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Comments on Puget Sound Energy's 2011 Draft Integrated Resource Plan

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Members of the Washington Utilities and Transportation Commission:

CC: Philip Popoff, Puget Sound Energy

Thank you for the opportunity to participate. We greatly appreciate PSE taking our suggestion from our 2009 IRP comments of adding in a "No Northwest Coal" scenario. This prepared PSE for understanding the true costs coming when the Boardman & Centralia plants are shut down, and was a good approximation of actual plans. However the analysis needs to do a better job measuring Colstrip costs and preparing for unexpected disasters. We believe conservation should play the primary role in PSE's natural gas acquisition plans. We'd like to see more consideration around unpredictable disasters (both natural & man-made).

Lastly, the IRP process as established by the UTC is inadequate to meet the future challenges that our world and nation must face. The process's focus on costs and short-term modeling are not up to the task. We ask the UTC to think about a longer term.

Changes to Base Case

Since this IRP process began, there are two significant changes that should be included in PSE's base case. The retirement of the Boardman and Centralia plants should be factored into all the base case cost estimates for future power rates, transmission needs, and any other minor effects like load balancing. This will give us a more accurate picture of power prices in 2020 and beyond. We would prefer that PSE does not include any "zombie coal" scenario where these agreements are reversed.

For the 2013 IRP, we recommend more changes to better model coal. As a further refinement to the No Northwest Coal scenario, it should model a shutdown of Colstrip in 2020. All scenarios should include a sensitivity to coal prices & pollution controls to the expected end of life of any coal plant. Estimating the future cost of coal out to 2045 in addition to establishing a range of necessary capital improvements to stop air pollution from NOx, SOx, PM, mercury & water pollution from coal ash must be done.

Electric Analysis Comments

In Figure 5-15, PSE omitted Aurora's suggested resource build for the No Northwest Coal scenario. What happened? The discussion on page 5-41 states PSE doesn't know how much they would need to build vs. buy from the market. I was expecting more details here, such as plans to build a gas plant or two as well as to build additional transmission to buy more power from the market.

Page 5-32 talks about constraining wind built in the Green World scenario. The note is that due to high gas, CO2 and market prices, this scenario would build wind only for all of its new resource need. While the need to build for peak capacity is clear and PSE's low 5% capacity factor for wind suggests it is not the best solution, perhaps PSE picked the wrong cap. Here, the cap is about 30% of the new resource builds are limited to wind. PSE however has significant other resources available which provide ample opportunity for ramping up & down generation for load balancing. PSE's wind farms also are in geographically diverse areas, which may lead to a higher capacity factor as well. A state in Germany has achieved 40% of their total electricity coming from wind & solar, though with some struggle to balance resources. Perhaps a better limit for a scenario would be limiting wind builds to 30% of PSE's total generation capacity, not 30% of new resource builds. Allowing more wind, which was cheaper than other sources in this scenario, should also lower the cost of the Green World scenario.

Figure 5-31: Note that the No Northwest Coal scenario cost is roughly 10% more expensive and meets emissions goals. This is very encouraging news, and will give policy makers a lot more certainty when weighing various options. The fact that future IRP's must alter their base case scenario to include shutting down two coal plants also means this cost gap will be significantly smaller in the next IRP. This would help provide a lot more certainty around the exact costs of shutting down Colstrip, which is something we look forward to seeing modeled and planned for in the next Integrated Resource Plan.

Demand-Side Resources Regional Mismatch

On page 5-42, PSE's analysis strongly indicates demand-side resources both reduce risk and cost, and the Sierra Club whole-heartily agrees. However, the Northwest Energy Coalition's *Bright Future*¹ report claims all normal demand growth could be met by energy efficiency in our region, and has quantified the need at 340 aMW and identified regional sources available. Similarly, the Northwest Power and

¹ NW Energy Coalition *Bright Future*
<http://issuu.com/nwenergycoalition/docs/brightfuture?viewMode=magazine&mode=embed>

Conservation Council's 6th *Power Plan* clearly states: "The plan finds enough conservation to be available and cost-effective to meet 85% of the region's load growth for the next 20 years."² While PSE's plan does rely significantly on DSR, it is in the range of 23% to 37% of all new sources, drastically off from 85% - 100%. The UTC should drill into this disconnect – clearly someone's assumptions about cost and achievability are off. It suggests either PSE's analysis is flawed, or both the Northwest Power & Conservation Council and the Northwest Energy Coalition are incorrect. Hopefully PSE can explain this mismatch between regulators, the environmental community and the regulated utility as well as recommend corrective action in future IRP's.

"Coal Transition Power"

The Sierra Club is not a fan of coal power due to its copious emissions that damage human health and cause catastrophic climate change. However, given the agreement to shut down Centralia, we support PSE acquiring "coal transition power" as necessary to facilitate the retirement of the Centralia plant and provide a stable planning environment for the plant's laborers & community.

Colstrip Costs & Risks

We suspect the economic costs of Colstrip are too low, omitting several potential future liabilities. PSE has done a good job looking at carbon costs, but that is hardly the only cost associated with a polluting coal plant. As described in Appendix C, a coal plant like Colstrip faces regulatory cost risks from the EPA for mercury emissions, NOx emissions, water treatment, and coal ash ponds. Future regulatory changes may incur additional costs. While it is hard to predict the future, PSE should add a sensitivity to future regulatory costs with Colstrip, and estimate when ratepayers would be asked to cough up for these costs.

For example, the EPA may require coal ash impoundment ponds to be rebuilt, but we won't have firm regulations until 2012. The EPA has concluded a quarter of US coal ash impoundment ponds are structurally deficient. If Colstrip's coal ash impoundment pond is structurally deficient, this could require a very large capital expenditure, in addition to the risks of failure to lives and property.

Similarly, PSE staff does a great job modeling natural gas prices, but didn't look at future coal prices. Nationally, coal prices increased 4.9% from February 2010 to February 2011³, showing a high level cause for concern. America has burnt all the good & moderate coal, and we're left with lower grade subbituminous coal. However the facts on the ground in Colstrip may be more intriguing. PSE staff was not able to comment meaningfully on the size of coal deposits at Colstrip nor the projected mine lifetime. If the coal plant's lifetime extends beyond the mine's lifetime, PSE may need to buy coal from

² NWPC 6th *Power Plan*, http://www.nwcouncil.org/energy/powerplan/6/final/SixthPowerPlan_Overview.pdf

³ US EIA *Electric Power Monthly* May 2011, http://www.eia.doe.gov/cneaf/electricity/epm/epm_sum.html

elsewhere in the Powder River Basin, perhaps with expanded rail capacity. This comes with the possibility of needing to compete with China for Powder River Basin coal (PRB coal is already exported through Texas and may be exported through terminals at Longview & Cherry Point and one terminal in Canada). Securing coal for Colstrip may not be cheap!

PSE's analysis did not include these potential costs. While modeling the No Northwest Coal scenario did at least model the price differential of shutting down coal plants, it assumed a clean shutdown. It didn't look at the shape or speed of a "thousand paper cuts" that may make Colstrip uneconomic to dispatch during many months of the year. PSE should model this slow death's costs & estimate remaining plant lifetime to protect ratepayers from any surprises.

If these operating costs are significant and increasing over time, the UTC should consider a threshold for encouraging PSE to shut down Colstrip and what mechanism is available for recovering plant costs. For this reason, we strongly encourage the UTC to ensure all Colstrip operating costs are paid on a reasonable timeframe that do not exceed the expected lifetime of the plant. Ratepayers would be quite unhappy if the coal plant were to shut down in 2020 but are asked to keep paying for it through 2045. If the lifetime of the plant shrinks, the timeframe for capital cost recovery should also shrink.

Natural Gas Conservation

The IRP process produced an incredibly wide range of natural gas demand side reduction, ranging from 8% to 80% of future capacity requirements. That appears too wide for rationally informing short term conservation investment decisions. We strongly encourage PSE and the UTC to push as hard as possible on natural gas conservation now to fully lock in potential conservation into our built environment. The tail effects of conservation measures like insulation are great – that impact is felt for the life of the structure, which will often exceed the IRP's 20 year time window. If you can insulate a house well and it stands for 100 years, the total energy savings can be far greater than what is recognized in the medium term.

Tail effects & opportunity costs justify placing a heavier weight on building long-lasting conservation measures, at a fast rate as soon as possible. It also reduces our fuel needs, which should lower future volatility to a smaller range (even if volatility is the same percentage). Another concern is keeping our money in the US economy – we should spend our dollars on local construction projects to reduce our energy needs, instead of buying more energy from foreign sources.

While natural gas appears to be abundant now due to hydraulic fracturing, there are growing concerns around water treatment above ground and water contamination below ground, and the natural gas industry is not yet on track to solve these. That is a good recipe for limiting fracking's political appeal, or its exemption from the Clean Water Act. What looks abundant now may become less so over time.

The fact that the Green World scenario shows all resource needs by 2021 are met with DSR is fantastic, showing a world where this is possible & cost-effective. While the Green World assumptions may not fully come to pass, including it to model risks and show what is possible at what price is great.

Relevance of Green World

While the Green World scenario is one of two that successfully lowers utility emissions to 1990 levels, the national political landscape doesn't support a carbon tax at the current time. However, we do wish that PSE keep modeling this scenario. This does two things: educate us all about the costs, and keep PSE prepared for the possibility of a change in the political environment.

Here's a sampling of the changes we should be considering. First, Senator Maria Cantwell has a simple carbon tax proposal, deriving its simple appeal by excluding all carbon offsets. Beyond the potential for federal action, action in Olympia could produce a similar cost on carbon. While the Western Climate Initiative isn't progressing, a new governor could change that. Given Jay Inslee's environmental advocacy, you could bet something significant would arrive if he were elected governor in 2012. But most interestingly, the Carbon Washington organization is building support to put a carbon fee initiative on the ballot in 2014⁴, seemingly with the support of PSE's CEO.

Preparing for the Unexpected

PSE must include more allowances for unexpected disasters. This century has just started but we've already seen a region-wide power crisis, a national & international financial crisis, two wars, a huge spike in oil prices coupled with a slow, long-term growth trend, a pine beetle infestation wipe out entire forests, a natural disaster wipe out much of a US city, and an earthquake & tsunami beat down an industrialized nation to its knees. Specifically in the power sector, we've seen damage to nuclear reactors in Japan & a US nuclear plant forced to stay shut down due to flooding.

While modeling a large disaster (such as a catastrophic breach at Grand Coulee Dam or the loss of one of PSE's main cross-Cascade transmission corridors due to wildfire or hostile actors) is never a happy task, preparing for a range of rare events is warranted. However none of PSE's Monte Carlo draws showed an electricity spot market price higher than \$300, let alone anywhere close to the \$1200 seen briefly during the Enron-caused power crisis in California. This variance is too limited. Perhaps PSE could model elevated prices that persist in some form for several months, to simulate a substantial blow to our region's transmission system or another Enron-style crisis.

Depreciation & Cost Recovery

⁴ Carbon Washington's web site: <http://www.carbonwa.org/>

We ask that all plants are fully paid for within their expected lifetime, not exceeding the lifetime. Ratepayers would not take kindly to being surprised by having to pay decommissioning costs then continue to pay the plant's construction costs for years after the plant has stopped.

As a policy issue, lower short-term rates at the cost of higher long term costs seems irresponsible. The US must undergo a massive debt deleveraging, and we don't need to encounter the same problem at all levels of our society. This sort of short-term political expediency will be increasingly less tolerated by fiscally conservative voters.

Transportation Loads

We look forward to future refinements of the plugin electric vehicle load in the future, based on more real world data power draw rates from actual hardware being sold on the market. The peak impact of 51 MW in 2031 in chapter 4 sounds low. Given Peak Oil and the entry of several major auto manufacturers into the electric car market, we suspect a significant portion of the US auto fleet comes with a plug over time for a good portion of its energy needs.

PSE's CEO Kimberly Harris recently pointed out that she killed time-of-day metering in 2001 because the peak shaving effects weren't significant enough. However, she also noted that plug-in electric vehicles could also all be charged immediately when people get home at the evening peak demand. In the absence of a smart grid solution, perhaps time-of-day metering would be a simple approach for driving the right consumer behavior. Additionally, if PSE's conservation program were to favor home appliances with timers (such as those used in the UK to shift loads to off-peak times), this could make time-of-day metering more effective. PSE should consider analyzing this in a future IRP.

Does Sound Transit Phase 2 significantly impact load, or add significant load balancing costs?

Energy Conservation

Beyond the energy efficiency work PSE already does, a utility should be doing some long-term planning around both a smart grid, and more importantly, how to surface cost & consumption information to ratepayers. This conservation effort serves a different purpose than energy efficiency: to change behavior of ratepayers (or at least their devices). Specifically, installing smart meter with no smart appliances nor any visible reporting infrastructure to homeowners or businesses on how they can reduce their costs or shift their loads is probably the dumbest thing we could build. Clearly research on appliances needs to be done, as well as the user interface for a home and business to see their usage and take corrective action.

Beyond saying PSE should invest in the smart grid, specifically PSE should work with existing hardware manufacturers like Itron and software projects to get detailed consumption & rate information in front of consumers and programmable appliances in real time. Unfortunately some of the projects from high-

profile companies like Google's PowerMeter and Microsoft's Hohm both got cancelled recently, due to poor adoption and possibly an unsuccessful uptake by some utilities. Hopefully PSE can find at least one suitable business partner.

Decoupling

It is becoming clear that decoupling is a good way to reward a utility based on the value they provide to our region and the utility's success on environmental performance goals. Decoupling should make a regulator's job easier and ease discussions with a utility. This eliminates possible squirrely activity from a utility, such as figuring out whether they can pull build dates in by a year or two to get extra profit, or low-balling energy efficiency investments because they don't get compensated for generation they do not build. While not suggesting this has happened, with a carefully designed incentive structure the public can have a higher confidence that the costs are appropriate.

The intent should be to reward a utility for meeting our power demands with good service & maintenance, as well as taking care of the environment & other community needs. And an allowance needs to be made for a reasonable rate of return. If low-income homeowners need aggressive, targeted conservation programs, this should be easier to support under decoupling. To motivate conservation instead of tying utility profits to capital expenditures, perhaps the utility's profit could grow inversely proportional to load growth per capita, coupled with progress towards Washington State's greenhouse gas reduction goals.

We strongly encourage the UTC to revisit this issue.

Future Ideas

In the next IRP, PSE should consider whether high voltage direct current wires could be used to lower transmission losses during long-distance transmission, such as from new or existing wind farms to load areas. This looks like a promising regional idea worthy of further study⁵.

UTC's IRP Process Inadequacy For Global Problems

The IRP process as run by the UTC seems limited in its power & scope and is inadequate to addressing the long-term challenges our world is facing. The overriding factor is cost, but cost doesn't prepare for the range of potential risks to society. We ask the UTC to pursue longer-term thinking.

The most obvious challenge is catastrophic climate change. While the IRP does allow modeling of carbon costs, that assumes that our federal or state government has the intestinal fortitude necessary

⁵ http://en.wikipedia.org/wiki/High-voltage_direct_current#Renewable_electricity_superhighways

to tackle the problem, and to build a binding accord that applies to all developed nations plus China. Success is required for the continuing existence of our species on this planet, with anything approximating today's lifestyles. We're not going to replace trillions of dollars of energy infrastructure by squabbling about discount rates to get 2% extra conservation from our utility. We are not on track to addressing this challenge at the global, national, state, or local level. Washington State is blessed with an above-average educated population and a lot of hydropower – if we cannot address this problem in Washington State, the hope for the rest of the planet is quite low. The Utilities & Transportation Commission has the opportunity & responsibility to truly lead the world.

The next major challenge facing the world is energy descent⁶. This is the point of maximum extraction for all of our fossil fuels and others relying on finite resources (like uranium). Estimates are that oil extraction appears to have peaked in 2008⁷. Natural gas world-wide may peak sometime around 2030⁸. Coal may peak as early as 2025, if you look carefully at worldwide coal demand, the quality of coal left in the ground, and the costs of extracting existing reserves⁹. And on the nuclear front, uranium extraction may peak around 2035¹⁰, and there may only be about 80 years of uranium left. Beyond the geological limitations, energy demand growth in energy-exporting countries may mean energy available to the world market peaks sooner and contracts at an even faster rate.

The exact years & rate of decline are open to debate, but the long-term shape of the non-renewable energy supply curve available to the human race is not in doubt; at some point, the amount of energy available to our civilization will hit a maximum and begin decreasing annually. This will require replacing the world's existing \$2 trillion fossil fuel extraction infrastructure with renewable sources of energy, huge investments in energy conservation, research to find other novel primary fuel supplies, and a rethink of energy demand.

There are similar problems with availability of food and water for the world, as well as a lack of high quality governments in a significant portion of the world. As all of these problems will be happening in parallel, our ability to cope with changes may be strained to the breaking point. Hopefully this doesn't lead to war and famine.

The future we want to live in relies on renewable energy for electrical production coupled with biofuels and a complete rethink of our transportation infrastructure. This will require revisiting land use, replacing the car with effective mass transportation, and simply transplanting people in bulk so they don't need to drive 30 miles a day to get to where they work. We may build huge transmission lines to a North American wind corridor stretching from North Dakota to northern Texas, with connections to the Western power grid and Chicago. Conservation measures will provide perhaps the cheapest route to solving these problems, so that America does not waste half our energy in poorly insulated buildings or in non-efficient equipment, or with gas-guzzling cars.

⁶ Energy Descent: http://en.wikipedia.org/wiki/Energy_descent

⁷ Peak Oil http://en.wikipedia.org/wiki/Peak_oil

⁸ Peak Natural Gas: http://en.wikipedia.org/wiki/Peak_gas#World_peak_gas

⁹ World Peak Coal estimates: http://en.wikipedia.org/wiki/Peak_coal#World_peak_coal

¹⁰ Peak Uranium http://en.wikipedia.org/wiki/Peak_uranium

However, Washington State & the Bonneville Power Administration's current planning processes leave us in a world where we cannot build new transmission to export excess power. As a direct effect, the BPA is curtailing renewable power generation during certain months in high-water years. Wind farms aren't built because transmission availability is a limiting factor in siting, because no one knows how to pay for the new lines our nation needs. The lack of ability to build transmission wires makes our region look like Emperor Nero fiddling while Rome burns.

The IRP process is not moving us to the world we must construct quickly enough. While the IRP will save ratepayers \$80M here or \$120M there in the next 10 years, if it does not address catastrophic climate change and Peak Energy, then it has failed. It is time for the UTC to think globally and act locally. If this requires legislative action, the Sierra Club is happy to assist in whatever role we can.

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