

Michele Kvam
Puget Sound Energy
Bellevue, Washington

June 12, 2018

Dear Michele,

Thank you for the opportunity to provide input to the 2019 IRP renewable energy resource cost development. The effort this year is critical to providing accurate inputs to PSE IRP analyses and made more important by a rather dramatic reduction in renewable energy costs since resource data was developed for the previous IRP. Please share this letter with staff and HDR consultants. This list contains access to several relevant data sources plus issues that I believe are essential to achieving the most accurate results.

- 1) The Lazard Levelized Cost of Energy Analysis – Version 11 dated November 2017¹ contains very comprehensive and up-to-date data and can provide the foundation for further refinement. It of course is not Pacific Northwest specific nor site specific, therefore the need for more locational data which is the focus of some of the subsequent items on this list.
- 2) The cost trend lines for both Solar and Wind continue to predict lower costs in the future so it seems reasonable to estimate cost with respect to a reasonable timeline of when these facilities would be constructed rather than a backward average cost approach. NREL has conducted forward-looking estimates and these should be consulted. One report, Enabling the SMART Wind Power Plant of the Future Through Science-Based Innovation², illustrates the pathway to a 50% LCOE reduction by 2030. This indicates, given the highly competitive market and the scientific approach that there is not much risk in the assumption that the wind price reduction trend can continue. Solar projections can be found on NREL's Annual Technology report³.
- 3) Data from RFPs needs to be considered. Xcel Energy source solicitation data⁴ from Colorado lists median bid prices of \$18.10 per MWh for wind and \$29.50 per MWh for solar as well as prices for combinations with storage. Construction prices are lower in the Plains states than on the coast, but the data would be very applicable to Eastern Montana. PSE can do the same with their RFP responses. By showing median data from multiple sources, confidentiality can be protected.
- 4) Purchased Power Agreements are another source of accurate cost data. An example is the purchase of power by NorthWestern Energy from an 80 MW wind farm in Central Montana for \$21.66 per MWh⁵. The plant is being built by Allete Clean Energy, who has built plants in Minnesota, Iowa, and the Montana-neighboring-state North Dakota.

¹ <https://www.lazard.com/media/450337/lazard-levelized-cost-of-energy-version-110.pdf>

² <https://www.nrel.gov/news/program/2017/science-driven-innovation-can-reduce-wind-energy-costs-by-50-percent-by-2030.html>

³ <https://atb.nrel.gov/electricity/2017/>

⁴ <https://assets.documentcloud.org/documents/4340162/Xcel-Solicitation-Report.pdf>

⁵ https://billingsgazette.com/opinion/columnists/guest-opinion-nwe-customers-will-save-with-low-cost-wind/article_46d47cc8-dc51-5e38-8429-89c664824a1f.html

- 5) PSE and its consultants need to do a much better job of defining Montana wind costs than was done in the previous IRP as outlined in the UTC letter⁶ dated May 7, 2018. Many issues were raised by Synapse Energy Economics, developers, environmental groups and stakeholders. Synapse reported that in the 2017 IRP, PSE overstated capital, operational, and transmission costs associated with renewable resources⁷. Capital and operational costs should be updated with much lower cost industry data available from Lazard, NREL, source solicitations, PPAs and other sources.

Regarding Transmission costs, PSE in the last IRP coupled performance data from Martinsdale, MT furnished by DNV-GL with transmission data from locations farther East requiring a 75-mile new transmission line, greatly increasing transmission cost, but more importantly significantly increasing the associated line loss cost rather than adding a substation at Martinsdale located adjacent to the Montana Intertie transmission line. Performance and transmission data need to be co-locational. Many good production sites exist along the 200+ mile Intertie line with lower transmission and line-loss cost. Transmission costs without a Martinsdale site option would be inadequate.

Montana wind is important to PSE's future because no other new cost-effective renewable resource provides peak capacity matching PSE's seasonal winter peak load. For the same reason it makes sense for PSE to maintain use of its Montana Intertie transmission line. Another associated issue is the capacity factor used previously. Apparently, average yearly capacity factor (46) was used for all analyses. I believe the winter factor (60) should be used for peak load analyses.

For Washington wind, PSE has fresh data from its Skookumchuck Green Direct project and should not use cost data from dated Snake and Wild Horse projects.

- 6) The resource data presented in the next IRP is some of the most consequential data presented in the IRP process since all subsequent analyses are only as accurate as the input data used in them. We should expect that presentation of the resource data include a full breakdown of each component cost (e.g. EPC, O&M, transmission, owners cost, etc.), the data source, the rationale for using that particular data, conversion of the data to common cost units, and the cost summary process, so that full transparency is achieved, leading to confidence in the Advisory Group, UTC, and stakeholders that the subsequent analyses will reflect to the best of everyone's ability the most accurate plan.

Thank you,

Willard (Bill) Westre

Mechanical Engineer

Sierra Club

IRP Advisory Group

⁶ [file:///C:/Users/Bill/Downloads/UE-160918_UG-160919%20Acknowledgment%20Letter%20Attachment%20Final%20\(002\).pdf](file:///C:/Users/Bill/Downloads/UE-160918_UG-160919%20Acknowledgment%20Letter%20Attachment%20Final%20(002).pdf)

⁷ [file:///C:/Users/Bill/Downloads/UE-160918%20and%20UG-160919%20Synapse%20Comments%20\(2\).pdf](file:///C:/Users/Bill/Downloads/UE-160918%20and%20UG-160919%20Synapse%20Comments%20(2).pdf)