

Resource Adequacy Advisory Committee Meeting
Steering Committee Meeting

December 6, 2013

Meeting Time: 10:00 A.M. to 3:00 P.M.

Meeting Location: Northwest Power and Conservation Council
851 SW 6th Ave.
11th Floor Meeting Room
Portland, OR 97204

Facilitator: John Fazio, Northwest Power and Conservation Council

Note Taker: Kyle Gustafson

Attendees: *On-Site*
Charlie Black, Northwest Power and Conservation Council
Brett Sims, Portland General Electric
Philip Popoff, Puget Sound Energy
Zac Yanez, Snohomish Public Utility District
Megan Capper, Eugene Water & Electricity Board
Kevin Nordt, Grant County Public Utility District
Tomás Morrissey, Pacific Northwest Utilities Conference Committee
Rob Diffely, Bonneville Power Administration
Phil Carver, Oregon Department of Energy
Wendy Gerlitz, Northwest Energy Coalition
Greg Mendonca, PNGC Power
Tom Karier, Northwest Power and Conservation Council
Stephen Oliver, Bonneville Power Administration
Fred Heutte, Northwest Energy Coalition
Howard Schwartz, Washington State Department of Commerce, Northwest
Power and Conservation Council
Elizabeth Osborne, Washington State Department of Commerce, Northwest
Power and Conservation Council
Stefan Brown, Portland General Electric
Steve Johnson, Washington Utilities and Transportation Commission
Dick Adams, Pacific Northwest Utilities Conference Committee
Cameron Yourkowski, Renewable Northwest Project
Steve Simmons, Northwest Power and Conservation Council

Attendees: *Via GoToMeeting*
Mark Stokes, Idaho Power
Jo Elg, United Elective Cooperative
Therese Hampton, Public Generating Pool
John Chatburn, Idaho Office of Energy Resources
Tom Haymaker, Clark County Public Utility District
David Clement, Seattle City Light
Phil Obenchain, PacifiCorp
Steven Weiss, Bonneville Power Administration

Resource Adequacy Advisory Committee Meeting
Steering Committee Meeting

December 6, 2013

Travis Metcalfe, City of Tacoma
Brian Kuehne, Portland General Electric
Scott Kinney, Avista Corp.
Mark Ohrenschall, Energy News Data
Tom Deboer, Puget Sound Energy
Tom Kaiserski, Montana Department of Commerce

Resource Adequacy Advisory Committee Meeting
Steering Committee Meeting

December 6, 2013

Summary of action items derived from tech notes (may not be complete):

1. Long-term action: Council should investigate developing an explicit load forecast for each Northwest node modeled in GENESYS (Massoud Jourabchi).
2. Next meeting agenda item: Review the Council's forecast hourly load shapes for 2019.
3. Next meeting agenda item: Council's follow up work to identify historical weather-normalized load growth for winter and summer peaks and for monthly averages.
4. Next meeting agenda item: PNUCC to present a comparison of Council forecasted loads to NRF reported loads.
5. Short-term action: Obtain historical data on BC imports to the PNW, especially during times of stress such as during extreme temperature events (Rob Diffely).
6. Short-term action: Develop a more robust assessment of potential market supply from BC, in particular for peaking events (e.g. using Canadian storage).
7. Short-term action: Query non-BPA wind generators for historical operation data (Kujala/Fazio)
8. Short-term action: Work with Idaho Power Company to assess its market supply access from the east and southwest (Noll/Fazio)

Summary of action items derived from steering notes (may not be complete):

1. Get a better understanding of reliance on market supplies
2. Review access to independent power producers (IPP)
3. Better understanding of resource transitions in the West and how they affect other resource's operations
4. Examine current agreements or assumptions regarding the sharing of resources and assess if any market "friction" exists and if so, how we can incorporate it into our analysis
5. Examine if economic risks or other risks may be the cause of future unserved load
6. Examine the conditions under which curtailments occur. Classify curtailments, if possible, into types (e.g. capacity, energy, major, minor, etc.)
7. Consider adding market supply as a random variable in GENESYS (long term)
8. Coordinate better with transmission groups. Consider ways to incorporate transmission outages into assessment.
9. Consider adding nomogram data for other major transmission lines
10. Develop a clear definition of what "planned" resources are for all resource types
11. Compare our planning assumptions with utility assumptions
12. Examine historical delays in completing construction of planned resources. Perhaps include some delay in determining whether a project will be available in the year under consideration.
13. Specify more clearly the "emergency" actions taken to assess the final LOLP
14. PNUCC to compare their most recent resource data with the Council's
15. Better define the "work product" and what the message is (Council)
16. Define the specifics for a gas-limited scenario

Resource Adequacy Advisory Committee Meeting Steering Committee Meeting

December 6, 2013

Note: Action items and items of importance are highlighted in yellow.

John Fazio with the Northwest Power and Conservation Council began the Resource Adequacy Advisory Committee (RAAC) Steering Committee meeting at 10:00 A.M. He noted that the RAAC committee was formerly known as the Northwest Resource Adequacy Forum.

Fazio introduced the co-chairs of the Steering Committee, Tom Karier one of the two Washington Northwest Power and Conservation Council members and Steve Oliver with the Bonneville Power Administration. The meeting attendees then introduced themselves.

Introductory Comments

Presenters: Tom Karier, Northwest Power and Conservation Council, and Steve Oliver, Bonneville Power Administration

Karier introduced himself and noted some issues that arose with the Northwest Resource Adequacy Forum:

- Waning participation during a time when Northwest adequacy was questionable
- Unclear forum missions
- Disorderly member transitions

Karier explained that the Council called for the formation of the RAAC under the Federal Advisory Committee Act, in part, to resolve the issues mentioned above. The charter for the RAAC was approved by the Council in July of 2013. The RAAC will advise the Council on resource adequacy issues. Karier stated that addressing adequacy is more important now because of the anticipated plant closures in the near future.

Oliver discussed addressing adequacy on a regional level and applying the findings on a utility level. He stated that the region was once energy-limited, but is now transitioning into one that is more capacity-limited because of the addition of variable energy resources. Oliver shared that people are still trying to figure out how to use models designed to manage and watch energy into ones that measure capacity—a complex problem.

Oliver noted that significant items to address include:

- Understanding reliance on market supplies
- Access to independent power producers (IPPs)
- Resource transitions in the West, not just the Northwest
- The sharing of resources, which may be an important factor to address in the modeling assumptions

Resource Adequacy Advisory Committee Meeting Steering Committee Meeting

December 6, 2013

Resource Adequacy Advisory Committee, Background and Overview

Presenter: John Fazio, Northwest Power and Conservation Council

Scope and Role

Fazio stated that the RAAC was formed under the Federal Advisory Committee Act, and that the committee has four objectives in its advisory role:

- Aiding in the development and review of the NW resource adequacy standard and the methodology used to define it
- Helping with the annual adequacy assessments Aiding the Council with all adequacy-related issues
- Assisting with the incorporation of adequacy-related information into the Council's Power Plan

Fazio told the meeting attendees that the RAAC members serve solely in an advisory capacity, as they do not vote. He explained that the RAAC meetings are open and have published notes.

Fazio explained that the RAAC is divided into a technical and steering committee. The technical committee deals more with technical issues, while the steering committee deals more with issues related to policies and methodologies.

Fazio shared that the RAAC management officer is Charlie Black with the Northwest Power and Conservation Council. He stated that each committee has two co-chairs: a member of the Council's staff and an individual from the Bonneville Power Administration (BPA). The co-chairs of the technical committee are Fazio and Rob Diffely with the Bonneville Power Administration (BPA). The steering committee co-chairs are Karier and Oliver.

Oliver asked about how the RAAC comes to decisions if the members do not vote. Fazio gave some examples of how the forum conveyed information to the Council in the past. He said that attending members generally worked on a consensus basis and any dissenting opinions were noted and forwarded to the Council for consideration. The anticipation is that the RAAC would continue in that manner, with member opinions given more deference than those of interested parties. The RAAC will forward summaries of consensus and disagreements to the Council.

Phil Popoff with Puget Sound Energy stated that in the past, the forum sometimes took informal votes to determine if there was a consensus among members and to stimulate dialogues. Oliver suggested conducting "polls" instead of voting.

NERC Definition of Adequacy

Fazio referred to the respective slide and stated that the North American Electric Reliability Corporation (NERC) defines adequacy as the "ability of the electric system to supply the aggregate electric power and energy requirement of the electric consumers **at all times**, taking into account scheduled and reasonably expected unscheduled outages of system components."

Resource Adequacy Advisory Committee Meeting

Steering Committee Meeting

December 6, 2013

Fazio stated that he doesn't agree with the NERC definition because no utility plans for a 100 percent adequate system because it would be too costly.

Fazio shared that all adequacy metrics are some combination of the frequency, duration and magnitude of anticipated shortages that are derived from a simulation of the power supply operation. In other words,

- How often is there a supply shortage (frequency)
- How long might the shortage last (duration)
- How big is the shortage (magnitude)

Adequacy Measurements: Frequency, Duration and Magnitude of Shortages

Referring to the respective slide, Fazio shared that the metrics used in the energy industry to measure adequacy include:

- **LOLP** (loss of load probability): The likelihood of having at least one shortage in a future year
- **LOLE** (loss of load expectation): The expected number of shortage events per year
- **LOLH** (loss of load hours): The expected number of shortage hours per year
- **EUE** (expected un-served energy): The average amount of un-served load
- **CVaR95** (conditional value at risk): The average magnitude of the worst 5 percent of shortage events

Fazio shared that the Council uses LOLP as its standard, but the GENESYS model calculates all the metrics.

Analytical Tools—GENESYS

Fazio shared that the Council uses the GENESYS model to measure adequacy. GENESYS is a hybrid model, developed with parts of other models, like the Bonneville HYDSYM program. GENESYS performs a simulation of the regional power system operation in chronological order for every hour in the year (8,760 hours). It then repeats the simulation with different combinations of future unknown variables, such as water supply, wind, temperature and forced outages. This Monte Carlo (probabilistic) method produces a curtailment record, which includes every hour when loads were not successfully met. All adequacy metrics are derived from this curtailment record.

Sample Weekly Dispatch

Fazio stated that the respective slide shows a sample graph that looks like one that the GENESYS model would create and explained the different elements of the graph.

Pacific Northwest (PNW) Adequacy Standard

Referring to the respective slide, Fazio shared that the adequacy standard includes a metric—a standard that's measureable—and a threshold (a maximum or minimum). The Council adopted LOLP as its adequacy metric in 2011 and set the threshold to a maximum of 5 percent.

Resource Adequacy Advisory Committee Meeting Steering Committee Meeting

December 6, 2013

Fazio explained that the Council didn't want a system with an LOLP greater than 5 percent because that would mean that extraordinary, and likely expensive, measures would have to be taken to serve loads.

Oliver asked if the Council adopted his interpretation of the adequacy standard. Fazio stated that the interpretation was his own, but that the Council adopted the metric and the threshold. Oliver suggested that the RAAC members consider at another time if economic risks or other risks may be the cause of future un-served load tolerances.

Phil Carver with the Oregon Department of Energy commented that he agrees with Fazio's interpretation of the adequacy standard, and talked about "annoyance" standards versus underlying "catastrophe" metrics when it comes to modeling "unknown unknowns." He stated that he prefers the EUE metric because of the ability to compare it to things like distribution outages, noting that the public has survived power outages due to storms and other events.

Fazio replied that the Council had the Environmental Systems Research Institute (ESRI) in Brazil review the LOLP methodology. He stated that an ESRI representative suggested figuring out how often a utility is willing to take unwanted (extraordinary or expensive) measures and using that as a determination of a standard. Fazio said that depending on how one models standby resources, 5 percent could be considered an "annoyance" standard.

Fazio stated that the RAAC can look at the conditions under which shortages occur (e.g., poor water condition and plant forced outages) to get a sense of what combinations of events can lead to shortages. He added that a more quantitative analysis of the correlation between shortages and combinations of random variables could be very useful to the Council and to utilities.

Fazio noted that even though the Council's power plan only has authoritative power over the BPA, utilities should also be actively involved in adequacy discussions because state utility commissions and public utility boards often ask how an individual utility's plans compare to the regional plan.

David Clement with Seattle City Light asked if regional imports are treated as a firm resource in the Council's calculations or if there are probabilities associated with them. Fazio replied that firm contracts (both into and out of the region) are modeled as firm. The "market" supply is treated as an available resource with varying capabilities throughout the year. He said that the capability of the market supply does not change during a simulation but that many sensitivity studies are done to see how the LOLP varies as a function of that supply. He added that GENESYS doesn't model forced outages on the market supply "resource" nor are outages modeled for the tie lines between regions. Fazio said that if solid data were available, modeling the market supply as an unknown future condition (random variable) might be possible. More discussion on this topic is needed.

In response to Carver's question about the reliability of the transmission system and Fazio stating that the Council doesn't model outages on transmission, Fred Heutte with the Northwest Energy Coalition said that having a think tank-approach to combine the transmission and power sides may be a good

Resource Adequacy Advisory Committee Meeting

Steering Committee Meeting

December 6, 2013

idea. He said there may be cases when the region faces both supply and transmission issues and because of that, our assessment of the LOLP may be low. Fazio responded by saying that some NECC sub-regions are attempting to add transmission outages to their assessments of adequacy. However, that would be difficult to do for the Council because it doesn't have a transmission model.

Loss of Load Probability

Referring to the respective slide, Fazio stated that the Council looks at each future year as a single number—as a “good” year or “bad” year. If there are any curtailments in a simulation, it's a bad year. He explained that the loss of load probability is the number of bad simulations divided by the total number of simulations.

History of Northwest (NW) Assessments

Referring to the respective slide, Fazio stated that in 1999, the Council published a report that had a four-year outlook showing a 24 percent LOLP for 2003. He noted that the modeling at the time was different - focusing more on energy issues. In 2009, the outlook for 2015 showed a 5 percent LOLP, which the Council published in the Sixth Power Plan. Fazio pointed out that for the 2012 outlook for 2017, the LOLP crossed the 5 percent threshold to 6.6 percent, so the Council additionally calculated that it would take about 350 megawatts of dispatchable combined-cycle resource to reduce the 2017 LOLP to 5 percent.

2017 Assessment Updated

Referring to the respective slide, Fazio stated that since the 2017 assessment last year, the Council has acquired better data and has made several changes to the GENESYS model. He shared that last year's assessment left off about 250 average megawatts of hydro and had the Bonneville Dam in the west node (instead of the east). When the Council included the new information in the model, the LOLP decreased to 5.2 percent.

Fazio went on to say that the model went from a monthly time step to a 14-period per year time step (splitting April and August). The resulting LOLP dropped to 4.9 percent. Finally, after taking into account the new hydro operating constraints in the latest version of the biological opinion (which includes new summer spill regulations) the resulting LOLP was 5.4 - lower than the 6.6 percent published last year but still above the 5 percent threshold.

Fazio reviewed some of the improvements made to the model, which include:

- Changes to the topography (going from 2 nodes to 3 nodes)
- Revising the hourly hydro dispatch algorithm
- Calculating the hydro peaking capability separately for each node

Resource Adequacy Advisory Committee Meeting Steering Committee Meeting

December 6, 2013

Apparent Precision Overwhelmed by Larger Uncertainties

Fazio stated that there are two variables that can significantly affect the LOLP, which are not modeled as random variables explicitly. The first is market supply and the second is long-term load uncertainty (due to variable economic conditions). He explained that last year staff ran many sensitivity studies in which both the market supply and long-term load were varied. The resulting table shows how the LOLP varies as a function of both uncertainties. With a large market and low demand growth, the LOLP shrinks to under 5 percent. However, with no market and high load growth, the LOLP can be as high as 17 percent. Each square in the table is shaded red (for LOLP greater than 5 percent) or green (for LOLP less than 5 percent). He noted that there are clearly more red squares than green ones.

Continuing Challenges

Reading from the respective slide, Fazio shared that continuing challenges include:

- The increasing complexity of the power system (with more variable generation resources)
- Peaking and capacity issues growing
- Methodologies varying across the industry
- Retooling the model to also deal with capacity issues (and not just energy issues)

Fazio stated that because of these challenges, we should expect to see continued volatility in the LOLP results. However, we should always try to identify why the changes occurred and whether they were due to errors, modeling enhancements, policy changes or physical changes to the power supply.

Major Modeling Changes for 2019 Assessment

Fazio showed the respective slide and stated that modeling changes for the 2019 assessment include:

- Shifting the Northwest topography from two nodes to three nodes
- Fine-tuning hydro peaking capacities

Work Plan for 2019 Assessment

Fazio pointed out the three phases for the 2019 assessment in the respective slide:

- Phase 1: Data collection and vetting
- Phase 2: Drafting an assessment, which will happen in February or March 2014
- Phase 3: Presentation of the final assessment and sensitivity studies to the RAAC and Council

In each phase, the technical committee meets before the steering committee. The power committee meets last to approve data, review studies and approve the final studies.

In response to Oliver's question about the work plan having a seemingly short turnaround time, Fazio explained that the scheduled was shortened due to delays in finalizing the charter for the RAAC. Normally, he said, the process begins in June, when last year's observed loads first become available.

Resource Adequacy Advisory Committee Meeting Steering Committee Meeting

December 6, 2013

The process is expected to be finished by May to coincide with the release of the PNUCC NRF document. However, Fazio noted that there is a possibility of not releasing the findings by May of next year.

Key Modeling Assumptions

Presenters: John Fazio and Charlie Black, Northwest Power and Conservation Council

What the Steering Committee Provides

Fazio noted how the RAAC steering committee helps the Council:

- Review key assumptions
- Review the study approach
- Offer comments and suggestions to the Council regarding the adequacy standard and how it should perform the study

Aurora Topology

Fazio stated that the graph on the respective slide is the AURORA topology that the Council uses. He noted that the rhomboid shape around the three items in “bubbles” represents the Pacific Northwest: Pacific Northwest west (area 16), Pacific Northwest east (area 1) and southern Idaho (area 5).

GENESYS Topology

In the first slide with the GENESYS topology graph, Fazio explained that the Council previously has used two bubbles in the Northwest: east and west, with Idaho combined in the east. He said that after many discussions about the topic, the Council decided to separate southern Idaho from the east because, among other reasons, the area has different load patterns.

Fazio explained that the GENESYS topology is simpler than the one found in the AURORA model. Referring to the graph in the second respective slide, he noted that the bubbles in the red square represent the Northwest and that Captain Jack, or CJ, is simply a transfer point.

Major Resources Modeled in the Idaho Nodes

Major resources modeled in the Idaho node include:

- Bennett Mountain
- Danskin
- Bridger
- Langley Gulch
- North Valmy

Fazio said that some resources that are not physically located in Idaho are sometimes modeled as being in the node so that they can be modeled with forced outages. Fazio said that the Council is trying to

Resource Adequacy Advisory Committee Meeting Steering Committee Meeting

December 6, 2013

determine if it should model some type of market availability for southern Idaho. He stated that the Council could model that market as a resource that feeds into Idaho or as a “market resource” inside the Idaho bubble.

Carver asked, in regards to transfer capabilities, about the concepts the Council used in the GENESYS topology. Fazio explain that the Council incorporates the nomogram in the model for the lines that go from the east to the west, but the capacities of the other transmission lines are fixed year-round. He said that there hasn’t been much discussion about this topic, but it needs to be addressed, and there are plans to review it. Fazio added that the Council plans to consolidate the figures with the AURORA numbers, determine if there’s a seasonal pattern and see if there is variability in intertie capacity. Carver said it was worth thinking about adding a transmission component in GENESYS.

Heutte commented that items he thinks need attention include the DC and AC interties, as well as the northern intertie connections in Canada. He added that the BC interties will be de-rated as a converter station gets rebuilt, which will reduce capacity in the next five years.

Modeling Uncertainties

Referring to the respective slide, Fazio stated that the model has four random variables:

- Columbia River flows
- Temperatures that affect load variation
- Wind generation
- Forced outage of thermal resources

Modeled Uncertainties

Referring to the chart on the respective slide, Fazio pointed out that in the “Water year selection” row, the Council chose to draw water years sequentially because random water year selection isn’t ready yet. He explained that the operation of Canadian reservoirs is preset to fixed elevations based on an 80-year sequential record. If we were to select water years at random, the Canadian operation would not line up from one year to the next. Fazio said that the Council developed a way to calculate the Canadian operation dynamically, but it hasn’t been completely tested yet He shared that the Council hopes to use random water year selection for future studies to capture a wider range of water conditions, and discussed the importance of doing this.

Fazio stated that another random variable used in the simulations is daily temperature,” which drives variability in electricity demand. He said that the Council uses 1929 to 2005 historical daily temperature data to create an hourly demand record for each of those temperature year profiles. Temperature year profiles are selected randomly.

A third random variable used is wind generation. To simulate the hourly generation from regional wind projects, we use a temperature-correlated data set. This data set includes wind year profiles that consist of 8,760 hourly capacity factors. To get hourly wind generation, each hour’s capacity factor is multiplied

Resource Adequacy Advisory Committee Meeting Steering Committee Meeting

December 6, 2013

by the total installed wind nameplate capacity. This data is derived from the historical operation of the BPA wind fleet.

Because wind data is temperature correlated, we must “lockstep” the selection of wind data with temperature data. In other words, we choose temperature year profiles at random (see above), and then select a wind year profile consistent with the specific temperature year chosen. It’s a little more complicated because the wind data actually includes 20 different wind year profiles for each temperature year. Thus, the temperature years are chosen randomly, and then the model chooses a wind profile randomly from the 20 different profiles available for that specific temperature year.

Uncertainties Not Modeled Explicitly

Fazio shared, referring to the respective slide, uncertainties not modeled explicitly include:

- Economic load growth
- Market availability
- Climate change
- Policy impacts such as carbon tax, the Columbia River Treaty and changes to fish and wildlife operations
- Fuel and electricity prices
- Fuel supply

Fazio commented that the Council will perform sensitivity analyses for any of the uncertainties mentioned above, if their impact on LOLP is significant. He said that last year, sensitivity analyses were done for long-term load growth and market availability. If it becomes important to do so, the Council will modify GENESYS to model any of these uncertainties explicitly, that is, let the model choose from a range of options for each of these.

New and Standby Resources

Referring to the respective slide, Fazio stated that one of the important assumptions that drive the model is the amount of “planned” wind resource to include. For the 2017 assessment, the Council used sited and licensed wind. **The suggestion for the 2019 assessment is to use expected renewable portfolio standard (RPS) wind capacity instead.**

Karier, Carver, Kevin Nordt with the Grant County Public Utility District and Cameron Yourkowski with the Renewable Northwest Project had a discussion about potential new wind development, like the elimination of tax credits, regulatory mandates and Renewable Energy Certificate (REC) banking.

Yourkowski said that his organization is willing to share its wind-related analysis with the Council.

Resource Adequacy Advisory Committee Meeting Steering Committee Meeting

December 6, 2013

Black suggested that the RAAC use information from other committees, such as the Generating Resources Advisory Committee (GRAC), for wind-related data.

Oliver asked about making a thermal forecast or speculation outside of “sited and licensed,” as it relates to the building or availability of plants. He stated that there should be some type of consistency across new and standby resources so there’s less speculation and volatility. Karier noted that the RPS for resources like wind and thermal would be different. Carver, Black and Howard Schwartz with Washington State Department of Commerce then discussed uncertainties and assessments of RPS among different resources.

Nordt asked about reaching out to the utilities to ask them about their plans and assessments to see how they differ from the Council’s assumptions. Popoff stated that he agreed with Nordt about doing this, particularly with thermal, to see if there is a difference. Popoff said that the report should include a clear message that states if the region is going to be okay or in trouble considering “what’s on the ground right now.”

Zac Yanez with the Snohomish Public Utility District asked if the amount of wind listed for adequacy affects the balancing, or reserve, and then, in regard to the remainder, affects what’s available for adequacy. Fazio said that it does. Fazio, Oliver and Yanez had a discussion about how wind can affect modeling and adequacy. Fazio said that the amount of within-hour balancing reserves held depend on the amount of installed wind. He said that currently the Council is assuming that 900 MW are held for INC and 1,100 MW are held for DEC by the federal hydro system.

Heutte shared that the Western Electricity Coordinating Council (WECC) used Common Case Transmission Assumptions that are based on criteria like financial capability and siting and licensing, which helped improved foresight. He explained how WECC uses new and standby resources in its models. Heutte said that he suspects accelerated wind development in the Pacific Northwest because of President Obama’s executive order about federal agency procurement, and thinks that it’s an important factor to consider.

Black discussed the types of helpful, informative items to report to the region regarding the adequacy assessment results, stating that these items should be useful for communication. He said that the results should state: “What do we need to follow through on and make happen to ensure we don’t have a less than adequate power system.”

Fazio noted that the underlying question is in how conservative the RAAC wants to be. He shared that last year’s group decided that thermal should be sited and licensed. This year, he said, that if the RAAC wanted to be more conservative, they could say to include a plant only if it is actually under construction and expected to be operational by the year under examination.

Black suggested that the RAAC first determine the threshold question of what the outcomes or gaps would be if certain actions occur, and then make recommendations about what the region would have

Resource Adequacy Advisory Committee Meeting Steering Committee Meeting

December 6, 2013

to do to fill that gap. Fazio replied that Black's suggestion sounded like the conducting of a needs assessment, which isn't the same as an adequacy assessment, and explained the difference. Black stated that the adequacy assessment seems like the Council is reporting "speculations," to which Schartz replied that a better term is "forecasting conservatively."

Karier stated that some of the information regarding sited and licensed projects may be measurable if one looks at historical data to see the percentage that were finished at certain points, asking if this was something that someone could do to validate assumptions. Carver said that this would be useful as long as the information excluded nuclear plants.

Schwartz suggested for thermal: If it's under construction, "put it in" if the utility is under contract with an independent power producer and there are outlined consequences if the utility backs out. He stated that he doesn't have a proposal for renewable energy, but suggested that for energy efficiency, "If it's in current activity, if it's planned...we don't try to turn that on and off anymore."

Popoff said that he had a problem with looking at what "could be built." He stated that if they look at what's currently under construction, it can fill part of the adequacy hole, but there's still a residual hole. Popoff observed that utility plans show twice as much capacity than what is necessary to fill that hole—half of it is held by utilities and the other half is held by independent power producers. However, all of it isn't going to get built as they'll only build what's needed. He concluded that "if it's being built, count that because it offers an indicator regarding the need to build."

Fazio asked in regards to energy efficiency, if the RAAC should continue to use the Council's Sixth Plan target or try to project what the forecast may be in 2019. Many of the RAAC members agreed that they should use the Council's target.

Wendy Gerlitz with the Northwest Energy Coalition said that the Coalition has made it clear that they think that the targets from the Sixth Plan should be consistently applied in this and other settings.

Fazio summarized:

- There are still some decisions to make regarding thermal, but it seems as if the consensus is to be more conservative and use what's under construction. Actually, this was not agreed to. We agreed to discuss this further at the next meeting.
- Regarding wind, the RAAC is going to receive input from the GRAC.
- For energy efficiency, the RAAC will use the targets from the Sixth Plan.

Fazio stated that the standby resources include demand response and emergency resources that have limited hours of use. He noted that their cumulative capacity has risen while their energy capability has significantly declined because of the number of hours of allowable use for these resources. Fazio stated that standby resources include:

- New demand-side operations

Resource Adequacy Advisory Committee Meeting Steering Committee Meeting

December 6, 2013

- Diesel or more expensive resources that can be used during emergencies
- Call-back provisions on contract
- The Banks Lake project

Oliver commented that, in regards to standby resources, “they assume, until the energy content is consumed, that they’re applied to LOLP event misses, and they apply those misses along the way.” He stated that the committee members should consider, when determining LOLP in the region, the size of the misses and the response by utilities to offer backup resources.

Dick Adams with the Pacific Northwest Utilities Conference Committee stated that he agreed with Oliver. He added that an explanation of the “heroic efforts” that the Council uses in its models needs to be included in the analysis, as well as the parameters regarding reliance on the market.

Popoff stated that he also agreed with Oliver. He suggested asking the utilities if they’re operationally in a position to be able to share, as well as removing utilities from the list that state sharing would pose too much of a hardship.

Carver suggested publishing figures that include and leave out standby resources. He added that he’s interested in learning which utilities have standby resources of their own, as well as the distribution and concentration of the resources.

Heutte commented that the flexibility of resources and the risks associated are important to consider. Oliver replied that he wants to make sure that the RAAC doesn’t confuse adequacy with flexibility.

Gerlitz stated that she thinks it would be beneficial, if the assumptions change, to compare the new assumptions with past assumption to see if they offer the most accurate outcomes. She said that she feels conflicted about changing the thermal approach, as a more conservative view may not offer an accurate outcome. Gerlitz shared that the Coalition thought that the resource adequacy assessment in the Sixth Plan was too conservative.

After the meeting’s lunch break, Fazio recapped that the RAAC members, with the exception of Gerlitz, would like to use thermal projects under construction for the analysis. Heutte stated that he agrees with Gerlitz, and mentioned plants that aren’t fully sited and licensed and the variations of integrated resource plans (IRPs) across the state.

Brown stated that IRPs do not acknowledge a plant. [Any help here? I can’t remember the discussion.] In response to a comment that Oliver previously made about treating renewable and thermal energy consistently, Brown said that he thinks that they may not have to because of renewable portfolio standard (RPS) requirements and inconsistencies in how utilities acquire new resources.

Adams discussed the request for proposals (RFPs) and data available from the NRF. He explained that if there is a plant that has a name and is under construction with an online date, it’s reflected in his agency’s spreadsheet tables. Fazio, Adams and Brown had a discussion about the criteria that the Pacific

Resource Adequacy Advisory Committee Meeting Steering Committee Meeting

December 6, 2013

Northwest Utilities Conference Committee (PNUCC) and Portland General Electric (PGE) use to determine if plants are committed. Brown said that he'd be comfortable using the PNUCC shortlist for RAAC purposes.

Tom Haymaker with the Clark County Public Utility District asked if there is a concern regarding the fact that merchant developers may use the Council's adequacy report to guide a decision about starting the building of a project. He gave the example of a developer forgoing a project because the Council's report reflects adequacy in the region. Fazio replied that the PNUCC doesn't include IPPs in its list of future resources because it doesn't try to speculate how the market may develop in the next five years.

Popoff stated that he liked the more conservative approach because if the Council's report indicates a shortage in the region, it may motivate utilities that are short to take action. He said that he'd rather err on the side of caution so utilities that are seemingly short take a proactive approach, even if it turns out that they were not short.

Steve Johnson with the Washington Utilities and Transportation Commission replied that he doesn't want to make utilities unnecessarily "scramble around" if they get a false signal that they're short. He then discussed the uncertainties and assumptions related to projecting out to 2019. Johnson stated that he thinks it's reasonable to do the study on a sited and licensed-basis in regards to thermal energy, and that it's important for the Council to clearly communicate the criteria used in the report.

Oliver commented that the Council should be as realistic and clear as possible regarding the assumptions, and discussed the different types of conservative approaches it could take.

Karier stated that it's worth considering the level of project completion when considering thermal plants to include in the study.

Black said that California has uncertainty issues with its long-term procurement process in regards to what the utilities are contracting for and what is actually going to materialize. He added that it may be good to determine what the consequences may be if:

- Nothing happens
- What's underway seems fairly likely to happen
- They went further to fill what they think the "gap" is

Karier said that if the Council analyzes these consequences, it still has to make an ultimate decision regarding adequacy. Black replied that looking at the consequences can help determine things like the character of LOLP events.

Adams said that the PNUCC will have an updated shortlist of thermal plants within the next month. He recommended looking at the list at the next RAAC steering committee meeting so the members could have a better idea about what the PNUCC lists, have a more focused conversation and make a decision about what plants to recommend for the analysis.

Resource Adequacy Advisory Committee Meeting Steering Committee Meeting

December 6, 2013

Popoff shared that the RAAC could use a traffic light system where “red” means the hole is so big that licensed and sited plants can’t fill it. “Yellow” means cautionary action needs to take place. He said that he thinks that the Council needs to develop a message that stimulates the right actions.

Heutte talked about the evaluation of different metrics to use in the analysis, adding that if the Council is going to add a resource that is not sited and licensed, it needs to be more than just “notional.”

Black listed follow-up items, which include:

- Adams providing information gathered by the PNUCC
- Defining the “work product” and how the Council will communicate the message
- The construction of the assumptions

Black stated that the Council staff and public affairs staff will work on crafting the subject matter of the Council’s message regarding the results of the adequacy assessment, and will share the results with the steering committee.

Market Supplies

Referring to the respective slide, Fazio stated that the Council makes assumptions about the in-region market and IPPs, and talked about the vetting process for the data listed in the table. He noted that the market assumptions for the Northwest in 2017 are 3,451 megawatts (full IPP) in the winter and 1000 megawatts in the summer. The assumptions proposed for 2019 are the same.

Fazio mentioned that Diffely did a presentation for the technical committee that concluded that the Northwest couldn’t count on BC Hydro for any market availability. Diffely stated that he found that availability depends on the water conditions and that he will offer a follow-up with more information.

Carver mentioned the exclusion of the Montana/Alberta transmission line on the slide, which is energized with 400 megawatts.

Heutte asked about the definitions of summer and winter. Fazio answered that summer is May through August and winter is September through April.

Resource Adequacy Advisory Committee: Discussion of Related Topics

Presenter: John Fazio, Northwest Power and Conservation Council

Topics

Fazio showed the respective slide and stated that the following are items that committee members said they wanted to discuss:

- Time horizons
- Future policy impacts on resource additions or retirements

Resource Adequacy Advisory Committee Meeting Steering Committee Meeting

December 6, 2013

- Future policy changes in hydroelectric operation
- Gas-electric coordination
- Climate effects

Time Horizons

Fazio shared that the Council looks five years ahead, but utilities look 10 years ahead.

Adams said that the committee needs to be sensitive to the fact that the adequacy study goes out to 2019, but 18 months later, at the end of 2020, 450 megawatts will drop off because of the retirement of the Boardman plant.

Fazio asked if a five-year period is a sufficient amount of time to take the proper actions.

Oliver suggested noting events that are going to take place soon after 2019, like the Boardman plant closing in 2020, in the adequacy report. Adams mentioned the Council conducting a sensitivity study for situations like this. Karier said the Council did do sensitivity studies related to the Boardman plant going offline.

Popoff said that a five-year outlook is good for studies, but it may be helpful to also have some flexibility—when it makes sense—to look a little further out. He then mentioned the coal plants going offline in 2021.

Fazio said that it is possible to extend the outlook, and that extra work would come in the form of obtaining additional resources and data. He shared that the Council is considering conducting a needs assessment for every year to see how the LOLP changes between now and a year in the future. Fazio concluded that it wouldn't be a lot of extra work to base the report for ten years out, and that the Council could publish a 10-year outlook with a list of assumptions.

Carver shared that the state commissioners generally don't want to look more than three to five years out, and the commissions aren't interested in reports that look past five years because of the high level of uncertainty.

Fazio replied that the Council can do a sensitivity study, whether it's for a 10-year outlook or for an anticipated change in any future year.

Heutte said that he thinks that a five-year outlook is good because of the high level of uncertainty, and provided examples of events that occurred within the last decade.

Gas-Electric Coordination

Adams shared with the meeting participants that there's a growing number of gas-fired generation in the Northwest. Not all of the generation has firm contracts or pipeline delivery of fuel, so the steering committee needs to determine how to treat such a scenario for the adequacy study. He added that the current assumption is 100 percent availability and the I-5 pipeline is 100 percent subscribed for firm

Resource Adequacy Advisory Committee Meeting Steering Committee Meeting

December 6, 2013

capacity. Adams stated that he wondered if there is value in capturing this concept in the adequacy study because the trend isn't fixed; it's growing.

After Johnson mentioned diesel #2 and solutions other than gas availability, Adams said that he's more interested in the megawatt hours.

Popoff brought up the Grays Harbor supply as an example of a type of pipeline capacity that's modeled, but no longer there. He said that he is willing to help find out related information.

Fazio said that the Council could also do a sensitivity study that looked at, in general, what would happen if the supply of gas were to decrease as a function of temperature.

Heutte said that he can provide the committee with information from the Committee on Regional Power Operation and Western Interstate Energy Board regarding their gas assessments.

Johnson stated that he doesn't think the adequacy study should include ("bake in") efficiencies or a lack thereof regarding utility operations, decisions and coordination. Fazio said that the Council does not do this.

Fazio stated that his recommendation is to think about how to structure a sensitivity analysis to look at how a generic fuel limitation may affect the LOLP, and then apply real-world data as it becomes available.

Future Policy Impacts on Resource Additions or Retirements

Fazio said that he thinks that sensitivity studies are the best way to evaluate policy impacts. Fazio and Karier discussed future policy impacts being more of a topic that the Council would take on and consider instead for its Power Plan development.

Climate Effects

Popoff stated that he suggested discussing climate change because of questions that he's heard about underlying trends in extreme weather during a historic period that the Council should perhaps reflect in its study.

Fazio stated that the Sixth Power Plan had an appendix devoted to climate change, which indicated how it may affect reservoirs. He added that the Council will have to address climate change in some way (especially in regards to hydro availability and temperatures) in the development of its next plan. He discussed use of global circulation models that look 25 or 50 years into the future and the challenges of trying to use the models to look one or two years ahead using the assumptions. Fazio observed that the trends in climate change are small compared to the natural variations in stream flows.

Fazio said that the Council can also examine the frequency of potential extreme cases. He shared that he doesn't think climate change is an issue for the adequacy analysis in the next five years, because the effects of other uncertainties will outweigh the effects of climate change.

Resource Adequacy Advisory Committee Meeting Steering Committee Meeting

December 6, 2013

Carver pointed out, referring to the slide with input information, that with the 80 years of historical records and 77 years of temperature-related data, they know that temperature extremes on the “high” side are going to be more extreme and that the temperature “lows” are going to be less extreme. He said that there are still going to be extreme events, but there probably aren’t going to be any long-term events on a monthly basis, like long cold snaps.

Carver talked about the adjusting of hydro data from 80 historical years to something more synthetic, which will give them the capability to determine if there are hydro events caused by climate change. He said that temperature data is pretty reliable, but wind is more problematic because of the lack of records and models.

Fazio, Carver and Heutte discussed the modeling of the events in the future and the range of uncertainties in the different resources and load variations. The underlying questions are, “do the historical temperature and water records show effects of climate change?” If so, is there a way to “strip out” those effects? Fazio said that the Climate Impacts Group at the University of Washington has done some work on this but he has not seen it.

Potential Changes in Hydroelectric Operation

Fazio stated that he doesn’t anticipate any immediate changes of concern.

Adams asked about the technical committee capturing the friction that exists among the various balancing authorities. Oliver said that the Council should state that they believe that there will not be perfect interactions and that a lack of coordination could raise the LOLP. Brown stated that this topic is perhaps better for the technical committee.

Black reminded the group that the assessment is regional resource adequacy study, not a utility-specific resource adequacy study or a study that measures each subarea’s LOLP. He then discussed some of the details about the modeling and the impacts, or outage risks that could occur depending on the type of analysis results.

Oliver suggested changing the metrics by a certain number instead of changing metrics based on assumptions regarding friction so the Council gets more macro-like results regarding adequacy. Brown said that if the RAAC assumes that friction doesn’t exist, it needs to be noted.

Nordt said that “friction” may not be the right word, and suggested using the term “transactional friction.”

Fazio brought up that the steering committee is scheduled to meet again in February or March 2014, but they could meet sooner. He said that he’ll send the meeting notes to the committee members so they can review them.

Resource Adequacy Advisory Committee Meeting
Steering Committee Meeting

December 6, 2013

Estimating Availability of Imports from California and Desert Southwest

Presenters: John Fazio and Charlie Black, Northwest Power and Conservation Council

Fazio shared that the Council assumed 1,700 on-peak megawatt hours for the winter for the 2017 assessment, as well as 0 on-peak megawatt hours for the summer. The off-peak assumptions for both seasons were 3,000 megawatt hours. He stated that he is working on getting revised data.

Goals for Future Assessment

Black stated that Oregon and California could benefit from having more direct interactions and coordination, as this could help develop an assessment regarding the availability of imports in 2019. Referring to the respective slide, Black said related goals include:

- Developing a framework for a systematic, sound analysis that's continually updated with information
- Forming ongoing relationships and information exchanges with entities in California
- Identifying and assessing uncertainties
- Reliable data sources

Black talked about how some Council staff have already developed professional relationships with entities in California. He added that the Council is pursuing a contract with Energy GPS to aid in obtaining a better estimate of out-of-region market supply..

Fazio stated that the North American Electric Reliability Council (NERC) began a pilot adequacy program 2 years ago. In the pilot program, the hope was to get all NERC sub-regions to assess adequacy in the same way, which is to calculate their sub-region's loss of load hours (LOLH) and expected unserved energy (EUE). NERC has no immediate intention of setting thresholds for those metrics but simply wanted all of its sub-regions to submit their assessments for these 2 metrics. WECC responded by saying that there are no foreseen adequacy problems for the Northwest as the LOLH and EUE are 0 percent through 2016 for all of its sub-regions. Clearly this does not line up with the Council's adequacy assessment of 2.3 hours for the LOLH and about 5,000 megawatt-hours for the EUE for the 2017 operating year..

Report on California Energy Summit Conference

Presenter: Steve Simmons, Northwest Power and Conservation Council

Steve Simmons with the Northwest Power and Conservation Council stated that he was at a conference earlier in the week that examined resource adequacy issues in California. He shared that the main themes included:

Resource Adequacy Advisory Committee Meeting Steering Committee Meeting

December 6, 2013

- Resource adequacy
- Flexible capacity requirements
- Policy goals
- Solar and storage
- The loss of the SONGS plant (around 2,000 megawatts)
- Once-Through Cooling (OTC) retirements (around 8,000 to 10,000 megawatts) by 2020

Resource Adequacy in California

Simmons reported that California is currently in a generation surplus, but has a forecast shortage. The California Public Utilities Commission (CPUC) and Cal ISO (California Independent Sub-Operators), Simmons stated, were concerned about meeting the long-term capacity requirements as it takes six to eight years, at minimum, to develop a gas-fired plant.

Flexible Capacity Requirements

Simmons said that there was talk at the conference about the OTC plants retirements paving the way to bring on more efficient and flexible resources, which may aid in preparation for the impending solar-related “duck curve.”

Simmons noted that he learned that capacity replacement is location-specific, and gave the example of SONGS. He also discussed some of the forecasts created by California entities. Simmons shared that the CPUC has a long-term procurement plan with a flexibility capacity requirement.

Policy Goals

Simmons said that California has an RPS goal of 33 percent by 2020, but that AB32 greenhouse gas-related goals and policies may be a bigger driver. He noted that the state expects the number of renewables to rise after the 2020 deadline. Simmons shared that the California AB32 Cap and Trade is in place to reduce greenhouse gas emissions to 1990 levels by the year 2020, and the state is on target so far.

Solar and Storage

Simmons reported that the CPUC is addressing rate setting, so the net metering will stay in place through 2017. The state has a 50-megawatt storage procurement minimum, which will come online in a few years. Simmons noted that storage technologies are evolving, particularly battery-related technologies. However, the installation of large solar projects will begin to slow in the near future and smaller installations will take their place. Simmons talked about solar failure rates, the integration of solar and storage products, and projects from the generating resources side.

Fazio concluded the meeting at 3:00 P.M.

Resource Adequacy Advisory Committee Meeting
Steering Committee Meeting

December 6, 2013

q:\jf\raac\2013\raac steering committee meeting notes - 6 december 2013.docx