Sophie Hayes (12546)
Utah Clean Energy
1014 2nd Ave.
Salt Lake City, UT 84103
801-363-4046
Attorney for Utah Clean Energy

BEFORE THE PUBLIC SERVICE COMMISSION OF UTAH

In the Matter of PacifiCorp's 2011 Integrated Resource Plan	**Docket No. 11-2035-01**

Comments of Utah Clean Energy

I. Introduction.

Utah Clean Energy is grateful for the opportunity to submit comments on PacifiCorp's 2011 IRP. Utah Clean Energy values integrated resource planning as a critical component of prudent utility practice. Long term planning provides a broader frame of reference for utility activities, which otherwise are considered discretely in terms of revenue requirements for particular test years.

The 2011 IRP does not conform to the IRP Standards and Guidelines in several respects and should therefore not be acknowledged. These comments will focus on recommendations for future integrated resource planning, to facilitate more useful and prudent analysis going forward, as well as shortcomings in this particular IRP.

II. Long-term planning for a cleaner future.

Integrated resource planning provides a critical and necessary context within which to evaluate the prudence of utility decision making. According to the Commission order on IRP Standards and Guidelines, the purpose of integrated resource planning is to

> Evaluate all known resources on a consistent and comparable basis, in order to meet current and future customer electric energy services needs at the lowest total cost to the utility and its customers, and in a manner consistent with the long-run public interest. The process should result in the selection of the optimal set of resources given the expected combination of costs, risk and uncertainty.[1]

In this iteration of the IRP, the Company is sending mixed signals as far as projecting an expected combination of costs, risks, and uncertainties. While the Company acknowledges that it expects national policy to shift in the direction of a clean energy economy,[2] and plans its transmission acquisition accordingly,[3] in other areas of the IRP, the Company commits irrevocably to resources that increase costs and risks for customers, given an expected "green future."

Regardless of trends in national energy policy, the Company's commitment to coal plant upgrades, without proper analysis in the IRP, and plans to invest in traditional, fossil-fueled baseload generation, maintains the Company's "business as usual" trajectory. This trajectory puts customers at risk for future regulatory costs or stranded asset costs associated with future carbon, air quality, and water regulation. It also puts ratepayers, and all people, at increased risk from the contributions of greenhouse gas emissions to global climate change and the costs of adapting to a warming planet. Additionally, ratepayers, among others, are susceptible to costly

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[1] Docket No. 90-2035-01, *Report and Order on Standards and Guidelines*, Issued June 18, 1992 (hereinafter *Standards and Guidelines*), page 42.
[2] *See, e.g.* 2011 Integrated Resource Plan, Volume I, Issued March 31, 2011 (hereinafter *2011 IRP*), pages 47, 82, 225-29.
[3] *2011 IRP*, pages 47, 82.

adverse health effects from numerous other harmful, non-greenhouse gas emissions and byproducts.

The Company's business as usual trajectory does not provide the needed flexibility to gracefully and cost-effectively transition to a highly efficient future with much greater investments in zero variable-cost, pollution free renewable resources. Indeed, the Company's approach to IRP creates an untenable conflict between maintaining traditional resource planning and acquisition and intentionally analyzing, evaluating, and addressing the needs of a changing world.

According to the recently released *Western Grid 2050* Report, the Western electricity sector will invest more than $200 billion by 2030 whether a green future unfolds or not.[4]

> Significant investment will be required because coal, gas and nuclear facilities will need to be retired or replaced, population, economic growth, and electrification will drive gross electricity demand up, demand reduction efforts like energy efficiency programs will continue, new electric generation will be built and new transmission will be added. The question is not whether hundreds of billions will be invested but rather how they will be invested.[5]

The *Western Grid 2050* Report highlights the differences between the incompatible Business As Usual (BAU) development path and a Clean Energy Vision (CEV) development path in an effort to analyze the best path forward, given long term considerations of economic, environmental, energy security, and public health consequences.[6]

Although the 2011 IRP begins contemplating a "green" future,[7] the current analysis does not intentionally evaluate the relative performance, costs, or long-term public interest differences

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[4] Carl Linvill, John Candelaria, and Ashley Spalding, *Western Grid 2050: Contrasting Futures, Contrasting Fortunes* (August 22, 2011) (hereinafter *Western Grid 2050*), page 1, available at http://www.cleanenergyvision.org/clean-energy-vision-technical-report/.

[5] *Id.*

[6] *Id.* at 2.

[7] *See, e.g. 2011 IRP*, pages 225-29.

between Business As Usual and a clean energy future. However, "[b]efore allowing the BAU trajectory to be selected by default, it is appropriate to examine the relative performance of the BAU and CEV trajectories to ensure that hundreds of billions of investment dollars are not inadvertently wasted."[8]

For example, in the current IRP, the Company failed to analyze the costs and consequences of retrofitting (versus retiring) its large fleet of aging coal plants with pollution control equipment necessary to bring them into compliance with current and pending environmental regulations.[9] Nevertheless, it is likely that massive investments in coal will become a liability for customers as diverse regulation of coal plant pollutants expands. Moreover, even though the Company's coal plants are very old, significant investments in the aging coal fleet will likely necessitate longer life expectancies in order to justify the investments. Such investments commit ratepayers to the consequences of a Business As Usual path and reduce the flexibility of the PacifiCorp system to transition to a cleaner future.

The central assertion of the *Western Grid 2050* report is therefore critical to a discussion of PacifiCorp's integrated resource planning: "If no choice is made [between BAU and CEV], investment will be driven by *inertia rather than intention* and the grid of 2030 and 2050 will look very much like the grid of 2010. This report asserts that making an intentional choice between the BAU and CEV trajectories now is the responsible course of action."[10]

Deepening customers' financial commitments to traditional generation and Business As Usual is inconsistent with their long-term interests given expected national energy policy, including increased internalization of environmental externalities and, importantly, the catastrophic consequences of uncurbed greenhouse gas and other emissions, which are ignored at

[8] *Western Grid* 2050, page 5.
[9] Company response to Sierra Club Data Request 3.1 in docket 10-035-124 (attached).
[10] *Western Grid* 2050, page 1 (emphasis added).

our peril.[11] It is past time for long-term planning to appropriately account for the risks associated with fossil-fuel based generation. That is, it is only appropriate and prudent to account for such risks in a manner consistent with and proportionate to the level (harm plus probability) of the risk.[12]

Integrated resource planning and prudent long-term planning can and should facilitate analysis of the long-term cost-effectiveness of a transition to a clean energy future.[13] To

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[11] *See, e.g.* Intergovernmental Panel on Climate Change (IPCC), CLIMATE CHANGE 2007: SYNTHESIS REPORT (2007), available at http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm; Academies of Brazil, Canada, China, France, Germany India, Italy, Japan, Mexico, Russia, South Africa, United Kingdom, United States, *G8+5 Academies' joint statement: Climate Change and the Transformation of Energy Technologies for a Low Carbon Future* (May 2009), available at http://www.nationalacademies.org/includes/G8+5energy-climate09.pdf; US Global Change Research Prgoram, *Global climate change impacts in the United States* (2009), available at http://downloads.globalchange.gov/usimpacts/pdfs/climate-impacts-report.pdf; and National Academy of Sciences, *Advancing the science of climate change: Report in brief* (2010), available at http://dels.nas.edu/resources/static-assets/materials-based-on-reports/reports-in-brief/Science-Report-Brief-final.pdf.

[12] As noted in the Western Grid 2050 report, the consequences of climate change are potentially so costly that taking steps to ensure against them is a justified course of action: "People may disagree on the probability that climate change will lead to dramatic, negative consequences but even if one believes the costly impacts have a low probability of occurring . . . insuring against the risk is necessary. Failure to insure against plausible high impact, negative events has negative economic consequences." *Western Grid 2050*, page 80 (citing Martin L. Weitzman, *Fat-Tailed Uncertainty in the Economics of Catastrophic Climate Change* (February, 2011); *see also,* Frank Ackerman and Elizabeth A. Stanton, *Climate Risks and Carbon Prices: Revising the Social Cost of Carbon* (2011), available at http://www.e3network.org/papers/Climate_Risks_and_Carbon_Prices_executive_summary+full_report+comments.pdf; National Research Council of the National Academies, HIDDEN COSTS OF ENERGY: UPDATED CONSEQUENCES OF ENERGY PRODUCTION AND USE. Washington DC: The National Academies Press (2010); Martin L. Weitzman, Book Review: *The Stern Review of the Economics of Climate Change*, JOURNAL OF ECONOMIC LITERATURE (September 2007); and Martin L. Weitzman, *On modeling and interpreting the economics of catastrophic climate change*, THE REVIEW OF ECONOMICS AND STATISTICS (February 2009), available at http://dash.harvard.edu/bitstream/handle/1/3693423/Weitzman_OnModeling.pdf?sequence=2.

[13] The *Western Grid 2050* Report concludes,

> The West will invest hundreds of billions of dollars in the electricity system by 2030. Aging infrastructure and growing demand will drive large investment regardless of the development trajectory chosen. Differences in investment cost and differences in fuel and carbon cost will drive costs higher in different measure between a BAU and CEV trajectory, but costs and prices will increase in either case.
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> The magnitude of the cost and price differences are highly uncertain because many factors such as the cost of fuel, the cost of carbon, the rate of technological change and the cost of raw materials are highly uncertain. One's opinion about which future will cost more depends on one's opinion about how these uncertainties will turn out.

accommodate the changing world, changing technologies, and warming climate, the Commission should consider requiring future integrated resource planning to incorporate Scenario Analysis into the least cost, least risk planning process. In a recent paper written for the National Regulatory Research Institute, David M. Boonin described the differences between integrated resource planning and Scenario Planning:

> IRP identifies a least-cost resource plan aimed at meeting future needs and, in some instances, is broadened to apply to a small band of projected trends—e.g., variations in future loads, fuel costs, resource construction, or purchases power. Utility scenario planning, by contrast, first identifies sharply different views of a distant future—call them scenarios—and then seeks to define a resource strategy that is most successful in addressing all of those potential futures. Although utilities and regulators engaged in resource planning must consider greater uncertainties than ever before, these uncertainties usually fall within a range bounded by high and low industry projections.
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> . . . Scenario planning is prompted by uncertainties typically associated with long-term commitments and multiple options. Scenario planning does not attempt to identify the most likely future. Its purpose instead is (a) to acknowledge that uncertainties can drive the future onto very different paths, and (b) to examine how particular solutions address or fail to address those different futures. Like war games for business or government decisions, scenario planning allows decisionmakers to examine several scenarios and strategies with the goal of accommodating multiple futures with one strategy—to take the first steps down a path that appears most robust, perhaps one that identifies new services and business opportunities as well as one that best avoids disastrous results. Scenario planning allows decisionmakers to rehearse the future and identify high-promise, low-risk responses. As a risk management tool, it helps identify consistently acceptable results under all scenarios.[14]

> If one accepts the notion that unabated carbon emissions are a serious global problem, and if one accepts that the western electricity sector can increase the likelihood that carbon emissions reduction will accelerate if the West does its part to address carbon emission reduction, then the choice to follow a CEV path is clear. If one does not accept this notion then the preference between BAU and CEV trajectories depend on one's opinions about how cost uncertainties will turn out and on one's opinions about the environmental, energy security and public health performances advantages held by a CEV future as highlighted in this report.

Western Grid 2050, page 144.

[14] David M. Boonin, *Utility Scenario Planning: "Always Acceptable" vs. the "Optimal" Solution* (March 2011), pages 1 and 4 (attached), available at http://nrri.org/pubs/multiutility/NRRI_utility_scenario_planning_mar11-07.pdf.

Utah Clean Energy respectfully requests that the Commission consider Scenario Analysis as a possible component of PacifiCorp's long-term planning tool-kit. The Colorado PUC is hosting a series of technical conferences on effective long-term planning methods. Utah Clean Energy suggests this would be a beneficial process in Utah for evaluating planning in a dynamically changing world.

III. Comments on the 2011 IRP.

Utah Clean Energy recommends that the Commission not acknowledge the 2011 IRP because it fails to conform to the standards and guidelines and is deficient in other respects. Specifically, Utah Clean Energy addresses the following and concludes that the Commission should not acknowledge this IRP:

- Utah Clean Energy is generally pleased with the amount of DSM selected in the Preferred Portfolio, but requests more information on certain aspects of modeling DSM resources.
- Utah Clean Energy appreciates the Company's commitment to investigating a continued and expanded distributed solar PV in Utah, but provides recommendations for modifications to future IRP modeling.
- Utah Clean Energy recommends the Commission require the Company to evaluate the flexibility, in compliance with Standard and Guideline 4.j., of its system's ability to integrate variable energy resources that will contribute to a clean energy future.
- Due to significant disadvantages levied on wind resources in the IRP, which hampered their selection, Utah Clean Energy recommends that the Commission require modification of the action plan related wind energy in the near term.

- Utah Clean Energy finds wind-specific transmission costs to be discriminatory and at odds with the broad-based benefits of transmission infrastructure.
- Imposing integration charges on wind alone is discriminatory and not in compliance with the standards and guidelines to compare resources on a "consistent and comparable basis." Nevertheless, if the Commission determines that it is appropriate to charge wind resources with integration costs, Utah Clean Energy requests that the Commission provide guidance and requirements for the next wind integration study.
- The Commission should provide the Company with guidance and requirements for using the IRP process to find and evaluate ways to reduce the cost of integrating variable resources.
- PacifiCorp failed to evaluate the significant costs of bringing its existing coal fleet into compliance with new, draft, and anticipated environmental regulations. It is therefore impossible to evaluate whether this IRP has resulted in the selection of the optimal set of resources given the expected combination of costs, risk, and uncertainty.
- Utah Clean Energy requests expanded analysis of utility-scale solar resources for the IRP update and next IRP.
- Based on the results of IRP modeling of geothermal resources, Utah Clean Energy recommends that the Action Plan be revised to include acquisition of geothermal resources in the near term.

a. Demand-side, including distributed, resources.

Utah Clean Energy is pleased that the Company included, in its Preferred Portfolio, 1189 MW of Class 2 by 2020 and 2563 MW by 2030. DSM is clearly the absolute least cost resource. However, a transition to a clean energy future will require significant investments in cost-effective energy efficiency and demand response programs. A recent study by the National Academies of Science analyzed energy efficiency potential in the United States. They analyzed currently available efficiency technologies and practices and technologies that are expected to be developed over the normal course of business by 2020 and found that, "In buildings alone, these technologies could eliminate the need to increase electric generating capacity, despite economic and population growth. Cost effective energy improvements are the cheapest and quickest way to move toward a sustainable energy future with lower greenhouse gas emissions."[15]

It is therefore imperative that IRP modeling fairly evaluate demand-side resources and that strategies are developed to acquire all cost-effective DSM. Utah Clean Energy recommends that the Commission request a technical conference to explore such demand-side resources modeling issues as whether the method for assigning Class 2 DSM programs to specific DSM resource bundles limits the amount of Class 2 DSM that can be selected,[16] whether the ramp rates used in modeling energy efficiency bundles favors supply-side resources,[17] and how the

[15] The National Academy of Sciences, *Real Prospects for Energy Efficiency in the United States: Report in Brief* (2009), *page* 1.

[16] In their Initial Comments and Recommendations on the 2011 IRP, Oregon Commission staff said, "PacifiCorp groups energy efficiency measures into bins based on levelized costs. The size of the bins created by PacifiCorp varies greatly and seemingly arbitrarily. Staff is looking into whether PacifiCorp's designation of which measures go into which bins, and the resulting 'average' bin cost, is limiting how much Class 2 DSM is being selected." Docket No. LC 52, In the Matter of PacifiCorp, dba Pacific Power 2011 Integrated Resource Plan, Staff's Initial Comments and Recommendations (hereinafter *OPUC Staff Initial Comments*), page 3.

[17] Oregon Commission staff, in their initial comments on the 2011 IRP also said, "Ramp rates are important in energy efficiency modeling. Staff is investigating changes to ramp rates since the last IRP update and examining whether PacifiCorp's method for ramping up efficiency, once a bin is determined by the model to be cost effective, is favoring supply-side resources in the near term." *OPUC Staff Initial Comments*), page 3.

plans to implement the demand-side potential found to be achievable in the latest Cadmus Potential Study and indeed strategies to acquire all cost-effective DSM.

Oregon Commission staff, in their initial comments on the 2011 IRP, highlighted sensitivity analysis conducted by the Company in response to Oregon Commission order showing that Conservation Voltage Reduction (CVR) is cost-effective for the entire PacifiCorp system.[18] Utah has at least one company that specializes in load balancing and harmonics reduction to reduce energy losses, thereby creating more usable energy. Utah Clean Energy requests a technical session on CVR and harmonics reductions to gain a better understanding of the technologies and energy saving potential and requests that the IRP update have more analysis on the system savings achievable through and value attributable to CVR[19] and related strategies.

For the IRP update, the Company should be more specific about the actions it intends to take, within the next two years, to investigate and pursue cost-effective commercial/residential solar hot water heating programs.[20]

Utah Clean Energy appreciates the Company's commitment to investigating a continued and expanded solar program in Utah.[21] Utah Clean Energy also appreciates, that the Company ran two sensitivity analyses to correct the modeling error that ran the total resource cost for distributed solar instead of the utility costs for a rebate program. The sensitivity runs selected all of the solar PV that PacifiCorp allowed the model to select per year (1.2 MW per year) at two rebate levels $1.50/watt and $2.00/watt. This annual limit appears to be based upon the Cadmus

[18] *OPUC Staff Initial Comments*, page 4.
[19] OPUC staff noted, "If PacifiCorp had included CVR for planning purposes it may have affected the preferred portfolio selection results. Even though the likely savings for the whole service area is small (perhaps as much as one percent of loads), it is roughly the same size as other specific additions tested in the stochastic model (PaR). The present value of savings from CVR would be larger than the savings from other adjustments PacifiCorp made to achieve the preferred portfolio." *OPUC Staff Initial Comments*, page 4.
[20] "The 2011 IRP preferred portfolio includes 30 MW of solar hot water heating resources by 2020 (18 MW in the east side and 12 MW in the west side." *2011 IRP*, page 254.
[21] *Id.*

DSM Potential Study and their projected achievable potential in Utah of 3.85 aMW by 2030. However, the total technical potential for roof top solar in Utah is 2664 aMW by 2030. The achievable potential for Utah seems very low and this seeming artificial constraint should be evaluated in the review of the solar rebate program for Utah. Furthermore, the achievable solar PV rooftop potential should be modified in the IRP update and future IRPs.

In the action plan, the Company commits to using their analysis of roof top potential and their experience with Oregon's pilot solar program in their review of Utah's solar rebate program. These are two good starting points and we trust the analysis will include analysis that Sandia has conducted with RMP, and data and information from experts across the country and states that have robust solar markets.

Gas resources.

Utah Clean Energy is concerned with the Company's use of combined cycle combustion turbines as capacity resources without analysis of the flexibility of the system to respond to the needs of a clean energy future. Specifically, investments in CCCTs represent long-term commitments to base-load resources, which may undermine the flexibility of PacifiCorp's system to add clean, zero variable-cost resources, such as wind and solar.

Utah Clean Energy recommends that the Commission require the Company to evaluate the flexibility of its system before it acknowledges baseload resources to meet capacity needs. In a clean energy future, system operation will be geared to maximize use of wind and solar resources dispersed across the West. Together with expanded energy efficiency programs, distributed generation, customer resources, and modern information and control technologies, renewable resources form the core of the clean energy future. Dispatchable resources will fill in around variable energy, to ensure reliable operation in every hour in every region of the grid.

With so much emissions-free, low marginal cost energy available, it is critical to thoroughly evaluate the need for expensive, fossil-fueled baseload plants.

IRP Standard and Guideline 4.j. states that PacifiCorp's integrated resource plans will include "considerations permitting flexibility in the planning process so that the Company can take advantage of opportunities and can prevent premature foreclosure of options."[22] Additionally, it is critical for the transition to a clean energy future that current investments do not preclude efficient and timely investments in clean energy resources. For example, budgeting for carbon requires different ways of planning and operating the power system. It puts the focus on energy over capacity, because emissions are a function of energy.

Despite the guidance to permit flexibility in planning and preventing premature foreclosure of options, the Company does not address whether it could address its capacity deficit more economically with significant demand-side capacity reductions and lower capital-cost single cycle combustion turbines (SCCTs). Filling the entire capacity need with new CCCTs has the potential to undermine the opportunity for new renewable resources to provide zero variable-cost energy. CCCTs commit PacifiCorp's system to a less flexible base of operations than might otherwise be available; whereas deferring such commitments might better prepare the Company for a transition to a clean energy future that demands the most flexible and responsive gas complements.

Utah Clean Energy requests that the Commission require the Company to evaluate the flexibility of the system before it acknowledges baseload resources to meet capacity needs. Additionally, we request that the Commission request explanation of and justification for the "stochastic production cost adjustment," which credits CCCTs with a 16% capital discount.[23] It

[22] *Standards and Guidelines*, page 46.
[23] *2011 IRP*, pages 118 and 180.

is important to understand how this discount biased portfolio selection in favor of CCCTs and whether that bias is appropriate.

b. Wind modeling constraints

Utah Clean Energy has several concerns with the approach the Company used to model wind resources in this IRP. IRP modeling did not reflect consistent benefits to Utah ratepayers from renewable energy acquisition in the early planning years. Utah Clean Energy therefore recommends that the Commission not acknowledge the IRP and to request modification of the action plan related wind energy in the near term.

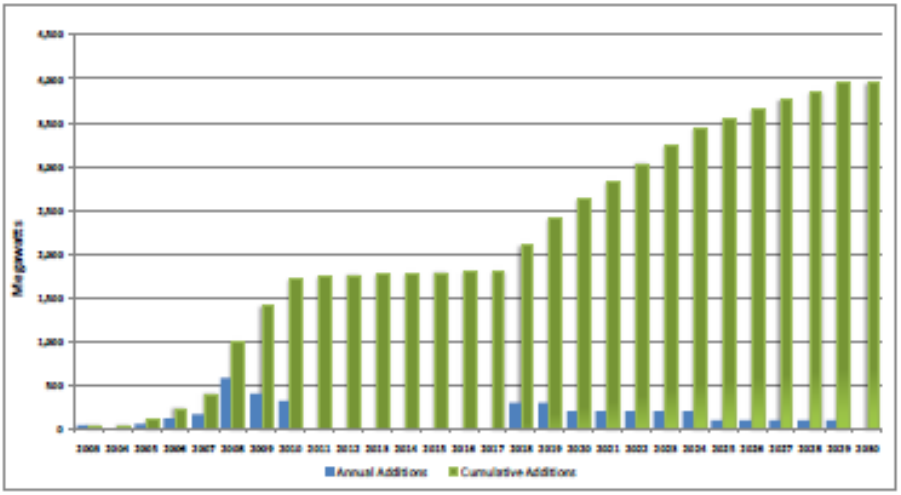
PacifiCorp explained that for this IRP, System Optimizer would be limited such that no more than 200 MW of wind energy could be selected in a given year. The limit was not cost-based, but rather "The wind capacity smoothing approach embodies the planning preference of the Company."[24] The Company should allow its model to pick all cost-effective wind rather than arbitrarily limiting the amount that the model can select.

PacifiCorp should address how it can acquire larger amounts of wind earlier in the planning period. In order to mitigate risk and support its acquisition path analysis, the Company utilized upper-tail mean PVRR performance results to include 2,100 MW of wind resources in its Preferred Portfolio.[25] In order to allocate those 2,100 MW of wind additions across the planning horizon, the Company ran System Optimizer with modified renewable policy assumptions.[26] The model selected wind in every year beginning in 2015. However, in the Preferred Portfolio, the first installment of these 2,100 MW of wind resources is not scheduled to come online until 2018.[27]

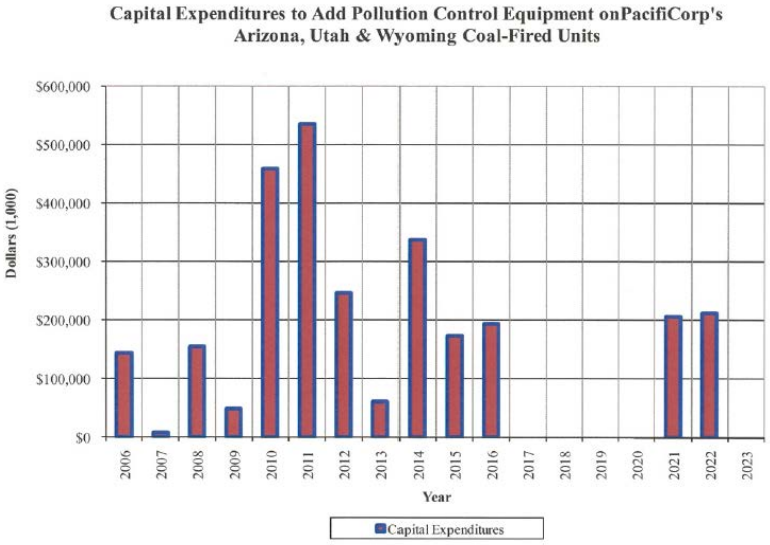
[24] Company response to UCE-WRA Data Request 1.2 in Docket No. 11.2035-01 (attached).
[25] *2011 IRP*, pages 226-29.
[26] *Id.* at 226.
[27] *Id.* at 228.

Figure 9.1[28] graphs the annual and cumulative renewable capacity additions between 2003 and 2030:

Figure 9.1 – Annual and Cumulative Renewable Capacity Additions, 2003-2030



Note: the renewable energy capacity reflects categorization by technology type and not disposition of renewable energy attributes for regulatory compliance requirements.



It is interesting to compare this graph with the coal plant investment graph found in *PacifiCorp's Emissions Reduction Plan*.[29] There is no wind acquisition during the most costly

[28] 253.

coal retrofitting years; wind acquisition picks up only after the company has completed most of the retrofits.

The Action Plan does not contemplate any wind procurement in the early planning years.[30] It states,

> Acquire up to 800 MW of wind resources by 2020, dictated by regulatory and market developments such as (1) renewable/clean energy standards, (2) carbon regulations, (3) federal tax incentives, (4) economics, (5) natural gas price forecasts, (6) regulatory support for investments necessary to integrate variable energy resources, and (7) transmission developments. The 800-megawatt level is supported by consideration of regulatory compliance risk and public policy interest in clean energy resources.[31]

Nevertheless, the timing of wind acquisitions is relevant both to cost and risk mitigation. The Company should take care not to miss opportunities to take advantage of federal incentives, prime locations, available transmission, and low turbine prices, and should revise its action plan to add wind sooner in the planning period.

PacifiCorp should revise its Action Plan to include a wind RFP in the near term. The Company explained that wind resources cannot be acquired in Wyoming until the 2018 expected completion of the Windstar-Populus segment of Energy Gateway due to a lack of transmission transfer capability for exporting the energy.[32] With regard to wind resources in other states, the Company stated that "the constraints are primarily economic in nature. Wind resources outside of Wyoming are not cost-effective *based on the Company's capacity factor and capital cost assumptions*, a result confirmed by the IRP portfolio modeling."[33] Several parties have raised concerns throughout the planning process regarding the Company's assumed wind costs and

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[29] Available at http://deq.state.wy.us/aqd/308%20SIP/PacifiCorp%20Emissions%20Reductions%20Plan_11-2-10_Chap.%206.pdf.

[30] The wind portion of the action plan is in blue italic font, indicating that the action items will extend beyond or occur after the next two years. *2011 IRP*, page 254.

[31] *2011 IRP*, page 254.

[32] Company response to OCS Data Request 2.4 in Docket No. 11-2035-01 (attached).

[33] *Id.* (emphasis added).

capacity factors.[34] An RFP would provide real information about actual costs and capacity factors, in addition to information on whether wind developers could withstand curtailment necessary from transmission constraints which now exist.

Another issue of particular concern with regard to this IRP is that PacifiCorp's modeling of renewable resource costs did not model a revenue credit for unbundled REC sales. By way of explaining this decision, the Company states, "Once greenhouse gases are regulated—and until the unbundled REC and carbon markets are reconciled—PacifiCorp plans to cease selling unbundled RECs. As an assumption for portfolio modeling, renewable resource costs do not reflect a revenue credit for unbundled REC sales."[35] However, at this time, greenhouse gases are not regulated and PacifiCorp continues to sell unbundled RECs; therefore, the Company has imposed an unjustified burden on renewable energy by not crediting its costs with the value the Company is receiving from its renewable attributes. This decision violates the direction to compare resources on a consistent and comparable basis[36] and should not be acknowledged.

c. Wind-specific transmission costs.

Without sufficient justification, wind resources selection forces incremental investment in Energy Gateway. Utah Clean Energy finds this constraint to be discriminatory[37] and at odds with the broad-based benefits of transmission infrastructure; it should therefore not be acknowledged. As PacifiCorp recognizes, transmission provides multiple benefits; the costs of these benefits should be shared by all resources, not allocated to wind.

[34] See, e.g. *Comments of Interwest Energy Alliance RE: IRP Modeling*, submitted February 25, 2011.
[35] *2011 IRP*, page 42.
[36] *Standards and Guidelines*, 4b, page 44.
[37] *Id.*

Table 6.10 of the IRP documents the potential capacity and cost of five wind resource zones in the new transmission topology used in this IRP.[38] There are two resource zones where wind may be selected without increased transmission costs; however, these zones are constrained so that only 400 MW of cost level 1 wind may be sited there. In contrast, within the three remaining wind-only resource bubbles, more than 16,000 MW of wind in the lowest cost level are potentially available (mostly in Wyoming). Because resource selection within wind generation bubbles automatically assigns incremental costs for Energy Gateway, all portfolios are encouraged not to select more than 400 MW of wind. Where the model selects more than 400 MW of cost level 1 wind, PacifiCorp's modeling constraints will force the incremental costs of Energy Gateway.

Wind resources are the only resources whose selection forces incremental investment in Energy Gateway. PacifiCorp cites the following system-wide benefits of new transmission: access to markets, reliability, and efficient system operations.[39] PacifiCorp explains that "Energy Gateway will support multiple load centers, resource locations and resource types."[40] Further, the Company has "emphasized that significant new transmission capacity is needed to adequately serve its customers' load and growth needs for the long-term."[41] Moreover, it is unlikely that we can predict the full range of benefits that new transmission may create. Therefore, it is inappropriate to force wind resources to shoulder a disproportionate share of the cost of incremental transmission in IRP modeling. Given the breadth of transmission benefits recognized by the Company, Utah Clean Energy finds it troubling that only wind resources are constrained with the incremental costs of energy gateway.

[38] *2011 IRP*, page 130.
[39] *2011 IRP*, pages 58 and 232.
[40] *2011 IRP*, page 58.
[41] *2011 IRP*, page 282.

Utah Clean Energy recognizes that Energy Gateway is an important and valuable investment that enables the development of renewable resources. However, it is unsatisfactory that the Company's modeling places the cost burden of the project on selected wind resources. Should the Company find Energy Gateway to be cost effective, it should include the project's expected PVRR in all portfolios and allow all resources to access it freely.

d. Wind-specific integration charges.

Imposing integration charges on wind alone is discriminatory and not in compliance with the standards and guidelines to compare resources on a "consistent and comparable basis."[42] If the Commission determines that it is appropriate to charge wind resources with integration costs, Utah Clean Energy requests that the Commission provide guidance and requirements for the next wind integration study. Additionally, the Commission should provide the Company with guidance and requirements for using the IRP process to find and evaluate ways to reduce the cost of integrating variable resources.

Electric systems incur costs to integrate the output of all generators as well as loads and it is effectively impossible to attribute added system cost to any specific generator. In a recent paper, entitled "Cost Causation and Integration Cost Analysis for Variable Generation," Michael Milligan, et al. explain why.[43]

> Integration impacts are not exclusive to wind and solar. Nearly all generators can impose costs on the power system or other generators when they are added to the power system. These impacts are seldom calculated as integration costs and never applied to conventional generators as integration costs.[44]

[42] *Standards and Guidelines*, 4b, page 44.
[43] Michael Milligan, et al., *Cost Causation and Integration Cost Analysis for Variable Generation* (June 2011) (hereinafter *Milligan*), available at http://www.nrel.gov/wind/systemsintegration/pdfs/2011/milligan_cost_causation_integration_cost_analysis.pdf.
[44] *Milligan*, page 11.

Because integration costs for traditional resources are socialized across the system,[45] it is possible that it is more expensive to break down the unvarying output of baseload coal plants against constantly changing load shape than it is to integrate wind power. Because all generators impose integration costs on the system, and because those costs cannot easily be tracked to specific generators, it is reasonable to have load pay for all integration costs. Imposing such charges on only one class of generators—in this instance, wind—does not treat resources on a consistent and comparable basis.

Moreover, PacifiCorp should adopt grid reforms that reduce the cost of integrating renewable energy before it can recover costs for wind integration charges. Utah Clean Energy recognizes and appreciates PacifiCorp's efforts at balancing area coordination.[46] Such reforms must include faster scheduling, improvements in forecasting, and an energy imbalance market. Such reforms will reduce costs to customers, as well as reduce emissions, even without the addition of more wind energy.

Nevertheless, if the Commission finds that a wind integration charge is appropriate, it is critical that the next wind integration study be conducted with the oversight of an independent Technical Review Committee (TRC) so that the problems and errors plaguing the Company's 2010 wind integration study are not repeated.

Throughout the last wind integration study process, the Company declined to address substantial flaws, and the Company did not provide enough time for stakeholder review of the study results in advance of the IRP process. Since its publication, numerous other flaws have been identified.[47] The major problems of the most recent wind integration study include the

[45] *Milligan*, page 14.
[46] *2011 IRP*, page 47.
[47] Docket No. 10-035-124, 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

following: the study relied on an incorrect mathematical formula[48]; duplicating wind facility data eliminated diversity benefits and undermined the credibility of the study[49]; the Company failed to validate synthetic data[50]; and the study process reflected a lack of engagement with the concerns expressed by diverse stakeholders.[51] Utah Clean Energy has reviewed and supports the comments of Interwest Energy Alliance, which describe these flaws and errors in more detail.

Utah Clean Energy requests that the Commission provide clear direction for independent, expert oversight of future wind integration studies. Before PacifiCorp's next IRP workshops begin, PacifiCorp should be required to use an independent TRC with two important conditions: 1) its members must be approved by Commission or National Renewable Energy Laboratory (NREL) staff as representing the best industry expertise and 2) the TRC must operate according to the industry standard principles developed by the Utility Wind Integration Group and NREL.[52] Stakeholders should be provided sufficient time (at least 60 days) to review and respond to study findings before the study is made final.

In addition to the foregoing procedural remedies, the Commission should also direct PacifiCorp to evaluate advancements in integration well in advance of the next IRP. For example, for or before the next IRP update, PacifiCorp should explore and report on the following: using more granular modeling to recognize the value of low-cost, fast-responding reserves; making stronger efforts to evaluate advancements in demand-side integration

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Service Regulations, *Direct Testimony of Randall Falkenberg* (2011), available at http://www.psc.state.ut.us/utilities/electric/elecindx/2010/10035124indx.html.

[48] *See* Comments of Renewables Northwest Project (RNP), submitted April 23, 2010, May 5, 2010, June 1, 2010, and August 26, 2010, available at http://www.pacificorp.com/es/irp/wind_integration.html.

[49] This error was first identified in Randall Falkenberg's public record testimony in Wyoming Public Service Commission Docket No. 20000-384-ER-10.

[50] Comments of Renewables Northwest Project (RNP), submitted April 23, 2010; Comments of NREL, submitted April 23, 2010, available at http://www.pacificorp.com/es/irp/wind_integration.html.

[51] *See* PacifiCorp's Responses to Supplemental RNP Comments, available at http://www.pacificorp.com/es/irp/wind_integration.html.

[52] Utility Wind Integration Group (UWIG), *UWIG Issues Principles/Guidelines for Technical Review of Wind Integration Studies*, available at http://www.uwig.org/TRCguidelines.htm.

technologies; and quantifying the cost-saving value of impending market improvements, such as sub-hourly scheduling and an energy imbalance market. Addressing these concepts and incorporating them into long-term planning can shift the dialogue away from present constraints to future possibilities.

e. Coal resources.

PacifiCorp failed to evaluate the costs of bringing its existing coal fleet into compliance with new, draft, and anticipated environmental regulations. It is impossible to evaluate whether this IRP has resulted in the selection of the optimal set of resources given the expected combination of costs, risk, and uncertainty. Therefore, the Commission should not acknowledge the IRP.

Ongoing, substantial investments in coal plants were assumed in IRP modeling, without analysis of alternatives. The IRP process is supposed to include evaluation of all "present and future resources."[53] Nevertheless, at a July 12 technical conference, Pete Warnken stated that this IRP had analyzed only new resources, not currently existing resources.[54] Furthermore, in response to a data request in the most recent Utah rate case, PacifiCorp explained,

> No specific cost-effectiveness analysis of the environmental upgrades at issue in this docket were performed by the Company or external parties as part of the 2008 or 2011 IRPs. Consistent with current state IRP guidelines, the company's IRP process and associated system planning models have focused on the economics and risks of acquiring future resources rather than potential investments connected with existing assets.[55]

However, analysis of alternatives is necessary sound long-term planning. It is also necessary component of evaluating the prudence of resource decisions as discrete components of

[53] *Standards and Guidelines,* 4.b., page 44.
[54] July 12, 2011 Technical Conference on IRP Modeling.
[55] Company response to Sierra Club Data Request 3.1, Docket No. 10-035-124 (attached). The Company's statement that integrated resource planning should look at future resources rather than existing resources is in conflict with Utah IRP Standard and Guideline 4.b. to evaluate all present and future resources.

rate case test periods. And, as mentioned above, it is critical to evaluate the costs, benefits and relative performance of different acquisition paths in order to decide intentionally where the next twenty years of investment will lead us.

The alternatives considered have implications for the future we choose. Western Grid 2050 states,

> While both the BAU and CEV trajectories presume growth in the renewable energy generation fleet due to enforcement of state mandated renewable energy standards, the CEV trajectory focuses its discretionary investment resources on energy savings and renewable energy technologies. The BAU trajectory focuses its discretionary financial resources on improving coal generation and building gas generation to meet emerging demand growth.[56]

Analysis of alternatives will facilitate deliberate, informed decisions about our energy trajectory and its consequences.

The Company did not include any attempt at quantifying a range of estimates for complying with environmental regulation of coal plants in its 2011 IRP. However, in the Order on IRP Standards and Guidelines, the Commission found that "a range of estimates for external costs is appropriate for analysis of the risks associated with changing environmental regulation."[57] Despite a complete lack of analysis in its long-term planning process, Cathy S. Woollums, Senior Vice President and Chief Environmental Counsel for MidAmerican Energy Holdings Company (PacifiCorp's parent company) testified regarding such costs before the United States Senate's Committee on Environment and Public Works in June of 2011.

PacifiCorp's "total costs for all projects that have been committed to will exceed $2.7 billion by the end of 2022. Total costs, which include capital, O&M, and other costs during the period 2005 through 2023 are expected to exceed $4.2 billion and by 2023 annual O&M costs

[56] *Western Grid 2050,* page 5.
[57] *Standards and Guidelines,* page 33.

will have reached $360 million."[58] Ms. Woollums further testifies that "recent discussions with the Utah and Wyoming Departments of Environmental Quality suggest that EPA Region 8 believes it may be necessary, for purposes of Regional Haze BART requirements, to install another five SCR in Wyoming and four SCR in Utah, combined with the five planned installations, within a five-year time period—potentially requiring 14 SCR by 2017 and an additional $1.7 billion to $2 billion in costs."[59]

To determine whether planned investments in coal plants comply with least-cost, least-risk utility planning, each unit must be looked at separately. For each unit, the Company must evaluate its efficiency, coal costs, known costs of environmental clean-up, the years investments will be made, the risk (and range) of additional environmental clean-up costs that are not yet known, the deadline for operating the plant without making all necessary additional investments, and the costs and risks associated with future carbon regulation. These factors must then be compared to the known alternative costs of closing each plant and replacing it with something that is cleaner and more efficient.[60]

The Commission should not acknowledge the 2011 IRP because there is insufficient analysis to show that PacifiCorp's Preferred Portfolio is least cost, least risk, and in the long public interest. Utah Clean Energy requests that the Commission require the Company to complete the following for the IRP update:

[58] Testimony of Cathy S. Woollums, Senior Vice President and Chief Environmental Counsel, MidAmerican Energy Holdings Company, to the Committee on Environmental and Public Works, United States Senate, June 15, 2011, page 2.
[59] *Id.* at 3.
[60] With regard to clean air costs associated with Regional Haze (BART) SIPs, the Company must disclose the range of options it has considered, since BART provides for some flexibility with regard to the lifetime of a plant, permitting a reduction in plant life instead of increased life expectancy from additional clean air investments (resulting in a net decrease in emissions).

- Present a thorough accounting of applicable current and reasonably foreseeable impending environmental regulations that may result in either substantial compliance costs or operational constraints on both the company's existing and proposed generating resources;
- Evaluate feasible compliance mechanisms, the costs of those mechanisms (both capital and operational) on both existing and proposed generating resources, as well as evaluate the risk and timing of those regulations, and use those evaluations to produce a reference, high, and low trajectory of non-CO2 environmental compliance costs;
- For each unit, evaluate its efficiency, coal costs, known costs of environmental clean-up, the years investments will be made, the risk (and range) of additional environmental clean-up costs that are not yet known, the deadline for operating the plant without making all necessary additional investments, and the costs and risks associated with future carbon regulation;
- Compare the analysis of each unit with the known alternative costs of closing it and replacing it with something that is cleaner and more efficient.

Utah Clean Energy further requests that the Utah Commission require the Company to submit the unit-by-unit analysis recently required by the Oregon Public Utility Commission[61] in Utah.

f. Utility-scale solar.

The price of solar PV has dropped dramatically in the last 24 months. Table 6.3 in the IRP does not include a levelized cost for crystalline solar PV. It does include costs for thin film,

[61] An audio recording of this meeting is available here: http://www.puc.state.or.us/PUC/meetings/pmemos/2011/081911/audiochart.shtml.

which it gives a capacity factor of 19%. The cost with federal tax credits is listed at $233.90/ MWH.[62] Lazard, a large global investment bank, conducts annual analysis estimating the cost of variety of energy sources, including utility scale ground mount solar PV. In their most recent analysis, the costs of ground mount solar PV are between $109/MWH and $124/MWH and they predict $80/MWH for single axis ground mount systems in 2012.[63] These numbers are about half the value used in the IRP and they are in line with a single axis ground mount PV project currently under development in Utah.

For the IRP update and next IRP, the Company should look to forward looking cost projections for solar costs, as well as collect data on installed costs of solar PV projects for both tracking and fixed-tilt systems, and the analysis should include prices PacifiCorp received in its Oregon 2MW solar RFP from January 2011, although the project was relatively small in size.

Additionally, one of the best qualities of PV is its peak shaving ability. Therefore, PacifiCorp should quantify the economic benefits of meeting a portion of its peak load through additional solar energy acquisitions.

The IRP includes a mention of a Sandia study, "Development of PV resources in Utah will be studied with Sandia National Laboratories."[64] It would be helpful for the company to include an update on the Sandia Analysis in the IRP update.

g. Geothermal.

PacifiCorp's initial 'preferred portfolio' included 105 MW of geothermal, and nearly all of the portfolios derived from the core cases included well over 200 MW of geothermal, with seven of the 19 cases including over 350 MW.[65] One portfolio derived from core case 14 included 675 MW of

[62] *2011 IRP*, page 117.
[63] Lazard, Levelized Cost of Energy Analysis – Version 5.0, June 2011, slide 2.
[64] *2011 IRP*, page 133.
[65] PacifiCorp Public Input Meeting Presentation, Slide 2, January 20, 2011.

geothermal resources.[66] PacifiCorp opted to remove all geothermal from their preferred portfolio and stated that it wanted "a clear signal that legislators and regulators will support full recovery of development costs" before pursuing geothermal energy.[67]

We understand that the company may be uncomfortable bearing the risk of geothermal development and we would support a technical workshop to better understand the risks and to explore strategies to reduce the risk. But, given that geothermal energy was consistently selected in nearly all cases, the removal of geothermal energy raises serious concerns. PacifiCorp should be required to take steps to procure geothermal electricity generation. The Company may be uncomfortable developing geothermal themselves, but that does not preclude them from purchasing cost-effective power from geothermal developers. The Action Plan should be revised to include an RFP for geothermal procurement in the near term.

[66] PacifiCorp Public Input Meeting Presentation, Slide 2, January 20, 2011.
[67] *2011 IRP*, page 224.