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Comments by James Adcock on Docket UE-200304 PSE 2023 EPR

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Comments Related to Puget Sound Energy's EPR, Docket UE-200304

5/31/2023

Comments by James Adcock, Electrical Engineer, MIT, decades-long participant in PSE's public Integrated Resource Planning Process, and a leading critic of PSE's modeling efforts. James has spent his entire career engaging in statistical analysis, including at three Fortune 500 companies.

As Puget makes clear in their EPR23 document, Puget has not actually taken any of the "Progress" steps yet, and any Puget description of such future possible step is merely speculative – Puget has not committed to making any actual "Progress."

Likewise, any concerns I express herein about Puget's EPR23 document are simply future speculative concerns that might happen if Puget actually were to take any of the steps that they have stated they might possibly take in their EPR23 document. It is only for simplicity of exposition that I will express all further writing in this comment paper as-if Puget were actually taking the definitive actions which I am expressing future concerns about.

In general I am concerned about the very low rate at which Puget is reducing its GHG emissions – in its most recent "Annual Energy and Emissions Intensity Metrics Report" by a mere 0.3% -- that is not nearly a high-enough rate to get it to "80% clean" by 2030, are required by CETA. Puget's own targets in the Progress Report are 5% a year – 16X higher! I believe Puget is engaging in "Designed to Fail" – deliberately intended to fail to meet the 2030 requirements to be actually "80% clean" by 2030. We need UTC to "light a fire" under Puget and explain in no uncertain terms the consequences of deliberately failing to meet the requirements of the law – namely actually 80% clean by 2030.

In general I am concerned that Puget may be heading towards a "Double Counting Scheme" involving hydrogen. Here is how that would work. Puget sells green power to a "partner" hydrogen partner, that partner turns the power into hydrogen which Puget then burns in their natural gas generating plants. The round-trip efficiency of doing this is about 30%. IE only 30% of the original total renewable power is turned back into useful power for Ratepayers to use. But Puget claims 100% of the original green power towards CETA "clean" requirements, plus an

additional 30% as also being “clean” for a total of 130% “clean” – whereas this trip has actually only netted 30% of the original clean power as benefitting Puget Ratepayers. Puget should only be allowed to claim the final 30% round-trip efficiency of net power available to Ratepayers, not the 100%, and not the 130%.

That this is actually a double counting scheme can be determined by using a different “energy storage of electricity technology”, namely batteries. In the hydrogen scheme electricity is chemically changed to hydrogen for energy storage. In battery storage of electricity case the electricity is simply changed to a different chemical form of energy storage, which, like hydrogen, can then be turned back to electricity.

Consider this scenario instead: Puget sells green power to a Battery Storage “partner,” who then sells the power back to Puget later in the day. Imagine if Puget claims 100% of the “clean” power sold to the Battery Storage partner, and then the round-trip efficiency of Battery Storage is 80% or better, so Puget gets an “additional” 80% back from their “partner”. Puget now claims 180% of the original power. Is this legit? Clearly not – the power purchased back from the Battery Storage partner is the same old power sold to the battery storage partner – but now reduced to 80% of its original value. Puget can claim the 80% sold to Ratepayers, not the original 100% -- and certainly not 180%. Yet this is identically what is happening in the Hydrogen case: Power is sold to a partner who returns that same power – less than the total original power due to round-trip inefficiencies – at a later point in time.

Pages 1.2 “Mitigating Risk” Long-time IRP stakeholders are well aware of the pattern of Puget finding “partners” to share the risk of their project, and using those “partners” as justification for starting a project – and then the “partners” evaporate and Puget Ratepayers are left holding the bag. The “partnership” with Fortescue Future Industries is of the skimpiest nature, written on the thinnest of onionskin paper. Please UTC, if Puget moves forward with “green” hydrogen make sure Ratepayers are not left holding the bag – when Puget chooses to move into a new business – the manufacturing and sale of synthetic hydrogen gas – neither Puget electrical nor natural gas Ratepayers should be forced to pay for Puget’s forays into such new businesses.

Pages 1.2 Resource Planning Foundations:

Puget states that the EPR is just a “planning exercise” IE that they are not making any commitment to make any actual “Progress.”

Pages 1.5

Puget acknowledges that hydrogen is an “uncertain fuel source” – i.e., that there is no such green hydrogen fuel, there is no such green hydrogen market, and the future availability of such fuel is pure speculation. People active in the EV community have seen Hydrogen Fanatics “speculating” – in wildly enthusiastic terms – about this non-existent fuel for at least a dozen years now. It did not happen. What happened instead is the explosive growth of Battery Storage – which is a much more efficient way of storing energy – over 80% efficient round trip, whereas what Puget is

talking about re “Hydrogen” – actually trying to justify building even more new ***Natural Gas*** generating plants – is an absurdly low 30% round trip technology! Even if there was Green Hydrogen available it makes no sense to burn it in such an inefficient manner! If there was such a Hydrogen Technology, then Puget would have to build 3X as many Wind Farms to generate such Hydrogen – just to waste it by burning it in Natural Gas generating plants – and even then, Puget is only talking about burning 1/3 Hydrogen while continuing to burn 2/3 Natural Gas. Please do not be deceived: This is simply a buggy-whip manufacturer trying to give their buggy-whips a new coat of “Green” paint. Buggy whip manufacturers do not deserve to be allowed to force Ratepayers to pay for such nonsense! In any case, merely duct-taping a cardboard sign onto the smokestack of a Natural Gas Generating Plant, reading “***This is a Hydrogen Plant***” or “***This is a Biodiesel Plant***” should not be enough to make such a Natural Gas Generating Plant “CETA Compliant” – what should make such as plant “CETA Compliant” is to be actually burning 100% Hydrogen, or 100% Biodiesel respectively. If, say, in a given year 1% of the total generation of such a plant is actually run on green fuel, then 1% of the plant costs of that year, including depreciated overnight costs, should be considered “CETA Compliant.”

In regards to “Advanced Nuclear Small Modular Reactors (SMR)” – perhaps UTC has forgotten previous Ratepayer Experience with WHOOPs aka WPPSS – where the cost overruns continued at such a pace that if the project had been completed – it was abandoned – the total cost overruns – in 1980 dollars – would have been $24,000,000,000.00? That the one reactor that went into service is built on top of an earthquake fault line? That the historical average major nuclear leak failure rate of nuclear reactors is 1 in 40? That if the one WHOOPS nuclear reactor fails, that not only kills humans but might destroy the entire Columbia salmon runs? That the mere Fukushima clean-up costs – not counting the human lives – may run to a Trillion dollars? And that would represent – on a per ratepayer basis, one Million dollars of clean-up cost per Puget customer? Or is UTC proposing a scheme where Puget would be held responsible for all such damage costs, including loss of human lives, “leaving Ratepayers whole?”

I ask that UTC give Puget clear feedback now that UTC cannot imagine any scenario where they would support a Puget foray into Nukes – Puget even blows things up just using Natural Gas!

Pages 2.1 Puget states that they targeted a linear ramp from 2021 to 2030, from PSE existing renewables to 80% renewables in 2030. This would then be their target renewables percentages:

2021	33
2022	38
2023	43
2024	49
2025	54
2026	59
2027	64
2028	70

2029	75
2030	80

Does this in fact correspond to their proposed actual renewables acquisitions? When in the past year Puget has in fact only reduced emissions per MWh by 0.3%? Not 5% -- i.e. a rate more than 16 times too slow?

Page 2.6

“Biodiesel” Puget clarifies that Biodiesel will be used as a backup fuel – it is not a primary fuel. So, the new “Biodiesel” Generating plants will not actually be run on Biodiesel. Rather, they will be run on Bog-Standard Natural Gas. The “Biodiesel” will only be sitting there in a tank, with another cardboard sign duct-taped to it: “See, this is a Biodiesel Plant!” Puget acknowledges that the Biodiesel will just be sitting there in a tank for many many years. A New Natural Gas plant that actually runs on Natural Gas and not on Biodiesel is NOT a “Ceta Compliant” Generating Plant!

Yet Another Duct-taped Cardboard Sign on the Smokestack: “Ceta Compliant”!

Here's a thought: Is it possible that Puget just wants shiny new Natural Gas Plants – at ratepayer’s expense – to play into the Californian Energy Imbalance Market? We Washingtonians have pay to “insure” Californians? In recent years the “energy imbalance” on the Columbia Gorge to LA “California Interties” has been literally 10,000 to 1 – California benefits from 10,000 units of electrical power the PNW sends down to California for every 1 unit of power California sends back to the PNW. Maybe it is time that California builds its own new Natural Gas Plants!

Ditto “R99”

“Hydrogen” – Green Hydrogen in practice continues to be the Mythical Flying Unicorn of the renewables world. They have been talking about it for over a decade now with no real practical progress. They are now running neck-and-neck with Cold Fusion in a Bottle.

Puget of course wants to waste Ratepayer money on the Mythical Unicorn – and then will claim having spent 2% a year on such wastage they are now exhausted and can do no more. Let us call it as it is: Just Another Ratepayer Rip-off.

When Puget builds new “Hydrogen” or “Biodiesel” generating plants – which are actually just bog-standard Natural Gas generating plants – and then those plants become stranded assets, then Puget owners should eat the costs of those imprudent investments, not ratepayers. Fake justifications of imprudent investments do not make those prudent investments.

Page 2.9 Customer Benefit Indicators (CBI)

Puget invents CBIs to suit Puget's own interests, *claiming* that these measures are based on customer surveys – but those surveys are always manipulated in Puget's interest. In this case they included 3 "in the home" categories in their CBI measures – increasing the weighting in that "what is really only one category" by five times. Puget did provide a spreadsheet to stakeholders that we could experiment with. I de-weighted the "in the home" category back to 1 – not 3 – by dividing the weighting on those categories by 3. And then as an experiment I doubled the weighting on the category "actually reduced GHG emissions" – because this is something that stakeholders have been telling Puget to do for over a decade. When I did this the "preferred portfolio" became the one Puget calls "Renewables Overbuild" – the same scenario that Puget called "Green World" for the last decade – which is what we are in now: "Green World" – the "Renewables Overbuild" aka "Green World" is what Puget has been telling us for the last decade: Puget would have to build a ton of new Wind Farms. Except now we are there: CETA equals Green World. The total cost of new Wind Generation is less than just the fuel costs of Natural Gas generation – so Wind Generation is cost effective for Ratepayers in any case. So now that we are there – is Puget going to build a ton of new Wind Farms? Nope. Now Puget says they are not going to do this. Instead, Puget invents CBIs. Are the CBIs cost effective – are they lowest reasonable cost? Nope. Puget did not include a measure of cost effectiveness in the design of their CBIs. It is possible to make cost-effective CBIs: Puget could sum the broad societal benefits of a program with the local societal benefits. For example, better insulated homes would help both the homeowner or renter with utility costs, and reduce GHG. You can actually measure Customer Benefits – you don't have to invent CBIs out of whole cloth! Whatever happened to "Lowest Reasonable Cost"?

Page 2.12

Utilities can actually meet up to 20 percent of their 2030 standard by a fourth means: They can use what UTC calls "Retained RECS." But of course, Utilities will want to falsely claim those for the 80% primary compliance.

Puget does point out that they actually miss 80% in 2030 – they do not actually hit their claimed target. If they did, they would not need to pay $3.18 million in alternate compliance. So they claim they meet 80% -- but then they claim they don't meet 80% -- someone please explain that one to me?

Page 2.13 Social Cost of Carbon

The current measures of SCC were invented back in 2008 by a conservative economist Richard Tol – who did not actually even include the costs of environmental damages from GHG emissions! Real scientists have been complaining ever since that he set the numbers too low.

EPA is now proposing SCC numbers which are several times higher – Puget and UTC should

assume that SCC costs, even if embedded in CETA, will only become several times higher. When EPA updates its numbers, so will Washington State.

https://www.epa.gov/system/files/documents/2022-11/epa_scghg_report_draft_0.pdf

Page 3.3

"WRAP requirements" I have strongly expressed concerns about several of the WRAP climate modeling choices at their meetings. There are problems in the daily-hourly interpolation method of the Climate Models – the same models used by Puget. There are problems with regional downscaling leading to highly improbable seasonal temperature distributions. We know those distributions should be "skewed Gaussian" distributions – except in the WRAP downscaled climate models they are not. I believe something somewhere has gone wrong. When I ask where the downscaled data came from in the first place, I am not given straight-forward answers. Someone did the downscaling, and provided Fazio (and thereby Puget) with that downscaled data – and no one will tell me where it actually came from. Is it from PRISM, is it from CIG? Where did it come from? – It had to come from somewhere – climate data does not downscale itself! I'm not saying that Puget or Fazio's group did anything wrong with this data – I'm saying to me it looks like something somewhere has gone wrong. The probability distributions are not remotely "correct." And there are problems on the assumed limits on levels of imports from neighboring regions – read: California. The PNW exports 8 Gigawatts down to California. But WRAP assumes a hard limit of 3.4 Gigawatts into the PNW from all sources.

Page 3.4

Puget describes [in the box] that new Natural Gas Peaking generation uses non-emitting hydrogen or biodiesel – but as Puget described earlier the biodiesel is not in fact used – it just sits there in a "backup" tank. Again, just tape a cardboard sign to the Natural Gas Smokestack "This is a Biodiesel Plant" – except it is not a biodiesel plant and it is not CETA compliant – unless it actually is burning biodiesel over the course of the year, and not biodiesel. I believe Puget is playing games, and these new Natural Gas generating plants will not in fact be run substantially on biodiesel – they will be run substantially on Natural Gas. They are not "CETA Compliant" – they are bog-standard new Natural Gas Generating Plants.

Page 3.10 "Hydrogen Fuel Risk"

There is the significant risks that Green Hydrogen will continue to not exist, that if it does exist it will not be at a reasonable price, and that if it is added to the existing Natural Gas Pipelines this will lead to embrittlement of pipelines and more Puget Natural Gas Explosions.

Page 3.11 Puget's analysis assumes the new Natural Gas Peakers falsely advertised as "Hydrogen" Peakers will only run for very limited hours serving Puget customers. But this is not how the Electricity Industry works, as acknowledged in the IRP meetings – once built these Peakers "Dispatch to Market" – running for anyone who wants it – say via the California Energy Imbalance Market – that chooses to pay for them. Therefore, I suggest that Puget's analysis showing that these new Natural Gas Peaker plants will only have limited dispatch to meet Puget customers' needs is clearly false.

Page 3.14 Summer vs. Winter Peaking

While Puget's analysis always shows they have greater need for additional Winter Peaking than Summer Peaking, in recent years Puget has had declared energy emergencies in both the Summer and the Winter. I continue to suggest that Puget has a false continued "backwards looking" expectation that Climate Change is not as large as it really is, that coldest winter days (on a 20-year LOLP basis) have very rapidly warmed – much more than Puget is willing to acknowledge, and the chances of a very hot Summer day shortfall are still under-acknowledged. This matters in two ways that I can think of: The Puget / PGE Summer/Winter Power Swap contracts are looking increasingly inappropriate, and the value of Eastern Washington Utility Scale Solar is not being fully appreciated.

Page 3.15 Volatility

Puget says we are seeing greater temperature volatility, but rather we have seen just the opposite: Extreme coldest winter days have greatly warmed in temperature, representing a much smaller range of winter temperatures to be expected on a 20-year LOLP basis. Summer volatility – the chance of a very hot summer day – has increased somewhat.

Page 3.15 Peak Capacity Contribution

When Wind and Solar are "running" then they contribute so much that Puget doesn't have a power problem. If Puget were to actually implement both Washington and Montana wind, those locations are far enough apart to actually have Wind Diversity, such that one or the other is running about 2/3rd of the time – meaning on a 20 year LOLP basis Puget's reliability increases 3-fold compared to not having those Wind Resources. Puget undervalues the contributions of Renewables to meeting Peak need because Puget assumes that there has been a 100% build-out of Natural Gas Peakers to meet peak need – and then asks how much additional contribution Renewables make. But if you build those Renewables for other reasons – namely to meet Clean Energy Standards – then there is not the need to build so many of those Peakers! Order Matters! Build the Renewables first, or at least model "Renewables First" – and THEN ask what additional Peakers might be needed!

Page 3.18 Advanced Nuclear

The reason “Interested Parties” – read: Puget’s Ratepayers – asked Puget to model not using Advanced Nuclear is because Nukes have already had a catastrophically bad outcome on Washington Ratepayer pocketbooks --- WHOOPS aka WPPSS. Not to mention the Fukushima Trillion Dollar Disaster! – which would be the equivalent of each and every Puget ratepayer paying one million dollars in damages! How many ways do we have to say: Do Not Do This!

Page 3.25 CBIs

Puget’s proposed “CBIs” are simply a pure fiction of Puget’s own choosing designed to accomplish the portfolio outcome that Puget aways wanted. As a counter-example, using a Puget provided spreadsheet I divided by three the weightings applied to measures for the home – because Puget had triple-weighted those measures by including three of them, and I doubled the small weighting that Puget had applied to actually saving the planet and the human race – and then instead the Spreadsheet chose the “Renewables Overbuild” option – building lots of Wind Farms -- which Puget had said for the last dozen years that that is what they would have to do if ever a “CETA Like” “Green World” law were to pass.

In particular Puget’s choice of CBIs completely ignored any measure of cost-effectiveness. For example, if the CBIs are too expensive, then the option of an alternative of “direct support” might be more interesting – but you can’t tell if the CBIs include no concept of cost effectiveness!

In particular, Puget’s current approach expects a large amount of Ratepayer Participation. What if Ratepayers do not agree to Puget’s offers? Then Puget is going to complain that it is the Ratepayer’s Fault that CETA goals are not met. But it is not Ratepayer’s responsibility to meet those requirements, it is Puget’s. If Puget takes an approach that is “Designed to Fail” then that failure is Puget’s responsibility, not Ratepayers.

Page 4.4 “Best Science”

“Best Science” must be used to analyze impact. “Best Science” is not being used if year after year, decade after decade, Puget and Council ignore the problems that I have been pointing out, relating to their modeled temperature distributions, are ignored. The reason my comments continue to be ignored is that Puget continues to want to exaggerate how cold winter days can be, in order to justify a needlessly excessive amount of new Natural Gas Peaker Capacity. Once built this Peaker capacity will not just sit there waiting for a really cold day which never happens, rather Puget will use this new needlessly excessive Peaker capacity to play into the new Californian Energy Imbalance Market. Puget’s Ratepayers get to pay to “Insure” Californian ratepayers! In recent years the “Trade Balance” via the Californian AC/DC Interties has been as high as 10,000 to 1 – for every 10,000 units of power the PNW sends down to California to

insure that California “Keeps the Lights On” – the PNW only get 1 unit of power back!

Let Californians build their own Peaker Plants – don’t make us pay for their Peaker Plants!

Page 5.1 “Portfolio Benefit Analysis Tool” is the Puget-provided spreadsheet which I mentioned previously, where as an example I changed the weightings from what Puget provided instead somewhat in the direction of actually preserving the planet and then human race – and then that tool picks the “Renewables Overbuild” option instead.

Page 5.2 Puget still assumes “Peak Need” in Winter, but in reality, Puget has had declared “Energy Emergencies” both Winter and Summer in recent years.

Page 5.5 Social Cost of Carbon has recently been updated by the Biden Administration to higher values. See also:

Bressler, R.D. The mortality cost of carbon. *Nat Commun* **12**, 4467 (2021). https://doi.org/10.1038/s41467-021-24487-w

From which one can calculate, based on Puget annual emissions, about 5,000 lives lost per year due to those emissions. This is not just a bunch of “Lawyerly Word Games” – people are getting killed.

Page 5.6 Please note that Puget is still not including Social Cost of Carbon in dispatch – i.e., Puget is still pretending that Carbon Emissions don’t really do anything to anybody. Such assumptions are simply false, and many decades out of date. Instead, Puget should actually be trying to minimize CO2 emissions in all company decisions, including whether or not to dispatch a given plant during any hour of the day or night. For example, based on MCC – Mortality Cost of Carbon, PSE emissions at current rates will kill about 5,000 people per year of those emissions.

Page 5.8 Climate Change Models

There are still lots of problems with the Climate Change Models. I don’t believe these problems were introduced either by PSE or NWCouncil/Fazio’s group, but rather “upstream” of those teams. I did ask NWCouncil/Fazio “chain of custody” type questions – where the data that they are using come from, IE what group did the downscaling, but I have not been able to get a straight-forward answer to that straight-forward question: Who/What group actually did the downscaling – because there are clearly problems with it.

We know what the temperature distributions of temperature data in the coastal PNW should look like: In the Winter those temperature distributions should look like skewed Gaussian distributions – long tail cold. Those tails are become shorter over time: the chance of a rare very cold day is becoming increasingly less likely; the temperature distributions are becoming less skewed. In the summer the opposite happens. Summer distribution show be Gaussian skewed long tail hot, and the long tails are becoming somewhat longer: the chance of a rare very hot summer day are become somewhat less rare.

But the downscaled temperature distributions do not show this – they do not even demonstrate a skewed Gaussian distribution. Instead, the temperature distributions appear to have been crudely manipulated. This is concerning to me. I would expect good climate models – including the downscaling process, to closely imitate "real life". If they don't, then there is no reason to use those climate models.

NWCouncil/Fazio used downscaled climate data where only two temperatures and times were given daily, namely the daily minimum and maximum temperatures, and then attempt to model the temperatures in between using a reconstruction technique. Unfortunately, the reconstruction technique being used has obvious problems that should be fixed, or an alternative method should be used.

There are three different Climate Models being used. One disagrees completely with the other two. After a few more years it should become obvious whether the two models are correct, or the one model is correct. The model(s) which have been proven wrong at predicting the future should no longer be used. Two models predict that things will continue to get warmer along the same patterns as in the past 70 years. The other model predicts increasing atmospheric turbulence will cause the warming not to follow the same patterns as in the past 70 years. Only one of these two scenarios can be true.

NWCouncil/Fazio have warned that their efforts should not be used by utilities for resource modeling. Yet Puget does so.

Page 5.26 PSE states that "most current solar and battery system are not controllable to manage peak reliability to date" – but they should be. What does it take to make this actually happen in the future? That is the whole point of the future – in the future we have the choice to do things differently – better – than in the past!

Page 6.7 While I personally am more interested in the issue of Peak winter heating days, or Peak summer cooling days aka "20 Year LOLP" – and how many new Natural Gas Peakers – or not – are required to meet these future needs, the *average* not "Peak" new future estimated requirements expressed on this page in terms of annual average HDD and CDD seem reasonable to me: We will continue to see rapid reduction in average winter heating load, and will continue to see rapid increase in average summer cooling load.

Page 6.8 For some reason here PSE discusses 1-in-2 Peak needs, whereas a 1-in-20 aka "20 Year

LOLP" discussion would be more useful.

Page 6.11 Again: Puget always wants to talk about Winter Peak Load, but the reality is that Puget has declared energy emergencies both Winter and Summer in recent years.

Page 7.2 Puget makes clear that their desire for new Peakers is not just to meet Ratepayer load, but rather to participate in regional markets!

Page 7.3 Puget acknowledges that in fact they need capacity during the Summer, not just Winter. In fact, by Summer 2034 Peak need greatly exceeds Winter need. It doesn't matter that PSE is "Winter Peaking" – what matters is that it is during the Summer that PSE's Peak Need Capacity is the greatest! And new Utility Scale Solar in Eastern Washington can help preserve and extend Hydro capacity during late summer months, to meet that need – because we consume too much Hydro currently during the summer, running out of Hydro capacity by late summer. Which is why Utility Scale Solar makes a meaningful contribution to meeting our regional needs.

Page 7.4 Puget models ELCC by first assuming that 100% of capacity has already been built out using Natural Gas Peakers, and then asks how much more load carrying capacity Renewables contribute. Well, not much – because Puget assumes that the need has already been built out using Natural Gas Peakers. Ask the question the other way: If the Renewables were built out first, then how much contribution do those Natural Gas Peakers make – and then the answer goes the other way: In that scenario it is the Natural Gas Peakers which are not contributing much useful capacity.

Page 7.10 Puget continues the PG&E seasonal exchange, even when Page 7.3 shows that this contract no longer makes any sense – because Puget's Peak Need will soon be Summer not Winter. Puget should cancel this contract. Page 7.11 confirms that this Seasonal Swap contract makes a *negative* contribution to Puget's portfolio needs! Page 7.12 confirms this again – this PG&E contract needs to be canceled!

Page 7.13 Again, Puget assumes full build-out using Natural Gas Peakers, and then complains that Renewables don't make much contribution – of course not – because Puget has already assumed that enough Natural Gas Peakers have been built to meet need!

Page 7.14 Demonstrates that Demand Response can be quite effective.

Page 7.16 Puget quotes Unnamed "Experts". Real "Experts" have names and credentials and affiliations.

Puget confirms again that the reason they want to do new Natural Gas Peaker builds is to compete better in regional markets.

Page 7.21 WPP – creating Rules and Governance that treats Ratepayers of each utility fairly is a

difficult problem, and one frankly that groups such as WPP care insufficiently about. Resources, such as Peakers, which contribute “Insurance” to a common “Risk Pool” should be based on the individual Risk Profiles of each Utility. For example, Utilities with greater Peak Extremes – more extreme coldest winter days, or more extreme hottest summer days – more extreme outliers in general – have a higher Risk Profile – and should be contributing more Peak Capacity to the common pool than utilities with a lower Risk Profile – utilities which have more moderate Winter Cold Extremes, and Summer Hot Extremes. “Payments” – in the form of built Natural Gas Peaking Capacity – should be proportional to Risk Profiles – those who are more like to have “accidents” pay more for their “insurance” – they build more Natural Gas Peakers.

Page 8.2 Previously in terms of Stochastic Modeling Puget didn’t use the past 30 years – they reached back 80+ years to the 1930s for their temperature data – during which time Coldest Winter Days have warmed 18 degrees due to Climate Change!

Page 8.6: Hydrogen: Hydrogen is a fuel source only if Hydrogen is actually being used as the fuel source. Otherwise, the Generating Plant is simply a bog-standard Natural Gas Generating plant with a cardboard sign duct-taped to the smokestack reading “This is a Hydrogen Plant”. I suggest Puget actually plans to run these plants overwhelmingly on Natural Gas – the “Hydrogen” label being only a deception.

Biodiesel: Biodiesel is a fuel source only if Biodiesel is actually being used as the fuel source. Otherwise, the Generating Plant is simply a bog-standard Natural Gas Generating plant with a cardboard sign duct-taped to the smokestack reading “This is a Biodiesel Plant”. I suggest Puget actually plans to run these plants overwhelmingly on Natural Gas – the “Biodiesel” label being only a deception.

Page 8.41 “Each Portfolio” does not in fact show the tradeoff between “equity enabling value and cost” because the CBIs are simply Puget whole hog inventions used to justify what Puget wants to do anyway. They do not represent any real measure of “equity” nor “value” – because Puget has not attempted to measure any such value. If Puget had actually measured any such “equity value” then traditional “Lowest Reasonable Cost” approaches could be used to decide which measures to adopt, or whether other approaches might represent better value to the people affected, such as “direct support” measures. This is all just “stuff and nonsense” where Puget is avoiding any accountability whatsoever. Please do not allow Puget to waste Ratepayer money in these kinds of unaccountable ways.

If Puget had actually attempted to measure actual value to the affected people, then Puget could add those societal benefits to the societal benefits of reducing carbon – *Social* Cost of Carbon – to form a total, that could be compared to the cost of the programs, making such programs *Accountable* -- because the benefits then would be literally *Countable* as in Dollar and Cents – and then Puget, and UTC, could say “This Program Pays for Itself, But This Other Program Doesn’t – and then UTC to tell Puget to go ahead with the projects that make sense, but not the other programs, and could suggest other Cost Effective programs, such as “direct

support" when doing so makes more sense than unproductive programs. But none of this is happening. Instead, Puget wants to go ahead with programs that literally have no accountability – Puget is simply wasting money willy-nilly. Please do not allow Puget to waste Ratepayer money in these unaccountable manners!

Appendices A.1 I strongly disagree with Puget's representations of how the public meetings are going. Puget is actively engaging in "freezing out" meaningful participation in these meetings, by ignoring "raised hands," deliberately "running out the clock" to avoid the more contentious subjects, only answering specific technical questions on a generic hand-waving "kindergarten level", etc. Prior to COVID-19 the in-person meetings were often contentious and unpleasant – but at least Puget conducted these meetings on a "professional level" – where the stakeholders at those meetings were treated as the professionals that they are – many of these stakeholders are Electrical Engineers, have experience in Statistical Analysis, have decades working on Environmental Issues in the PNW, etc.

But now Puget is freezing out real "questions and answers" and is treating people on a "kindergarten" level. Puget will be spending billions of dollars on CETA programs, etc. – and without any real Stakeholder participation in the process!

IAP2 – Puget conducts most of the meetings on an IAP2 "Inform" basis – Puget simply "Presents" what they will be doing without any real "Participation" as required by law, not even allowing Stakeholders real opportunity to ask meaningful questions and receive meaningful answers, nor to give Puget feedback about what we like or dislike about Puget proposals and presentations.

Documents are not produced in a timely manner, so that they are available timely before meetings for Stakeholders to review, and after meetings any follow-up documents come months later.

The design of Puget's website describing IRP meetings and documents still remains too hard to new Stakeholders to find and to navigate. Information is spread senselessly across disparate locations.

Feedback on submitted questions: When I submit specific technical questions to Puget in writing, Puget lumps those specific technical questions with other questions and simply answers them generically in a hand-waving manner on a kindergarten level.

A.6 Whenever I [an "Interested Party"] express concerns about whether or not Puget is committed to reach the CETA requirements of 80% actually clean by 2030, Puget instead responds that they are committed to 100% "GHG neutrality" – which to me means that Puget has no actual commitment to get to the 80% actually clean by 2030, but rather intends to use one or another Fake Carbon Offsets to get to a Fake 100% "GHG neutrality" – rather than to actually get to 80% actually clean by 2030 – as required by CETA law.

A.7 I have been a Participant in Puget's "public meetings" – IRP meetings etc., for the last dozen years, and I have not seen any actual improvements during how Puget conducts those meetings recently, or in general. In fact, since the start of COVID-19 things have gone downhill badly, as Puget uses the moderator to block access to any real Stakeholder participation in the process.

D.47 Puget talks about blending hydrogen into Natural Gas Peakers – leading to about 30% "round-trip" efficiency in the use of those Renewables!

F.3,4,6 Explains how the choice of Peak Temperature Models directly affect Puget's projections of Peak capacity need. If the Temperature models are screwed up, then so are Puget's projections of Peak capacity need. Please note, going back a decade+, Puget has always overestimated actual peak loads. If Puget always fails their estimates in the same direction, why not fix these systemic biases in modeling? These systemic errors are not a good thing – "Adding an additional margin of error" – because that additional margin is already built into the capacity build requirements elsewhere.

F.9 4.2 Temperature: Puget continues the pattern of using outdated weather data when new data is available. In this case the most recent actual weather data Puget used was 2019, and we now have actual weather data through 2022. Puget needs to "automatically" incorporate new actual weather data as it becomes available. "Real" weather data is always better than climate model predictions for a very simple reason: Because it is real.

4.4 Puget confirms that they are using Monte Carlo methods. Even if (say) Puget does a 100% draw without replacement from a data set, that is still Monte Carlo methods, which fundamentally require the assumption of "stationarity" in the climate data. IE the assumption that climate change isn't happening. But we know that climate change is happening. So the correct way around this problem is to make use of the "quasi-stationary" assumption: Only use weather data from the recent past, or climate model of the near future. Puget appears now, finally, to be only using weather data from the recent past. However, the down-scaled climate models of the future appear to be pretty screwed up, based on the implausible temperature distributions in those models, which raises the question I have not been able to answer from Fazio/NWCouncil: Where did the downscaling happen, and who performed it?

F.14 Reranking the hottest (or coldest) days under the assumption that those days happen on highest load days (working weekdays) and not on weekend or holidays, obviously leads to a bias of Puget requiring more Peak capacity than actual – but this is not a big-enough bias for me to get too excited about. This means that it predicts very hot or very cold days that affect PSE's Peak Load predictions about 7/5 too often.

G.6 Again, the Climate Change modeled data that Puget is using seems pretty screwed up, primarily due to the downscaling I believe – leading to highly improbable temperature distributions. We know what "real" Climate Data from SeaTac looks like: It looks like skewed Gaussian distributions, skewed long tail cold in the winter, skewed long tail hot in the summer. But the Climate Change modeled data that Puget is using doesn't look like that at all. It looks as-

if the temperature distribution have been “stretched” in a highly improbable manner. Which, again, begs the question who actually did the downscaling, and where. I don’t believe either Fazio’s group nor Puget were involved in this – I believe it happened somewhere “upstream” from them.

Further, two of the Climate Change modeled data sets look pretty compatible with what historically we have been seeing from SeaTac – coldest Winter days have become MUCH warmer – coldest Winter days used to be as cold as 0 degrees F, now the coldest Winter days – on a 5% LOLP i.e. once in 20 years basis, are about 18 degrees F – a 28% reduction in Peak Winter heating load! But the third of the three models predicts something radically different: that increasing atmospheric turbulence is actually going to start making Winter coldest days colder again. Only one of these things can be true: Either coldest Winter days are going to continue to warm, or coldest Winter days are going to become colder again. Either way, one of these two choices will prove itself wrong over the next couple years – and then the Climate Model(s) associated with that wrong prediction must no longer be used by Puget! Please do not let Puget continue to use Bad Data.

G.7 For the last decade Puget has consistently overpredicted load. Getting their estimates consistently wrong always in the same direction needs to be called out for what it is: Engaging in Ploys in order to Overbuild at Ratepayer Expense. Please stop Puget from continually overpredicting load and thus Overbuilding! There is already planning margin built into our Electrical System. There is no need to further gin up build requirements by consistently overpredicting load.

G.8 Predicts more Winter Hydro and even less late summer Hydro. Which points out, again, that Puget is wrong to focus their concerns on Winter and not Summer. Puget is wrong to continue the Seasonal Swap. And Puget has the opportunity to build more Eastern Washington Solar where it will help preserve limited Hydro resources during the Summer, especially late Summer, when we need that stored energy for very hot summer days.

G.9 An Actual Price to Carbon and Dispatch. Stakeholders have been telling Puget for many many years that they need to actually include the Cost of Carbon in their dispatch modeling. And now we see here that Stakeholders were correct in their predictions: With CCA dispatch now actually has a cost. It doesn’t matter the Puget Electrical gets some “free” allowances – those allowances can be sold, so needlessly consuming them represents an action destructive to Ratepayer Pocketbooks.

Please instruct Puget to include Cost of Carbon in their dispatch modeling NOW!

G.12 Illustrates clearly why Puget needs to build more Utility Scale storage in order to shave morning and evening peaks, and to capture low costs from off-peak hours.

G.13 Illustrates just how expensive it will be to be caught without these peak Storage capacities.

G.14 Demonstrates that Puget cannot continue to rely on the assumption of low gas prices. Rather renewables have become the resource of choice, total cost lower than just the gas cost of Natural Gas Generator Plants.

H.2 Building "as needed" based on Aurora output does not lead to optimal results because future needs are predictable, allowing Puget to predict future needs and build in a more sensible manner. For example, it doesn't make sense to build new Natural Gas plants if those are going to become "Stranded Assets" a few years later as Environmental Regulations become tighter. Of course, Puget attempts to overcome this problem by inventing a mythological hydrogen industry which is going to magically swoop in like a white knight on a flying unicorn to keep those Natural Gas Plants going – Natural Gas Plants which Puget wants to keep building just like the "buggy whip" manufacturer that Puget continues to prove itself to be.

Just say "NO!" to more new, already-obsolete Puget Natural Gas generating plants – even if Puget duck-tapes a cardboard sign to the smokestacks reading "This is actually a Hydrogen Plant". No, it isn't actually. It is a Natural Gas plant; it will never run substantially Hydrogen. Because Hydrogen doesn't exist, and even if it did it would be too expensive and would find better uses than Puget co-burning it wastefully in their Natural Gas plants.

H.3 Retirements – AURORA is not predicting "Retirements" correctly because Puget is not including dispatch costs as is appropriate with CCA.

H.10 Dispatch is not being modeled correctly in AURORA because Puget is not including Dispatch costs as is appropriate with CCA.

H.11 "Include Emission Costs in Dispatch" – Puget confirms that they are NOT in most cases including dispatch costs in their AURORA modeling – but they should be given CCA – dispatch has a real cost now!

H.14 Puget confirms, again, that Social Carbon Costs were not modeled as a dispatch costs – as they should be under CCA – but rather as an externality. With CCA the Puget statement at the bottom of this page: "Since the SCGHG is not a cost passed to ratepayers" – this statement is false. And so, Carbon Costs should have been modeled in dispatch.

Please tell Puget that they must model Carbon Costs in dispatch.

H.15 It is crazy, but Puget includes Carbon Costs on the dispatch of others, i.e., on "Market" – but not on themselves! How could this analysis possibly have been correct? Everyone else has to follow the rules, but not Puget??? Applying this bias – and Puget does acknowledge that it was a bias on their part – leads Puget to build more resources of their own, and to rely on Market less – because they are modeling that they are not exposed to "Carbon Taxes" – but everyone else is!

Please Protect our Ratepayer Pocketbooks against needless and rapacious Puget continued overbuild of Natural Gas Generating Plants!

H.16 Puget states without justification: “elements of an equitable portfolio are difficult to translate into cost values” It is not difficult – Puget just chose not to do so, thereby avoiding requirements that Utilities justify their spending on a “Lowest Reasonable Cost Basis” – costs that now with CETA and CCA finally are required to include both local and planet-wide damages, including to Equity, and to the Environment – which includes our state’s salmons, forests and forestry, farming, tourism, ski industry, climbing industry, outdoor sports, …

H.20 Since Puget’s CBI measures are Puget-invented metrics pulled out of thin air, so is this chart.

H.27 I believe it is an error to not include “Planned Outages” in any generating plant’s “Forced Outage Rates.” If a plant is not available, then it is not available.

H.28 10.1 Modeling that assumes a yearly build-out, without foresight of what will need to be built in future years, is sub-optimal design, raising costs and emissions. Human beings are capable of predicting what needs to be built in the future, rather than constantly remaining “behind the eight ball” only building things at the last moment – or even later – “too late.”

H.34 Puget falsely assumes full build-out of Natural Gas generators before calculating any additional peak capacity contributions from Renewables. This is backwards. First the contributions of Renewables should be calculated, including their peak capacity contributions, and then any peak capacity shortfalls, if any, should be calculated as a contribution from Natural Gas Peakers.

H.35 Please note that ALL the Wind choice and ALL the Solar choice represent attractive energy costs – whether or not they contribute to peak capacity. There is no excuse not to be currently building much more Wind and Solar!

H.38 EPA has recently almost quadrupled the “Social Cost of Carbon” estimates – inline with what Environmental Scientists have been saying for years. So, the SCGHG column numbers should be increased by about $59 each, as should the numbers in the “Total” column.

H.39 I believe what Puget is calling “Biodiesel Peakers” will actually be Bog-Standard “Natural Gas Peakers” – Peakers which are actually, in practice, going to run off of Natural Gas. Puget is just falsely duct-taping a cardboard sign on the smokestacks: “This is a Biodiesel Peaker.”

J.8 I believe Puget’s current CBIs are “fatally flawed” in that they are motivated by affected ratepayer surveys – and I have witnessed firsthand how Puget manipulates these kinds of surveys with a heavy hand to generate the kind of results that Puget wanted to get in the first place. Secondly the CBIs are “fatally flawed” in that they do not include a measure of cost-effectiveness. Rationally, affected ratepayers would want Puget to provide them with the most benefits for the available money. But I do not believe this is Puget’s motivation – rather Puget

just wants to waste money willy-nilly so that they can claim they have spent money up to the 2% "off-ramp" and do not need to do anything more. Except under CETA *There Is No Such Offramp" – prior to 2030. So, Puget needs to stop wasting money and actually get to 2030 requirements to actually really be 80% clean by 2030.

Appendix L In general year after year after year Puget predicts load growth incorrectly on the high side. Truthful, unbiased modeling would remove this bias, so it does not continue to happen year after year after. Biased modeling is not a good thing. Additional margins are already included elsewhere in the system build requirements. They should not also be built into the modeling – which results in "double dipping" into Ratepayer pocketbooks.

L.1 Historically, over the last approximately 75 years, using the traditional temperature measurement point of SeaTac, Climate Change HAS NOT "made extreme events more likely" rather Climate Change has made "extreme events" LESS likely, as "coldest winter days" extremes have decreased from zero degrees F, down to now about 18 degrees F. These are not "modeled numbers" – these are the "coldest winter days" which have actually occurred over 20-year spans, corresponding to 5% LOLP. So, Climate Change is STRONGLY making Winter conditions more moderate and more predictable. Conversely, Summer is showing MODEST increases in extremely hot days. Puget continues to ignore reality.

L.4 Again, I think it is an error to model "Perfect Capacity" when Natural Gas Generators actually have both planned and unplanned outages, plus the possibility of pipeline failures that could make the necessary Natural Gas capacity unavailable. When Wind and Solar are unavailable Puget models that. When Natural Gas Plants are unavailable – Puget still pretends that they are "Perfect" – that they are still available – even when they are not.

L.5 ELCC Saturation Effect – Explains why Puget should stop foot-dragging when it comes to acquiring Battery Storage, and should work harder at acquiring Wind Diversity. With the possible effects of "Wind Integration" and "Solar Integration" – combining these things with the inherent storage capacity of the PNW Hydro system, we need not have this saturation effect. Puget needs to better explore the possibility of such "Wind Integration" and "Solar Integration" contracts with BPA and other major Hydro operators. The possible energy storage capacity of BPA via Hydro Generation Modulation – something with BPA already does naturally to maximize generating value – is enormously gigantic compared to all other storage technologies!

L.11 I have strongly disagreed with Council's "hard limits" approach to modeling the amount of imports available from California limited to 3.4 Gigawatts. I believe California has a much greater capacity that could be used to provide support to the PNW when we have shortfalls. In recent years the PNW, over the Californian AC/DC Interties, have provided 10,000 times more power to California than California has returned back to support the ratepayers of the PNW. This has GOT TO CHANGE! The PNW cannot simply continue to build more and more Natural Gas Peakers which IN PRACTICE PNW ratepayers pay to build, but which IN PRACTICE simply go to insure the needs of Californian ratepayers – at our expense! California needs to build their own Natural Gas Peakers, and California needs to stop putting artificial constraints on how much power Californian utilities are allowed to export to the PNW – in return – to support OUR peak needs. It needs to be "tit for tat" -- "we scratch your back, you scratch our back" – not the current

situation where we, the ratepayers of the PNW, meet Californian needs, but California does nothing in return. Puget is simply planning to build even more Natural Gas Peakers [falsely calling those "Biodiesel" or "Hydrogen" Peakers] not to meet the needs of Puget Ratepayers, but rather to supply the needs of Californian ratepayers via the Californian Imbalance Market, and/or its successors.

L.11 Wholesale Market Curtailments. As Puget points out here, results depend largely on which of the three Climate Models one uses. Two models find similar results. The third model predicts colder more variable winter cold extreme days. Only of these two sets of Climate Modeling Results can be correct, and that will be determined by the next couple of years' actual weather. When one of these two sets of climate models proves to be incorrect, then Puget must stop using it.

L.12 Table L.2 – shows that Puget is actually "Summer Peaking" – in the sense that Puget's peaking shortfall is MUCH greater during the Summer than in the Winter. It is time to terminate the Seasonal Exchange Contract with PGE.

L.13 Storage Forced Outages – It make no sense that Puget models Forced Outages for these storage technologies, but not for Natural Gas Generators, which also go offline for a variety of reasons including unexpected failures, planned outages, and loss of pipeline supply.

L.13 Hydro Generation Flexibility – It is not sufficient to model Puget's Hydro Flexibility, Puget also needs to model how BPA operations will change with the increasing amounts of Wind and Solar in the region. BPA's current operations show that BPA will "automatically" – based on a desire to maximize Market profits – BPA will automatically shift Hydro generation away from periods of high Wind and Solar generation, because when those things operate Market prices drop to zero, and BPA does not want to sell Hydro power for "zero" dollars. Puget needs to work harder with BPA and other regional major Hydro generators to create "Wind Integration" and "Solar Integration" contracts which exchange more variable Wind and Solar generation for less variable tranche of Hydro generation.

L.13 Wind and Solar Generation Profiles – I'm not sure here based on Puget's characterization of their contract with DNV, but it should NOT be the case that "underlying weather conditions are the same for each resource's profile" – unless those resources are geographically adjacent. For example, Montana Wind and Solar SHOULD NOT be modeled as having the same "underlying weather conditions" as Washington State Wind and Solar because they are geographically separate enough from each other that most of the time they are not experiencing "the same" Wind and Solar conditions. This is the nature of Wind and Solar diversity which we have been begging Puget for many years to take advantage of!

L.15 When Puget admittedly did not correctly model the NWPP Reserve Sharing Program that introduces another bias in Puget's modeling effort yet-again exaggerating Puget's need for new Natural Gas Peakers [which Puget falsely labels "Biodiesel" or "Hydrogen" Peakers respectively]

L.15 Please note that E3 finds VERY HIGH ELCC for Storage Technologies such as Utility Scale Batteries. IE such not-Natural-Gas-Peaking-Capacity is available 95% of the time. In comparison, we do not know what percent of the time Natural Gas Peaking Capacity would actually be available – because Puget just assumes without reason that it would be available 100% of the time – and it is not!

L.15 Continued to be not-explored: Puget continues to not-explore correlations between load and renewables. For example, it means during hot summer days, there are not clouds, and so Solar produces more power on those days. And displaced Hydro can then store power for a couple hours and return it to the system when needed for peak afternoon loads. But Puget continues to refuse to model these kinds of correlations.

L.20 Shows – again – that the potential Peak Capacity shortfalls that Puget might experience are in late summer – August – when regional Hydro supplies have run short. Solar contributes to system capacity during summer, allowing the Hydro system to retain more water for these late summer months. This is why the region uses more Natural Gas generation during the late summer, not winter. And why Solar can greatly contribute towards saving Hydro for when it is needed to meet Peak Demands, and reducing the consumption of Natural Gas in Peaker Plants.

L.22 E3 in their RECAP model *does* make the assumption that (as I described earlier) Hydro naturally gets out of the way of renewables, storing this displaced energy behind their dams at a later time and/or date to meet future needs. For these reasons Wind and Solar DO contribute to Peak Capacity in ways Puget is still not modeling.

L.25 It is not a good idea to model Solar from seven different geographically distinct regions as being "100% correlated" IE – some of these regions probably have clouds when other regions do not. And even in the Wind associations, the size of the regions in which perfect "100% correlation" is assumed is too large – this leads to a falsely reduced assumption of Wind contribution to Peak Capacity.

L.25 Wind and Solar Saturation Curves. The only way that Wind and Solar fail to contribute is if they do not run. We know when they do not run, because BPA then also has to spill Hydro because there is too much "must run" system capacity in the PNW. When BPA spills, they set a "Spill Flag" in their data files which we can explore to see how often these conditions happen. How often does the "Spill Flag" condition occur? Answer: a couple hours per year. Further, Puget falsely calculates these Renewables peak contribution numbers assuming that new Natural Gas Peaker capacity [falsely labeled "Biodiesel" or "Hydrogen"] have already been fully built out.

L.27 It is a modeling error to lump together Utility Scale and distributed solar together – assuming that they are 100% correlated – since Utility Scale would be primarily Southeastern Washington, compared to distributed solar which would be primarily Western Washington – and cloud cover is nowhere near 100% correlated between these regions. Puget always falsely models the contributions of Renewables too low, and of Natural Gas Generators [falsely labeled "Biodiesel" and "Hydrogen"] too high.

L.32 PSE actually models “Natural Gas Peakers” not “Biodiesel” nor “Hydrogen – demonstrating again that the “Biodiesel” and “Hydrogen” claims are just nonsensical “Cardboard Signs Duct-taped to the Smokestacks”. These units are not “Biodiesel” units, and they are not “Hydrogen” units, rather they are bog-standard Natural Gas Generation units, and Puget is modeling them as such here.

L.33 Planning Reserve Margin – Bizarrely, Puget claims that increased needs for Peak Capacity in the Summer means that they need to increase their Peak Capacity needs in the Winter. This statement is patently bizarre, and the only reason I can think of why Puget would be saying this is that they are trying to motivate preserving the Seasonal Swap Contract with PGE, when clearly that contract should go away.

Let me just state, contrary to Puget’s claims, the obvious: When the models say you need more capacity during the summer, that means you need more capacity during the summer. It does not mean, as Puget tries to claim, that you need more capacity during the winter. Can UTC please talk some sense into Puget – this is beyond ridiculous!

Let me make an analogy: Puget claims when you get a flat on the right rear tire that means you need to put a patch on the left front tire!

L.36 ELCC Saturation Curves. Contrary to Puget’s claims, both Summer and Winter ELCC saturation curves show much more ability of Puget to use Wind and Solar productively than in Puget’s 2021 IRP. This is frightening – that Puget could have been so wrong – and might continue to be so wrong! If the Puget modeling is any good at predicting Puget needs for various new resources, then there should only be relatively small changes in those modeling results from year to year. But that is certainly not what we are seeing. The question remains: How do “we” fix Puget’s modeling efforts so that they actually mean something, so that Puget does not continue to needlessly and excessively pollute GHG, and so that ratepayer’s pocketbooks are not needlessly ripped off???

Stakeholders have been complaining about how Puget has been erroneously modeling renewables for more than a decade. How do “we” actually get this problem fixed? This situation is unacceptable.

L.36 Storage and Demand Response ELCCs – this table shows just how horribly wrong Puget has been in their modeling of Storage over previous years. For many many years Stakeholder have been telling Puget that they were getting it wrong in their modeling of Storage, and now it turns out that Stakeholders were correct. What does it take to fix Puget modeling efforts going forward so that these kinds of Huge errors do not continue in the future?

L.37 Given the billions of dollars of Ratepayer monies on the line, complaints that Puget’s Modeling group does not have the computing resources necessary to get the job done quickly and correctly are not acceptable. What does it take to get the Modeling group the modern computing resources they need so that is not a continuing excuse not to do the modeling correctly? There is an extraordinary amount of computer resources available, including using graphics cards as numerical computation devices, as is currently being used in generative AI.

Why can’t Puget get these modern computing resources to the Modeling Group and use them?

Thank you for your consideration,

James Adcock, Electrical Engineer, MIT