Northwest Power and Conservation Council
Systems Analysis Advisory Committee
July 31, 2024

John Ollis, NWPCC, began the meeting at 9:00 by greeting the room, introducing Zoom as the new meeting platform, and calling for attendance.

Dave LeVee, Powercast, asked how pricing signals will affect demand response [Slide 9], saying it can be integrated into AURORA. Ollis said, in general, the region reflects demand response in a more detailed way and assumes it's included in the loads outside the region. LeVee was glad this substantial shift is being examined. Ollis agreed, asking for ideas on how to fine tune out-of-region estimates. LeVee suggested using AURORA for forecasting.

Rick Williams, PSU, asked about if out-of-region supplies are being examined along with out-of-region loads. Ollis answered yes. Williams then asked about wildfire concerns when transmission paths are unavailable. Ollis pointed to adequacy assessments where they limit transmission ability.

Dor Hirsh Bar Gai, NWPCC, said staff are working on this with utilities, the National Labs, and the new Climate and Weather Advisory Committee. Williams suggested reaching out to major military installations as well to learn about the 14-day Pull the Plug law. Ollis asked for clarification. Williams said it addressed the bulk power grid's support to the military installations. Ollis agreed this is important and will be considered broadly in the Plan.

Fred Heutte, NW Energy Coalition, pointed to a large upcoming shift from the LNG Canada export terminal [Slide 11]. He said it's two-billion-cubic-feet-a-day facility that will impact NW gas pricing. Tomás Morrissey, NWPCC, agreed saying the Fuel Advisory Committee will discuss this further in the fall.

Heutte pointed to the price bump box on the slide, saying this LNG facility is likely to be shipping commercial quantities within the year with two more coming online soon. Morrissey said this price forecast includes Woodfibre LNG, which is supposed to come online in 2027/2029. Heutte said Woodfibre is located in the lower mainland which will have different impacts than the Kitimat LNG projects have a separate pipeline.

Ollis asked Morrissey about the price bump, wondering if it's caused by increase in demand from the LNG without the potential of flowing that demand. Morrissey said yes, the delay could cause a tighter gas market until 2029. He said the larger facility Heutte was discussing is different and will be discussed in the fall.

Heutte suggested getting company stakeholders to come and talk about those projects for the fall FAC.

Williams provided the following information in the Zoom chat: For Council Staff, there are several major DOD installations supplied by the Northwest bulk electric grid for critical mission loads. The requirements stat with public law Title 10 US Code Section 2920 Energy resilience and energy security measures on military installations. Search term: Metrics and Standards for Energy Resilience at Military Installations DOD OUSD letter May 29, 2021

Aliza Seelig, PNUCC, asked I believe I heard from E3 that CA's latest IEPR doesn't have the full extent of data centers in CA. It only includes under construction data centers. Have you heard the same thing, in the chat [Slide 15]. Ollis said he didn't do the California load research this time.

Morrissey said he had not heard that yet, adding that there have been no direct discussions with the CEC about data centers. He noted that this slide is the 2022 update. Seelig said a new forecast will come out in the fall or early next year, wondering if that is enough time. Ollis said he will look at it and will likely compare it to the Council's forecast. He said the Council is an out-of-region data taker. Morrissey said right now they use the CEC forecast and IRPs from other utilities.

Seelig said West Tech is still important to look at as public data sources can lag in visibility. She then addressed reserve margins, asking how a higher load forecast will affect them. Ollis thought they would affect clean energy, RPS targets, the load, and the reserve margin, so it's important to get it right especially for California.

Seelig wrote I believe the issue is with the 2023 IEPR. Something to dig into with CA experts when you pick it up a load forecasts in the chat [Slide 18].

Tiana Marmitt, Energy Exemplar, spoke about batteries [Slide 20] pointing to cities not allowing short-term batteries due to fire risk. She noted that developers have appealed to the CPUC to override these decisions, noting that LDES have significantly less fire risk. Ollis said that made sense to him, and asked for more limits that people may have heard about.

Marmitt said they are testing Form Energy batteries as that will also be their base candidate and was happy to share information. Ollis mentioned difficulty in getting it to hit seasonal targets. Marmitt said they are still in the testing phase and found that sampling will play a huge factor. She recommended every hour, every week or a first- or third-week schedule to capture a full day. Ollis said that is what they do.

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Devin Mounts, PGE, addressed the non-linear trend on [Slide 26]. Ollis said it's curtailed clean energy, like when a wind plant could have produced 100 MWs in an hour but didn't have transmission, while gas units had to hold reserves. He said storage allows shifting around but AURORA can't track the long duration storage well, so he did a back-of-the-envelope estimate. Mounts asked if this means there's a build out of long duration storage

early in the process, so more energy is curtailed than in the 2030-2035 period and there's less curtailment as transmission catches up.

Ollis answered yes, to an extent. He said long duration storage is not available in the model until 2028. Ollis then said the placement of renewables, other resources and the general efficiency of the system buildout play a role as well, noting that adding more transmission causes more renewable curtailment, probably because of wind.

Jason Sierman, ODOE, asked "remind me what energy storage for LDES proxy was relative to energy for battery? 4-hr battery vs 12-hr LDES, 24-hr LDES? and at what costs? reason being I recall a trend towards 8 and 12-hr batteries…and wondering how they stack up cost wise, in the chat. Ollis answered the long duration energy storage is a 100-hour battery.

Sierman then asked if 100 hours comes in at less cost than fifty times a four-hour battery. Ollis said they use the current cost projection which is fairly low and compares well to a four-hour battery.

Sierman asked if it was less than 25x more expensive. Ollis thought it was closer to 10x, saying the fixed cost is significantly lower but the efficiency is also quite a bit lower. Sierman said he's seeing a trend where batteries keep extending their duration and get cheaper and cheaper to build. Ollis said he's hearing about other technologies that don't have the same rare earth issues as lithium ion. He said lithium ion is probably getting picked up to take advantage of the ITC from the IRA.

Scott Levy, Bluefish, said he heard from LBNL that the four-hour battery gets an advantage from a code, and it pairs well with diurnal ramping at sunset and sunrise. He said a 10-hour Iron Air battery would take up about four to five acres of land, saying they need two to three acres per megawatt. Ollis said we will learn more over time.

Levy said that FERC considers batteries to be a large generating asset, so BPA is waiting for the next cluster study. He was perplexed as batteries seem like a transmission asset to him. Ollis said the Council considers them a wholesale power asset with some transmission deferral value. He said they will continue to test that in the upcoming Plan to capture their stacked value stream.

Levy thought it might be worth looking into minimum generation requirements [Slide 37] to see what's causing the negative prices. Ollis said staff could probably do a better job modeling storage. He said the minimum generation required to keep gas on plus having a lot of renewables is part of the phenomenon.

Williams thought the presentation showed thoughtful work and asked about price signals during abnormal situations [Slide 42]. He said the value of long-term storage is different during distinct disruptions in the bulk power grid. Williams pointed to the Great Coastal Gale of 2007-2008 where EPRI did a study. Ollis said this study will not do a great job of

that, but the Plan can and will allow staff to dig deeper. He pointed to using the OptGen model which has more nuance and abilities to capture resilience.

Heutte addressed question 2, asking if it more about data storage limitations or CPU cycles. Ollis said it was both, but he was less concerned with run time and more about storing all the data. He wondered what people wanted/used and the importance of 8760 data.

Heutte said he guessed no one needs 8760 for all but for a few, noting the cloud loves to take data for free but charges to get it out. Ollis said they don't run AURORA in the cloud yet and the Council doesn't have an infinite computing budget.

Ollis encouraged members to email thoughts on how to improve this forecast work, saying he plans to present to the Council in the next couple of weeks and ended the meeting at 12:00.

Attendees via Zoom

Dor Hirsh Bar Gai	NWPCC
John Ollis	NWPCC
Peter Harnish	NorPac Pater
Mary Kulas	Nuclear
Roberto Noguera	CAC
Matthew Stajcar	Northwestern
David Clement	NEEA
Eugene Rosolie	NWEA
Leona Haley	Avista
Frank Brown	BPA
Landon Snyder	Snohomish PUD
Nora Hawkins	WA Dept of Com
Rachel Clark	City of Tacoma
Brian Dombeck	BPA
Ian McGetrick	Idaho Power
Tyler Tobin	PSE
Rick Williams	PSU
Chase Morgan	Idaho Power
Devin Mounts	PGE
Danielle Szigeti	Tacoma Power
Katie Chamberlain	Renewable NW
Aliza Seelig	PNUCC
Lori Hermanson	Avista
Barbara Miller	USACE
Ahlmahz Negash	Tacoma Power
Nathaniel Clayville	NWPCC
John Lyons	Avista
Ted Light	Lighthouse Energy
Mike Frantz	GC PUD
Rob Diffely	BPA
Elizabeth Osborne	NWPCC
Dave LeVee	Pwercast
Ben Ulrich	EWEB
Tomás Morrissey	NWPCC
Jason Sierman	ODOE
Fred Heutte	NW Energy Coalition
Eric Graessley	BPA
Vishvas Chalishazar	PNNL
Shailesh Shere	Clallam PUD
Tiana Marmitt	Energy Exemplar
Jennifer Magat	PSE
Brian Dekeip	NWPCC
Mike Swirsky	Critfc
Leann Bleakney	NWPCC
Scott Levy	Bluefish
Criag Patterson	independent