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BEFORE THE PUBLIC SERVICE COMMISSION OF UTAH

In the Matter of the Application of Rocky Mountain Power for Authority to Increase its Retail Electric Utility Service Rates in Utah and for Approval of its Proposed Electric Service Schedules and Electric Service Regulations	**DOCKET NO. 13-035-184** **Utah Clean Energy Exhibit 1.0 (DT)**

DIRECT TESTIMONY OF SARAH WRIGHT
ON BEHALF OF
UTAH CLEAN ENERGY

[REVENUE REQUIREMENT – PUBLIC/REDACTED]

May 1, 2014

RESPECTFULLY SUBMITTED,
Utah Clean Energy

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Sophie Hayes
Attorney for Utah Clean Energy

INTRODUCTION

Q: Please state your name and business address.

A: My name is Sarah Wright. My business address is 1014 2nd Ave, Salt Lake City, Utah 84103.

Q: Have you previously filed testimony before this Commission?

A: Yes. I have testified on behalf of Utah Clean Energy in Docket Nos. 05-057-T01 (re: Questar's conservation enabling tariff), 09-035-15 (re: Rocky Mountain Power's energy balancing account), 10-035-124 and 11-035-200 (re: residential rate design in Rocky Mountain Power's last two general rate cases), and 12-035-100 (re: avoided costs from renewable facilities).

Q: Please review your professional experience and qualifications.

A: I am the founder and director of Utah Clean Energy. Through my work with Utah Clean Energy over the last 11 years, I have been involved in a number of regulatory dockets, including Integrated Resource Planning, rate cases, tariff filings, and other dockets relating to energy efficiency, renewable energy, and net metering. I serve on Rocky Mountain Power's DSM Steering Committee and both Rocky Mountain Power's and Questar Gas Company's DSM Advisory Committees.

I have over 13 years of energy policy experience working on state, local, and national energy policy, providing expertise and policy support for renewable energy and energy efficiency. I have served on numerous energy policy working groups and taskforces, including the Energy Efficiency and Energy Development Committees supporting Governor Herbert's Energy Task Force and Ten Year Energy Plan; the Governor's Utah Renewable Energy Zone Task Force; Governor Huntsman's Energy

Advisory Council and Blue Ribbon Climate Change Advisory Council; Utah's Legislative Energy Policy Workgroup, and Salt Lake City's Climate Action Task Force. I also served on the State of Utah, Division of Air Quality PM2.5 State Implementation Plan workgroup.

Currently, I serve on two committees for Governor Herbert's Your Utah Your Future Project (the Utah Clean Air Action Team and the Energy and Emergency Preparedness committee). Additionally, I serve on Mayor Becker's local Climate Committee that supports his membership on the White House Task Force on Climate Preparedness and Resilience. I serve on the Board of Directors for Interwest Energy Alliance and the Interstate Renewable Energy Council Regulatory Advisory Board for the US Department of Energy Sunshot Initiative.

For15 years prior to founding Utah Clean Energy, I was an occupational health and environmental consultant, working on occupational health and ambient air quality issues for a wide variety of commercial, industrial, and governmental clients across the west.

I have a BS in Geology from Bradley University in Peoria, Illinois and a Master of Science in Public Health from the University of Utah in Salt Lake City.

Q: Have you previously filed revenue requirement testimony before this Commission?

A: No.

Q: Why are you filing revenue requirement testimony now?

A: The revenue requirement phase of a general rate case provides a forum for evaluating the Company's compliance with its statutory duties.[1] Rate increases must be just and reasonable. An inquiry into the justness and reasonableness of the Company's revenue request necessitates a review of the decision-making processes that incurred the costs the Company proposes to transfer to ratepayers.

Company investments, which are reviewed in rate cases, are ostensibly informed by PacifiCorp's integrated resource planning (IRP) process and the action plans derived therefrom. On behalf of Utah Clean Energy, I have been participating in PacifiCorp's IRP process for the last 9 years, advocating in the public interest for a smart, proactive transition to a resource portfolio with greater levels of renewables and efficiency, resulting in reductions in greenhouse gas emissions (GHG).[2] Nevertheless, the Company's investment strategy is still heavily reliant on carbon intensive resources. In order to establish a record, going forward, for evaluating the justness and reasonableness of the Company's investments in high-carbon resources, I am filing testimony in this revenue requirement portion of the Company's rate case.

OVERVIEW AND CONCLUSIONS

Q: What is the purpose of your direct testimony?

A: The purpose of my testimony is to demonstrate the necessity of utility decision-making that accounts for well-established climate change risks and effectuates GHG

[1] *See, e.g.* U.C.A. § 54-3-1, *et seq.* ("Every public utility shall furnish, provide and maintain such service, instrumentalities, equipment and facilities as will promote the safety, health, comfort and convenience of its patrons, employees and the public.")

[2] Throughout my testimony I use the terms CO2, carbon and GHG interchangeably to describe climate changing emissions associated with burning fossil fuels.

emissions reductions. My direct testimony is limited to evidence necessary for ensuring that rates are just and reasonable and in the public interest. My direct testimony does not propose specific revenue adjustments, but rather shows that rates based on investments that either increase or do not significantly decrease greenhouse gas emissions are not in the public interest, nor are they just and reasonable. My silence on a particular issue does not indicate support for or opposition to that issue.

Q: Please summarize your conclusions and recommendations.

A: I conclude that Climate science necessitates resource planning and acquisition with a specific objective of reducing greenhouse gas emissions. Resource planning and acquisition that do not effectuate significant reductions in greenhouse gas emissions are not in the public interest. In order for rates to be just and reasonable, the Company—not ratepayers—should bear the risks associated with its carbon-intensive investment strategy.

JUST AND REASONABLE RATES

Q: What is your conclusion regarding just and reasonable rates?

A: Climate change necessitates resource planning and acquisition with a specific objective of reducing greenhouse gas emissions. Resource investments that do not effectuate significant reductions in greenhouse gas emissions are not in the public interest and cannot result in just and reasonable rates:

1. Investments that do not effectuate significant reductions in greenhouse gas emissions harm the well-being of Utahns, including their safety, health, comfort and convenience.

2. Investments that do not effectuate significant reductions in greenhouse gas emissions allow the financial health of the utility to remain strong at the expense of customers, who first must pay for carbon-intensive investments and then must pay additional costs associated with "lock-in" risk.
3. Investments that do not effectuate significant reductions in greenhouse gas emissions put ratepayers at unreasonable risk of increases in the costs of providing service.

Q: Please explain your first conclusion, that investments that do not significantly reduce greenhouse gas emissions are not just and reasonable because they harm the well-being of Utahns, including their safety, health, comfort and convenience.

A: The scientific consensus is clear: human interference with the climate system is occurring, and climate change poses costly risks for human and natural systems. Utah and its citizens and ratepayers are not exempt from the impacts of climate change. For the last 40 years, Utah has experienced temperature warming at roughly *twice* the global average. As I discuss below, increased warming is associated with increased impacts.[3]

Some climate change impacts that are already impacting and will continue to impact Utah and the West include an increase in unusually hot summer days, more precipitation falling in the form of rain than snow (which impacts our access to water); and more frequent droughts. These impacts are projected to increase, subjecting Utahns to conditions that are unfamiliar, costly and potentially harmful. For example, increased

[3] "Impacts" refer to effects on natural and human systems, including effects on lives, livelihoods, health, ecosystems, economies, societies, cultures, services and infrastructure due to the interaction of climate changes or hazardous climate events occurring within a specific time period and the vulnerability of an exposed society or system.

droughts lead to increased wildfires, which impact public health and damage public and private property and lands.

Q: What does this rate case have to do with climate change and its impacts?

A: Overall risks of climate change impacts can be reduced by limiting GHG emissions and the associated rate and magnitude of climate change.[4] Climate change risks are reduced in scenarios with the lowest temperature change projections, although some risk from adverse impacts remains regardless. Modeled scenarios that are consistent with a *likely* chance of keeping global average temperature change below two degrees Celsius (3.6 degrees Fahrenheit),[5] relative to pre-industrial levels, include *substantial* cuts in anthropogenic[6] GHG emissions by mid-century.

Currently, around a third of GHG emissions in the US are the result of fossil-fueled electricity generation,[7] so electric utilities are one of the most impactful sources of greenhouse gas emissions reductions. In fact, a growing number of studies demonstrate that administrative and political barriers make economy-wide policies harder to design and implement, while sector-specific solutions, such as changes in electricity generation, may be better suited to addressing barriers and market failures.

Reducing greenhouse gas emissions from the electricity sector is critical to managing risks associated with climate change. Adaptation strategies, unfortunately, have

[4] "The overall risks of climate change impacts can be reduced by limiting the rate and magnitude of climate change. Risks are reduced substantially under the assessed scenario with the lowest temperature projections compared to the highest temperature projections." *Climate Change 2014: Mitigation of Climate Change* ("Working Group III Report"), Intergovernmental Panel on Climate Change (2014), page 15, available at http://www.ipcc.ch/.
[5] Utah is currently seeing warming at twice the global average.
[6] Anthropogenic greenhouse gas emissions are human-caused greenhouse gas emissions, such as from burning fossil fuels for electricity production.
[7] 35% of GHG emissions in 2010 were released in the energy supply sector. Working Group III Report at 7.

limited effectiveness in reducing impacts.[8] Mitigation,[9] including large-scale changes in energy systems and potentially land use, is the most cost-effective way to reduce impacts.

From a risk-management perspective, and given the quantity and agreement of science underpinning these conclusions (representing a substantially larger knowledge base than has ever been available before), I have to conclude that anything other than significant reductions in greenhouse gas emissions from electricity generation cannot be in the public interest. In other words, an electricity generation resource investment strategy that dramatically reduces GHG emissions is a necessary path for avoiding unreasonable risk for ratepayers, and is therefore the only way to just and reasonable rates.

Q: How did you come to this conclusion?

A: I have been working in the field of energy policy for 13 years, specifically advocating for risk-aware decision-making that is consistent with mitigating (as well as adapting to) harm associated with climate change. On behalf of Utah Clean Energy I have consistently advocated for a smart transition, accomplished in a least-cost manner that does not lock in costly and risky investments in carbon intensive resources. In that time, the science supporting a need to reduce climate changing GHG emissions has gotten more robust and voluminous.

Recently, the Intergovernmental Panel on Climate Change (IPCC)[10] published three working group reports that comprise the organization's fifth assessment of the state

[8] "Adaptation" is the process of adjusting to actual or expected climate and its impacts. Adaptation includes efforts to moderate or avoid harm as well as take advantage of opportunities presented by a changing climate.
[9] "Mitigation" efforts attempt to slow the rate of climate change, including by reducing GHG emissions.
[10] The Intergovernmental Panel on Climate Change (IPCC) is the leading international body for the assessment of climate change. It was established by the United Nations Environment Programme (UNEP) and the World

of climate science globally (The Fifth Assessment Report or AR5).[11] In addition to my accumulated knowledge having worked in energy and climate policy for 13 years, I relied on these recent publications—specifically the three Working Group Summaries for Policymakers—which represent an assessment of the physical science basis of climate change (WGI), a review of the scientific, technical and socioeconomic literature on climate change impacts, vulnerabilities and adaptation strategies (WGII), and scientific analysis indicating opportunities for mitigating climate change impacts (WGIII). These three Working Group Reports represent an enormous corpus of scientific findings designed to facilitate decision making in the context of climate change.

Q: Please explain your second conclusion, that investments that do not significantly reduce greenhouse gas emissions are not just and reasonable because they allow the financial health of the utility to remain strong at the expense of customers, who first must pay for carbon-intensive investments and then have to pay additional costs associated with "lock-in" risk.

A: Because electricity generation comprises such a significant component of climate changing greenhouse gas emissions, the investment decisions the utility makes today, in part, *determine the risks of climate change*. Utility capital investments, such as coal plant retrofits, represent long-term commitments. Assuming the Commission finds those investments reasonable, ratepayers will pay the Company for those investments over the useful lives of those investments (plus a return on the Company's investment). In that

Meteorological Organization (WMO) in 1988 to provide a clear scientific view on the current state of knowledge in climate change and its potential environmental and socio-economic impacts.

[11] The "Fifth Assessment Report" (AR5) is an exhaustive compendium of the current state of scientific knowledge relevant to climate change, representing thousands of scientific studies and hundreds of peer reviewers. It consists of three Working Group reports and a Synthesis Report.

way, infrastructure developments and long-lived products that do not significantly reduce emissions "lock in" ratepayers to long-term GHG-intensive pathways and more extreme climate impacts.

Thus, delaying mitigation efforts by making investment decisions today that do not reduce GHG emission creates "lock-in risk," which 1) substantially increases the difficulty (and costs) of transitioning to the long-term emission levels necessary to reduce climate change impacts and 2) narrows our options, going forward, for maintaining a relatively "safe" temperature increase.[12] [Begin Highly Confidential:] [redacted] [End Highly Confidential.][13]

Alarmingly, without additional efforts to reduce GHG emissions beyond those in place today, there is high confidence[14] that our emissions trajectory will result in global

[12] A relatively "safe" temperature increase is below two degrees Celsius—3.6 degrees Fahrenheit— relative to pre-industrial levels.

[13] From the Company's first supplemental response to Sierra Club data request 2.11(e): "The Company has conducted an analysis of the SCR installation on Hayden Unit 1under attorney-client privilege, which privilege is hereby waived by the Company. The Company is waiving attorney-client privilege on this analysis because it ultimately had no bearing on the Company's decision to support PSCo's installation of the required environmental compliance equipment under review in this docket. The environmental compliance equipment under review is required by applicable law and its installation is also supported by the terms and conditions of the Participation Agreement governing the Parties' rights and obligations as joint-owners in the facility. This notwithstanding, the analysis is commercially sensitive and highly confidential."

[14] Confidence level synthesizes the evaluation of evidence and agreement.

mean surface temperature increases from 3.7 to 4.8 degrees Celsius in 2100 (6.7 to 8.6 degrees Fahrenheit) compared to pre-industrial levels. (These are median values—when climate uncertainty is included, the range is 2.5 to 7.8 degrees Celsius, 4.5 to 14.0 degrees Fahrenheit.) Lock-in risk is compounded by the lifetime of investments, the difference in emissions associated with foregone alternatives and the magnitude of the investment cost.

Ratepayers, as discussed above, bear the costs of investments in electricity infrastructure (plus a rate of return). Given that ratepayers have no control over the Company's investment strategy, it is unreasonable for them to bear additional "lock-in risk" associated with carbon regulation and the costs of installing new low-carbon energy infrastructure in the future, in addition to stranded asset costs. Ratepayers should not have to pay more because the Company doesn't account for well-accepted science in its long term resource investments.

The good news is that investments with long lifetimes and *low emissions* can facilitate a transition to low-emissions pathways while also reducing emissions. Indeed, robust mitigation scenarios show reduced costs for achieving air quality and energy security objectives, with significant co-benefits for human health, ecosystem impacts, resource sufficiency and energy system resilience:

> These mitigation scenarios show improvements in terms of the sufficiency of resources to meet national energy demand as well as the resilience of energy supply, resulting in energy systems that are less vulnerable to price volatility and supply disruptions. The benefits from reduced impacts to health and ecosystems associated with major cuts in air pollutant emissions are particularly high where currently legislated and planned air pollution controls are weak. There is a wide range of co-benefits and adverse side-effects for additional objectives other than air quality and energy security. Overall, the potential for co-benefits for energy

> end-use measures outweigh the potential for adverse side-effects, whereas the evidence suggests this may not be the case for all energy supply and [land use] measures.[15]

In other words, low-emissions resources avoid lock-in risk, facilitate a transition to a low carbon future and have significant public interest benefits (promote safety, health, comfort and convenience). On the other hand, investments in high carbon resources increase risk, compound costs for ratepayers and threaten the public interest.

Q: Is there scientific support for significant changes to our electricity supply?

A: Yes, as discussed above, the scientific evidence for anthropogenic climate change and the significant impact globally and on Utah is well established. To keep GHG emissions at concentrations that are only *likely* to keep global average temperature change below 2°C, we must reduce GHG emissions by 40% to 70% from 2010 levels globally by 2050. To meet this imperative we need rapid improvements in energy efficiency and a tripling or quadrupling of zero- and low-carbon energy sources. Because electricity production is responsible for such a significant portion of the world's GHG emissions, electric utilities are in a unique position to mitigate climate risk.

Q: Do you think the Company is adequately evaluating climate change risk, carbon risk and risks of stranded assets in its planning and resource decision-making?

A: No. Unfortunately, there is no discussion of climate *science* and its implications for utility resource decisions in the IRP. And while the Company includes estimated costs of carbon regulation in IRP analysis, the IRP process consistently narrows potential portfolio candidates to a small corps of portfolios that are similar in cost and make up.

[15] Working Group III Report at 19.

Compounding this risky approach, in the 2013 IRP, the Company did no analysis to test the risk and resilience of portfolios against *different possible futures*, such as a highly carbon-constrained future.[16] This is a huge analytical shortcoming, subjecting ratepayers to significant and unreasonable risk associated with climate uncertainty. PacifiCorp's resource decision-making should include a means of evaluating how different portfolios perform in a variety of future scenarios.

Q: Please explain your third conclusion, that investments that do not significantly reduce greenhouse gas emissions put ratepayers at unreasonable risk of increases in costs of providing service.

A: A key risk associated with climate change (identified with high confidence) is "systemic risks due to extreme weather events leading to breakdown of infrastructure networks and critical services such as electricity, water supply, and health and emergency services."[17] This risk represents actual costs that Utahns may bear as our climate changes, but it is also likely that ratepayers will bear costs associated with carbon regulation. The Company estimates costs associated with carbon regulation in its IRP as a tool for internalizing costs associated with future regulation. These costs in no way reflect the

[16] In its Order on the 2008 IRP, the Utah Commission directed PacifiCorp to conduct the following analysis to evaluate preferred portfolio susceptibility to uncertainty:

> 1) Identify optimal portfolios for a relatively broad, and consistently applied, set of fixed input assumptions; 2) subject the unique sets of these portfolios to stochastic risk analysis and identify superior portfolios with respect to the tradeoff between expected cost and risk exposure; 3) examine the cost consequences of the superior portfolios *with respect to uncertainty* by subjecting them to evaluation under the initial set of relatively broad fixed input assumptions.[16]

In a data request response from Docket No. 13-2035-01, PacifiCorp explained that it did not complete this analysis for the 2013 IRP because the top performing portfolios "have similar resource types, timing, and quantities among the planning period most critical to influencing the 2013 Action Plan. Given these similarities among the top performing portfolios, a deterministic risk analysis would not be productive in identifying cost consequences by subjecting them to a range of fixed input assumptions."

[17] *Climate Change 2014: Impacts, Adaptation and Vulnerability* ("Working Group II Report"), Intergovernmental Panel on Climate Change (2014), page 12, available at http://www.ipcc.ch/.

totality of costs associated with actual carbon emissions, but present a tool for quantifying increased costs associated with greenhouse gas emissions.

Q: Have you looked at potential costs associated with carbon prices that ratepayers might bear under future carbon regulation scenarios?

A: Yes. While I do not have access to the tools necessary for deterministic risk modeling, I did a comparison of potential carbon costs associated with two portfolios from the 2013 IRP:

- EG2- C07, which is similar to PacifiCorp's Preferred Portfolio, except that the preferred portfolio uses RECs for RPS compliance instead of renewable resources. Total estimated carbon emissions for the 20 year planning horizon for this portfolio are nearly double the 20-year emissions associated with the following portfolio.
- EG2-C09 is very similar to EG2-C07, but is has significantly less GHG emissions. The main difference is that Case 09 includes an additional 5,300 MW of coal plant retirements/conversions and a greater reliance on natural gas. This portfolio has nearly half the total estimated carbon emissions over the 20 year planning horizon compared to EG2-C07. (My selection of this portfolio for comparison purposes does not indicate my support for a specific GHG reduction strategy over another. Rather, my objective was to look at differences in potential carbon costs associated with divergent investment strategies with significantly different carbon emissions.)

Using information from the 2013 IRP on carbon emissions for both portfolios and the Company's three carbon cost scenarios,[18] I calculated estimated costs of carbon regulation for each portfolio in each year of the 20 year planning horizon. This provides a snapshot look at potential ratepayer costs in any given year out to 2032.

Then, in order to compare these values to the System Optimizer present value revenue requirements (PVRR) for the two portfolios, I took the net present value of the 20-year carbon costs using a discount rate of 6.882%, consistent with the IRP. (Additionally, I used a social discount rate of 1% to reflect the societal impacts of climate change and to see how discount rate impacted the results.) *Please see Tables 1 and 2 in UCE Exhibit 1.1 (DT)* and summary table below for years 2022 and 2032.

Estimated CO2 Costs (Million) in 2022 and 2032
for Portfolio EG2-CO7 and EG2-CO9 and IRP CO2 Price Scenarios

	2022			2032		
	IRP CO2 Cost Scenarios			IRP CO2 Cost Scenarios		
Portfolio	Base Case	High Case	Hard Cap Base Gas	Base Case	High Case	Hard Cap Base Gas
EG2-CO7	$ 856	$ 1,394	$ 2,915	$ 1,267	$ 3,675	$ 5,335
EG2-CO9	$ 360	$ 586	$ 1,226	$ 595	$ 1,725	$ 2,504

I also compared the difference in PVRR between the two portfolios (around $5.8 billion) with the magnitude of potential carbon risk. *See Table 3 in UCE Exhibit 1.1 (DT).*

Q: What did you find through this analysis?

[18] From PacifiCorp's 2013 IRP, Volume 1, pages 167-68: The medium (base case) carbon price scenario ascribes a cost to CO2 emissions within ten years of 2013, and as such, prices are assumed beginning in 2022, with an assumed annual real escalation rate of 3 percent. Under the high CO2 price scenario, a cost is ascribed to CO2 emissions beginning 2020, which is two years earlier than in the medium CO2 price scenario. Under the high scenario, it is assumed that regulation would ramp into more stringent requirements over the first two years (in 2020 and 2021). The U.S. Hard Cap scenario reflects a CO2 price trajectory produced using the Integrated Planning Model (IPM®) assuming a generic cap-and-trade program is imposed upon the power sector of the economy beginning in 2020 with declining annual emission limits that reach 80 percent below 2005 levels by 2050.

A: Without considering the monumental costs that all society is projected to bear from the impacts of climate change, the potential carbon costs in any given year, according to the Company's carbon price scenarios, are astounding. The Company's revenue request in the 2014 rate case pales in comparison to estimated potential carbon costs faced by ratepayers in the future. In 2022, EG2-C09—the lower carbon portfolio—has potential carbon costs of $360 million using PacifiCorp's Base Case carbon assumption, $586 million using the High carbon scenario and $1.23 billion using the Hard Cap scenario.

For portfolio EG2-C07 (the high emissions portfolio) potential costs are more than double those of EG2-C09. In 2022, the Base Case carbon costs are $856 million, High scenario carbon costs are $1.39 billion and Hard Cap carbon prices are $2.92 billion.

These prices escalate and in 2032 the estimated costs for EG2-C09 range from $595 million for the Base Case, $1.73 billion for the High carbon scenario and $2.5 billion for the Hard Cap carbon cost scenario. And again, the potential carbon costs for the EG2-C07 are double, with costs of $1.27 billion for the Base Case scenario, $3.67 billion for the High scenario and $5.34 billion for the Hard Cap scenario. The potential carbon costs in any given year illustrate the risk to ratepayers of failing to transition to a lower carbon portfolio. *Please see Tables 1 and 2 in UCE Exhibit 1.1 (DT)* for estimated potential ratepayer carbon costs by year.

Q: Please explain the results of your net present value (NPV) analysis.

A: Another way to look at potential carbon costs is to compare the present value revenue requirement (PVRR) for the portfolio with the net present value of estimated

carbon costs over the planning horizon. *Table 4* compares the present value of estimated potential carbon costs between a lower carbon portfolio and the high emissions portfolio. The lower carbon portfolio has a higher PVRR—$5.83 billion more (although it is important to note that this is just one portfolio that results in lower carbon emissions—high levels of energy efficiency will reduce this cost while also reducing emissions). When you compare the NPV of the potential carbon costs (with a discount rate equivalent to that used in the IRP) there is a "break even" point somewhere between the Base Case carbon costs and the High case. If carbon prices are in line with the High cost scenario, ratepayers save $1.5 billion and if carbon prices are in line with the hard cap scenario, rate payers save $6.3 billion on a NPV basis.

I also calculated the present value of the carbon costs with a discount rate of 1%. Although not strictly comparable with the PVRR calculated using the IRP discount rate, it is consistent with the societal impacts of climate change. This analysis shows the present value costs of carbon are between $4.37 billion to $19 billion for the lower carbon portfolio, EG2-C09 and between $9.93 billion to $42.7 billion for the high carbon portfolio. Again, the higher carbon portfolio has over double the potential cost to ratepayers. Note that the analysis does not include risks associated with paying for stranded assets associated with the need to switch to lower carbon energy resources in the future if imprudent decisions are made today.

Q: What conclusions do you draw from your analysis of potential carbon prices?

A: The results call into question the "benefit" of choosing apparently lower cost, but high emissions portfolios. The results highlight significant uncertainty regarding costs associated with the Company's resource decisions. Looking at the magnitude of risk and

uncertainty calls into question the justness and reasonableness of approving investments in pollution controls for highly carbon intensive coal plants.

Q: What is your recommendation based on your analysis?

A: In order for rates to be just and reasonable, the Company—not ratepayers—should bear the risk associated with its high carbon investment strategy and should face cost disallowances if its investments, going forward, do not dramatically reduce emissions.

CONCLUSION

Q: Please summarize your conclusions and recommendation.

A: The overwhelming scientific evidence regarding the devastating and costly impacts of climate change and evidence that we can reduce these impacts by transitioning our energy supply to lower carbon resources seriously undermine the justness and reasonableness of the Company's investments in carbon-intensive resources and other investments that lock-in a carbon intensive future.

If the Company continues on its current investment path, and if the Commission continues to approve the Company's investments in carbon-intensive resources, the wellbeing of Utah ratepayers, including their safety, health, comfort and convenience will be threatened. Utah ratepayers will bear unreasonable risk associated with carbon costs, stranded assets and costs of future portfolio changes to correct imprudent investments unless the Company is held accountable for its carbon-heavy investment strategy. Going forward, the Company must take significant steps to reduce its carbon emissions or face disallowances for unjust and unreasonable investments. That concludes my testimony.