Systems Analysis Advisory Committee

March 27, 2015

Meeting Time: 9:30 a.m. to 1:30 p.m.

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

Facilitator: Ben Kujala, Northwest Power and Conservation Council, SAAC Chair

Note Taker: Kyle Gustafson

Attendees: *On-Site*
John Ollis, Northwest Power and Conservation Council, SAAC Vice-Chair
Tomás Morrissey, Pacific Northwest Utilities Conference Committee
Fred Heutte, Northwest Energy Coalition
Sybil Geiselman, Eugene Water and Electric Board
Tom Chisholm, U.S. Army Corps of Engineers
Dick Adams, Pacific Northwest Utilities Conference Committee
Tom Eckman, Northwest Power and Conservation Council, SAAC Management Officer
Ehud Abadi, Bonneville Power Administration
Jim Litchfield, Litchfield Consulting
Chad Madron, Northwest Power and Conservation Council

Attendees: *Via GoToMeeting*
Brian Dekiep, Northwest Power and Conservation Council
Danielle Walker, Bonneville Power Administration
Dave LeVee, Pwrcast
Elizabeth Osborne, Northwest Power and Conservation Council
Gillian Charles, Northwest Power and Conservation Council
Ken Nichols, EQL Energy
Marty Howard, BMH
Michael Deen, Public Power Council
Michael O'Brien, Renewable Northwest
Michael Schilmoeller, Northwest Power and Conservation Council
Robert Petty, Bonneville Power Administration
Phil Carver, Oregon Department of Energy
Phillip Popoff, Puget Sound Energy
Sima Beitinjaneh, Portland General Electric
Wendy Gerlitz, Northwest Energy Coalition
Zac Yanez, Snohomish PUD
Clint Kalich, Avista

Welcome and Introductions

Presenter: Ben Kujala, Northwest Power and Conservation Council

Ben Kujala began the System Analysis Advisory Committee (SAAC) meeting at 9:30 a.m. The meeting attendees introducing themselves before Kujala reviewed the meeting's agenda and the current SAAC member list in slide 2.

Dave LeVee with Pwrcast commented that he did not see his name on the list.

RPM Dispatch and NPV Calculation Follow-Up

Presenter: Ben Kujala, Northwest Power and Conservation Council

RPM Thermal Dispatch Decision

Kujala reviewed slide 3. He explained how he calculated thermal dispatch.

Kujala reviewed slide 4, "Within Period Variation."

Model Thermal Dispatch Logic

Kujala reviewed slide 5, a screenshot of the model's Web interface. He explained the different variables on the respective chart.

RPM NPV Calculation

Kujala reviewed slide 6. He stated that the market price covers more than just the regional market price in regards to what can be imported and exported.

In response to the question by Jim Litchfield of Litchfield Consulting, Kujala explained that market imports and exports set a boundary on how much you can import or export before a receiving penalty.

Litchfield asked if there is any limit on how much trading is going on between regional parties in regards to the internal market in the Pacific Northwest.

Kujala replied that the model sets up a single dispatch; it doesn't have a sense of an individual utility's position. A discussion about penalties and its definitions followed.

Sybil Geiselman with the Eugene Water and Electric Board asked if the penalty is proportional to what's occurring during a specific period. Kujala answered that in regards to over-generation and load shedding, the penalty is proportional.

On Average Generation Exceeds Loads

Kujala reviewed the graph on slide 7.

Litchfield stated that he thinks the Council should better illustrate what goes into the net present value (NPV) of cost.

Kujala said that he agreed, particularly when it comes to showing the total social benefits.

Kujala, Litchfield, an individual attending via GoToMeeting and Tom Eckman with the Northwest Power and Conservation Council had a conversation about the meaning of social benefits, as well as the cost- and value-related factors that go into determining the NPV.

Ehud Abadi with the Bonneville Power Administration (BPA) asked about the value of conservation and value of generation. Kujala said that they would discuss this topic further, as well as adequacy logic and economic logic, in the upcoming joint Regional Adequacy Advisory Committee (RAAC) meeting.

Tomás Morrissey with the Pacific Northwest Utilities Conference Committee (PNUCC) asked if the load in the chart reflected load before conservation.

Kujala replied that it reflects the "average load over all the various futures," and that he'd have to "dig into the model and take a look."

General Concept
Kujala reviewed slide 8.

Michael Schilmoeller who attended via GoToMeeting commented that the variable costs include imports and exports. He added that the model counts the cost of "your own generation in the region," as well as the "benefit of exports out of the region and the cost of imports into the region at market price."

Zac Yanez with Snohomish PUD asked if the value for a load supply capability (LSC) is the "lower of dispatch costs or market price," since the power is sold to serve loads, not the market.

Kujala replied that the model does not reflect what an LSC, utility or an independent power producer (IPP) would do. He added that the model reflects a "total region benefit, and the system is run using the market price as a way to indicate what the dispatch should be."

Yanez and Kujala discussed the definition of the "levelized value" and its appropriateness. Kujala explained how the model works in regards to the economic and adequacy logic, and stated that they will discuss this topic more in the joint RAAC meeting.

Litchfield stated that he shares Yanez's concern because the model will give advice about the region, "which will do whatever is in its best economic interest… (which) tends to show a consistent overbuilding."

Kujala clarified that "overbuild was not driven by economic interests;" it is driven by adequacy requirements.

Litchfield stated that the Council should be clear regarding the role it's going to play with the model's results because it is giving advice to decision-makers.

Kujala, Eckman and Litchfield discussed the model, its construction and purpose, as well as the Council's advisory role. Kujala said that the model would help others look at the different futures created and evaluate the potential risks.

Fred Heutte with the Northwest Energy Coalition stated that he is not "uncomfortable" with the model because it helps bring in more information, a greater perspective about what the "constraints ought to be," and how much the Council allows the model to vary.

Morrissey and Kujala discussed the market setup within the model and the prices to which it is responding.

Clint Kalich with Avista said that in the regional portfolio model (RPM) around the year 2000, his organization dealt with prices exogenously. He asked how the model deals with overbuild and its impact on the market prices. Kalich pointed out the present model is not representing the marketplace correctly because of overbuild. He said that when he looks at the results of the RPM, he expects that the only reason that overbuilds should occur is because of the adequacy standard. Kalich stated that if this is not the case, there's a flaw in the model.

Kujala responded that the model is now doing a better job in regards to the issues that Kalich brought up in terms of the adequacy standard and overbuild.

An individual attending via GoToMeeting stated that it's important to remember that the model is looking at several different plans. He said that if there is a plan that's consistently overbuilding, it's an expensive plan that's not going to be on the efficient frontier. He added that when systems are overbuilt, markets are depressed and the region can't recover the value or the cost of the resources in question because the units aren't running.

Kujala stated that the current RPM and the previous plan's RPM are different. He said that for adequacy inputs, instead of overbuilding different futures, the model uses policy requirements to meet the Council's adequacy standard, which results in persistent overbuild throughout the entire model. He added that the model, in regards to the efficient frontier, tries to find the best resource strategies that meet the adequacy requirements at the least cost.

Kujala said that in the model, wind is a resource that cannot be dispatched, but gas is a resource that can. He explained how the model deals with the market price for different resources, pointing out that resource dispatch and market price relate to one another.

Abadi commented on carbon dioxide (C02) prices and an accurate representation of risk.

Geiselman asked which advisory committee determined the penalty price.

Kujala stated that the SAAC did.

Geiselman asked if the penalty price is not an important driver of the results.

Kujala answered that it helps avoid penalty prices when it's possible.

Eckman added that it "sends enough of a signal (in the model) for overbuilds to be cheap," in regards to adequacy.

Kalich and Kujala discussed the dispatching of resources within the model.

Kujala reviewed slide 9 and 10.

Perpetuity Formulation

Kujala reviewed slide 11.

In response to Litchfield's question, Kujala explained the discount rates applied and the respective perpetuity formulation.

Kujala reviewed slide 12, "RPM Web Interface.

RPM Conservation Supply Curves and Logic

Presenter: Ben Kujala, Northwest Power and Conservation Council

Updates Since the Sixth Plan

Kujala reviewed slides 13 and 14.

In regards to the concept of program years, Kujala explained that the model has to complete a program year before moving on to the next, regardless of how many 12-month periods passed. He said that this allows for more input-driven modeling.

Kalich commented that instead of allowing the model to turn the program off and on several times, it should allow the program to run, for instance, for two or five years.

Kujala replied that Kalich was not the only person to make this comment, so the model has this type of functionality built into it, but the Council chose not to use it because the inputs didn't produce the elements that it wanted to capture. In the model, ramps drive inputs.

Litchfield asked how the conservation program adjusts in response to the number of bins purchased in a specific period.

Kujala said that model has a smoothing effect that changes by quarter.

Eckman added that smoothing period is user-defined.

In regards to lost opportunity conservation being available based on the program cycle, Kujala stated that the representation is more consistent with a rotating stock.

Kujala reviewed slide 15, "Measure Combination."

Study Supply Data

Kujala explained the graphic in slide 16.

Eckman asked why the negative price in the graphic's chart occurred in the "Price ($/MWh)" column.

Kujala answered that negative prices happen when "there are more social benefits than there are costs to doing that conservation." He then explained the different columns in the chart.

Eckman stated that there are two main reasons for negative costs in the respective bin. First, "There are differed transmission and distribution (T&D) benefits associated with the capacity…" Second, "There are also O&M (operations and maintenance) savings, or measures, that reduce their first costs and negative present value once you account for the O&M savings." He added that it's not a negative first cost, it's a negative lifecycle cost.

Heutte shared a real-world example of negative costs. He stated that the city installed LED street lamps on his street, so it probably won't have to change the bulbs for 20 years.

Eckman said that negative prices occur in the commercial sector with high-efficiency light bulbs.

Kujala pointed out that the graphic represents one input, which isn't necessarily available for purchase. He stated that one needs to combine several different inputs for the study.

Kujala and Eckman explained the different inputs. Kujala stated that T&D benefit is $26 for transmission and "$30-something" dollars for distribution.

Abadi stated that he is having a hard time understanding the distribution aspect of the inputs.

Kujala stated that the inputs came from different advisory committees. He explained that the SAAC's responsibility is to make sure that the different elements in the model get consistent and equal treatment, including generation, PR and conservation.

In response to Kalich's question about generation assets in the model, Kujala stated that the generation asset has costs for interconnecting into the transmission system. He said that it also has, "if it's in the west side on a recip, a benefit for deferring the need for expanding the system."

Kujala addressed Kalich's concern about crediting conservation and what seemed like double counting, stating, "If you build in the east, you don't get the credit, but you don't pay the $26 (for transmission)." The only cost is the interconnection cost. Kujala said that the credit is based on deferring future transmission system expansion. Kujala and Kalich discussed the credits and costs in the model.

Phillip Popoff with Puget Sound Energy commented about the need for a better understanding regarding the costs, credits and transmission areas.

Kujala explained that the SAAC used information gathered from the Generating Resources Advisory Committee (GRAC) regarding transmission areas, recip and combined-cycle turbines, as well as other types of resources.

Popoff stated that the Council's approach is different than his organization's, explaining that it "takes the resource and adds the cost associated with the resource."

Kujala acknowledge that there is a difference between the Council's perspective and a utility's perspective.

Popoff and Kujala discussed transmission types and their locations. Popoff stated that he found it strange that the model doesn't consider combined-cycle plants in the west side for the credit. Kujala said that he would talk to the GRAC about this.

Tom Chisholm with the U.S. Army Corps of Engineers asked how the Council received input from transmission planners.

Kujala replied that he doesn't have many details about this, but he knows that the Council used BPA rates and various studies.

Kujala highlighted that the dollar amounts input are not of concern, but their use is.

Eckman, Kujala and Morrissey discussed the west side recipes and their building in regards to economic purposes and credits.

Kujala reviewed slides 17 to 23.

Example Game Price Smoothing
Kujala explained the graph in slide 24. He stated that it follows the general trend from quarter to quarter, but removes volatility, making a more stable price signal for decision-making purposes.

Compared to Conservation
Kujala reviewed slide 25. He explained that the adder is part of the optimization, which is changed to create the efficient frontier in the different portfolio strategies. He said that it is a decision variable and the "lever" that moves conservation up or down. Kujala stated that the model and user input affect the adder.

Kujala and Eckman explained how the adder works and what considerations go into it.

Ken Nichols with EQL Energy asked what the units and the time periods represent.

Kujala answered, "It's a quarterly price that's smoothed exponentially for energy in dollars per megawatt hour (MWh)."

Kalich asked for the reason for using the adder.

Eckman stated that it is "the least cost for a given level of risk susceptibility."

Kujala added that the market isn't the only influence over the adder.

Kalich, Kujala, Eckman and Abadi discussed how different scenarios and futures influence adders.

Eckman pointed out that adders are not static, which allows the model to derive ranges that provide more insight about supply curves and costs.

LeVee stated that he is concerned about the volatility of price in regards to conservation and generation alternatives meeting demand, as well as the respective dynamics in play.

Kujala replied that the Council is trying to replicate a "long-term purchase decision, not moment-to-moment market decisions." He explained how the model accounts for volatility and uses adders, stating that the market price is not the driving force.

Popoff stated that his organization split the value of conservation into three components in its plan—energy value, capacity value and avoided renewable value. He asked if the Council is reflecting the capacity and avoided renewable values.

Kujala replied that the Council is capturing all the respective values.

Kujala explained the graph in slide 26, "Average Cumulative Conservation."

Into the RPM

Kujala explained how he created the graph in slide 27, which comes from a Web interface. He showed how different features within the graph work.

Geiselman asked where she could find the discussion regarding T&D benefit values.

Eckman replied that the Conservation Resources Advisory Committee (CRAC) discussed this topic during its latest meeting, but established the values at a prior meeting. He said that the CRAC derived the values from the Regional Technical Forum (RTF).

Dick Adams with the Pacific Northwest Utilities Conference Committee commented that the treatment of avoided T&D costs might need modification in one of the parameters because building to meet load growth may be different than building to replace, for example, 7,000 megawatts of existing generation. He said that a future topic of discussion should include how the region treats T&D costs in particular scenarios.

Kujala responded that the Council already created a way to address such scenarios.

Heutte said that he thinks that the model serves as a good starting point to explore different scenarios, like the retirement of coal plants, but it isn't going to provide all the answers.

Adams stated that he thinks the model looks like an energy model driven by economics, not by need, and that it does not address capacity. He asked if this was correct.

Kujala and Adams discussed the term "economics."

Adams stated that the model's approach appeared as if conservation would be acquired solely on comparing its price to the value its sees in the market.

Kujala explained how the adder behaves in the conservation cost formula in slide 25.

Eckman stated that the adder, in an indirect way, captures capital investments for capacity or energy to avoid.

Kujala, Eckman and Abadi discussed the purpose that the adder serves.

Morrissey asked if the Council knows what the adders on the efficient frontier are.

Kujala responded that it does not.

RPM RPS Logic

Presenter: Ben Kujala, Northwest Power and Conservation Council

RPS Logic

Kujala displayed slide 28.

REC Calculations

Kujala reviewed slide 29.

Morrissey asked if a utility from Oregon, for example, could buy a Montana Renewable Energy Certificate (REC).

Kujala replied that it could not, as the Council made assumptions regarding existing resources and how many go to other states.

In response to a question from an individual attending via GoToMeeting, Kujala stated that there is no optimization in regards to the regional portfolio standard's (RPS) requirements, as "every single future has a particular RPS build that's based on meeting the requirements." He explained, "Optimization affects conservation. Conservation is netted off the load, so you don't have to fulfill RPS for conservation." Kujala said that the Council uses the least-cost renewable resources based on the current inputs going into the model, similar to an adequacy measure or constraint. He said that the model would always meet RPS.

RPS Requirement

Kujala explained the graph in slide 30.

In regards to a question about banking, Kujala explained that the model has a starting condition where an individual state begins with a set of resources that may or may not be in the state. In the model, the resources exist and go into the bank annually.

Eckman added that the banking rules are per state.

Kujala and the individual attending via GoToMeeting who asked about banking and RECs discussed the RPS requirements in the model. Kujala explained that they reduced the input-related RPS requirements in Washington state to reflect different phenomena and scenarios; the model won't show an overbuild.

Renewable Resources Allocation

Kujala explained the graph in slide 31. He stated, "…Each gain has a build that is essentially going into the RPS based on the bank's need… The model has a state build when existing resources run out."

REC Bank Balance Example

Kujala explained the graph in slide 32. He pointed out that the build is not very volatile.

Kujala explained the graph in slide 33, "RPS Build Example."

No Renewable Build Example

Kujala explained the graph in slide 34. He said that in some futures, there is no RPS build through 2035.

In response to Morrissey's question, Kujala stated that the graph shows low load growth, high conservation and a combination of other factors. Therefore, even though RPS standards are increasing at certain dates, they do not necessarily need to be filled at those dates, giving the build a lagged effect by the banking logic.

Into the RPM Again…

Kujala explained the graph in slide 35. He accessed the online model interface and showed the RPS section. He talked about the different boxes in the graph and the functions they serve.

In response to Morrissey's question, Kujala stated that the graph reflects the renewables built for the RPS.

Geiselman asked if the graphs capture hydro and Tier 1 exemptions in the Oregon RPS.

Kujala replied that they do not.

Kujala stated that the model interface is similar to the one completed for the Sixth Plan.

Scenario 1A and 1b Inputs and Initial Results
Presenter: Ben Kujala, Northwest Power and Conservation Council

Scenario 1B—Disclaimer

Kujala reviewed slides 36 and 37.

Why Not Negative Conservation Adders

Kujala explained the graph in slide 38. He said that there is no base case. Instead, there is a scenario 1B.

An individual attending via GoToMeeting asked what the efficient frontier in the graph is.

Kujala answered that the bottom left tip of the blue section in the graph, between 75 billion and 100 billion, is the efficient frontier. A conversation between Kujala, Eckman, Litchfield and Abadi about the graph followed.

Kujala reviewed slide 39.

Resource Strategies

Kujala showed slide 40.

Because of time constraints, Kujala was not able to review slides 40 to 59. He stated that he would discuss them at the next SAAC meeting.

Closing

Kujala reviewed future SAAC meeting topics listed on the meeting's agenda page.

The SAAC meeting adjourned at 1:30 p.m.