March 24, 2022

UM 2143 Investigation into Resource Adequacy in the State – Staff Report

Process Proposal and RA Solution Straw Proposal

This report describes Oregon Public Utility Commission Staff's (Staff) initial analysis of the status of Resource Adequacy (RA) in the state to inform the direction of the policy investigation.

Summary

Staff's initial analysis does not signal the need for near-term implementation of a binding RA program for Oregon. Staff believes that further analysis and review focused on regional resource adequacy programs would be beneficial and believes that the RA investigation should focus on complimentary resource adequacy framework at the state level that could identify any seams issues in comparison to the regional adequacy framework for the next phase. This second phase will also look to leverage current Oregon regulatory processes (e.g., IRPs or Clean Energy Plans) in examining and presenting resource adequacy.

Background

Staff's strategy for the RA investigation begins with a high-level assessment of RA for Oregon Load Responsible Entities (LRE) over the next five years. The goal of this initial assessment is to understand the existence, scale, and urgency of any RA gaps to inform straw proposals and help the Commission right-size its RA policies. If the informational filings reveal the need for urgent, binding action to ensure near-term RA in the state, Staff will recommend that the Commission open a near-term rulemaking to adopt an RA standard and program with compliance demonstrated through seasonal forward showing filings that are acknowledged by the Commission. If the informational filings reveal that there is not a need for urgent, binding action, parties will utilize these insights to consider development of a long-term RA solution that can operate in concert with a regional program and fill any gaps identified in the state and region.

To protect commercially sensitive data, Staff committed to synthesize data from each Load Responsible Entity (LRE) and present aggregate findings about the status of RA in written report followed by a workshop.

Analytical approach

Model

This analysis is intended to provide a quick, rudimentary snapshot of RA in the state. Staff used a deterministic approach due to the simple nature of the initial analysis. Staff initially planned to perform the analysis using a readily available open-source model from National Renewable Energy Laboratory (NREL) known as PRAS: Probabilistic Resource Adequacy Suite. Prior to inputting in the PRAS model, an outboard check was completed in Excel. The files developed for PRAS were in a csv format, making the comparison of load and resources fairly simple. This first look was intended to calibrate the later runs. However, when looking at the load-resource balance (LRB) it was evident that the outboard look was sufficient for some early conclusions.

Filings

Staff worked with LREs to determine that they would submit their five-year load-resource balance using a data workbook created by the Western Power Pool (WPP)[1] for the Western Resource Adequacy Program (WRAP). Filings were received from the three Oregon investor- owned utilities (IOUs): Idaho Power, PacifiCorp, and Portland General Electric (PGE); and all of the ESS's currently serving Oregon load: Avangrid Renewables (Avangrid), Calpine Solutions (CS), Constellation New Energies (CNE), and Shell Energy North America (Shell).

The workbooks contained tabs for load and resources. On the load side information requested included hourly load profiles for the years 2010-2020 and peak load projections for summer and winter for 2022-2027. Resource tabs in the workbook requested information on storage hydro, run-of-river hydro, solar, thermal, wind, among others, external purchases and sales, and demand response programs. Outage data for thermal and hydro resources was also requested. For variable resources, i.e., solar, wind, run-of-river hydro information requested included either hourly generation from 2010-2020 on a per generating unit basis, or on an aggregated level by technology type.

> *IOU filings:* The data workbooks for the IOUs were relatively uniform and reflected the load resource balance across their entire service territory i.e., the load resource balance was not limited to Oregon specific loads or resources for multi-state utilities.
>
> *ESS filings:* Due to the lack of captive ratepayers and use of relatively shorter-term contracts ESS date filings were different than the IOU filings and more challenging to evaluate for a five-year RA outlook. The ESS workbooks were limited to loads served within the state, and as with the IOUs, the resources were not limited to within the state. These loads were also separated into PacifiCorp and PGE service territories. For ESS's with larger generation fleets conducting business in multiple states, Staff requested the ESS to provide a list of resources that would be used to meet loads within Oregon.

Staff appreciates the participation of LREs in this voluntary filing process and their willingness to work with Staff to resolve issues with the data and template.[2] Staff learned a lot about the intricacies of aggregating LRE data for use in developing an aggregate RA outlook which will pose valuable in considering long-term RA policies.

Staff analysis

In developing load forecasts for the future five years, Staff attempted to utilize a simple yet objective approach. Staff developed peak ratios to apply to historic hourly load averages. For LREs without peak

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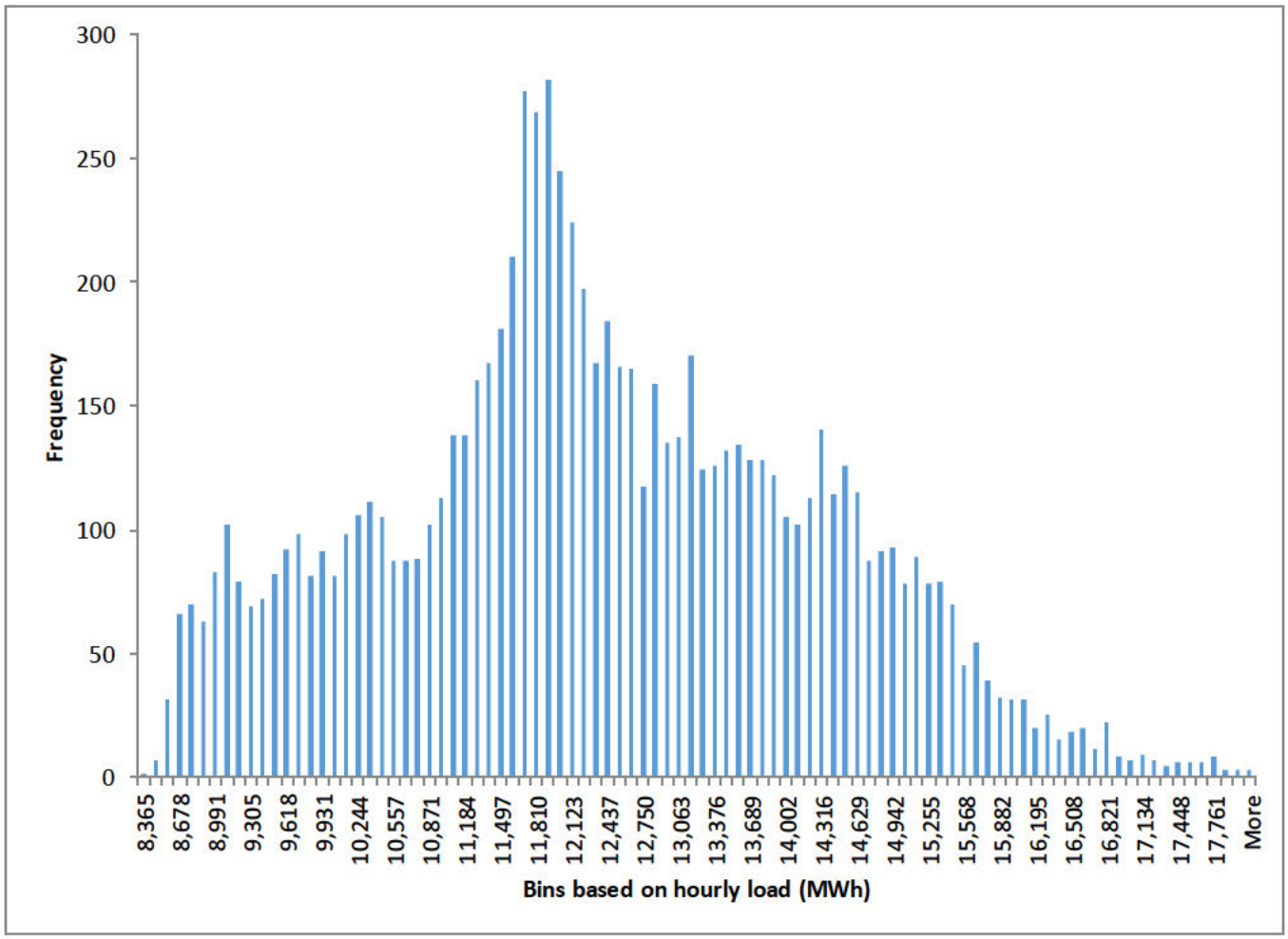
[1] The Northwestern Power Pool (NWPP) recently changed its name to the Western Power Pool (WPP).

[2] For example, some workbooks had issues with data that needed to be verified/corrected, were missing historical data, showing generation in excess of generator nameplate, as well as generation with no motive force available (solar generation at midnight for instance). On the load side, multiple parties did not include peak forecasts, and some had less than the ten years of data requested, this generally due to the length of time in the market. Staff worked with parties to correct data where possible. Some of the missing hourly values, such as wind production, were replaced with averaging the hours before and after the missing value. That is, if 2am generation was blank, but 1am had 100 MWh, and 3 am, had 110 MWh, then the missing 2 am value was replace with 105 MWh. Parties also submitted corrected data following discussions with Staff.

forecasts Staff assumed load patterns consistent with the historical hourly data provided. These forecasts were based on the most recent three years provided.

For LREs with historical data of five years or longer, and peak forecasts, Staff produced a load forecast shaped by historic trends, based on ratio of projected to historic peaks. Staff examined the hourly load value as a percentage of annual peak load. These percentages were calculated for every hour, then average for the most recent five years. This value was multiplied by the annual projected peak to develop load forecasts. For LREs with more limited historical data, and no peak forecast, Staff used the average load for the past three years. Figure 1 below shows the load distribution for 2020, bucketed by demand levels. This is a slightly skewed normal distribution, as expected. This pattern was repeated in Staff's projections.

Figure 1: 2020 Load Histogram



On the resource side, Staff developed 12X24 curves for variable energy resources (VERs). These curves were developed for wind, solar, and hydro, and run-of-river hydro. These curves were based on data submitted by the LRE's. That is, for each month, an average value was calculated for each of the 24 hours in a day. For instance, in January, all hours ending 1 (i.e., 1 am) were averaged for an average expected January hour ending 1 value. This was repeated across 24 hours in January, as with all other months.

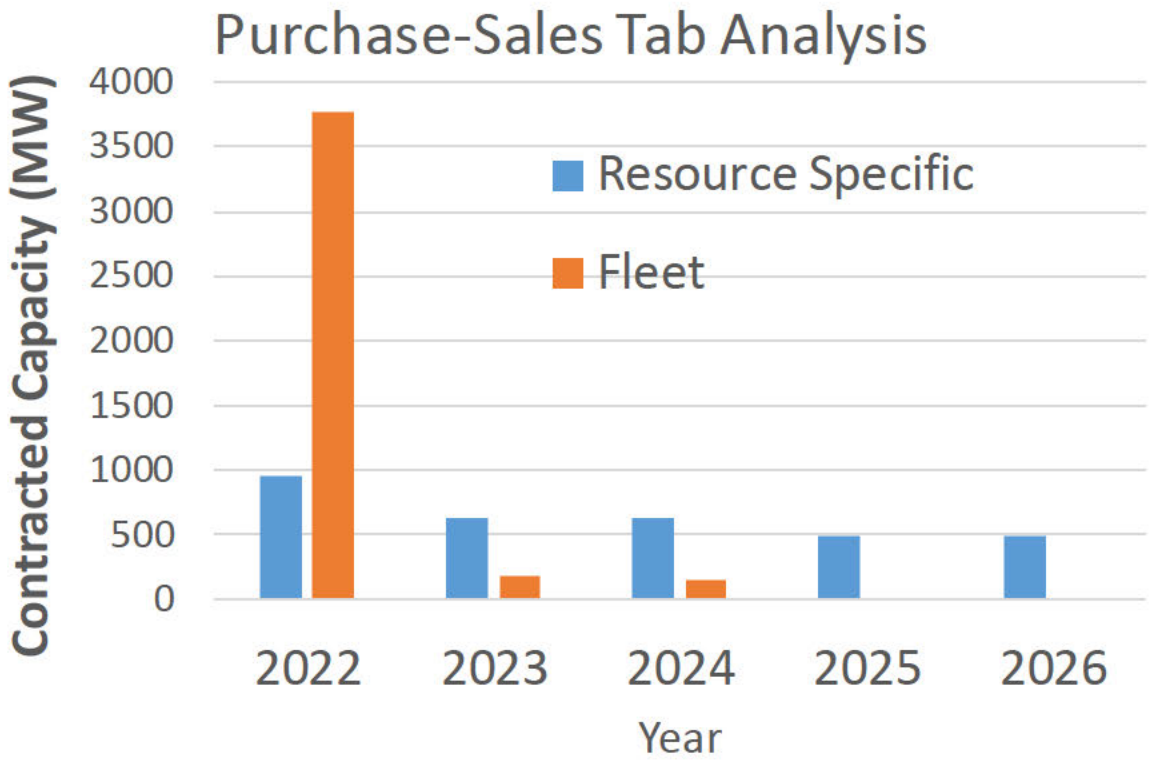
For dispatchable storage hydro, Staff treated it as if the full capacity was available for each hour in the analysis for the deterministic look, recognizing monthly capacity differences. This is not how the system would run, but a reasonable proxy for a RA capacity look.

Some VER generators were either missing data or had no data. These were generally for new (or expected) projects. In these cases, Staff either used an average shape based on the LRE's other, like-situated generators (fleet average) or, in some cases looked at LRE's generators that were in the specific area for the shape (regional average). Note the regional average cases relied on shapes from generators within the LRE's resources submitted; Staff did not use generators from different LREs in developing monthly shapes.

For dispatchable resources in this deterministic look Staff de-rated generation in line with the anticipated forced outage rates, or the Unforced Capacity (UCAP). Some of the LREs provide those values in power cost filings, Staff used those where available. Staff also reached out to parties when the values weren't included. For a 100 MW facility with a 10% forced outage rate, Staff assumed 90 MWh output available across all hours. Staff did not include down times related to planned maintenance, the assumption here being planned maintenance occurs during shoulder months where there it is less likely there would be resource adequacy issues due to lower demand overall.

Contract resources were treated differently, dependent on the underlying generating resource(s). If a contract was tied to a specific variable resource, a set of 12X24 curves were developed consistent with historic trends of that resource. This is in cases involving contracts for resources such as wind or solar. Contracts with undefined, or Fleet resources were considered firm, with no adjustments made. This same approach was used with smaller resources, such as Qualifying Facilities (QFs). For reference, the Fleet resources were a small part of the resource mix, and smaller than the resource-specific mix outside of 2022, as shown in the Figure 2.

Figure 2: Contracted Capacity Analysis



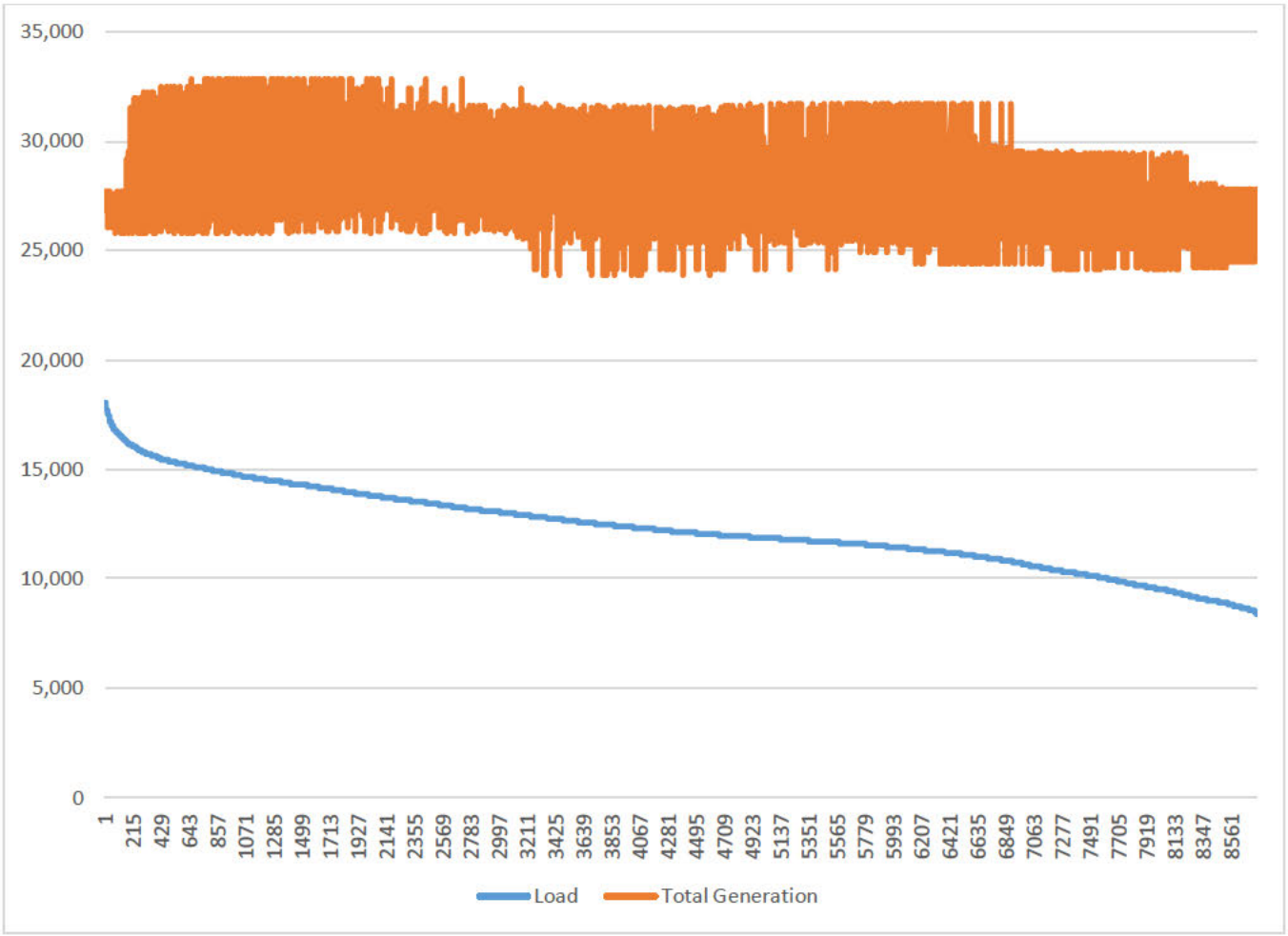
The initial deterministic look did not incorporate demand response (DR) programs, or, as discussed further, the full potential of storage flexibility. Staff was developing the files for PRAS in a methodical manner, with the DR and storage potentially being examined external to the model. As evidenced in the findings section below, the flexibility of these resources to meet short-term capacity needs was not needed for meeting load in the deterministic look.

Input files were developed in line with the discussion above. These were developed with the intent to use in the PRAS model. The first file developed looked at the aggregate load of all LREs. This was an hourly file, starting at January 1, 2022, through December 31, 2027, with the corresponding load. Following that, the resource files were prepared: solar, hydro, run of river, wind, and thermal. These were likewise hourly across the 2022-2027 timeframe. Results of the analysis follow below.

Findings

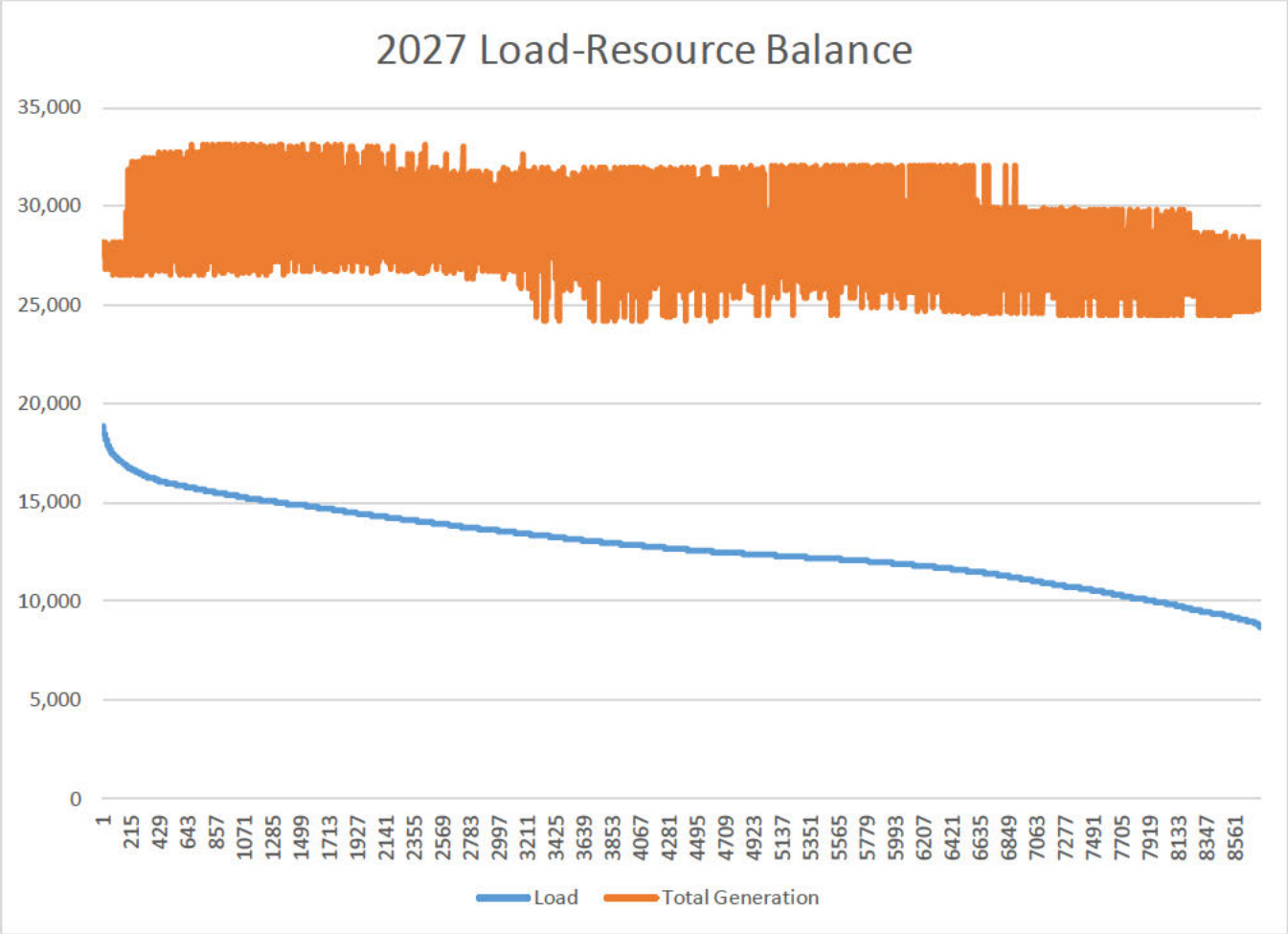
The aggregate outlook of the LRE data is presented below in load-duration curves, where the annual hourly load is stacked from highest (peak) demand to the lowest need, with the corresponding hourly generation available. As is evident in the Figure 3, for the year 2022 the resources exceed the load substantially in all hours. In the hour where load and generation are the closest, generation available exceeds load by 49%. For the peak hour, July 29 at 5:00 pm, generation available exceeds load by 53%.

Figure 3: 2022 Load-Resource Balance



While the look above was for the first year in the five-year analysis, the results did not appreciably change for the other years. Figure 4 shows a similar look for 2027. While available resources are down, due to assumptions in the LRE filings such as, generator retirements, contract expirations, etc., and the load is up about 4%, the overall picture is similar to that in 2022. Here in the tightest hour, available resources exceed load by 47%. Here the peak hour has resources that are 49% higher than load, a slight decline from the 2022 analysis.

Figure 4: 2027 Load-Resource Balance



Given the results of the outboard analysis, with available generation in excess of load by a sizeable amount, Staff did not proceed with a stochastic analysis.

Conversely, more complete analysis could examine other factors, such as hydro years beyond the ten years of historic data or randomly occurring forced outages, and the potential for increasing variable resources paired with increasing weather volatility. This is the type of analysis expected from IOU IRPs, becoming more important as more variable generation is in the resource mix.

Another big factor that could impact resource adequacy is transmission availability. Again, this is something the IOUs incorporate in their IRPs. Such analysis will become more important in the anticipated decarbonization of the electric grid in order to ensure variable resources far away from load centers are able to deliver the necessary energy.

Finally, Staff recognizes that the LRE informational filings do not reflect the resource transformations called for under Oregon House Bill 2021 and other policies that might drive electrification. This short-term look does not include years with emissions reduction compliance targets but does cover important years for resource actions that will allow PacifiCorp, PGE, and the ESS's to meet their 2030 targets and beyond.

Recommendations

Knowing the strengths, and weaknesses of the deterministic look, Staff reached the following conclusions.

First, immediate Commission action regarding RA is not warranted when looking at the results of the analysis above. Any such action would be premature and would be unlikely to result in a substantive increase to reliability for Oregon ratepayers of Commission-regulated utilities and alternative suppliers. From the data provided, Staff does not see an immediate need for additional resources, with the caveat that transmission was not modeled, Staff made simplifying assumptions for expedited modeling, and the analysis was performed on an aggregate as opposed to LRE basis. Staff would reiterate, that this process was designed to look at the RA issue only for the LREs under Oregon PUC regulatory oversight. This does not imply that the region does not have capacity issues in the short-term or that RA is not a growing concern for the PUC.

Second, Staff does not believe additional analysis based on the data submitted at this point is warranted. In moving forward to ensure resource adequacy in the state, Staff believes that the docket should focus on the long-term solution provided in the October 15, 2021, Staff filing, with attention on implementing planning-focused RA standards at the state level. Utility IRP models have the sophistication to address issues that Staff's analysis did not, such as transmission, and detailed stochastic analysis. IRPs will also be able to incorporate changes in long-term load forecasts associated with such things as electrification, climate change, as well as legislative measure, such as HB 2021 more completely than a trended load forecast.

Staff continues to believe that the proposed annual compliance filing for entities not participating in a regional compliance program, and every second year for participants, is reasonable. The analysis above did not identify immediate need for Commission action, on an aggregated basis. The compliance filings will keep the Commission apprised of the RA picture and allow for action if required on an individual LRE basis. The requirement, for participants, could be included for the IOU's IRP, or IRP Update to help simplify filings. The Commission would acknowledge the RA plan as being reasonable whether included in an IRP or IRP Update.

While the analysis did not point to any specific shortfall issues with any of the ESSs, Staff believes ESS compliance via a multi-year resource plan, similar to an IRP would be beneficial. This information could be included in the clean energy reporting required by HB 2021. This would likely apply to all ESSs, including any that are not in the WRAP. Staff believes this is still a viable solution with some issues to be investigated more thoroughly. The ESS situation is different, as discussed above, from those of IOUs. The ESS's generally have short-term contracts to supply energy to their customers while RA generally looks more at long-lived generating assets. The mismatch may put ESSs at a competitive disadvantage; there may need to be some additional guidance in these situations.

Any state requirements would be designed to operate in a complimentary manner with regional RA programs, such as the WRAP. While the details of how the Commission can best address RA at the state-level are still to be determined, the process outlined by Staff will enable stakeholders and the Commission to identify the best solution in an efficient manner. Staff also believes that the Commission can leverage other RA proceedings and studies produced throughout the region while addressing RA. The Northwest Power and Conservation Council (NWPCC) examines RA on an annual basis, looking five years out. WECC studies the RA issue on an energy basis, as opposed to a capacity basis. IEEE has a Resource Adequacy Working Group, and EPRI is examining resource adequacy in expectations

of a future where the electric grid is decarbonized. These organizations are independent, with years of experience that could prove valuable. Staff should leverage their work in examining RA.

Staff's long-term solution, as articulated in the October 15, 2021, memo, continues to be an appropriate path forward to examine RA in the region. The RA standard is based on a 1-in-10 loss-of-load-equivalent (LOLE) focused on a five-year outlook at the individual LRE level. The holistic, deterministic outlook showed no immediate need for the region, but this could be different for an individual LRE. Due to potential issues with transmission availability, resource acquisition timelines, and potential impacts associated with electrification the time period could be increased for RA, examining the front ten year of an IOU's IRP for instance. Staff's adequacy standards cover the first five-years, as proposed. These values could be extended or adjusted if the requirements look for a longer-term RA plan.

Third, in working with the LRB data, Staff notes that one of the largest potential concerns are the seams issues in RA. IOUs don't plan for long-term opt out customers, while ESS's generally have short-term contracts with the opt-out customers. The current analysis did not identify specific issues for any of the ESSs, however, the mismatch between ESS contract length, and resource lifecycles could lead to a situation where no entity is planning for the RA of long-term opt-out customers absent Commission intervention. This is something that should be examined in the upcoming phase as it may not be adequately addressed by Staff's initial long-term proposal.

As the region moves towards a greener generation mix, resource adequacy will continue to be an important issue. If electrification occurs in a meaningful way, there will be additional strain on resources. As such, Staff recommends continued involvement with the WPP and their WRAP program. Staff also suggests tracking the other agencies and organizations, such as NWPCC, WECC, EPRI, as well as other approaches in the future.

Finally, if during the investigation phases it is determined that Staff should aggregate load and resource data in a similar method as the current analysis, Staff will need to explore the ability to bring in additional resources. Such an approach would likely require additional sophistication in modeling as well as additional data from LREs.

Staff looks forward to continuing the discussion with Stakeholders in anticipation of presenting recommendations to the Commission. See the following table for the currently envisioned timeline.

	Timeline	Activity	Description
Phase 1	**April 7, 2022**	Workshop	Workshop to review public, aggregate data and Staff's findings.
	April 14, 2022	Comments	All party comments in response to Staff's report, findings about appropriate next steps.
	May 19, 2022 *Staff memo 5/14*	Public Meeting	Staff Public Meeting recommendation to open a rulemaking (beginning in informal stage). Will include an updated straw proposal for the RA solution.
Phase 2 dates are estimates, subject to Commission decision to open a rulemaking on May 19, 2022			
Phase 2	**June 1, 2022**	Comments	Comments on Staff's updated straw proposal (will be attached to 5/19 PM memo).
	June 9, 2022	Workshop	Workshop to discuss Staff proposal and stakeholder positions.
	Jun 28, 2022	Comments	Final comments on Staff's proposal.[3]
	July 19, 2022	Draft Rules	Staff circulates draft rules.
	July 28, 2022	Workshop	Workshop to discuss draft rules.
	August 15, 2022	Comments	All party final comments.
	September 20, 2022 *Staff memo 9/1*	Public Meeting	Public meeting to move to formal rulemaking.
	~90 days	Formal rules	Formal rulemaking concludes, implementation dockets can begin ~January 2023.
Following Phase 2, launch implementation dockets and continue to monitor status of regional program development			

If you have questions on the process or content of this Report, please contact:

Ted Drennan
Economic and Policy Analyst, Utility Strategy & Integration Division
503-580-6380
Ted.drennan@puc.oregon.gov

[3] Staff can add workshops to address specific areas of disagreement or technical assistance before this step.