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**Comments on the Puget Sound Energy 2009 Integrated Resource Plan (Docket #** UE-080949)

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Members of the Washington Utilities and Transportation Commission:

CC: Philip Popoff, Puget Sound Energy

Thank you for allowing the Sierra Club to comment on the 2009 IRP. We believe that Puget Sound Energy's (PSE) Integrated Resource Plan fails to meet the fundamental test of climate change. By prolonging their investment in the Colstrip coal plant, they are limiting their ability to make any meaningful reductions on greenhouse gas emissions until coal is phased out toward the latter part of their IRP. Current science indicates that significant reductions will be needed to avoid dangerous climate change impacts. Several prominent scientists recently determined that limiting global warming to a 2 degree Celsius increase above preindustrial levels, the goal set in IPCC report, would require reductions in current emissions by at least 35% by 2020.[1] And, given the negative impacts already apparent with current levels at 389 ppm, and rising by 2 ppm annually, data suggest that the proper the 2 degree goal targeted in the IPCC report is almost certainly insufficient. [2]

In addition, by failing to account for the full impacts of climate change, PSE may be subjecting shareholders and ratepayers to unnecessary carbon liability. "Carbon price" as talked about in state and federal legislation is only a reflection of the costs to reduce carbon emissions. "Carbon price" does not reflect the cost of paying for damages done by climate change which are extensive throughout

[1] Stephen Schneider, et al., Letter to Congressional Leaders (March 23, 2009), available at http://stephenschneider.stanford.edu/Publications/PDF_Papers/Congressional_Ldrs_Ltr.pdf (last viewed July 1, 2009).

[2] See Hansen, J., et al., Target atmospheric $CO_2$: Where should humanity aim? (2008), available at http://pubs.giss.nasa.gov/docs/2008/2008_Hansen_etal.pdf (last viewed July 1, 2009); see also Brown, L., et al., Time for Plan B: Cutting Carbon Emissions 80 Percent by 2020" (2008), available at http://www.earth-policy.org/Books/PB3/80by2020notes.pdf (last viewed July 1, 2009).

Washington State and the Northwest. As reported by Sir Nicholas Stern of the London School of Economics, carbon damages could be as high as $85/CO2 ton.

In addition to their failure to fully account for the cost of climate impacts, PSE also does not fully account for the cost of other pollutants from their coal power. Coal-fired power plants are the leading source of mercury in the United States. The U.S. Geological Survey has now determined that all fish in U.S. streams have mercury in them. Coal-fired power plants are also leading sources of soot, haze and acid-rain. These costs are not fully accounted for in PSE's IRP.

Sierra Club would like to see a more forth-coming disclosure of PSE's use of coal by fully disclosing all purchased power agreements for coal. Such disclosure will allow a full assessment of damage and liability caused by the individual coal plants where such PPAs exist.

We are further dismayed by the separation of PSE coal resources and the effects they have on the Powder River Basin. The Powder River Basin, once the most sought after hunting grounds by Native Tribes across the Northern Plains, is slowly turning into an industrial waste land due to massive strip mines that are robbing ranchers and wildlife of the most precocious resource in the west, water.

The Powder River Basin contains some of the most delicate habitat in the country. Coal mines in the region have a dismal record of reclamation for a simple reason, it cannot be done. Sage flats and rolling grasslands do not recover from the massive cuts these mines leave in the earth.

Powder River Basin coal mining has taken what was once some of the most pristine prairie and sage habitat and turned it into black wounds, hundreds of feet deep and miles across. There is simply no coming back from a strip mine for these lands and the wildlife that one lived there.

The Sierra Club has some feedback on individual assumptions around transportation, economic forecasts, and the conservation program. We also have some goals for society that we would like to achieve, and these changes amount to a new scenario we suggest for all Washington utilities' next IRP process.

A New Scenario

Sierra Club recommends that the UTC research and then recommend ways to ensure utilities include in the IRP, not just an assessment of probable "carbon prices" for emission reductions, but that additional accountability be included for assessing the cost of climate damages for fossil fuel facilities.

For the next IRP process, the Sierra Club suggests a new "greener-world" scenario, above & beyond PSE's not-so green world scenario. Our changing world demands significant new investments & redirecting significant capital flows. In the words of conservative columnist George F. Will, "the point of such investments is to subordinate market rationality to the higher agenda of planetary salvation". Without proposing mechanisms at this point, here's the world we'd like to create in the next decade.

1. Coal-free Northwest by 2020.

a. The obvious reasons are avoiding climate change
b. Reducing air pollution,
c. Accountability for use of Powder River Basin coal.

2. No LNG imports.
    a. Energy Security - natural gas must not become as politically interwoven as oil.
    b. Environmental impact of LNG terminal & tankers. In particular, we have specific siting issues w/ proposed Columbia River facilities.
    c. Increased CO2 emissions associated with compressing the natural gas (20-30%)
    d. No necessity at the proposed scale. Proposed LNG imports would be twice what we consume. Terminals would exist primarily to serve California.
    e. A cost concern that a glut of domestic supply may challenge the economics of an LNG terminal. Recent increases in domestic natural gas suggest building more pipelines across the Rockies may be a better idea for our region.
    f. We wonder if LNG import terminals could morph into LNG export terminals, through gasification on the tankers themselves.

3. Increased natural gas & electric conservation efforts by utilities. We believe energy efficiency & conservation are cheaper ways to meet our energy needs.
    a. Conservation should be pursued until the average cost of conservation equals the average cost of power generation.
    b. Funded with higher conservation rates on people's bills.
    c. Conservation can mitigate the risks associated with our stated goals above.
    d. For social equity, more aggressive, targeted programs with higher conservation program costs should be considered.

4. Prepare for electrifying the transportation grid.
    a. Smart grid technologies will be necessary to smooth out demand, both to control costs and mitigate emissions.
    b. Planning & investment now will prove worthwhile.

5. Prepare for grid-parity solar, both PV & solar hot water.

We'd like our utility planners to fully embrace this world view as one possible scenario, so that as we realize our agenda, Washington utilities are prepared to be leading partners in saving our planet.

**Transportation Load Shape**

The transportation loads may require some attention. PSE's core assumptions were based off work from the Northwest Power & Conservation Council's analysis of battery characteristics for plug-in electric hybrids, such as the Chevy Volt or a modified Prius with additional batteries. And the industry is

moving in that direction, but we suspect this will be supplanted roughly around 2016 by all-electric vehicles. These batteries will have different characteristics. Consider the battery packs developed by Tesla Motors. Their batteries have a range around 240-300 miles[3], with a 55 kWh battery capacity. Tesla claims they can charge batteries by 80% in 45 minutes, and get 100% charge in 3.5 hours[4]. This implies a peak charge rate of 59 KW per hour. Compared with PSE's assumptions on page 3-14, this is a factor of 5.5 difference in battery capacity, and almost 50x in peak charging capacity.

Assuming Americans drive less than 40 miles per day, then perhaps the total energy consumption may not differ significantly from the NWPCC plan. Cars may be charged weekly instead of nightly. However, the peak charging rate may present a problem, especially if cars are plugged in when people return home at peak load times. This planning risk will require investments in smart grid technologies, where cars are charged overnight, perhaps even using a reservation system to charge during certain windows to smooth out power demand. We believe this justifies some investment in smart grid pilot projects.

One additional wrinkle to the transportation load may come from increased use of "shore power" for ships, planes, and in the future, hybrid electric locomotives (GE is developing one right now capable of using regenerative braking). We'd like this to be considered in the analysis, though this may be a marginal concern compared with the electric car.

**Probability of Transportation Loads Scenario**

While the IRP does not explicitly claim a probability on serving the transportation loads, the authors imply a low probability given that transportation loads are only included in one scenario & the absence of the transportation loads from some of the summary resource build slides. We believe this is very likely to occur and should be factored into more scenarios. One recent development that helps cement our view is the US Department of Energy just granted $8B to Ford, Nissan & Tesla Motors to accelerate battery development, with the possibility of around $17B for GM and Chrysler available as they emerge from bankruptcy[5]. The other concern is Peak Oil, and if we heed the pessimists, we need to consider 2012 as a likely date. The first suggests a lot of industry money moving into this area, and the second suggests consumer demand for autos will be forced to change due to geological limitations influencing fuel price. Future development of lithium-air batteries may accelerate adoption at an even faster rate. In the next IRP process, the Sierra Club believes transportation loads must be included in more scenarios.

**Economic Forecasts**

[3] http://www.teslamotors.com/blog4/

[4] http://www.teslamotors.com/display_data/Model_S_FAQ.html#

[5] http://seattletimes.nwsource.com/html/politics/2009369625_apusfordenergy.html

At a macro-economic level, we have a concern about the GDP forecast from Global Insights. Consider figure 4-2. The revised GDP projections are suggesting a higher growth rate in future years. This does not mesh with comments from Microsoft CEO Steve Ballmer or General Electric CEO Jeff Immelt, both of which have said we're going through an "economic reset"[6]. If consumers really have gone through a mental shift in consumption patterns similar to how the Depression shaped a generation's behavior towards spending, then we must acknowledge that not only was the last several years of US GDP growth buoyed by a housing bubble, it must also be further curtailed now that consumers are spending differently. Considering one of the largest employers within PSE's service area subscribes to this view and has used it to both delay expansions & curtail future growth, the IRP needs to give this significant credence. This view is incongruous with Global Insights' higher GDP projections. PSE claims impact on Boeing and Microsoft is incorporated into the low growth forecasts (see page 4-9), but it's unclear whether PSE's overall GDP estimates are correct.

**Local Gas Production**

On the natural gas supply front, we are excited by the possibility of small-scale, local natural gas production from both municipal solid waste and the rise of the anaerobic digester. We've heard reports that King County's landfills are flaring natural gas, and startups like Blue Marble Energy were unable to sell gas (produced from seaweed) into PSE's existing pipeline network. While there may be technical considerations for these limitations and these sources today may be marginal, this is the wrong outcome for society. As natural gas is a large but finite resource & a potent greenhouse gas, rejecting the use of natural gas emitted from our own waste streams is silly. We encourage PSE to support these projects & consider partnering with more potential local producers, such as dairy farms, landfills, and other biomass-producing facilities. One side effect may be to ease some of the pipeline capacity limits that PSE appears to be bumping against, and to lower gas transport costs.

**Natural Gas Supply**

From a risk management perspective, diversifying our natural gas supply will help in the event of a supply disruption in Canada. We suspect that expanding existing natural gas pipelines to the Rockies may be a worthwhile investment, if done to bring more natural gas into the Pacific NW for our *local* use.

Beyond the expected concerns around safety, we'd like to proceed cautiously here. Some non-local market participants have had remarkably poor transparency with their plans, and the math around regional pipeline capacity doesn't seem to add up. From our very limited investigation, we cannot tell whether gas companies are planning to build LNG terminals to import natural gas for California (instead of building pipelines from Wyoming to California, or terminals in California), or whether they want to build an LNG import terminal then repurpose it to *export* LNG to Japan (where gas is more expensive,

[6] http://blog.seattletimes.nwsource.com/soundeconomyblog/2009/02/24/this_reset_button_wont_be_easy.html

currently 5x the domestic wellhead price). Regional decision-makers need to take a long term look at what's going on with our pipeline network. The recent price volatility in the US natural gas market has produced a confusing mess, and the capital investment required for an LNG plant seems extremely risky with this volatility. Ratepayers shouldn't subsidize this effort directly or indirectly (through competing for natural gas supplies with California or export terminals).

On the separate topic of LNG storage, in the absence of other large underground storage facilities like Jackson Prairie, we're not opposed to LNG storage, as long as the CO2 impact is factored in and it is operated to overcome pipeline constraints instead of arbitraging natural gas prices to the detriment of ratepayers. When Morgan Stanley is a comparable participant in the oil market with resource extraction companies like Exxon and Chevron, there's an excellent chance the oil market is not serving the best interests of the American people. We feel speculation should play a significantly reduced role in the natural gas market, and LNG is unfortunately a tool that brings natural gas one step closer to oil as a easily tradable commodity, potentially opening the door to significant market manipulation.

**Grid-Parity Solar**

First, we're happy to see PSE consider solar thermal systems as a possible future resource – we recognize this is likely to be cost-competitive sooner than many other alternative energy sources, and we look forward to seeing it as one possible consideration for future base load generation.

However, one intriguing possibility is the idea of solar PV panels being sold at grid-parity. Costs of solar panels are falling, with the lowest-cost panels from First Solar projected to cost around 53 to 63 cents per watt to manufacture in 5 years. While solar may have a way to go before it competes with wholesale electric rates, it is already competitive with retail electric rates in parts of California. It would be interesting to see analysis of solar PV (with lessened subsidies), and what impact we would see from a multitude of small-scale distributed power generators on our power grid.

We're also intrigued by the proposed Teanaway Solar Reserve[7]. While we are skeptical about their ability to compete with wholesale electric rates as well as their specific site, we applaud their effort. We realize that solar farms may not make a significant dent on PSE's peak capacity requirements since peak demand is in the morning & evening, and the seasonal peak demand is during the winter. However, increasing the proportion of our power coming from renewable sources is still a worthy outcome, and could help PSE with I-937 compliance in several years. PSE should consider cooperating with this project, even if the solar power is sold to other utilities in the medium term.

**Resource Cost Assumptions**

[7] http://seattletimes.nwsource.com/html/localnews/2009443136_solar10m.html

There are two technical questions about Figure 3-9: Resource Cost Assumptions. Note that the capacity credit for coal plants is higher than the availability. Why is this? Additionally, there is no fuel cost listed for coal. Is this in the "O&M – Variable" line item, or does PSE view coal costs as fixed costs? We do note that the NWPCC's 6th Power Plan draft has been using a carbon cost around $48/ton, and we believe this is a great starting point.

We share concerns with the Northwest Energy Coalition about the 5% planning reserve capacity credit for wind. If PSE can pair wind with BPA hydropower, peakers, or some advanced battery technology to expand this capacity credit, and if this supports more wind in PSE's portfolio, this would be an excellent outcome. We would prefer to see a number closer to 25%, if the technology can deliver.

**Conservation Programs**

PSE's conservation programs are commendable. The home energy audits look like invaluable tools for targeting specific problems with existing buildings. We also like the new home energy reports for residential customers. Getting this level of awareness of energy usage is necessary if we want to get the biggest bang for the buck from our conservation dollars. And the Good Energy customer awareness program looks interesting as well.

Regardless, we fully support expanding conservation efforts. We believe utilities should pursue conservation until the average cost of conservation equals the average cost of new power generation. This would ensure all cost-effective resources are built until a utility, until conservation efforts reach the average cost of existing generation. Our goals here are to minimize $CO_2$ emissions from natural gas, alleviate the need for LNG imports, and to support social equity for low-income & fixed-income households. If there is a higher conservation program cost associated with fully serving low-income groups that would be disproportionally disadvantaged by higher energy costs, this may still be the correct outcome for society. Even if this delves into more expensive conservation resources, but lowers future fuel cost risks or does achieve equity for our people, this should be recognized, pursued, and rewarded.

**Conservation as Risk Mitigation**

Conservation will help make other goals more achievable by mitigating risks. System-wide, one potential risk is a judicial mandate to breech four dams on the lower Snake River, reducing hydropower. Another risk is a carbon risk – while there are no set timetables for closing coal plants, the writing's on the wall. Their days are numbered. We also suggest avoiding LNG imports. Additionally, energy market speculation from Wall Street presents as much risk to cost as any other supply constraint, natural or political. Any conservation efforts that reduce our energy demand will move us to a world where we can accept these risks. This risk mitigation itself has a societal value (beyond the lower energy consumption) and should be reflected as an economic value and/or a regulatory or legislative mandate.

We encourage PSE and its regulators to think hard about the right mechanism to recognize risk mitigation. Perhaps we could establish an additional mechanism through the legislature, but one created by the utilities & their regulators may be more effective.

The Northwest Power & Conservation Council's copious analytical abilities and extensive research of conservation options in the 6th Power Plan give us immense hope for the future. Clever ideas such as a gravity-film heat exchanger show how continuously improving technology will open more doors for cost-effective conservation in new construction & potentially retrofitting existing buildings. As water becomes a critical resource, perhaps the utility's energy conservation efforts may find themselves more entangled with water utilities. If the Northwest, in another decade or two, moves to a system of providing grey water in addition to potable tap water, perhaps conservation efforts will have even more opportunities. We ask PSE to continue pushing hard on conservation, and explore new ways to reduce energy demand.

**Minor Points**

- PSE is not anticipating geothermal or offshore wind, even after 2020? While these resources may be too far out to quantitatively model, they should not be ignored entirely. How can this be squared with Northwest Power and Conservation Council projections?
- Have PSE's hydro power resource projections been adjusted to reflect lower regional snowpack caused by climate change? Assuming that long-term average snowpack levels will be sustained for the next twenty years presents a huge risk to PSE's portfolio.

Thanks for your consideration.

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