CAC EXHIBIT E (DAS)

STATE OF INDIANA

INDIANA UTILITY REGULATORY COMMISSION

JOINT PETITION AND APPLICATION OF PSI ENERGY, INC. , D/B/A DUKE ENERGY INDIANA, INC., AND SOUTHERN INDIANA GAS AND ELECTRIC COMPANY, D/B/A VECTREN ENERGY DELIVERY OF INDIANA, INC., PURSUANT TO INDIANA CODE CHAPTERS 8-1-8.5, 8-1-8.7, 8-1-8.8, AND SECTIONS 8-1-2-6.8, 8-1-2-6.7, 8-1-2-42 (A) REQUESTING THAT THE COMMISSION: (1) ISSUE APPLICABLE CERTIFICATES OF PUBLIC CONVENIENCE AND NECESSITY AND APPLICABLE CERTIFICATES OF CLEAN COAL TECHNOLOGY TO EACH JOINT PETITIONER FOR THE CONSTRUCTION OF AN INTEGRATED GASIFICATION COMBINED CYCLE GENERATING FACILITY ("IGCC PROJECT") TO BE USED IN THE PROVISION OF ELECTRIC UTILITY SERVICE TO THE PUBLIC; (2) APPROVE THE ESTIMATED COSTS AND SCHEDULE OF THE IGCC PROJECT; (3) AUTHORIZE EACH JOINT PETITIONER TO RECOVER ITS CONSTRUCTION AND OPERATING COSTS ASSOCIATED WITH THE IGCC PROJECT ON A TIMELY BASIS VIA APPLICABLE RATE ADJUSTMENT MECHANISMS; (4) AUTHORIZE EACH JOINT PETITIONER TO USE ACCELERATED DEPRECIATION FOR THE IGCC PROJECT; (5) APPROVE CERTAIN OTHER FINANCIAL INCENTIVES FOR EACH JOINT PETITIONER ASSOCIATED WITH THE IGCC PROJECT; (6) GRANT EACH JOINT PETITIONER THE AUTHORITY TO DEFER ITS PROPERTY TAX EXPENSE, POST-IN-SERVICE CARRYING COSTS, DEPRECIATION COSTS, AND OPERATION AND MAINTENANCE COSTS ASSOCIATED WITH THE IGCC PROJECT ON AN INTERIM BASIS UNTIL THE APPLICABLE COSTS ARE REFLECTED IN EACH JOINT PETITIONER'S RESPECTIVE RETAIL ELECTRIC RATES; (7) AUTHORIZE EACH JOINT PETITIONER TO RECOVER ITS OTHER RELATED COSTS ASSOCIATED WITH THE IGCC PROJECT; AND (8) CONDUCT AN ONGOING REVIEW OF THE CONSTRUCTION OF THE IGCC PROJECT	**CAUSE NO. 43114**
VERIFIED PETITION OF DUKE ENERGY INDIANA, INC. FOR AUTHORITY PURSUANT TO AN ALTERNATIVE REGULATORY PLAN AUTHORIZED UNDER I.C. 8-1-2.5 ET SEQ. AND I.C. 8-1-6.1,8-1-8.7, AND 8-1-8.8 TO DEFER AND SUBSEQUENTLY RECOVER ENGINEERING AND PRECONSTRUCTION COSTS ASSOCIATED WITH THE CONTINUED INVESTIGATION AND ANALYSIS OF CONSTRUCTING AN INTEGRATED COAL GASIFICATION COMBINED CYCLE ELECTRIC GENERATING FACILITY	**CAUSE NO. 43114 S1**

DIRECT TESTIMONY OF DAVID A. SCHLISSEL
ON BEHALF OF THE
CITIZENS ACTION COALITION OF INDIANA
SAVE THE VALLEY
VALLEY WATCH
SIERRA CLUB
May 15, 2007

PUBLIC (REDACTED) VERSION

Table of Contents

List of Exhibits

1. Introduction and Qualifications

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 and Florida 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 Citizens Action Coalition of Indiana, Valley Watch, Save the Valley and the Sierra Club – Hoosier Chapter.

Q. Have you testified previously before this Commission?

A. Yes. I testified in Cause Nos. 28045 and submitted testimony in Cause 38702-FAC-40-S1 which was settled prior to the scheduled hearings.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to address the appropriate carbon dioxide ("CO_2") emissions prices that should be used to analyze the relative economic costs and benefits of Duke Energy Indiana ("Duke") and Vectren Energy Delivery of Indiana's ("Vectren") proposed Integrated Gasification Combined Cycle Facility ("IGCC Project") and to evaluate whether Duke and Vectren have appropriately reflected the capital cost of the proposed facility in their modeling analyses. This testimony presents the results of my evaluation of these issues.

Q. How is your testimony organized?

A. My testimony is organized as follows:

1. Introduction and Qualifications.

2. Summary of Conclusions and Recommendations.

3. Duke and Vectren's consideration of the potential for greenhouse gas regulations.

4. Duke and Vectren's consideration of the potential for a higher capital cost for the proposed IGCC Project.

2. Summary of Conclusions and Recommendations

Q. Please summarize your primary conclusions.

A. My primary conclusions are follows:

1. Duke and Vectren have not adequately considered the potential for greenhouse gas regulations in their economic analyses of the proposed IGCC Project.

2. Duke and Vectren have not adequately considered the potential for a higher capital cost in their economic analyses of the proposed IGCC Project.

Q. Please summarize you primary recommendations.

A. The Commission should not issue a Certificate of Public Convenience and Necessity for the proposed IGCC Project and should not approve the other related requests by Duke and Vectren..

3. The Analyses by Duke and Vectren Do Not Adequately Consider the Potential Impact of Greenhouse Gas Regulations

Q. How does Duke view the prospects for carbon regulation?

A. A number of Duke's witnesses in this proceeding acknowledge that it is a matter of when the federal government adopts greenhouse gas regulations, not if. This testimony is consistent with prior statements by Duke's senior corporate officials who have been very forthright about their belief that federal regulation of greenhouse gas emissions is both essential and inevitable. For example, in April 2006, the then 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.[1]

James Rogers, CEO of Duke Energy, also 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."[2] Mr. Rogers also was quoted in a recent *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."[3]

In addition, in 2001, Mr. Rogers testified before the Senate Committee on Environment and Public Works[4] that "Congress needs to address the climate change issue [and f]urther, I know from personal experience that it's impossible to build new coal baseload power plants since the economics cannot be determined without knowing what requirements the plant will face on carbon."

Moreover, before the merger, when Mr. Rogers was CEO of Cinergy, that Company made a number of frank public statements about global warming including:[5]

> Global climate change is perhaps the greatest environmental challenge for Cinergy as a coal-burning energy company. There is growing consensus among scientists that our planet's climate is warming as a result of human actions. While there is neither consensus on the rate of this warming nor the ultimate impact on Earth, global climate change has become one of the most important scientific and political issues of

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1 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

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

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

4 Statement of Mr. James E. Rogers, Chairman, President and Chief Executive Officer of Cinergy Corp. before the Committee on Environment and Public Works, United States Senate, May 2, 2001.

5 "Cinergy Sustainability Report." www.cinergy.com/pdfs/sustainability_report.pdf, page 8.

> our time.
>
> The impact of climate change on Cinergy's 13,300 megawatts of coal-fired generation is obvious. We burn nearly 30 million tons of coal in our facilities, emitting 66.5 million tons of carbon dioxide (CO_2) a year. CO_2 is the most common of the "greenhouse gases," so labeled because, when in the atmosphere, they can prevent the sun's heat from escaping back into space. The balance between the heat from the sun and the heat escaping from the earth helps our planet remain habitable. But an atmosphere overloaded with green-house gases could result in a warm planet drastically different from what we now know.
>
> Cinergy is the sixth largest utility emitter of CO_2 in the United States, simply because we burn large quantities of coal. We burn coal because it's the most abundant and, therefore, the most economical way to produce electricity. Our customers want, and our country's economy needs, reasonably priced energy. Our challenge is to meet these needs in a more environmentally benign way.
>
> As yet, there is no technology that removes CO_2 from exhaust gases; there is no scrubber, no selective catalytic reduction (SCR) unit, and no "carbon collector." The short-term answers lie in energy-efficiency and carbon sequestration projects to offset our emissions. The long-term answers beg for technology, both to lighten the environmental footprint of coal and to provide us with other methods of energy generation.

Duke also has joined the high profile U.S. Climate Action Partnership ("US CAP") which advocates for federal, mandatory legislation of greenhouse gases. The six principles of the groups are:

- Account for the global dimensions of climate change;
- Create incentives for technology innovation;
- Be environmentally effective;
- Create economic opportunity and advantage;
- Be fair to sectors disproportionately impacted; and
- Reward early action.

Most significantly, USCAP has argued that CO_2 emissions should be reduced by 60% to 80% by 2050. As I will discuss later, this is relatively the same goal as

many of the climate change bills that have been introduced in the current U.S. Congress.

Q. Is Duke's request for a Certificate of Public Convenience and Necessity to build the 630 MW IGCC Project consistent with these statements by Mr. Anderson and Mr. Rogers and with Duke's participation in USCAP?

A. No. As I understand, Duke is not including any technology for carbon capture and storage as part of the IGCC Project and has not committed to doing so at any time in the near future. Therefore, there is no reason to expect that construction and operation of the proposed IGCC Project will lead to lower CO_2 emissions. Indeed, as shown in the testimony of Bruce Biewald, the addition of the proposed IGCC Project will increase Duke's CO2 emissions. At the same time, building the proposed IGCC Project will divert funds and other resources from implementing cost-effective demand side measures and renewable options that would reduce CO_2 emissions before the Project's planned 2011 in-service date.

Duke's senior officers advocate for CO_2 regulation but the Company apparently expects that regulation to do very little, if anything at all, to actually reduce carbon dioxide emissions.

Q. Have mandatory greenhouse gas emissions reductions programs begun to be examined and debated 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. Through their consideration of these proposals, legislators are increasingly educated on the complex details of different policy approaches, and they are laying the groundwork for a national mandatory program. Some of the federal

proposals that would require greenhouse gas emission reductions that had been submitted in Congress through early February 2007 are summarized in Table 1 below.

Table 1. Summary of Mandatory Emissions Targets in Proposals Discussed in Congress[6]

Proposed National Policy	Title or Description	Year Proposed	Emission Targets	Sectors Covered
McCain Lieberman S.139	Climate Stewardship Act	2003	Cap at 2000 levels 2010-2015. Cap at 1990 levels beyond 2015.	Economy-wide, large emitting sources
McCain Lieberman SA 2028	Climate Stewardship Act	2003	Cap at 2000 levels	Economy-wide, large emitting sources
McCain Lieberman S 1151	Climate Stewardship and Innovation Act	2005	Cap at 2000 levels	Economy-wide, large emitting sources [CHECK]
National Commission on Energy Policy (basis for Bingaman-Domenici legislative work)	Greenhouse Gas Intensity Reduction Goals	2005	Reduce GHG intensity by 2.4%/yr 2010-2019 and by 2.8%/yr 2020-2025. Safety-valve on allowance price	Economy-wide, large emitting sources
Jeffords S. 150	Multi-pollutant legislation	2005	2.050 billion tons beginning 2010	Existing and new fossil-fuel fired electric generating plants > 15 MW
Carper S. 843	Clean Air Planning Act	2005	2006 levels (2.655 billion tons CO2) starting in 2009, 2001 levels (2.454 billion tons CO2) starting in 2013.	Existing and new fossil-fuel fired, nuclear, and renewable electric generating plants > 25 MW
Feinstein	Strong Economy and Climate Protection Act	2006	Stabilize emissions through 2010; 0.5% cut per year from 2011-15; 1% cut per year from 2016-2020. Total reduction is 7.25% below current levels.	Economy-wide, large emitting sources
Rep. Udall - Rep. Petri	Keep America Competitive Global Warming Policy Act	2006	Establishes prospective baseline for greenhouse gas emissions, with safety valve.	Energy and energy-intensive industries
Carper S.2724	Clean Air Planning Act	2006	2006 levels by 2010, 2001 levels by 2015	Existing and new fossil-fuel fired, nuclear, and renewable electric generating plants > 25 MW

[6] More detailed summaries of the bills that have been introduced in the U.S. Senate in the 110th Congress are presented in Exhibit DAS-2.

Kerry and Snowe S.4039	Global Warming Reduction Act	2006	No later than 2010, begin to reduce U.S. emissions to 65% below 2000 levels by 2050	Not specified
Waxman H.R. 5642	Safe Climate Act	2006	2010 – not to exceed 2009 level, annual reduction of 2% per year until 2020, annual reduction of 5% thereafter	Not specified
Jeffords S. 3698	Global Warming Pollution Reduction Act	2006	1990 levels by 2020, 80% below 1990 levels by 2050	Economy-wide
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
Sen. Bingaman – Discussion draft		As of 1/11/2007	2.6%/year reduction in emissions intensity from 2012-2021, 3%/year reduction starting in 2022	Economy-wide

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

A. Yes. Although there are increasing numbers of Republican legislators who recognize the need for legislation to regulate the emissions of greenhouse gases, the results of the recent elections, in which control of both Houses of Congress shifted to Democrats, are likely to improve the chances for near-term passage of significant legislation. For example, experts at an industry conference right after the elections expressed the opinion that now that Democrats have won control of

Congress, electric utilities should expect a strong legislative push for mandatory caps on carbon dioxide emissions.[7]

Senator McCain also has indicated that he believed that the chances of Congress approving meaningful global warming legislation before 2008 were "pretty good" and that he believed that "we've reached a tipping point in this debate, and its long overdue."[8]

At the same time, Senators Bingaman, Boxer and Lieberman sent a letter to President Bush on November 14, 2006, seeking the President's commitment to work with the new Congress to pass meaningful climate change legislation in 2007.[9] Senators Bingaman, Boxer and Lieberman in January are the chairpersons of, respectively, the Senate Energy and Natural Resources Committee, the Senate Environment and Public Works Committee and the Senate Homeland Security and Governmental Affairs Committee in the current Congress.

Nevertheless, our 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. 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, and they are also connecting intense weather events like Hurricane Katrina and heat waves to global warming.[10] 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.

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

8 Ibid.

9 Ibid.

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

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.[11]

Other recent polls reported similar results. For example, a Time/ABC/Stanford University poll issued in the spring found 68 percent of Americans are in favor of more government action.[12] In addition, a September 2006 telephone poll, conducted by NYU's Brademas Center for the Study of Congress, reported that 70% of those polled stated that they were worried about global warming.[13]

At the same time, according to a recent public opinion survey for the Massachusetts Institute of Technology, Americans now rank climate change as 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.[14] 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. What CO_2 prices have Duke and Vectren used in their modeling of the proposed IGCC Project?

A. Duke's base case IRP modeling assumed that no CO_2 legislation or regulation mandates would be implemented during the planning period.[15] Thus, there were no base case CO_2 prices in the Company's 2005 IRP modeling. However, Duke used the following price forecast in a CO_2 sensitivity scenario in that modeling:

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11 Ibid.

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

13 Kaplun, Alex: "Campaign 2006: Most Americans 'worried' about energy, climate;" Greenwire, September 29, 2006.

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

15 Testimony of John L. Stowell, Joint Petitioners' Exhibit No. 7, at page 4 lines 2-3.

Table 2: CO_2 Price Forecast used in Duke Modeling[16]

	2003$	Nominal $
2015	$7.00	$9.13
2016	8.15	10.87
2017	9.12	12.44
2018	10.19	14.21
2019	11.40	16.25
2020	12.75	18.59
2021	13.63	20.32
2022	14.57	22.21
2023	15.57	24.26
2024	16.64	26.51
2025	17.78	28.97
2026	19.01	31.67
2027	20.31	34.60
2028	21.71	37.81
2029	23.21	41.34
2030	24.80	45.16

Duke used this same CO_2 price forecast in the Carbon sensitivity scenarios in the new Strategist modeling discussed in the Company's Supplement Testimony submitted in December 2006.

Vectren did not run a carbon sensitivity analysis in its 2005 IRP modeling but did include a carbon scenario in its 2006 Update.[17] According to Vectren witness Retherford, the CO_2 price forecast used in the carbon sensitivity in the 2006 Update was consistent with Duke's price forecast.[18]

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16 Testimony of John L. Stowell, Joint Petitioners' Exhibit No. 7, at page 11.
17 Testimony of Angila M. Retherford, Petitioners' Exhibit AMR-1, at page 9, lines 9-10.
18 Ibid, at page 9, lines 14-16.

Q. How was this forecast developed?

A. This forecast was based on a draft bill circulated by Senator Jeff Bingaman in mid-2006. Senator Bingaman's draft bill was largely based on a proposal by the National Commission on Energy Policy (NCEP) from December 2004, which recommended a greenhouse gas intensity target starting in 2010 with an allowance price cap starting at $7/ton. As John Stowell, Vice President, Environmental, Health and Safety Policy at Duke Energy describes in his testimony, "Duke Energy Indiana started at $7 because, in our view, the proposal that has garnered the most attention [Sen. Bingaman's draft] in the U.S. Senate uses this starting price level."[19] Vectren similarly based its CO2 price forecast on the Bingaman proposal.[20]

Q. Did Senator Bingaman's draft bill start in 2015?

A. No. Senator Bingaman's draft bill had a 2010 start date. However, Duke and Vectren assumed a later 2015 starting date in their analyses.

Q. Does the CO_2 price forecast used by Duke and Vectren reasonably capture the possible magnitude of greenhouse gas regulation that would apply to Duke Energy Indiana and Vectren's systems?

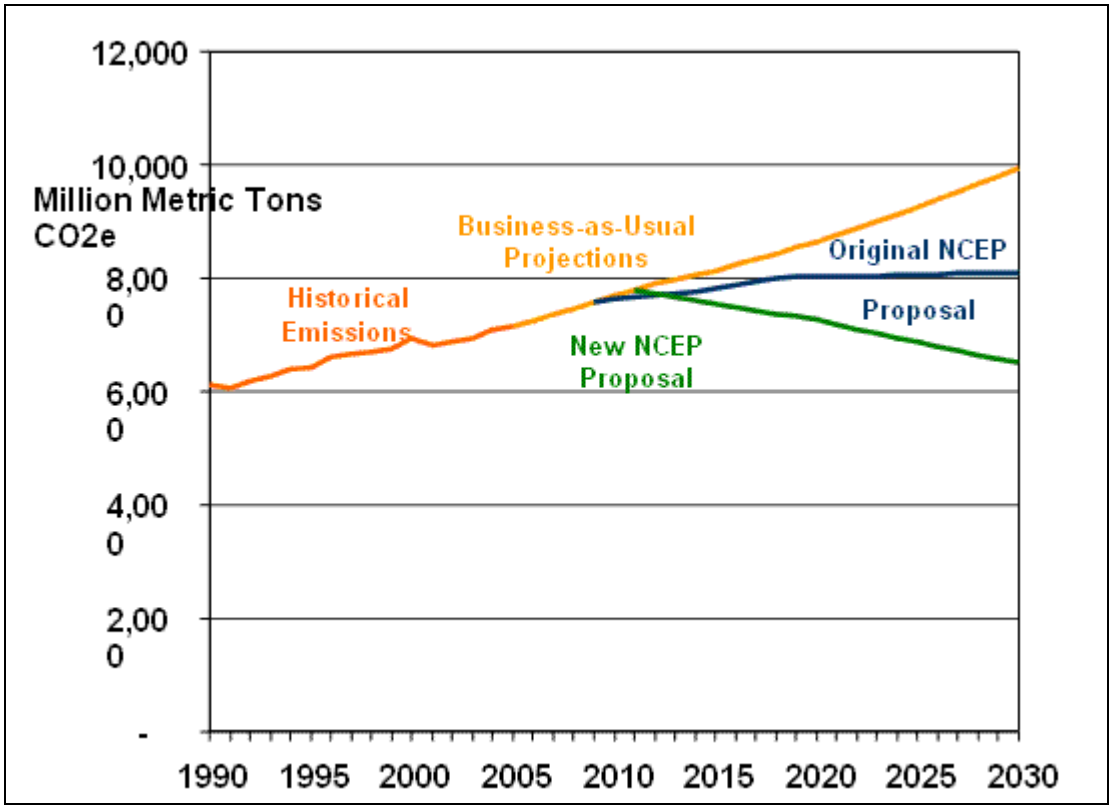
A. No. First, because of the uncertainty surrounding future CO_2 regulation, a range of prices is more appropriate, just as resource planners normally consider a range of projected fuel prices. Second, there is really no compelling reason why Senator Bingaman's draft would be passed by Congress and enacted into law over all the other bills currently in Congress. It is certainly not the only bill that has garnered significant attention.

Indeed, the National Commission on Energy Policy recently modified its greenhouse gas regulation proposal. Instead of advocating for a reduction in greenhouse gas intensity, NCEP now proposes that starting in 2012, national emissions be reduced so that by 2020 they are at 2006 levels and by 2030, they

[19] Testimony of John L. Stowell, Joint Petitioners' Exhibit No. 7, at page 11, lines 20-21.

are 15% below current levels. A graphical version of the difference between this new proposal and the proposal on which Senator Bingaman's draft bill and, consequently, Duke and Vectren's CO_2 price forecast was based, is shown in Figure 1 below.

Figure 1: Original and Current NCEP Proposals[21]



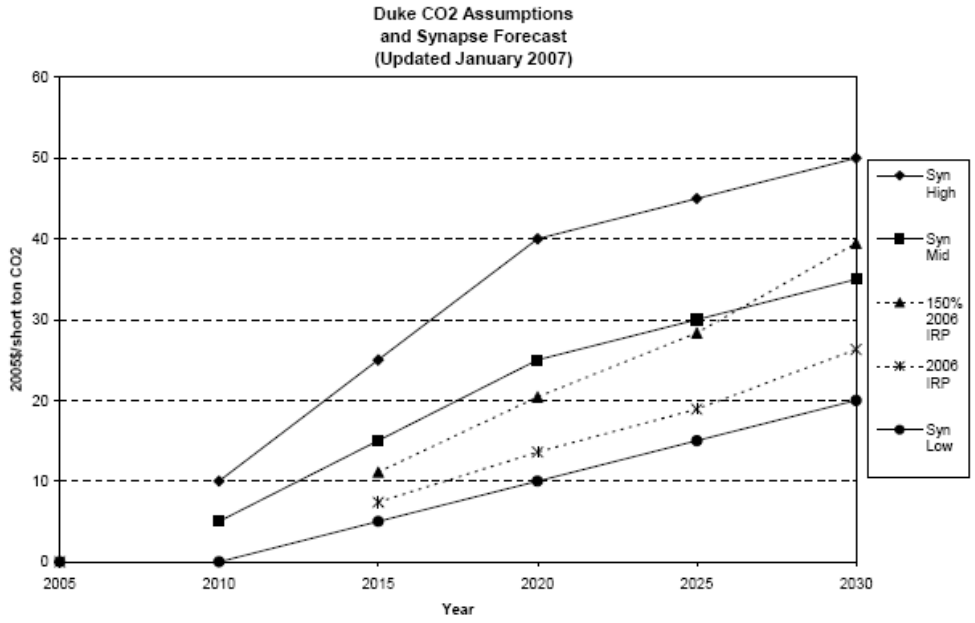
Q. Is the single CO_2 price trajectory used by Duke and Vectren to evaluate the proposed IGCC Project consistent with recent forecasts prepared by or for Duke Energy Carolinas?

A. No. Duke Energy Carolinas recently presented two CO_2 price forecasts for its evaluation of the proposed Cliffside coal project in North Carolina Utilities Commission Docket No. E-7, Sub 790. These forecasts are presented as the dotted lines in Figure 2 below. Duke Energy Carolinas' lower CO_2 price forecast

[20] Testimony of Angila M. Retherford, Petitioners' Exhibit AMR-1, at page 9, lines 12-14.
[21] From the National Commission on Energy Policy, www.energycommission.org.

was based on the same draft bill as the forecast that Duke Energy Indiana and Vectren have used in this docket. However, Duke Energy Carolinas also presented a second CO_2 price forecast which was 150 percent of the lower forecast.

Figure 2: Duke North Carolina CO2 Price Forecasts[22]

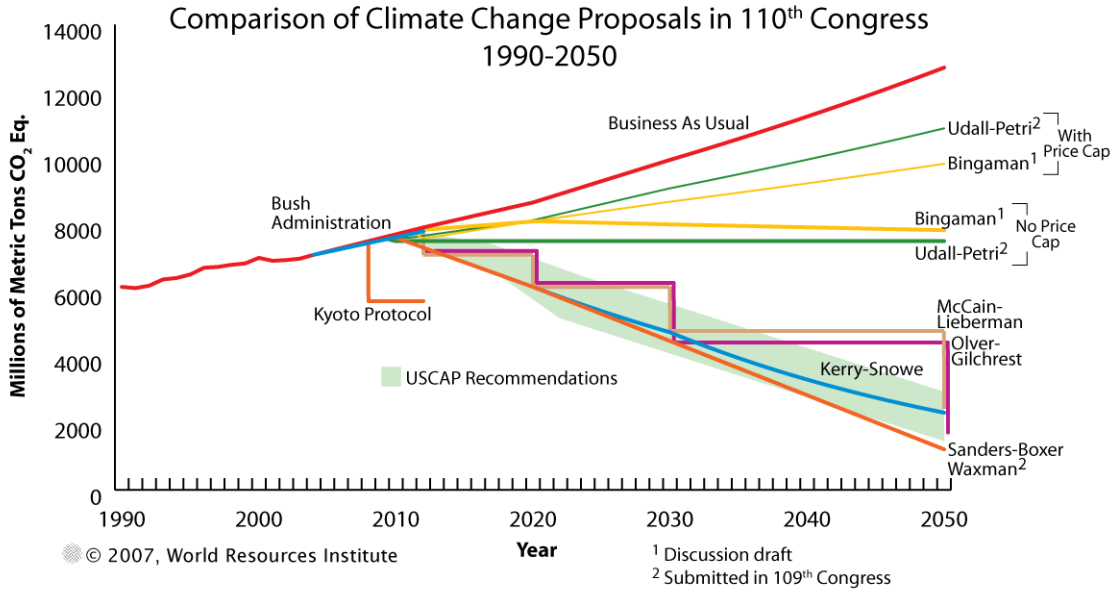


Q. Is the draft Bingaman proposal on which Duke and Vectren have based their CO_2 price forecast in this docket consistent with the bills that actually have been introduced and are under consideration in the current Congress?

A. No. As shown in Figure 3 below, almost all of the other bills that actually have been introduced in Congress would require dramatically larger CO_2 emissions reductions than the discussion draft circulated by Senator Bingaman.

[22] Source: Rebuttal Supplemental Testimony of Janice D. Hager for Duke Energy Carolinas, North Carolina Utilities Commission Docket No. E-7, Sub 790, at page 9.

Figure 3: Emissions Reductions Required under Climate Change Bills in Current US Congress



Q. Are the emissions reductions that would be required under the draft Bingaman bill on which Duke and Vectren have relied comparable to the reductions that the USCAP have said are necessary?

A. No. The shaded area in Figure 3 above represents the 60% to 80% reductions in emissions from current levels that the USCAP has called for. These reductions are much, much more substantial than the very slight emissions reductions that would result from adoption of the draft Bingaman proposal without a Price Cap. As shown in Figure 3, the Bingaman proposal With a Price Cap actually would result in increased CO_2 emissions from current levels.

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

A. Table 3 below presents the carbon dioxide costs, in $/ton CO_2, that are presently being used by some utilities for both resource planning and modeling of carbon regulation policies.

Table 3. Carbon Dioxide Costs Used by Utilities

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

**Values for these utilities from Wiser, Ryan, and Bolinger, Mark. "Balancing Cost and Risk: The Treatment of Renewable Energy in Western Utility Resource Plans." Lawrence Berkeley National Laboratories. August 2005. LBNL-58450. Table 7.*
Other values: PacifiCorp, Integrated Resource Plan 2003, pages 45-46; and Idaho Power Company, 2004 Integrated Resource Plan Draft, July 2004, page 59; Avista Integrated Resource Plan 2005, Section 6.3; Northwestern Energy Integrated Resource Plan 2005, Volume 1 p. 62; Northwest Power and Conservation Council, Fifth Power Plan pp. 6-7. Xcel-PSCCo, Comprehensive Settlement submitted to the CO PUC in dockets 04A-214E, 215E and 216E, December 3, 2004. Converted to $2005 using GDP implicit price deflator.

Q. Has Synapse developed a carbon price forecast that would assist the Commission in evaluating the proposed IGCC Project?

A. Yes. Our forecast is described in more detail in Exhibit DAS-3, starting on page 41 of 63.

During the decade from 2010 to 2020, we anticipate that a reasonable range of carbon emissions prices will reflect the effects of increasing public concern over climate change (this public concern is likely to support increasingly stringent emission reduction requirements) and the reluctance of policymakers to take steps that would increase the cost of compliance (this reluctance could lead to increased emphasis on energy efficiency, modest emission reduction targets, or increased use of offsets). We expect that the widest uncertainty in our forecasts will begin at

the end of this decade, that is, from $10 to $40 per ton of CO_2 in 2020, depending on the relative strength of these factors.

After 2020, we expect the price of carbon emissions allowances to trend upward toward a marginal mitigation cost. This number will depend on currently uncertain factors such as technological innovation and the stringency of carbon caps, but it is likely that, by this time, the least expensive mitigation options (such as simple energy efficiency and fuel switching) will have been exhausted. Our projection for greenhouse gas emissions costs at the end of this decade ranges from $20 to $50 per ton of CO_2 emissions.

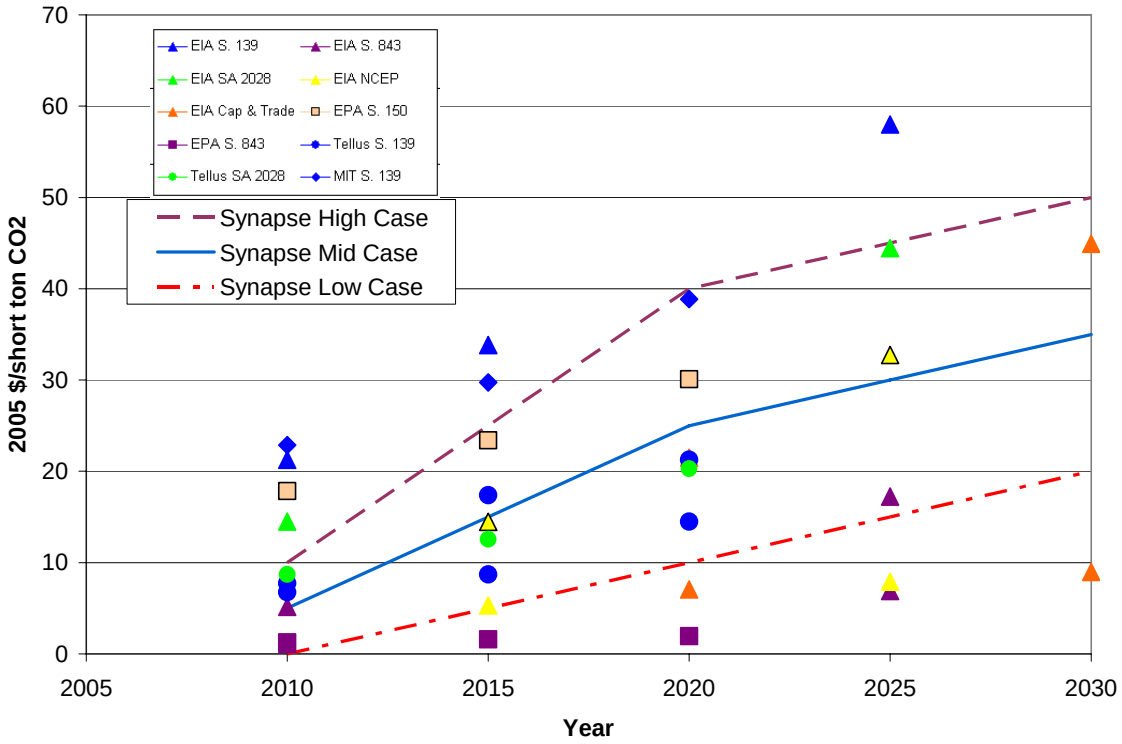
We currently believe that the most likely scenario is that as policymakers commit to taking serious action to reduce carbon emissions, they will choose to enact both cap and trade regimes and a range of complementary energy policies that lead to lower cost scenarios, and that technology innovation will reduce the price of low-carbon technologies, making the most likely scenario (the mid case) closer to (though not equal to) low our carbon cost scenario than our high carbon cost scenario.

After 2030, and possibly even earlier, the uncertainty surrounding a forecast of carbon emission prices will increase due to the interplay of factors such as the level of carbon constraints required and technological innovation. Scientists anticipate that very significant emission reductions will be necessary, in the range of 80 percent below 1990 emission levels, to achieve stabilization targets that will keep global temperature increases to a somewhat manageable level. As such, we believe there is a substantial likelihood that response to climate change impacts will require much more aggressive emission reductions than those contained in U.S. policy proposals, and in the Kyoto Protocol, to date. If the severity and certainty of climate change are such that emissions levels 70-80% below current rates are mandated, this could result in very high marginal emissions reduction costs, though we have not yet quantified the cost of such deeper cuts on a per ton basis.

Q. What is Synapse's forecast of CO_2 emissions prices?

A. Synapse's forecast of future carbon dioxide emissions prices are presented in Figure 4 below. This figure superimposes Synapse's forecast on the results of other cost analyses of proposed federal policies.

Figure 4. Synapse Carbon Dioxide Prices



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

A. Synapse's forecast, levelized[23] over 20 years, 2011 – 2030, is provided in Table 4 below.

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

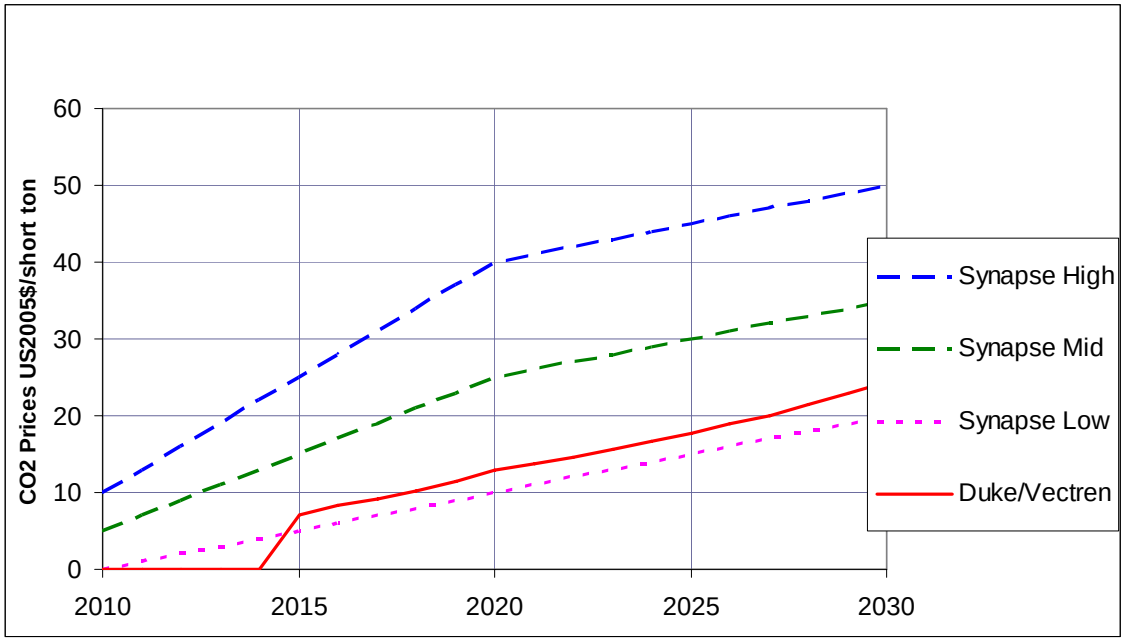
Low Case	Mid Case	High Case
$8.23	$19.83	$31.43

[23] 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. How do the Synapse CO_2 price forecasts compare to the forecast used by Duke and Vectren in their modeling of the proposed IGCC Project?

A. As shown in Figure 5 below, the CO_2 price forecast used by Duke and Vectren in their modeling of the proposed IGCC Project is significantly lower than the Synapse mid and high forecasts.

Figure 5: Synapse and Duke/Vectren CO2 Price Forecasts



Q. Are the Synapse CO_2 price forecasts based on any independent modeling?

A. Yes. We did not perform any new modeling to develop our CO_2 price forecasts. However, as shown in Table 5 below, these 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")

Table 5: Analyses of Greenhouse Gas Regulation Proposals Considered in Synapse CO_2 Price Forecast

Policy proposal	Analysis
McCain Lieberman – S. 139	EIA 2003, MIT 2003, Tellus 2003
McCain Lieberman – SA 2028	EIA 2004, MIT 2003, Tellus 2004
Greenhouse Gas Intensity Targets	EIA 2005, EIA 2006
Jeffords – S. 150	EPA 2005
Carper 4-P – S. 843	EIA 2003, EPA 2005

Q. Please comment on the fact that several of the analyses from which you developed your CO_2 price forecast were prepared in 2003 and 2004.

A. We believe it is important for the Commission 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 presented in Table 5 above were the most recent analyses available when we developed our CO_2 price forecasts back in about the spring of 2006. However, the results of these analyses remains relevant today even though some of the studies on which our forecast were based are now several years old.

Most importantly, as can been seen from Figure 3 earlier in this testimony, almost all 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. As I will discuss below, the 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 triangles, squares, circles and diamond shapes in Figure 4 above reflect the results of all of the scenarios examined in the MIT, EIA, EPA and Tellus analyses listed in Table 5?

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

For example, the blue triangles in Figure 4 represent the results from EIA's modeling of the 2003 McCain Lieberman bill, S. 139. We 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 4 represent the results from MIT's modeling of the same 2003 McCain Lieberman bill, S.139. MIT examined 14 scenarios which examined 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. We have 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. We 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, SA 2028, the Amended McCain Lieberman bill 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 4.

Q. Did Synapse selectively use certain scenarios from the analyses by MIT, EIA, EPA and Tellus in order to present the highest possible CO_2 prices, thereby ignoring other lower cost scenarios?

A. No.

Q. Do you believe that technological improvements and policy options will reduce the cost of CO_2 emissions?

A. Yes. Exhibit DAS-3 identifies a number of factors that will affect projected allowance prices. These factors include: the base case emissions forecast; whether there are complimentary 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.[24] In particular, we anticipate that technological innovation will temper allowance prices in the out years of our forecast.

Q. Duke witness Rose has testified that it is unlikely that if U.S. CO2 controls were enacted, that it would be so stringent as to significantly harm U.S. coal generation.[25] Do you agree?

A. No. Duke and the other USCAP participants have called for 60% to 80% reductions in CO_2 emissions from current levels. These same reductions would be mandated under many of the bills under consideration in the current Congress. 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

[24] Exhibit DAS-3, at pages 46 to 49 of 63.
[25] Testimony of Judah Rose, Joint Petitioners' Exhibit No. 6, at page 48, lines 13-14.

tax or higher emissions allowance prices. The Duke CO_2 allowance price forecast would not have this effect.

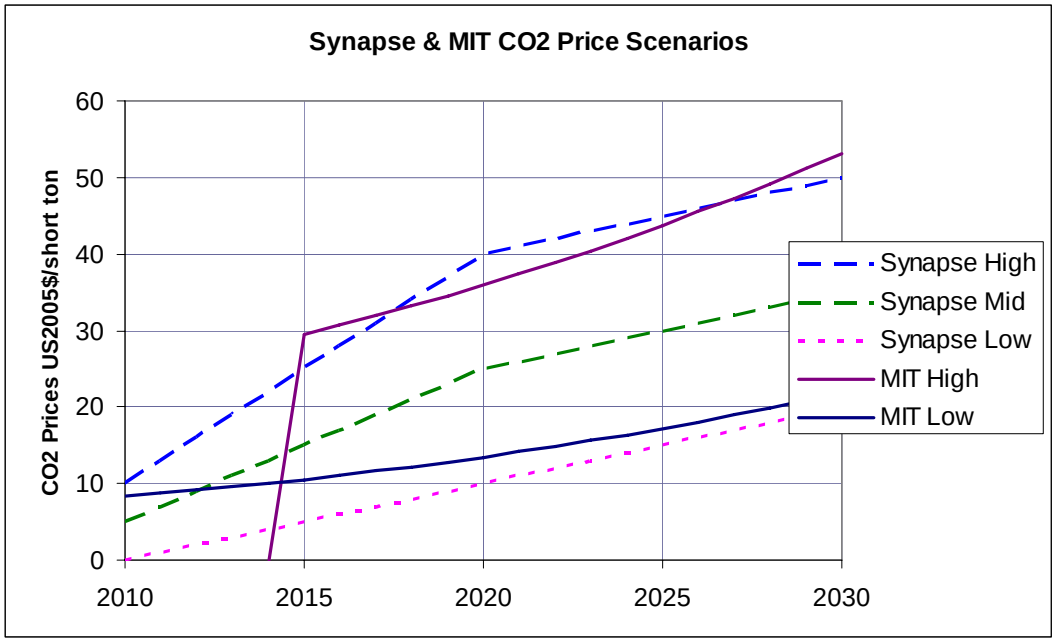
Q. Do you agree with Duke witness Rose that the possibility exists that offsets (that is, allowances) could be purchased from other sectors producing greenhouse gases and/or from other countries, thereby reducing the levels of CO_2 allowance prices?

A. Yes. As I explained earlier, we believe it is reasonable to expect that offsets will be included as part of a greenhouse gas cap-and-trade mechanism. However, it is uncertain what level of offsets will be allowed and whether there will be a functioning international market in which verifiable offsets will be traded. Further, while offsets would have some impact on CO_2 allowance prices, they would not negate the impact of CO_2 regulations on the economics of coal-based generation, for the reasons just explained. Nor would they eliminate the need to make significant reductions in CO_2 emissions within the U.S. For these reasons, although it is important that any analysis consider a wide range of potential future CO_2 costs to reflect this uncertainty, the Duke CO_2 price forecast remains unrealistically low.

Q. Have you seen any recent forecasts of future CO_2 emissions prices that are similar to the Synapse forecast?

A. Yes. A report of an interdisciplinary study at the Massachusetts Institute of Technology on *The Future of Coal* was issued in early March 2007. Figure 6 below shows that the CO_2 price forecasts in this study are very close to the high and low Synapse forecasts.

Figure 6: CO_2 Price Scenarios – Synapse & MIT March 2007 Future of Coal Study



Q. Do the Synapse carbon price forecasts presented in Figure 4 reflect the emission reduction targets in the bills that have been introduced in the current Congress?

A. No. We developed our price forecasts late last spring based on the 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 emissions reductions than the bills that we considered when we developed our carbon price forecasts. Consequently, we believe that our forecasts are conservative.

Q. Have you seen any analyses of the CO_2 prices that would be required to achieve the much deeper reductions in CO_2 emissions that would be required under the bills currently under consideration in Congress?

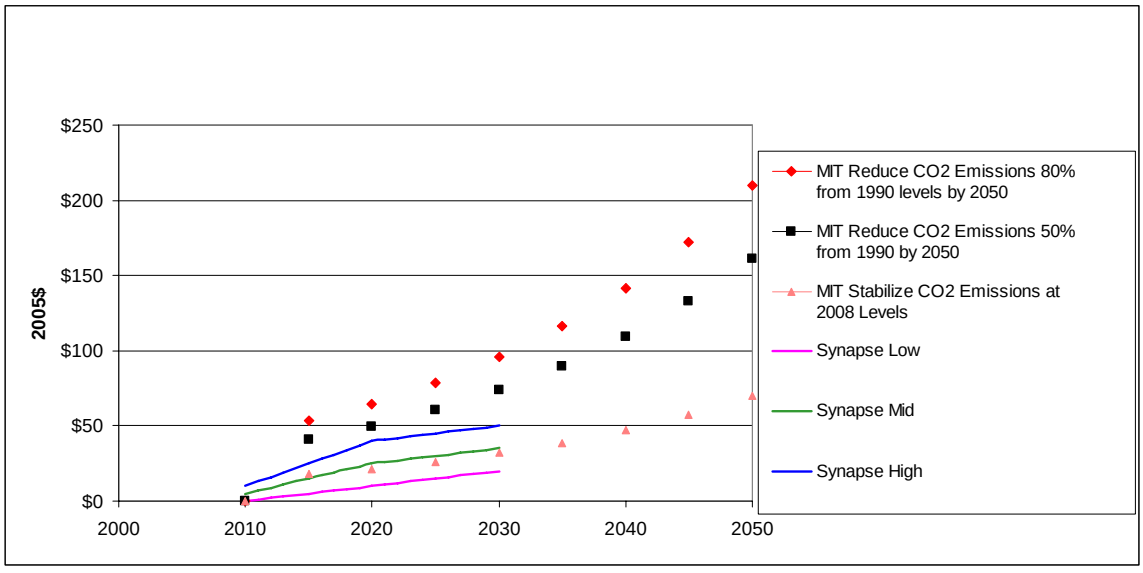
A. Yes. An *Assessment of U.S. Cap-and-Trade Proposals* was recently issued by the MIT Joint Program on the Science and Policy of Global Change. This *Assessment* evaluated the impact of the greenhouse gas regulation bills that are being considered in Congress.

Twenty nine scenarios were modeled in the *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 was allowed, whether there would be international trading of allowances, whether only developed countries or the U.S. pursue mitigation, whether there would be safety valve prices adopted as part of greenhouse gas regulations, etc.[26]

In general, the ranges of the projected CO_2 prices in these scenarios were significantly higher than the range of CO_2 prices in the Synapse forecast. For example, twelve of the 29 scenarios modeled by MIT projected higher CO2 prices in 2020 than the high Synapse forecast. Fourteen of the 29 scenarios projected higher CO2 prices in 2030 than the high Synapse forecast.

Figure 7 below compares the three Core Scenarios in the MIT *Assessment* with the Synapse CO2 price forecast.

Figure 7: CO_2 Price Scenarios – Synapse and Core Scenarios in April 2007 MIT *Assessment of U.S. Cap-and-Trade Proposals*



[26] The scenarios examined in the MIT *Assessment of U.S. Cap-and-Trade Proposals* are listed in Exhibit DAS-4.

Q. Did the recent MIT *Assessment of U.S. Cap-and-Trade Proposals* examine any scenarios in which there would be "safety valve" prices similar to those in the draft bill by Senator Bingaman on which Duke has relied for its CO2 price forecast?

A. Yes. Although these scenarios forecast significantly lower CO_2 emissions allowance prices than the Synapse mid and high forecasts, the CO_2 emission reductions achieved by 2050 in these scenarios were not close to the 60% to 80% levels that are set forth as the goals in most of the legislation that has been introduced in the current Congress. The reductions in CO_2 emissions in these safety valve scenarios also fell far short of the 60% to 80% reductions by 2050 that have been called for by USCAP, in which Duke is a participant.

Q. Are you recommending that the IURC adopt these significantly higher projected CO_2 allowance prices in its evaluation of Duke and Vectren's proposed IGCC Project?

A. Not at this time. However, the results of the recent MIT *Assessment* confirm the reasonableness of the range of the current Synapse forecast of future CO_2 prices.

Q. Have Duke and Vectren included any equipment for carbon capture and sequestration in the design for the proposed IGCC Project?

A. No. The Project includes an area that is reserved for future carbon capture equipment.[27] However, Duke has acknowledged that it has not developed specific plans to retrofit the proposed facility for any level of carbon capture.[28]

Q. Have Duke and Vectren prepared any estimates of what it might cost to add CO_2 capture and sequestration equipment to the proposed IGCC Project?

A. [

redacted

[27] Duke Revised Response to Data Request IWF-CATF 1.3.
[28] Ibid.

.[29]

redacted

].[30]

Q. Have Duke and Vectren included any of these costs of carbon capture and sequestration equipment in the cost estimate used in their analyses of the proposed IGCC Project?

A. No.

Q. Have Duke and Vectren identified any potential performance impacts from the addition of CO_2 capture and sequestration equipment?

A. Yes. Duke has said that the capacity and efficiency penalties associated with removal of up to 90% of the CO_2 from an IGCC plant are not currently known.[31] However, Duke has estimated an [redacted] decrease in the Project's net power level at a 90% carbon capture level and an [redacted].[32]

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29 Confidential Attachment to Duke Revised Response to Data Request IWF-CATF 1.3-A.
30 Ibid.
31 Duke Response to Data Request IIG 3.5.
32 Ibid.

Q. Have Duke and Vectren reflected these performance penalties from carbon capture and sequestration in their analyses of the proposed IGCC Project?

A. No.

Q. Have you seen any estimates of the general amount by which carbon capture and sequestration would increase the cost of generating power at the proposed IGCC Project?

A. Yes. Duke witness Rogers presents a table in his testimony that shows that CO_2 capture would increase the cost of generating power at an IGCC plant by 30%.[33]

Q. Have Duke and Vectren included this cost increase in their analyses of the proposed IGCC Project?

A. No.

Q. Have you seen any evidence that Duke and Vectren intend to capture and sequester the CO_2 emissions from the Project at any time in the foreseeable future?

A. No. Duke has indicated that it is uncertain when, if ever, it will implement carbon capture:

> Carbon capture and sequestration currently are not requirements for either existing or proposed generating plants. In addition, the feasibility of "permanent" CO_2 storage in the earth is not proven and there are many unanswered questions with respect to such carbon sequestration. These issues will require legislative action at the national level and likely at the state level, as well. While Duke Energy Indiana believes that carbon capture and sequestration may eventually be required for generating stations, the effective date of any such requirements could easily be well beyond the proposed commercial operation date of the Edwardsport Project. Given the open issues with respect to carbon sequestration and the potentially significant costs that are expected with respect to carbon capture and sequestration, Duke Energy Indiana believes the most reasonable approach is to construct an IGCC plant that will provide superior environmental performance from the outset with respect to those

[33] Testimony of James E. Rogers, Joint Petitioners' Exhibit No. 1, at page 13, lines 6-11.

emissions that are regulated while at the same time providing the optionality of carbon capture deployment, if and when carbon capture requirements become effective.[34]

Q. How would the new bill to require carbon capture and sequestration that has been submitted by Senator Kerry (S.1227) affect the proposed IGCC Project?

A. Senator's Kerry's bill would 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 IGCC Project. This is certainly an interesting development but we have not seen any analysis from Duke or Vectren of the potential impact of this requirement on the costs of the proposed IGCC Project.

Q. How much additional CO_2 will the proposed IGCC Project emit into the atmosphere?

A. According to Duke, the proposed IGCC Project will emit approximately 4.3 million tons of CO_2 annually.[35]

Q. Would incorporating Synapse's carbon price forecast have a material effect on the economics of building and operating the proposed IGCC Project?

A. Yes.

Q. What would be the annual incremental costs of greenhouse gas regulations to Duke and Vectren?

A. Assuming average annual emissions of 4.3 million tons of CO_2, the range of the incremental annual, levelized cost to Duke and Vectren from greenhouse gas regulations would be:

Low Case - 4.3 million tons of CO2 · $8.23/ton = $35 million.

[34] Attachment to OUCC 3.2-A to Duke response to Data Request OUCC 3.2.
[35] Confidential Attachment to Duke response to Data Request IWF-CATF 1.3-A.

Mid Case - 4.3 million tons of CO2 · $19.83/ton = $85 million

High Case - 4.3 million tons of CO2 · $31.43/ton = $135 million

Q. Duke witness Rose has testified that it is a possibility that the more quickly a coal plant is brought on line, the more likely it will qualify for the allocation of CO_2 allowances as an existing coal plant.[36] Do you agree?

A. This claim is pure speculation by Mr. Rose. It is unclear what provisions for grandfathering existing coal plants will be adopted as part of future greenhouse gas legislation. At the same time, it is unrealistic to expect that all of the existing and 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.

4. Duke and Vectren Have Not Adequately Considered the Potential for A Higher Capital Cost for the Proposed IGCC Project in their Economic Analyses

Q. Have you seen any evidence that suggests that Duke and Vectren may be underestimating the cost of constructing the proposed IGCC Project?

A. Yes. The Front End Engineering and Design ("FEED") Study Report for the proposed IGCC Project states that the new cost estimate "assumes that it will not be necessary to pay significant premiums to attract craft labor for the Project, assuming 40 hour work weeks with only occasional overtime."[37] This assumption is at variance with the cost estimate for another contemporaneous coal-fired construction project in the Midwest U.S., Big Stone II, which assumes that there will be significant competition for the craft labor and other resources needed to build all of the generating facilities being proposed for the years 2010 and after.

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[36] Testimony of Judah Rose, Joint Petitioners' Exhibit No. 6, at page 49, lines 14-20.

[37] April 2, 2007 FEED Report, at page 23.

For example, in testimony filed at the Minnesota Public Utilities Commission last fall, Kermit Trout from Black & Veatch, an experienced power plant design and construction firm, noted the following:

- Given that multiple energy production projects are expected to be competing for skilled labor during the construction period [i.e., 2007-2011], [labor] productivity was adjusted down by 10 percent. this adjustment represents [Black & Veatch's] expectation that while additional craft will become available to complete the projects, the craft will likely be entry level personnel and thus less productive than more experienced, skilled and efficient labor. …. this item represents approximately $25 million of the total estimate.[38]
- Given that other projects have publicly announced since 2004 that they will be competing for skilled labor, [Black & Veatch's] expectation is that the project will need to pay some sort of premium as a labor attraction incentive. A reserve allowance of approximately $25 million was included in the estimate to attract sufficient labor to this project, due to expected market conditions.[39]
- For the same reason, Black & Veatch factored in a subsistence allowance in its estimates of construction labor costs. This represents an allowance applied per work-hour for housing and associated expenses for traveling craft (that is, skilled craftsmen and laborers who are living away from home). It is expected that this subsistence allowance will apply to approximately 90 percent of the craft. This represents a cost of approximately $30 million that may not have been considered necessary when [the 2004 cost estimate for the Big Stone II Project was compiled].[40]

Q. Has Duke acknowledged that the competition for resources has increased the estimated costs of proposed power plants?

A. Yes. Duke witness Moreland noted as "major concerns" the rapidly escalating costs of certain commodities that will be used for the Edwardsport Project, such as steel and concrete, along with escalating labor rates.[41] Mr. Moreland

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38 Prefiled Supplemental Direct Testimony of Kermit Trout, before the Minnesota Public Utilities Commission, Docket OAH No. 12-2500-17037, MPUC Dkt No. CN-05-619, and OAH No. 12-2500-17038-2, MPUC Dkt. No. TR-05-1275, at page 21, lines 5-11.

39 Ibid, at page 21, lines 16-20.

40 Ibid, at page 22, lines 1-6.

41 Testimony of Robert D. Moreland, Joint Petitioners' Exhibit No. 4, at page 15, lines 6-10.

specifically identified that the costs of concrete increased by about 15% and the cost of steel increased by about 11% in 2005 and 2006.[42]

Additionally, in testimony filed at the North Carolina Utilities Commission on November 29, 2006, Duke emphasized the significant impact that the competition for the resources is having on the costs of building new power plants. This testimony was presented to explain the approximate 47 percent, that is, $1 billion, increase in the estimated cost of Duke Energy Carolinas' proposed coal-fired Cliffside Project that the Company announced in October 2006.

For example, Duke Energy Carolinas witness Judah Rose noted in his testimony to the North Carolina Utilities Commission 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.[43]

Mr. Rose 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

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[42] Ibid, at page 15, lines 10-11.

[43] 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.

addition."[44] Thus, according to Mr. Rose, new coal-fired power plant capital costs have increased approximately 90 to 100 percent since 2002.

Mr. Rose also noted that the primary source for his testimony that the costs of new coal power plants appear to have further increased by 40 percent in 2006 was "estimates provided to us by Duke."[45] He also cited anecdotal public evidence that noted that the capital cost increase for "Integrated Gasification Combined Cycle (IGCC) coal-fired power plants was 35 percent."[46] This same anecdotal evidence also showed that the costs of other generating technologies had similarly increased by substantial amounts.

Q. Given this continuing domestic U.S. and international competition for the resources needed to build new power plants, is it reasonable to assume that the proposed IGCC Project will experience further cost increases before it is completed?

A. Yes. Duke may have to increase the estimated cost of the project once it completes its design and/or the selection of equipment suppliers. Moreover, any number of factors could lead to even higher costs during the remaining years before the proposed IGCC Project is completed, if indeed a Certificate is issued and the Project is allowed to continue. These factors could include the worldwide competition for power plant equipment, commodities and labor, project delays, regulation-related costs, and weather conditions. Thus, there is no guarantee that the current capital cost estimate for the proposed IGCC Project will be the last.

Q. Have you seen any evidence that in their analyses of the economics of the proposed IGCC Project Duke and Vectren have examined any scenarios that reflected higher capital costs than the estimated cost in the FEED Study?

A. No.

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

[45] Ibid, at page 16, lines 4-6.

[46] Ibid, at page 16, lines 9-16.

Q. Did Duke examine a scenario that reflected a higher capital cost as part of its earlier analyses in the 2005 IRP?

A. As part of its 2005 IRP, Duke examined a sensitivity that did not reflect any federal incentives. According to Duke witness Jenner, the net cost of the IGCC examined in this sensitivity was higher than the then-current cost estimate due to the exclusion of the federal incentives.[47] However, it does not appear that Duke examined any similar higher IGCC Project capital cost sensitivities as part of the new modeling analyses discussed in Ms. Jenner's Amended Supplemental Testimony.

Q. Is this consistent with the analyses that Duke presented in North Carolina in support of the proposed Cliffside Project?

A. No. As part of its analyses of its proposed Cliffside Project, Duke examined a number of sensitivities that reflected a 20 percent higher cost to construct a new coal plant.[48] Indeed, Duke even analyzed a sensitivity reflecting a 20 percent higher capital cost for a new coal plant in November 2006 after it had just increased the estimated cost of the Cliffside Project by about 47 percent.

Q. Is it prudent to pursue a new power plant without considering the potential for higher capital costs?

A. No. It imprudent to ignore the potential for higher capital costs when evaluating the economics of planned generating unit additions against alternative options, including, but not limited to, demand side measures and renewable technologies. This is especially true given the potential for further cost increases resulting from the domestic and international competition for power plant construction resources.

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[47] Testimony of Diane Jenner, Joint Petitioners' Exhibit No. 5, at page 14, lines 1-2.

[48] Supplemental Testimony of Janice D. Hager on behalf of Duke Energy Carolinas, November 29, 2006, North Carolina Utilities Commission Docket No. E-7, SUB 790, at page 6, line 11.

Q. Duke witness Pashos has said that the results of Duke's new analyses of the relative economics of the proposed IGCC Project are conservative because the Company used the high end of the range of capital cost estimates presented in Confidential Exhibit 4-D.[49] Do you agree?

A. No. As stated in the April 2, 2007 FEED Study filing and Duke's response to Data Request CAC 9.1.a., the new cost estimate for the IGCC Project is approximately 5.2 percent higher than the high range of the capital cost estimate discussed in Joint Petitioners' October 2006 pre-filed testimony and used in the new Strategist modeling analyses discussed in the Amended Supplemental Testimony of Diane Jenner. Because the high end of the range of capital cost estimates used by Ms. Jenner in the new modeling analyses is still approximately 5.2 percent below the currently estimated cost of the proposed Project, the capital cost used by Ms. Jenner in the new analyses cannot in any way be called "conservative."

Q. Why should the IURC be concerned about possible increases in the capital cost of the proposed IGCC Project if, as Duke has testified, the costs of other generating technologies also have increased significantly in the past few years?

A. The IURC's decision in this proceeding should be based on the most reliable and objective recent information about important cost factors such as estimated capital costs and projected CO_2 emissions costs. In particular, increases in the capital and operating costs of fossil options due to increased construction costs and/or assumptions about future CO_2 emissions costs will improve the relative economics of energy efficiency alternatives and non- or low-carbon emitting options.

Q. Does this conclude your testimony?

A. Yes.

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[49] Amended Supplemental Testimony of Kay Pashos, Joint Petitioners' Exhibit No. 16, at page 4, lines 8-14.