**Northwest Power & Conservation Council**
**Resource Adequacy/Systems Analysis Advisory Committees**
**April 4, 2024**

John Ollis, NWPCC, greeted the room at 9:30. Chad Madron, NWPCC, explained the best way to interact with the Go-to-Webinar platform. Ollis then called for introductions.

**Technical Setup for the 2029 Adequacy Assessment**
**John Ollis, NWPCC & Dor Hirsh Bar Gai, NWPCC**

Rick Williams, PSU, asked if "limiting gas buildout" means limiting gas transmission, gas plants, or all of it [Slide 7]. Ollis answered that it seemed that there were places where gas would not be built but in the past AUROA would have seen the economics to build those plants. He said staff was seeing buildouts that didn't make sense, so they placed a limit on building gas where it made sense from a policy perspective.

Ollis said there are new factors, like converting to hydrogen, that might change things, but limits are still an open question. He pointed to Alberta and Wyoming where there are no policy issues and places like Idaho where there may be a push to build gas quickly to get recovery. Because of this Ollis said the strategy is to let these places build for a while

Heutte said PacifiCorp's IRP update shows a drift back to gas especially way out into the 2040s. He didn't think it was unreasonable to put limits on the buildout of some resources but thought it important to specify the reasons. Heutte pointed to upcoming constraints like a new Canadian Liquid Natural Gas export terminal slated to send out 1.8 billion cubic feet a day. He said this will have a price and supply effect on the Northwest.

Heutte said the potential for solar, wind, and pumped hydro remains large as long as the resources are sited with sensitivity. To conclude, Heutte said it is fine to impose limits but important to specify the main factors under consideration.

Ollis said justifications for gas limitations have not changed, noting that there is no more gas on the west side but restrictions ease as you move east. He said states with 100% clean policies, like New Mexico and Colorado, don't' get any gas but states where the utilities self-impose clean goals have a more in-between approach.

Jim Malinowski, Clark PUD, noted that BPA wind and solar data shows two-week periods with almost no wind production and winter solar of only 20% of summer production. He did not see how you could build enough storage to ensure reliability, adding that Clark's reserves were wiped out during the two weeks of extreme cold weather. Malinowski asked how the region can get through without building reliable resources and not try to depend on intermittent resources.

Ollis said finding that balance is why staff runs these studies. He pointed to a presentation by Tomás Morrissey, NWPCC, about how resources were shared during that cold event and how tight the situation was. Ollis agreed that there needs to be a wide variety of resources and there is value in the existing gas system. He said a gas limitation does not mean there will be no new gas builds, but they might be in different states which would put pressure on the transmission system.

Dor Hirsh Bar Gai, NWPCC, stated that staff has been thinking about this and consulting with people at PNNL about how to analyze "renewable droughts." He said these droughts could be highlighted in the adequacy assessments and plans to talk about them more in the coming months.

James Gall, Avista, admitted that excluding gas from the price forecast is less concerning than excluding it from the actual Plan. He stressed that the policy goals of states and utilities include cost caps and reliability requirements. He said excluding gas may trip over the cost constraint or reliability requirements and thought gas should be allowed in those circumstances.

Ollis stressed that staff is not saying "no gas," stating that all the buildouts have a fairly large amount of gas but less than in the past. He agreed that there are not enough commercial options available yet to replace new gas but will be exploring what is available. Ollis offered to send a link to a past presentation that talks about build limits and outlines Council philosophy. He added that members can add comments on this presentation as well.

Rob Diffely, BPA, addressed converting gas plants to hydrogen, wondering if that will be limited as well. Ollis said that is a work in progress adding that he is not yet comfortable with it for this assessment but will probably show up in the next Plan.

Heutte stated that gas, as well as all kinds of other resources, had problems during the January freeze. He called the assumption that gas deliverability would never be an issue false, pointing to major issues on two different pipelines. Heutte said big cold fronts come with a lot of wind at first and perhaps we should be thinking about how to take advantage of that. He said we should also take advantage of the resource diversity of the west to charge the system ahead of these events.

Ollis said this is one of the key features of the recently developed GENESYS model, but it still needs work.

Heutte asked for the definition of long duration [Slide 8]. Ollis said staff defined it at 100-hour battery for Iron Air, four-hour lithium ion, and pump storage in the middle. Heutte thought this was a good strategy, adding that Form Energy will be presenting to the Council soon.

Ollis said every resource added to the model increases run time but said research and discussion about other technologies will continue in the Generating Resources Advisory Committee.

Heutte said that increase in model run time is actually over a week. Ollis added that sometimes the computer breaks in the middle of a run. Heutte suggested using more things like GridPath RA, adding that big models take so long to run that there should be more discussion about the issue. Ollis said this is core content for this committee and thought there had to be a better solution.

Williams said the bulk electric grid is a national security asset and asked if the Council explored DOD supercomputing. Ollis called that interesting and asked to talk more offline.

Gall asked if there were going to be any information about reserves today [Slide 9]. Ollis replied that they don't use the base level of reserves in AURORA but use a reserves estimate from the 2032 anchor data set. He added that they don't have a dynamic reserves approximation yet, but it is something he would like to get as he believes reserves will need to increase.

Gall confirmed that they have been underestimating how much they need to carry. He recalled they used to assume 10 percent of renewable dispatch, but EIM requirements demand substantially more. Gall said if you don't put the reserve requirements in AURORA you end up underestimating your prices. Gall then said you can't assume that hydro can provide these reserves because if you don't have the water you can't count on the capacity. He called for better ways to incorporate the capacity the region now has to carry.

Ollis agreed, saying this is why the Council moved to OptGen and GENESYS. He said they still struggle with fuel accounting and called for feedback around balancing reserve increases.

Brian Dombeck, BPA, asked if the gas limitation assumptions discussed earlier are in the baseline shown on [Slice 13]. Ollis answered yes, pointing to a higher gas build which says adequacy is the pressure. He added that all the runs meet policy even with a smaller renewable overbuild.

Gall approved of the results as it illustrates what the system needs but asked if it reflects reality, pointing to the expected 26GW of storage needed by next year. Ollis agreed, adding that there hasn't been an update in one and a half years and some numbers may change after he inputs existing resources.

Gall thought there has to be a reasonable level of what could be built in the short run, adding that there is probably not as much new storage added over the last 18 months as you think.

Malinowski called this a very rosy scenario for renewables and battery storage while ignoring Small Modular Reactors that could be built close to a load center, which don't need additional transmission. He said this is not a balanced approach without including a substantial investment in SMRs and asked why SMRs are not included.

Ollis said they do include SMRs in the data as a proxy clean resource but there are issues with cost and delivery time. Malinowski said the lead time for transmission upgrades is at least as long as the time for SMRs. Ollis agreed but noted that renewables and batteries are available now. Ollis highlighted that staff plan to test the timing and cost of these different resources.

Heutte said PacifiCorp's IRP shows a nuclear option with capital costs of $8800 a kilowatt and $286 fixed O&M a year and a fuel that does not yet exist. He said 2035 is the earliest he sees a major nuclear build out. Ollis agreed with those numbers saying the same is true for offshore wind.

Heutte continued saying the numbers on the slide gave him whiplash because of the gigantic flip between renewables and batteries. He said the Inflation Reduction Act financially separated the value of these things, gracefully summing the situation up by saying, "not every meal that gets cooked in the kitchen makes it out to the diners."

**Clustering Scenarios by Theme**

Heutte asked what "transient" on [Slide 21] means. Ollis explained that high gas prices could be transient.

Gall called freeze offs on the gas supply "the real deal" and was concerned with finding solutions. He said the winter event created some issues and called for indicating solutions from a resiliency point of view. Ollis said that will come from interpreting results with a narrative as AURORA can't do that, but Plan work will allow more capability.

**Updates to the T&D Deferral Value**
**Tomás Morrissey, NWPCC**

Morrissey asked for utility Subject Matter Experts who can help update the T&D Deferral Value.

Scott Levy, Bluefish, asked for more information about batteries. Morrissey said this wasn't in the last Plan, but the idea was placing the battery close to load centers.

Ben Ulrich, EWEB, suggested reaching out to consultants like Lighthouse Consulting or Cadmus. Morrissey thanked him.

Heutte noted that Idaho Power is putting batteries in substations, calling it a front-of-meter approach. He thought this type of work should be explored. Morrissey said that might too granular.

**Update on GENESYS Enhancements & Assumptions**

Williams stopped at [Slide 4] noting that the Columbia Treaty is presently up in the air, creating at least three uncertainties: the availability of water, flooding as the regime is shifting, and the effect of huge flooding events on regional bulk transmission. He stressed that these are real possibilities. Hirsh Bar Gai agreed, adding that staff needs inputs for scenarios. Williams suggested reaching out to the Army Corps of Engineers and the Department of State.

Ollis said they are always in contact with these entities but getting that information is unlikely for this adequacy assessment. Ollis said the new regime will be known by the end of this year so it will be included in the next Plan.

Ollis asked if Williams wants this information in this assessment. Williams said yes or staff should produce a clear statement that you're not doing it but acknowledges that these are known issues. Ollis said ok and will speak to staff.

Hirsh Bar Gai added that flooding that effects transmission could be added to the list of transmission implications.

John Fazio, independent, asked if the weekly future value of water is based on the uncertainty of all 19 climate scenarios but the dispatch picks A, C, or G separately and then aggregates again. Hirsh Bar Gai said the short answer is yes, but it depends on what scenarios are added.

Ollis added that this risk informed hydro inventory allotment is not establishing the exact amount of hydro but the value over time. He likened it to a cost curve for hydro.

Heutte addressed William's earlier comment saying he assumed no one will know what the treaty will look like until October 1. He then addressed the modeling saying it made sense to do it in two stages. Heutte then asked if it will change the outcomes or if this is more of an efficiency improvement.

Hirsh Bar Gai said this is not an efficiency improvement even though it will save time but more of a significant assumptions improvement. He said the run time of each scenario would be the same but the week ahead allocation lets staff see the risk of all the futures and the value of what the hydro could be. Heutte said this is a risk profile that optimizes where to look more deeply.

Ollis said this change is in response to a stakeholder comment that said we are not identifying operator uncertainty within the year they are working in.

Dombeck asked for a high-level summary of how staff moves from three separate scenarios to the blended one. Hirsh Bar Gai said they can do a deep dive at another meeting but previewed that the idea is aggregating the loads and renewable shapes instead of doing individual scenarios.

Dombeck asked if aggregating is stacking, averaging, or adding. Hirsh Bar Gai said it's stacking into one data set. Ollis said every reservoir will have a dollar amount that will be informed by all scenarios.

Heutte pointed to the large amount of data on the generation side [Slide 5] and wondered how to eventually improve the spread with the application of better weather data. He suggested reaching out to Justin Sharp, Sharply Focused, for more.

Heutte then addressed the load side, noting that the extreme weather illustrated that the load forecasts are not performing as expected. He noted that CA ISO, and other entities, made adjustments. He suggested focusing on the tail ends. Hirsh Bar Gai said they could improve this if they had the data, and the Demand Forecast Advisory Committee (DFAC) and Climate and Weather Advisory Committee (CWAC) are focusing on it.

Gall said the EIM publishes a flex ramp requirement for every BA and that's what Avista holds to [Slide 5]. He suggested getting that data as the method on the slide is probably five times too low. Ollis said they've used that data in the past for the regional reserves, but staff are asking for wind and solar forecast error. Ollis said they are holding 6000MW to cover this. He said they have covered what the EIM is holding now, and the Council is forecasting between 3100-4000MW higher for 2027-2029.

Gall said the slide confused him. Hirsh Bar Gai offered to make is clearer.

Diffely asked if moving away from deterministic forced outages and into stochastic was on the list of GENESYS improvements. Hirsh Bar Gai confirmed that it is on the list.

Williams called for a deep stochastic dive into scenarios at a later date as there is a category of foreseeable high consequence events that are hard to model but now have some available data. He asked what would happen if things like the heat dome and Bootleg Fire happened that the same time and WECC resources were restricted. Hirsh Bar Gai said he has heard similar questions and plan to reach out to stakeholders.

Heutte said that 10 years ago no one (except him and one other person) thought there would be South to North flow on the AC/DC interties [Slide 6]. He said it's happening more and more and not based on price alone. He wondered if nominal or relative price differences drive the flow.

Ollis said each zone comes from a price determination out of AURORA, calling it the hourly volume available per the load, and that volume informs price. He said hourly granularity allows them to put in the volume available below what has to be served locally. Heutte said the traditional RAAC view was to limit S to N to 2500MW and the week of January 13th was over that limit for the entire week, 24/7.

Hirsh Bar Gai said market imports have been a lively topic of conversation, but this assessment will continue to use the 2500/1250MW limits.

**Generating Resources Updates Since the 2021 Power Plan**
**Annika Roberts, NWPCC**

Diffely asked for more detail about the resources on [Slide 7]. Roberts referred to a data base of every plant that she is currently cleaning up. She offered to send it to Diffely soon.

Ollis said [Slide 14] is where this committee should focus their attention. Roberts said the GRAC saw a similar slide and BPA offered a lot of comments.

Heutte suggested looking at early IRP work.

**LUNCH**

**Load Forecast for Resource Adequacy Assessment 2029**
**Dan Hua, NWPCC**

Heutte asked what kind of computational efforts the neural network model requires [Slide 29]. Hua confirmed it needs a lot of time to run and as well as a machine with a high-end NVIDIA card.

**Data Centers and Chip Fabrication Load Forecast**
**Tomás Morrissey, NWPCC**

Dombeck asked about the connection between [Slide 7] and Hua's earlier presentation. He said Hua's called data center growth flat in 2029 while this is 2950. He asked if this is an average.

Morrissey said this graph looks at 2023-2029 while Hua's are 2022-2029. Hua said that his is also 2023-2029 and both are 2540. Morrissey offered to check back. Dombeck confirmed there is a forecast for 2029 that is shy of 4000 that is some kind of average. Hua said it's about 3800 and then there are the differences. Hirsh Bar Gai said the ~1,500 difference is the gap in the forecasts subtracted in 2029.

Heutte said the QTS data center in Hillsboro is three really big facilities that could get even bigger. He said this highlights the magnitude of these centers pointing to their major effect on system management. Heutte said it's hard to predict and the region has to be ready for a wide range. He recalled a comment from Robert Cromwell who said, "In the data center world long term planning is two years." Heutte said this crunch is not just in one place but across the whole NW.

Morrissey said they will test more than one line because of this. Heutte talks about the difference between projections and predictions, suggesting it be renamed to "corridor of uncertainty." Hirsh Bar Gai reminded the room that scenarios are not probabilities.

Heutte said the region can no longer predict the future in a major way as it's not driven by general economic trends and population. He pointed to industrial and decarbonization loads brining in a whole new range of uncertainty.

**Transportation**

Diffely asked what the difference is between the graphs on [Slide 6]. Hirsh Bar Gai answered that the left represents 2030 and the right is 2045.

Gall asked how much reduction Time of Use will bring to the curves on [Slide 7]. Hirsh Bar Gai said it depends on the parameters staff end up using. He said the CEC has data to reference and appealed to utilities to share theirs. Gall said they have some commercial TOU data he could share but nothing on residential yet.

**BREAK**

**New Federal Spill Operations for the Lower Snake and Lower Columbia Projects**

Levy stated that change in generation from this operation will be between 700MW to 1000MW [Slide 8] and will not help the fish. Hirsh Bar Gai thanked him for his comment.

Hirsh Bar Gai ended the meeting at 2:30.

**Attendees in Person and Via Go-to-Webinar**

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| Dor Hirsh Bar Gai | NWPCC | Eric Graessley | BPA |
| John Ollis | NWPCC | Fred Heutte | NW Energy Coalition |
| Dan Hua | NWPCC | Brian Dombeck | BPA |
| Annika Roberts | NWPCC | Rick Williams | PSU |
| John Shirts | NWPCC | Tomás Morrissey | NWPCC |
| Jennifer Light | NWPCC | Brittany Andrus | WECC |
| Steven Simmons | NWPCC | Frank Brown | BPA |
| Chad Madron | NWPCC | Laura Buford | BPA |
| Laura Buford | BPA | Katie Chamberlain | Renewable NW |
| Jared Hansen | Idaho Power | Rachel Clark | Tacoma Power |

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| John Crider | EWEB |
| Dylan D'Souza | NWPCC |
| Mike Dalton | Montana |
| Rob Diffely | BPA |
| Ryan Egerdahl | BPA |
| Tracy Farwell | Better Energy |
| John Fazio | independent |
| Sean Ford | Portland PPC |
| James Gall | Avista Corp |
| Max Green | Renewable NW |
| Doug Hart | PSE |
| Aditya Jayam Prabhakar | CA ISO |
| Massoud Jourabchi | Greenway Research |
| Mary Kulas | Nuclear MMK |
| Dave LeVee | Powercast |
| Scott Levy | Bluefish |
| Douglas Logan | independent |
| Canon Luerkens | Montana |
| John Lyons | Avista |
| Jim Malinowski | Clark PUD |
| Ian McGetrick | Idaho Power |
| Devin Mounts | PGE |
| Heather Nicholson | Orcas |
| Joel Nightingale | WA UTC |
| Craig Patterson | independent |
| Steve Schmitt | Northwestern |
| Kate Self | NWPCC |
| Kevin Smit | NWPCC |
| Tyler Tobin | PSE |
| Ben Ulrich | EWEB |
| Hannah Wahl | PSE |
| Seth Wiggins | PGE |
| Mike Wu | CA ISO |
| Rob Campbell | PGE |
| Connor Lennon | Tacoma Power |
| Pat Byrne | BPA |
| Blake Scherer | Benton PUD |
| Adam Schultz | CA ISO |
| Brian Dekiep | NWPCC |