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Via Electronic Filing

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Re: Docket UE-140546: Sierra Club Preliminary Comments

Please find attached Sierra Club's Preliminary Comments in the above-referenced docket.

Please let me know if you have any questions. Thank you.

Respectfully submitted,

/s/ Derek Nelson

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BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

Pacific Power and Light Company 2015 Integrated Resource Plan	Docket UE-140546

SIERRA CLUB PRELIMINARY COMMENTS ON PACIFICORP INTEGRATED RESOURCE PLAN

May 18, 2015

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I. Modeling the Clean Power Plan in the PacifiCorp IRP

a. Background

These preliminary comments were prepared by Sierra Club with the technical assistance of Synapse Energy Economics. Sierra Club may supplement these comments as new information becomes available.

PacifiCorp's 2015 IRP models a version of the Clean Power Plan (CPP), EPA's proposed rule to reduce carbon dioxide (CO_2) emissions from existing power plants. The CPP is EPA's 2014 proposal to meet CO_2 emissions limitations from existing sources using a Best System of Emissions Reductions (BSER). A version of the CPP is expected to be finalized in mid-summer 2015, after EPA received over 8 million comments on the proposal. As PacifiCorp has pointed out numerous times, the proposed CPP is exactly that – a proposal, subject to change in mechanism, assumptions, and stringency. Yet PacifiCorp has oriented around one specific interpretation of the CPP, using one specific compliance mechanism. This narrowness of focus leaves PacifiCorp in the position of structuring many of its assumptions and operational restrictions around a single expectation of the regulation, and does not comport with reasonable least cost planning in the face of uncertainty. In this section, we describe how PacifiCorp's review of a single interpretation of the CPP may result poor planning results.

EPA has structured the CPP around four fundamental "building blocks" that represent possible means for achieving the established emissions standard: (1) increasing existing coal plant efficiency, (2) displacing coal generation with existing natural gas, (3) increasing renewable energy acquisitions, and (4) implementing energy efficiency programs. Taken together, EPA estimates that these programs will reduce emissions by a certain amount in each state. By default, EPA's targets for each state are set as a rate, measured in pounds of CO_2 per megawatt-hour (lbs/MWh). The rate has been a source of confusion to many parties: it represents both projected emissions from existing sources and generation from covered sources, as well as new renewable energy and energy efficiency programs.

The CPP sets forth two basic routes for reducing state CO_2 emissions from existing sources: states can either meet the rate-based target using a combination of the building blocks or other programs, or meet an alternate mass-based target, measured in total tons of CO_2. EPA's proposal allows states to choose the metric by which they measure compliance.

The rate-based mechanism is a fairly unique measure of compliance, while the mass-based system is similar to the result of a cap-and-trade scheme, currently employed for national sulfur dioxide (SO_2) emissions under the Acid Rain Program, regionally for nitrogen oxides (NO_X) budget trading program, and for CO2 in California and Regional Greenhouse Gas Initiative (RGGI) states. The rate-based approach, at least as used in EPA's target-setting, assigns credit for renewable energy and energy efficiency programs implemented by entities in the state, apparently regardless of their impact. The mass-based approach assigns credit for stack-based emissions reductions.

From the perspective of resource planning, the rate mechanism is a far more difficult measure to use in planning. It is also the mechanism that PacifiCorp has chosen to utilize in almost every one of the core cases.

b. Rate-Based Compliance is Not Optimal in PacifiCorp Modeling

The rate-based compliance approach is, by all measures, far harder to model when optimizing for least cost on a net present value basis. The mass-based approach is far simpler. Since at least the mid-1990s with the advent of SO_2 (acid rain) and NO_X trading programs, energy planners have understood that it was appropriate to model mass emissions caps using an opportunity cost for generators, regardless of whether emissions allowances were tradable. Every ton of emissions avoided by reducing generation eases compliance and thus has monetary value. In "hard cap" mass-emissions reduction modeling, emissions have a shadow price –i.e. the cost of incrementally shifting production to lower emissions sources, on a per ton basis. In a tradable credit program, the emissions have a direct monetary value, but the meaning is the same. In both cases, the cost of emissions is typically considered a variable cost – i.e. higher costs should result in lower production for high emissions resources.[1]

The rate-based trading mechanism is much more confounding from a forward modeling perspective, requiring some form of rate-based credits, wherein resources that are higher

[1] This mechanism is described in fair detail in a paper from Resources for the Future from 2008: Burtraw, D and D. Evans. 2008. Tradable Rights to Emit Air Pollution. Resources for the Future Discussion Paper. RFF DP 08-08

emissions than a target rate pay an incremental amount, and resources that are below the target rate receive an incremental financial incentive.[2] While this type of trading can be constructed within a model setup, most off-the-shelf dispatch and capacity expansion models are not set up for this mechanism.

PacifiCorp's System Optimizer model is not configured to determine a least cost plan for rate-based compliance. It is readily configured to determine a least cost plan for mass-based compliance.

To overcome the barrier that System Optimizer cannot search for a least cost rate-compliant plan, PacifiCorp fundamentally misuses the tool, manually choosing and excluding resources in order to meet targets in different states. PacifiCorp developed the "111(d)" tool specifically to develop user-specified portfolios that meet rate-based compliance. By developing each individual portfolio manually, PacifiCorp undermines System Optimizer's ability to find least cost plans.

As far as Sierra Club is aware, PacifiCorp is the first (and still only) utility to model rate-based compliance with the CPP. From the perspective of national policy, we can thank PacifiCorp for forging down this path and pointing out the difficulties of finding optimal compliance on a rate basis. However, from the perspective of ratepayers and concerned groups who rely on PacifiCorp's planning to evaluate real risk, we do not support PacifiCorp's exclusion of mass-based compliance.

c. PacifiCorp's CPP Modeling Is Narrowly Defined

PacifiCorp's failure to model mass-based CPP compliance (i.e. "cap-and-trade") and the narrow definition of rate-based compliance used by the Company leaves PacifiCorp's customers vulnerable to contrary state and federal decisions. PacifiCorp, despite being one of the most expansive utilities in the Western Interconnect, will not (and should not) determine the form of 111(d) compliance that will ultimately be used by Oregon, Utah, Washington, California, or Idaho, much less Arizona, Colorado, or Montana. PacifiCorp cannot know today if those states

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[2] A version of which is described by Western Resource Advocates in 2014: Michael, S and J. Nielson. 2014. Carbon Reduction Credit Program: A State Compliance Tool for EPA's Clean Power Plan Proposal. Western Resource Advocates.

will pursue rate or mass-based compliance, and while the utility can hope for consistent (and possibly cooperative) treatment by those states, it is just as likely (if not more likely) that a mass-based compliance scheme based on California's trading mechanism will be employed as a rate-based scheme.

Having chosen a rate-based scheme for compliance, PacifiCorp further narrowed its treatment by pre-determining its specific path to compliance rather than modeling a least cost plan. Within the construct of the proposed CPP, states could either be required to use energy efficiency and renewable energy (EE/RE) from in-state sources or allowed to procure EE/RE from other states through rate or mass-based trading. Both of these outcomes are equally likely. Parties have proposed interstate trading mechanisms that would credit (or penalize) resources relative to their respective state targets,[2] and EPA's proposal certainly doesn't exclude such mechanisms.

To be clear, PacifiCorp's treatment of 111(d) and the Clean Power Plan isn't necessary wrong– it is just so narrowly defined that it fails to allow for other options that could leave PacifiCorp in a very different space after states find their best compliance outcomes.

d. PacifiCorp's Deterministic Rate-Based Approach Undervalues Coal Conversion and Retirement

PacifiCorp today stands at a crossroads. Ongoing regional haze compliance, increasing coal costs, low gas prices (and forecasts), and rapidly falling renewable energy prices all suggest that PacifiCorp should be proactively reviewing all possible opportunities to reduce its dependency on coal when such actions are cost-effective. In modeling the Clean Power Plan, PacifiCorp specifically excluded mechanisms that would provide consumer benefits for the retirement or conversion of coal.

Under a mass-based approach, each ton of CO_2 emitted has a cost – either a direct trading price or a shadow price (i.e. opportunity cost). By extension, each ton of CO_2 that is <u>not</u> emitted has a monetary benefit, either as an allowance that is not retired or not purchased. Therefore, under a mass-based trading approach, avoiding emissions from coal-fired resources has clear monetary benefit. To fully secure this benefit, PacifiCorp would have to allow its fossil units to both ramp down (i.e. re-dispatch) <u>and</u> even retire in the face of high emissions costs. PacifiCorp neither modeled a mass-based approach, nor allowed units to retire economically, and thus captured none of this outcome.

Under a rate-based approach, resources that emit less than states' rate targets have value, while resources that emit more than states' rate targets incur penalties. The degree to which a resource emits less than state targets determines its value – if the rate is commensurate with a gas-fired emissions rate (e.g. near 1,100lbs/MWh), gas-fired units have no value to helping the state meet its rate goals, and coal-fired units should be penalized. If the rate is between gas and coal (e.g. 1,700lbs/MWh) then gas-fired units have a moderate value, and coal units are penalized less. In some states, a target below gas-fired emissions rates (e.g. 700lbs/MWh) incurs penalties for both coal and gas-fired resources, while crediting EE/RE measures. This differential crediting can be modeled as a specific penalty towards high emissions resources and credit towards low emissions resources. To capture this process may have required significant modifications to the System Optimizer framework, or workarounds by PacifiCorp, but would have resulted in more cost effective outcomes. Instead, PacifiCorp did all of its rate- based modeling outside of System Optimizer, realizing no incremental benefits for EE/RE programs and no incremental penalties for the dispatch of existing coal units.

e. PacifiCorp's Modeling of 111(d) is a Detriment to Ratepayers

PacifiCorp should be one of many stakeholders when Washington, Oregon, California, Idaho, Utah, Wyoming, Montana, Arizona, and Colorado design their respective 111(d) plans. If any of those states chose to pursue a mass-based compliance route with tradable allowances (e.g. RGGI-styled cap and trade), PacifiCorp's fossil-fired units will (or should) incur incremental operational costs (i.e. a dispatch adder for CO_2 costs). Depending on which states engage in such a process, and how trading is structured, PacifiCorp's coal-fired units could see a substantial incremental variable cost – a cost that renders some of those units non-economic in the face of ongoing capital expenditures. The retirement of existing resources can change which resources PacifiCorp choses to pursue today and the shape of PacifiCorp's action plan. By excluding reasonable modeling of mass-based 111(d) compliance, PacifiCorp has excluded consideration of cost-effective outcomes under a mass-based approach, and endangers ratepayers should PacifiCorp states choose to pursue a mass-based compliance approach.

PacifiCorp's exclusive choice of a rate-based approach could be read as the utility's bid to control and structure 111(d) compliance for their states, with an outcome that may neither favor ratepayers nor state environmental policies. It is not reasonable that a single monolithic company be granted the power to shape state environmental policy simply via fiat.

f. PacifiCorp's Rate-Based Assumptions Are Inconsistent with Oregon and Washington RPS Definitions

PacifiCorp's rate-based trading mechanism assumes that EPA's final rule will allow unrestricted trading of renewable energy credits (RECs) across state lines, an assumption that challenges the definitions of renewable energy credits/certificates in Oregon and Washington.

The 111(d) model employed by PacifiCorp always starts with a first action in which "system renewable energy… [is] allocated among the states."[3] While the action is not described in more detail, within the construct of the model it operates as such: total renewable energy procured or generated in each state is first used to meet state targets; any excess is allocated to a multi-state pool and distributed amongst states that are not at their target rate. The action in the model does not change the allocation of renewables used for meeting RPS targets in Oregon or Washington.

Practically speaking, this would likely operate as the sale or transfer of a separate and distinct "111(d)" attribute from renewable energy projects owned or under contract to PacifiCorp. In other words, PacifiCorp envisions that for the purpose of 111(d) compliance, that it can simply split off a 111(d) attribute from either physical renewable energy or renewable energy credits, and transfer that attribute alone to a non-compliant state. In PacifiCorp's Preferred Portfolio (C05a-3Q), about half of the renewables procured for Oregon's RPS are made available for use in other states, contributing substantially to compliance in Washington and Wyoming.

[3] See 2015 IRP, page 145. "First, for compliance purposes, system renewable energy and cumulative Class 2 DSM energy efficiency savings from California and Idaho are allocated among the states."

The problem with PacifiCorp's assumption is that Oregon statute expressly associates RECs with the "environmental, economic, and social benefits" of the generation.[4] Similarly, Washington's RPS rule would seem to bar the same transfer, as the REC "includes all of the nonpower attributes associated with that one megawatt-hour of electricity."[5] It is not clear that a 111(d) attribute can, or should be separable from energy procured for RPS purposes.

By separately transferring a 111(d) attribute used to achieve Oregon's RPS, PacifiCorp assumes that Oregon is willing and able to allow their RPS to be used for two distinct purposes, potentially double counting the environmental, economic, and social benefits of the generation in Oregon and Washington. By exclusively making the assumption that RPS-acquired energy from Oregon is available to other states, PacifiCorp misses modeling what other actions Washington and Wyoming would need to take to reach reasonable compliance.

g. Modeling Mass-Based 111(d) Compliance is Consistent with Past IRPs

Ten months ago, while the IRP modeling was still in its infancy, Sierra Club openly requested that PacifiCorp also model mass-based compliance with 111(d).[6] The request, before the Oregon PUC, detailed many of the concerns in these comments, and noted that mass-based compliance is readily modeled by PacifiCorp.

Mass-based compliance is built into the System Optimizer framework, and can be executed by either applying a system-wide cap, or using a proxy cost for CO_2 emissions allowances. Both mechanisms had been used by PacifiCorp in past IRPs and are still available in the current implementation of the Company's model. PacifiCorp simply elected to disable this functionality in System Optimizer, no reason given.

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[4] Oregon Administrative Rule 330-160-0005 "Renewable Energy Certificate" (REC or Certificate) means a unique representation of the environmental, economic, and social benefits associated with the generation of electricity from renewable energy sources that produce Qualifying Electricity. One Certificate is created in association with the generation of one MegaWatt-hour (MWh) of Qualifying Electricity. While a Certificate is always directly associated with the generation of one MWh of electricity, transactions for Certificates may be conducted independently of transactions for the associated electricity.

[5] Washington RCW 19.285.030 "Renewable energy credit" means a tradable certificate of proof of at least one megawatt-hour of an eligible renewable resource where the generation facility is not powered by freshwater. The certificate includes all of the nonpower attributes associated with that one megawatt-hour of electricity, and the certificate is verified by a renewable energy credit tracking system selected by the department.

[6] Technical Workshop. August 6, 2014. Oregon Public Utilities Commission

The purpose of an IRP is to find a plan that meets customer needs at the lowest reasonable cost, where the definition of "lowest reasonable cost" includes an assessment of "the cost of risks associated with environmental effects including emissions of carbon dioxide." [7] By having largely excluded a review of mass-based compliance from the 2015 IRP, an environmental risk that can clearly impact PacifiCorp's fleet and ratepayers, PacifiCorp fails to create a plan that meets the lowest reasonable cost criterion in Washington.

II. Removal of Endogenous Power Plant Retirements

a. Background

PacifiCorp's coal fleet has faced, and continues to face, a variety of new environmental regulations that impose costs and operating restrictions. Since 2008, PacifiCorp has engaged in significant capital and operating expenditures to comply with regional haze obligations and the mercury and air toxics standards (MATS) rule. Going forward, PacifiCorp's coal units will likely see costs for additional regional haze obligations, and may see impacts of National Ambient Air Quality Standards (NAAQS), as well as coal combustion residual (CCR) rule, and CO_2 emissions costs for 111(d).

In the 2011 IRP (March 2011), PacifiCorp effectively ignored impending environmental regulations for the purposes of the IRP, assuming that existing coal units would continue operations unabated. This IRP conducted a "proof-of-concept modeling of coal unit replacements,[8]" but disclosed little about the study or its specific results. The study was not used to inform the action plan or concurrent capital expenditures.

Around 2011, Ventyx (now ABB), the model vendor for System Optimizer, upgraded the ability of the capacity expansion model to allow for "endogenous" coal retirements. In other

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[7] Washington RCW 19.280.020 "Lowest reasonable cost" means the lowest cost mix of generating resources and conservation and efficiency resources determined through a detailed and consistent analysis of a wide range of commercially available resources. At a minimum, this analysis must consider resource cost, market-volatility risks, demand-side resource uncertainties, resource dispatchability, resource effect on system operation, the risks imposed on the utility and its ratepayers, public policies regarding resource preference adopted by Washington state or the federal government, and the cost of risks associated with environmental effects including emissions of carbon dioxide.

[8] Termed the "coal plant utilization study." 2011 IRP, p180

words, the model became capable of choosing if existing thermal units should be operated, retired, or changed (i.e. converted to natural gas), independent of user choice. This capacity had not been used by PacifiCorp in the 2011 IRP, but under regulatory pressure, PacifiCorp expanded the study in the 2011 IRP Update (March 2012) to review investments at Naughton, Jim Bridger, Hunter, Craig, and Hayden.[9] In this study, PacifiCorp reviewed the economics of retiring or retrofitting individual units. In addition, PacifiCorp began testing the model's ability to endogenously retire coal units.

In the 2013 IRP, PacifiCorp expanded the endogenous retirement capability of System Optimizer. Each unit was allowed to continue operation, or retire or convert to natural gas.[10] Sierra Club filed comments in response to this IRP commending the significant improvement in modeling capability, and the disclosure of important results, and recommending refinements to the process. The same endogenous retirement capacity was then used by PacifiCorp to examine investments in individual coal units for the purposes of Certificates of Public Convenience and Necessity in Wyoming and Pre-Approvals in Utah.

In the current 2015 IRP, PacifiCorp has completely eliminated the endogenous retirement capacity of System Optimizer in all but one core case (C14a). In the remainder of the IRP, PacifiCorp simply chooses a "Regional Haze Scenario" in which some units are retrofit and others are converted or retired early. In every case, PacifiCorp simply programs in the retirement schedule, denying the opportunity for the model to choose an optimal path under environmental constraints. This complete turnaround is a massive shortfall in the 2015 IRP, and represents a significant step backwards by the utility in finding a least cost plan to meet environmental compliance requirements.

[9] 2011 IRP Update, p67.

[10] 2013 IRP, p161 "Building upon modeling techniques developed in the 2011 IRP and 2011 IRP Update, environmental investments required to achieve compliance with known and prospective regulations at existing coal resources have been integrated into the portfolio modeling process for the 2013 IRP. Potential alternatives to environmental investments associated with known and prospective compliance obligations are considered in the development of all resource portfolios. Integrating potential environmental investment decisions into the portfolio development process allows each portfolio to reflect potential early retirement and resource replacement and/or natural gas conversion as alternatives to incremental environmental investment projects on a unit-by-unit basis. This advancement in analytical approach marks a significant evolution of the IRP process as it requires consideration of potential resource contraction while simultaneously analyzing alternative resource expansion plans."

b. PacifiCorp's has not Justified Eliminating Endogenous Retirement

PacifiCorp announced during early stakeholder meetings that it would eliminate endogenous retirement from the current IRP. Sierra Club suggested that this change would undermine the core meaning of the IRP, and would prevent PacifiCorp from finding anything close to a least cost plan. PacifiCorp did not disagree that the process was non-optimal, but suggested that the endogenous retirements posed more difficulties than they understood how to deal with. PacifiCorp indicated that long term coal contracts with liquidated damages were difficult to model in an endogenous retirement framework, and that some units might be able to trade off against each other in alternative regional haze scenarios.

PacifiCorp's justifications do not hold water. While regional haze scenarios involving multi-plant compliance could be more difficult to model, (a) these tradeoffs are relatively limited to plants in near proximity, and (b) total, multi-unit emissions caps could be captured through mechanisms within the System Optimizer framework.[11] With regards to coal contracts, PacifiCorp has sufficient information to know their expected damages for early withdrawal from take-or-pay contracts on an annual basis, and this information is readily modeled.

c. Endogenous Retirements Allow for Lower Resource Costs

Allowing the model to choose to retire units optimally results in a lower cost plan than when retirements are guessed by planners. PacifiCorp confirms this outcome for the case in which a CO_2 cost is also imposed: "When allowing endogenous coal unit retirements beyond those assumed for Regional Haze scenarios (core case C14a), costs are lower than the C14 portfolios developed with specific timing for assumed coal unit retirements." Since PacifiCorp did not test any scenarios in which coal units were allowed to retire endogenously even without their "high CO_2 cost," we are unable to determine how much more cost effective such a portfolio would have been.

[11] System Optimizer allows units to be clustered into "technology groups," where one unit may occupy multiple groups simultaneously. Emissions caps and other constraints may be applied to technology groups. The same rough estimation that PacifiCorp used to evaluate unit tradeoffs can be replicated in a total technology group emissions cap.

d. Coal Resources Are Artificially Constrained to Operate

In the IRP, there is a small note indicating that "for coal resources, PacifiCorp assumes that annual generation levels cannot fall below an equivalent 70% annual average capacity factor." No explanation for this constraint is provided. In our experience, this is the first time that we have seen such a constraint explicitly applied in any utility. In some cases, utilities believe that their coal units are equivalent to "must run," even if there is no specific reliability constraint on the unit. In no case have we seen a constraint that requires a unit to operate at an elevated capacity factor regardless of its economic dispatch requirements.

The 70% capacity factor limit is belied by PacifiCorp's coal units' actual operations. In 2014 alone, Dave Johnston 2, Hunter 1, Jim Bridger 1 & 4, Huntington 1, and Craig 1 all operated below the 70% threshold. In 2012, when gas prices were particularly low, about half of PacifiCorp's coal fleet violated this threshold (Dave Johnston 1, 2 & 3, Naughton 1, Hunter 2, Jim Bridger 2 & 4, and Hayden 1 & 2).

Implementing an artificial capacity factor limit on units that may, in fact, be economically constrained in the future would certainly result in a higher cost plan than required.

III. A High Level Assessment of Energy Efficiency Resources

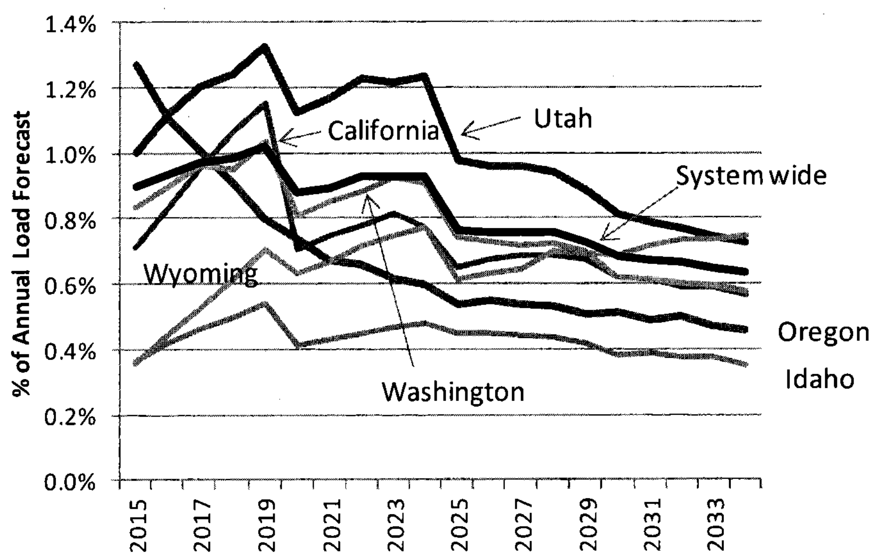
a. Background

The projection of annual incremental energy savings in PacifiCorp's 2015 IRP is overly conservative, and significantly lower than what leading states and utilities have achieved in the past or are planning to achieve in the near future. The projected annual savings significantly decrease year by year. This is largely influenced by a major inherent limitation of potential studies which is that potential studies primarily rely on current commercially available technologies and lack information on savings from future efficiency measures. This is particularly problematic when potential studies are applied to a long-term system planning that expands beyond a 10 year horizon. Therefore it is highly likely PacifiCorp's own savings projection over the 20 year study period in its IRP is significantly underestimated.

b. Annual Incremental Savings Remain Well Below Leading States, and Falling

The projection of annual incremental energy savings in PacifiCorp's 2015 IRP has flaws in its projection of the maximum annual incremental savings and annual energy savings ramp-rates. The highest savings in terms of savings as a percent of sales are around 1.3 percent (for California and Oregon); other states are far lower. These ramp rates are significantly lower than the level of savings demonstrated or targeted by leading states and utilities, as will be discussed below. Further, all states except Wyoming are projected to reach the highest annual savings (in percent of sales) in very early years (e.g., Oregon in 2015, and the rest of states except Wyoming in 2019), and then show declines in savings. These declines are particularly significant for Oregon, Utah, and Washington (Figure 1). The annual incremental weighted average savings across all jurisdictions decrease from about 0.9 percent to about 0.6 percent by 2034.

Figure 1. Annual Incremental Energy Savings for the Preferred Portfolio (% of Annual Load Forecast)



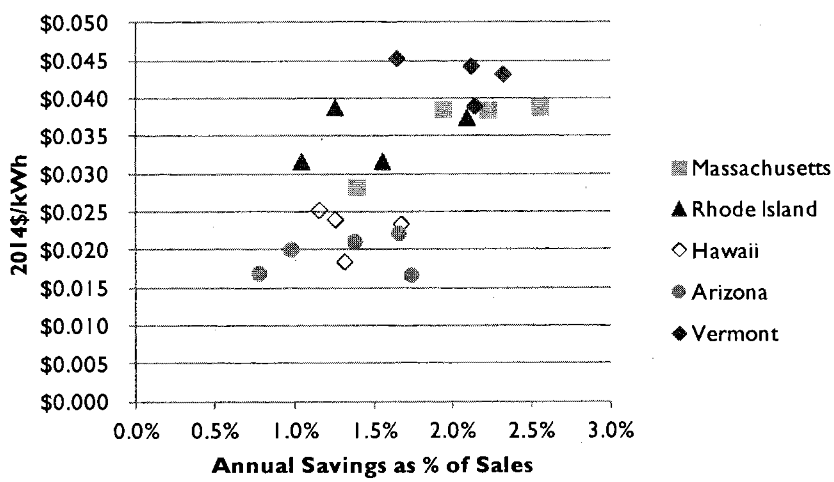
Source: PacifiCorp 2015 IRP, Volume 1, Table A.1 – Forecasted Annual Load Growth, 2015 through 2024 (Megawatt-hours); "C05a-3Q, Preferred Portfolio" worksheet in "265338Web - Copy of PacifiCorp-2015IRP_RH1-SOReportPackage-03162015 3-31-2015" file provided by PacifiCorp in OR LC-62

c. Annual Ramp Rate for New EE is Slower Than Expected, or Negative

Figure 1 also exhibits that all jurisdictions are expected to ramp-up annual savings by just 0.1 percent (for California) or less. Oregon has no ramp-up in savings at all, and instead its savings are expected to continue declining from the second year.

Current state policies and historical data suggest that PacifiCorp could assume a much faster ramp rate and reach a higher annual maximum savings level than what it modeled energy efficiency in the IRP. For example, several leading states have achieved a significant amount of savings cost-effectively beyond 1.5 percent to 2.5 percent levels as shown in **Error! Reference source not found.**. It is particularly notable that Massachusetts and Vermont have been operating their energy efficiency programs for the past few decades and recently achieved 2 percent to 2.5 percent savings over multiple years at a cost of 4.5 cents per kWh or less.

Figure 2. Energy Efficiency Cost of Saved Energy ($/kWh) and Annual Savings (% of Sales) from 2009 to 2014



Sources: (1) Molina. (2014). The Best Value for America's Energy Dollar: A National Review of the Cost of Utility Energy Efficiency Programs, ACEEE (2) ACEEE State Energy Efficiency Scorecard reports in 2011, 2012, and 2013. (2) Geller, et al. (2014). Maintaining High Levels of Energy Savings from Utility Energy Efficiency Programs: Strategies from the Southwest. (3) Hawaii Energy Annual Reports in 2012 to 2014 National Grid Electric and Gas Energy Efficiency Programs Year-End reports in 2010 to 2013. (4) Massachusetts program administrators' data obtained from Jeff Loiter, a member of the Massachusetts Energy Efficiency Advisory Council consultant team on April 2, 2015.

In addition, according to U.S. EPA's review of historical energy efficiency programs from 2003 to 2012 as part of its filing for the proposed Clean Power Plan, there were 26 entities that achieved around 2 percent annual savings for the past several years. The same analysis also found that about 75 entities across the nation took just about 3 years to increase annual incremental energy savings by 1 percent, which equates to annual average ramp rates of 0.33 percent. Table 1 presents these findings broken out into two groups: Top Saver 1%, which achieved maximum first-year savings of 0.8 to 1.5 percent, and Top Saver 2%, which achieved maximum first-year savings of above 1.5 to 3 percent. Based on these results, EPA chose 0.2 percent per year as an annual savings ramp rate for each state to adopt for the purpose of complying with the proposed Clean Power Plan.

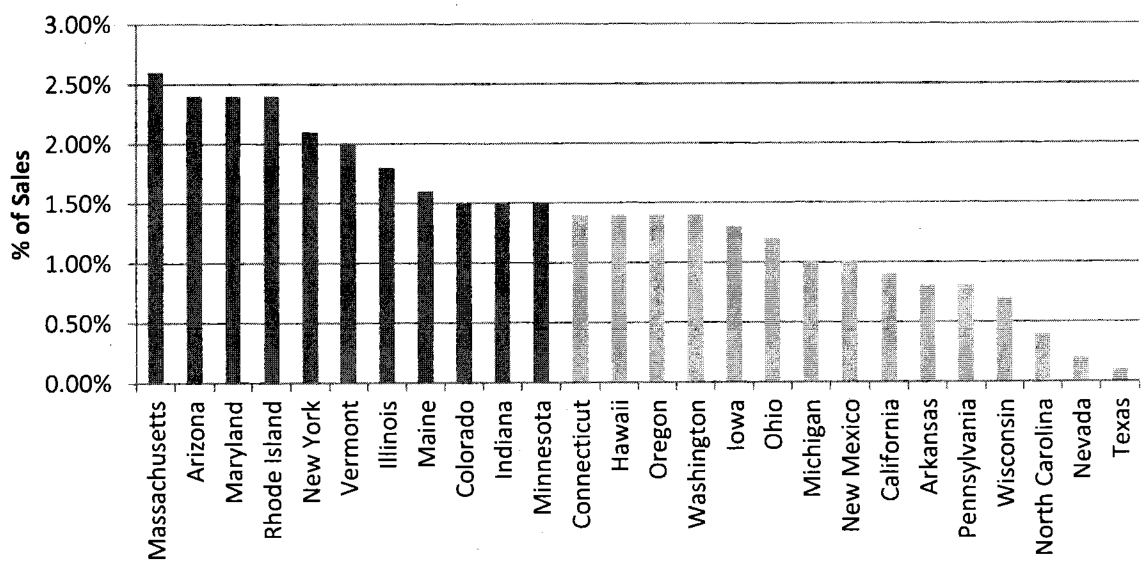
Table 1. Energy Savings Ramp-up Trends in 2003 through 2012

	Top Saver 1%		**Top Saver 2%**	
	Average Annual Savings Increase	**Estimated Years to Gain Incremental 1%**	**Average Annual Savings Increase**	**Estimated Years to Gain Incremental 1%**
Average	**0.30%**	**3.4**	**0.38%**	**2.6**
Median	**0.29%**	**3.4**	**0.34%**	**3.0**
Max	0.63%	1.6	1.28%	0.8
Min	0.10%	10	0.14%	7.3
# of sample entities	47		26	

Source: U.S. EPA. (2014). GHG Abatement Measures, Technical Support Document (TSD) for Carbon Pollution Guidelines for Existing Power Plants. Appendix 5-2.

Finally, several states with EERS have annual energy savings targets beyond the level PacifiCorp expects to achieve through its IRP. Currently about 26 states have EERS policies. Among them, 11 states have targets to achieve 1.5 percent to about 2.5 percent per year savings (Figure 3).

Figure 3. Average Incremental Energy Savings Target by State through EERS Policy



Sources: Downs et al. (2014) Energy Efficiency Resource Standards: A New Progress Report on State Experience. ACEEE

In addition, EPA found that the 10 states with annual ramp-up schedules mandated in their EERS expect annual savings at a pace ranging from 0.11 percent (Colorado and Oregon) to 0.40 percent (Rhode Island), with an average of 0.21 percent per year – twice faster than the maximum annual rate among all jurisdictions assumed by PacifiCorp.[12]

PacifiCorp should seek to accelerate energy efficiency programs in the near term to capture cost-effective savings illustrated in the potential study. As these programs are accelerated, PacifiCorp will likely start to see other cost effective measures emerge.

d. Long Term Energy Efficiency Potential is Rising, Not Falling

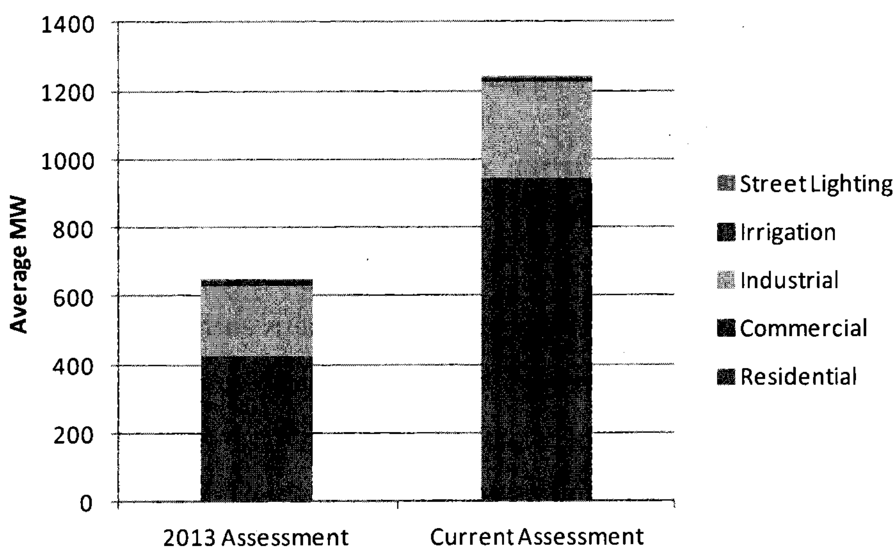
Energy efficiency potential studies have a critical, inherent limitation, especially when they are applied to project a long-term energy resource vision that goes beyond a 10 year analysis horizon. These studies rely mainly on currently commercially available technologies to estimate savings potential, and are typically designed to look at near term savings potentials. While some studies include emerging technologies and may even include expected price

[12] U.S. EPA. (2014). GHG Abatement Measures, Technical Support Document (TSD) for Carbon Pollution Guidelines for Existing Power Plants. Appendix 5-2.

reduction for certain measures, few studies attempt to estimate energy savings potential from future emerging measures that could become available in 10 to 15 years due to lack of information. The implication of this limitation is that efficiency potential studies almost always underestimate the amount of long-term savings potential. The fact that PacifiCorp's IRP presents declining available savings at a greater rate year by year is a result of this inherent limitation of potential studies.

A review of historical potential studies demonstrates consistent underestimation of energy savings potential. A case in point is PacifiCorp's own historical potential studies conducted in 2013 and in 2015. The 2015 potential study, conducted by the Applied Energy Group (AEG) for PacifiCorp, found nearly twice as much savings potential as in the 2013 study as shown in Figure 6 below despite the fact that PacifiCorp achieved additional savings since 2013. The 2015 AEG study indicates that the majority of this increase in savings is "primarily driven by the emergence of LED lighting technology as a viable, cost-effective, and rapidly-improving technology option."[13]

Figure 4. Comparison of Class 2 DSM Potential with Previous Assessments

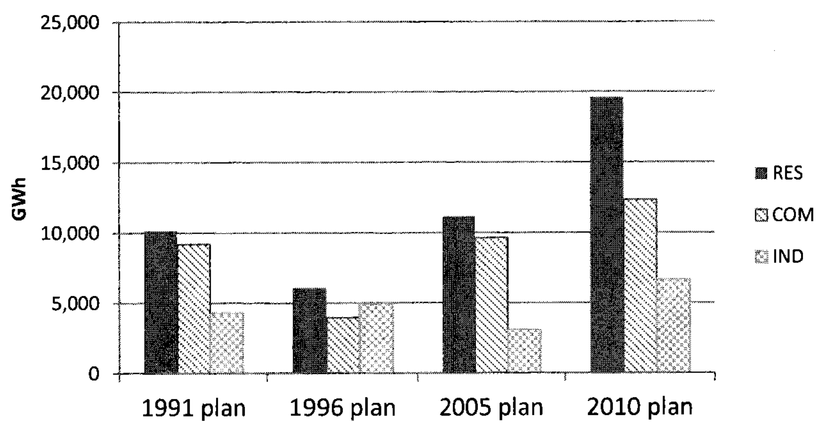


Source: AEG (2015). PacifiCorp Demand-Side Resource Potential Assessment for 2015-2034, Volume 2. Table 5-1.

[13] AEG (2015). PacifiCorp Demand-Side Resource Potential Assessment for 2015-2034, Volume 2. Class 2 DSM Analysis, page 5-2.

Comparing historical energy efficiency potential studies by the Northwest Power Conservation Council (NWPC), which has a long history of running efficiency programs in the Pacific Northwest region, we see a similar pattern (see Figure 5). While the potential study for the 1996 Power Plan was lower than the previous study, the following studies in 2005 and 2010 found a greater amount of savings potential. One study reviewing these NWPCC's studies concluded that "when programs invest in higher levels of efficiency, this helps drive measurement improvement and technical innovation, resulting in large and more reliable conservation supply estimates."[14]

Figure 5. Comparison of Energy Efficiency Potential Estimates for Pacific Northwest by NWPCC's Historical Regional Power Plans (GWh)



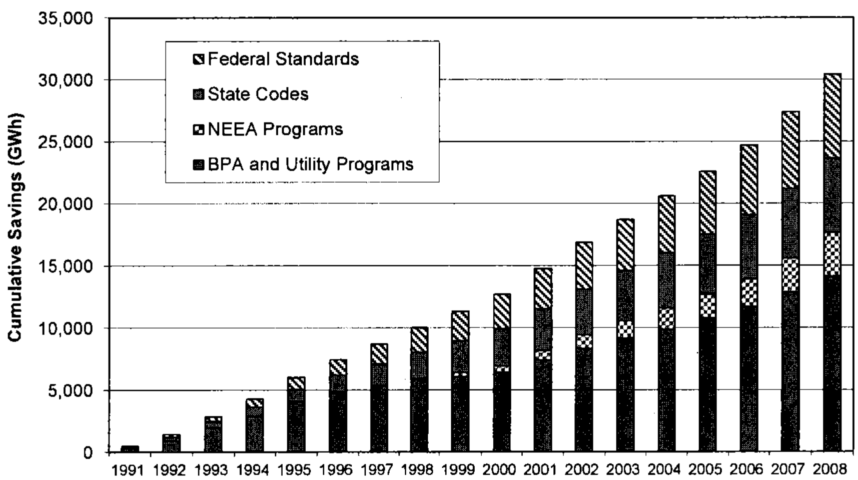
Sources: Gordon et al. 2008. "Beyond Supply Curves" Proceedings of 2008 ACEEE Summer Study on Energy Efficiency in Buildings; NWPCC 2010. Sixth Northwest Conservation and Electric Power Plan.

Figure 6 below presents historical energy savings through various energy efficiency programs and policies in the Pacific Northwest region. What is most interesting in this figure is that the region's cumulative savings achievement of roughly 30,000 GWh energy savings since 1991 is far more than the energy efficiency potential estimates made in the NWPCC's 1991 power plan (approximately 23,000 GWh). The latest power plan in 2010 has found even greater energy savings potential than the potential found in 1991. These historical evidence suggests that the best strategy to make use of energy efficiency potential study results is to try to achieve as

[14] Gordon et al. 2008. "Beyond Supply Curves" Proceedings of 2008 ACEEE Summer Study on Energy Efficiency in Buildings, available at http://aceee.org/files/proceedings/2008/data/papers/8_419.pdf.

much identified energy savings as possible in early years by following industry best practices and achievements by leading entities (e.g., reaching 2 percent per year savings by a certain year in the first 10 year horizon).

Figure 6. Cumulative Energy Efficiency Savings Estimates in the Pacific Northwest Region since 1991 (GWh)



Source: Eckrman 2010. "Regional Conservation Summary 1978 - 2008 Adjusted for BPA co-funding and including line losses" data file obtained from Tom Eckman on March 1, 2010. Average MW figures have been converted to GWh in this figure.

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Following from this logic, it is clear that PacifiCorp should recognize that simply because a potential study recognizes today's technologies and the saturation of those technologies does not mean that energy efficiency will cease to exist a decade from now. New products and services are developed at a rapid pace, and would be expected to impact PacifiCorp's system not only in the next decade but in the latter half of the study as well. It is important that PacifiCorp recognize long-term new cost effective potential, as the long-term requirements of the utility influence the decisions made by PacifiCorp today.

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Respectfully submitted,

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