BEFORE THE PUBLIC UTILITIES COMMISSION OF COLORADO

Docket No. 10M-245E

IN THE MATTER OF COMMISSION CONSIDERATION OF PUBLIC SERVICE COMPANY OF COLORADO PLAN IN COMPLIANCE WITH HOUSE BILL 10-1365, "CLEAN AIR – CLEAN JOBS ACT"

CROSS-ANSWER TESTIMONY OF DAVID A. SCHLISSEL

October 8, 2010

Q. Please state your name, occupation, and business address.

A. My name is David A. Schlissel. I am the President of Schlissel Technical Consulting, Inc. My business address is 45 Horace Road, Belmont, Massachusetts 02478.

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

A. I am testifying on behalf of Western Resource Advocates.

Q. Have you previously submitted testimony in this proceeding?

A. Yes. I filed Answer Testimony on September 17, 2010.

Q. What is the purpose of this Cross-Answer Testimony?

A. I am responding to the Answer Testimony submitted by Staff witness Gene Camp, Colorado Mining Association ("CMA") witness Thomas Hewson, Peabody Energy Corporation witnesses Kipp Coddington, David Montgomery and Dr. Anne Smith, and American Coalition for Clean Coal Energy ("ACCCE") witness Terry Ross.

Q. Staff witness Camp rejects the results of PSCo's Strategist modeling because, according to him, they make no sense.[1] What is your interpretation of how the Strategist model handled the addition of the combustion turbines and combined cycle units that replaced Cherokee Units 1, 2 and 3?

A. As a caveat, I have not had access to the full Strategist output results. Nevertheless, we had identified the same process with regard to the replacement capacity added by Strategist that Mr. Camp describes in his Answer Testimony. However, it appears to me, based on my previous experience in resource planning in general, and with Strategist in particular, that the model is taking a reasonable 'building blocks' approach to adding new capacity as additional Cherokee capacity is retired. Initially, the model adds combustion turbine capacity to replace Cherokee Unit 1. Then, it converts that combustion capacity into a 1x1 combined cycle unit when Cherokee Unit 2 is retired – I assume this is done by adding a heat recovery steam generator to the combustion turbine capacity that had been previously installed. Then when additional capacity is needed in 2023, the model converts the existing 1x1 into a 2x1 unit by adding another combustion turbine.

Contrary to Mr. Camp, I do not interpret what Strategist is doing as retiring the combustion turbine that was added in 2018. Instead, it is being converted into a 1x1 combined cycle unit. Then in 2023, the 1x1 combined cycle unit would be converted into a 2x1 unit. The unit is not being retired. This seems like a reasonable, low cost way to add capacity to a utility system.

Strategist is a widely accepted capacity expansion model. It is reasonable for the Commission to rely on its results in this proceeding to evaluate the comparative PVRR of different resource options.

[1] Answer Testimony of Gene L. Camp, at page 17, lines 3-22.

Q. Do you agree with the testimony by CMA witness Thomas Hewson that "…. The time for Congress to pass a comprehensive energy bill which taxes carbon has likely come and gone"[2] and "given the extremely pessimistic outlook for comprehensive energy legislation, the modeling scenarios should have incorporated a no carbon penalty as a base assumption and developed a range of carbon penalties for sensitivity runs."[3]

A. No. As I discussed in my Answer Testimony, it is unreasonable to expect that there will not be any federal climate change legislation or policy at any time.

To the contrary, it is increasingly clear that global climate change is a real problem, and the evidence of the adverse impact of greenhouse gas emissions on the planet will become more obvious over time. Indeed, despite the lack of Congressional action this year, there still is strong public, political and business support for a comprehensive federal climate action policy. For example, Moody's Investors Service has noted that although the near-term likelihood for new climate legislation may be remote due to current economic circumstances, "[o]ver the longer term, climate legislation appears inevitable – and a transparent framework that would put a price on carbon emissions is a necessity that few utilities oppose."[4]

Statements from individual coal-generating utilities confirm Moody's view on the inevitability of a comprehensive federal policy on climate change. For example, Progress Energy noted the following in the Integrated Resource Plan it filed on September 13, 2010 with the North Carolina Utilities Commission:

> Even though at the time of this filing there appears to be a temporary loss in legislative momentum with respect to climate change, it is widely assumed there will ultimately be legislation of some form resulting in a mandate to reduce the carbon output from the Company's generation fleet.[5]

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2 Answer Testimony of Thomas A. Hewson, Jr., at page 10, lines 2-3.

3 Answer Testimony of Thomas A. Hewson, Jr., at page 3, lines 16-19.

4 *U.S. Electric Utilities See Some Clarity in Evolving Federal Energy Policies*¸ Moody's Investors Service Special Comment, February 2010, at page 1.

5 Progress Energy Carolinas *Integrated Resource Plan* filed September 13, 2010 in North Carolina Utilities Commission Docket No. E-100, Sub 128, at page 3.

Q. What is likely to happen if Congress does not approve comprehensive climate change legislation in the near future?

A. As Peabody witness Montgomery has explained in testimony he presented earlier this year in another proceeding:

> Command-and-control policies are almost certain to play a role should comprehensive legislation fail to pass as EPA has made it clear that it will regulate CO_2 as a pollutant under the CAA [Clean Air Act] unless pre-empted by Congress.[6]

Q. When Dr. Montgomery testified about EPA policies on climate change, what levels of CO_2 allowance prices was he projecting under cap-and-trade legislation?

A. Dr. Montgomery testified in Mississippi that a wide range of CO_2 costs, with initial CO_2 prices in 2015 of $0, $10, $20 and $30 per ton, rising annually at a rate of 5 percent plus inflation form "a reasonable range for planning purposes" and that the price paths with initial prices between $10 and $20 per ton were more likely, in his opinion, than the $0 and $30 per ton extremes.[7]

Q. Do you agree with the testimony of CMA witness Hewson and ACCCE witness Ross that the Commission should adopt a "wait and see" approach with regard to climate policy, and wait until a federal or state legislation has been enacted or regulations have been promulgated to make assessments of the amount and timing of carbon control costs?[8]

A. No. Waiting until federal policy is determined could well mean the investing of hundreds of millions of dollars in coal plants that will not be economic to operate under future climate change regulation. In fact, as I will discuss later in this Cross-Answer Testimony,

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6 *Phase Two Direct Testimony of W. David Montgomery on Behalf of Mississippi Power Company*, Mississippi Public Utilities Commission Docket No. 2009-UA-0014, July 2009, at page 8, lines 12-15.

7 Id, at page 5, lines 1-6.

8 Answer Testimony of Thomas A. Hewson, Jr., at page 4, lines 15-22, page 5, lines 9-12, and page 11, lines 14-18, and the Answer Testimony of Terry Ross, at page 13, line 21, to page 14, line 6.

the modeling presented by PSCo shows that the installation of emissions controls on the Cherokee Units 1-4 and Valmont coal units is the more expensive option if any future CO_2 costs are assumed.

Utilities regularly incorporate uncertainty in their planning – for example, uncertainty about future loads, the capital costs of building new generating units, future SO_2 and NOx emissions costs, and future fuel prices. The reasonable and prudent approach is to consider ranges of reasonable costs for these key variables – not to ignore them because they are not fixed at this time. The same is true for the costs of greenhouse gas emissions.

Q. Are CMA witness Hewson and ACCCE witness Ross, in fact, proposing a "wait and see" approach?"

A. No. Each witness is proposing that the Commission adopt Benchmark Scenario 1.0 which would require the investment of hundreds of millions of dollars in emissions controls for Cherokee Units 1-4 and Valmont Unit 5. Instead of being a "wait and see" approach, this is a "commitment to coal" approach.

Q. Are all utilities adopting "wait and see" approaches like that recommended by Mr. Hewson and Mr. Ross?

A. No. Although many utilities are continuing to pursue previously approved plans to install emissions control equipment at their existing coal-fired power plants, an increasing number are deciding to retire their unscrubbed (for SO_2) units in light of anticipated federal emissions requirements, including those addressing climate change, and lower forecast natural gas prices.

For example, last December, Progress Energy Carolinas submitted for North Carolina Utilities Commission approval a plan to retire approximately 550 MWs of coal fired generating facilities that did not have flue gas desulfurization equipment (scrubbers). The Company subsequently decided to retire all 1,485 MW of coal-fired generating facilities

in North Carolina that do not have scrubbers rather than merely to focus on the 550 MWs it had previously requested permission to retire.

Duke Energy Carolinas has similarly announced that it is planning to retire 890 MWs of unscrubbed coal capacity – in addition to the 800 MWs of coal-fired capacity that the Company had previously agreed to retire (for a total of 1,690 MWs of coal-fired capacity in the Carolinas that the company will retire by 2018).

Another large coal-owning utility, American Electric Power, ("AEP") recently announced at the Bank of America/Merrill Lynch Power & Gas Leaders Conference that it will retire 5,000 MW of its coal-fired fleet by 2017 and will operate another 1,925 MW of its older, inefficient coal-fired units only during peak demand times in response to anticipated environmental regulations and cheap natural gas.

Other utilities, such as TVA and First Energy, also have announced that they will be idling, with the possibility of retiring, some of their coal-fired units. And a number of analyses and studies have projected significant coal unit retirements in coming years in response to lower demands, lower natural gas prices and anticipated EPA regulatory actions, as well as the potential for federal regulation of greenhouse gas emissions.

Q. Do you agree with Mr. Hewson's testimony that the retirement of Cherokee Units 1-4 and Valmont Unit 5 only becomes the preferred, or lower cost, option if a $20/ton CO2 price is assumed?[9]

A. No. As shown in Figure 8.10 in PSCo's Emissions Reduction Plan, and confirmed by WRA's analysis, Scenarios that include the retirement of Cherokee Units 1-4 and Valmont Unit 5 are more economic than Benchmark Scenario 1.0 even if no CO_2 price is assumed. This economic advantage increases as the assumed CO_2 price is raised.

For example, Table 1 below shows the PVRR assuming a $10/ton CO_2 price beginning in 2014 for the period 2010-2046 for Benchmark Scenario 1.0 and for the Replacement Scenarios that parties in this proceeding discussed in their Answer Testimony. As can be

[9] Answer Testimony of Thomas A. Hewson, Jr., at page 4, lines 6-8, and page 10, lines 19-21.

seen, Benchmark Scenario 1.0 is a more expensive option than WRA's Scenario 6H Revised and the other retirement scenarios even at this low CO_2 price.

Table 1: PVRR with $10/ton CO_2 Price

Scenario	PVRR
Benchmark 1.0	$72,276
5B	$71,720
6H	$71,794
6.1E	$71,658
7E	$71,868
WRA 6H Revised	$71,685

Q. CMA witness Hewson testifies that the start date for CO_2 regulation should be set after 2016.[10] Would excluding CO_2 costs for the years 2014 through 2016 have a significant impact on the PVRR comparison between adding emission controls and retiring Cherokee Units 1-4 and Valmont Unit 5?

A. No. Tables 2a, 2b and 2c, below, present the PVRR for the same scenarios presented in Table 1, above, assuming that there would be no CO_2 costs in the years 2014 through 2016. As can be seen, Benchmark Scenario 1.0 remains the most expensive option even if, as Mr. Hewson claims, the start date for CO_2 regulation should be set after 2016.

Table 2a: PVRR Assuming No CO2 Costs 2014-2016 - $10/ton CO_2 Price Trajectory in Subsequent Years

Scenario	PVRR
Benchmark 1.0	$70,866
5B	$70,365
6H	$70,485
6.1E	$70,329
7E	$70,626
WRA 6H Revised	$70,378

[10] Answer Testimony of Thomas A. Hewson, Jr., at page 5, line 7 and page 12, line 9.

Table 2b: PVRR Assuming No CO2 Costs 2014-2016 - $20/ton CO_2 Price Trajectory in Subsequent Years

Scenario	PVRR
Benchmark 1.0	$74,523
5B	$73,835
6H	$73,812
6.1E	$73,719
7E	$73,952
WRA 6H Revised	$73,694

Table 2c: PVRR Assuming No CO2 Costs 2014-2016 - $40/ton CO_2 Price Trajectory in Subsequent Years

Scenario	PVRR
Benchmark 1.0	$81,837
5B	$80,774
6H	$80,466
6.1E	$80,498
7E	$80,604
WRA 6H Revised	$80,326

Q. Do you have any comment on CMA witness Hewson's testimony that every year that CO_2 costs are delayed would save PSCo $100 million from Cherokee's operation?[11]

A. Yes. Mr. Hewson's claim is technically correct but misleading because the cost of fossil-fired alternatives to the continued operation of Cherokee Units 1-4 also would be lower if CO_2 costs are delayed. Indeed, as shown in Figures 2a, 2b and 2c, above, the PVRR of Replacement Scenario WRA 6H Revised remains lower than that of Scenario Benchmark 1.0 even if it is assumed that CO_2 regulation does not begin until 2017.

[11] Answer Testimony of Thomas A. Hewson, Jr., at page 12, lines 17-22.

Q. CMA witness Hewson testifies that PSCo's base carbon prices assume no technology price caps or use of offsets.[12] In your Answer Testimony, you explained that PSCo's $20/ton and $40/ton CO_2 prices are consistent with the results of the modeling analyses of the legislative proposals that have been considered in the U.S. Congress, most particularly the recent EIA and EPA modeling of the Waxman-Markey Bill and the American Power Act that was introduced in the U.S. Senate. Do these modeling analyses assume the availability of offsets and carbon capture and storage technology ("CCS")?

A. Yes. The EIA and EPA modeling of both the Waxman-Markey Bill and the American Power Act assumed, in general, the use of offsets and the development and deployment of CCS technology.

Q. Do you agree with the testimony of CMA witness Hewson that he expects that long term CO_2 prices will be capped by CCS costs as early as 2023?[13]

A. No. Both CMA witness Hewson and Peabody witness Coddington suggest in their testimony that carbon capture and sequestration (CCS) will be a low-cost compliance option for any stringent climate policy.[14] However, many technical, legal and social issues exist that must first be resolved before CCS is deployed on a large scale. In addition, CCS remains expensive relative to other carbon-reducing technologies. As a result, there is great uncertainty as to when CCS technology may be commercially available and what the costs of this technology would be.

[12] Answer Testimony of Thomas A. Hewson, Jr., at page 6, line 15, through page 7, line 4.

[13] Answer Testimony of Thomas A. Hewson, Jr., at page 6, line 23, to page 7, line 1, and page 13, lines 17-20.

[14] Answer Testimony of Kipp Coddington, page 18, line 24 through page 19, line 1.

Q. Even if CO_2 allowance prices were capped in the long term by the cost of CCS, does that mean that they would be lower than the range of prices that PSCo has assumed in its Strategist modeling, that is, the $20/ton and $40/ton price trajectories?

A. No. There is no credible evidence that the ultimate cost of CCS technology will be below the CO_2 prices assumed by PSCo in its Strategist modeling for many years into the future.

For example, the recent Report of the Interagency Task Force on Carbon Capture and Storage, relied upon by Mr. Coddington, cites costs for CCS technology at *new* coal plants of between $55/ton and $104/ton. CO_2 allowance prices in PSCo's $20/ton forecast would not reach these levels until 2029 and 2038. Consequently, the fact that CCS technology might cap CO_2 allowance prices at some point in the future will have little impact on the relative economics of installing new emissions controls on PSCo's existing coal-fired power plants. Retiring Cherokee Units 1-4 and Valmont Unit 5 under WPA Scenario 6H Revised would continue to be a lower cost option than adding controls.

Q. CMA witness Hewson testifies that his research has found that natural gas demand increases from the power sector due to CO_2 regulation could increase natural gas prices.[15] Is it reasonable to assume that natural gas prices would increase significantly if the federal government adopts legislation or regulations to regulate and reduce greenhouse gas emissions?

A. No. It is possible that natural gas demand could be somewhat higher due to CO_2 emission regulations and, as a result, natural gas prices could be expected to be somewhat higher than otherwise would be the case. However, the effect is very complicated and will depend on a number of factors, such as how much new natural gas capacity is built as a result of the higher coal-plant operating costs due to the CO_2 emission allowance prices, how much additional DSM and renewable energy alternatives are added to the U.S. system, the levels and prices of any incremental natural gas imported into or developed in

[15] Answer Testimony of Thomas A. Hewson, Jr., at page 7, lines 11-15, page 14, lines 10-14, and page 15, lines 9-23.

the U.S., and changes in the dispatching of the electric system. Indeed, depending on future circumstances, there may be some periods in which the prices of natural gas may be lower as a result of CO_2 regulations. Thus it is very difficult to determine, at this time, the amount by which natural gas prices might increase, if at all, due to the regulation of CO_2 emissions.

In sum, the detailed modeling of proposed greenhouse gas legislation does not support the conclusion that the price of natural gas would increase as a result of a federal program for regulating greenhouse gas emissions but, rather, reveals a much more complex dynamic.

Q. Have you been able to review the analyses on which Mr. Hewson bases his claims about the relationship between carbon regulation and natural gas prices?

A. No. CMA refused to provide these analyses in response to discovery from WRA. CMA claims that all of these studies are confidential and proprietary. The only information Mr. Hewson did provide was a spreadsheet with various natural gas prices developed in various modeling analyses of climate change proposals. But there was no analysis of any relationship between CO_2 prices and natural gas prices or between the details of the legislative proposals and natural gas prices. Without these analyses, and a corresponding ability to validate their reasonableness, Mr. Hewson's claims are of no value.

Q. Have you investigated the impact that the enactment of CO_2 emissions regulations might have on natural gas prices?

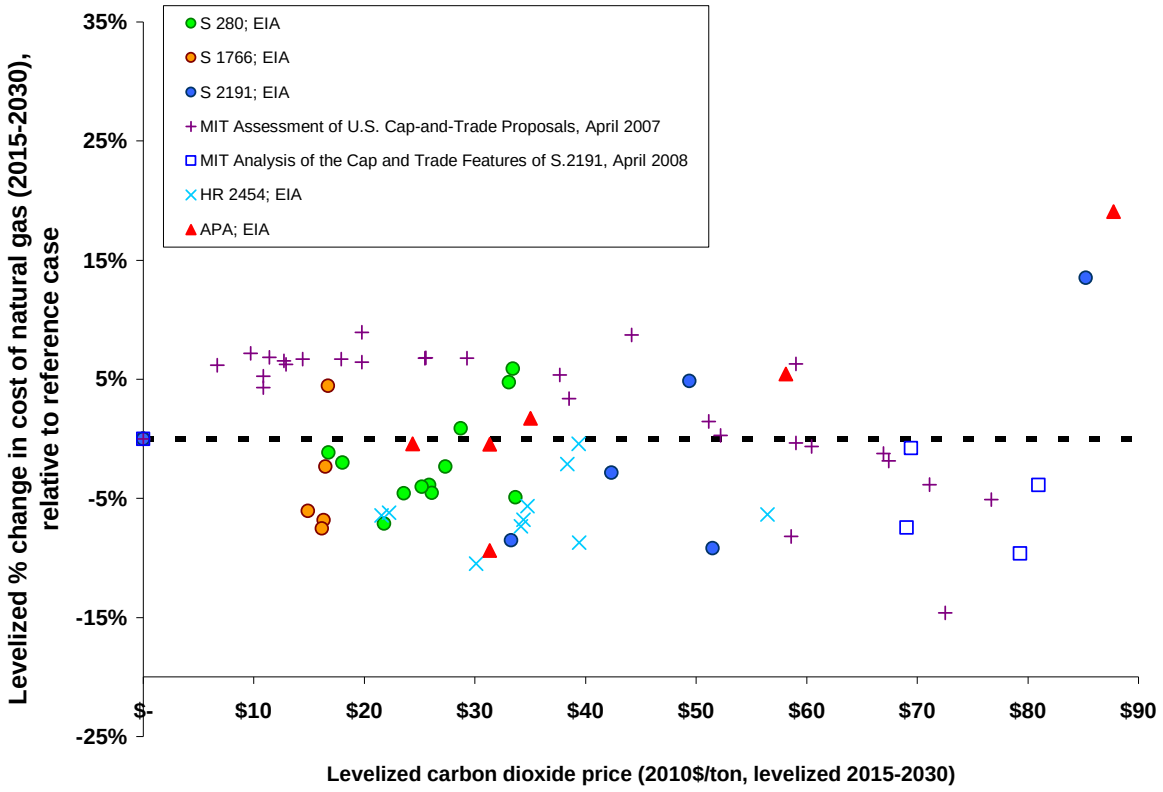
A. Yes. With the assistance of Synapse Energy Economics, I have examined publicly available modeling results to evaluate the impact that adoption and implementation of CO_2 regulatory legislation could be expected to have on natural gas prices. The results of our review are presented in Figure 1 below.

Figure 1, below, shows the levelized percentage changes in natural gas prices (i.e., increases or decreases from the base case, which includes no regulation of greenhouse

gas emissions) in a large number of scenarios from the major climate change proposals that have been introduced in the U.S. Congress in recent years. Each data point shown in Figure 1 reflects the levelized change in natural gas prices in a modeled scenario and the levelized CO_2 price for that scenario.

The levelized CO_2 prices and natural gas price changes presented in Figure 1 have been developed from the results of modeling of multiple climate change proposals in the 110th U.S. Congress: Senate Bill S.280 (the McCain-Lieberman bill), Senate Bill S.1766 (the Bingaman-Specter bill), Senate Bill S.2191 (the Lieberman-Warner bill), the Waxman-Markey Bill (House Bill 2454) in the 111th Congress and the American Power Act that was introduced in the U.S. Senate by Senators Kerry and Lieberman.

Figure 1: The relationship between CO_2 emissions allowance prices and natural gas prices.



As shown in Figure 1, *none* of the results of any of the independent modeling analyses support an assumption that regulation of CO_2 emissions will increase natural gas prices by a significant amount except, possibly, at high CO_2 prices. The modeling results are inconclusive as to whether low CO_2 prices will push natural gas prices up or down.

Indeed, the results of the modeling of a substantial number of the CO_2 regulation scenarios represented in Figure 1 suggest that the adoption of greenhouse gas regulation in some circumstances could lead to lower natural gas prices as the demand for and the use of natural gas decline due to its greenhouse gas emissions. Thus, it is not reasonable to assume that federal regulation of greenhouse gas emissions would inevitably lead to a significant increase in the price of natural gas, especially at CO_2 prices such as PSCo has modeled in this proceeding.

Q. Does Figure 1, above, include the modeling of HR 2454, the Waxman-Markey legislation that has been approved by the U.S. House of Representatives and the American Power Act that was introduced in the U.S. Senate?

A. Yes. The results of the EIA's modeling of the Waxman-Markey bill and the American Power Act are included in Figure 1.

Q. But doesn't common sense suggest that regulating greenhouse gas emissions will lead to less coal-fired generation and more of a dependence on natural gas – thereby increasing the demand for and price of natural gas?

A. Not necessarily, especially over the mid-to-longer term. In fact, there are several reasons why federal regulation of greenhouse gas emissions may not lead to any meaningful increases in the price of natural gas. First, natural gas plants also emit CO_2. Thus, there will be incentives as a result of federal regulation of greenhouse gases to shift away from use of natural gas to more carbon neutral options such as energy efficiency and renewable energy resources. This will act to reduce the demand for natural gas as well as coal-fired generation.

It also is generally accepted that strategies for reducing our national greenhouse gas emissions will require implementing complementary policies adding large amounts of new wind and energy efficiency. Thus, legislative proposals for regulation of greenhouse gases, such as the Waxman-Markey bill also included increased investments in these

areas. Consequently, the forecast for natural gas prices is at best uncertain. The substantially higher domestic U.S. natural gas supplies that have been identified within the past two years also may reduce the impact that regulation of CO_2 emissions could have on natural gas prices.

Q. ACCCE witness Ross testifies that adding controls to Cherokee Units 1-4 and Valmont Unit 5 (Benchmark Scenario 1) represents "the most reasonable and targeted first step in addressing long-term carbon policy."[16] Do you agree?

A. No. Retiring Cherokee Units 1-4 and Valmont Unit 5, and replacing them with a portfolio of natural gas, energy efficiency and renewable resources, would be a reasonable and targeted first step in addressing a long-term carbon policy that actually reduces the Company's greenhouse gas emissions.

The same is true with regard to Peabody Coal witness Coddington's testimony that maintaining its current fleet (i.e., not retiring Cherokee Units 1-4 and Valmont Unit 5) is the most reasonable path for preserving "PSCo's operational flexibility in light of potential carbon reduction mandates in the future"[17] and Peabody witness Smith's claim that adding controls under Benchmark Scenario 1.0 provides "[o]ptionality in the face of potential future CO_2 prices."[18] The best plan for actually reducing CO_2 emissions is to retire the plants that produce those emissions, not to continue to operate them for decades, as Mr. Hewson, Mr. Ross, Mr. Coddington and Dr. Smith would have PSCo do.

Q. Does this conclude your testimony?

A. Yes.

[16] Answer Testimony of Terry Ross, at page 8, lines 2-3.
[17] Answer Testimony of Kipp A. Coddington, at page 30, lines 7-15.
[18] Answer Testimony of Dr. Anne E. Smith, at page 90, lines 10-11.