James Adcock, Puget Sound Energy Ratepayer, Electrical Engineer, July 25 2013

Comments on:

Puget Sound Energy, Inc.

2013 Integrated Resource Pan, Dockets UE-120767 and UG-120768

I ask that Commission "***Not Accept***" this PSE IRP because of the following reasons, individually or together:

PSE:

1) Refuses to design to "***lowest reasonable cost***" as defined by the IRP statute.
2) Denies meaningful public participation as required by the statute.
3) Creates an unreasonable engineering design by denying the reality of climate change impacts on that design.
4) Contrary to the IRP representation, PSE's own data shows that Colstrip 1&2 do not reasonably survive the planning period when evaluated against reasonable EPA estimated CO2 costs. Thus PSE should be planning for their retirement within this 20-year planning period.
5) Proposes using ratepayer funds to expand their current natural gas monopoly into a new business of LNG transportation fuels.
6) Misrepresents the cost of Wind extraordinarily high in order to avoid including Wind meaningfully in their analysis.
7) Fails to create a reasonable engineering IRP plan of action "A Plan" as required by the statute – not just a bunch of possible scenarios.

James Adcock, electrical engineer, graduate of MIT, expertise in statistical analysis, including holding patents in the area. Currently a private investor, widely diversified, long term holder of the entire tradable securities market, who does not profit from investments made or not made in the electrical nor natural gas market. My only interest is literally to try to preserve the planet for the future of my children, and to try to preserve the natural God-given beauty of the Pacific Northwest for all to enjoy, into the future, against needless and ***uneconomic*** destruction.

IRP, Integrated Resource Plan, A Plan, The Plan: WAC 480-100-238 a) "Integrated resource plan" or "plan" means ***A plan*** describing the ***mix*** of energy supply resources and conservation that will meet current and future needs at ***the lowest reasonable cost*** to the utility and its ratepayers. [where ***lowest reasonable cost*** is explicitly defined in WAC 480-100-238. Not a bunch of scenarios, but rather ***A Plan***]

Internalized CO2 Costs: Designing and operating the generation of an electrical utility to actually include the impact costs of CO2 pollution on human society, and thereby on the

economy, as required in the IRP analysis regulations, and as is required by state legislature findings, and as actually implemented by the other major state utilities except for PSE. Note that the CO2 pollution costs on Society aka "Social Costs of Carbon" SCC are often – incorrectly – thought of as being the values that environmentalists put on saving the environment. This is false. Current SCC estimates are made by economists based on best climate change science estimating the damage of CO2 pollution on the ***economy***, not on the actual ***environment***, nor on our preferences to maintain that environment. The preference we, as a society, place on maintaining the environment is called the "Existence Value" of the environment – the monetary value we as a society would place on the continued existence of polar bears, orca whales, the National Parks, etc. This "Existence Value" is not even included at all in current SCC estimates because the economists doing these estimates admit they do not know how to calculate "Existence Value." Again, SCC calculates actual damages to the business economy, and therefore the job market, but not the environment. Including these actual environmental damages would greatly increase SCC even higher, in a manner which is not currently calculated.

SCC is not a calculation of an environmentalist preference. It is a measure of the damage of CO2 pollution on the economy, and therefore on the job market. When we needlessly and uneconomically damage the economy, we also damage the job market. A weakened economy results in a weakened job market – as we have clearly demonstrated in the recent economic crash. Needless and excessive CO2 pollution damages the economy while it damages the job market – Lose-Lose.

PSE Refuses to design to Lowest Reasonable Cost

The required IRP design process is a paper design of a possible but reasonable future design, forward-looking 20 years, designed to minimize total costs on a "***lowest reasonable cost***" basis as defined in the statute, which includes environmental damage costs – included environmental damages from CO2. The IRP is intended to force utilities, UTC, and ratepayers to look to the future in utility design, rather than simply being short-term reactive, to try to avoid repeats of "down the garden path" mistakes like WPPSS. The IRP also informs the RFP process, the new facilities decisions, and the decision when to retire, but does not force a literally one-to-one correspondence between the IRP design and the future decisions that PSE makes, with oversight and concurrence from UTC. For simplicities' sake in description, these comments does not attempt to always literally describe this distinction between the IRP paper design, and the actual system design decisions eventually made in the future, informed by the IRP. We recognize that this distinction always applies herein going forward, whether stated explicit or not: this paper always is referring to the IRP Plan 20-year future forward looking, not PSE actual operations today.

WAC 480-100-238

(1) ... each electric utility must develop an "***integrated resource plan***."

(a) "***Integrated resource plan***" or "plan" means a plan describing the mix of energy supply resources and conservation that will meet current and future needs at the ***lowest reasonable cost*** to the ***utility and its ratepayers***.

(b) "***Lowest reasonable cost***" means the lowest cost ***mix of resources*** determined through a detailed and consistent analysis of a wide range of commercially available sources. 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 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***.

Note the requirement to design the IRP not for "Lowest Rates" but rather to "***Lowest Reasonable Cost***" – a term defined in the statute to include costs of environmental damages.

The common name given to the "***cost of risks associated with environmental effects of emissions of carbon dioxide"*** is the Social Cost of Carbon (SCC.) These costs have been estimated by numerous independent, peer reviewed, scientific studies around the world. In turn these costs have been reviewed and combined in a scientifically valid manner to form a "Best Estimate" by the federal agencies, EPA et al, originally in ***EPA TSDSCC,*** currently in ***EPA TUSCC*** -- Technical Support Document: - Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis – Under Executive Order 12866 – Interagency Working Group on Social Cost of Carbon, United States Government. Combining independent scientific analyses into one or more fair-minded "consensus" CO2 costs numbers is not a trivial matter, but requires scientific expertise, and often a committee of scientist deliberations. EPA has performed these scientific analyses in creating their SCC costs. PSE has not, rather pulling numbers from various papers "rabbit out of a hat." In particular PSE's labelling of its numbers are sharply at odds with the scientific estimates, where PSE labels as a "High Cost" CO2 cost [the high end of the range of possibilities] what EPA estimates to be a reasonable "Middle of the Range" [most probable] CO2 cost.

RCW 19.280.030 (1) (d) "A comparative evaluation of renewable and nonrenewable generating resources, including transmission and distribution delivery costs, and conservation and efficiency resources using 'lowest reasonable cost" as a criterion;" -- but PSE does not use "***lowest reasonable cost***" as their criterion, rather they use "lowest costs" as in "lowest rates", ignoring the costs of the risks of environmental damage by setting them to $0 in the Base Case actual IPR plan of action.

"Clawback" – PSE assumes that CO2 emissions made today are "for free" "we have gotten away with something – good for us!" but this is not necessarily the case. First of all, from "***Prisoner's Dilemma***" we know that when we cheat on others, they respond by cheating on us – this is "Gaming Theory 101" and even our legislators recognize this – this is why they consistently say in their legislative findings "we must do our part to reduce CO2 emissions" – they know that what goes around comes around, and when we dump on others, they respond by dumping on us. But it goes farther than this. As the nation begins to implement CO2

regulations, powerful states such as California who have already seriously invested in renewables will ask – strongly – that the "voluntary" contributions they have already made be recognized in law. And relatively speaking this means that those who have not be making contributions to solving the CO2 problem, but rather have been ***free riding***, such as PSE, will relatively speaking be subject to "clawback" – required penalty payment for previous ill-gotten gains. A benefit to California is relatively-speaking a penalty to PSE ratepayers So the ratepayer of say five years hence is going to be paying a "clawback" penalty for the PSE CO2 pollution which is happening today. "There is no free lunch." Rather, today's PSE ratepayer is eating tomorrow's PSE ratepayer's lunch. And our children, and their children, will be paying the highest price of all. Today's PSE's "pennies wise" behavior becomes the "pounds foolish" behavior which our children and our grandchildren will be forced, against their will, to pay for.

When CO2 emissions can be reduced at a cost less than the SCC, then these CO2 emissions should be reduced. To not do so is to needlessly damage the economy, leading to less wealth for everyone. On the contrary, if say a CO2-free renewables generation scheme incrementally costs more than the SCC, then that CO2-free scheme should not be implemented, because it is not economic to do so – implementing that scheme then would represent a damage to the economy. This way of thinking is not new to the utility, nor to the UTC, it is the same thinking that is applied to conservation, namely that the utility needs to implement all cost effective conservation, but not more. Similarly to be best benefit human society, to best benefit the economy, the utility should be implementing all SCC cost-effective reductions in CO2 emissions, but not more. SCC Cost effective schemes should be used, such as replacing coal with natural gas, but SCC cost ineffective schemes should not be used, such as [to choose an extreme example] requiring 100% generation by residential solar.

The IRP statute requires that PSE must develop ***A*** actual ***plan*** of action, not a bunch of "scenarios" but rather ***A*** actual ***Plan***. While PSE explores a bunch of "scenarios" the PSE actual plan of action – "The Base Case" – they submit does not meet the definition of "***lowest reasonable cost***" because PSE's "Base Case" plan ignores the risks of CO2 imposed on ratepayers and their children and grandchildren, it ignores public policies regarding resource preference, and by setting the SCC cost of CO2 to $0 it ignores the cost of risks associated with environmental effects including emissions of carbon dioxide. When PSE sets the cost of CO2 to $0 in their Base Case engineering design that is identically the same as PSE denying that climate change exists, for if it did exist then it would be having damaging effects on the economy, and the CO2 cost would be greater than $0. So by setting CO2 costs to $0 PSE is denying climate change, contrary to PSE's public representation on their company web page, recognizing the reality of climate change, and PSE's need to respond. And in developing this plan, PSE must examine not just the impacts on the utility itself from the perspective of the utility, but also the impacts on its customers, the ratepayers, from their perspective. "…the mix of energy supply resources and conservation that will meet current and future needs at the lowest reasonable cost to the utility ***and its ratepayers***." These perspectives (the utility's vs. the ratepayers') ***are not*** identical – they are not even similar. The utility does not substantially experience the externalities caused by CO2 emissions – at least not until state and federal regulators force internalization of these CO2 costs [whether those regulations are some kind of trading scheme, or by ***Command and Control***], but the ratepayer does experience the CO2 costs whether or not

federal regulation forces internalization of their costs, through the destruction of the economy, destruction of the pristine beauty of the PNW – which is why we all live here in the first place – and ultimately through the destructions of the lives of our children and grandchildren. Further, the utility views the world from an extremely short-term focus driven by extremely high 7%-8% discount rates, whereas the ratepayer, as a member of society, sees the world through a much lower discount rate of 1-2-3% -- the social rate of discounting – and desiring the continued healthy and happy lives of their children and grandchildren. Fed 30 year T-bill rate is indicative of the social benefits hurdle rate – being currently about 1.5 – 2.0% in real dollars after correcting for inflation. Society must take a long term view of the world – if society wants to continue to exist. We use terms such as "patriotism" to describe the preference we have for our form of government, and for gentle societies, to continue to exist. This continued existence of our society requires an assumed low discount rate for social investing, including the "investment" in our children's continued existence, rather than for today's immediate consumption. Without a low social discount rate the lives of our children and grandchildren literally count for nothing. But the utility must make its short term profit. These are entirely different views of the world, and not surprisingly lead to conflict. Short term profit, or long term continued existence of human society? Choose one. A 7% discount rate implies that the lives of our grandchildren are only worth 1% as much as the lives of their grandparents. Even a social investing 2% discount rate implies the lives of our grandchildren are only worth 30% as the lives of their grandparents. The IRP statutes requires PSE to generate the IRP not just from the point of view of PSE, but also from the point of view of the ratepayers. But PSE does not do this. In the IRP, and in the IRPAG meetings, PSE literally refuses to acknowledge any viewpoint other than their own, by not allowing participants to even speak.

"Lowest Reasonable Cost" includes:

Risks imposed on ratepayers, including the environmental risks imposed by climate change. Not just the risk to PSE, but also the risk to ratepayers. These risks include direct and indirect risks. The risks of having an electrical system poorly designed and built for the tasks it currently actually faces. The risks of having to pay for a system needlessly overbuilt for winter cold snaps, but at the same time underprotected from actual loss of transmission lines and resulting power outages "Loss of Load" during winter storms. A system facing risks of high regulatory costs which PSE steadfastly refuses to acknowledge. The loss of PNW's reputation of being a clean and caring community with a pristine environment, able to draw world-leading talent from around the globe – and able to draw tourist dollars from around the globe, here to enjoy some of the world's best outdoor recreation, including (now melting and flooding leading to road washout and loss of access to) Mt. Rainier National Park, and (now flooding and losing the beaches of) Olympic National Park.

"***Public Policies***" include consistent legislative findings that we must do our part to reduce CO2 emissions and global warming.

The statistical range of costs, aka SCC, aka "***cost of risks***" of the actual environmental effects of CO2 emissions. Not the risk of CO2 taxes, but rather the actual risk of the actual environmental

damages – which the ratepayer experiences – whether or not those actual environmental damages are associated with state or federal taxes.

EPA TSD -- Technical Support Document: - Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis – Under Executive Order 12866 – Interagency Working Group on Social Cost of Carbon, United States Government. Shows that the current, consensus, science-based estimate of CO2 costs is $45.80 / ton CO2. In comparison PSE misrepresents $30 / ton CO2 as being a "High Estimate." PSE fails to acknowledge the announced CAA regulatory reality.

IRP Page 2 – 8 PSE misrepresents carbon costs, PSE represents $25 / ton CO2 in 2017 as being "Very High" carbon costs whereas the ***EPA TUSCC*** shows 2017 $50.40 / ton CO2 as being a "Medium" carbon cost. IE PSE's claimed "Very High" Carbon Cost is 2X lower than EPA's "Medium" carbon cost. EPA "High Carbon Cost" aka "Avoiding Fat Tail Risk" is $117.00 / ton CO2 – PSE's "Very High" carbon cost is more than 4X lower than EPA's "High" carbon cost. But then ultimately in the cover letter to the submitted IRP, PSE discards even these PSE-misrepresented carbon costs, unreasonably setting their Base Case design to a SCC of $0 – ultimately PSE denies climate change entirely.

Massachusetts v. EPA Supreme Court decision 549 U.S. 497 (2007): "While there may be disagreement on the appropriate level of the Social Cost of Carbon, it is not zero." Established a requirement of Obama Administration to Act, both on new sources (new coal power plants) and existing sources (existing coal power plants.) "This is a suit by a State for an injury to it in its capacity of quasi-sovereign. In that capacity the State has an interest independent of and behind the titles of its citizens, in all the earth and air within its domain. It has the last word as to whether its mountains shall be stripped of their forests and its inhabitants shall breathe pure air." This is literally the situation before us, because as CO2 emissions raise temperatures, forest scientists find that ***all*** subalpine native forests in the PNW will go extinct in this century, from fire, bark beetle, drought, etc. caused by climate change.

Fat Tail Risk – the extra economic weighting that needs to be applied to a reasonable "insurance cost" that accounts for the unlikely, but more extreme economic damages case, of a sudden and catastrophic loss of planet, rather than more generally assumed slow and gradual loss of planet over the next century. "Fat Tail Risk" includes such items as sudden loss of Antarctic Ice Sheet, Sudden Loss of Greenland Ice Sheet, Sudden Release of Artic Methane – all cases of sudden, unpreventable, and irreversible loss of planetary function. These less likely but even more devastating risks must be assigned a higher economic "insurance" weight to properly account for their potential devastating effects on human society, and the resulting destruction of the economy. If we were to design to avoid the Fat Tail Risk then we must assign a $ / ton CO2 cost about double the Middle CO2 costs – Fat Tail Risk implies a current EPA 2013 $101 / ton CO2.

PSE misrepresents the regulatory risks associated with their choice of using the $0 / ton denying-climate-change scenario as Base Case "The Plan". PSE represents that the only possible regulatory risk is Federal Congress agreeing to a GHG Cap and Trade "carbon tax" scheme – and then discounts this risk as being negligible. On the contrary, **Mass v. EPA** shows that Obama has

an obligation to act under CAA to control CO2, and has been remiss in not acting sooner. New Source Control [new coal power plants] has already been announced, and more recently in Obama's "Flat Earth Speech" June 25 2013 he stated that CAA control over existing CO2 sources is coming soon. Further, Commissioners have the ability to control PSE's actions based on ***"all ways just and reasonable"*** and ***"lowest reasonable cost."*** Also, there are efforts underway in-state to control carbon emissions by citizen initiative.

Is it ***"in all ways just and reasonable" J&R*** to destroy the planet and future generations of the human race for a small reduction in rates paid today? I ask this as a serious question. The state legislature repeatedly finds that it is necessary that we do our part. But PSE does not do so. The state legislature finds that it is necessary that utilities internalize CO2 costs. But PSE does not do so. Is it ***J&R*** for PSE to sharply increase CO2 pollution at the same time the other Washington State utilities are working earnestly to create real plans of actual action to generate more clean renewables, and reduce CO2 emissions? At the same time PSE plans to increase CO2 pollution to 45% over 2020 state targets, while selling off their renewables projects [Lower Snake II.] Are these PSE actions to ***free ride*** off of the good efforts of other utilities and ratepayers ***"in all ways just and reasonable?"***

"Free Ride" – a term in economics which describes by analogy to the person who ride a public bus without paying the bus fare – in the case of businesses where one business seeks economic advantage over other businesses by "cheating" on the established rules of required behavior, such that the other businesses are forced to absorb the costs of the ***"free rider."*** PSE takes a ***"free ride"*** by radically increasing their CO2 emissions while other utilities are diligently working to meet state 2020 goals to reduce their CO2 emissions. PSE takes a ***"free ride"*** while the construction industry increases building conservation efforts, and ratepayers pay-up to buy lower CO2 emitting vehicles, etc. PSE is not reasonably doing its fair share of the effort to reduce CO2 emissions, PSE is ***"free riding"*** at the expense of the rest of society.

"The Plan" – after PSE has described a variety of different ***"scenarios"*** to participants and the IRPAG meetings are all completed, then PSE changes the meaning of the information which has been presented to IRPAG participants by announcing in a cover letter to Commissioners that the only ***"scenario"*** that actually counts is the ***"climate change deniers scenario"*** Base Case where PSE claims that the economic damages to society from their CO2 pollution is exactly $0 / ton.

"Climate Change Denial Scenario" – a representative name given to the PSE "Base Case" plan which ignores science, especially the modern science of climatology, and asserts that the damages to human society is exactly $0 / ton CO2. A plan with also ignores the ***lowest reasonable cost*** requirements of I-937 IRP planning and which also ignores the legislative findings of the requirement to internalize CO2 costs. See also Supreme Court ***Mass v. EPA*** – "there may be disagreements about the correct cost to society of CO2 emissions – but we know it's not zero!" Obama: "I don't have much patience for anybody who argues the problem is not real. We don't have time for a meeting of the Flat Earth Society." June 25 2013, announcing near-term plans to regulate existing sources [existing coal power plants] under the CAA.

Existing Stationary Source Regulatory Announcement: Obama's speech of June 25 2013 stating his near-term intention via EPA regulations under the ***CAA*** to regulate emissions from existing coal power plants as well as new coal power plants. One possible form of these regulations is anticipated to be capacity derating whereby coal power plants are only allowed to generate a fraction of their possible yearly production, thereby reducing CO2 emissions.

Mass v. EPA: Massachusetts v. Environmental Protection Agency, 549 U.S. 497 (2007), is a U.S. Supreme Court case decided for the states in which twelve states and several cities of the United States brought suit against the Environmental Protection Agency (EPA) to force that federal agency to regulate carbon dioxide and other greenhouse gases (GHGs) as pollutants. A finding which also stated that while there may be disagreements about what the correct scientific costs of CO2 emissions should be, the answer is certainly ***not*** $0 / ton. This decision also forces the Obama Administration to regulate CO2 emissions from stationary sources both old and new, such as coal power plants. The Obama Administration chose to first focus on new coal power plants, and now is in the process of issuing regulations on old coal power plants [Obama "Flat Earth" speech June 25, 2013]

CAA: Clean Air Act – the act of Congress under which the President [***"Obama"***] is required to regulate air pollution, including CO2, as affirmed in Supreme Court ***Mass v. EPA,*** both ***new sources*** and ***old sources.***

New Source – a new source of air pollution, effectively CO2 pollution, primarily new coal power plants, which are required to be controlled by the CAA. But new coal power plants are already effectively prohibited under state law.

Old Source, Existing Source – an existing source of air pollution, effectively CO2 pollution, haze, and mercury, etc. effectively meaning existing coal power plants, such as Colstrip 1&2. Required also to be regulated by ***Obama*** under ***Mass v. EPA***

Obama: President Obama, or the federal administration working under his direction, including most prominently EPA, all required under ***CAA*** and ***Mass v. EPA*** to actually regulate CO2 and other coal power plant pollution emissions, both from new coal power plants, and also from existing coal power plants.

Shadow Price: a regulatory action which effectively sets a price on CO2 emissions without actually setting up a system of cap and trade that literally establishes such a price. Such a regulatory action might force emissions reductions per plant by setting nameplate reductions – "By 2020 existing coal power plants can only run at a maximum 50% power point relative to their design ratings" – for example, or it might leave the actual design of CO2 reductions to individual states, or regional state consortiums, as long as actual CO2 reductions are actually met.

EPA TSDSCC: *Technical Support Document: - Social Cost of Carbon for Regulator Impact Analysis – Under Executive Order 12866*. A now-outdated [see below] EPA et al document establishing $32.84 / ton as a "Middle" reasonable, scientific consensus, actionable, "Middle Most Likely Scientific Estimate" of actual CO2 costs for 2013. EPA lists two "reasonable"

actionable discount rates – 2.5% and 3.0% -- and corresponding SCCs and I herein average these two EPA values to find a single "Middle" EPA value (per year) for discussion herein. CO2 damage costs to economy increase rapidly as a function of time as the climate and the environment, and therefore the affected economy, becomes more and more damaged, thus later years under discussion, such as 2017, have higher SCC than year 2013. PSE misrepresents to their own benefit these EPA "Middle" CO2 costs as instead being "High Cost" outlier estimates. In doing so PSE misrepresents the current best understanding of climate science, substituting their own preferences – without a reasonable scientific rationale to explain why PSE's understanding of climate science is superior to that of the consensus value of actual real actual published peer-reviewed climatologists.

EPA TUSCC: *Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866*, Interagency Working Group on Social Cost of Carbon, United States Government. An EPA et al document establishing $45.80 / ton as a reasonable, scientific consensus, actionable, "middle estimate" of actual CO2 costs for 2013. As scientists and regulators more closely examine the totality of damages to the planet, and therefore the economy, the estimate of CO2 damage costs are increasing rapidly, and as the planet becomes more damaged CO2 damage costs are again increasing rapidly.

Knock-out Price: The CO2 cost, based on PSE's own estimates, at which continuing to operate Colstrip 1&2 unreasonably creates more damage to the economy and thereby human society, than to reasonably discontinue operation. PSE's own Figure 5-22 lists this price as being $30 / ton CO2 [under reasonable assumptions of gas prices], a price also independently estimated by Northwest Council. IE the price at which if PSE actually reasonably did ***internalize CO2 costs*** PSE would retire Colstrip 1&2 and operate other units, such as gas turbines instead, which have lower CO2 emissions and therefore lower CO2 costs.

Out of the Money: When CO2 costs exceed the benefit of running Colstrip 1&2, if PSE were to reasonably internalize CO2 costs, then Colstrip 1&2 are referred to as being "Out of the Money" meaning that other units, including PSE's own gas turbines, should be preferably run as being the lowest "Mid-C comparable prices" – these other lower CO2 emissions units then "Win the Auction" compared to Colstrip 1&2 and are allowed to run at lower total cost to society than Colstrip 1&2. When other units win the auction, the Colstrip 1&2 are "Out of the Money" – they have lost the auction. Reasonable utility actions to minimize costs is often compared to public auction, since the public Mid-C price is one choice that the utility ought to be using in comparison to their own internal costs whenever it is more economical to do so. This comparison is often theoretical rather than real, where utilities including PSE should be using it to evaluate their own internal dispatch choices in order to minimize costs. PSE's own estimates are that Colstrip 1&2 are "Out of the Money" at $30 / ton CO2 – a value also confirmed in Northwest Council public presentations. This is lower than current EPA best consensus scientific estimates of $45.80 / ton CO2 – i.e. continuing to run Colstrip 1&2 causes societal damages of $18 / ton CO2 in excess of Colstrip 1&2's value to society. Of course PSE currently would prefer to continue to run Colstrip 1&2 – because currently PSE is not paying for these

excessive CO2 damages, but rather society is paying for these excessive CO2 damages. PSE uses their monopoly power to force these damages onto society for PSE private benefit.

Ignores State CO2 Targets: IRP Figure 5-23 Base Case shows that PSE is proposing to increase CO2 pollution to 45% above 1990 levels by 2020 – a time when state requirements are to ***reduce*** CO2 down to 1990 levels. IE PSE proposes CO2 levels which are unreasonably too high by 45% by state standards. This represents increased PSE CO2 pollution of 3,000,000 tons per year, or excessive SCC damages of $135,000,000 per year. On the contrary to the PSE proposal, the target 2020 reductions are readily achievable. PSE identifies approaches to meet these reductions in 4 out of the 10 portfolios "schenarios" they examined – PSE has the technical ability to meet these goals, it simply chooses not to. This is in comparison to Seattle City Light, which listened to its IRPAG participants, and chose actions that do meet the state 2020 targets for CO2 emissions. It is possible to meet the state 2020 targets, but PSE in this IRP chooses to explicitly plan to ignore those 2020 targets.

In the RCW 80.80.005 legislative findings 1) d) it is mandated, not optional, to include the life-cycle costs of CO2 emissions. PSE does not do so in their actual "The Plan" Base Case. 4) b) further electrical utilities are to internalize the costs of [CO2] emissions and reduce ratepayer exposure to costs associated with future regulations – namely the ***Existing Stationary Source Regulatory Announcement*** which Obama made June 25 2013. PSE ignores these regulations, asserting that PSE will not reduce CO2 emissions, nor include the cost of CO2 in their IRP planning, unless and until Congress passes a Cap and Trade bill. PSE asserts, incorrectly, that their only regulatory requirement, and risk, is to any future hypothetical federal cap and trade regulation passed by congress. On the contrary in this 20-year IRP Plan, PSE needs to respond to current state regulations including the IRP regulations, future possible state and regional regulations including future citizen initiatives, and to announced, and/or reasonably anticipatable federal regulations.

In summary PSE has ignored the regulatory requirement to actually design the IRP to "***lowest reasonable cost***" because if they did so it would indicate that Colstrip 1&2 should be retired. Since PSE has not followed the requirements for the design of the IRP, it should be "***Not Accepted.***"

PSE Denies Meaningful Public Participation

PSE has demonstrated a pattern of consistently refusing to produce in a timely manner documents which are clearly required to be part of the public record, and which are necessary to inform IRP participation. Examples include ignoring Judge Moss' direction to contemporaneous submit minimally redacted public versions of documents and testimony in the TransAlta Coal Transition APA, and refusal to produce an actual RFP ranking as required by WAC 480-1-7-035 (3) Industrial Customers reports similar problems where PSE refuses to produce documents or otherwise explain their results. PSE's continued refusal to produce publicly required documents prevents meaningful IRPAG participation.

"Public Participation" -- During public IRP meetings PSE consistently, repeatedly, and in on-going manner refused to allow me to speak to the need for PSE to meet IRP requirements 2b "***lowest reasonable cost including environmental effects of carbon dioxide***" while at the same time -- each and every time -- submitted their own invented definition instead of "Lowest Rates" [ignoring ***environmental effects***] at the start of each and every meeting. Mr. Popoff and Mr. Hazzard went so far as to engage in a "shout down" to prevent me from trying to correct this on-going PSE misrepresentation of IRP regulations. The two gentlemen in turn allowed discussions to go on for literally hours about subjects which were less controversial to PSE. I ask that Commission make it clear that "public participation" does not allow PSE to engage in content censorship of participant communication to PSE and to other participants. PSE acts to limit conversations to only those subjects that PSE wishes to address. On the contrary the clear intent of the IRP process is to get utilities to consider issues they have failed to consider on their own. At the IRPAG meetings PSE is simply trying to "run out the clock" – talking to death uncontroversial subjects while denying IRPAG discussion of the controversial parts, and then repeating this practice over and over again every two years, so that meaningful IRP Planning progress can never be made.

Preventing participation in the IRP*:** PSE essentially prevented my participation in the IRPAG group by stating repeatedly that I was not allowed to respond to the miss-assertion made by PSE at the start of every single IRPAG meeting that the requirements of the IRP plan are for "lowest rates" [PSE's assertion] and not "lowest reasonable cost***" [as defined in the RCW.] PSE consistently refused to acknowledge my request to comment. PSE [Mr. Popoff and members of his staff] insisted on holding the floor almost continuously, and talked literally for hours without taking comments or questions. PSE did allow Sierra Club to take over one meeting and responded exclusively to Sierra Club at that meeting, while at the same time not allowing me to ask questions, or talk at all, at other meetings. Does one have to show up with lawyers to be acknowledged by PSE at the IRPAG meetings? Does ***public participation*** mean that one has to show up with lawyers and engage in a lawsuit before PSE will acknowledge a member of the public? Further, PSE repeatedly blocked access to public documents I requested from them. Not PSE proprietary documents. Rather documents which PSE has a clear requirement to make public. The reason for these PSE blocking actions is very simple: I wanted to point out that PSE's obligation under the IRP regulations are to generate ***A plan*** based on ***"lowest reasonable cost"*** not PSE's approach of describing ***multiple scenarios*** and then choosing one particular scenario after the IRPAG meetings have all happened (thereby changing the meaning of all the presentations that PSE has given to the participants) – namely changing after the fact to the ***$0 / ton CO2 denying-climate-change scenario*** to be "The Plan" – a plan which does not meet the definition of ***"lowest reasonable cost."*** I ask that Commissioners make it clear that PSE is not allowed to engage in ***"content censorship"*** – that the whole point of ***public participation*** is that a utility be forced to consider other idea, other points of view, and other assessments of the risks to ratepayers and society than the utility's own historical point of view – and to respond to those points of criticism in a way that allows Commissioners to consider whether or not the utilities choice of actions ***["The Plan"]*** are ***"in all ways just and reasonable" J&R*** and which meet the actual stated ***I-937 requirements.***

Please note that PSE skipped over some of the slides included in the IRPAG meeting handouts which PSE reasonably anticipated might be more controversial than average. Thus the IRPAG meeting handout Powerpoints do not reasonably represent what PSE actually presented at meetings. And of what was presented at the meetings, PSE did not give IRPAG participants reasonable opportunity to respond to ask questions to many if not most of the slides. PSE was particularly pointed in ignoring my raised hand, and not responding to my questions, "*freezing me out*" of participation. Again, does one have to show up with lawyers for PSE to permit ***public participation***? When I emailed comments, questions, and requests for public documents to Mr. Popoff, he was not responsive to my contacts, including my requests for the required public RFP ranking documents.

I ask that PSE be required to record future IRPAG meetings, so that any future disagreements between what did or did not happen in IRPAG meetings be recorded, and that PSE be required to log, and log their response to, any response cards that PSE presents to IRPAG participants. Further that PSE be required to record and log email questions, comments, and requests for documentation, and when and how, if any, PSE responded to those requests. Other utilities are already maintaining such logs, it is reasonable to do so. Further, I ask that PSE be required to restore public access to prior IRP plans, which they have recently removed from their website. Access to paper versions of these documents at UTC Olympia does not represent a realistic alternative to participants.

Request for RFP Ranking: State regulations require PSE to create a public actual RFP ranking document and to make it available on request at the company's place of business. As a participant in IRPAG meetings I have been denied as reasonable opportunity to participate by PSE's repeated actions to delay and deny access to publicly required documents that I needed to be a reasonably informed IRPAG participant. Not documents that are private to PSE, but rather documents that PSE is already required to make public. WAC 480-107-035 Project ranking procedure requires PSE to make public at their place of business the actual ranking of RFP projects. I needed to see this to see if PSE was reasonably choosing lowest cost approaches to generating electricity. I asked Mr. Popoff to provide this. He said he would, but then never responded. Eventually I went to PSE place of business, as required in WAC 480-107-035, and asked to see the required project ranking but was told that none existed. I petitioned UTC staff for assistance in this. What I was shown, eventually, months later, after petitioning UTC, was a partial ranking, not an actual ranking, stating at which of three PSE evaluation rounds a particular proposal was knocked out. Not a ranking. Rather a knock-out round statement. We know such a real ranking exists, because PSE expert witness in front of Judge Moss in the TransAlta APA acknowledge that TransAlta was not the lowest cost project, but rather was the second-lowest cost project. And in the case of the TransAlta APA I was denied access to the [as required by Judge Moss' orders] "minimally redacted as to planning details only" public versions of submitted public testimony and evidence, by PSE failing to properly concomitantly submit these publicly-viewable versions of testimony and evidence as required by judge's order. On the contrary PSE hid the fact that they were not submitting properly minimally redacted documents by submitting "dummy documents" – documents which on the surface appeared to be the required public versions, but when one read past the cover letter, one found that the contents had

been literally 100% redacted, not properly "minimally redacted." Only many months later at my insistence was the public record corrected by PSE submitting the "minimally redacted" public versions of the documents – after proceedings had completed, and after the IRPAG meeting had been held. Further, there are other cases where it appears that PSE has improperly redacted as being "proprietary" information that they have published publicly elsewhere. For example PSE redacted a "RFP resource proposals by location" map which PSE had already made publicly available on their website as part of their RFP documentation. Once a company publicly releases "proprietary" information, then that information is no longer "proprietary" and thus cannot be redacted from the public record. Ratepayers and IRPAG participants need actual access to publicly required documents so that they may be reasonably informed of whether or not a utility is meeting its statutory requirements, and operating in a ***"lowest reasonable cost"*** manner. Deliberately acting to keep the public in the dark is unfair and unreasonable. There is a reason why we have "Sunshine Laws." By refusing to provide publicly required documents that PSE has violated the reasonable "***public participation***" requirement of the IRP process.

PSE and Mr. Popoff were unresponsive to participants' requests for data, questions and other issues. At the early IRPAG meetings Mr. Hazzard (PSE's "facilitator") asked participants to write down on provided pieces of paper questions and comments for PSE to follow-up on. But PSE never followed-up on those questions or comments. Only several meetings later, after numerous complaints, did PSE start to respond to question and comments by – dismissively – discussing those comments briefly at the start of the next IRPAG meeting. The questions were never addressed seriously. The questions and comments from the early IRPAG meetings were never discussed, and where never followed up. They were effectively simply "shredded." I ask that in future IRP's that PSE be required to publicly log and respond to all questions, comments, and email, and that the PSE response be part of this log. Other utilities are already doing this. In this IRP I ask that Commission find that PSE's consistent failure to respond violates the fair "public participation" requirement of the IRP process.

I ask that previous, current and future PSE IRP plans, and meeting handouts remain available online in electronic form, hosted either at WUTC or at PSE's website. WUTC has declined to host these electronic versions, PSE had hosted them in previously years, but now PSE has suddenly withdrawn them from their website. It is important that we maintain this public record of previous IRPs so we can use previous efforts to inform future efforts – to keep the plans on track. It is not reasonable to ask participants to trek down to Olympia to read the previous IRPs in paper form. Please require PSE to put the previous IRPs back up on their website, or host them at the WUTC website. This is yet another example of PSE preventing participants' reasonable access to public required documents.

PSE has allowed no public participation in the IRP process – except perhaps to Sierra Club's lawyers. Except for these lawyers the PSE IRP process has been: PSE gives a presentation and the audience listens. When I raise a hand to ask a question, or to question the veracity of a statement, PSE refuses to acknowledge me. PSE shows a consistent pattern of ducking the IRPAG participants probing questions, and contrary comments. The intent of the IRP Process is not to rubber stamp a utility's plans. The intent of the IRP Process is to discover weaknesses in a

utility's plans, so that those weaknesses can be fixed before ratepayer dollars are wasted by that utility. By refusing comments and questions that challenge PSE's own assumptions, PSE defeats the whole intent of the IRP Process. By refusing comments and questions PSE raises costs to ratepayers, thus defeating the "***lowest reasonable price***" principle. I ask that IRPAG participants be allowed real participation in PSE IRPs, including being able to ask questions that PSE does not want raised, and making comments and objections pointing out weaknesses in PSE's plans, even when PSE does not want those weaknesses to be exposed.

I ask when evaluating PSE's IRP that Commission compare to the behavior of Seattle City Light in the generation of their IRP, how they included IRPAG participants in the design and evaluation of their system design choices, and how actual real and substantial participation by IRPAG participants resulted in a unanimous decision by participants to support the Seattle City Light IRP. On the exact contrary, the consensus coming out of PSE's IRPAG participants appears to be 100% ***lack*** of support for PSE's IRP plan, 100% a position that Commission should ***Not Accept*** PSE's plan.

One cannot help but notice how slow and recalcitrant PSE is in providing access to their own publicly required documents, during the IRP public process, the RFP ranking, and the public version "minimally redacted" copies of the TransAlta APA evidence – while at the same time asking other people and other organizations to respond in an expedited manner to the TransAlta APA. Industrial Customers expresses similar frustrations.

In summary PSE has acted strongly to deny just and reasonable public participation in the IRP Process. I ask therefore that this IRP plan be "Not Accepted."

PSE Denies the Reality of Climate Change

PSE denies the reality of climate change, setting the SCC to $0 in their actual Base Case "***The Plan***" course of action – i.e. PSE is unreasonably asserting that their CO2 pollution causes no damages to society. In acting on this scientifically unfound assertion they unreasonably and uneconomically increase environmental damage costs to society by creating excessive emissions of CO2 pollution.

Scenarios: A term PSE uses to discuss a multitude of possible IRP Plans – "scenarios" – to IRPAG participants without actually revealing to those participants which plan PSE actually intends to take. PSE represents to IRPAG participants that these multiple scenarios demonstrate that PSE is modeling CO2 costs as being any of a range of possibilities. But then after the last IRPAG meeting PSE changes this PSE representation of their planning process by stating in a cover letter to Commissioners that only the scenario that states that CO2 damages do not exist, the $0 / ton scenario – the ***Climate Change Denier Scenario*** – only that scenario will be used as the actual Base Case "***The Plan.***" If PSE were reasonably using their own asserted range of CO2 costs then their plan of action "***The Plan***" would be based on a SCC close to the middle of their choice of costs – but they are not even doing that. PSE is ignoring even their own set of (unreasonably estimated low) SCC costs, instead asserting that SCC is $0 / ton CO2.

IRP Page 3-3 PSE acknowledges that state laws and regulations include a commitment to reduce GHG to 1990 levels by 2020 (RCW 70.235.020) But instead the IRP "Base Case" plan of action is to ***increase*** CO2 levels to 45% above 1990 levels by 2020.

PSE continues to overbuild their system by continuing to design using peak load data from the 1950s, whereas the cold snap trend data shows a 9 degree increase in bidecadal [once in 20 years] cold snap temperatures since the 1950s (see attached plot.) A simple solution to most of this problem is to direct PSE to only use the last 30 years weather data (including stream flows), instead of the last 60+ years' worth of data, since PSE's very old and outdated weather data no longer in any way represents temperature events that could happen in today's warming climate. Similarly spring water runoff is happening a full month earlier than PSE's outdated data. PSE's old and outdated stream flow data is no longer representative of today's stream flows.

IRP H-6 states that PSE uses temperature data from 1950 thru 2011. But due to climate change data from the 1950s is no longer representative of the weather we can reasonable expect today. Examination of the coldest days weather – those days which determine the size of the electrical system that PSE is designing, have risen 9 degrees Fahrenheit since the 1950s– today's current "cold snaps" are much much less intense than the cold snaps of the 1950s. Using weather data from the 1950s leads to overbuild, and resulting overcharging of ratepayers. Further, moving forward, this means that PSE misjudges the transition from being a winter-peaking to being a summer-peaking system, which means that PSE miss-designs how much, what generation, and what kind of generation is needed where. See attached plot of "Bidecadal Cold Snaps," showing 9 degrees reduction in bidecadal coldest-day heating load (HDD) [5% Loss of Load]. Denying the reality of climate change causes the wrong system to be built – PSE is still overbuilding for winter heating load when instead PSE should be planning for increases in summer cooling load. It is not just a question of PSE gaming the system to see just "how long they can get away with it" – PSE playing a game of "Regulatory Chicken" – but rather as PSE games the system, PSE builds the wrong system, leading to higher costs, and higher rates in the future. And in the most recent case PSE now sells cheap a Wind System (Lower Snake II) which they will just have to turn around and buy again later at a dear cost to ratepayers. "Failure to Plan is Planning to Fail."

IRP Appendix K-29 PSE states that they use stream flow data from 1929 to 1998. As the climate has changed, stream flows have changed. Stream flow data from the 1920's is no longer representative of stream flows we can expect today, with the well-known problem of earlier loss of spring snow mass, and lower winter accumulations, leading to a general pattern of higher winter stream flows, lower summer stream flows, and earlier spring stream flows. Again, given the reality of climate change, longer term records ***are not*** better. I ask Commission direct PSE to use stream flow data from only the last 30 years, in order to better match the current climate reality of the stream flows, not data from the turn of the century which represent stream flows we can never see again given the realities of climate change.

PSE is making common use of statistical random draw techniques, where the modeler takes a random draw of, say for example, a particular year's worth of stream flow data, combining such random draws of differing years to predict a possible future situation that the system must be able to accommodate. These random draw techniques are making tacit use of a presumed

statistical property of the data being drawn from, namely "Statistical Stationarity," meaning that there is no moving trend happening within that data – each year's set of data is as equally likely to happen as any other year's set of data. But we know that this is not true of PSE's data sets. Climate Change is happening, temperatures, especially Winter coldest day "cold snap" days, are becoming warmer, requiring less generating capacity – 9 degrees warming in coldest days since the 1950s, and stream flows are shifting to earlier and earlier spring snow pack melt-off – a full month earlier than the 1920s. Yet PSE still uses, in a statistically inappropriate manner, this outdated temperature data from the 1950s, and the outdated stream flow data from the 1920s. I ask that Commission direct PSE to use data only from the last 30 years, so as not to unreasonably overbuild their generation capacity, nor to build inappropriate generation for current changed-climate conditions.

IRP Page 4-8 While PSE publically states that they believe in the reality of climate change, Mr. Popoff's IRP group continues to ignore climate change, by setting their Base Case "plan of action" based on $0 / ton CO2. They analyze other "scenarios" – but then continue to ignore these other scenarios – they continue to ignore that climate ***is*** changing, and that those changes are imposing a real economic carbon cost on society, and that therefor PSE CO2 emissions are damaging the economy in an ***uneconomic*** manner when PSE continues to refuse to account for these emissions in their design of the IRP Plan Base Case actual "Course of Action."

Prisoners Dilemma: a term in economic for a problem in which there are two stable solutions, each plausible, but with one solution lower cost and therefor more desirable. In climate change the two plausible solutions are 1) assume that everyone else is going to cheat – ***free ride*** – and emit CO2 emissions to their own benefit, in which case if you make this assumption then the winning course of action is to also cheat and ***free ride*** to your own benefit. In this course of action the planet, the economy, and the human race are destroyed – but over the short term rates are held slightly lower. 2) the other possible solution is to assume that the other emitters are people also of good will, who, given a chance, would also prefer to not destroy the planet, the economy, and the human race, and to give these other parties a chance to demonstrate their own good will by choosing ***not to free ride*** by instead implementing ***pay as you go*** – requiring current ratepayers to reasonably pay for a system which avoids unnecessary uneconomic CO2 damages, thereby not unreasonably increasing the economic costs due to climate change and future PSE investments in new systems to fix the problem after the fact – multiplied by unrepairable damages – ***Solomon Irreversibility***. The legislature has found which way PSE is ***required*** to go – PSE is required ***not*** to ***free ride*** but rather to correctly and fairly internalize the cost of CO2 in their design decisions, include their IRP Base Case design.

Solomon Irreversibility: *Irreversible climate change due to carbon dioxide emissions.* Susan Solomon, PNAS, Proceedings of the National Academy of Sciences, December 16, 2008. A famous peer-reviewed scientific paper in one of most prestigious scientific journals which scientifically demonstrates that CO2 emissions today cause damages effectively forever – for 1000s to years to come – damaging the lives of our children and grandchildren in perpetuity. Also reducing the economy and thereby our and their standards of living for perpetuity. As the carrying capacity of the planet is diminished due to CO2 damages fewer human being can

survive, more must die of starvation and war [Climate Insecurity], and the survivors are pushed northward into the reduced remaining habitable regions of the world, most notably Canada, Russia, and Alaska. See Jorgen Randers "2052: A Global Forecast for the Next Forty Years" – for the world's leading futurists' take on the coming "soft crash" climate change scenario [as opposed to the "Fat Tail" sudden catastrophic climate change event, such as the sudden loss of the Greenland Ice Pack.]

It should not be in dispute that PSE needs to reasonably do their part to actually reduce their actual total CO2 emissions based on legislative findings – and that UTC has a requirement to hold PSE to this task [RCW 43.21C.020 2) "all practicable means" (a) Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations], and that CO2 emissions damage the state's economy – that CO2 damage costs are ***not*** $0 / ton CO2 as PSE has assumed in their course of action:

RCW 80.80.005 Findings — Intent. (1) The legislature finds that:

(a) Washington is especially vulnerable to climate change because of the state's dependence on snow pack for summer stream flows and because the expected rise in sea levels threatens our coastal communities. Extreme weather, a warming Pacific Northwest, reduced snow pack, and sea level rise are four major ways that climate change is disrupting Washington's economy, environment, and communities;

(b) Washington's greenhouse gases emissions are continuing to increase, despite international scientific consensus that worldwide emissions must be reduced significantly below current levels to avert catastrophic climate change;

(d) Washington has been a leader in actions to slow the increase of greenhouse gases emissions, such as being the first state in the nation to adopt a carbon dioxide mitigation program for new thermal electric plants, ***mandating integrated resource planning for electric utilities to include life-cycle costs of carbon dioxide emissions***, etc.

RCW 43.21C.020

(1) The legislature, recognizing that a human being depends on biological and physical surroundings for food, shelter, and other needs, and for cultural enrichment as well; and recognizing further the profound impact of a human being's activity on the interrelations of all components of the natural environment, ... shall (b) create and maintain conditions under which human beings and nature can exist in productive harmony.

(2) In order to carry out the policy set forth in this chapter, it is the continuing responsibility of the state of Washington and all agencies of the state to use all practicable means, consistent with other essential considerations of state policy, to improve and coordinate plans, functions, programs, and resources to the end that the state and its citizens may:

(a) Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;

(b) Assure for all people of Washington safe, healthful, productive, and aesthetically and culturally pleasing surroundings;

(c) Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;

(3) The legislature recognizes that each person has a fundamental and inalienable right to a healthful environment....

But needless, excessive and uneconomic emissions from Colstrip 1&2 destroy all these things. ***Solomon Irreversibility*** shows that these needless and excessive CO2 emissions destroy the conditions under which "human beings and nature can exist in productive harmony" – the scientific CO2 damage costs ***are*** measured damages to the economy. Needless and excessive – uneconomic – CO2 emissions damages the economy. Excessive CO2 emissions destroys businesses, it does not help create them.

Commission is required to act to support state recognized environmental policies and values:

RCW 43.21C.030 Guidelines for state agencies, local governments

The legislature authorizes and directs that, to the fullest extent possible: (1) The policies, regulations, and laws of the state of Washington shall be interpreted and administered in accordance with the policies set forth in this chapter, and (2) all branches of government of this state, including state agencies, municipal and public corporations, and counties shall:

(a) Utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision making which may have an impact on the environment;

(b) Identify and develop methods and procedures, in consultation with the department of ecology and the ecological commission, which will insure that presently unquantified environmental amenities and values will be given appropriate consideration in decision making along with economic and technical considerations;

(c) Include in every recommendation or report on proposals for legislation and other major actions significantly affecting the quality of the environment, a detailed statement by the responsible official on:

(i) the environmental impact of the proposed action;

(ii) any adverse environmental effects which cannot be avoided should the proposal be implemented;

(iii) alternatives to the proposed action;

(iv) the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity; and

(v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented;

(f) Recognize the worldwide and long-range character of environmental problems and, where consistent with state policy, lend appropriate support to initiatives, resolutions, and programs designed to maximize international cooperation in anticipating and preventing a decline in the quality of the world environment;

(g) Make available to the federal government, other states, provinces of Canada, municipalities, institutions, and individuals, advice and information useful in restoring, maintaining, and enhancing the quality of the environment;

(h) Initiate and utilize ecological information in the planning and development of natural resource-oriented projects.

See ***Solomon Irreversibility*** – PSE CO2 emissions result in irreversible planetary damages, representing an "irreversible and irretrievable commitments of resources" – namely a Hotelling consumption of environmental resources (of the earth's climate, the glaciers, and the seas, …) – these environmental goods are "mined" today, never to return in the future. Our children and grandchildren's lives are compromised – if not outright extinguished – in perpetuity.

IRP Figure 4-9 shows that PSE is using a Base Case CO2 pollution damages cost of exactly $0 / ton CO2. IE PSE is denying that their CO2 pollution is having any effects on the climate, on the environment, nor on human society. PSE is engaging in climate change denial, contrary to their public representations on their corporate web site that PSE believes in the reality of climate change.

PSE quotes on page 4-8 RCW 80.70 as their authority for setting the Base Case CO2 pollution damage estimates to $0 / ton. But RCW 80.70 contains no such basis for setting CO2 pollution damage estimates to $0 / ton. I ask that Commission direct PSE to use the EPA et al "Technical Support Document: - Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis – Under Executive Order 12866" – Interagency Working Group on Social Cost of Carbon, United States Government" document or its successors as their authority for CO2 pollution damage estimates, averaging the 2.5% and 3.0% discount rates to find a "Middle" value, and performing standard linear table value interpolation to find the values for intermediate years not listed in the document's table.

IRP Page 4-8 contains PSE assumptions of CO2 pollution damage estimates. PSE lists their estimates of the damages caused by their CO2 pollution 2014 on page 4-9 Figure 4-7. These are not reasonable technical estimates based on the best current knowledge of climate change science, and I ask that Commission direct PSE to use EPA estimates taken from the science in EPA et al "Technical Support Document: - Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis – Under Executive Order 12866" -- or subsequent most recent EPA update. Without a reasonable basis PSE sets their CO2 pollution damage estimates, as compared to EPA science-based estimates, as follows:

2014 Damage to the Economy Caused by CO2 Pollution / Ton CO2

	PSE	EPA
Low Estimate	$0.00	$11.80
Base Case -- Middle	$0.00	$46.90
High Estimate	$0.00	$105.20

PSE numbers from Figure 4-7

In 2017 PSE begins to recognize ***some*** damage is suddenly being caused by their CO2 pollution, but their estimates are still un-scientifically and unreasonably set too low, further, and for some umexplained reason, the Base Case, which should correspond to the Middle "most likely scenario" value is instead set by PSE to a value of $0:

2017 Damage to the Economy Caused by CO2 Pollution / Ton CO2

	PSE	EPA
Low Estimate	$8.21	$12.00
Base Case -- Middle	$0.00	$50.40
High Estimate	$25.00	$117.00

PSE numbers from Page 4-8

where the "Middle" Base Case of $0.00 / ton CO2 is not an error on my part – this is the engineering design value for the pollution damages that their systems are causing – according to PSE – that PSE is actually using for their IRP. IE even in their 2017 estimates PSE is inexplicably denying that their systems case climate change CO2 damages, in contrary to best consensus science, and contrary to ***Mass v. EPA***, and contrary to EPA findings upon which EPA is basing their stationary source regulations.

By setting their "Base Case" design estimate of the best scientific estimate of CO2 pollution damages to the economy to be $0.00, PSE unreasonably denies modern climate change science – contrary to their own stated public policy which acknowledges the reality of human caused climate change. In doing so PSE fails to generate a ***Just and Reasonable*** engineering design of their system based on the best practices of science and engineering. I ask that Commission state that $0 is not a reasonable scientific nor engineering estimate of the CO2 pollution damages that PSE systems cause, and direct that they use the EPA estimates instead, averaging the EPA 2.5% and 3.0% discount columns to form a single "Middle" most-likely estimate to be used by PSE for their "Base Case" course of IRP design action. By setting their CO2 pollution damage estimates to $0.00 PSE ***does not*** "RCW 80.80.005 vitally internalize the significant and underrecognized cost of emissions and reduce Washington consumers' exposure to costs associated with future

regulation of these emissions, which is consistent with the objectives of integrated resource planning by electric utilities under chapter 19.280 RCW."

"Reciprocity" and "Reciprocity Ratio" – PSE always assumes that there is no reciprocal benefits to ratepayers in trying to reduce CO2 – in order to save the lives of our children and grandchildren. PSE essentially assumes that mankind is already doomed because everyone else will also use CO2 to trespass on the lives and properties of others – just as PSE does. But this need not be the case, and is not the case. 29 states have RPS standards, as does Washington State – given the choice voters choose ***not*** to trespass on the lives and property of others, they choose to "do the right thing." Similarly the nations of Europe are leading the US, not following it. Even Communist China has implemented more renewable energy than the United States. So PSE's analysis is incorrect, the "Reciprocity Ratio" is not, as PSE claims equal to 0 – where PSE ratepayers get nothing back from investing in CO2 reductions – rather the Reciprocity Ratio is greater than 1 -- where PSE ratepayers are ***getting even more CO2 reductions back out*** of the implied worldwide goodwill-based trading system than PSE is putting in. Again, there does not need to be explicit federal law, nor international law, for CO2 reductions to happen. They can happen, and they are happening, because states and nations, worldwide, recognize on a "***Prisoners Dilemma***" basis that it is in their selfish best-interests to reduce CO2 emissions even without a hypothetical global UN world-wide agreement, because when they do so, then others in other states and other nations also respond by in turn "donating" their own CO2 reductions – in their own selfish best interests. The PNW, as a whole, being a relatively low CO2 region, can (for example) reduce its CO2 emissions by 10% at a lower cost than other regions of the world can reduce their CO2 emissions by 10% – the PNW comes out a winner, not a loser, when it comes to reducing CO2 emissions. On the other hand, we live in a region which has so much to lose from these very CO2 emissions which are causing climate change – climate scientists recognize that the PNW is one of the most sensitive regions in the world to climate change. Again – it is in our own best interests to support reductions in CO2 emissions. We should all be supporting CO2 emissions strongly – it is in the PNW's best interest to do so. It is only the rare "extremists" who want to ***free ride*** on this implicit trading system – such as Puget Sound Energy – who tear down these mutual systems of "I scratch your back, you scratch my back" – these systems of mutual goodwill – by not playing fair, by making excuses, by fudging the numbers, and by denying the damages their CO2 pollutions causes to the lives and property of others. We are not seeing this kind of extreme behavior from Washington's other utilities.

Prisoner's Dilemma: A game-theory result where there are two plausible and stable outcomes, each of which makes sense in their own way, but one case comes with much lower cost than the other. In the case of climate change, we are all "prisoner's" on this planet together. One plausible result is to "stick together" each working together to avoid or reduce climate change in order to minimize everyone's damage costs. The other plausible result, – "rat out the other guy" – is where everyone tries to maximize their own private profits at the expense of everyone one else, which has the practical result thereby of actually maximizing everyone's damage costs. Both are plausible results – but one leads to much lower costs than the other. This is why the legislature consistently finds "We must do our part to reduce CO2 emissions" – because when we do our part, our fellow "prisoners" on this planet respond by doing their part, and everyone

has lower economic damages due to climate change. See for example: The Environmental Prisoner's Dilemma, Eric K. Clemons and Heinz Schimmelbusch, May 20 2007, Wharton School of Business, http://opim.wharton.upenn.edu/~clemons/blogs/prisonersblog.pdf

There is well-known basic CO2 balance that must be maintained – whether we want to or not – moving forward: CO2 emissions per person per year times number of people must equal the amount of CO2 per year that can be absorbed by the environment. Until this numerical balance is obtained, the planet continues to warm up until the number of humans decrease, by death, war, starvation, or dehydration [Climate Security.] Eventually the CO2 balance will be obtained. The question is, how do we want to obtain this balance? The easy and humane way? Or the hard and inhumane way? I suggest we should try to obtain the CO2 balance in the easy and humane way. This requires that all states and countries begin to actually reduce the amount of CO2 which they emit per person. This is what the state legislature means when they say, in their legislative findings "we in this state must also do our part to reduce CO2 emissions." The state legislature doesn't say "let's keep pointing our fingers at the federal government. Let's keep pointing our fingers at the Chinese." The legislature says ***WE – meaning our utilities as well –*** must begin to actually reduce CO2 emissions. Not more than 20 years in the future – then it's our children who are reducing their emissions. The legislature says that ***WE*** – not our children, need to begin reducing our emissions. Reducing CO2 emission to 1990 levels by 2020. Given the long-lives of generating plants, we can accomplish this goal only if we actively pursue this goal today.

RCW 70.235.005

(1) The legislature finds that Washington has long been a national and international leader on energy conservation and environmental stewardship, including air quality protection, renewable energy development and generation, emission standards for fossil-fuel based energy generation, energy efficiency programs, natural resource conservation, vehicle emission standards, and the use of biofuels. Washington is also unique among most states in that in addition to its commitment to reduce emissions of greenhouse gases, it has established goals to grow the clean energy sector and reduce the state's expenditures on imported fuels.

(3) It is the intent of the legislature that the state will: (a) Limit and reduce emissions of greenhouse gas consistent with the emission reductions established in RCW 70.235.020; (b) minimize the potential to export pollution, jobs, and economic opportunities; and (c) reduce emissions at the lowest cost to Washington's economy, consumers, and businesses

RCW 70.235.020 (1) (a) The state shall limit emissions of greenhouse gases to achieve the following emission reductions for Washington state: (i) By 2020, reduce overall emissions of greenhouse gases in the state to 1990 levels.

Note the court recognition of the need of the state to control GHG (CO2) in Case No. C11-417 MJP, Chapter 70.94 RCW, WASHINGTON CLEAN AIR ACT, Chapter 173-400 WAC.

In making this plan PSE is claiming that there is no reasonable possible risk that GHG regulations will be introduced or enforced for the next 20 years, either by federal CAA enforcement, state SIP, state voter initiative, state law, etc. That there will be no GHG

restrictions on existing sources for the next 20 years. Is this really a ***reasonable*** assumption? Given that Obama has announced near-term coming GHG regulations on existing sources? PSE is stating that the GHG cost under their Base Case analysis is $0 / ton CO2. PSE is claiming, again, that no enforcement risk exists over the next 20 years. Really? Is this a reasonable design assumption? Or is it simply yet another form of PSE climate change denial.

In PSE public statements about GHG at: http://pse.com/aboutpse/Environment/Pages/Greenhouse-Gas-Policy.aspx PSE tells ratepayers that they will use Renewables to reduce their CO2 emissions. But to the contrary the reality is, in this IRP PSE is using non-renewables to sharply increase their CO2 emissions to 45% above 2020 state targets.

Let us remind ourselves what Washington States is going to lose over the next century due to climate change, as recognized by leading Washington and Oregon climate scientists. We stand to lose our forests – 100% extinction of our native forests below the alpine level. Extinction of salmon – who do not survive in the then-tropical waters south of Vancouver Island. Flooding and loss of low-lying seaport communities such as Long Beach, and Neah Bay, as well as Port of Seattle, and the Seattle sea wall. Loss of our skiing, and our world-leading sportswear industries. Loss of tourism. Loss of agriculture to summer "Palmer Drought Index" intensified drought conditions. Loss of our ability to draw world-leading talent to this region. Loss of our Spring Snow Pack, which we use for our summer irrigation, and crops, and drinking water, and hydroelectric power, etc. It does not go too far to say that over the next century due to climate change we stand to lose almost everything that we today consider as being uniquely "The Pacific Northwest." "The Pacific Northwest" will simply be gone, and today's resident coming back 100 years from now would say "What planet is this?"

In summary by setting SCC to $0 / ton CO2 PSE unjustly and unreasonably designs a system that uneconomically emits excessive pollution, needlessly damaging the lives, property, and businesses of others. This design is not ***J&R***, and therefore I ask that this IRP be "***Not Accepted.***"

Colstrip 1&2 Do Not Survive the Planning Period

Under a reasonable analysis, using reasonable gas price assumptions, PSE lists their own estimates of the "knock-out" price of CO2, where it is no longer cost-effective to society to continue to run Colstrip 1&2, at a price of $30 / ton CO2. However, ***EPA TUSCC*** document lists current "Middle" estimates of the cost of carbon at $45 / ton CO2 – Colstrip 1&2 even today are not cost-effective for society to run using PSE's own analysis (under reasonable scientific basis for SCC). CO2 costs are an increasing function of time – as we continue to raise the earth's temperature, the environment – and therefore the economy – are damaged at an ever-increasing rate.

IRP Page 5-37 PSE incorrectly represents their own analysis when they claim that "Base + Very High CO2" is the only scenario where it is not the case that the portfolio is similar across most

scenarios. On the contrary their own analysis using their own gas costs shows that at carbon prices $30 / ton and above Colstrip 1&2 should be shut down (figure 5-23 page 5-47) But current ***EPA TUSCC*** science-based "Medium" central estimates of carbon costs for 2013 is $45.80 – i.e. current operation of Colstrip 1&2 is already ***uneconomic*** to human society – the damages to the economy caused by the Colstrip 1&2 CO2 pollution already exceeds the value that these coal power plants provide to society – using PSE's own analysis, once corrected for PSE's misrepresentation of scientific SCC.

IRP Page 3-8 PSE considers the "Lowest and Highest" Carbon Costs from EPA, but ignores the "Medium" costs (2.5% and 3.0% discount cases) which EPA states represent reasonable values to establish courses of action – and to be the basis of the EPA announced forthcoming restrictions on existing coal power plants, announced by President Obama June 25, 2013. Based on latest EPA updates "Medium" CO2 costs for 2013 are $45.80 / ton CO2 – continuing to rise in the future. The previous EPA Social Cost of Carbon estimates were at $29.96 / ton CO2. So Social Cost of Carbon is high enough even today that PSE should be closing Colstrip 1&2. Contrary to PSE representations, Colstrip 1&2 do not reasonably survive the 20 year IRP planning period.

IRP Page 2 -13 PSE consistently refuses to break out Colstrip 1&2 from Colstrip 3&4, even though they are different technologies, different CO2 emissions, different ages, and different ownership structures. And PSE uses highly biased estimates of CO2 costs.

IRP Page 5-54 PSE hides the unprofitability of continuing to run Colstrip 1&2 by lumping them in with Colstrip 3&4.

"The ***mix of resources***" – means not just resource acquisitions, but also consideration of resource retirements. PSE has consistently refused to fairly consider and discuss resource retirements, particularly Colstrip 1&2.

In All Respects Just and Reasonable RCW 80.28.010 Duties as to rates, services, and facilities (2) Every gas company, electrical company, wastewater company, and water company shall furnish and supply such service, instrumentalities and facilities as shall be **safe**, adequate and **efficient,** and **in all respects just and reasonable.** Operating a coal powered facility which emits CO2 emissions which are recognized as ***not*** being safe to the continued existence of human society, and which unreasonably and needlessly emits so much CO2 as to cause more economic costs than other generating facilities, such as natural gas turbines, when those CO2 environmental damage costs are included is ***not*** being "efficient" – economic efficiency would be generating power by the lowest possible cost, including environmental externalities from the emission of CO2 pollution – by PSE's own reckoning natural gas plants have a lower total cost than coal. By profiting from the CO2 needlessly emitted PSE engages in a taking of other people's lives and property, including the lives of their children and grandchildren in perpetuity ***[Solomon Irreversibility]***. This is not ***in all respects just and reasonable.***

PSE's Figure 5-22 shows that Colstrip 1&2 is ***out of the money*** in a low gas price + low CO2 cost scenario. Also ***out of the money*** in the PSE mid-gas price and mid CO2 costs scenarios. And in general Colstrip 1&2 are at risk via ***Mass v. EPA***, and the Obama June 25 2013 ***Existing***

Stationary Source Regulation Announcement. That is when one fixes PSE's misrepresentations of CO2 SCC costs by correctly replacing them with EPA "Middle" scientific consensus most recent updated CO2 SCC costs.

Page 202 PSE claims that in a "reasonable range" Colstrip remains viable, but that Colstrip 1&2 could be at risk. But these PSE claims are only justified by PSE mislabeling EPA CO2 carbon costs, where the "Middle" "Most Likely Scientific Estimates" from EPA PSE mislabels as being "High" or "Very High" carbon costs in order to make it appear these CO2 pollution economic damage are unlikely to happen and thus are "*un*reasonable." IE PSE claims that the mainstream "Middle" "Most Likely Scientific Estimates" are not reasonable – PSE makes these claims without basis. PSE, in their IRP planning group, is still engaging in Climate Change Denial, even as the PSE the parent company, on their public corporate website, is claiming that indeed the company recognizes that Climate Change is real. PSE says that climate change is real, but Mr. Popoff's group continues to deny its reality in their actual IRP planning. ***"Reasonable"*** engineering design practice would be to accept EPA's Middle "Most Likely Scientific Estimates" as one's design parameters, without fiddling with them, and without relabeling or nor misrepresenting them, and then design one's system to society's greatest benefit using those values. PSE does not do this. PSE fiddles with the numbers, and relabels them, and misrepresents them, and then ultimately ignores them entirely in its Base Case design in the IRP, unreasonably setting CO2 damage costs to $0.

Would it be prudent, just and reasonable for PSE to continue operation of a nuclear power plant leaking radiation? Would it be prudent, just and reasonable and prudent for PSE to continue operation of a hydroelectric dam, dangerously cracked, and threatening the lives of thousands of people living below? How can it be then prudent, ***just and reasonable*** that PSE continue operation of a coal power plant which produces dangerous and needlessly high emissions of CO2 pollution, when those pollution emissions cause more than enough economic damage to society that PSE itself admits represents the "shutdown decision" for the coal power plant? PSE admits that $30 / ton CO2 represents the "shutdown decisions" point for Colstrip 1&2 – but then misrepresents the actual scientific consensus CO2 damage costs in order to attempt to avoid the immediately following conclusion that Colstrip 1&2 should be shut down. The best science-based EPA estimates of SCC today are $45 / ton CO2 – well above PSE's shutdown criterion.

IRP Chapter 2, page 2-13, and figure 2-7, PSE misrepresents their results by providing one combined result for Colstrip 1&2 and Colstrip 3&4. These two facilities have different ages, different heat rates, and different ownership. Their issues are not the same and should not be combined. I ask that Commission direct PSE to generate separate IRP planning results for Colstrip 1&2, and 3&4. Further note that PSE has a "smooth transition path" by for example by only closing one unit of Colstrip 1&2, say unit 1. At a later time unit 2 could be closed, followed eventually by 3, and then later 4. There is no engineering reason to lump all four units together on an "all or nothing" basis. There are very good system planning reasons to look ahead and do a planned incremental phase out of these units, such that they do not all have to be replaced all at once. Doing an incremental phase out is lower risk, and has lower rate impacts, than replacing them all at once due to a lack of IRP planning foresight.

LNG

IRP Pages 2-24, 3-5, 6-23 PSE mentions in passing that is proposing using ratepayer funds from the regulated natural gas business to extend their monopoly into the LNG transportation business. Similar to the state restrictions placed on PSE expanding into the EV electrical fuel market, Commissioners should make it explicit that PSE cannot use ratepayer funds to fund the extension of their natural gas monopoly into the LNG business. I suggest (for example) a more appropriate business structure would be independent ownership of the LNG transportation distribution facilities business, with lease-back of the excess storage capacity to PSE.

PSE Misrepresents the Cost of Wind

IRP Page 5-65 PSE analysis of the Cost of Wind contains analysis errors. PSE first said in IRPAG meetings that these costs were $300 / ton. When I questioned the veracity of those numbers Mr. Popoff has responded by saying that they stood by their analysis "the numbers are what they are" – but now has responded in the written IRP by lowering those estimates to $150 / ton. I continue to question the veracity of those numbers and ask that they be audited, or that PSE otherwise be required to publically defend these extremely high estimates. When we talk about the "Cost of Wind" in terms of $ / ton CO2 we are talking about the cost of operating the wind turbines plus the cost of the backing gas turbines minus the variable costs of those gas turbines. Or alternatively one can think of this as the cost of running a gas turbine plus the cost of using Wind to displace some of that gas turbine operation, leading to lowered CO2 emissions. Using public sources such as the ***Black and Veatch*** report, assuming Wind displaces Natural Gas, this leads to a midlife cost of about $60-$80 / ton – a factor 2X to 4X lower than the very high Wind CO2 displacement cost numbers PSE has been quoting – without being willing to justify those very high cost results. A simple explanation for this difference would be, for example, if PSE doesn't correctly model CO2 reductions that happen outside of their own facilities which result due to the existence of those Wind plants – but these would still be reductions in CO2 benefitting society, just reductions in CO2 which PSE has not modeled correctly. In general the very high Wind CO2 cost reductions numbers that PSE has been quoting leads one to question the general veracity of their IRP modeling efforts. These PSE IRP modeling efforts are done in a "black box" manner which PSE is not willing to expose for public verification, nor has allowed or provided any other method to check the veracity of their modeling efforts. Mr. Popoff did offer an opportunity for the public to see an overview of how their modeling works. I responded immediately that "Yes I would like to see this overview" – and then Mr. Popoff never responded again.

Black & Veatch Report: National Renewable Energy Laboratory (NREL) *Cost and Performance Data for Power Generation Technologies* February 2012 – public data on relative generating costs, including the relative generating costs of coal and natural gas plants vs. Wind power plants, which allows one to calculate the implied $ / ton CO2 cost associated with choosing to build (more expensive initial cost) Wind power plants compared to (lower initial costs but higher

fuel and CO2 costs) natural gas plants. This comparison leads to a cost of $30 - $40 / ton CO2 when Wind displaces coal generation, and a cost of $60 - $80 / ton CO2 when Wind displaces natural gas generation. PSE inexplicitly claims a much higher cost of $300 / ton CO2 in IRPAG meetings, lowered in their submitted IRP Plan to $150 / ton CO2 – but still literally inexplicable, because we asked PSE to explain these numbers, and they cannot, or will not.

Again, PSE's actions lead one to reasonably question the veracity of the entirety of PSE's analysis and numbers. Mr. Popoff at IRPAG meetings claimed that Wind Power is costing PSE $300 per ton of CO2 abatement. I strongly questioned [and continue to question] this number and asked Mr. Popoff to justify it. Public numbers from credible sources put Wind Power at a cost of about $30 per ton of CO2 abatement – a factor literally 10X lower than PSE is claiming Wind Power costs them. How can this possibly be the case? Wind costs a reasonable range of numbers. Wind largely displaces coal or natural gas. The costs and the CO2 emissions are well-known, and there is nothing unique about PSE in this matter. Yet PSE claims their costs are literally 10X higher than industry averages. How could this be the case? Mr. Popoff responded by email offering participants an opportunity to see how PSE's "black box" modeling system works which was used to generate these numbers. I immediately responded that yes I would like to see their system. At that point in time Mr. Popoff never again responded. IRPAG participants were never allowed to see PSE's magic "black box" modeling which PSE uses to generate their numbers. Again, this represents one of many cases where PSE quotes numbers without being able to back them up, where one begins to question whether PSE is acting fairly to truthfully represent their costs and system choices to Commission and IRPAG participants, or whether PSE is simply cutting the cloth wholesale to make the case for the system they want to build in the first place – and for the near-term selling of carbon-free generating facilities, and purchase of high-carbon generation, leading to a near-term profit of $79 million to PSE. These PSE actions demonstrate the unreliability and unreasonableness of PSE IRP analysis and design. I ask that Commission reject PSE numbers and analysis as not being credible since PSE is unable or unwilling to back them up.

Wind Capacity factors, page 4-22. PSE claims that Wind does not contribute to Capacity, assigning Wind only a 4% capacity credit and a 30% Wind Capacity factor. IE PSE is claiming that Wind is only available 4% of the time, and then when it is available it is only able to contribute 30% of nameplate. PSE does not reasonably explain this results. As an electrical engineer, and one who has studied Wind, I do not believe these numbers to be credible. I ask that they be audited, or otherwise publically vetted.

Currently PSE is selling off Lower Snake II at a profit to PSE of $35 million. They would not be doing this is they had done an unbiased analysis. What this means is that in a few years EPA regulations will be forcing CO2 reductions, that more Wind will be necessary, PSE will by buying back Wind – at a higher price – and will be forcing ratepayers to pay the piper – for PSE's unwillingness to reasonably, honestly, and in an unbiased manner actually use the IRP to look forward into the future – farther than just the next two years.

The only reasonable most cost-effective actions a Washington Utility can take to reduce CO2, is to implement as much efficiency as society is willing to accept (society being only so willing to

accept intrusion into their personal purchase choices) and thereafter replace Coal with a combination of Wind and Natural Gas. PSE, based on an unwillingness to actually perform real IRP planning, is heading in exactly the wrong direction, selling Wind and buying Coal.

PSE Fails to Create a Reasonable Engineering IRP Plan

PSE system design violates the "Pay as You Go" principle. Design of utilities rate recovery has always been to match costs to benefits, thus facility costs are amortized, and collected, over the life of the facility. In the case of CO2 pollution, the "Pay as You Go" principle is not met, since the CO2 pollution damages continue for literally 1000s of years after the facility is closed. [see: ***Solomon Irreversibility.***] Thus our children and grandchildren pay the price of PSE behavior, rather than current ratepayers. The current ratepayer receives the benefit, but the future ratepayers pays the price. This violates the "Pay as You Go" rate recovery principle and is not "***Just and Reasonable***" since recovery time period does not match benefits time period.

RCW 19.280 "…the legislature finds it essential that electric utilities in Washington develop comprehensive resource plans that explain the mix of generation and demand-side resources they plan to use to meet their customers' electricity needs in both the short term and the long term."

PSE's focus is so short-term inward looking that PSE's IRP cannot survive two months, let alone two years – or the claimed 20 years. PSE releases the IRP claiming no need to respond to climate change anytime within the next 20 years, and then two months later Obama announces the well-known predictable requirement that EPA regulate old source CO2 emissions. PSE claims that their only regulatory threat is that federal Congress pass a carbon cap and trade bill, and then discounts that risk happening any time in the next 20 years – because of the clear 2-year-duration chaos in the House of Representatives today. But Obama already has regulatory control under the Clean Air Act, and has announced control over existing sources – no Congressional Approval required. PSE's regulatory analysis in this IRP does not even survive two months until President Obama's Flat Earth speech (June 25, 2013). This is indicative of just how consistently backward looking PSE's IRP analysis is – rather than looking forward towards how best to actually meet societal requirements for the next 20 years.

RCW 19.280.030 (2) (b) Requirement to enumerate the resources that will be maintained and/or acquired. It is not just the new acquisitions which must be examined, but also whether or not existing resources shall be maintained. Further, the resources must actually be enumerated. PSE does not enumerate their maintained resources. The requirement is not one of summary totals, rather the requirement is of actual enumeration of actual generating resources. PSE does not do so in this IRP.

RCW 80.28.010 Duties as to rates, services, and facilities:

(2) Every gas company, electrical company, wastewater company, and water company shall furnish and supply such service, instrumentalities and facilities as shall be ***safe***, adequate and ***efficient***, and in ***all respects just and reasonable.***

(8) safe to public. [Note: not just an issue of being safe to its own ratepayers (as PSE's Mr. Popoff claims in the IRPAG meetings) – rather the PSE system design must be safe to everyone. If for example PSE were to design a system that needlessly takes the life or property of a Seattle Ratepayer, would that be ***J&R?*** Yet this is precisely what Mr. Popoff claims in the IRPAG meetings – that PSE ***only*** has a responsibility to its ratepayers, not to any other members of society.] Needless, excessive, and uneconomic emissions of CO2 are not safe to the public, rather they damage the public's lives, businesses, and property.

RCW 80.24.024-025 UTC Authorized to financially encourage renewables. [It is ***not*** simply the case, as PSE has repeatedly claimed at all IRPAG meetings, that PSE must always simply seek to minimize rates. A system that produces high level of CO2 is needlessly not safe to the public because of the well-recognized dangers of climate change caused by CO2 emissions.] UTC can financial encourage lower carbon choices, even when (contrary to PSE claims) this does not result in lowest rates today. I hereby ask Commission to do so. It is reasonable and prudent to make system design choices – given the 30+ year lifetimes of those decisions – that actually recognize the reality of climate change, the ever-increasing damages to the economy caused by CO2 pollution emissions – and which reasonably and prudently act to reduce those CO2 pollution emissions – when doing so can be done at a lower total societal cost than ignoring those CO2 pollution emissions.

RCW 80.28.130 Allows Commission to direct a utility to make changes to increase the security of the public to the actions of a facility. IE Commission can direct PSE to take action to reduce CO2 pollution emissions in order to reduce the dangers of the public from that CO2 and climate change. I hereby ask Commission to do so. Commission can also take action to require PSE to reduce ratepayer exposure to the regulatory risk of a system design overly reliant on high levels of CO2 pollution. I therefore ask Commission to take such action by "**Not Accepting**" this PSE IRP Plan.

RCW 80.50.010 (2) Requires operation of a generation system in a manner to preserve and protect the quality of the environment; to enhance the public's opportunity to enjoy the esthetic and recreational benefits of the air, water and land resources; to promote air cleanliness; and to pursue beneficial changes in the environment. PSE's system design that emits high levels of CO2 does just the opposite of this requirement, thus PSE's IRP Plan is not just and reasonable, and should be "**Not Accepted**."

IRP Page 3-8 PSE acknowledges that they must balance positive and negative customer impacts, regulatory requirements, and financial performance, in setting its program mix and targets. Yet this is precisely what PSE has failed to do – PSE has failed to fairly consider and to fairly balance system prices and system design against the external environmental damage costs that their system causes. PSE has failed to realistically price into their design decisions these environmental damage costs at all – either by misrepresenting the costs to society of those damages, by denying that these emissions are causing negative changes in the environment, damaging the economy, and damaging the lives and property of others, and by insisting that they do not have a responsibility to even include the issue of the environmental damages they cause into the design and operation of their systems.

Puget Sound Energy is by a very large margin the dirtiest Washington State electric utility, and is rapidly becoming dirtier, at the same time that other utilities are working diligently to reduce or even eliminate their carbon footprint. PSE is ***free riding*** on the good, public-spirited, and diligent effort of our other, much cleaner, utilities. PSE should be required to also "do their part" to meet Washington State 2020 carbon target requirements. PSE should not be allowed to ***free ride.*** When PSE ***free rides*** that is not ***J&R***.

PSE regional load cold snaps have decreased in intensity by 7 degrees Fahrenheit since 1950. Bidecadal (1 in 20 years) cold snaps have decrease in intensity by 9 degrees Fahrenheit since 1950. Bidecadal data corresponds to the required 5% Loss of Load. But PSE continues to use 1950s data to (over-)design their system capacity for cold snaps. This is unreasonable behavior on the part of PSE, especially since as a corporation they acknowledge the reality of climate change. They acknowledge the reality of climate change, but then they refuse to recognize the reality of climate change when it comes to how climate change reduces costs to ratepayers – by making winter peak system loads significantly smaller which means we don't need winter peakers. As always, PSE always "plays the game" in every particular situation to PSE's advantage, and to the disadvantage of ratepayers, thus ***unreasonably*** driving up rates – even when doing so means that PSE acts in self-inconsistent manner from minute to minute while designing the IRP.

Puget Sound Energy is not taking their IRP requirements seriously, stating in IRPAG meetings pretty much that this whole exercise is a joke. Other utilities take it seriously, record questions, respond to questions – even going so far as to take IRPAG participant's input into the actual physical design of their system. PSE does none of these things.

Let us remind ourselves where the IRP requirements come from – they came from the seriously negative and almost region-destroying experience with the WPPSS nuclear power plants. We said "never again will we allow this kind of close-minded 'down the garden path' behavior." But now we ***are*** seeing this kind of 'down the garden path' behavior again – where PSE is refusing to acknowledge that we don't live in the 1950's anymore, that the climate ***is*** changing, that serious reductions in CO2 emission ***are*** going to have to happen to save the planet and the human race, and those CO2 emissions ***are*** going to have to come from coal power plants.

Effectively in part, on Page 2-5 PSE is saying "Oh well, don't take these values too seriously because they are only good for the next two years." PSE is saying that they are designing an IRP to last for only the next two years – and I would have to agree with PSE on this matter, having being an IRPAG participant for a couple cycles now, namely that PSE sees the IRP process as one that expires every two years, and if they can keep enough Band-Aids and duct-tape on their systems to keep them going for the next two years, then that is "good enough." But that is not supposed to be the nature of an IRP. A IRP is supposed to be a long-term forward-looking paper design of the system, 20 years forward looking, so that PSE, UTC, Commissions, and ratepayers can be reasonably assured that PSE is not making "down the garden path" mistakes where by avoiding taking a ***serious look*** into the future, poor investments are made, or appropriate investments are not made in a timely manner, such that higher investments have to be made in the future to fix previous mistakes, or we all are left with a system that is ill-designed to meet the

needs of the future. PSE's refusals to plan ahead today lead to higher rates in the future. PSE choice of high-carbon system design today leads to higher rates in the future. PSE continually refuses to do this forward-looking, honest, self-analysis that asks "What are we doing wrong, how can we fix it, and how can we do better in the future?" PSE also refuses outside analysis by denying IRPAG participants even an opportunity to speak in IRPAG meetings! And most specifically PSE continues to ***deny*** the damages that they are causing to the environment, and the responsibility to ***reasonably*** avoid ***unnecessary, excessive and uneconomic*** damages to the environment – and thereby to the economy, and to the standing Washington State has in the nation, and in the world.

IRP Figure 1-8 shows that PSE intends to increase their CO2 emissions, not decrease them, rather increase to 45% above 1990 levels in 2020, a point in time when RCW 70.235.020 requires the state to reduce emissions to 0% above 1990 levels. I ask the Commission find that this is not a **Just and Reasonable** system design, and direct PSE to develop an IRP design consistent with RCW 70.235.020.

On page 2-4 "Developing the Resource Plan" PSE represents that there is a high degree of uniformity between the system "scenarios" that would built under a wide variety of different economic conditions, gas price conditions, and CO2 environmental damage estimates. This is simply ***not true,*** as PSE's own data shows, if one only reads it. PSE tries to hide this fact by lumping Colstrip 1&2 with Colstrip 3&4, and by mislabeling their CO2 pollution damage costs to make it seem as-if what are actually mainstream "Middle Estimates" of those costs are instead extreme-outlier values. Further PSE misrepresents gas prices to represent current gas prices as being "extremely low" when clearly they are "Middle" values – gas prices could go or down from where they are today. In any case, with realistic labeling substituted for the PSE labeling on Figure 2-2 one sees a large variety of situations where Colstrip 1&2 are no longer economic to operate – if one includes the CO2 pollution damages that these units cause to the economy. Current gas prices and current EPA CO2 prices are enough to make Colstrip 1&2 "uneconomic" – as a rational society we should not be allowing these units to run. This can seen most clearly in Figure 2-3, the data points for what PSE calls "Base Gas" and "High CO2." Actually, these gas prices are much higher than today's gas prices, and what PSE calls "High CO2" is actually lower than EPA "Middle" CO2 prices, which are $45 / ton CO2 2013. So even in what would be more realistically labeled as a "High Gas Prices, Low CO2 Costs" – even then Colstrip 1&2 are "out of the money" and should be retired.

Prudence, "Safe and Sane" operation of a utilities facilities, "In All Ways Just and Reasonable." Is needless and uneconomic operation of facilities that emit needlessly high levels of CO2 resulting in "Loss of Planet" prudent? "Safe and Sane"? "In All Ways Just and Reasonable"? I ask that Commissioners find that PSE's IRP which calls for operation of Colstrip 1&2 in an uneconomic manner, where the environmental damages exceed PSE's own estimates for reasoned alternatives to that highly polluting generation, is not Prudent, is not "Safe and Sane" and is not "In All Ways Just and Reasonable." When PSE pushes its costs onto others needlessly, including onto our children and grandchildren, it is not acting in a Just and Reasonable manner. It is violating the "Pay as You Go" principle, were current ratepayers are

not paying the price for the electricity they are choosing to consume. Rather the price of this electricity is being placed onto future generations of ratepayers.

PSE acts in an "Ayn Randian" manner, insisting that they are free to make whatever business decisions that they like, and that they are not accountable to the public for their actions. But PSE is not engaging in a "normal" business. Rather, they are engaged in a regulated monopoly, where ratepayers do not have the opportunity to select a different, lower-polluting provider. In exchange, the legislature has recognized that the monopoly has to be regulated in order to avoid excessive and unfair behavior by the utility, including damage to property and loss of life, including from pollution and other environmental damages, examples of which historically include catastrophic failures such dam failures, nuclear plant failures, and actual read loss of load in the dead of winter due to lacking tree maintenance, etc. – resulting in loss of ratepayer lives. Now the major concern of IRPAG participants is not "loss of load" but rather "loss of planet" and "loss of life" due to excessive and needlessly economically-unproductive emissions of CO2, leading to extreme weather and other catastrophes. In exchange for the requirement of "safe and sane" operation of their utility in the best interest of society, the utility is allowed a generous, and highly safe – but regulated – return on their investments. PSE wants it both ways – they want the generous and highly safe return on their investments – but they do not want to be regulated in the best interests of society to avoid unfair and excessive damages to life, property, and the environment. I ask the commissions here reinforce to PSE that they are not an unregulated "Ayn Randian" business, that they have a paramount duty to design and operate their facilities in a "safe and sane" manner, including doing so in a manner which is ***"in every way just and reasonable"***. I ask here that Commissions find that to operate the Colstrip 1&2 coal power plants in a way that is uneconomic to society, because the costs of the damages from the resulting CO2 emissions exceed the economic benefits of operation of that power plant in comparison to other non-coal power plants, does not represent ***"in every way just and reasonable"*** behavior on the part of the utility, but rather represents an unfair taking of the lives and property of others in human society, and an unfair imposition of utility costs on others, including our children and grandchildren, these costs continuing in perpetuity [see ***Solomon Irreversibility***] Thus this IRP which continues to assume running Colstrip 1&2 "in perpetuity" regardless of the uneconomic CO2 damages these plants cause, does not represent a ***just and reasonable*** design of an IRP.

Certainly we expect to see a utility to present some self-serving bias in their IRP plans. But PSE pushes this to such an extent as to separate this IRP plans from an objective reality.

I therefore ask that this IRP be "**Not Accepted.**"

James Adcock,

Electrical Engineer

EPA Social Cost of Carbon $ / ton CO2 ***from EPA TUSCC*** -- Linear Interpolation between table values in order to give 2013 middle value:

				(fat tail risk)	
	5.0%	3.0%	Middle	2.5%	95.0%
2010	**$11.00**	**$33.00**	$42.50	**$52.00**	**$90.00**
2011	$11.20	$34.00	$43.60	$53.20	$93.80
2012	$11.40	$35.00	$44.70	$54.40	$97.60
2013	$11.60	$36.00	**$45.80**	$55.60	$101.40
2014	$11.80	$37.00	$46.90	$56.80	$105.20
2015	**$12.00**	**$38.00**	$48.00	**$58.00**	**$109.00**
2016	$12.00	$39.00	$49.20	$59.40	$113.00
2017	$12.00	$40.00	$50.40	$60.80	$117.00
2018	$12.00	$41.00	$51.60	$62.20	$121.00
2019	$12.00	$42.00	$52.80	$63.60	$125.00
2020	**$12.00**	**$43.00**	$54.00	**$65.00**	**$129.00**
2021	$12.40	$44.00	$55.00	$66.00	$132.00
2022	$12.80	$45.00	$56.00	$67.00	$135.00
2023	$13.20	$46.00	$57.00	$68.00	$138.00
2024	$13.60	$47.00	$58.00	$69.00	$141.00
2025	**$14.00**	**$48.00**	$59.00	**$70.00**	**$144.00**
2026	$14.40	$48.80	$60.00	$71.20	$147.00
2027	$14.80	$49.60	$61.00	$72.40	$150.00
2028	$15.20	$50.40	$62.00	$73.60	$153.00
2029	$15.60	$51.20	$63.00	$74.80	$156.00
2030	**$16.00**	**$52.00**	$64.00	**$76.00**	**$159.00**
2031	$16.60	$53.00	$65.00	$77.00	$162.40
2032	$17.20	$54.00	$66.00	$78.00	$165.80
2033	$17.80	$55.00	$67.00	$79.00	$169.20
2034	$18.40	$56.00	$68.00	$80.00	$172.60
2035	**$19.00**	**$57.00**	$69.00	**$81.00**	**$176.00**

EPA "Base Case" = **$45.80**
PSE "Base Case" = **$0.00**

Colstrip CO2 Costs 2013 **$48.64 per MWh**

Trend In 5% (Bidecal) Coldest-Day Cold Snaps – increasing 9 degrees since the 1950s. Winter peaking load requirements have been decreasing rapidly. Use of outdated temperature data from the 1950s and 1960s is no longer justifiable. This plot records (blue line) the coldest temperature in the previous 20 years, a rare event, which is why the blue line changes only occasionally. Trendline (red line) shows coldest-day snaps warming at a rate of 9-degrees in the PSE-chosen incorrectly-assumed to be "stationary" analysis period.