Risks & Opportunities for PacifiCorp
State Level Findings: Utah

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The resource planning environment for the U.S. electric energy sector is experiencing a period of rapid evolution. The energy sources once seen as “low cost”—in particular, coal-fired electricity generation—are now understood to carry high long-term costs in damage to human health, the environment, and the Earth’s climate.

In our report, *Risks and Opportunities for PacifiCorp in a Carbon Constrained Economy*, we showed that companies such as PacifiCorp that own and run coal plants face unprecedented financial risks that affect both their ratepayers and their shareholders. PacifiCorp’s ratepayers face the risk of high costs for environmental upgrades, higher fuel costs, high remediation costs to undo the environmental harm created by the plants such as groundwater contamination, and the risk of higher energy costs once the cost of CO₂ pollution is internalized in rates. The company’s shareholders face the risk that it will not be allowed to recover all of these costs from ratepayers, if the company fails to plan prudently in the face of these evolving risks and costs.

Since the release of *Risks and Opportunities*, PacifiCorp has issued its 2015 Integrated Resource Plan (IRP) detailing the company’s anticipated load and resource balance through the year 2034. Also included was the company’s “action plan” identifying “steps to be taken during the next two to four years to deliver resources in the preferred portfolio.” As detailed in its 2015 plan, the company intends to do the minimum necessary to meet state and federal environmental and renewable energy requirements—including appeals of EPA rulings in an attempt to avoid installing the most effective pollution controls on its coal plants in Utah and elsewhere—while partially reducing its dependence on coal over 20 years.
This companion report on state-level findings in Utah is intended to provide a discussion of Utah-specific risks associated with PacifiCorp’s coal fleet. We also provide an overview of where Utahns’ electric power comes from today, and a survey of available options for and benefits of expanded use of in-state energy efficiency and renewable energy resources.

**ENERGY SUPPLIERS AND SOURCES**

As of 2012, the last year for which US Government data are available, over 80% of the electricity used in Utah was sold by Rocky Mountain Power (RMP)—a subsidiary of the regional utility PacifiCorp, and the focus of our “Risks and Opportunities” report. The balance was sold by a number of municipal and tribal utilities and electric cooperatives. PacifiCorp as a company is highly dependent on coal-fired generation, as is the state of Utah. Figure 1 shows the generation mix from which PacifiCorp/RMP draws its power for its six-state service area; Figure 2 shows the overall generation mix by fuel in Utah.

On net, Utah is an energy-exporting state, including net exports of electricity. Of the 40,000 GWh of electricity generated in the state, approximately 27% (~9,800 GWh) is exported to neighboring states each year.

**AIR POLLUTION IN UTAH**

Utah is famous for its beautiful national park areas and world-class ski resorts, supporting a tourist industry that brought in $7.5 billion in 2013 and produced approximately $1 billion in tax revenues. The tourism industry supports about 132,000 jobs, or about one out of every ten jobs in the state. Air pollution harms this vital economic engine by impairing visibility in the parks. Pollution also leads to health problems in the state, particularly during the winter “inversion” when polluted air is trapped near the ground in many parts of Utah. Although there are several sources of the pollution that leads to regional haze and smog, an important contributor is so-called “secondary particulates”—particles formed in the atmosphere from the sulfur (SO2) and nitrogen (NOx) pollution from burning coal in power plants.

Under the Federal Clean Air Act, Utah is required to control haze-forming pollutants from the state’s older coal-fired power plants through the use of the Best Available Retrofit Technology (“BART”). In 2008, Utah
proposed a plan under which its four BART-eligible units—Hunter Units 1 and 2 and Huntington Units 1 and 2—would satisfy the BART requirement for nitrogen using their existing pollution controls. This technology has reduced emissions of NOx from the four units—a key precursor of smog and haze—from a baseline level of about 24,000 tons per year in the years 2001-2003 to approximately 17,000 tons per year in 2012-13. An additional and more costly technology, Selective Catalytic Reduction (“SCR”), would reduce this pollution far more effectively, to around 3,300 tons of NOx per year for the four units. RMP and the state Division of Air Quality argued that this additional technology was not required, because they believed that emissions with the existing technology were low enough. EPA disagreed with the state’s analysis, and rejected Utah’s plan for controlling particulates and NOx from these generating units.

EPA’s rules require particularly stringent pollution controls on sources that affect “Class I” areas, such as the national parks in Utah and the surrounding states. The Clean Air Act mandates that states must take actions that will ultimately restore these areas to their pristine, natural levels of visibility. Many of the coal-fired plants in neighboring states, including plants in Arizona, Colorado, and New Mexico, have been required to install the more effective pollution controls, despite the additional expense. Some units, such as those at the Cholla plant in Arizona, will either be retired or switch from coal to natural gas to significantly reduce pollution without the expense of installing SCR.

As of this writing, Utah has re-filed its State Implementation Plan having responded to some deficiencies identified by EPA. However, Utah still proposes its existing, less-effective controls as BART for the Huntington and Hunter units. According to the company’s 2015 IRP, Utah’s amended SIP with the company’s updated BART analysis “is expected to be submitted for approval to the EPA in early 2015.” It is not clear when the EPA will make a final determination of whether the most stringent controls will be required.

Despite that fact the electric power generation is responsible for over 50% of the NOx emissions in Utah (and the Hunter and Huntington plants alone contribute 40% of the entire sector’s emissions) PacifiCorp argues that the more stringent SCR approach would be unduly expensive—especially in the face of impending greenhouse gas regulation, which could reduce the output of the units and possibly cause them to retire early. It is unknown at this time whether EPA will accept Utah’s less-stringent interpretation of BART for these units, or will require more effective emissions controls like those required in neighboring states. However, even if the less-effective controls are accepted for now, greater controls may be required the next time the state’s plan is up for review, in order for the region to continue to make required progress towards the goal of pristine visibility in all of the national parks.

PacifiCorp, its shareholders, and Rocky Mountain Power ratepayers face a dilemma as long as the company relies on its coal-fired generators for such a large share of its power. Bringing the plants to the highest levels of emissions control is expensive, and entails further investment in resources that the company acknowledges will become less economically viable under pending federal carbon rules; in fact, the company claims that its current plan will partially reduce its reliance on coal, although it will take the full 20 years of the plan to do so. On the other hand, failing to fully clean up the plants for decades impairs visibility in Utah’s parks and harms public health in Utah and elsewhere. At the same time, the plants continue to emit millions of tons of carbon pollution each year (a recent report found that Utah’s electric sector is sixth highest in the nation in terms of intensity of carbon emissions) while kicking the can down the road for a transition to the clean energy future. One way out of this dilemma is to redirect investment towards Utah’s extraordinary endowment of clean renewable energy resources, significantly reducing the risks and costs of continued reliance on coal.

**RENEWABLE ENERGY**

Utah is blessed with an abundant and diverse renewable resource potential, including solar, wind, and geothermal resources. Utah also has a central location in, and strong transmission ties with, much of the western US electricity market, including to California with its very high demand for renewable energy. These factors make Utah ideally positioned to reap the economic and employment benefits of developing renewable energy resources, both for in-state consumption and for export.
However, Utah has fallen behind other states in the region in development of renewable energy and creation of renewable energy jobs. While Utah legislature has enacted a goal of 20% renewable energy by 2025, the law specifies that this goal, which is just a goal and not a requirement, should be met only “to the extent that it is cost-effective to do so.” Specifically, the commission must approve or disapprove the acquisition based on “whether it will most likely result in the acquisition, production, and delivery of electricity at the lowest reasonable cost to the retail customers.”

Costs considered by the commission do not include the economic development and employment benefits of the various power sources.

PacifiCorp’s 2015 IRP details the company’s plans for compliance with each state’s renewable energy requirement, including Utah’s RPS “goal”. In large part, the company plans to rely “unbundled RECs”—Renewable Energy Credits that are not specifically tied to energy produced by or even purchased by the company. While this strategy meets the minimum standards set by the laws in each state, it falls far short of the full potential economic development and job creation opportunities for clean energy in Utah, as described below.

Table 1 summarizes the technical potential for renewable resources in Utah, according to a 2012 study by the U.S. Department of Energy’s National Renewable Energy Laboratory (NREL). For perspective, annual electricity sales in Utah in 2013 were approximately 30.5 billion kWh.

<table>
<thead>
<tr>
<th>RESOURCE</th>
<th>ENERGY POTENTIAL (Billion kWh/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UTILITY-SCALE PV</td>
<td>5.215</td>
</tr>
<tr>
<td>CONCENTRATING SOLAR</td>
<td>5.067</td>
</tr>
<tr>
<td>WIND</td>
<td>31</td>
</tr>
<tr>
<td>GEOTHERMAL</td>
<td>939</td>
</tr>
</tbody>
</table>

Table 1. Renewable Energy Technical Potential in Utah. (Source: NREL, 2012)
The NREL data shown in Table 1 are designed to reflect an upper bound on resource potential in the state, without regard to, for example, transmission accessibility or cost. However, they do suggest that there are abundant solar, wind, and geothermal resources in Utah, enough to provide for all Utahns’ electricity needs, and to sell excess energy to other states, even if only a small fraction of this clean energy potential is ultimately developed.

Another estimate of renewable energy potential in the state comes from the Utah Renewable Energy Zones (UREZ) Task Force, formed by the Governor’s Energy Advisor and Utah Geological Survey. The UREZ “Phase II” Final Report identified solar, wind, and geothermal renewable energy zones in Utah that are reasonably near transmission interconnection points, are sufficiently concentrated to justify the required transmission build-out, and that meet other technical criteria that the authors believed to represent limiting factors.

The UREZ report found that Utah has the potential for 3.1 billion kWh/yr of geothermal, 27.8 billion kWh/yr of solar, and 21.2 billion kWh/yr of wind. The total, 52 billion kWh, approaches PacifiCorp’s entire 6-state sales of electricity to its customers. This exceeds by 60% the total electricity sales in Utah in 2012.

The UREZ report concludes by identifying and analyzing “a set of scenarios, designed to represent a plausible range of generation and transmission development through 2025.” These are keyed to the state’s Renewable Portfolio Goal (RPG)—the goal (but not a requirement) to meet 20% of the state’s energy needs with renewable energy by 2025. The most aggressive scenario analyzed in the UREZ report envisions enough renewable generation in Utah to meet the RPG, including 9 billion kWh of energy from in-state renewable resources in 2025—enough to power 950,000 Utah homes—but still less than one fifth of the potential identified in Utah’s renewable energy zones.

A more conservative study was compiled by the Western Governors’ Association (WGA) in 2009, focusing only on “those areas throughout the Western Interconnection that feature the potential for large scale development of renewable resources in areas with low environmental impacts, subject to resource-specific permitting processes.” This study identified 7.2 GW (15 billion kWh/yr) of solar, 1.7 GW (4 billion kWh/yr) of wind resources and 1.7 GW (12 billion kWh/yr) of geothermal in Utah that it considered to be of sufficient quality, and concentrated enough geographically, to justify the large-scale investment in transmission required to connect it to the existing grid.

More recent data from the region make it clear that the WGA study was too conservative. For example, according to the American Wind Energy Association, there are already over 3.1 GW of installed wind in Oregon, exceeding the “maximum” potential of 2.9 GW for that state reported by the WGA. What the study confirms, however, is that there is a large, varied, and accessible energy resource and economic development opportunity in Utah and in the region that has only just begun to be tapped.

**ENERGY EFFICIENCY**

According to the 2014 rankings of states by the American Council for an Energy-Efficient Economy (ACEEE), Utah ranks 23rd of the 50 states overall for policies and practices that promote energy efficiency. Utah’s scores in each category considered by ACEEE are shown in Table 2.

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>POSSIBLE POINTS</th>
<th>UTAH POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>UTILITY AND PUBLIC-BENEFIT PROGRAMS AND POLICIES</td>
<td>20</td>
<td>7</td>
</tr>
<tr>
<td>TRANSPORTATION POLICIES</td>
<td>9</td>
<td>1.5</td>
</tr>
<tr>
<td>BUILDING ENERGY CODES</td>
<td>7</td>
<td>4.5</td>
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<tr>
<td>COMBINED HEAT AND POWER</td>
<td>5</td>
<td>1.5</td>
</tr>
<tr>
<td>STATE GOVERNMENT INITIATIVES</td>
<td>7</td>
<td>3.5</td>
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<tr>
<td>APPLIANCE AND EQUIPMENT EFFICIENCY STANDARDS</td>
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<td>0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>50</strong></td>
<td><strong>18</strong></td>
</tr>
<tr>
<td><strong>RANK OUT OF 50 STATES</strong></td>
<td></td>
<td><strong>23</strong></td>
</tr>
</tbody>
</table>

*TABLE 2. ACEEE SCORECARD FOR UTAH ENERGY EFFICIENCY POLICIES AND PRACTICES*
The Utah Energy Efficiency and Conservation Plan,\textsuperscript{31} most recently updated by the Utah Office of Energy Development in February, 2014, recognizes the benefits of low-cost energy efficiency to Utah ratepayers; the plan was intended to “serve as a call to action to both the public and private sectors in Utah to commit to and expand a culture of energy efficiency and conservation in order to support Utah’s growing economy, shape future policy and partnerships, and further Utah’s commitment to responsible energy development.”\textsuperscript{32} However, the plan itself does not put forward specific requirements or goals that would impel the state or its utilities, including Rocky Mountain Power, to equal or exceed other states in the region in fully exploiting this cost-effective resource.

PacifiCorp’s own resource plan, as shown in its 2015 IRP, anticipates growing Class 2 DSM resources—i.e., energy efficiency—6,000 GWh for all six states by 2034.\textsuperscript{33} While this would certainly be an important, low-cost contribution to meeting customer needs, it is far below the “achievable technical potential” identified by the company’s consultant in support of the IRP. In fact, Appendix 4 to the IRP shows that there is 7,500 GWh in Utah alone during this period. Further, the state’s existing energy efficiency programs have been impressively cost-effective. In 2012, PacifiCorp spent $18.6 million on energy efficiency, avoiding the need to produce an estimated 1.9 million MWh of energy. This average cost to save energy—under $0.01/kWh—is far below the cost of most supply-side energy resources.\textsuperscript{34} There is clearly room for Utah to reap more benefit from this clean, sustainable resource.

**ENERGY, ECONOMY, AND JOBS**

The energy sector is an important economic driver in every state. In Utah, over $2.3 billion was spent on electricity alone in 2014.\textsuperscript{35} Some of those dollars support employment in the state by funding construction, operations, and maintenance jobs, while others are used for fuel purchases, interstate transmission lines, and capital, operations, and maintenance costs of power plants throughout the region. The relative job-creation effectiveness of these expenditures is highly dependent on the specific energy source: energy efficiency is on the high-employment benefits end of the spectrum with a very high percentage of resources used for labor
and purchase of materials in-state; fossil generation resources require high ongoing expenditures on fuel and emissions costs, which provide limited labor benefit, along with supporting workers at the plant. Renewable energy dollars are primarily spent on the costs of building each resource, split between in-state labor and the cost of materials. Renewable energy operations and maintenance costs are primarily directed towards labor.

Table 3 shows the employment impacts of alternative electricity generation resources in Utah, based on the Jobs and Economic Development Impacts (JEDI) model developed by the US Department of Energy’s National Renewable Energy Laboratory (NREL). This Table shows that over the lifetime of each resource, wind, solar, and geothermal energy projects produce far more jobs per $Million spent than fossil fuel resources. All calculations assume construction begins in 2016, and monetary calculations are in 2012 dollars. Default JEDI inputs were used with the exception of the cost of solar PV, which was updated to $3300/kWDC to reflect more recent US Department of Energy data. Values are indicative for Utah generally and do not reflect any specific installation or project. Construction period jobs are reported in full-time-equivalent (FTE) job-years; i.e., if one individual is employed for two years, that represents two job-years.

<table>
<thead>
<tr>
<th></th>
<th>WIND</th>
<th>GEOTHERMAL</th>
<th>SOLAR PV</th>
<th>GAS</th>
<th>COAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSTRUCTION PERIOD</td>
<td>2.3</td>
<td>2.9</td>
<td>8.9</td>
<td>2.2</td>
<td>3.6</td>
</tr>
<tr>
<td>ANNUAL O&amp;M JOBS</td>
<td>7.7</td>
<td>5.6</td>
<td>14.1</td>
<td>0.8</td>
<td>3.6</td>
</tr>
</tbody>
</table>

**Table 3. Employment Impacts by Generating Resource Technology in Utah Based on NREL’s JEDI Model.**
CONCLUSION

Despite being a state with an extraordinary abundance of clean, renewable energy resources, Utah lags behind other states in the region and the nation in policies and incentives to promote renewable energy development. Rocky Mountain Power, by far Utah’s largest supplier of electricity, relies on coal generation for almost 80% of its energy. By relying so heavily on this most polluting source of energy, the company is endangering the health of Utahns and the environmental quality of the state, while at the same time putting ratepayers at risk for higher energy and environmental remediation costs in the future. The company’s most recent integrated resource plan recognizes many of these risks and anticipates a reduced reliance on coal in the future, but proposes to implement this partial reduction gradually over the next 20 years. This plan is too little and too late to realize the full benefit of Utah’s low cost and abundant clean energy resources.

Because of the state’s resource potential and its central location within the Western Interconnection, Utah is well-positioned to develop and export renewable energy. Increased reliance on the states renewable resource endowment would help Utahns avoid the cost, risk, and environmental and health costs of continued reliance on coal. Utah also has the opportunity to build on the state’s success in developing cost-effective demand-side resources by implementing and expanding well-established practices to encourage more efficient use of energy. This would provide the double benefit of creating jobs throughout the state while saving consumers’ money on their electric bills.

Both energy efficiency and renewable energy represent attractive opportunities for economic development and risk reduction in Utah’s electric energy sector. Rocky Mountain Power would serve the state’s residents and ratepayers better by redirecting their energy dollars away from coal and towards these clean, in-state resources.
ENDNOTES

1 PacifiCorp 2015 IRP, Chapter 9, p.213.

2 See http://www.eia.gov/electricity/state/utah/ for a detailed overview of Utah electricity sources and sales.

3 http://energy.utah.gov/resource-areas/energy-information/.


5 Total 2013 employment in Utah was 1,355,721 according to the Utah Department of Workforce Services: http://jobs.utah.gov/wi/pubs/em/annual/current/table29.pdf.

6 Hunter Unit 3 is regulated under a separate standard known as “Prevention of Significant Deterioration” because it is younger than the other units.


8 Ibid. The baseline represents the average emission rate for the period 2001-2003, while the retrofitted case represents the lowest rate for the years 2011-2013.


10 Based on EPA database of air emission sources by state: http://www.epa.gov/air/emissions/where.htm.


14 “Benchmarking Air Emissions of the 100 Largest Electric Power Producers in the United States”, May 2014. The report is “a collaborative effort among Bank of America, Calpine, Entergy, Exelon, Public Service Enterprise Group (PSEG), Ceres, and the Natural Resources Defense Council (NRDC).”


16 Utah Code 54-17-602(1)(a)

17 Utah Code Subsection 54-17-201(2)(c)(ii)

18 2015 IRP, Chapter 8.

19 National Renewable Energy Laboratory (NREL), 2012, “U.S. Renewable Energy Technical Potentials: A GIS-Based Analysis”. Technical potential is defined as “the achievable energy generation of a particular technology given system performance, topographic limitations, environmental, and land-use constraints” (p.1) without consideration of economic or market factors.


23 The Black and Veatch UREZ report does not quantify all of the technically available solar energy in Utah; as the authors note, “There is significantly more [solar] generating potential than could be reasonably expected to be developed.” Of the studies cited here, only the NREL values (Table 1) attempt to quantify the full potential for solar in Utah.

24 US EIA annual retail sales data by state (available at http://www.eia.gov/electricity/data/state/) reports that 2012 total retail sales of electricity in Utah were 29,723,368 MWh.

25 Black & Veatch, 2010, p. 6-1


33 2015 IRP, Figure 8.23.


37 http://www.nrel.gov/analysis/jedi/.

ABOUT THE AUTHOR
Ezra D. Hausman, Ph.D. is an independent consultant on energy and environmental economics based in Auburndale, Massachusetts.

In his sixteen years consulting on energy market issues, Ezra has provided expert testimony in over two-dozen cases, delivered numerous reports and presentations, and offered other expert services for clients including federal and state agencies; offices of consumer advocate; legislative bodies; cities and towns; non-governmental organizations; foundations; industry associations; and resource developers. His specific areas of expertise include:

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- *Electricity and generating capacity market design*

- *Integrated Resource Planning and portfolio analysis*

- *Economic analysis of environmental and other regulations, including regulation of greenhouse gas emissions, in electricity markets*

- *Quantification of the economic and environmental benefits of displaced emissions associated with energy efficiency and renewable energy initiatives*

- *Mitigation of greenhouse gas emissions from the supply and demand sides of the U.S. electric sector.*

Ezra holds a Ph.D. in atmospheric science from Harvard University, an S.M. in applied physics from Harvard University, an M.S. in water resource engineering from Tufts University, and a B.A. degree in psychology from Wesleyan University.