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BEFORE THE PUBLIC SERVICE COMMISSION OF UTAH

In the Matter of the Application of PacifiCorp's 2013 Integrated Resource Plan	**DOCKET NO. 13-2035-01** **Initial Comments of Utah Clean Energy**

I. INTRODUCTION

Utah Clean Energy is grateful for the opportunity to submit comments in response to PacifiCorp's 2013 Integrated Resource Plan ("IRP"). Utah Clean Energy is likewise grateful for the opportunity presented by PacifiCorp and the Utah Commission to participate in the IRP process. As participants in the IRP process, Utah Clean Energy has attended public input meetings, submitted comments to PacifiCorp in response to its public input meetings, and filed data requests in the above-captioned docket regarding IRP inputs and assumptions.

II. COMMENTS ON THE 2013 IRP

The IRP is not only used for resource planning, but also impacts other issues, including avoided cost calculations. The shortfalls of the IRP are magnified in many utility and regulatory decisions. Utah Clean Energy has significant concern with some of the model inputs and risk modeling that overestimate the costs and undervalue the risk mitigation benefits of renewable energy. Furthermore, our underlying concern with the 2013 IRP is that, even as climate impacts amass and as science predicts impacts will continue to increase more rapidly than previously

thought, PacifiCorp's resource planning still turns a blind eye to changing conditions that necessarily impact its electricity system[1] and ratepayers. Predominantly backwards-looking assumptions will not serve the Company's ratepayers going forward.

In this section, Utah Clean Energy addresses specific concerns or issues with the following components of the 2013 IRP: portfolio development, stochastic risk analysis, preferred portfolio selection, deterministic risk analysis, the 2013 IRP action plan, acquisition path analysis, and coal retirement analysis. After each subsection, Utah Clean Energy presents recommendations for further work on the action plan prior to acknowledgment,[2] for future IRPs or the IRP update, or for potential adjustments to the Utah IRP Standards and Guidelines ("S&G").

A. Portfolio development

Up-to-date and accurate information is necessary for populating System Optimizer in order for the model to generate meaningful portfolio results. PacifiCorp's supply-side resource assumptions (specifically solar resource assumptions), demand-side resource potential assumptions, and load forecasting assumptions weaken System Optimizer's ability to select "optimal" portfolios.

1. Supply-side resource assumptions inflated costs and undervalued renewable resources, undermining the validity of System Optimizer results. The costs that the company assumed for *utility scale solar resources* are significantly inflated above costs that were publically available when the Company set its price assumptions—and since then prices have dropped further. Utah

[1] U.S. Department of Energy, *U.S. Energy Sector Vulnerabilities to Climate Change and Extreme Weather* (July 2013), available at: http://energy.gov/sites/prod/files/2013/07/f2/20130716-Energy%20Sector%20Vulnerabilities%20Report.pdf ("DOE report").

[2] *See* IRP Standards and Guidelines, guideline number 6: "IF the Plan needs further work the Commission will return it to the Company with comments and suggestions for change. This process should lead more quickly to the Commission's acknowledgement of an acceptable Integrated Resource Plan."

Clean Energy understood, based on discussion at a public input meeting in October 2012, that the Company would run sensitivity analysis for solar costs to determine at what price point solar would be selected by System Optimizer. The Company subsequently declined to undertake that analysis. The Company also declined to run sensitivity analysis requested by Utah Clean Energy in a data request, assuming more current solar prices based on a report of first quarter 2013 solar prices.[3] While we understand the challenges that PacifiCorp faces in determining accurate solar costs for modeling in the IRP, we think it is imperative to use more accurate cost figures. Particularly because solar development can benefit from the 30% investment tax credit before 2017, the Company should expeditiously conduct further modeling with more up-to-date cost estimates.

The *capacity value of renewable resources* was underestimated in the 2013 IRP. In the 2013 IRP, the Company changed its method of accounting for the capacity value of renewable resources away from industry-accepted, reliability-based capacity valuation methods to a method based on an exceedence probability of resource availability at system peak. Because resource planning must look at the least cost, least risk means to reliably meet load for all hours of the year, a reliability-based method, such as one of the methods recently approved in Docket No. 12-035-100, should be used in the IRP. In that docket, the Commission concluded:

> PacifiCorp's Exceedence Method is not an industry standard approach. Rather, it was developed by PacifiCorp, and this is our first exposure to this method. The record shows this method arbitrarily weights Company data because it fails to consider reliability measures, like LOLP [loss of load probability], in the determination of the hours evaluated. Therefore, the method may incorrectly state the reliability value of an intermitted resource and the capacity payment to intermittent QFs, and contravene the important objective of ratepayer indifference… We are persuaded by the parties opposing

[3] Docket No. 13-2035-01, UCE data requests to PacifiCorp 4.13 and 4.14, attached.

PacifiCorp's method that the ELCC and CF methods described in the NREL Study reasonable account for LOLP.[4]

Utah Clean Energy has attached the report referenced by the Commission (as the "NREL study") to these comments. Additionally, rather than reproduce the record supporting reliability-based capacity valuation methodologies from that docket here, Utah Clean Energy requests that the Commission take administrative notice of the record in Docket 12-035-100, as well as the reasoning outlined in its Order, as it relates to capacity valuation, as relevant to the discussion of capacity value in this IRP docket, in order to maintain the consistency of avoided cost pricing and integrated resource planning.[5]

In a data request, Utah Clean Energy determined that the Company's assumptions regarding the solar *Investment Tax Credit* are incorrect.[6] IRP modeling assumed that the tax credit reverts to zero instead of a reversion to a 10% credit, as scheduled in the federal statute.[7]

2. Utah Clean Energy and SWEEP are filing joint comments on PacifiCorp's demand-side management potential study. These comments are incorporated into these comments as an attachment.

3. Load forecasting based solely on historic weather does not position the IRP to consider load growth associated with climate change. PacifiCorp's load forecasting is based on historical data and does not consider or anticipate impacts of global climate change on weather or load.[8] The Company explains that its extreme (one in 20 year) weather scenario is based on the last 20

[4] Docket No. 12-035-100, *Report and Order* (issued August 16, 2013), pages 29-30 (footnotes omitted). The "NREL study" referenced by the Commission is entitled, *Comparison of Capacity Value Method for Photovoltaics in the Western United States*, and is attached to these comments.
[5] *See* IRP Standards and Guidelines, Procedural Issues number 7.
[6] Docket No. 13-2035-01, UCE data request to PacifiCorp 4.12, attached.
[7] http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US02F&re=1&ee=1 "A number of changes to this credit are scheduled to take effect for systems placed in service after December 31, 2016. The credit for equipment that uses solar energy to generate electricity, to heat or cool (or provide hot water for use in) a structure, or to provide solar process heat will decrease from 30% to 10%."
[8] Docket No. 13-2035-01, UCE data requests to PacifiCorp 3.1-3.2, attached.

years of historical actual weather data.[9] Utah Clean Energy considers this practice problematic based on climate science, which indicates systemically changing weather and climate patterns.[10] Further, a recent draft government report shows that Utah is ground zero for temperature increases in the West with projected average temperature increases of 12-15°F by late century if greenhouse gas emissions continue on their current trajectory.[11]

In a recent report, the United States Department of Energy ("DOE") concluded that increasing temperatures will likely increase electricity demand for cooling: "One study estimates that 34 gigawatts of additional generating capacity will need to be constructed in the western region alone by 2050 to reliably meet the increased peak load due to projected increasing temperatures solely from climate change (excluding capacity additions due to population changes)."[12] This summer, Utah's temperatures were the highest on record and RMP's demand also hit an all-time high.[13]

The Company's historical-only look at temperature cannot provide an accurate picture of ongoing and future climate and weather trends, resulting in an IRP that does not reflect accurate information about future loads and attendant costs and risks.

Recommendations regarding portfolio development:

1. *Prior to acknowledgement, the Commission should direct the Company to change its action plan as follows:*
   a. *model updated cost and capacity values for solar and wind to inform the IRP update;*
   b. *issue a request for information immediately (rather than in 180 days as indicated in action item 1d.) to obtain updated solar market information;*
   c. *work with the wind industry to get updated wind cost data;*

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[9] Docket No. 13-2035-01, UCE data request to PacifiCorp 3.1, attached.

[10] http://www.nytimes.com/2013/08/20/science/earth/extremely-likely-that-human-activity-is-driving-climate-change-panel-finds.html?pagewanted=all&_r=0.

[11] *Draft Climate Assessment Report*, National Climate Assessment and Development Advisory Committee (January 2013), page 38, available at: http://ncadac.globalchange.gov/.

[12] DOE Report, *supra*, note 1, page 15.

[13] http://www.sltrib.com/sltrib/news/56649691-78/summer-average-degree-degrees.html.csp.

d. *utilize that information in sensitivity analysis using System Optimizer to see if more accurate solar costs and capacity values change portfolio results (these sensitivity runs should utilize the recently approved interim solar capacity values from Docket No. 12-035-100);and*
e. *if solar cost data from the RFI will take too long to be incorporated into the IRP update alternative data could be utilized, such as first or second quarter GTM Research cost data.*

2. *In addition to the analysis for the IRP update, PacifiCorp should conduct a more focused study effort for the next IRP cycle to develop a better assessment of solar, wind, and geothermal costs. We are ready to work with PacifiCorp and other stakeholders to bring the best available data and insights to renewable resource costs and potential assumptions.*
3. *In order to treat resources on a more consistent and comparable basis, the Company should implement the following changes to its portfolio development modeling in future IRPs and Updates:*
   a. *incorporate renewable resource price decline projections, based on experience curves;*
   b. *explicitly consider the impacts of an energy imbalance market on variable resource integration (for all variable resources); and*
   c. *assume a REC price curve for the duration of the planning horizon based on REC price predictions and state RPS standards.*
4. *In order for integrated resource planning to include "a range of estimates or forecasts of load growth," consistent with S&G 4a, the Commission should consider adding weather considerations to the factors that "affect the consumption of electric services" in S&G 4.a.ii.*

B. Stochastic risk analysis

1. Shocking of stochastic variables did not consider significant impacts associated with climate change. In its risk analysis, PacifiCorp shocks five stochastic variables: load variability, hydro availability, thermal plant outages, natural gas prices, and wholesale electricity prices. Loads, hydro levels, and thermal plant outages are all significantly vulnerable to climate impacts in ways not considered in the 2013 IRP.

As indicated above, electricity cooling loads are expected to increase as global temperatures continue to rise.[14] In addition to systemically rising global temperatures, the Company should anticipate that extreme weather events, such as long-lasting heat waves, will increase. For example, in the summer of 2013, Japan, Korea, China, and other parts of Asia were hit with enduring heat that put great strain on populations and electricity systems.[15]

Despite increasing and increasingly extreme weather events, PacifiCorp decided to turn its *long-run load volatility* parameter off.[16] At its technical conference before the Utah Public Service Commission the Company indicated that stochastically shocking long run load volatility is unnecessary because integrated resource planning is conducted every two years, allowing PacifiCorp to respond in real time to more systemic changes in load. Under this reasoning, however, there is little value in evaluating long-run risks associated with any stochastic variable as part of ongoing integrated resource planning. The purpose of evaluating risks on a longer-term basis is to test the resilience of specific portfolios to longer-term changes associated with significant risk factors, such as load changes associated with increasing temperatures. If the Company's PaR modeling fails to meaningfully do this, PacifiCorp should find a new way to evaluate long-term risks associated with load variability, rather than elide its analysis.

Another stochastic variable impacted by climate change is *hydro availability*. According to the DOE report on energy sector vulnerabilities to climate change, changes in precipitation and decreasing snowpack could decrease available hydropower generation capacity and affect

[14] *See DOE Report, supra, note 11.* Additionally, "A Congressional Research Service report estimates that storm-related power outages cost the U.S. economy $20-$55 billion annually. Whether from aging infrastructure, increasing development, or increasing storm intensity and frequency, outages from weather-related events are increasing." *Id.* at page 35.

[15] http://www.bloomberg.com/news/2013-08-13/dozens-die-in-asia-heat-wave-as-power-supply-strained-to-limits.html.

[16] PacifiCorp 2013 IRP, Volume I, page 188.

the operation of facilities in some regions.[17] Given its relatively heavy reliance on hydroelectric resources, PacfiCorp should consider water impacts associated with climate change in its risk analysis.

Thermal plant operations are also impacted by both increasing temperatures as well as decreasing water availability. Decreasing water availability for cooling at thermoelectric facilities could reduce available thermal generation capacity.[18] "Once-through cooling systems are particularly vulnerable to low streamflow conditions due to the large volumes of water withdrawn."[19] Further, increasing air and water temperatures reduce the efficiency of thermoelectric power generation. In fact, "average summer capacity at thermoelectric power plants by mid-century (2031-2060) is projected to decrease by between 4.4% and 16%, depending on climate scenario, water availability, and cooling system type, as compared to the end of the 20th century."[20] Risk analysis of *thermal plant outages* should account for such significant impacts.

2. The timing and magnitude of carbon emission prices is out of step with likely carbon regulations. The Company's base case carbon price curve does not impose a cost on carbon until 2022. However, the EPA is expected to issue rules regulating carbon emissions from existing coal plants by June 1, 2014. Consequently, the timing and costs associated with carbon regulation may be much faster and higher than was considered in PacifiCorp's base case assumptions.

3. Carbon emissions associated with and carbon price impacts on market purchases are not transparent in IRP analysis; therefore, carbon risk associated with Front Office Transactions

[17] *DOE report*, *supra,* note 1, page 17.
[18] *DOE report*, *supra*, note 1, page 17.
[19] *DOE report*, *supra,* note 1, page 22.
[20] DOE report, *supra,* note 1, page 10.

(FOTs) is difficult to evaluate. In a data request response, PacifiCorp explained how it evaluates carbon costs potentially associated with FOTs:

> The Company develops resource portfolios using the System Optimizer model (SO Model) within a wide range of scenarios that include varying start dates and price points for prospective CO_2 price assumptions. The CO_2 price assumption for any given scenario is applied as a dispatch cost to fossil fuel generation resources in the development of wholesale electricity price forecasts produced with the MIDAS model as depicted in Volume I of the 2013 Integrated Resource Plan (IRP); specifically Figure 7.5. The basis for pricing front office transactions (FOTs) is the electricity price forecast for the specific delivery period (i.e. annual flat or third quarter heavy load hours), inclusive of the incremental cost for CO_2 emissions reflected in the electricity price forecast.
>
> The same concept is applied in the Company's stochastic risk analyses using Planning and Risk (PaR) in stochastic model. In this phase of the IRP modeling process, carbon risk associated with FOTs is captured through scenario analysis, whereby three different CO_2 price assumptions (zero, medium, and high) are evaluated in the stochastic PaR simulations. In each of these PaR simulations, FOTs are priced inclusive of the CO_2 costs reflected in the associated electricity price forecast (i.e. the electricity price forecast varies among the zero, medium, and high CO_2 price scenarios). The price for FOTs is further subjected to the same Monte Carlo random sampling process that is applied to electricity prices that drive system balancing sales and purchases.[21]

Although carbon prices are taken into consideration in creating FOT price forecasts, no emissions rate is assigned to FOTs in the IRP. PacifiCorp explained:

> There is no emission rate applied to front office transactions (FOTs)… The cost of CO_2 emissions for any given CO_2 price scenario is applied at the source (the seller), and as such, the cost of CO_2 is included in the price of FOTs when purchased. Assigning emissions to FOTs would effectively result in assigning emissions to both the seller *and* the purchaser, resulting in double counting of CO_2 emissions and the associated cost.[22]

Not assigning an emissions rate to FOTs is problematic, however, because it obscures the carbon impacts of different portfolios containing different levels of FOTs. Furthermore, although a legislated or regulated price on carbon impacts FOT prices, an embedded carbon price does not

[21] Docket No. 13-2035-01, UCE data request to PacifiCorp 3.3, attached.
[22] Docket No. 13-2035-01, UCE data request to PacifiCorp 3.6, attached.

provide PacifiCorp or others a clear indication of the Company's vulnerability to different carbon prices and, importantly, ignores real emissions associated with various portfolios.

Recommendations regarding stochastic modeling:

1. *Long term load variability should not be turned off in the risk analysis as it undermines the purpose of long-term integrated resource planning and obscures the risk mitigating benefits of energy efficiency and renewable energy. Further ratepayers are the ones at risk for more and or higher priced market purchases if loads are higher than predicted.*
2. *More complete consideration of climate change will make the Company's risk analysis more accurate and robust. Stochastic modeling assumptions must consider ongoing and future climate impacts because loads, hydro availability, and thermal outages are highly vulnerable to climate change.*
3. *Because future natural gas prices and electricity prices are fraught with uncertainty, co-mingling the modeling of carbon risk with fuel and market price risk creates even greater uncertainty. Carbon prices should not be co-mingled with natural gas and electricity prices. Further, emissions and potential costs of carbon associated with on FOTs should be analyzed and reported separately. This will facilitate transparency.*
4. *Utah Clean Energy recommends that the Commission and Company support further investigation into specific vulnerabilities of PacfiCorp's system to climate impacts. Based on the DOE report, future integrated resource planning should include "better characterization at the regional and local levels of climate change trends relevant to the energy sector, including water availability, wind resources, solar insolation and cloud cover, and likelihood and magnitude of droughts, floods, storms, sea level rise and storm surge," and identification of a consistent methodology and indicators to better prioritize and evaluate vulnerabilities and response actions; compare costs and benefits of adaptation intervention versus inaction (including the full costs of future critical infrastructure damage, loss of infrastructure, and power outages); and account for potential limitations of intervention measures over a range of spatial and temporal scales (including high impact, low probability events)."*[23]
5. *With regard to load forecasting, "When assessing, forecasting, and responding to potential impacts of climate change and extreme weather on the energy sector, consideration is needed not only for predictable gradual changes but also for lower probability, higher warming scenarios with potentially more severe impacts."*[24]
6. *The Company should attribute an emissions rate to FOTs to include in its comparison of resource portfolio emissions levels.*

[23] DOE Report, *supra*, note 1, page 44.
[24] DOE Report, *supra*, note 1, page 6.

C. Preferred portfolio selection

1. Predominantly focusing on the stochastic mean PVRR of different portfolios, as opposed to focusing the risk-adjusted mean or upper-tail mean PVRR metrics, likely biases portfolio selection to portfolios based on lower cost futures. If stochastic variables are constantly reverting to mean values at pre-determined rates, stochastic risk analysis, at least in terms of its focus on the *stochastic mean PVRR*, will consistently result in the selection of lower cost portfolios (from System Optimizer) relative to higher cost optimized portfolios. In other words, emphasis on the stochastic mean PVRR over *risk-adjusted PVRR* metrics biases risk analysis to portfolios based on less costly futures, such as futures with fewer environmental regulations or internalized costs.

It is axiomatic that a less expensive future is better for ratepayers. Futures without internalized externality or social costs are cheaper than futures where these costs are internalized. Obviously, we would like to be able to assume that the future will unfold in the least expensive way possible; however, no one gets to decide how the future unfolds. More meaningful risk analysis would come from focusing on the risk-adjusted mean PVRR or the upper-tail mean PVRR of various portfolios. As it is, IRP modeling seems to inherently prefer optimistic futures—an assumption that may not end up being in the best interest of ratepayers.

In this IRP, portfolios with internalized social costs competed with portfolios with externalized social costs and (unsurprisingly) lost. Risk mitigation benefits—from portfolios that assume higher costs from the outset—could not outweigh the bias inherent in modeling that selects lower cost futures. And although the IRP is designed to compare costs against risks, this IRP did not consider obvious and high-likelihood risks, including the following: increased load specifically due to climate change and extreme weather events, increased thermal outages due to

climate change and extreme weather, reduced/volatile hydro availability due to climate change and extreme weather.

Recommendations regarding preferred portfolio selection:

1. *S&G 4.k requires the utility to include in its planning "A range, rather than attempts at precise quantification, of estimate external costs which may be intangible, in order to show how explicit consideration of them might affect selection of resource options. The Company will attempt to quantify the magnitude of the externalities, for example, in terms of the amount of emissions released and dollar estimates of the costs of such externalities. Utah Clean Energy recommends the following as a way to comply with this direction in future IRPs: in addition to comparing carbon emissions and projected regulatory costs of different portfolios (including emissions associated with FOTs), the Company should apply a social cost of carbon and compare differences in PVRR among portfolios with additional social costs per emissions level so that regulators and stakeholders can get a sense of the external, social costs associated with different resource plans. Such analysis would provide an additional decision-making criterion for selecting the preferred portfolio. It will also help the Company better comply with one of the directives of S&G 4.g, to describe how* social concerns *affect cost effectiveness estimates of resource options. There are a number of resources that analyze and report on a range of social costs to consider during the next planning process.*

D. Deterministic risk analysis

1. The Company did not evaluate how its preferred portfolio performed assuming different futures, resulting in an IRP that lacks analysis about uncertainty. 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.[25]

[25] Docket No. 09-2035-01, *Report and Order* (issued April 1, 2010), page 19 (emphasis added).

In a data request response, PacifiCorp explained that it did not complete this analysis for the 2013 IRP (and indicated its intention not to in a public input meeting) 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."[26]

PacifiCorp's IRP must consider uncertainty, in addition to costs and risks. Comparing top performing portfolios against each other under a single set of fixed input assumptions is different than testing a portfolio's robustness in the face of different futures. A 2012 Ceres/RAP report on "risk-aware regulation" explains one way of conducting uncertainty analysis using a utility's redispatch model:

> A redispatch modeling tool allows a utility and the regulator to test the resilience of portfolios against *different possible futures*. For example, a regulator might want to know how five different generation portfolios behave under situations of high natural gas prices, or tougher environmental regulations. By varying the input assumptions while monitoring the relevant output (e.g., net present value of future revenue requirements) the regulator can assess the risk that contending portfolios pose to future rates if, for example, prices vary from their predicted levels.[27]

PacifiCorp's planning should include a means of evaluating how different portfolios perform in a variety of future scenarios. "Understanding the impact of climate change and extreme weather on future energy sources and technologies is critically important. While many impacts are anticipated, there is no single technology solution, and the climate resilience of any

[26] Docket No. 13-2035-01, UCE data request to PacifiCorp 3.9, attached.
[27] Ronald J. Binz, et al., *Practicing risk-aware regulation: What every state regulator needs to know* (Ceres, RAP 2012), page 54 (emphasis added).

energy technology option will ultimately be measured by its ability to remain reliable under a broad range of environmental conditions."[28]

Recommendations regarding deterministic risk analysis:

1. *Utah Clean Energy recommends that integrated resource planning must contain uncertainty analysis, particularly of the type described above. Such analysis would facilitate the selection of an "optimal" portfolio, but would also facilitate more meaningful acquisition path analysis. "In addressing vulnerabilities to climate change and extreme weather, the energy sector will need to consider uncertainty as part of a risk management approach. As decisions will be made with incomplete information, ensuring longer-term system reliability requires flexible strategies that allow course corrections."[29]Uncertainty analysis is consistent with the definition of integrated resource planning and will lead to a more "least regrets" approach to long term planning.*

E. Distributed solar analysis

Utah Clean Energy is pleased to see that the IRP selected 293 MW of distributed solar photovoltaic (PV) solar PV; yet, we find it interesting that this amount of solar is nearly the same as the 20-year market potential for Utah identified in the *PacifiCorp Assessment of Long-term System-Wide Potential for Demand-Side and Other Supplemental Resources (The Cadmus Group, March 2013)*: 262 MW. The proximity of these two figures suggests that the market potential available for selection by the System Optimizer Model is the limiting factor to the amount of cost-effective distributed solar in the preferred portfolio. We recommend that the Company re-analyze the market potential for distributed solar, given today's solar costs and installation trends.

We believe the market potential numbers identified in The Cadmus Group's March 2013 are disproportionately low compared to the technical potential for solar PV in Utah and for the entire PacifiCorp territory, and that the methodology used to determine the market potential

[28] DOE Report, supra, note 1, page 42.
[29] DOE Report, supra, note 1, page 36.

vastly underestimates the 20-year market potential for PacifiCorp. According to the 2013 Cadmus Analysis, Utah's technical potential for distributed solar PV on a capacity basis (12,779 MW) represents nearly half of the overall technical potential for the entire PacifiCorp service-territory (a total combined capacity for both residential and non-residential of 25,933 MW). Yet, the Cadmus Group analysis suggests that Utah's market potential is a mere fraction (approximately 2 percent) of its total technical potential. Cadmus explains that the market potential is based on the following: reported actual capacity installed, by state and sector; technical potential, and ramp rates.

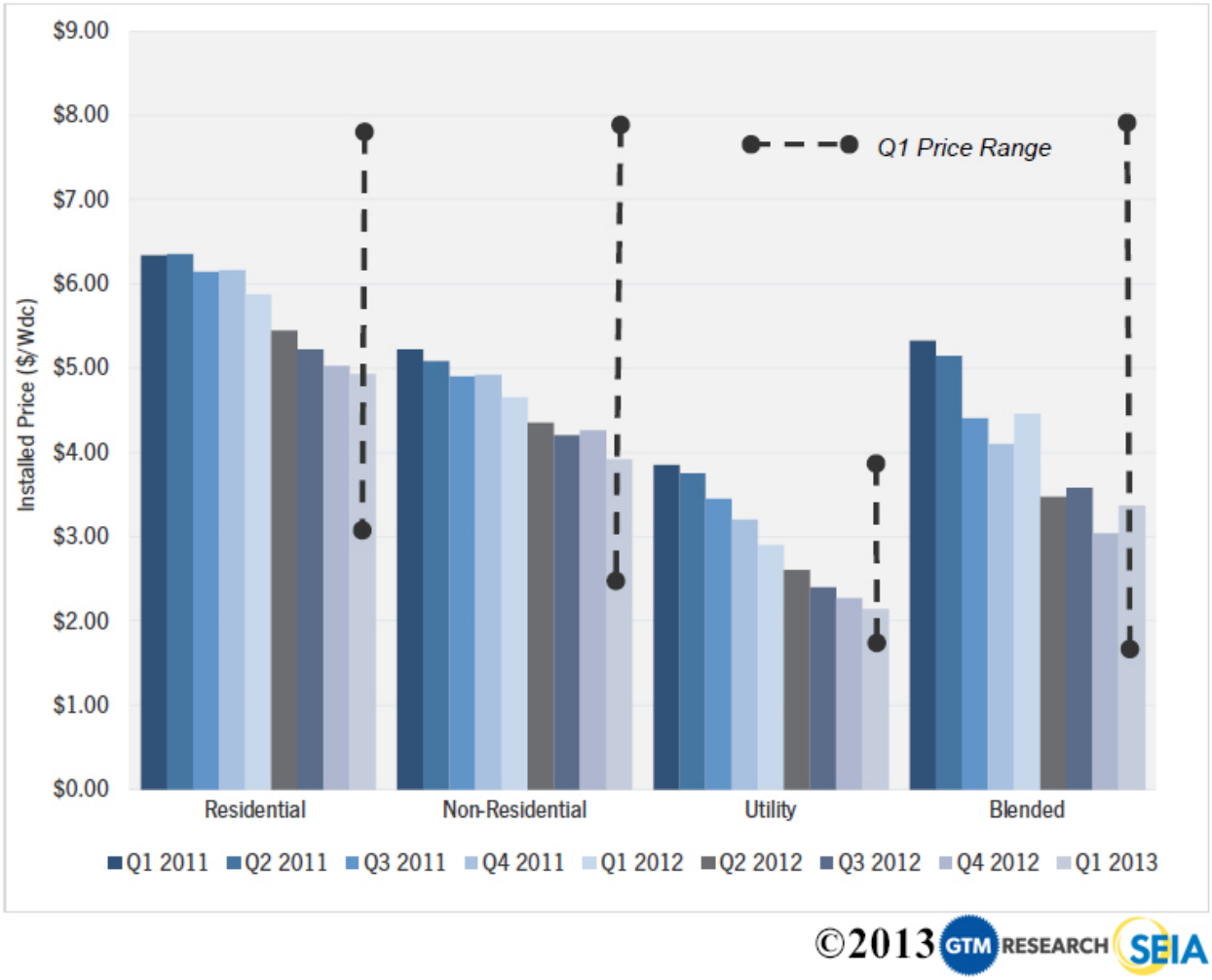
With respect to Cadmus' market potential methodology, we believe that using the reported actual capacity to determine future market projections over the next 20 years is a flawed approach, especially in emerging markets like Utah. Cadmus acknowledges this challenge in its analysis: "Utah's incentive program remains in a pilot state, and it likely does not accurately represent the long-term impacts of a mature and long-running incentive program. Therefore, using installation data to date for Utah could underrepresent long-term market penetration rates."[30] However, despite the acknowledgement in their analysis, it is unclear whether or not this was taken into account when determining Utah's 20-year market potential.

Lastly, as we have pointed out in previous comments, the solar PV costs used in the 2013 Cadmus Analysis and the IRP are too high and too outdated to accurately represent the current solar market prices, which are vastly different from 2011 prices. According to the Solar Energy Industries Association, the average cost of a completed PV system dropped by 24 percent over

[30] The Cadmus Group, Inc./Energy Services in collaboration with Nexant, Inc. Prepared for PacifiCorp. Final Report: *Assessment of Long0term System-Wide Potential for Demand-Side and Other Supplemental Resources.* March 2013. Page 103.

the past year [from Q1 2012 to Q1 2013] to $3.37/Watt across all sectors, and the average price of a solar panel has declined by 60 percent since the beginning of 2011 (see figure 2.6).[31]

Figure 2.6 Average Installed Price by Market Segment, Q1 2011 – Q1 2013



Recommendations for Distributed Solar:

1) We recommend that the Company re-analyze the market potential for distributed solar, given today's solar costs and installation trends.

2) Update the distributed solar PV costs to reflect current costs and projected cost trends.

3) Use the updated solar PV market potential and solar PV costs in the IRP Update Analysis.

4).Update the solar PV market potential and solar PV costs prior to the 2015 IRP.

[31] Solar Energy Industries Association Website. Solar Industry Data. U.S. Market Installs 723 Megawatts in Q1 2013; Grows 33% Over Last Year. URL: http://www.seia.org/research-resources/solar-industry-data.

F. Acquisition path analysis

1. The Company's acquisition path analysis does not include a discussion of attendant costs and who bears the risks associated with having to pursue different acquisition paths. The Company explains of its acquisition path analysis:

> PacifiCorp uses the IRP and business plan to serve as decision support tools for senior management to determine the most prudent resource acquisition paths for maintaining system reliability and low-cost electricity supplies, and to help address strategic position issues. The key strategic issues as outlined in this IRP include (1) addressing regulatory risks in the areas of climate change and renewable resource policies; (2) accounting for price risk and uncertainty in making resource acquisition decisions; (3) load uncertainty; and (4) determining the appropriate level and timing of long-term transmission expansion investments, accounting for the regulatory risks and uncertainties outlined above.[32]

The Company then provides a table that outlines different trigger events, corresponding to the strategic issues above, and near- and long-term resource acquisition strategies. The Company does not provide a discussion of the costs associated with or who bears the risks of having to pursue different acquisition paths. Deterministic risk analysis, as described above, would facilitate this discussion of costs and risks associated with different futures and the ability of the preferred portfolio to be flexible in the face of and withstand uncertainty at least expense to ratepayers.

Recommendations regarding acquisition path analysis:

1. *Acquisition path analysis, required by S&G 4.f, should include a discussion of attendant costs and who bears the risks associated with having to pursue different acquisition paths. S&G 4.h requires evaluation of financial, competitive, reliability, and operational risks associated with various resource options, how the action plan addresses those risk, and who should bear such risks (ratepayers or stockholders). Utah Clean Energy recommends that acquisition path analysis should specifically include a discussion of the costs associated with having to pursue different acquisition paths as well as an explanation of who bears the risks—ratepayers or stockholders.*

[32] PacifiCorp 2013 IRP, Volume 1, pages 265-66.

G. Coal investment analysis

1. Utah Clean Energy appreciates the improvements PacifiCorp has made in its evaluation of continued investments in its aging coal fleet; nevertheless, regulators should not rely on the analysis to evaluate prudence decisions because Company did not model a wide enough range of compliance scenarios. The Company was unresponsive to stakeholder input in ways that undermine the usefulness of its coal investment analysis. Near the beginning of the planning process (in August of 2012), a coalition of IRP stakeholders submitted a letter recommending adjustments to coal investment assumptions, specifically assumptions about regional haze requirements.

> We recommend PacifiCorp model a more comprehensive suite of environmental regulations beyond just regional haze. PacifiCorp should continue to incorporate the costs of compliance with the mercury and air toxics rule. In addition, we recommend the Company also incorporate the forth-coming regulations of coal combustion residuals, cooling water intake facilities, and wastewater discharges. These final regulations will come into effect during the horizon of this planning cycle. The Electric Power Research Institute estimated the compliance costs for the proposed coal combustion residuals rules. The EPA proposed rule for cooling water intake structures estimates the compliance costs. For power plant effluent standards, the EPA has made a preliminary estimate of the compliance costs.5Not including these forthcoming regulatory compliance costs will result in an inaccurate and incomplete IRP.
>
> Regional Haze: We recommend using the EPA proposed Federal Implementation Plans (FIPs) as the base case for regional haze compliance. The Strawman proposes using the State Implementation Plans (SIPs) to estimate a base environmental compliance scenario, while using Federal Implementation Plans for a more "Stringent EPA BART/Regional Haze" scenario. But the EPA has already rejected these SIPs as inadequate and proposed FIPs in several states, including Wyoming, Arizona, and Montana. The basic compliance options and deadlines in these FIPs should also apply for Utah. It is not reasonable to assume the rejected SIPs are the base case for regional haze compliance.
>
> In addition, we recommend that PacifiCorp apply the FIP base case to all core case scenarios. Regardless of what else happens, the Company must comply with the Clean Air Act going forward, so all portfolios must include these costs. Along with assuming the EPA FIPs as the base case, PacifiCorp should utilize the state SIPs as a less stringent

case. Additionally, PacifiCorp should model a more stringent case that estimates the costs of even more robust environmental protections, including selective catalytic reduction (SCR) controls for the reduction of nitrogen oxides as recommended by conservation groups and the National Park Service.[33]

Despite the encouragement of numerous stakeholder groups, the Company declined to model EPA FIPs as a reasonable base case assumption, instead using it for its "stringent regional haze" assumption. The Company did not model a regional haze scenario that was more stringent than the EPA FIP. As it happened, the coalition's recommendation to use EPA FIPs as base case assumptions with an additional more stringent scenario would have provided useful analysis: currently faced with an EPA "re-proposal" regional haze compliance path in Wyoming, the Company stated in its August 2013 technical conference: "If the EPA's re-proposed rule is left to stand, many of the company's coal-fueled generating plants in Wyoming could face early shut-down."[34] Clearly (since it was recommended over a year ago), a more stringent compliance scenario was not unforeseeable; nevertheless, the Company's coal analysis omitted just such a scenario that would have allowed it to evaluate the prudence of coal investment decisions given an EPA re-proposal-like scenario.

Recommendations regarding coal investment analysis:

1. *In the IRP update, the Company should evaluate all future potential environmental compliance obligations for coal plants simultaneously, including more stringent environmental controls and carbon costs that start earlier.*
2. *Utah Clean Energy believes that if integrated resource planning took climate change and environmental regulations more seriously, the process would likely result in a different coal investment strategy. In addition to including social costs of carbon as part of its preferred portfolio selection strategy, Utah Clean Energy recommends that the Company's coal investment analysis look at benefits of reduced emissions (all emissions, including carbon) in its coal investment calculus. The Company has already laid the groundwork for exploring social costs and benefits in its*

[33] Utah Clean Energy, et al., *Joint Party Comments* (08-20-2012), available at http://www.pacificorp.com/irpcomments.

[34] Docket No. 13-2035-01, Technical Conference (August 27, 2013) slide deck, slide 12.

transmission systems benefits tool, which could be utilized in evaluating the costs and benefits of investing in coal plants in the face of significant harm associated with carbon and other emissions.

III. COMMENTS ABOUT PERIODS OF RESOURCE SUFFICIENCY AND DEFICIENCY

The Company is reliant on market purchases, called Front Office Transactions (FOTs), more than it ever has been in the past. In 2022 the 2013 IRP preferred portfolio relies on FOTs for 12% of its capacity mix and 4% of its energy mix. The Company is heavily reliant on the market for its resource needs over the planning horizon, both before and after it plans to build a combined cycle combustion turbine.[35]

In its Order on the 2008 IRP, the Commission made the following statement and recommendations regarding heavy reliance on FOTs:

> We are concerned with the Company's stated confidence in managing the risk associated with reliance on the market for a significant portion of its customers' power requirements, especially combined with its comfort with planning to a 12 percent planning reserve. These decisions appear to leave little room for forecast error related to prices and loads. Meanwhile, the Company is asking for an energy cost adjustment mechanism in a separate docket [the Energy Balancing Account docket, Docket No. 09-035-15]. In part, the Company there argues it cannot effectively manage the risks, even one year out, of the costs associated with unexpected fuel prices, wholesale electric prices, and loads. At a minimum, we direct the Company to include the costs of hedging in its IRP analysis of resources that rely on fuels subject to volatile prices. We also direct the Company to perform sensitivity analysis to determine a hedging strategy which minimizes costs and risks for customers.
>
> Additionally, we direct the Company to include an analysis of the adequacy of the western power market to support the volumes of purchases on which the Company expects to rely… We direct the Company to identify whether customers or shareholders will be expected to bear the risks associated with its reliance on the wholesale market. Finally, we direct the Company to discuss methods to augment the Company's stochastic analysis of this issue in an IRP public input meeting for inclusion in the next IRP or IRP update.[36]

[35] 2013 IRP, Volume 1, *Table 8.7—PacifiCorp's 2013 IRP preferred portfolio*, page 227.
[36] Docket No. 09-2035-01, *Report and Order* (issued April 1, 2010), pages 29-30.

The IRP is used to determine periods of resource deficiency and sufficiency for avoided costs calculation purposes. However, *access* to capacity through wholesale electricity markets is different than having firm contracts or an actual physical capacity resource, in that ratepayers bear the risk of unpredictable market prices. Therefore, the current definitions of resource sufficiency and deficiency may not be in the best interests of ratepayers.

> ***Recommendation regarding definition of sufficiency and deficiency:***
> *Utah Clean Energy recommends that the Commission open a docket to investigate changing the definitions of periods of resource sufficiency and deficiency to include consideration of the Company and ratepayer's reliance on FOTs and the market. This is timely and critical given the company's heavy reliance on FOTs throughout the planning horizon.*