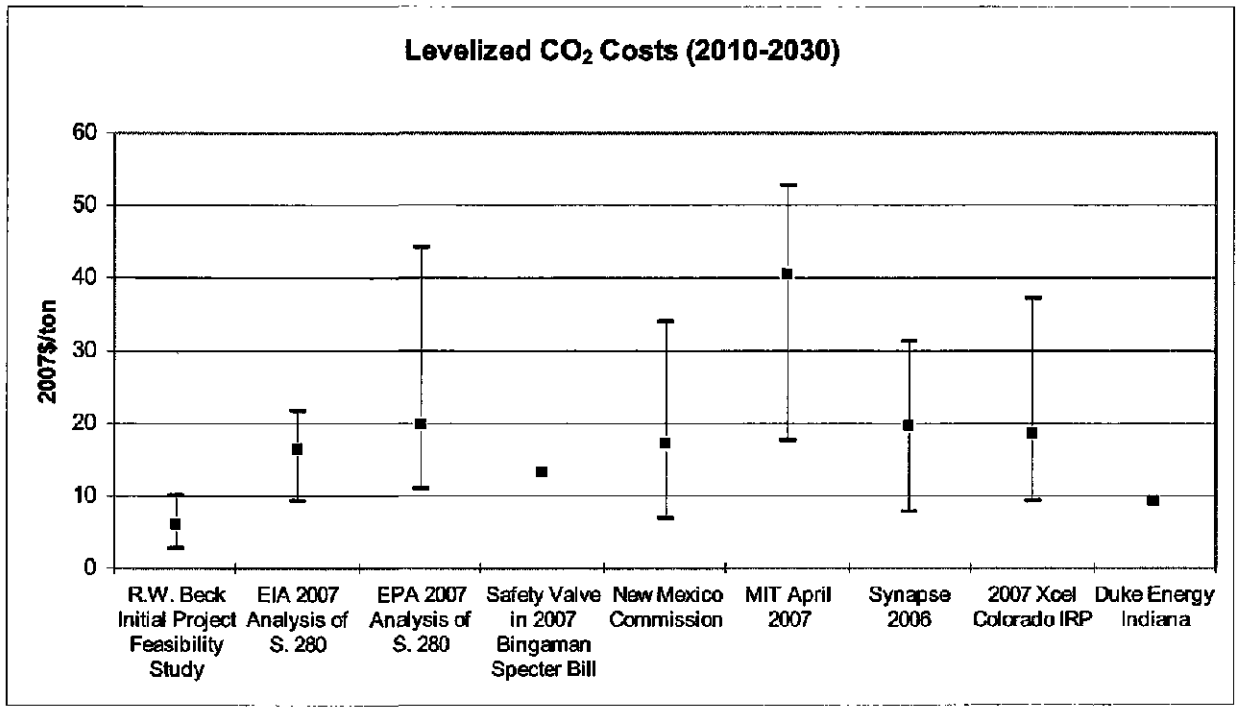
In contrast, the Synapse CO_2 price forecasts are consistent with than the ranges of CO_2 prices forecast by the EPA, EIA and MIT based on the legislative proposals in the current U.S. Congress, the safety valve prices in Senate Bill S. 1766, and

the forecast ranges of the New Mexico Public Regulation Commission and Xcel Energy.

Q. How do the Synapse and the CO_2 price forecast presented in R.W. Beck's *Initial Project Feasibility Study* compare to the expected prices of CO_2 emissions allowances under the legislation currently being considered in the U.S. Congress?

A. Figure 6, below, compares, on a levelized basis, the Synapse CO_2 price forecasts and the CO_2 price forecast from the June 2007 *Initial Project Feasibility Study* with the same forecasts that are included in Figure 5 above.

Figure 6: Synapse and CO_2 Price Forecasts from June 2007 *Initial Project Feasibility Study*



The comparison in Figure 6 shows that the range of CO_2 prices that R.W. Beck considered in the June 2007 *Initial Project Feasibility Study* is narrow and is substantially below the ranges of CO_2 prices forecast by the EPA, EIA and MIT

based on the legislative proposals in the current U.S. Congress and recent forecasts of the New Mexico Public Regulation Commission and Xcel Energy. The top end of the range of CO_2 prices considered by R.W. Beck in its risk assessment also is just about the same as the Duke Energy Indiana forecast recently accepted by the Indiana Utility Regulatory Commission but is below the safety valve prices in Senate Bill S. 1766, the Bingaman-Specter global warming legislation.

Q. Why is there a range of levelized CO_2 prices for the June 2007 *Initial Project Feasibility Study?*

A. The high and low ends of the range of levelized CO_2 prices for the June 2007 *Initial Project Feasibility Study* shown in Figure 6 above reflect the high and low CO_2 forecasts that R.W. Beck considered when it developed the expected values for future CO_2 prices shown in my Table 3 and in Table 4-7 on page 4-18 of the *Initial Project Feasibility Study*. As can be seen from my Figure 6 and from Figure 7-8 in the *Initial Project Feasibility Study,* R.W. Beck considered only a very narrow range of possible CO_2 prices when developing the expected values it used in the *Initial Project Feasibility Study* and in the Analysis of Potential Project Risks contained therein. That is why R.W. Beck is able to conclude that varying CO_2 prices would not have a significant impact on the overall cost of power from the AMPGS Project. In R.W. Beck's Analysis of Potential Project Risks, the price of power from the AMPGS Project does not vary much when CO_2 prices are changed because R.W. Beck only allows that only very minor changes in CO_2 prices will occur. As I have shown this is an extremely unreasonable assumption.

Q. Would it be reasonable to assume that a new pulverized coal-fired plant like the AMPGS will be grandfathered under federal climate change legislation or will be favored with the provision of extra CO_2 emission allowance allocations that could mitigate or offset the impact of CO_2 regulations?

A. No. It is unclear what provisions for grandfathering existing coal plants, if any, will be adopted as part of future greenhouse gas legislation. At the same time, it is unrealistic to expect that many or all of the new coal-fired plants currently being proposed will be grandfathered because of the substantial reductions in CO_2 emissions from current levels that have to be made by 2050 just to stabilize atmospheric concentrations of CO_2 at 450 ppm to 550 ppm.

Meeting these goals will require either a reduction in dependence on coal for electricity generation or a very large investment in conversion of the current coal generating fleet in the U.S. The only realistic way either of these is going to happen is with a large marginal cost on greenhouse gas emissions such as a CO_2 tax or higher emissions allowance prices. It is not reasonable to expect that a new pulverized coal plant, like the AMPGS, which will substantially increase the emissions of CO_2 into the atmosphere, will receive significant emission allowances under any U.S. carbon regulation plan.

For example, the National Commission on Energy Policy has recently recommended that "new coal plants built without [carbon capture and sequestration] not be "grandfathered" (i.e., awarded free allowances) in any future regulatory program to limit greenhouse gas emissions."[60] A report of an interdisciplinary study at the Massachusetts Institute of Technology on *The Future of Coal* similarly noted that:

> There is the possibility of a perverse incentive for increased early investment in coal-fired power plants without capture, whether

[60] *Energy Policy Recommendations to the President and the 110th Congress*, National Commission on Energy Policy, April 2007, at page 21.

> SCPC or IGCC, in the expectation that the emissions from these plants would potentially be "grandfathered" by the grant of free CO_2 allowances as part of future carbon emissions regulations and that (in unregulated markets) they would also benefit from the increase in electricity prices that will accompany a carbon control regime. Congress should act to close this "grandfathering" loophole before it becomes a problem.[61]

Additionally, it has been proposed in Congress that new coal-fired plants would be required to actually have carbon capture and sequestration technology. For example, a bill by Massachusetts Senator Kerry's bill limit CO_2 emissions from new coal-fired facilities to 285 lbs/MWh. New coal-fired facilities would be defined as those that begin construction on or after April 26, 2007 and would certainly include the proposed AMPGS Project.

Q. What is AMP-Ohio's position regarding the likelihood that the emissions from the AMPGS Project will be grandfathered under federal greenhouse gas legislation?

A. AMP-Ohio has said that it cannot predict future legislation/regulations regulating greenhouse gas emissions.[62]

Q. Is it possible that natural gas demand could be higher due to CO_2 emission regulations and, as a result, natural gas prices can be expected to be higher than otherwise would be the case?

A. Yes. However, the effect is very complicated and will depend on a number of factors such as how much new natural gas capacity is built as a result of the higher coal-plant operating costs due to the CO_2 emission allowance prices, how much additional DSM and renewable alternatives become economic and are added to the U.S. system, the levels and prices of any incremental natural gas

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61 *The Future of Coal, Options for a Carbon-Constrained World, an Interdisciplinary MIT Study*, March 2007, at page (xiv).

62 AMP-Ohio Response to Request No. 45 in Exhibit DAS-2.

imports, and changes in the dispatching of the electric system. There it is very difficult to determine, at this time, the amount by which natural gas prices might be raised due to CO_2 emission regulations.

Q. What are you recommendations concerning the CO_2 prices that the Power Siting Board and the AMP-Ohio member communities should use in evaluating AMP-Ohio proposed AMPGS Project?

A. Given the uncertainty associated with the legislation that eventually will be passed by Congress, we believe that the Power Siting Board should use the Synapse range of forecasts of CO_2 prices shown in Figure 3 above to evaluate the relative economics of the proposed AMPGS plant.

Q. How much additional CO_2 would the AMPGS Project emit into the atmosphere?

A. AMP-Ohio has projected that the AMPGS will emit 7,367,000 tons of CO_2 annually.[63]

Q. What would be the annual costs of greenhouse gas regulations to AMP-Ohio and the customers of the participants in the AMPGS Project under the Synapse CO_2 price forecasts if AMP-Ohio proceeds with the proposed AMPGS Project?

A. The annual expenditures on CO_2 emissions allowances that the participants in the AMPGS would have to pay in 2015, 2020 and 2030 under the Synapse low, mid and high price forecasts are shown in Table 5 below:

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[63] *Initial Project Feasibility Study*, Attachment ES-1.

Table 5: Annual AMPGS Project Participant CO_2 Emissions Allowances Payments under Synapse Price Forecasts

Year	Synapse Low CO_2 Price Forecast ($Millions)	Synapse Mid CO_2 Price Forecast ($Millions)	Synapse High CO_2 Price Forecast ($Millions)
2015	$42	$125	$208
2020	$83	$208	$333
2030	$167	$292	$417

4. AMP-Ohio Has Not Adequately Considered The Risk Of Further Increases In The Estimated Cost Of The AMPGS Project

Q. What is the currently estimated cost for The AMPGS?

A. The currently estimated cost of the AMPGS Project, without interest and other financing-related costs, is $2.533 billion.[64] The currently estimated cost, with interest and other financing-related costs is $2.91 billion.[65]

Q. Have you been able to evaluate the reasonableness of this cost estimate?

A. No. AMP-Ohio refused to provide the workpapers and source documents which formed the basis for the current cost estimate for the AMPGS Project.[66] AMP-Ohio also refused to provide any evidence that supports the claim that this cost estimate "reflects equipment, material and labor market conditions in the region of the AMPGS as of the date of the *Initial Project Feasibility Study.*[67]

Q. What is the current status of the AMPGS Project?

A. It appears from the Burns and Roe evaluation for the Division of Cleveland Public Power that the project design is still in a conceptual state:[68]

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64 Table 1 on page ES-7 of the June 2007 R.W. Beck *Initial Project Feasibility Study.*
65 Table 2 on page ES-8 of the June 2007 R.W. Beck *Initial Project Feasibility Study.*
66 AMP-Ohio Response to Request No. 32.a. in Exhibit DAS-2.
67 AMP-Ohio Response to Request No. 32.b. in Exhibit DAS-2.
68 *Consulting Engineer's Report for the American Municipal Power Generating Station located in Meigs County, Ohio*, for the Division of Cleveland Public Power, Burns and Roe Enterprises, Inc., October 16, 2007, at page 10-1.

> In performing our due diligence review of a conceptual cost estimate, BREI relied on current in-house cost data for plants of a similar size. A more detailed review could not take place at this time since engineering has not begun and bulk quantities for items such as concrete, structural steel, building sizing, piping, electrical cable, conduit and tray, etc., have not been developed. Budget quotations for most major equipment have not been obtained, which further restricted our review to the use of current in-house data.[69]

Q. Is it even certain that the AMPGS Project would be a subcritical pulverized coal power plant?

A. No, it appears that the overall plant technology is not yet set. Burns and Roe noted in its Report for the Division of Cleveland Public Power that it "believes there are significant risks that this technology [subcritical] will be challenged in the air permitting process leading to potential delays in receipt of permits and thereby impacting the commercial operation date. There is a reasonable probability that the project will be forced to make a change to supercritical technology."[70] Burns and Roe further noted that in a conference call held on September 28, 2007, AMP-Ohio "stated that the EPC Contractors will be given the opportunity to propose a supercritical pulverized coal plant as an alternate to the subcritical plant."[71]

Q. What conclusion did Burns and Roe reach concerning the currently estimated cost for the AMPGS Project?

A. Burns and Roe found the current cost estimate to be in the range of the expected cost for a two unit subcritical coal-fired power plant of its size and design.[72] However, Burns and Roe warned that the escalation estimate "may not be

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69 Id.
70 Id, at page 2-3.
71 Id, at page 2-4.
72 Id, at page 1-3.

conservative as seen by significant increases in construction materials costs in recent years."[73]

Q. Is it reasonable to expect that the actual cost of the project will be higher than AMP-Ohio now estimates?

A. Yes. The costs of building power plants have soared in recent years as a result of the worldwide demand for power plant design and construction resources and commodities. There is no reason to expect that plant costs will not continue to rise during the years when the detailed engineering, procurement and construction of the AMPGS will be underway. This is especially true given the extremely early stage of the engineering and procurement for the project.

For example, Duke Energy Carolinas' originally estimated cost for the two unit coal-fired Cliffside Project was approximately $2 billion. In the fall of 2006, Duke announced that the cost of the project had increased by approximately 47 percent ($1 billion). After the project had been downsized because the North Carolina Utilities Commission refused to granted a permit for two units, Duke announced that the cost of that single unit would be about $1.53 billion, not including financing costs. In late May 2007, Duke announced that the cost of building that single unit had increased by about another 20 percent. As a result, the estimated cost of the one unit that Duke is building at Cliffside is now $1.8 billion exclusive of financing costs. Thus, the single Cliffside unit is now expected to cost almost as much as Duke originally estimated for a two unit plant.

Q. Did Duke explain to the North Carolina Utilities Commission the reasons for the skyrocketing cost of the Cliffside Project?

A. Yes. In testimony filed at the North Carolina Utilities Commission on November 29, 2006, Duke Energy Carolinas emphasized that the competition for resources

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[73] Id.

had had a significant impact on the costs of building new power plants. This testimony was presented to explain the approximate 47 percent ($1 billion) increase in the estimated cost of Duke Energy Carolinas' proposed coal-fired Cliffside Project that AMP-Ohio announced in October 2006.

For example, Duke Energy Carolinas explained that:

> The costs of new power plants have escalated very rapidly. This effect appears to be broad based affecting many types of power plants to some degree. One key steel price index has doubled over the last twelve months alone. This reflects global trends as steel is traded internationally and there is international competition among power plant suppliers. Higher steel and other input prices broadly affects power plant capital costs. A key driving force is a very large boom in U.S. demand for coal power plants which in turn has resulted from unexpectedly strong U.S. electricity demand growth and high natural gas prices. Most integrated U.S. utilities have decided to pursue coal power plants as a key component of their capacity expansion plan. In addition, many foreign companies are also expected to add large amounts of new coal power plant capacity. This global boom is straining supply. Since coal power plant equipment suppliers and bidders also supply other types of plants, there is a spill over effect to other types of electric generating plants such as combined cycle plants.[74]

Duke further noted that the actual coal power plant capital costs as reported by plants already under construction exceed government estimates of capital costs by "a wide margin (i.e., 35 to 40 percent). Additionally, current announced power plants appear to face another increase in costs (i.e., approximately 40 percent addition."[75] Thus, according to Duke, new coal-fired power plant capital costs had increased approximately 90 to 100 percent since 2002.

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[74] Direct Testimony of Judah Rose for Duke Energy Carolinas, North Carolina Utilities Commission Docket No. E-7, SUB 790, at page 4, lines 2-14. Mr. Rose's testimony is available on the North Carolina Utilities Commission website.

[75] Ibid, at page 6, lines 5-9, and page 12, lines 11-16.

Q. Have other coal-fired plant projects experienced similar cost increases?

A. Yes. A large number of projects have announced significant construction cost increases over the past few years. For example, the cost of Westar's proposed coal-fired plant in Kansas, originally estimated at $1 billion, increased by 20 percent to 40 percent, over just 18 months.

The estimated cost of the now-cancelled Taylor Energy Center in Florida increased by 25 percent, $400 million, in just 17 months between November 2005 and March 2007. The estimated cost of the Big Stone II coal-fired power plant project in South Dakota has increased by about 60 percent since the project was first announced. Finally, the estimated cost of the Little Gypsy Repowering Project (gas to coal) increased by 55 percent between announcement of the project in April 2007 and the filing of a request for a license to build in July 2007.

Q. What are the sources of the worldwide competition for power plant design and construction resources, commodities and equipment?

A. The worldwide competition is driven mainly by huge demands for power plants in China and India, by a rapidly increasing demand for power plants and power plant pollution control modifications in the United States required to meet SO_2 and NO_x emissions standards, and by the competition for resources from the petroleum refining industry. The demand for labor and resource to rebuild the Gulf Coast area after Hurricanes Katrina and Rita hit in 2005 also has contributed to rising costs for construction labor and materials. The expected construction of new nuclear power plants also is expected to compete for limited power plant design and construction resources, manufacturing capacity and commodities.

Q. Is it commonly accepted that domestic United States and worldwide competition for power plant design and construction resources, commodities and manufacturing have led to these significant increases in power plant construction costs in recent years?

A. Yes. A wide range of energy, construction and financial industry studies have identified the worldwide competition for power plant resources as the driving force for the skyrocketing construction costs.

For example, a June 2007 report by Standard & Poor's, *Increasing Construction Costs Could Hamper U.S. Utilities' Plan to Build New Power Generation*, has noted that:

> As a result of declining reserve margins in some U.S. regions ... brought about by a sustained growth of the economy, the domestic power industry is in the midst of an expansion. Standing in the way are capital costs of new generation that have risen substantially over the past three years. Cost pressures have been caused by demands of global infrastructure expansion. In the domestic power industry, cost pressures have arisen from higher demand for pollution control equipment, expansion of the transmission grid, and new generation. While the industry has experienced buildout cycles in the past, what makes the current environment different is the supply-side resource challenges faced by the construction industry. A confluence of resource limitations have contributed, which Standard & Poors' Rating Services broadly classifies under the following categories
>
> - Global demand for commodities
> - Material and equipment supply
> - Relative inexperience of new labor force, and
> - Contractor availability
>
> The power industry has seen capital costs for new generation climb by more than 50% in the past three years, with more than 70% of this increase resulting from engineering, procurement and construction (EPC) costs. Continuing demand, both domestic and international, for EPC services will likely keep costs at elevated levels. As a result, it is possible that with declining reserve

> margins, utilities could end up building generation at a time when labor and materials shortages cause capital costs to rise, well north of $2,500 per kW for supercritical coal plants and approaching $1,000 per kW for combined-cycle gas turbines (CCGT). In a separate yet key point, as capital costs rise, energy efficiency and demand side management already important from a climate change perspective, become even more crucial as any reduction in demand will mean lower requirements for new capacity.[76]

More recently, the president of the Siemens Power Generation Group told the New York Times that "There's real sticker shock out there."[77] He also estimated that in the last 18 months, the price of a coal-fired power plant has risen 25 to 30 percent.

A September 2007 report on *Rising Utility Construction Costs* prepared by the Brattle Group for the EDISON Foundation similarly concluded that:

> Construction costs for electric utility investments have risen sharply over the past several years, due to factors beyond the industry's control. Increased prices for material and manufactured components, rising wages, and a tighter market for construction project management services have contributed to an across-the-board increase in the costs of investing in utility infrastructure. These higher costs show no immediate signs of abating.[78]

The report further found that:

- Dramatically increased raw materials prices (e.g., steel, cement) have increased construction cost directly and indirectly through the higher cost of manufactured components common in utility infrastructure projects. These cost increases have primarily been due to high global demand for commodities and manufactured goods, higher production and transportation costs (in part owing to high fuel prices), and a weakening U.S. dollar.

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[76] *Increasing Construction Costs Could Hamper U.S. Utilities' Plans to Build New Power Generation*, Standard & Poor's Rating Services, June 12, 2007, at page 1. A copy of this report is included in Exhibit DAS-7.

[77] "Costs Surge for Building Power Plants, *New York Times*, July 10, 2007.

[78] *Rising Utility Construction Costs: Sources and Impacts*, prepared by The Brattle Group for the EDISON Foundation, September 2007, at page 31. A copy of this report is attached as Exhibit DAS-8.

- Increased labor costs are a smaller contributor to increased utility construction costs, although that contribution may rise in the future as large construction projects across the country raise the demand for specialized and skilled labor over current or project supply. There also is a growing backlog of project contracts at large engineering, procurement and construction (EPC) firms, and construction management bids have begun to rise as a result. Although it is not possible to quantify the impact on future project bids by EPC, it is reasonable to assume that bids will become less cost-competitive as new construction projects are added to the queue.

- The price increases experienced over the past several years have affected all electric sector investment costs. In the generation sector, all technologies have experienced substantial cost increases in the past three years, from coal plants to windpower projects.... As a result of these cost increases, the levelized capital cost component of baseload coal and nuclear plants has risen by $20/MWh or more – substantially narrowing coal's overall cost advantages over natural gas-fired combined-cycle plants – and thus limiting some of the cost-reduction benefits expected from expanding the solid-fuel fleet.

- The rapid increases experienced in utility construction costs have raised the price of recently completed infrastructure projects, but the impact has been mitigated somewhat to the extent that construction or materials acquisition preceded the most recent price increases. The impact of rising costs has a more dramatic impact on the estimated cost of proposed utility infrastructure projects, which fully incorporates recent price trends. This has raised significant concerns that the next wave of utility investments may be imperiled by the high cost environment. These rising construction costs have also motivated utilities and regulators to more actively pursue energy efficiency and demand response initiatives to reduce the future rate impacts on consumers.[79]

Q. Is it reasonable to expect that these same factors will continue to lead to further construction cost increases in future years?

A. Yes. I have seen no evidence that these factors will abate at any point in the foreseeable future. For example, Burns and Roe noted that it is difficult to predict the escalation of future power plant costs and expressed concern that "India is on the threshold of beginning a rapid expansion in the upcoming years will place

additional pressure on the availability of raw materials, shop fabrication space and available work force for engineering, site management staff and field labor and supervision."[80]

Q. Have you seen any figures or tables that illustrate the cost escalation that has been experienced in the construction industry in recent years?

A. Yes. Figure 7, taken from the August 2006 issue of Chemical Engineering Magazine, gives a sense of the escalation experienced by the construction industry since June 2003:

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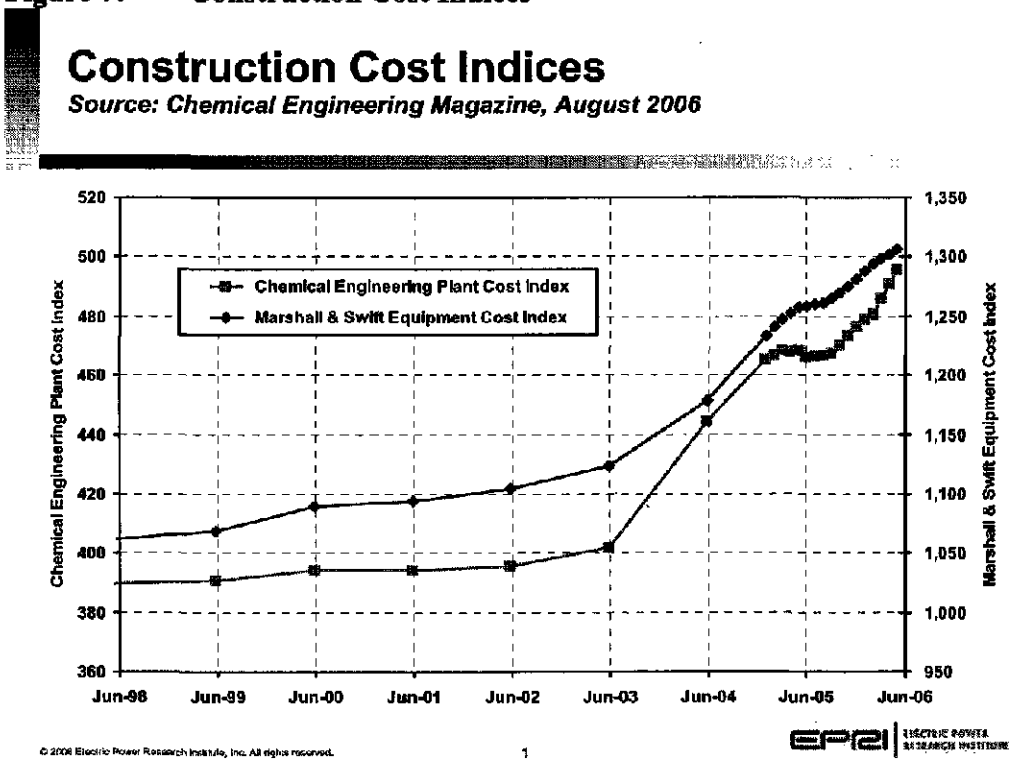
79 Id, at pages 1-3.

80 *Consulting Engineer's Report for the American Municipal Power Generating Station located in Meigs County, Ohio*, for the Division of Cleveland Public Power, Burns and Roe Enterprises, Inc., October 16, 2007, at page 10-9.

Figure 7: Construction Cost Indices



Q. Has AMP-Ohio commented on the increases that have recently been experienced in the estimated costs of building new coal-fired power plants?

A. Yes. In its Application to the Power Siting Board, AMP-Ohio noted that the price increases currently being experienced in the expected construction costs of coal based electric generation "are staggering."[81] AMP-Ohio also noted that "Price increases of 10% in a single six month period are being reported. Using this data and similar data on other projects as an estimate, a one month delay in a $2 billion project is over $33 million."[82]

81 AMP-Ohio Application, Section OAC 4906-13-05, at page 4.
82 Id.

Q. What is AMP-Ohio's assessment of the current state of the power plant construction industry or of construction costs?

A. AMP-Ohio refused to provide any assessments of the current state of the power plant industry or power plant construction costs that it prepared or that were prepared for it in the last two years.[83]

Q. Has AMP-Ohio provided any assessments which examined the potential for future increases in the capital or installed cost of the proposed AMPGS Project?

A. No. AMP-Ohio refused to provide any such assessments other than the June 2007 R.W. Beck *Initial Project Feasibility Study*.[84]

Q. By much does R.W. Beck believe that the cost of the AMPGS Project could increase before it is completed?

A. R.W. Beck has said that "based on our experience related to the construction and construction costs for coal plants similar to AMPGS, we have assumed that the total estimated construction costs reflected in the Base Case could vary by +15 percent or -5 percent."[85]

Q. Did R.W. Beck specify the "experience related to the construction and construction costs for coal plants similar to AMPGS" which formed the basis for this assumption.

A. No. AMP-Ohio refused to even specify the experience referenced by R.W. Beck.[86]

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83 AMP-Ohio's Response to Request No. 16 in Exhibit DAS-2.
84 AMP-Ohio's Response to Request No. 37 in Exhibit DAS-2.
85 *Initial Project Feasibility Study*, at page 714.
86 AMP-Ohio's Response to Request No. 49.a. in Exhibit DAS-2.

Q. Did R.W. Beck reflect this potential for construction cost increases in the resource planning in which it developed the Power Supply Plans for AMP-Ohio's member communities in which it found that participation in the AMPGS Project was part of a least cost, least risk capacity addition plan?

A.

[REDACTED]

Q. It is reasonable to assume that the increased competition for power plant design and construction resources, commodities and manufacturing capacity factors that has led to the significant increases in power plant capital costs also will lead to construction delays?

A. Yes.

Q. By how many months does R.W. Beck believe that its projected construction cost for the AMPGS Project could vary?

A. R.W. Beck has said that based on its experience with construction for coal plants similar to AMPGS, it has assumed that the AMPGS Project schedule could be early by 3 months or delayed by as much as 12 months.[87]

Q. Did R.W. Beck specify the experience related to the construction for coal plants which formed the basis for the assumption that the AMPGS Project schedule could be early by 3 months or delayed by as much as 12 months?

A. No. AMP-Ohio refused to provide that information.[88]

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87 *Initial Project Feasibility Study*, at page 714
88 AMP-Ohio's Response to Request No. 49.b. in Exhibit DAS-2.

Q. Did R.W. Beck reflect this potential for construction schedule delays in the resource planning in which it developed the Power Supply Plans for AMP-Ohio's member communities in which it found that participation in the AMPGS Project was part of a least cost, least risk capacity addition plan?

A.

[REDACTED]

Q. Is it your testimony that AMP-Ohio should change its current cost estimate for the AMPGS?

A. Not necessarily. However, in order to evaluate the risks of continuing with the proposed project, AMP-Ohio should have prepared sensitivity studies that examined the relative economics of the AMPGS Project against alternatives assuming that the capital cost of the project is substantially higher than AMP-Ohio now estimates. For example, in its economic analyses, AMP-Ohio could have prepared sensitivity analyses that reflected capital costs 20 percent and 40 percent higher than its current estimated cost for the AMPGS. It is not unreasonable to expect such additional cost increases at the AMPGS in light of the industry-wide experience and the expectation that worldwide demand will continue to be a driving force for rising prices.

Q. Is it reasonable to expect that these same current market conditions also will lead to increases in the estimated costs of other supply-side alternatives such as natural gas-fired, wind or biomass facilities?

A. Yes.

Q. What impact would higher coal-plant capital costs have on the relative economics of energy efficiency as compared to the AMPGS Project?

A. I have seen no evidence that the same worldwide demand for power plant resources has led to significant increase in the costs of energy efficiency

measures. Therefore, it is reasonable to expect that higher coal-plant capital costs increase the relative economics and attractiveness of energy efficiency.

Q. AMP-Ohio has said that it can mitigate the risk of further future cost increases by entering into a fixed price EPC contract for the AMPGS project.[89] Have you seen any evidence that suggests that it will be extremely unlikely, or indeed impossible, for AMP-Ohio to find a firm willing to enter into such a fixed price contract for the proposed plant?

A. Yes. As discussed by AEP witness Jasper, because the market has been extremely volatile in recent years, it is "impossible to get reasonable pricing fixed at this time. GE/Bechtel is unable to fix its equipment pricing, material costs and labor rates in advance."[90] Consequently, "GE/Bechtel [the EPC contractor for AEP's Mountaineer IGCC Project] and APCo have developed an adjustment mechanism to deal with significant market escalations in large plant construction costs as well as other commodities, that have impacted and are expected to continue to impact large plant."[91] The following categories of equipment, materials and labor costs will be subject to updating all following the issuance of AEP's Notice to Proceed to reflected updated pricing values and vendor quotes:

- Major Equipment and Subcontracts, with a value more than $1 million, will be competitively re-bid at the appropriate time based on the project schedule, and substituted for the pricing obtained from bids for the FEED [Front End Engineering Design] cost estimate.
- Plant Equipment and Subcontracts, with a value less than $1 million, will also be competitively re-bid at the appropriate time based on the project schedule, and substituted for the pricing obtained from bids, or from historical data from the FEED cost estimate.

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89 For example, see page 4-2 of the *Initial Project Feasibility Study*.
90 2007 Testimony of Appalachian Power Company witness William M. Jasper, West Virginia Public Service Commission Case No. 06-0033-E-CN, at page 15, lines 18-20.
91 Ibid, at page 16, lines 11-14.

- Bulk Materials. At the time of actual purchase of bulk materials, actual pricing will be obtained through competitive quotes and used to adjust the unit prices for bulk materials.

- Construction Equipment and Construction and Start-up Materials. At the time of actual purchase of equipment and construction and start-up materials, actual pricing will be obtained through competitive bidding. Gasoline and diesel prices will be adjusted based on prices published by the Department of Energy.

- Craft Labor. Actual corresponding labor rates will be used to recalculate the labor expenses actually incurred on a monthly basis.

- Non-Manual Service Rates. Actual corresponding rates paid for these support staff personnel during the execution of the project will be used to recalculate the costs on an annual basis.

- GE Manufactured and Proprietary Equipment. The mechanism for adjusting the price of GE manufactured and proprietary equipment will be agreed upon prior to executing the EPC Contract.[92]

Appalachian Power Company witness Jasper further testified in the same proceeding that:

> Company witness Renchek discusses in his testimony the rapid escalation of key commodity prices in the EPC industry. **In such a situation, no contractor is willing to assume this risk for a multi-year project.** Even if a contractor was willing to do so, its estimated price for the project would reflect this risk and the resulting price estimate would be much higher.[93] [Emphasis added.]

Burns and Roe reaches the same conclusions as these Appalachian Power Company witnesses concerning the possibility of finding a firm willing to agree to a fixed price EPC contract:

> BREI agrees that the fixed price turnkey EPC contract is a reasonable approach to executing the project. However, the viability of obtaining a contract of this type is not certain. The high cost of the EPC contract, in excess of $2 billion, significantly

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92 Ibid, at page 17, line 1, to page 18, line 3.
93 Ibid, at page 16, lines 16-20.

> reduces the number of potential contractors even when teaming of engineers, constructors and equipment suppliers is taken into account. Recent experience on large U.S. coal projects indicates that the major EPC Contractors are not willing to fix price the entire project cost. This is the result of volatile costs for materials (alloy pipe, steel, copper, concrete) as well as a very tight construction labor market. When asked to fix the price, several EPC Contractors have commented that they are willing to do so, but the amount of money to be added to cover potential risks of a cost overrun would make the project uneconomical.[94]

Q. Has AMP-Ohio been able to provide any evidence or documents which form the basis for the belief that it will be able to finalize a fixed price EPC contract for the AMPGS Project?

A. No. AMP-Ohio refused to provide any evidence or documents supporting the belief that it will be able to finalize a fixed price EPC contract for the AMPGS Project.[95]

5. AMP-Ohio's Resource Planning Analyses Are Flawed and Biased in Favor of the Proposed AMPGS Project

Q. In your experience, what evidence do electric utility companies typically submit in cases where they are seeking to justify the addition of new baseload generating facilities?

A. Electric utility companies typically provide economic and system modeling analyses that compare resource plans that include a range of supply side options and, with increasing frequently, companies are now including demand side options, as well, in their resource planning. These studies project the costs and benefits of the various supply and demand side alternatives for decades into the future. They are used to examine whether the proposed generation facility is a

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94 *Consulting Engineer's Report for the American Municipal Power Generating Station located in Meigs County, Ohio*, for the Division of Cleveland Public Power, Burns and Roe Enterprises, Inc., October 16, 2007, at page 11-1.

95 AMP-Ohio's Response to Request No. 6 in Exhibit DAS-2.

component of a least cost expansion plan. A standard approach is to calculate and compare the net and cumulative present values of the various alternatives.

In addition to base case studies, prudent utility economic and system modeling analyses also present a wide range of sensitivity analyses that examine the impact of changes in key input assumptions, such as capital costs and fuel costs, on the relative costs and benefits of alternative resource plans and options. As I discussed earlier, prudent and reasonable planning also requires that future CO_2 prices be reflected in resource planning.

Q. In your experience, is the *Initial Project Feasibility Study* that was prepared by R.W. Beck and submitted by AMP-Ohio typical of the types of analyses that companies file in support of applications to add new baseload generating capacity?

A. No. The *Initial Project Feasibility Study* does not provide evidence that the proposed AMPGS would be a component of a least cost, least risk generation expansion plan. In particular, the *Initial Project Feasibility Study* does not compare the economic, or environmental, costs and benefits of expansion plans with the proposed AMPGS Project against the costs and benefits of alternative plans without the Project. Such alternative plans should include other supply-side options, including some renewable resources, and demand-side resources. The *Initial Project Feasibility Study* only presents what it calls the "Beneficial Use of the AMPGS Project" which is not a resource plan in that it does not compare the estimated cost of generating power at the proposed AMPGS Project with the estimated costs of generating power at reasonable alternatives.

Q. Has AMP-Ohio prepared any economic and system modeling analyses regarding the proposed AMPGS Project?

A. Yes. R.W. Beck prepared Power Supply Plans for each of the member communities.

Q. Have you been able to review these Power Supply Plans?

A. We have reviewed the Power Supply Plans that were prepared by R.W. Beck for six or seven of the largest AMPGS Project participants.

Q. Have you been able to review the workpapers for the resource planning process in which R.W. Beck developed these Power Supply Plans?

A. No. AMP-Ohio refused to provide any workpapers or source documents for the resource planning process through which the Power Supply Plans were developed.[96]

Q. Have you nevertheless been able to formulate some opinions about the resource planning process conducted by R.W. Beck and AMP-Ohio?

A.

[REDACTED

- **[REDACTED]**
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[96] See AMP-Ohio's Responses to Requests Nos. 13, 24, 26, 27, and 28 in Exhibit DAS-2.

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Q. Are there any aspects of the methodology used by R.W. Beck that cause concern about the results of the Power Supply Plans?

A.

[97] **[REDACTED]**

[98]

Q. Have you seen resource planning analyses in which energy efficiency and renewable alternatives were made available to the capacity expansion model for selection based on economic costs?

A. Yes. We have seen and have participated in a number of integrated resource planning processes which have included energy efficiency as an option for meeting projected demands and energy requirements and which also have included wind and other renewable resources.

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[97] February 16, 2007 *Power Supply Plan for the City of Cleveland*, at page 3.
[98] February 16, 2007 *Power Supply Plan for the City of Cleveland*, at page 2.

Q. Did AMP-Ohio provide any analyses of the potential for demand-side management and energy efficiency within Ohio or the communities it serves?

A. No. AMP-Ohio refused to provide any studies of the potential for demand-side management and energy efficiency that had been prepared by or for it or by or for the Cities of Cleveland, Cuyahoga Falls, Hudson, Oberlin, Wadsworth and Bowling Green.[99]

Q. Did AMP-Ohio provide any analyses of the potential for wind and/or other renewable resources within Ohio or the communities it serves?

A. No. AMP-Ohio refused to provide any such studies.[100]

Q. Has AMP-Ohio compared the economic costs of the proposed AMPGS Project to demand-side resources?

A. No.[101]

Q. Has AMP-Ohio compared the cost of generating power at the proposed AMPGS Project with the cost of implementing energy efficiency measures?

A, AMP-Ohio refused to even state whether it had compared the cost of generating power at the proposed AMPGS Project with the cost of implementing energy efficiency measures.[102]

Q. Have you seen any evidence that suggests that energy efficiency, wind, or biomass cannot be part of a portfolio of alternatives to the proposed AMPGS Project?

A. No. We have not had the opportunity to conduct any assessments of the potential for energy efficiency or renewable resources in Ohio or in the communities that

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99 AMP-Ohio's Response to Request No. 8 in Exhibit DAS-2.
100 AMP-Ohio's Response to Request No. 9 in Exhibit DAS-2.
101 AMP-Ohio's Response to Request No. 30 in Exhibit DAS-2.
102 AMP-Ohio's Response to Request No. 46 in Exhibit DAS-2.

would be participants in the AMPGS Project. Nor have we had an opportunity to do any capacity expansion modeling of our own concerning the AMPGS Project. However, Synapse prepared a study in 2001 that suggests that a portfolio of alternatives that includes energy efficiency, renewable resources, and, if necessary, natural gas-fired capacity should be investigated and analyzed before a commitment is made to the proposed AMPGS Project. This study found that by 2020 energy efficiency could save 72,000 GWh by 2020 and reduce energy demands by more than 29 percent, at an average cost 2.4 cents per KWh.[103]

The 2001 Synapse study also found that by 2020 there was the potential for the addition of 900 MW of new wind resources in Ohio, 1,179 MW of biomass co-firing resources and 970 MW of new combined heat and power – biomass resources.

Q. Have you seen any recent examples of states and utilities seeking to achieve significant savings in energy requirements and peak demands through energy efficiency and demand-side measures?

A. Yes. A large number of states, cities and utilities are moving aggressively to save energy and reduce their power consumption through energy efficiency and demand side measures. For example, the City of Austin has set a goal of saving 15 percent of its projected energy requirements by 2020. The Sacramento Municipal Utility District has a goal of achieving 15 percent energy savings by 2017.

At the same time, the State of New York has adopted and is now starting to implement a "15 by 15" program through which it intends to reduce energy

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[103] Repowering the Midwest, the Clean Energy Development Plan for the Heartland, February 2001, at page 90, available at http://www.synapse-energy.com/Downloads/SynapseReport.2001-01.ELPC.Repowering-the-Midwest..99-42-Full%20Text.pdf

consumption by 15 percent by 2015.[104] The State of New Jersey has set a goal of reducing energy consumption by 20 percent by 2020.[105]

Q. Is it your testimony that the AMPGS Project should be cancelled and that, instead, AMP-Ohio and its member communities should pursue energy efficiency and renewable resources?

A. No. It is my testimony that the Project should not be certified at this time. Instead, before committing to a project that will ultimately cost in excess of $3 billion, AMP-Ohio and its member communities should re-examine the economics of the proposed AMPGS Project against portfolios that include reasonable amounts of energy efficiency and renewable resources and, if necessary new natural gas-fired capacity. As part of these new studies, AMP-Ohio and its member communities should investigate the potential for energy efficiency and renewable resources in Ohio and in their own communities.

Moreover, when it conducts new resource planning analyses comparing the AMPGS Project to supply-side and demand-side alternatives, AMP-Ohio should consider a reasonable range of CO_2 prices, such as that developed by Synapse, and should conduct sensitivities that allow for further increases in the cost of building the AMPGS Project and alternative options.

Q. Have you had an opportunity review the impact that participation in the proposed AMPGS Project will have on the fuel diversity of AMP-Ohio and the participating communities?

A. No. AMP-Ohio refused to provide the information we requested concerning the current and projected fuel diversities (in both MW and MWh) of AMP-Ohio and the larger participants in the proposed AMPGS Project.[106]

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104 Remarks by Governor Eliot Spitzer. "15 by 15": A Clean Energy Strategy for New York. 19 Apr 2007. Found at: http://www.state.ny.us/governor/keydocs/0419071_speech.html.

105 Governor's *Economic Growth Strategy* 2007.

Q. Is fuel diversity a broader issue than merely deciding whether to build a coal- or gas-fired generating unit?

A. Yes, it should be. Implementing demand side management programs and building or buying power from low carbon-emitting renewable resource facilities also would increase a company's supply diversity. Investments in demand side management and renewable resources would provide real benefits in terms of supply diversity by reducing AMP-Ohio's dependency on coal, gas and oil.

Q. Does this conclude your testimony?

A. Yes.

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[106] AMP-Ohio's Response to Request No. 12 in Exhibit DAS-2.