BEFORE THE NEVADA PUBLIC SERVICE COMMISSION

IN THE MATTER OF THE APPLICATION OF SIERRA PACIFIC POWER COMPANY FOR THE APPROVAL OF ITS 2008-2027 INTEGRATED RESOURCE PLAN	)))))	Docket No. 07-06049

Direct Testimony of

Ezra D. Hausman, Ph.D.

On behalf of

Nevadans for Clean Affordable Reliable Energy (NCARE)

October 17, 2007

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I. INTRODUCTION, QUALIFICATIONS AND SUMMARY

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

A. My name is Ezra D. Hausman, Ph.D. I am a Senior Associate 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 have been employed by Synapse since July of 2005. In this position I have served as an analyst and expert witness in numerous cases involving electricity market structure, electricity price forecasting, and economic analysis of environmental regulations. I have also facilitated and served as an expert analyst for state-level stakeholder processes aimed at mitigating greenhouse gas emissions.

Prior to joining Synapse, I was employed since 1997 as a Senior Associate with Tabors Caramanis & Associates (TCA), performing a wide range of electricity market and economic analyses and price forecast modeling studies, including asset valuation studies, market transition cost/benefit studies, market power analyses, and litigation support studies. I have extensive personal experience with market simulation and resource planning software.

I hold a B.A. from Wesleyan University, a M.S. in civil engineering from Tufts University, an S.M. in applied physics from Harvard University and a Ph.D. in atmospheric chemistry from Harvard University.

A copy of my current resume is attached as Exhibit EDH-1.

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

A. I am testifying on behalf of Nevadans for Clean Affordable Reliable Energy (NCARE).

Q. Please describe NCARE.

A. As described in NCARE's Articles of Association, attached as an Exhibit to NCARE's Petition for Leave to Intervene, NCARE is "a non-profit cooperative association of public interest entities with members, donors and supporters who are Nevada residents and ratepayers of Sierra Pacific Power Company (SPPC) and Nevada Power Company (NPC). All have common interests in promoting expanded use of renewable energy, energy efficiency, and other clean energy resources, and in preserving Nevada's environmental quality. NCARE consists of Citizen Alert, the Nevada Conservation League, the Progressive Leadership Alliance of Nevada, Western Resource Advocates, the Sierra Club and the Southwest Energy Efficiency Project."

Q. Have you testified previously before this Commission?

A. No.

Q. What is the purpose of your testimony?

A. Synapse was retained by NCARE to comment on certain aspects of Sierra Pacific Power Company's Integrated Resource Plan (IRP); specifically whether they had appropriately considered the costs associated with future CO_2 emissions. We were also asked to present testimony on recent trends in the observed and forecasted capital costs of new coal-fired electric generating plants. This testimony presents the results of our analyses.

Q. Please summarize your conclusions.

A. I conclude that while Sierra Pacific Power Company (SPPC) performed a cursory evaluation of the impact of CO_2 emissions costs on the proposed alternative resource plans presented in their IRP documents, they failed to incorporate the cost of future CO_2 emissions in developing those plans. For this reason, it is not reasonable to use a comparison of these plans as the basis for finding the least-cost or least-risk resource development pathway. The prudent course would be for SPPC to develop the plans from the beginning using realistic estimates of the future cost of carbon emissions.

I further conclude that the carbon emissions prices assumed by SPPC in comparing the costs of carbon emissions among the plans are out of date and unrealistic given the likely form and impact of future carbon regulations. I propose a range of prices that should be considered for the purposes of long-range utility resource planning, and I provide documentation and comparative analysis to substantiate these numbers.

Finally, I provide an overview of the general rising trend in the capital costs of coal plants and some discussion of how this trend should be taken into account in considering the company's plan.

Q. Please summarize your recommendations concerning the costs associated with CO_2 emissions.

A. I recommend that the Commission require Sierra Pacific to withdraw its plan and create a new plan, in which a comprehensive range of alternative resources and realistic resource costs are considered. In this new plan, SPPC should be required to consider up front all of the costs associated with each resource option, including the costs likely to be associated with the emissions of carbon dioxide in the future. SPPC should consider a range of forecasts for CO_2 prices, such as those presented in my testimony below, to provide a reasonable comparison of the economic benefits of alternative plans given a realistic range of future carbon emissions prices. I further recommend performing a sensitivity test, at least, using a high price scenario especially for the out years. This would accommodate the

case where congress acts aggressively within a decade or so to limit CO_2 emissions to a level which is likely to avoid many of the dangerous impacts of climate change.

In re-analyzing its resources selections, the Commission should require Sierra Pacific to model CO_2 costs as an up-front variable operating cost on all carbon dioxide emitting resources on in its system, so that the assumed CO_2 costs realistically influence the relative costs of operating these resources and thus properly inform resource development decisions. Moreover, in developing its new resource plan, the company should consider portfolios which have contributions from low- or non-carbon emitting resources, such renewable energy and energy efficiency, far in excess of the minimum levels required by Nevada's Renewable Portfolio Standard (RPS).

If the Commission chooses not to require SPPC to re-analyze and resubmit its plan using the prudent approach I have outlined and including realistic CO_2 emissions costs, I recommend that the Commission require that SPPC shareholders bear the risk of paying for the failure of the company to prudently and realistically consider future CO_2 compliance costs. That is, the Commission should put SPPC on notice that it retains the right to set rates as if SPPC had produced a more prudent resource plan with full consideration of realistic CO_2 emissions costs, and that SPPC be would be barred from passing on the excess emissions costs to ratepayers for the life of the resources.

Q. Please summarize your recommendations concerning the costs of new coal power plants?

A. I recommend that the Commission require Sierra Pacific to file, as part of its resource plan, a sensitivity study showing what the least-cost plan would be if coal plant costs were 30%, 50%, or 100% higher than the baseline costs projected in their plan. Further, when the company and NPC complete their review of the costs of the proposed Ely plant, I recommend that an independent engineering firm, retained by the Commission staff at SPPC's expense, be asked to review

these cost estimates and provide an opinion in an affidavit on whether they are reasonable and consistent with current and expected market conditions including recent and expected trends in the costs of materials, labor, and technology. I recommend that if it appears that resource construction costs will be significantly different from those the company used in developing its plan, that the commission use the results of the sensitivity study to determine whether the company should withdraw its plan and produce a new least-cost resource plan using updated cost assumptions.

If the Commission chooses not to require SPPC to conduct or provide any further analysis on coal plant construction costs and their impact on their resource plan, I recommend that the Commission cap the costs that SPPC is allowed to recover on the proposed new coal plants at the levels used in producing the IRP filing.

II. TREATMENT OF CARBON EMISSIONS COSTS BY SIERRA PACIFIC POWER

Q. Has Sierra Pacific Power Company taken CO_2 emissions costs into account in developing its 2008-2027 Integrated Resource Plan?

A. They have not. While SPPC witness David Harrison provided some analysis of the cost of CO_2 emissions in his testimony and these are mentioned in the IRP documents, all indications are that this assessment was done after the fact and had no influence whatsoever on SPPC's IRP and resource selections.

Q. **Please elaborate on your statement that the assessment was done after the fact and had no influence on SPPC's resource selections.**

A. Based on my review of the SPPC's IRP, it appears that the various expansion plans presented by the company were developed assuming a cost of zero for CO_2 emissions throughout the term of the plan. Once the alternative resource plans were developed using this assumption, the company then asked their consultant to impute a CO_2 cost to each plan using a value rising from $6 to $8 per ton of CO_2 emitted.

Thus, the resources selected in the modeling analysis were in no way influenced by the assumed level of the CO_2 emission costs.

Q. **Is this the proper methodology for assessing the impacts of CO_2 cost on a utility resource plan?**

A. No. To correctly assess the impact of a CO_2 compliance costs on a resource plan, these costs should be included up-front as a variable operating cost of each existing and new carbon dioxide emitting resource that is part of the plan. This is similar to the way fuel costs are treated—to do otherwise makes no more sense than developing a resource plan assuming that all fuel would be free forever, and then calculating the fuel costs after the fact.

Different kinds of resources emit different amounts of CO_2 for each kWh they produce, and thus they are will be affected differently by whatever cost is imposed on CO_2 emissions in the future. A coal plant, which emits approximately two pounds of CO_2 to the atmosphere for every kWh, will be relatively much less economically attractive under future CO_2 regulations than a gas plant, which emits about half as much. Resources which emit little to no CO_2, such as renewable energy and measures that reduce energy use, will enjoy a substantial economic advantage. Failing to take these considerations into account would mean that the company would produce more CO_2 pollution and incur higher costs than should be necessary, all because they based all of their alternative plans on a single estimate of CO_2 costs, zero, that they almost certainly know is unrealistic.

Q. What are the consequences of failing to consider CO_2 costs in the manner you suggest?

A. CO_2 emissions costs will be a primary driver of power production costs in the future, and should be a primary input into the integrated resource planning process in a way that actually influences resource selection. The consequence of failing to treat them in this way would be a resource plan which fails to reasonably, accurately, and prudently compare the likely costs of future resource

options, and that therefore is unlikely to reveal the lowest-cost or lowest-risk resource options for serving future load. Coal-fired generating plants have low fuel costs today compared to other types of resources, but have much higher CO_2 emissions, as noted above. Failing to consider emissions costs can make such resources look economically attractive, even though a more comprehensive assessment might reveal that they are far from a low-cost resource.

Q. Have you found any evidence in SPPC's official documents that they concur with this assessment?

A. Yes. In SPPC's Form 10-K, filed in March 2007 with the U.S. Securities and Exchange Commission, they note among risk factors (p. 26):

> Future changes in environmental regulations governing emissions reductions could make certain electric generating units uneconomical to construct, maintain or operate. In addition, any legal obligation that would require the Utilities to substantially reduce its emissions beyond present levels could require extensive mitigation efforts and, in the case of CO2 legislation, would raise uncertainty about the future viability of fossil fuels, particularly coal, as an energy source for new and existing electric generating facilities.

The form goes on to state, with reference to air emissions rules specifically including greenhouse gases (p. 27):

> Revised or additional regulations, which result in increased compliance costs, increased construction costs or additional operating restrictions, could have a material adverse effect on our financial condition and results of operations particularly if those costs are not fully recoverable from our customers and/or if such regulations make currently contemplated construction projects technologically obsolete or economically non-viable.

These quotes suggest to me that SPPC is aware of the significance of future CO_2 emissions costs to the future viability of coal-fired resources. Nonetheless, they neglect to consider them in developing their IRP for the years 2008 through 2027.

Q. Should the Commission permit such costs to be "fully recoverable from…customers", should they be incurred by the company?

A. If the Company fails to take clearly foreseeable costs into account in its resource planning process, and as a result makes suboptimal and imprudent resource choices that incur unneeded costs, the Commission should not allow these costs to be recoverable from ratepayers. In my opinion, this approach would be appropriate given the company's current resource plans due to their failure to adequately consider CO_2 emissions costs, and the Commission should put the company on notice that this will be the case.

Q. SPP witness Harrison emphasizes in several places in his testimony that CO_2 emissions costs are "speculative" (e.g., p.11 at 19) and "subject to significant uncertainty" (e.g., p. 10 at 20). Do you agree?

A. I agree that the future value of CO_2 emission costs are uncertain, just like the future value of fuel costs and other cost drivers for power production in the future.

Q. How would you suggest that a utility such as SPPC take carbon emissions costs into account, given the uncertainty in their future value?

A. Just like with any uncertain future cost driver, the most prudent approach is to study market trends, legislative proposals, and the academic literature to estimate the likely future value of the cost driver. Customarily, the utility could then take a "most likely," "high," and "low" trajectory case and see how the choice of trajectory affects the outcome of the IRP.

Q. Has Synapse Energy Economics performed the analysis you suggest for future CO_2 emissions costs?

A. Yes. We have prepared a paper entitled "Climate Change and Power: Carbon Dioxide Emissions Costs and Electricity Resource Planning" which I submit as Exhibit EDH-2. In this paper we have developed three possible carbon emissions price scenarios, as just described, which we recommend for use from the earliest stages of utility resource planning.

Q. How does SPPC witness Roberto Dennis, Corporate Senior Vice President of Energy Supply for Sierra Pacific Resources, describe SPPC's choice of a "preferred plan" for future resources?

A. According to Page 13 of Mr. Dennis' direct testimony, "The Preferred Plan provides the lowest cost and largest improvement in system reliability over the greatest range of potential scenarios (low, base, and high load forecast scenarios and low, base, and high fuel and purchased power scenarios)."

Q. Do you agree that this approach will yield "…the lowest cost and largest improvement in system reliability over the greatest range of potential scenarios"?

A. No. By limiting their analysis to variations in load forecasts and fuel and purchased power prices, but neglecting CO_2 emissions costs in developing the scenarios, the company has performed a flawed and incomplete analysis of their plan. This approach is inadequate to support the development of identification of a least-cost plan.

III. CO_2 EMISSIONS COSTS IN THE UNITED STATES

Q. Do you feel that federal regulation imposing a cost on CO_2 emissions in the electric sector is likely in a timeframe of significance to SPPC's IRP?

A. Yes. While there are significant uncertainties as to the design and details of the CO_2 regulations that ultimately will be adopted and implemented, numerous legislative proposals have already been introduced in Congress and in the states. The Supreme Court has recently ruled, in *Massachusetts vs. EPA*, that the EPA had offered no reason that CO_2 should not be regulated as a pollutant as suggested by a vast body of scientific evidence.[1] Finally, the growing public concern over global warming, combined with overwhelming scientific consensus on the issue,

[1] http://www.supremecourtus.gov/opinions/06pdf/05-1120.pdf

make some form of regulation inevitable within the earliest part of the timeframe covered in the IRP.

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. Some of the federal proposals that would require greenhouse gas emission reductions that had been submitted in Congress are summarized in Table 1 below.[2]

Table 1. Summary of Mandatory Emissions Targets in Proposals Discussed in Congress[3]

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
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

[2] Table 1 is an updated version of Table ES-1 on page 5 of Exhibit EDH-2.

[3] More detailed summaries of the bills that have been introduced in the U.S. Senate in the 110th Congress are presented in Exhibit EDH-4.

Proposed National Policy	Title or Description	Year Proposed	Emission Targets	Sectors Covered
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 CO_2) starting in 2009, 2001 levels (2.454 billion tons CO_2) 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 goal would be 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
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%	Economy-wide

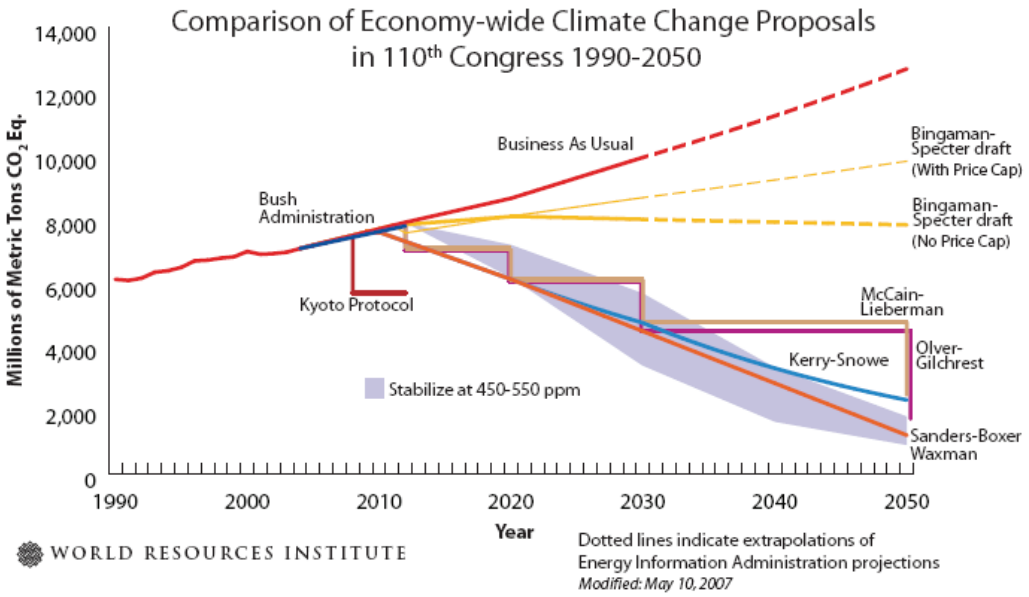
Proposed National Policy	Title or Description	Year Proposed	Emission Targets	Sectors Covered
			below 1990 level in 2050	
Olver, et al HR 620	Climate Stewardship Act	2007	Cap at 2006 level by 2012, 1%/year reduction from 2013-2020, 3%/year reduction from 2021-2030, 5%/year reduction from 2031-2050, equivalent 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

In addition, Senators Lieberman and Warner have issued a set of discussion principles for proposed greenhouse gas legislation. This legislation would mandate 2005 emission levels in 2012, 10% below 2005 levels by 2020, 30% below 2005 levels by 2030, 50% below 2005 levels by 2040, and 70% below 2005 levels by 2050.

The emissions levels that would be mandated by the bills that have been introduced in the current Congress are shown in Figure 1 below, prepared by the World Resources Institute:[4]

[4] http://pdf.wri.org/wri_analysis_of_ctproposals-110th_2.pdf

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. 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. Table 2 below lists the emission reduction goals that have been adopted by states in the U.S. Regional goals have also been established in the Northeast and Western regions of the nation.

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

State	Announced 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	

State	Announced 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)
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 2050		
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	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

State	Announced 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)
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		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	
BC	33% reduction by 2020		

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 are increasing numbers of legislators who appear inclined to support passage of legislation to regulate the emissions of greenhouse gases. However, 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. 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.[5] Indeed, the poll found that 74% of all respondents 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.[6]

At the same time, according to a recent public opinion survey for the Massachusetts Institute of Technology, [7] 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. 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.

IV. CO_2 EMISSIONS PRICES USED BY SIERRA PACIFIC POWER COMPANY

Q. You note that SPPC witness Harrison estimated the CO_2 emissions costs associated with each of the Company's plans. What is the source of Dr. Harrison's cost values for CO_2 emissions?

A. Dr. Harrison cites a report authored by the NERA, which is included with the Company's testimony in Technical Appendix II. However, the NERA report does not contain original analysis in this area, but cites two other studies in this area. These are, (1) a study by David Pearce published in 2001 to support emissions

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

6 Id.

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

prices for the years 2008 and 2009, and (2) prices based on a 2004 study by the National Commission on Energy Policy (NCEP) for the years 2010 and beyond.

Q. Setting aside whether the carbon emissions prices were used appropriately in developing the Integrated Resource Plan, do you support Dr. Harrison's use of the David Pearce emissions costs, as cited in the NERA study, for the years 2008 and 2009?

A. I do not. The Pearce study is itself quite out of date, and the studies upon which it relies are almost all more than ten years old. I am also, frankly, unable to reconcile the prices cited by NERA with the prices that I find in the Pearce study. These prices are also given as "damage" estimates, although they date from a period when the damages associated with global warming was much more poorly understood than it is today. Finally, I find it highly unlikely that there will be carbon emissions costs imposed as early as 2008. I think it is more reasonable to assume that emissions costs will come into play in 2009 or 2010.

Q. Setting aside whether the carbon emissions prices were used appropriately in developing the Integrated Resource Plan, do you support Dr. Harrison's use of the NCEP emissions costs, as cited in the NERA study, as estimates of emissions costs for the years 2010 and beyond?

A. No. Even when published, the NCEP values were quite low—$5 per ton CO_2 equivalent in 2010, and rising to $7 per ton CO_2 equivalent in 2020. In fact, in the NCEP report itself compares these values to permit prices based on the then-current McCain Lieberman Bill (Senate Amendment 2028, the Climate Stewardship Act of 2003) and finds that the McCain Lieberman would lead to emissions costs which were $9 to $16 in 2010, and $15 to $36 in 2020. Further, given the quickly changing climate for carbon regulation described above, it is unreasonable to base the Company's analysis on a report released in 2004.

Q. Has NCEP updated their recommended CO_2 emissions cost since the 2004 report?

A. Yes. I have provided their most recent update, dated April 2007 and entitled "Energy Policy Recommendations to the President and the 110th Congress", as Exhibit EDH-3. In this report, they recommend a safety valve cost of carbon emissions of $10 per ton of CO_2 equivalent, as opposed to $7 in the original study.

Q. Do you conclude that the updated NCEP emissions cost is the appropriate number to use for utility resource planning purposes?

A. No. The new NCEP proposal contains a safety-valve price that is so low it would almost guarantee that the carbon regulations would be ineffective. It is inconsistent with both the cost of mitigating carbon emissions and the general trend of legislative proposals before Congress. Thus, even though NCEP has increased the proposed price over the values used by SPPC, it is still unrealistically low.

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

A. Table 6.1 on page 41 of Exhibit EDH-2 presents the carbon dioxide costs, in $/ton CO_2, that were being used as of 2006 by a number of utilities for both resource planning and modeling of carbon regulation policies.

Q. Are you aware of any recent regulatory commission decisions concerning the levels of carbon dioxide emissions prices that utilities should consider when planning how to supply energy to their customers?

A. Yes. The New Mexico Public Regulation Commission recently ordered that utilities should consider a range of CO_2 prices in their resource planning. This range runs from $8 to $40 per metric ton, beginning in 2010 and increases at the overall 2.5 percent rate of inflation, with a mid-range value of $20 per metric ton. This range is significantly higher than the CO_2 prices used by SPPC in estimating the CO_2 emissions costs associated with their resource plans.

V. SYNAPSE ENERGY ECONOMICS CARBON EMISSIONS PRICE FORECASTS

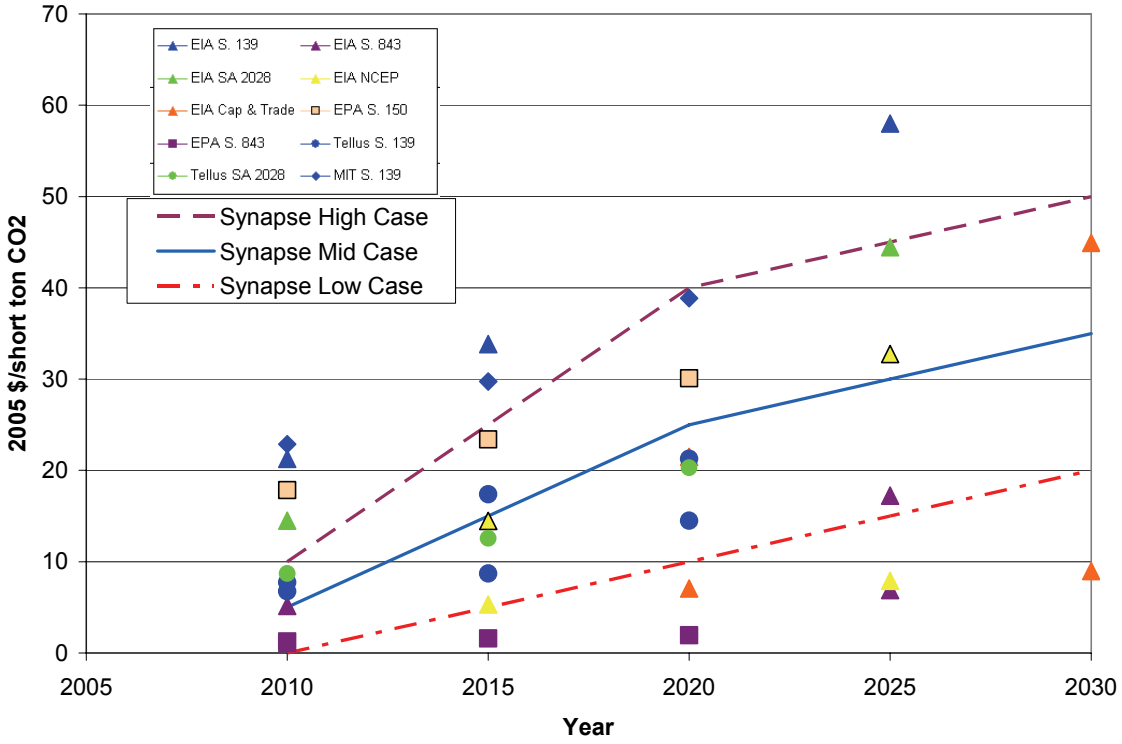
Q. You noted that Synapse has developed a set of carbon price forecasts that you recommend for use for utility resource planning purposes, supported by the analysis and discussion in Exhibit EDH-2. What are those prices?

A. Synapse's forecast of future carbon dioxide emissions prices are presented in Table 3 and Figure 2 below.

Table 3. Synapse Carbon Dioxide Emissions Price Forecast ($/ton CO_2)

Year	Low	Mid	High
2010	0.0	5.0	10.0
2011	1.0	7.0	13.0
2012	2.0	9.0	16.0
2013	3.0	11.0	19.0
2014	4.0	13.0	22.0
2015	5.0	15.0	25.0
2016	6.0	17.0	28.0
2017	7.0	19.0	31.0
2018	8.0	21.0	34.0
2019	9.0	23.0	37.0
2020	10.0	25.0	40.0
2021	11.0	26.0	41.0
2022	12.0	27.0	42.0
2023	13.0	28.0	43.0
2024	14.0	29.0	44.0
2025	15.0	30.0	45.0
2026	16.0	31.0	46.0
2027	17.0	32.0	47.0
2028	18.0	33.0	48.0
2029	19.0	34.0	49.0
2030	20.0	35.0	50.0
2031	20.0	35.0	50.0
2032	20.0	35.0	50.0
2033	20.0	35.0	50.0
2034	20.0	35.0	50.0
2035	20.0	35.0	50.0
2036	20.0	35.0	50.0
2037	20.0	35.0	50.0
2038	20.0	35.0	50.0
2039	20.0	35.0	50.0
2040	20.0	35.0	50.0

Figure 2. Synapse CO_2 Emissions Price Forecast and analyses of recent legislative proposals



Q. When were the Synapse CO_2 emission allowance price forecasts shown in Figure 2 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 EDH-2, starting on page 41.

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 progress.

Q. Are the Synapse CO_2 price forecasts shown in Figure 2 based on any independent modeling?

A. Synapse did not perform any new modeling to develop our CO_2 price forecasts. However, as shown in Table 6.2 on page 42 of Exhibit EDH-2, 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).

Q. Do the triangles, squares, circles and diamond shapes in Figure 2 above reflect the results of all of the scenarios examined in the MIT, EIA, EPA and Tellus analyses upon which you relied?

A. No. As a general rule, Synapse focused our attention on the modeler's primary scenario, or presented high and low scenarios to bracket the range of results. While there was some judgment involved in selecting which scenarios to represent, we worked hard to present an unbiased, representative sample of the most likely scenarios.

For example, the blue triangles in Figure 2 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 2 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 being the closest representation of the S.139 legislative proposal since it assumed that the cap was tightened in a second phase, as it was proposed to be under 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 2.

Q. What are some of the factors that will affect the cost of CO_2 emissions?

A. Exhibit EDH-2 identifies a number of factors that will affect allowance prices in the future. 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.[8]

Q. Do you anticipate that retrofitting conventional pulverized coal facilities with carbon capture technology will ultimately make coal-fired generation a low-cost, low-carbon source of electricity?

A. No. In the long run, it may be that coal combustion combined with carbon capture and storage (CCS) will be an important part of the US energy mix, allowing abundant reserves of coal in the US and elsewhere to be burned without significantly adding to the atmospheric loading. Perhaps one day technological improvements and learning curve effects will reduce the cost of carbon capture at all types of generating plants, making it economically feasible for utilities to retrofit their existing coal-fired resources. Unfortunately, however, carbon capture

technology for conventional pulverized coal-fired generation is quite immature at present, and I would not expect to see it become cost effective at any time in the near future, if ever. I find it more likely that CCS will become feasible for Integrated Gasification Combined Cycle (IGCC) plants, which can be designed today for optimal carbon capture and for which the technology is more mature.

Some studies have attempted to estimate the cost of removing CO_2 from the emissions stream of pulverized coal-fired power plants, despite the immature state of the technology. For example, a December 2006 study by the National Energy Technology Laboratory (NETL) projects that the cost of carbon capture and sequestration would be between $55 and $75/tonne of CO_2 avoided, depending on the type of plant used to replace the lost output (due to the decreased efficiency of plants with carbon capture) and the percent of output CO_2 captured. This study was based on plants of a technology similar to existing coal-fired plants in the United States.[9] The March 2007 "Future of Coal Study" from the Massachusetts Institute of Technology estimated that the cost of carbon capture for existing coal units would be between $56 and $71 per tonne.[10]

Q. What is the significance of the cost of carbon capture and sequestration to the emissions cost for CO_2?

A. One important factor that will set the cost of carbon emissions prices will be the "marginal cost of abatement"—that is, what would it cost someone on the margin to avoid the next unit of emissions? If and when CCS were to become available as a widespread option for controlling carbon emissions, many analysts believe that this approach could serve as the marginal abatement technology and would thus create a "cap" for the price of carbon emissions allowances. Companies would have a choice of purchasing allowances or paying the cost of building and operating CCS infrastructure, including the loss of efficiency this would entail for

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8 Exhibit EDH-2, at pages 46 to 49 of 63.

9 National Energy Technology Laboratory, "Carbon Dioxide Capture from Existing Coal-Fired Power Plants", Paper DOE/NETL-401/120106, December 2006.

10 *The Future of Coal*, *Options for a Carbon-Constrained World*, Massachusetts Institute of Technology, March 2007, Table A-3.E.4.

generating plants. This could especially be the case if CCS were a low cost option, so that coal-fired generation with CCS could be cost-competitive with renewable energy technology. However, as noted above it, looks unlikely that retrofitting coal plants that are not originally designed to accommodate CCS will be a low-cost option any time soon.

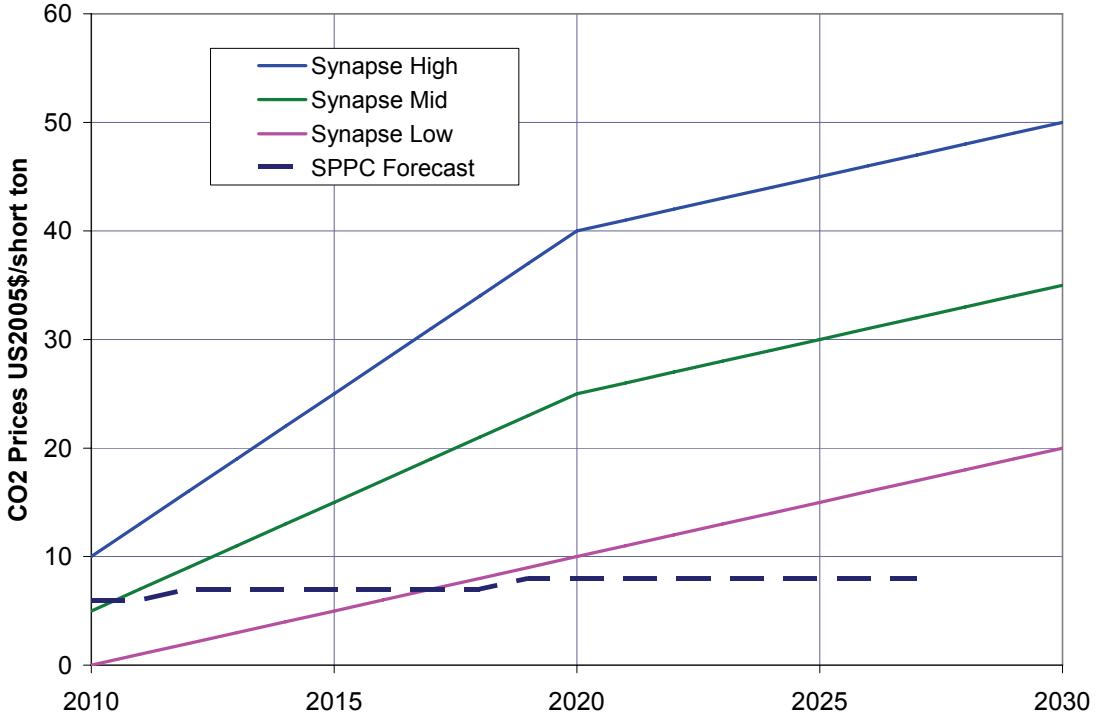
Q. Do the Synapse CO_2 price forecasts reflect the potential for the inclusion of domestic offsets and, perhaps, international offsets in U.S. carbon regulation policy?

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 2, the highest prices shown for 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 2 reflect the allowed use of offsets.

Q. How do the Synapse CO_2 price forecasts compare to the forecast used by SPPC witness Harrison?

A. The Synapse and SPPC/Harrison CO_2 price forecasts are shown in Figure 3 below. As can be seen from this Figure, the Company's CO_2 price forecast trajectory starts at about the same level as Synapse' Mid-case forecast. However, the SPPC forecast remains basically unchanged thereafter, while all of the Synapse forecast trajectories show an increasing price over time.

Figure 3: Synapse and SPPC CO_2 Price Forecasts



Q. Why do you anticipate that the price of carbon emissions will increase over time in all of your scenarios?

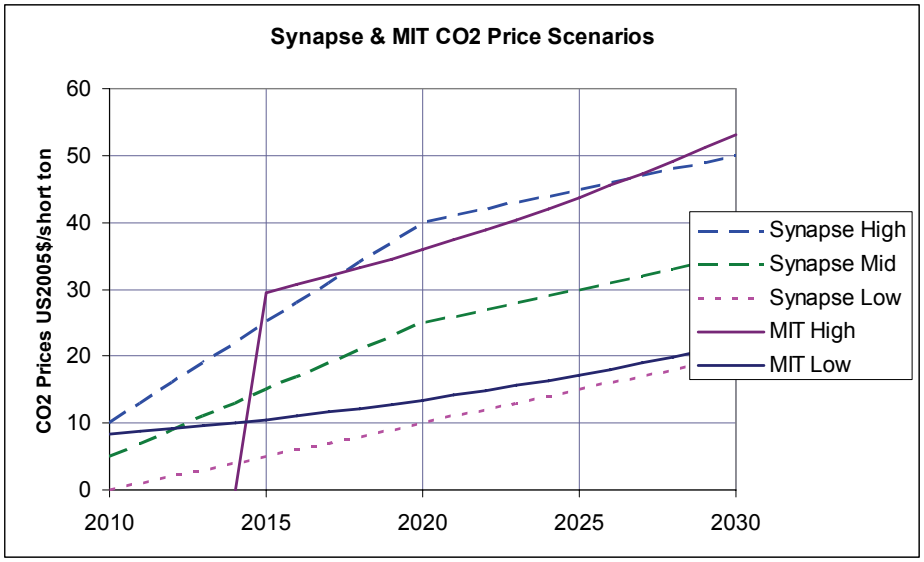
A. There at least four reasons for this. First, just on a political level, it seems extremely unlikely that Federal legislation will be passed that imposes a high cost on carbon emissions immediately. This is because it takes time for consumers, businesses, and generating companies to make the changes necessary to adapt to higher prices, and it could be damaging to the economy to impose high prices all at once. Second, it is likely that federal legislation will take the form of a cap-and-trade program, in which the total number of tons of emissions allowed will not increase (or may even decrease) even though total energy use is anticipated to continue growing. Thus the value of each ton of emissions is likely to increase as demand outpaces supply. Third, many of the bills proposed in congress, as well as emissions goals articulated in several states, suggest a ratcheting down of emissions in later years. Fourth, the social and economic damages associated with global warming are, unfortunately, not going to be avoided by modest initiatives

that keep emissions at or slightly above current levels; in fact they are likely to dwarf the cost of any conceivable carbon regulation in the decades to come. Thus I anticipate increasingly stringent emissions regulations in the years and decades to come, as both the costs and the public awareness of global warming increase.

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

A. Yes. The recent MIT study on *The Future of Coal*[11] contained a set of assumptions about high and low future CO_2 emission allowance price forecasts. Figure 4 below shows that the CO_2 price trajectories in this study are very close to the high and low Synapse forecasts.

Figure 4: Synapse CO_2 Price forecasts vs. MIT Future of Coal Study



[11] Massachusetts Institute of Technology, *The Future of Coal: Options for a Carbon-Constrained World*, 2007. Available at http://web.mit.edu/coal/.

Q. Does 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. It is important for utilities to rely on the most current information available about future CO_2 emission allowance prices, as long as that information is objective and credible. Synapse relied upon the most recent analyses and technical information available when Synapse developed its CO_2 price forecasts back in about the spring of 2006 when we developed the CO_2 price shown above.

Many of the new greenhouse gas regulation bills that have been introduced in Congress are more stringent than those that were being considered prior to the spring of 2006. The increased stringency of the current bills can be expected to lead to higher CO_2 emission allowance prices; further, the higher 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. While I would say that our CO_2 prices remain valid, I would also say that they are more conservative than they were when they were developed, given the general trend in the bills before Congress today.

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 mandated under the bills currently under consideration in Congress?

A. Yes. For example, a paper entitled *Assessment of U.S. Cap-and-Trade Proposals* was recently issued by the MIT Joint Program on the Science and Policy of Global Change.[12] This *Assessment* evaluated the impact of the greenhouse gas regulation bills that are being considered in the current Congress.

Twenty nine scenarios were modeled in the *Assessment*. These scenarios reflected differences in such factors as emission reduction targets and target years, whether banking of allowances would be allowed, whether there would be international

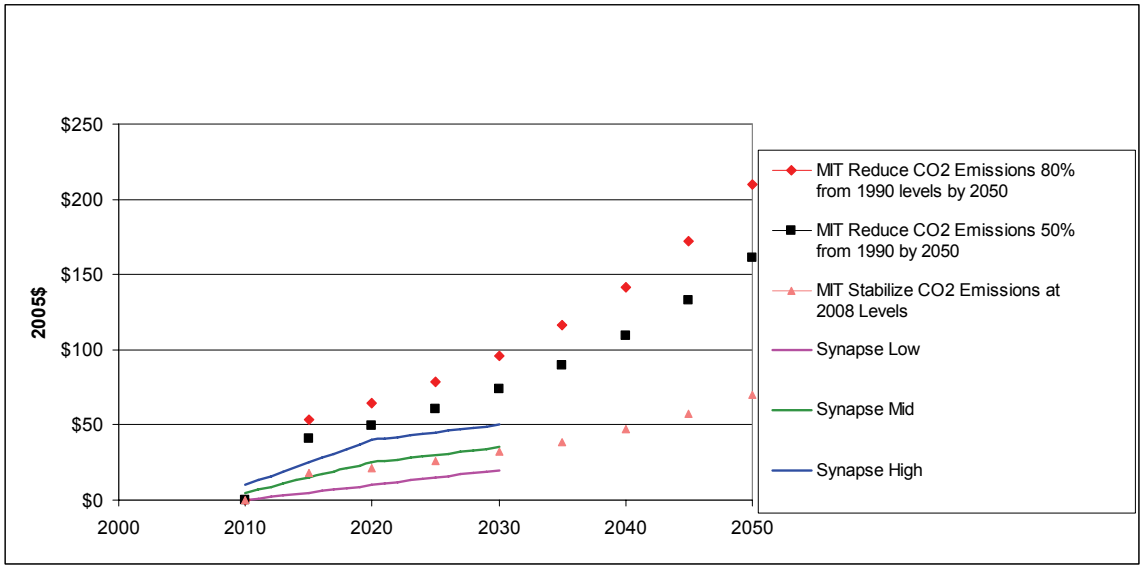
[12] Available at http://web.mit.edu/globalchange/www/MITJPSPGC_Rpt146.pdf.

trading of allowances, which countries or the U.S. 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 than the high Synapse forecast in 2020. Fourteen of the 29 scenarios (almost half) projected higher CO_2 prices than the high Synapse forecast in 2030.

Figure 5 below compares the three Core Scenarios in the MIT *Assessment* with the Synapse CO_2 price forecasts.

Figure 5: CO_2 Price Scenarios – Synapse and Core Scenarios in April 2007 MIT *Assessment of U.S. Cap-and-Trade Proposals*



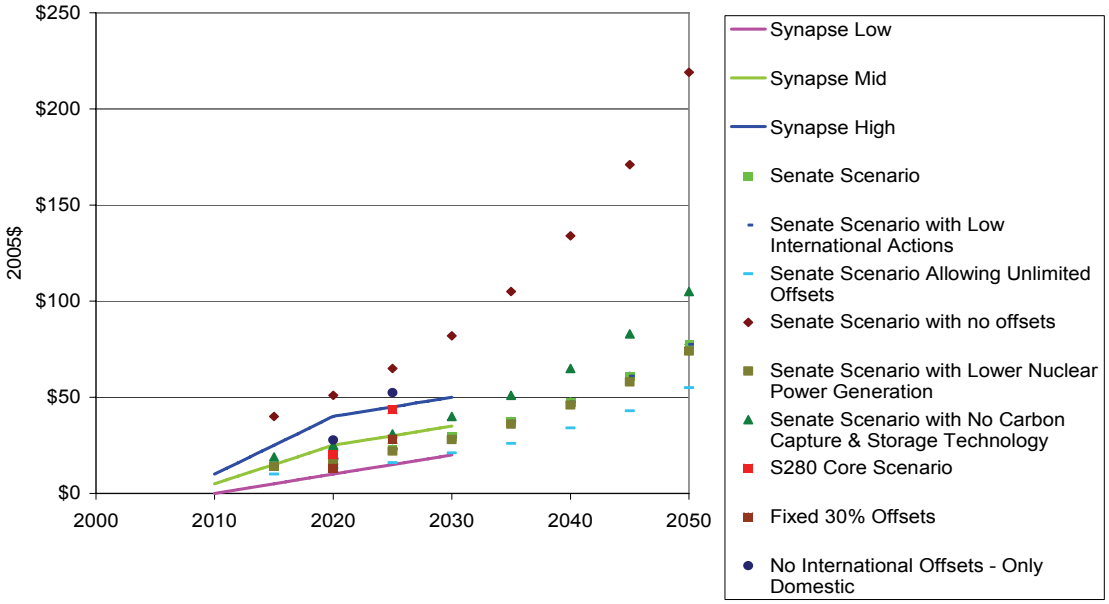
Q. How does the Synapse CO_2 emissions allowance price forecast compare to US government assessments of the impact of current bills in Congress?

A. Both EPA[13] and the Energy Information Agency (EIA) of the Department of Energy[14] have examined the current version of the legislation introduced in this

[13] *Energy Market and Economic Impacts of S. 280, the Climate Stewardship and Innovation Act of 2007,* Energy Information Administration, July 2007.

Congress by Senators McCain and Lieberman. Figure 6 below shows that the Synapse CO_2 prices is consistent with the range of scenarios examined in the EPA and EIA assessments:

Figure 6: Synapse CO2 Price Forecasts vs. Results of EPA and EIA Assessment of Current McCain-Lieberman Legislation

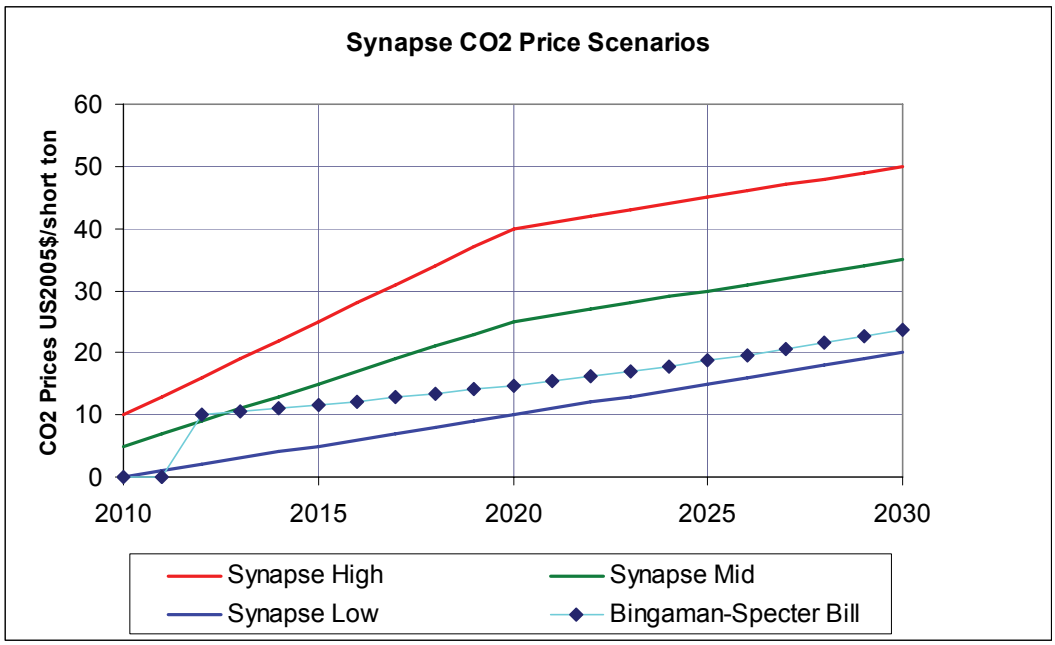


Q. How do the Synapse CO_2 forecasts compare to the safety valve prices in the bill introduced by Senators Bingaman and Specter?

A. As shown in Figure 7 below, the safety valve prices in the legislation introduced by Senators Bingaman and Specter fall between the Synapse mid and low forecasts.

[14] *EPA Analysis of the Climate Stewardship and Innovation Act of 2007, S. 280 in 110th Congress*, July 16, 2007.

Figure 7: Synapse CO_2 Price Forecasts vs. Safety Valve Prices in Bingaman-Specter Legislation in 110th Congress



Q. Should companies also consider a case without carbon emissions prices as part of integrated resource planning?

A. It may be reasonable to consider such a case as a sensitivity case covering the next few years. However, plans such as the one under consideration for SPPC involve resource choices that will determine the energy mix for decades to come, and involve resources that take several years to design, site and construct. Further, as seen even with the extremely low prices considered by SPPC witness Harrison, carbon emissions costs are likely to greatly exceed the costs associated with emissions of all other pollutants combines. Given these facts, I would not place much value on any scenario that did not include carbon emissions costs.

Q. What are your recommendations concerning the CO_2 prices that utilities such as Sierra Pacific Power should use in their integrated resource planning processes?

A. Given the uncertainty associated with the legislation that eventually will be passed by Congress, we believe that the most prudent approach is to use the range of forecasts of CO_2 prices presented in Table 3 and Figure 2 above to provide a

reasonable comparison of the economic benefits of alternative plans given the uncertainty in future carbon emissions prices. It would also be prudent to consider a higher price scenario, such as the MIT scenarios shown in Figure 5 or even higher, especially for the out years. This would accommodate the case where congress acts within a decade or so to limit CO_2 emissions to a level which is likely to avoid many of the dangerous impacts of climate change.

VI. CAPITAL COST TRENDS FOR COAL PLANTS

Q. Is it generally accepted that domestic U.S. and worldwide competition for power plant design and construction resources, commodities, and manufacturing capacity have led to significant increases in power plant construction costs in recent years?

A. Yes. Soaring power plant construction costs have been the subject of a number of studies, assessments and articles in papers and magazines, as well as testimony sponsored by companies that are proposing to build new fossil-fired generating plants.

For example, in testimony filed at the North Carolina Utilities Commission on November 29, 2006, Duke Energy Carolinas emphasized the significant impact that the competition for resources had been 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.

In fact, Duke Energy Carolinas' witness Judah Rose noted in 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.[15]

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 addition."[16] Thus, according to Mr. Rose, new coal-fired power plant capital costs have increased approximately 90 to 100 percent since 2002.

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

> As a result of declining reserve margins in some U.S. regions [of] the U.S. 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

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[15] 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.

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

- 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.[17]

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

A September 2007 report on *Rising Utility Construction Costs* prepared by the Brattle Group for the EDISON Foundation (Exhibit EDH-5) 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.[19]

The report further noted:

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[17] *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.

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

- 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.

- 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

[19] *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-6.

consumers.[20]

Q. Are these reviews of the current market conditions affecting the costs of proposed coal-fired power plants consistent with what you have observed in your practice?

A. Yes. These reviews of the factors affecting the estimated costs of new coal-fired generating facilities are consistent with what Synapse has found in the many proceedings involving coal plants in which we have been involved during the last few years—costs have inevitably risen substantially during and after Commission reviews of proposals for coal plants.

Q. Has SPPC properly accounted for the possibility of rising capital costs for coal plants in its resource plan?

A. No. It is my understanding that SPPC and the Nevada Power Company (NPC) are currently reviewing the prior cost estimates for the Ely facility, and that they intend to provide revised cost estimates to the Commission in due course. However, the Commission will want to avoid a situation in which revised cost estimates are provided with no opportunity to incorporate them into the plan, and to give due consideration to all resource options based on up-to-date cost projections.

A more prudent approach, especially given the well-established trend of rising coal plant costs, would be for the company to file with the Commission sensitivity analyses showing what plan would make the most sense if the cost of coal-fired resources turned out to be 30%, 50%, or 100% more than was estimated in producing the plan. Then, when revised cost estimates are presented to the Commission, it will be clear whether or not any underestimates in coal plant construction costs affected the outcome of the planning process, and the Commission can take appropriate action to ensure that ratepayers are not harmed by such estimation errors.

[20] Id, at pages 1-3.

I would also strongly recommend that the Commission require the company to fund an independent engineering review of the cost projections and risk factors for rising costs, which would be provided to the Commission in the form of an affidavit commenting on the costs used in the company's plan.

As with the carbon costs, it makes no sense to base the plan on one set of numbers which are unlikely to be realistic, and then adjust the result later with more reasonable numbers when there is limited or no opportunity for review. The Commission should require the company to use the right numbers from the start of the process to the best of their ability.

VII. RECOMMENDATIONS

Q. Given your review and analysis of carbon dioxide costs what are your recommendations to the Commission?

A. I recommend that the Commission require Sierra Pacific to withdraw its plan and create a new plan, in which a comprehensive range of alternative resources and realistic resource costs are considered. In this new plan, SPPC should be required to consider up front all of the costs associated with each resource option, including the costs likely to be associated with the emissions of carbon dioxide in the future. SPPC should consider a range of forecasts for CO_2 prices, such as those presented in Table 3 and Figure 2, above, to provide a reasonable comparison of the economic benefits of alternative plans given a realistic range of future carbon emissions prices. I further recommend performing a sensitivity test, at least, using a high price scenario such as the MIT scenarios shown in Figure 5, especially for the out years. This would accommodate the case where congress acts aggressively within a decade or so to limit CO_2 emissions to a level which is likely to avoid many of the dangerous impacts of climate change.

In re-analyzing its resources selections, the Commission should require Sierra Pacific to model CO_2 costs as an up-front variable operating cost on all carbon

dioxide emitting resources on in its system, so that the assumed CO_2 costs realistically influence the relative costs of operating these resources and thus properly inform resource development decisions. Moreover, in developing its new resource plan, the company should consider portfolios which have contributions from low- or non-carbon emitting resources, such renewable energy and energy efficiency, far in excess of the minimum levels required by Nevada's RPS.

If the Commission chooses not to require SPPC to re-analyze and resubmit its plan using the prudent approach I have outlined and including realistic CO_2 emissions costs, I recommend that the Commission require that SPPC shareholders bear the risk of paying for the failure of the company to prudently and realistically consider future CO_2 compliance costs. That is, the Commission should put SPPC on notice that it retains the right to set rates as if SPPC had produced a more prudent resource plan with full consideration of realistic CO_2 emissions costs, and that SPPC be would be barred from passing on the excess emissions costs to ratepayers for the life of the resources.

Q. Given your review of coal plant escalation costs what are your recommendations to the Commission?

A. I recommend that the Commission require Sierra Pacific to file, as part of its resource plan, a sensitivity study showing what the least-cost plan would be if coal plant costs were 30%, 50%, or 100% higher than the baseline costs projected in their plan. Further, when the company and NPC complete their review of the costs of the proposed Ely plant, I recommend that an independent engineering firm, retained by the Commission staff at SPPC's expense, be asked to review these cost estimates and provide an opinion in an affidavit on whether they are reasonable and consistent with current and expected market conditions including recent and expected trends in the costs of materials, labor, and technology. I recommend that if it appears that resource construction costs will be significantly different from those the company used in developing its plan, that the commission use the results of the sensitivity study to determine whether the company should

withdraw its plan and produce a new least-cost resource plan using updated cost assumptions.

If the Commission chooses not to require SPPC to conduct or provide any further analysis on coal plant construction costs and their impact on their resource plan, I recommend that the Commission cap the costs that SPPC is allowed to recover on the proposed new coal plants at the levels used in producing the IRP filing.

Q. Does this conclude your testimony?

A. Yes.