Northwest Power and Conservation Council
Conservation Resources Advisory Committee
January 30, 2019

Charlie Grist began the meeting at 9:30 am with introductions. He presented the agenda. Ross Holter, Flathead Electric Co-op moved to approve the agenda. Bud Tracy, independent seconded. The agenda was approved.

Grist urged CRAC members to read the minutes from October 2018 before their adoption later in the day.

Primer on Power Planning
Charlie Grist, NWPCC
Grist noted that the Plan has been renamed to the 2021 Power Plan for clarity.

John Morris, NW Energy Efficiency Council and D&R International, asked if there is clarity around the Market Momentum piece on [Slide 7] and if the region will continue to bank those aMW for planning. Grist asked that we note that for later discussion but talked about the importance of conservation that happens outside of programs and NEEA work, using LEDs as example.

Ross Holter, Flathead Electric Co-Op, asked if LED adoption was due to federal standards. Grist replied that it's hard to find causality because of the market's many moving parts. He noted that some analytical work will look at point-to-point market change.

Morris asked why the plan is not called the Eighth Power Plan [Slide 10.] Tina Jayaweera, NWPCC, replied that this name better communicates what the Plan is to the public.

Danielle Walker, BPA, asked if 2021 or 2022 is the effective date as BPA is planning on using the Seventh Plan through 2021. Grist and Jayaweera were not sure. Grist felt it important to link up with BPA on this. Chad Madron, NWPCC, said that there has been discussion on this topic and will be one of the first important decisions required.

Jeff Harris, NEEA, asked about the CRAC's role to help understanding how resources deliver efficiency and capacity as the grid moves to smaller time increments [Slide 11.] Grist said understanding timing, cost and changing flexibility is an important responsibility and will be discussed.

Harris asked if energy efficiency policy positions will be modeled as a scenario. Grist said it will if it happens at a state level, i.e. the RPS in the west or possibly nationally, like the Clean Power Plan.

Elaine Prause, Oregon PUC, questioned if the AURORA model really forecasts hourly avoided capacity [Slide 13.] Grist noted that the model has improved over time but that might be a

stretch. He continued, saying its big value is its ability to look at the whole western market and get a first-stage value of efficiency.

Harris asked if the second bullet under the Forecast Model bubble, “Modifies savings to reflect consumer price response”, is a change from previous practice. Grist explained that in an effort to estimate how much conservation potential is left the Council has used a frozen efficiency forecast and will continue to use it for the 2021 Power Plan.

Chris Johnson, Benton PUD, asked where new construction fuel choice information comes from. Grist pointed to the forecasting work of Massoud Jourabchi, NWPCC.

Harris noted the lack of Non-Energy Benefits on [Slide 15] calling them an increasingly bigger chunk of delivered value. Grist said they appear in the cost section. Harris recalled that the Seventh Plan shifted much of the value to the deferred cost of an equivalent resource and noted that the Regional Technical Forum has struggled with quantifying different NEBs like health and indoor air quality. Grist said this should be pulled out for further discussion. Jayaweera stated that staff is working on a Non-Energy Impacts framework with an eye towards Power Act language and consistency across all resources.

Harris suggested the CRAC could weigh in on various adaptive logic scenarios. Grist agreed and called it important to tee up early in the discussion.

J. Morris asked about formal instruments to evaluate the Seventh Plan in real time. Grist noted the mid-term assessment which is almost completed. Kevin Smit, NWPCC, pointed to other tools like an annual conservation progress report, Adequacy reports, load forecasts and others.

Mohit Chhabra, NRDC, moved back to [Slide 14] and asked how the model picks resources. Grist stated that last time it tests on levelized energy costs and staff found the model suggested building EE for capacity. He noted that the CRAC and SAAC look at that output and advise the Council. Chhabra urged that the decision is made early on as different characteristics could influence output.

Walker asked if the CRAC will discuss T&D deferral. Grist answered yes, calling it an ongoing discussion. Chhabra asked if the methodology presented earlier will be followed. Jayaweera answered yes, saying she plans on taking findings to the Council in March and called for more data.

Adam Shultz, Oregon DOE, asked why [Slide 18] is presented in 2006 dollars. Grist called this an old slide and that the next Plan will use 2016 dollars.

Harris asked if the results on [Slide 29] are so close because they are gated by ramp rates or supply curve availably. Grist theorized that the model was buying up to the end of the supply curve so the cost-effective limit was about $100/MWh because it was available for adequacy

and had a capacity contribution. Harris noted that the average portfolio costs is well below $100/MWh. Grist agreed and thought that higher cost EE will now compete with lower cost DR.

Harris pointed to electrification as a carbon reduction piece not represented on [Slide 31] and wondered if it will be incorporated in the 2021 Plan. Grist stated that that will be up to the Council with CRAC input. Harris stated that T&D deferrals will become T&D additions if electrification is adopted as a strategy.

J. Morris supported discussing electrification. Grist agreed, but cautioned against creating an analytically-overwhelming suite of scenarios. There were head nods of agreement in the room.

Holter noted his and other utilities' plan to roll out a residential demand-based rate to cover capacity constraints. He asked if that approach is being considered. Grist admitted that past plans did not look closely into rate structure mechanisms and perhaps could. Walker stated that, because of Act language, BPA would probably not support the effort. Grist stated that rate structure design causes behavior change that perhaps should be considered. Holter was not sure how widespread the structure change will be. Grist said rate design comes up often.

Chhabra suggested that the Council includes transportation if they study electrification to better understand its impact on the grid.

Harris wondered if AURORA will be updated to align with CAISO changes. Grist stated that the RPM is quarterly and can't turn into a 15-min model, but dynamic pricing should be turned into a value/cost stream for AURORA. Grist said this is a good topic for the SAAC.

Chhabra suggested looking at the impacts of changing temperatures to savings load shapes and suggested using the same temperature change forecast as they use for hydro availability, Demand Forecast and savings so they are aligned. There are lots of head nods in the room. Grist stated that staff is thinking about that already.

BREAK

PROPOSED MEASURE LIST
Distribution Efficiency
Mike Starrett, NWPCC

Distribution Upgrade Measures
Gurvinder Singh, PSE, stated that VAR savings estimates come from an old NEEA study that had a different saturation of incandescent versus LED lights. He noted that LEDs do not respond to voltage reductions and asked how the Plan will address that. Singh then noted concern with the stability of circuits that have the potential to accommodate distributed generation and suggested that they may require more controls which means more costs.

Starrett addressed the first question, pointing to an east coast study that found that technology designed to use constant power self-corrects to draw the same amount of power. He said some things, like line-loss savings, continue to be available and suggested that there are many possible solutions to explore, pointing to a metered study by Idaho Power.

Starrett addressed the second comment agreeing that additional controls may have to be added but suspected that there were not that many circuits with those loads yet. He thought the traditional buckets for system improvements would suffice.

Harris encouraged thinking about the problem in terms of the overall constant power loads on any given feeder. He recalled a past study that looked at putting an abundance of bad-quality CFLs on any given feeder and found that vars went up slightly but there was still more CVR potential because absolute loads went down.

Walker recalled a presentation given to BPA by Tony Koch that talked about the overlap of CVR and DVR. She offered to forward the materials.

Tracy stated that distribution upgrades and savings should be included in the reduction of loss conversation. Starrett stated that no-load loss is included in the pilot study and other study data and will be included in other subsequent studies. He said Idaho's power grid study gives real, on-the-ground data that wraps up all of the effects instead of specific things.

Grist asked if Tracy meant if re-conductering on its own should be considered a measure. Tracy said absolutely. Smit said this is on the major improvements list. Tracy called this really cost effective as there are savings in the amount of energy needed to be generated and to the utility for the long-life of the facility. He suggested putting more emphasis on this point.

Harris said the implementation of CVR programs require knowing line-losses and perhaps upgrading so you can implement the program. Starrett agreed that the upgrades are good and should come before a CVR program.

Harris noted that the share of AMI on the system has changed since the Seventh Plan and suggested looking at how AMI can help with this measure. Starrett added that the original draft study didn't include end-of-line because of the changes in cost brought about by AMI.

Smit called for data, expertise and contact information to be forwarded to Starrett. Holter said he has some information and asked if staff has open access to BPA efficiency programs. Jayaweera said they have access with some constraints.

Grist said most important is finding out how much remains and how fast we can acquire it. He pointed to institutional barriers associated with these measures and said the more on-the-ground data the better.

Residential New Measures

Tina Jayaweera, NWPCC

Holter called some of the red lined measures obscure and hard to pencil out but felt that there might be some data for pipe insulation under water heating. Jayaweera pointed to some NEEA work on sound bars and upcoming federal standards on high-efficiency ceiling fans but noted issues.

Ted Light, EES Consulting, asked if the load profile library gave good HOU data for room ACs. Jayaweera answered that the numbers are from ELCAP. T. Light stated that even a lowball estimate might be useful when looking at capacity contributions. Jayaweera agreed.

Harris asked if there's any thought given to representing future-looking efficiency, for instance products only available in Europe or technology not yet in products. Jayaweera pointed to Act language that limits measures that are "similarly available and reliable", though in the prior plan did consider an emerging tech scenario. She felt it would depend on how close to available the products are.

Harris asked about an integrated, whole house approach for new construction and retrofits, noting that packaging measures together might make them more cost effective than if they were looked at individually. Jayaweera said staff had the same question about commercial measures. Smit called it difficult to tease out and called for advice and help.

Harris said this is a place where external policy frameworks come into play, pointing to WA state's adoption of Net Zero by 2030 codes. He wondered how this plays into a new construction whole house approach. Grist said this will be taken up as we feel our way through the process noting that there will be SWAG (Some Wild Ass Guesses) required.

Bobbie Wilhelm, Idaho Falls Power, said that there might be some load growth associated with these measures. She used portable spas as example, noting that people who might not buy one because of the operating cost might get one if they could run it more efficiently. Grist went back to the definition of EE not being curtailment. Wilhelm agreed, but argued that if the measure gets more people to buy it, it might not be a resource. Jayaweera agreed that it's an interesting point but felt the measure would not make it in because of a lack of data.

Jayaweera noted that Room AC is interesting to Bonnie Watson, BPA and Jessica Mitchell, SnoPUD.

T. Light asked for a definition of imaging technologies. Jayaweera answered printers and scanners. T. Light then asked if EE that adds DR opportunities will be included. Jayaweera answered that staff is thinking deeply about EE/DR synergies and conflicts.

Walker offered years of pipe insulation data. She then asked if any existing measures from the Seventh Plan were taken off the list. Jayaweera answered no but welcomed feedback.

Morris wondered about EVs chargers. Jayaweera answered that everything on the slide [Res. Existing Measures] will be taken forward, including EV supply equipment.

Morris asked Harris if these measures align with NEEA's latest plan. Harris answered that they mostly align with the exception of newer technologies that are right outside the currently available product suite.

Jack Cullen, ETO, asked if modeling for new construction is only widget based or if there are some package options. Jayaweera noted the difficulty in parsing out what would fall into a package and said that at the minimum it will be widget-based and staff can work towards some packages. Culten said ETO moved to packages to better reflect their programs and suggested Council staff consider it. Jayaweera stated that the Council doesn't have programs.

Chhabra asked if Heat Pump Water Heaters is only electric to electric upgrades or if there could be fuel switching as well. Jayaweera stated that Council policy assumes that fuel choice comes first so electric to electric.

Chhabra said the competition, or lack of competition, between DR and EE depends on how the model picks resources and what benefits are valued. Jayaweera agreed.

Grist asked for further information on high efficiency ASHP with backup gas. Jayaweera explained the measure, noting that the fuel choice is still there and the savings would come from going from an inefficient HP to a more efficient HP.

Watson pointed to the variety of thermostats available and asked how the measure is defined. Jayaweera noted that they want to be consistent with the RTF. Jennifer Light, RTF manager, stated that the RTF is working on the measure in March and asked for input there.

Eric Sayre, NorthWestern Energy, referenced a new thermostat that has far more capabilities than a typical connected thermostat and wondered if there would be a breakdown of the category. Jayaweera said the Plan looks for the most cost-effective available potential, but it could be looked at incrementally through tiers.

Harris noted that NEEA put thin, triple-glazing on their list of emerging tech. Smit said they are on the commercial list. Grist wondered if there are potentially big performance gains as volume impacts costs for windows. Harris stated that the two market pain points: availability of super thin glass and the cost of the gas fill are almost solved so there might be a good rational to include this technology in the same way solid state lighting was included in the Seventh Plan.

Harris addressed the intersection between capacity and energy measures noting that products like HPWH could do both, particularly large volume units. He wondered how to model such measures.

Res Outstanding Questions

Chhabra suggested conducting side analysis, get a definition of low income and create a technical potential estimate to better serve low-income populations.

Cullen stated that ETO worked with OHCS (Oregon Housing and Community Services) to develop a conservation potential estimate, discussed details and offered to provide more information.

LUNCH

Commercial New Measures
Kevin Smit, NWPCC

Harris asked if extended motor products are included under Motors/Drives. Smit said that's in Industrial but not here and thanked him for catching the omission. J. Light noted that a fans measure is coming through the RTF and might be a good addition as well.

Grist asked if NEEA has worked on segmenting components. Harris was not aware of the full extent of the work but stated that NEEA has looked at circulation pumps, fans and compressed air.

Johnson speculated that most commercial buildings use gas. Grist said the CBSA identifies quite a bit of electric water heat in Seattle restaurants but will continue to investigate.

Grist expressed his concerns with integrated whole building design. Morris stated that as a program designer and implementer he felt the approach could give insight into ramp rates. He called a discussion about the value the Council gives to program design helpful.

Harris noted that people regularly invest in commercial sector buildings and there are regular replacement cycles. Harris thought an opportunity to influence that cycle should be fair game. He gave the example of giving a present value credit to an envelope measures that allows the eventual downsizing of an HVAC system.

T. Light suggested a way to address whole building design and still stick with a widget approach would be to look at EUI assumptions for different building types and then subtract savings from widgets and compare that to new buildings.

Harris pointed to new data sources for new construction like the 400 Net Zero or Net Zero-ready building EUIs evaluated by the New Building Institute.

Commercial New Measures: HVAC
Harris noted that there's an unglazed solar tempering system for make-up air that might be an interesting, small addition for areas east of the Cascades.

T. Light recalled that roof insulation didn't make it into the Seventh Plan and wondered why it's back in. Smit said it came up in the survey and it might not make it in again.

Philip Kelsven, BPA, offered data on weatherization for different commercial building types based on work from school weatherization. Grist wondered about uptake. J. Light reported that the RTF plans to look at school weatherization and expand it to other building types this year.

Chhabra suggested looking for experts in the RTF's HVAC subcommittee.

Harris asked if Convert to a VAV System is for converting existing rooftops. Smit answered no, it's a large building conversion to VAV. Harris called that a bad idea and asked about a variable speed control for a rooftop unit. Smit said that's ARC on the existing list. Harris asked about choice logic for a measure that might make a structure ineligible for other measures. Smit explained the process for the Seventh Plan and looked to do the same or better for this Plan.

Walker highlighted that the commercial team's priorities are: heat recovery ventilator, dedicated outdoor air systems, and heat pumps.

Watson added that she's transitioning to commercial and is happy to contribute to commercial HVAC. Smit thanked her.

Grist talked about evaporative cooling and one company that created a highly efficient device but was not sure about the product's current availability. Jayaweera relayed that she considered it for residential but was confounded by the fact that its cheaper than a compressor so creating a baseline will be difficult.

Smit asked if anyone has experience with the technology. Singh stated that PSE installed a few in their office buildings and found that they hardly run the compressor at all. He knew the manufacturers and offered to forward the information. Grist said the technology takes more fan energy. Singh agreed but said it takes a lot less compressor and this region is very appropriate for evaporative cooling.

Short Story: Non-res Lighting: Same Measures-Different Costs, Savings, Baselines
Charlie Grist, NWPCC

Proxy Measures for Interior Light [Slide 17]
Harris voiced support for integrated controls and fixtures but balked at dropping the HP fluorescent with Reduced Output as there are still lots of fluorescent product, T-12s and non-reduced wattage T-8s. Grist pushed back saying TLED lamps could replace the measure at reduced cost. Harris agreed but drew attention to the baseline. He then said that Solid State Lighting has a spread of efficacy and suggested breaking them out into tiers.

Walker pointed to issues with calculators, existing conditions and Current Practice baseline true up and wondered if there is a plan. J. Light said there are early replacement measures that

claim from a pre-conditions baseline. Grist said there are no plans to change methodology. J. Light continued, saying that we recognize that programs want to do early replacements so the RTF provides first year savings.

Proxy Measures for Exterior Light [Slide 19]
Morris shared that the DLC announced their horticultural lighting spec which could be helpful. Grist noted that lumens are for humans and plants like high-pressure sodium.

Harris suggested looking at the increment of efficacy in res lighting. He also noted that there are companies that are looking at harvesting data from lighting controls to apply to HVAC. He suggested speaking to Mark Rehley, NEEA for more information.

Estimated Count of Data Centers [Slide 22]
J. Morris was curious about segmenting data centers into classes wondering if typical data storage operations takes less energy than bit coin mining and if mining warrants its own class of data centers. Grist said the data center load is modeled by forecasting the number of calculations, storage, network, and support operations required - and it could again be a SWAG.

T. Light asked if baseline assumptions will be reviewed. Grist answered yes. Harris noted that he's found there could be potential for DR MW reductions in big data centers.

Industrial
Kevin Smit, NWPCC

New Measures
T. Light recalled seeing an Energy Trust measure for wood products facilities and perhaps for coffee roasters.

Whole Plan Measures
Harris pointed to NEEA's work on an energy management assessment tool. He wasn't sure about the size of the database, but suggested that it could be used to create a grid that identifies energy management components.

Walker reported that the BPA industrial team would like these collapsed into two or, even better, one category, noting that they can't use Energy Project Management (Better) with any program.

T. Light stated that Energy Trust has surveys from SEM participants but he doubted that there would be a strong correlation with results. He then agreed with Walker's comment about collapsing the measures from three to one.

Agriculture
Tina Jayaweera, NWPCC

New Measures
Johnson asked for a definition of Variable Rate Irrigation. Harris defined it as better field sensors that can vary the rate of water application on the fly. Harris then offered better data that could further VRI.

Outstanding Questions
Walker asked about the Low Energy Precision Application and the Mobil Drip Irrigation measure. Jayaweera stated that LESA (Low Elevation Spray Application) gets grouped with LEPA. She didn't recall why the Drip Application didn't get in. Harris seconded looking in to Drip pointing to both its limitations and technical potential. J. Light recalled that it was rolled into LESA/LEPA and there might be data.

Sayre asked where indoor ag fits in, noting that its HVAC and water needs resemble small industrial manufacturing. Smit agreed that it should go into the supply curves. Morris enthusiastically agreed, pointing to a connection between HVAC and lighting and the importance of looking at building types as there are grow operations in greenhouses, warehouses and residential structures.

Stock Model Turnover
Tina Jayaweera, NWPCC

Next Steps
Kelsven pointed to technologies, i.e. Heat Pumps, where components die at different rates and stories where people are waiting for tariffs to go away before replacing their washer/dryers. Kelsven thought this behavior might move the median.

Jayaweera pointed to technologies, like televisions, that influenced early replacement purchases but thought they would be hard to predict. Grist called for known equipment turnover measures where the age is not evenly distributed going forward.

Walker asked how this interacts with ramp rates. Jayaweera explained how ramp rates are overlaid on top of turnover.

Harris asked if there is interactivity in the model between this and an early ramp opportunity, i.e. early replacement. Jayaweera state that staff doesn't look at early replacement in the planning process as the savings are not long term. Harris asked about a situation similar to lighting, where there are leftovers. Grist explained further, saying there may be measures where the 1/EUL might not fit, or where the tail goes past the planning period. Harris pointed to T12 lighting and rooftop units as examples of this.

Jayaweera asked if the EUL for rooftops is too short. Harris said it goes back to the distribution assumptions like the Weibull which pushes their life past the Plan's 20-year life. Jayaweera countered that the well-mixed age assumption should fix this and moved to [Weibull versus Gaussian Distribution, second bullet] to illustrate her point.

Harris suggested looking at federal standards as an overlay to find the potential age bubbles.

Chhabra agreed that 1/EUL is good except for perhaps Residential New Construction which don't die out. Jayaweera said insulation is treated like a retrofit which is a way to represent the long measure life.

Walker called these special cases big predictions and wondered where it seemed worth taking the risk. Jayaweera said that EUL has error bounds and introducing another parameter does add risk.

Global Data Needs
T. Light addressed admin costs, saying that getting data relative to measure costs would be complicated and suggested getting $/kWh.

Harris noted that, through diffusion curve work, NEEA found that at some point, around 50%, the costs drop off. He suggested looking at the weighted average over 20-year life and referenced 20-years of CFL data that could be informative.

T. Light stated that utilities offer financing that is not commonly taken up. He wondered if, in residential, it induces a penalty. Jayaweera said the bullet represents when a homeowner puts an improvement on a credit card or home equity loan and not through the utility. T. Light said a utility financing program would be preferred over a credit card and wondered why there was not much uptake.

Harris said he doesn't know of any utility that is capitalizing EE dollars. Holter and Johnson both said they expense them.

Grist moved back to admin costs, noting that there is a less economy of scale which increases the overhead costs on each kWh saved. Jayaweera asked Walker if BPA has done any more work on $/kWh by sector. Walker answered that they add general Bonneville overhead to performance payments and don't track what the utilities spend per measure (only the BPA reimbursement).

Holter said that Flathead feels they got the low-hanging fruit and now that Bonneville is more willing to pay on weatherization measures they will have to add a staffer. Grist agreed that more difficult measures cost more.

Harris called for more differentiation by opportunity type for administrative costs, saying replacement because of burnout or standards have low admin costs while measures like retrofits are perhaps higher than 20%. Cullen agreed, suggesting segmenting by delivery type and sector.

Smit called for more admin cost and line loss data for the next meeting.

Eli Morris, PacificPower, offered to share data generated for their IRP which is more nuanced than 20% across the board. He said they segmented by state and found different results. Sayre added more about admin costs, noting that their costs are higher than 20% except for lighting which is 10%. He noted that rural markets have higher costs. He stated that he could potentially share the data.

Jayaweera ended the meeting at 3:30.

Attendees

Kevin Smit	NWPCC
Tina Jayaweera	NWPCC
Charlie Grist	NWPCC
Mohit Chhabra	NRDC
Ted Light	EES Consulting
Elaine Prause	Oregon PUC
Brandy Neff	PNGC Power
Jack Cullen	ETO
Ross Holter	Flathead Electric Co-Op
Bud Tracy	Independent Consultant for Idaho
Chris Johnson	Benton PUD
Danielle Walker	BPA
Adam Shultz	Oregon DOE
Deborah Reynolds	WA UTC
John Morris	D+R International, NW Energy Efficiency Council
Shani Taha	UCONS, LLC
Jeff Harris	NEEA

Attendees via Webinar

Bobbie Wilhelm	Idaho Falls Power
Bonnie Watson	BPA
Eli Morris	PacifiCorp
Eric Sayre	NorthWestern Energy
Kerry Meade	Smart Buildings Center
Larry Blaufus	Clark PUD
Jessica Mitchell	SnoPud
Robert Hanlon	Aegion
Gurvinder Singh	PSE
Steve Martin	Cascade Energy
Wendy Gerlitz	NW Energy Coalition
Jessica Aiona	BPA