Sept. 27, 2021

Dear PSE Planners and UTC Commissioners,

Sierra Club's Washington State Energy Committee, the Washington Clean Energy Coalition, and more than a dozen environmental organizations are writing to you to express our serious concerns regarding Puget Sound Energy's All-Source RFP docket (UE-210220). We were disturbed by presentations at PSE's "Effective Load Carrying Capability Workshop" held on August 31, 2021. The company continues to rely on old temperature data, opaque modeling parameters, and questionable assumptions to support conclusions that appear to benefit PSE's business at the expense of ratepayers and the environment.

Ignoring the effects of climate change

During the August 12 Open Meeting of the Utilities and Transportation Commission (UTC), PSE reported that it cannot produce summer or winter load forecasts that account for the impact of climate change until mid-2022, which is after the Clean Energy Implementation Plan has been finalized. Commissioner Rendahl said the lack of realistic forecasts was "basically untenable." Commissioners Danner and Balasbas also expressed frustration. PSE admitted it was a frustrating situation.

To be clear, the UTC and stakeholders have been asking PSE to properly account for climate change for years. The issue was raised by UTC Staff when providing feedback for PSE's 2017 IRP. Ken Johnson, PSE's Regulatory and Government Affairs Vice President, responded on February 20, 2018, "PSE believes that the addition of modeling for regional climate change impacts... is a positive addition... Northwest Power and Conservation Council staff has performed analyses similar to those suggested by Staff. Although PSE's ability to advance regional forecasting... due to climate change may be limited, PSE will engage as much as practicable."[1] A member of PSE's Technical Advisory Group reminded PSE of this commitment as the 2019 IRP was being developed. Although four years have passed, PSE has not achieved this important goal.

What are the consequences of acquiring resources and pursuing energy policies when PSE is not correctly projecting climate impacts? Inappropriate actions will be taken, money will be wasted, and customers will be vulnerable to power outages that could have been foreseen.

Driving forward, looking backwards

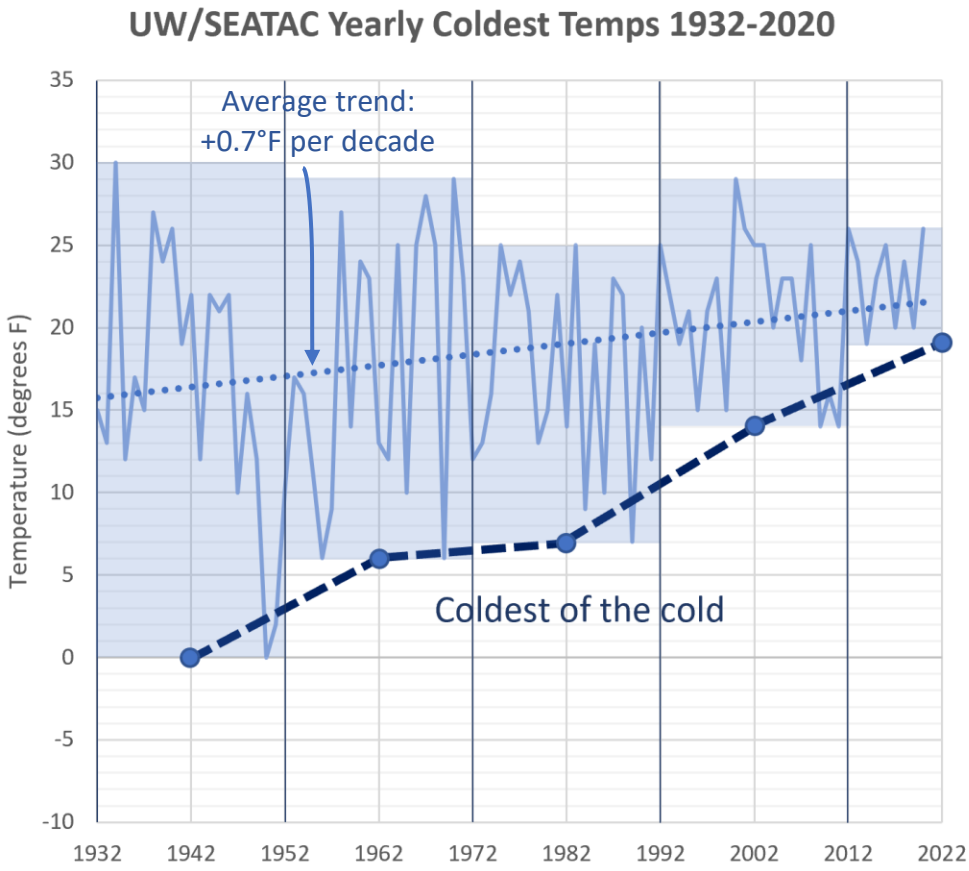
Our region's climate is changing. Winters and summers in the Puget Sound are getting warmer. But PSE's modeling methodology is not sensitive to the data of the last 30 years, which demonstrates these clear trends. Instead, PSE uses random sampling from the past 88 years of temperature data and the past 80 years of hydro data. The combinations of these randomly selected data are intended to provide a realistic model of the future. If the lights stay on in 95 percent of these scenarios, PSE assumes everything will be all right.

There are many signs that PSE's methods are failing. For example, the independent consultant, E3, found that 94% of the random scenarios that caused a "Loss of Load" came from data samples collected

[1] See page 6 of the attached letter from Ken Johnson.

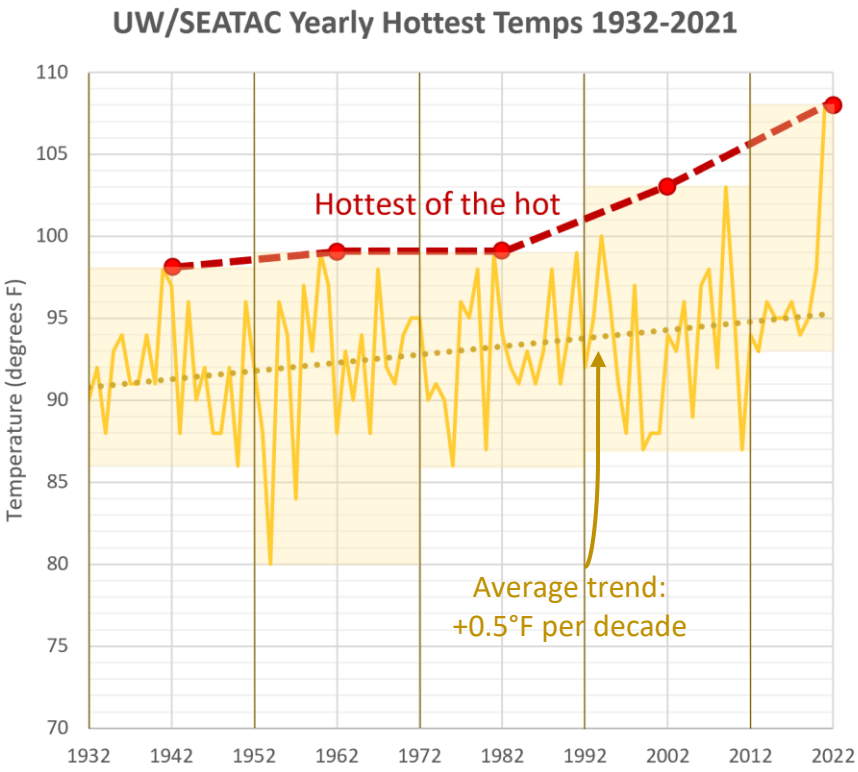
prior to 1972.[2] We surmise that most of these problematic scenarios occurred in winter due to projected cold temperature. But winters were colder in years before 1972 than they have been in more recent decades. PSE is on track to build a system that would work in the 1930s, not the 2030s.

To illustrate these concerns, we obtained weather data from the National Oceanic and Atmospheric Administration and produced graphs of the hottest and coldest days for each year:[3]



[2] https://www.pse.com/-/media/PDFs/001-Energy-Supply/003-Acquiring-Energy/E3_ELCC-Workshop-Presentation_20210831.pdf?sc_lang=en&hash=C48A615850F5CEBAC74F9B023C0969B5, slide 12

[3] Each year starts in October to avoid splitting data for one winter over two years, a standard practice in the industry.



The solid lines in these graphs chart the coldest and hottest temperatures for each year. These extreme temperatures drive peak demand and PSE's peak capacity needs. The shaded areas show the range of cold or hot temperatures for each 20-year period, starting in 1932.[4] The dotted lines show a rising average trend over the 90-year period; the dashed lines show the coldest or hottest temperatures for each 20-year period. We see that lowest and highest temperatures are rising more rapidly than the average trend. It is these "coldest of the cold" and "hottest of the hot" temperature extremes that pose the greatest risk of power adequacy shortfalls and service outages.

Although PSE's modeling is missing the risks and opportunities implied by shifts in seasonal extreme temperatures, the company acknowledges that demand is declining in winter and rising in summer. However, PSE appears to dismiss the possibility that it may become a summer peaking utility within the next decade. E3, the independent consultant on resource adequacy issues, says, "Moving forward, PSE's winter peaks may be reduced relative to summer peaks based on more recent climate warming trends. This has the potential to impact PSE's resource planning."[5]

E3's observation came before the Washington State Department of Commerce modified the Low Income Home Energy Assistance Program (LIHEAP) to help low-income residents install air conditioning equipment. As thousands of homes and apartments are retrofitted to help residents survive heat waves, demand for electricity on hot summer days will rise faster than PSE expects.[6]

[4] Twenty-year intervals correspond to PSE's "Loss of Load Probability (LOLP).
[5] https://www.pse.com/-/media/PDFs/001-Energy-Supply/003-Acquiring-Energy/E3_ELCC-Workshop-Presentation_20210831.pdf?sc_lang=en&hash=C48A615850F5CEBAC74F9B023C0969B5, slide 12
[6] https://www.djc.com/news/en/12143163.html

Failing to model for heat, drought, and decreased wind

PSE's modeling methods do not properly anticipate the risk of an intense heat wave event that occurs during a low hydro year. The correlation of heat and drought may be stronger than random sampling of historical data might indicate. For example, a hot year could melt snowpack early, increase evaporation, and force reductions in hydropower. Constraints on hydropower plants could occur at the same time that customer loads increase due to more prevalent air conditioning.

This possibility was studied by the Pacific Northwest National Laboratory in 2019, which produced a short video to explain their findings in simple terms.[7] The transcript of the video makes the case clearly and succinctly:

> *The Pacific Northwest relies on hydropower to meet nearly half of its annual demand. Hydropower is affected by how much snow melts each year, and* when *it melts. Historically, the greatest demand for electricity occurs in the cold winter months. Researchers from PNNL conducted a study to see how climate change could affect electricity delivery. They found that climate change nearly eliminated power shortfalls in winter, but greatly increased the frequency of shortfalls in the summer. Lower stream flows and greater demand for cooling created this risk. Their results show that power systems are affected by multiple stressors simultaneously, and these can cancel and compound each other, sometimes in unexpected ways. As power providers look to the future, planning for climate change may be far more challenging than previously thought.*

In 2019, less than a quarter of PSE's energy mix came from hydropower. PSE may claim that constrained hydro is not a major concern for the company. But if hydropower is reduced on a regional basis, market prices for electricity will rise. To keep prices in check, PSE will want to maximize use of its gas and wind resources. However, wind energy may also decline during a heat wave. PSE appears not to model a possible correlation between extreme heat and lower wind speed.

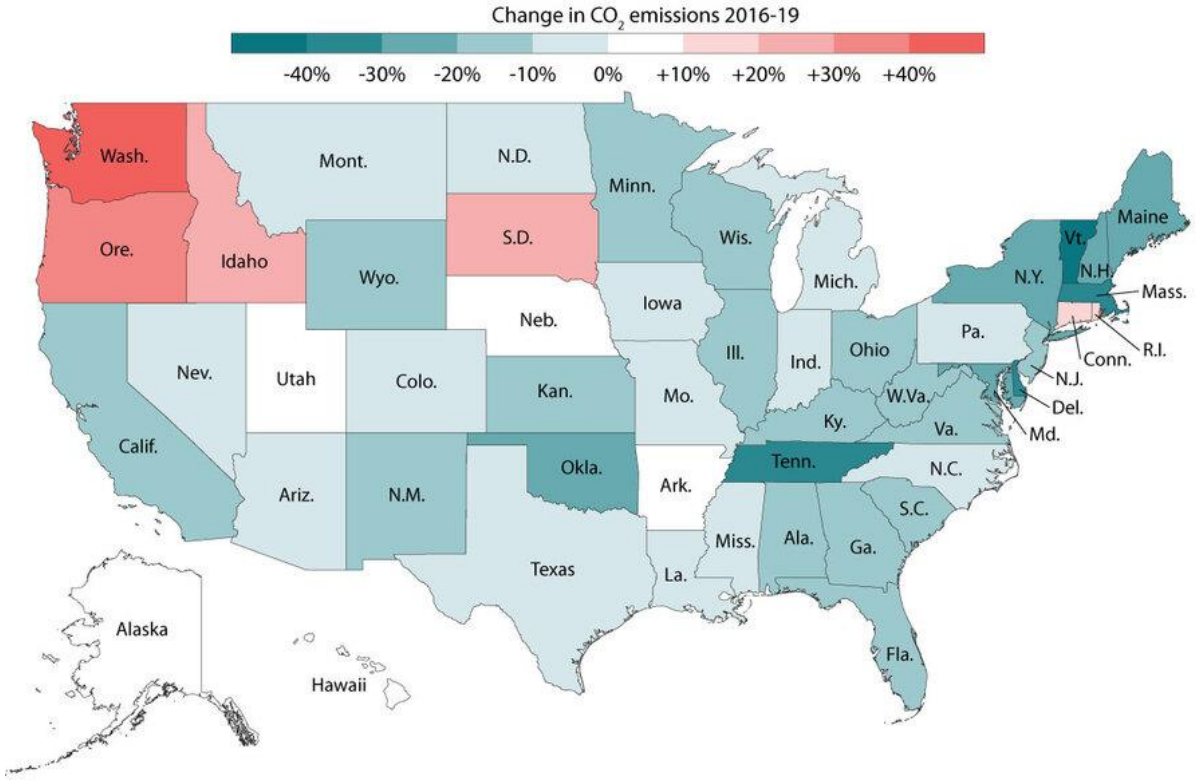
Drought conditions and reduced hydro availability have impacted our state in the recent past. The map below shows that while electric grids across the country were producing less emissions, in the Pacific Northwest —and Washington in particular—emissions were increasing due to a drought that occurred between 2016-2019.[8] In PSE's case, coal and gas produced most of the company's electricity. However, after 2025, coal will no longer be available, so PSE is likely to turn to gas, which is no better for the climate than coal.

[7] https://youtu.be/LKeqACr8MgA

[8] https://www.csmonitor.com/Environment/2021/0405/Carbon-score-card-Emissions-are-down-but-big-tasks-ahead-for-Biden

Good news: the greening of electric grids

Even under the administration of pro-coal President Donald Trump, many U.S. states migrated toward renewable sources or natural gas for electric power. But in the Pacific Northwest a drought curbed hydropower – a gap filled by coal and natural gas.



Going slow on solar and batteries

In its 2021 IRP, PSE prioritizes significant investments in wind, but invests very little in solar until after the first Clean Energy Implementation Plan period is over. And it delays acquiring combined Renewable and Storage Hybrid resources for over a decade.

Resource Type	Incremental Resource Additions			Total
	2022-2025	2026-2031	2032-2045	
Distributed Energy Resources				
Demand-side Resources[1]	256 MW	440 MW	1,061 MW	1,757 MW
Battery Energy Storage	25 MW	175 MW	250 MW	450 MW
Solar	80 MW	180 MW	420 MW	680 MW
Demand Response	29 MW	167 MW	21 MW	217 MW
DSP Non-wire Alternatives[2]	22 MW	28 MW	68 MW	118 MW
Total Distributed Energy Resources	412 MW	990 MW	1,820 MW	3,222 MW
Renewable Resources				
Wind	400 MW	1100 MW	1750 MW	3,250 MW
Solar	-	398 MW	300 MW	698 MW
Biomass	-	-	105 MW	105 MW
Renewable + Storage Hybrid	-	-	375 MW	375 MW
Total Renewable Resources	400 MW	1,498 MW	2,530 MW	4,428 MW
Peaking Capacity with Biodiesel	-	255 MW	711 MW	966 MW
Firm Resource Adequacy Qualifying Capacity Contracts	574 MW	405 MW	-	979 MW

PSE's continued reliance on old temperature data causes the company to over-emphasize winter peak loads. It comes as no surprise that PSE concludes that wind has a better annual load carrying capacity than solar because it is generally more available during winter months. However, over-investment in wind and meager investments in solar may leave customers vulnerable to a heat wave that coincides with low wind speeds. We ask for a more balanced acquisition strategy, including more solar and more battery storage to provide backup for likely peak loads in the summer.

Conclusion

PSE is not properly accounting for the significant challenges (and opportunities) posed by climate change. PSE's modeling process remains opaque and biased to address weather patterns from decades past, not for a realistic future. Compared to other northwest utilities such as PacifiCorp and Portland General Electric, PSE's 2025 resource additions are more concentrated on wind (50% of PSE's planned capacity acquisitions) compared to 20-35% for the other utilities. On the other hand, PSE's planned acquisition of energy storage (3% of acquisitions) is minor compared to 13-16% for the other utilities.

Our organizations ask the Commission to reject PSE's Clean Energy Implementation Plan until PSE provides its modeling data to stakeholders and demonstrates prudent planning for climate change.

With hard lessons learned in Texas, Louisiana, and California, Washington's largest electric utility must demonstrate leadership in transforming our electric grid to one that accounts for climate change and is clean, reliable, and affordable.

Don Marsh, Washington Clean Energy Coalition
Sara Patton, Sierra Club Washington State Energy Committee
David Perk, 350 Seattle
Pam Kepford, 350 Everett
Marty Bishop, 350 West Sound Climate Action
Phil Ritter, 350 Eastside
Janeen Provazek, 350 Tacoma
Beverly Parsons, Kitsap Environmental Coalition
Melinda Hughes, Thurston Climate Action Team
Kevin Jones, Vashon Climate Action Group
Fran Korten, Climate Action Bainbridge
Mark R. Vossler, Washington Physicians for Social Responsibility
Court Olson, on behalf of the coalition of 14 People for Climate Action city groups in King County
Marilyn Mayers, Earth & Climate Action Ministry team, East Shore Unitarian Church Bellevue
Kate Maracas, Western Grid Group