

**Northwest Power and Conservation Council
Systems Analysis Advisory Committee
January 23, 2020**

John Ollis, NWPCC, began the meeting at 1:00 by calling for introductions. He asked if there were any questions on the minutes from the November 2019 meeting and said they would be adopted after the break.

Climate Scenarios Selection

Dan Hua, NWPCC

Tomás Morrissey, PNUCC, asked if each scenario on [Slide 16] represented one water year or multiple water years. Dan Hua, NWPCC, answered that the climate data goes from 1950 to 2100 and the 2021 Plan will use 2020 to 2049. Morrissey confirmed that each scenario will have that 150 years of data. Hua confirmed.

Fred Heutte, NW Energy Coalition, asked how outliers are determined [Slide 23.] Hua clarified that the Box in a Box-and-Whiskers plot has a length, called an IQR, and the Whiskers extend out up to 1.5 times that IQR. Anything above or below the Whisker extremes, explained Hua, is considered an outlier.

Heutte wondered if a normal distribution like this is the right choice for atmospheric science. Hua assured him that the ends will be included in the selection methods. Heutte confirmed that the outliers will not be removed. Hua confirmed.

Heutte noted that the fewer HDDs and higher CDDs reveal a lot about load impact [Slide 24.] Hua agreed, saying the quantities will go into the load model.

Morrissey asked why Hua was looking for scenarios with the highest concentration winter HDDs [Slide 25.] Hua explained his thinking. Ollis said the goal is feed information for the temperature-sensitive part of the load, not all of the load.

Heutte asked why I and J on [Slide 26] was excluded. Hua explained that they behave very differently than the others when used to analyze hydro generation data. Heutte agreed that they look pretty ordinary for HDDs but might be different for hydro.

Morrissey wondered why Hua picked high and low HDD scenarios but didn't want extreme hydro. Ollis said there was a lot of internal discussion around this and the SAAC should talk more about it after the presentation. Heutte spoke about the relationship between models and how assumptions could carry through. Hua agreed, adding that he did not do the downscaling on the hydrological model. Heutte said there is no perfect model and you have to go with the best available.

Heutte noted that the outliers push out the averages so the median is a good proxy for the overall distribution [Slide 29.] Hua answered yes, sometimes.

Morrissey asked if some information was skipped on [Slide 30.] Hua explained that A and B are the same GCM with different downscaling, but that downscaling doesn't change the temperature very much. Morrissey asked why F R and A were chosen. Ollis said A was chosen to represent two parts of the range. Hua said he's showing F and R for comparison only and will not choose both.

Heutte asked when the RMJOC results will be made public [Slide 39.] Hua did not know. Heutte thought that it could raise some questions if it doesn't come out before the 2021 Plan. John Fazio, NWPC, thought the results were due out soon. Ollis said they're presenting this early to confirm methodology and thanked Bonneville for sharing some information before the official rollout.

Morrissey confirmed that this proposed set creates the widest range of CDDs and HDDs and cautioned that this might create a wider band of temperature possibilities. Fazio said no, this is actually smaller than the full range. Ollis said it's the highest range and the ones that are most representative of the whole set, according to staff judgment.

Morrissey thought it would be useful to see a combined Box-and-Whisker of A and F. Hua said it could be done. Fazio said they can bring more detailed information forward once all of the data is released. Hua feared committee members would eventually tire of the topic 😊

Huette said he understood RMJOC's process and the desire to not show early results. His concern, however, was the need to explain things step-by-step and the fast-changing nature of climate science. He appreciated the consistent approach and approved of the methodology.

Ollis said they will be back with more information but would like to stick with the chosen scenarios. Morrissey approved.

Jim Litchfield, consultant for Idaho, wondered about future steps, like incorporating HDDs and CDDs into the load forecast. He asked if the four cities used to calculate HDD/CDD were given the same weight in the linear equation on [Slide 21.] Hua said they were not and gave the magnitude ranges for the four.

Litchfield asked how A and F will be put into a load forecast model. Hua said the HDDs/CDDs will be one input in the load models. Fazio added that the Short-Term model will be used to get hourly loads in combination of the 2020 Long-Term model and suggested that this should be a topic for another meeting.

Ollis confirmed that HDD/CDD are just part of the load in Energy 2020 along with the secondary effects of climate change. Ollis thought that Massoud Jourabchi, NWPC, covered this in a presentation to the Demand Forecast Advisory Committee and offered to send the information out.

Litchfield said he's still trying to figure out how Jourabchi will disaggregate the HDD/CDDs down to the cities or if they will be plugged into a regression equation. Fazio said staff went with HDD/CDD as a quick way to sort, as opposed to creating 19 load forecasts.

Ollis reminded the room that the Climate Change data probably has less effect on the loads than the hydro. Litchfield agreed that made intuitive sense but remained curious on how the information will be plugged back in.

Incorporating an Adequacy Standard into Resource Expansion Strategies

John Fazio, NWPCC

Heutte asked for examples of winter DR [Slide 10.] Ollis said it wouldn't be all space heating as there is heating and cooling in both summer and winter. Heutte confirmed that summer DR would be non-zero. Heutte then asked if ELCC can use other metrics beside EUE. Fazio answered yes, pointing to a recent NERC meeting where using all of the metric was suggested.

Heutte then asked about using "nameplate" to quantify DR and EE. Ollis said they use "nameplate" to describe effective capacity, adding that it is a way to fit the demand-side resource into the model.

Heutte then asked how storage, like a battery or pumped storage, is assessed with ASCC. Fazio said he adds the characteristics of the battery and lets it recharge when there is surplus. Heutte asked about pump storage. Fazio said he hasn't worked on that yet and is still thinking about modeling it like a battery with more detail.

Morrissey asked what the starting point is for calculating ASCC. Fazio stated that as you can't calculate ASCC without any curtailments he starts with cases that have a 10% LOLP. Ollis added that the key is finding things with a similar reference point that can be aligned in the RPM.

Morrissey thought it would be fun to compare this with an ELCC calculation out of GENESYS. Fazio said he's done that in the past and the numbers were close, adding that it might be fun to do it again.

Heutte suggested looking at summer DR as coal retirements come in. He then highlighted footnote #1. Fazio said he will show more soon, adding that these numbers are with historical hydro and he will have to run them again with the climate adjusted numbers.

Heutte then asked when the change from "Classic" to "New" GENESYS could be expected. Ollis said they are still working on getting data and there will be a lot to share in coming meetings.

Litchfield appreciated the work on [Slide 16] and then asked if the resource adding order matters. Fazio said they plan to test that. Litchfield thought it would, saying if you already have 2000MW of solar on the system and then add 2000MW of wind you might get a different answer. Ollis called this a good question and stressed that this work happens in a smaller RPM optimization that only deals with adequacy reserve margins. He said this method allows you to

just look at the whole total. Litchfield understood, confirming that that this is a method that gets the RPM to behave.

Heutte asked for an explanation of the table on [Slide 17.] Fazio called it a representation of a range of possible new resources. Ollis said calculating the ASCC by resource type will be covered later in the presentation, along with choosing the right levels to test.

Heutte wondered if pulling pumped storage out from batteries would make a significant difference. Ollis said that will be tested, reminding him that the RPM has other ways to affect seasonal capacity.

Morrissey asked if the RPM would build a resource for Q2 if the ARM is not met [Slide 23.] Fazio said the Q2 surplus is always much bigger. Morrissey agreed but wondered if the RPM would try to build if the 20.3% ARM fell to 19%. Fazio answered no because the ARM would never be that low. Morrissey wondered why we need an Q2 ARM. Fazio said he broke out the 5% LOLP over the seasons and calculated the ARMS to match that.

BREAK

Exploring the RPM

John Ollis, NWPPC

Heutte suggested allowing for summer DR in the ASCC to deal with South of Allston issues. Ollis said all DR bins will probably have some effective capacity in each season. Morrissey thought one approach would be to use a multiplier of 1 for resources east of the Cascades and .9 for the west. Ollis said there has to be a solution that strongly takes project management into account.

Morrissey noted that a CT has more capacity, and suggested using 380 instead of 370 or de-rating a simple cycle to 210. Ollis explained that he was roughly calculating the adequacy contribution of a combined cycle in all seasons. He stressed that this is only used for adequacy.

Morrissey asked how many runs Ollis needs to complete. Ollis didn't know but his goal was under 200 and hopefully less than 100. He thought there could be multiple ASCCs for renewable resources while thermals, EE and DR may be constant enough to use an average.

Heutte asked if sub-regional correlation is the important driver for renewables. Ollis said it's more about diversity.

Heutte said this approach makes sense but promised to think more deeply about renewables and how much diversity is reflected in an aggregation to a sub-regional value. He added that there is not much production data yet, even from the Gorge.

Ollis predicted that he'll need three types of wind, one solar resource, and one storage, adding that this is still all up in the air and his prediction is probably wrong. Morrissey suggested that

Ollis will need two types of storage. Ollis thought DR and batteries will have the same ASCC. Morrissey cautioned that an eight- or 12-hour battery/pump storage project would be different.

Discussion on Passing Resource Operational Characteristics to a Capital Expansion Model

Heutte felt that any resource attached to the grid should pay something [Slide 3] and proposed a thought experiment to illustrate the challenges: take a 5MW battery included with high-res solar or wind and either put it on the grid but not connected, on the distribution system or behind the meter. He said this is the same resource with four different contexts and wondered how to assess it. Ollis didn't know. Heutte complained that renewables always get costs added but the same costs could be added for new gas or batteries or anything grid connected. Ollis said he recalled the Seventh Plan used BPA's integration rate and thought it would probably still be a decent proxy.

Ollis asked for feedback and suggestions for approaches.

Dave LeVee, PwrCast, pointed to papers he wrote that address this. He said the value of energy generation or DR is based on the hour when that generation occurs and when the energy is provided, like a market price forecast. Ollis agreed that the hourly detail is important but he's trying to find the cost of forecast error. Ollis wondered if he needed to do a study or punt and write a narrative.

LeVee stressed that there's a marketplace for different blocks of energy based on delivery time. He said energy is the product that varies in price based on delivery.

Ollis thanked LeVee and offered to follow up. Ollis ended the meeting at 4:00PM.

Attendees

John Ollis	NWPCC
Dan Hua	NWPCC
John Fazio	NWPCC
Tomás Morrissey	PNUCC
Kathi Scanlan	WA UTC
Fred Heutte	NW Energy Coalition
Eric Graessley	BPA

Attendees via Webinar

Aaron Bush	PPC
Ahlmaz Negash	Tacoma Power
Aliza Seelig	Seattle City Light
Dave LeVee	PwrCast
Elizabeth Osborne	NWPCC
Frank Brown	BPA
James Vanden Bos	BPA

Jim Litchfield	independent
John Lyons	Avista Corp
Jennifer Magat	Puget Sound Energy
Garrison Marr	Snohomish PUD
Max Greene	Renewable NW
Rachel Clark	Tacoma Power
Rob Diffely	BPA
Samuel Birru	Energy Trust of Oregon
Shirley Lindstrom	NWPCC
Sibyl Geiselman	Avangrid
Villamor Gamponia	Seattle City Light
Brian Dekiep	NWPCC