Generating Resources Advisory Committee Meeting

November 11, 2014

Meeting Time:	2:00 PM to 4:00 PM
Meeting Location:	Northwest Power and Conservation Council
Facilitator:	Gillian Charles, NW Power & Conservation Council
Note Taker:	Amy Milshtein
Attendees:	On-site

Franci Brinkman	Black & Veatch
Lisa Larson	HDR, Inc.
Rick Miller	HDR, Inc.
Ryan Stewart	BPA
David Sanna	Corps of Engineers
Nate Sandvig	Northwest Hydroelectric Association
Jed Jorgensen	Energy Trust of Oregon
Ehud Abadi	BPA
Rebecca O'Neil	Oregon Department of Energy
Ginger Gillin	GEI Consultant
Jan Lee	Northwest Hydroelectric Association
Sandra Elverud	PGE
Gillian Charles	Northwest Power and Conservation Council
Steven Simmons	Northwest Power and Conservation Council
Jeff King	J.C. King and Associates

Via Go-To-Meeting

Suzanne Adkins	Eugene Water and Electric Board
Maura Leveroos	
Ryan Hoppe	Tacoma Power
Jeff Kugel	PNGC Power
Van Hare	Pacific States Marine Fisheries Commission
Tom Haymaker	Clark PUD
Rick Sterling	Idaho PUC
Keith Knitter	Grant County PUD
Liz George	Applegate Group
Elizabeth Osborne	NWPCC Washington
Bryan Neff	California Energy Commission
Stefan Brown	PGE
John Harrison	NWPCC
Zac Yanez	Snohomish Co PUD
Brian Dekiep	NWPCC, Montana
Greg Nothstein	WA State Energy Office

Tomas Morrissey	PNUCC
Kevin O'Meara	Public Power Council
Martin Hansen	
Fred Rettenmund	MN Power
Kurt Conger	Northern Wasco Co. PUD
Dan Davis	Army Corps of Engineers
Rick Rozanski	McMinnville
James Gall	Avista
Leann Bleakney	NWPCC, Oregon
Dave Nightingale	WA Utilities & Transportation Commission
Sibyl Geiselman	EWEB
Adam Lewis	
Fred Heutte	NW Energy Coalition
Brad Spangler	Snohomish PUD
Peter Packet	Pacific States Marine Fisheries Commission
Jessica Graber	PGE

Gillian Charles, Northwest Power and Conservation Council, began the meeting by reviewing the agenda. She noted that many regional and national studies released over the last decade show substantial hydropower potential in the northwest. While these numbers grab attention, Charles stated that they might be misleading. She pointed to the most recent study for US DOE by Oak Ridge National Labs which identified 25 gigawatts of hydropower potential in the Pacific Northwest.

She stated the Council's objective was to hire a consultant to review and inventory the studies, characterize parameters to determine potential and draw conclusions. Charles said that the main goal was to determine realistic, reasonable hydropower potential assumptions with a focus on new stream reaches, opportunities at existing non-powered dams and upgrades at existing facilities.

Charles reviewed the four questions the Council asked the consultants:

Do the studies reveal a reasonable physical potential?
Does the potential integrate the Protected Areas?
Is there enough information to apply cost assumptions to technical potential?
If a supply curve cannot be derived, what is the potential next step?

Charles clarified the Council's intent of this report. She noted that the report will be one of many resources for further analysis and not a direct input into the plan. She called attention to the report's need for further analysis.

Charles explained the process of selecting and working with NWHA. She noted that an addendum that includes the US DOE 2014 new stream reach mapping project will be available along with comments from the Bonneville Environmental Foundation. She stated that all information can be found at http://www.nwcouncil.org/energy/grac/hydro.

Charles discussed the next steps which include further discussion and analysis of the materials to determine the possibility of new hydropower supply curves in the Seventh Plan. She stated that she and Peter Paquet, Northwest Power and Conservation Council, will present findings to the Council in December and future GRAC meetings.

Charles thanked the consultants and subcontractors for their work.

Regional Hydropower Potential Scoping Study

Jan Lee, Northwest Hydroelectric Association, gave an overview of NWHA and introduced the report they produced for the scoping study. She drew attendees' attention to the report's appendices, calling it the place to find the "meat" of the report along with the summary of findings.

She noted that appendix A is a table of the 24 reviewed studies while appendix B looks at the studies in more detail. She stated that appendix C is a chart of filed FERC applications along with a survey of utility and non-utility generators.

Report Chapters

Lee discussed the six chapters which are broken down by technology. She turned the presentation over to Lisa Larson, HDR, Inc. to discuss chapter 1: Non-powered dams.

Larson introduced her co-presenter Rick Miller, HDR who has reviewed many of these studies over the years with the national hydropower association. Larson first noted that the studies of non-powered dams were done at a national level which required a re-focus on the northwest.

She explained that the report looked at adding hydro to existing dams that were originally built for other reasons like flood control, recreation, water supply, navigation, and recreation. She noted that one report hypothesized that time and cost could be saved as these dams were already built but stated that that idea needed to be tested.

Larson pointed to the commonality and catalyst of the studies by tracing back to the Energy Policy Act of 2005 and the Memorandum of Agreement collaborated on by the Department of Interior, the US Army Corps of Engineers (USACE), and the US Department of Energy in 2010.

Studies A-1 through A-3 Potential Hydropower Capacity

Larson pointed to the studies listed. She stated that A-1 is Hydropower Resource Assessments at Non Powered USACE Sites. She noted that information from study A-2, An Assessment of Energy Potential at Non-Powered Dams in the US informed study A-1. Finally she noted study A-3, Hydropower Resource Assessment at Existing Reclamation Facilities.

Larson cautioned that when comparing information from these studies to remember that A-1 only looked at USACE facilities, A-2 is a broader DOE study, while A-3 focuses on Bureau of Reclamation studies. She noted that this doesn't mean there is conflicting information in the three reports.

Larson moved to the summary table on potential hydropower capacity for non-powered dams. She stressed that A-2 looked at 54,000 projects across the US and focused on energy potential using stream data from other reports. She told the room that culled Northwest data from those reports garnered 225 MW capacity. Larson stressed that A-2 did not look at the feasibility of building projects. She cautioned that because the study was so large some generalities were assumed, i.e. head and flow, which require further refinement.

She moved to the A-1 study and stated that it looked at A-2's 54,000 projects and drilled down to the 419 USACE facilities across the US which found 223 potentially feasible sites and 12 in the NW. She noted that this is where the 116 MWs come from. She also said that this report goes into more detail than A-2, including feasibility.

She noted that A-3 is a 2011 update from a 2007 report. Larson stated that the report discusses feasibility and uses a spreadsheet model. She stated that the report found 27 megawatts available in the Pacific North West.

Specific Sites in A-1 through A-3

Larson presented the slide which details the name, location, capacity and generation of each project mentioned in the studies. She turned the presentation over to Rick Miller, HDR to discuss the DOE Oak Ridge National Lab report A-1.

Miller stated that the industry put together a QAQC team on behalf of the National Hydropower Association to work with Oak Ridge and validate the report. He noted that a previous report from Idaho National Lab did not make sense from an industry standpoint. He said there was improvement in methodology and rigor in the Oak Ridge report.

He noted that there are over 80,000 dams in the US with only approximately 2500 with power on them. He stated that half of the 80,000 dams are less than 25 feet high. He acknowledged that the bulk of untapped potential is in the Mississippi basin.

Miller stated that from a high level perspective there is confidence in elevation and flow data that could result in generating energy and capacity. He then said there needs to be ground truthing at specific sites to further target potential.

Chapter 2-Conduit/Kinetic

Lee stated that these were projects that didn't require new diversions making them friendly to areas with protected designation. She explained that a conduit exemption project adds hydropower to an existing pipeline and noted that they are of particular interest to irrigation districts because adding power helps justify the expense.

She illustrated the concept of a conduit project with a picture of the Swalley Irrigation District in Bend, OR. She then illustrated the new technology of kinetic projects with photos from Instream Energy and Hydrovolts and noted that the facility is dropped directly into the water.

Specific Sites in B-1 through B-7

Lee identified the projects that had a higher potential than other listings with 92 megawatts capacity and close to 300,000 megawatt hours annually. Miller noted that there is some redundancy and pointed to Bowman Dam being included in power/non power dams as well.

Rebecca O'Neil, Oregon Department of Energy, asked to clarify if the information could be found twice. Lee answered yes but the numbers may not be the same as mentioned earlier. O'Neil asked why kinetic is represented with conduit projects. Lee replied that kinetic doesn't require diversion, are placed in some of the same areas and FERC is grouping them together. O'Neil asked if the kinetic studies address non-pipe or non-canal applications. Lee answered it could and pointed to NY's East River project meaning it could apply to rivers and streams.

Lee moved to the importance of the conduit exemption in Oregon and noted that OR has a statute that allows for existing water rights to be used for power. She also pointed to Oregon's incentives and money for feasibility studies.

Lee then stated that cities are moving forward with conduit exemptions in their pipelines noting that Portland has two projects. She then pointed to study B-1 Canal and Conduit Sites, Central Oregon, an Oak Ridge collaboration that considers the Deschutes River Basin. Lee mentioned that it has a high potential and identified projects that could be put together

B-3 North Unit Irrigation District Sites

She moved to a study that looked at sites in the North Unit Irrigation District and mentioned that two of the sites are currently under development.

B-5 Hydropower Resource Assessments at Existing Reclamation Facilities

Lee discussed B-5 and stated it was from 2012 and updated in 2014. She mentioned that there is good potential in the Pacific North West for adding more capacity; 34 megawatts that could be developed quickly which would bring forward 116,596.77 annual megawatt hours.

B-6 FERC & LOPP Non-Federal Hydroelectric Projects

She noted that the Bureau of Reclamation provided charts of projects that they looked at with developers and in some cases have agreements. Lee mentioned the legislation that allowed the Bureau to do a Lease of Power Privilege (LOPP) which allows a private developer to develop on Federal infrastructure system. She noted that some people have taken advantage of that, including a few pump storage types.

Chapter 3-Hydroelectric Pumped Storage

Miller started by talking about his passion for pumped storage saying it's "not our grandfather's pumped storage." He called it an environmentally benign energy solution. He showed a photo of the Rocky Mountain project in Georgia, the last pumped storage project from 1995. He mentioned the footprint but stated that it had a minimal effect on aquatic species.

Pumped Storage is Proven and Prolific

Miller gave an overview of projects in service today and noted the bulk are in the East and date back to the 1960s, 70s and 80s. He said there are 14 projects in the Western interconnect, 10 of which are related to water supply. He pointed to the Grand Coulee, the Keys Powerhouse and the Banks Lake Project. He noted that the report found some significant constraints in using the Keys Powerhouse like a true pumped storage system.

Pumped Storage Studies Reviewed

Miller reviewed the four studies:

- Assessment of Opportunities for New US Pumped Storage Hydroelectric Plants Using Existing Water Features as Auxiliary Reservoirs
- Technical Analysis of Pumped Storage and Integration with Wind Power in the PNW
- Appraisal Evaluation of Columbia River Mainstem Off-Channel Storage Options
- Hydroelectric Pumped Storage for Enabling Variable Energy Resources with Federal Columbia Power System

Summary of Capacity Identified in Studies C-1 through C-4

Miller discussed projects currently underway in WA and OR. He showed excitement about the John Day Pool Project. He noted it is by big transmission and big wind and has no fisheries issues.

He mentioned the Swan Lake project and noted that projects are not moving forward because of financing. He noted that of the 60-70 projects presently in front of FERC only one in California is under construction.

O'Neil asked if Swan Lake North is the same as Swan Lake. Miller answered it is. She then asked how many of these facilities are on existing reservoirs. Miller answered that the bulk of the IPP sites are greenfield and not damming any main stem. He then stated that Crab Creek, Hawk Creek and Sand Hollow utilize existing lower reservoirs but need new upper reservoirs off Coulee's main stem.

Miller spoke about Gordon Butte in Montana. He said it is similar to the John Day site but far away for east west transmission. O'Neil asked BPA to respond to the Banks Lake project and the way it is captured in this report. Nate Sandvig, Northwest Hydroelectric Association, called it intriguing but from a transmission water and wind perspective the John Day Pool is more interesting.

O'Neil asked if this was an expansion of Keys. Sandvig said no and noted the aforementioned constraints on Keys. Miller pointed to the Banks Lake North project and called it a duplicate of the existing Banks

Lake Keys Powerhouse. He stated that it would use Lake Roosevelt as the lower reservoir, Banks Lake for the upper reservoir and have new, separate water conveyances and an underground powerhouse. He said these would limit all of the constraints on the existing powerhouse.

Miller continued, stating that the Banks Lake South was originally permitted as a Brookfield site. He stated that Banks Lake would serve as the lower reservoir and a new upper reservoir would be constructed.

O'Neil stated that this underscores how challenging it is to come up with a cumulative number when dealing with so many interactive resources.

Ginger Gillin, GEI Consultants, asked what the geographic scope of the study is. Lee answered that it was the Bonneville Power service territory. Lee noted that some of the maps expand beyond that.

Miller noted that he already covered the information on the next two slides: Pumped Storage Projects with FERC Preliminary Permits and Project Storage Projects Under Significant Development. He noted that he left out the Lorella project in Southern Oregon and stated that it and many other projects have been early study stages for many years.

Chapter 4-Tidal & Wave Energy
Lee moved to the next chapter calling tidal and wave energy technology very new with no projects constructed. She showed the three technologies: Pitching Devices, Oscillating Water Columns and Overtopping or Tapered Channel.

Lee then pointed to three studies:

- D-1 Assessment of Energy Production Potential from Tidal Streams in the US
- D-2 Mapping and Assessment of the US Ocean Wave Energy Resource Lee noted that this study show Oregon has the potential for 48 Megawatts of capacity off of the coast while Washington has 683.
- D-3 Assessment and Mapping of the Riverine Hydrokinetic Resource in the Continental US

Chapter 4 – EPRI Estimates
Lee pointed to this data which shows high potential if someone could build the right device.

Chapter 4 – Tidal & Wave Energy
Lee showed two projects that Snohomish PUD worked on: Deception Pass and Admiralty Inlet. She noted that neither is moving forward. She said that there is a third demo project in Oregon that will deal with 150 kW units. Lee stated that FERC has five marine projects in licensing and six more with preliminary permits nationwide.

Chapter 5-General Hydropower Project Assessments

Lee stated that the 2014 US DOE study is the meaty part of the presentation. She mentioned that the Secretary of the Department of Energy has a 2030 goal of doubling hydropower. She stated that this study looks at 4000 stream reaches. Lee then stated maximum hydropower would be developed at the head of the streams. She then stated that the study identified 25,000 megawatts of capacity that could be developed in the NW. She pointed to area 17 on the map as the NW region.

Lee said that the study identified the highest potential in the Lower Snake River area. The next highest potential was in the Columbia Basin and the Deschutes basin is the highest sub region.

Lee compared numbers and stated that the potential in this report is equal to 76% of the NW's existing hydropower. She continued, stating that it represents 118% of the energy that is now provided.

Chapter 5-General Hydropower Project Assessments
Lee stated that the Oak Ridge study was broken down by projects under and over one megawatt. She explained that this is important as we get to the protected areas.

E-1 – PNW New Hydropower Potential
Lee showed the slide that breaks down potential by state noting its importance because it revealed 28,000 megawatts instead of 25,000. She felt boundary rivers may have been counted more than once.

E-1 PNW New Hydropower Potential
Lee revealed a map and stated that the darker colors represent more hydropower capacity.

E-1 Environmental Constraints
Lee discussed the constraints considered and pointed to a map of E-1 Fish Species of Concern, DOE. She explained that the darker areas showed where that concern is most substantial. Lee moved to the NWPCC's Protected Area Map. Lee explained the process of developing the protected areas from the 1980s. She noted that new measures as of October allow a petition process to review projects in exempt areas.

Peter Paquet, Northwest Power and Conservation Council, added that the protected areas are part of both the Council's Fish and Wildlife Program and the Power Plan.

Potential Capacity Associated with NPCC Protected Areas in Region 17
Lee stated that one reason to develop the map overlay was to look at the protected areas and address the DOE study's potential. She discussed the process for creating the map and pie chart. She tells the room that of the 1 MW or larger capacity sites identified by the study, all but 12% lie in the protected areas. That 12% is equal to about 2,000 megawatts remaining potential in the PNW.

Potential Capacity Associated with NPCC Protected Areas in Region 17
Lee pointed to a new pie chart which shows the different protected areas.

Overlay Map
Lee revealed the overlay map which shows all of the reaches and the protected areas. Van Hare, Pacific States Marine Fisheries Commission, described the process of creating the overlay. He called attention to a section of the second pie chart, protected under other State and Federal Actions, and stated that it was current from the 90s but doesn't include areas added since then.

Paquet added that when they did the original analysis they skipped anything in a Federal area because they assumed that they were already in a protected status.

Lee clarified with Hare that the mapping overlays for projects under one megawatt were not available from Oak Ridge so this map doesn't show them and only shows the overlay between projects greater than one megawatt and the protected areas. Hare agreed.

E-2 Locations of Small Hydropower Sites, Idaho National Labs
Lee moved to this study noting it is also Region 17 without Montana. She stated that the focus on this study was small hydro, 2-60 megawatts. Lee said it looked at 231,000 stream reaches and if all were developed it would have 200,000 megawatts of capacity. She noted that this illustrates how variable the studies are.

She noted that study E-3 couldn't be represented in a PowerPoint slide but told the room that it shows the location of 30 different projects in Oregon that could be developed. She said it comes to 30 potential megawatts.

Lee moved to E-4 stating that it looked at water rights but didn't look at specific sites or come up with potential. She mentioned study E-5 and said that it shows large hydropower potential but didn't separate out information on the NW.

Before moving on, Charles went back to the US DOE/Oak Ridge study and clarified that the study identified 25 gigawatt new stream reach potential in the PNW, but that only about 16 gigawatts were over the one megawatt size threshold. Therefore, the mapping overlay analysis that Hare did with Oak Ridge only whittles down the 16 gigawatts to about 2 gigawatts potential that does not fall in the protected areas. There still remains about 9 gigawatts identified from the study that because they are sites that are less than one megawatt, we do not have enough data to analyze whether they fall in the protected areas or not – due to the data we received from Oak Ridge.

Chapter 6 Tools for Assessing Hydropower Potential
Lee stated that the DOE is developing tools to look at technical feasibility. Miller added that the industries expectation is to do that in concert with the environmental requirements.

Lee brought the Committee's attention to F-4, the Virtual Hydropower Prospector from Idaho National Labs. She also commented on other tools.

Chapter 7 Legislative/Rulemaking

Lee said the Council asked them to find rules that were passed that might have an effect on future hydropower development. She mentioned in 2013 two laws were passed. The Regulatory Efficiency Act which she called a great rule that helps projects move forward. She noted the Bureau of Reclamation Small Conduit Hydropower Development and Rural Jobs Act.

Lee moved to EPA 111(d) and explained the rule and mentioned the significant goals for the North West. She felt that the area's hydropower inventory was not taken into account when creating those goals and mentioned a NHPA working group that is looking at it. She further mentioned the Fourth Power Plan which might provide some incentive or pricing mechanism.

Miller stated that the existing non-carbon emitting generation in the NW is not being included as the baseline. He felt that the existing hydro fleet is being excluded and that it doesn't make much sense. Miller notes that the three biggest carbon emitting states in the US have lower action goals.

Charles stated that the Council is working on developing an environmental methodology but is not sure how it will all play out. She noted that 111(d) is not final yet and might not be until after the draft is finalized. Miller interjected with an anecdote about Germany building new coal plants. Lee pointed to the political face of the rule and wonders what the change in congress means for 111(d).

Lee moved to the **Summary of Findings.** She stated that they surveyed utility and non-utility generators and used those numbers for capacity and costs along with numbers from FERC to bring the study into perspective.

Potential Hydropower

Lee stated that for non-powered dams there are 10 projects with 57 MW capacity. Conduit exemptions have 143 projects with 63 MW. Pump storage has three projects for about 2600 MW. She discussed improvements to existing projects which gives 388 MW of energy. Together it looks like 3238 MW new hydropower potential capacity for the region.

Charles brought the discussion back to upgrades, stating that they are happening now. Ehud Abadi, BPA, noted that Bonneville constantly upgrades their equipment but are losing megawatts all the time and therefore they are maintenance upgrades rather than adding capacity. Ryan Stewart, BPA, added that they are turbine replacements that happen when they wear out. He continued saying that sometimes they will replace a turbine before its useful life ends if they can financially justify it. Stewart called attention to the Grand Coulee 19-21 upgrade on the chart stating that it's actually 240 MW not 200 MW. He finished stating that the average efficiency gain from the equipment upgrades is 4%-5% and the BPA is not doing much to actively pursue expansion outside of efficiency improvements. Charles reiterated that it sounds like most of these upgrades are to reclaim the natural degradation to the system and equipment that occur over time.

O'Neil stated that it sounds like these upgrades are in addition to what's in the study. Charles answered that some are overlapping but BPA's efficiency upgrades are not included in the capacity count. Stewart confirmed that the projects on the list are currently underway and are not forward looking.

Lee moved to pricing and costs and where the data came from. She noted that conduit projects appear to have a high price because they include pipelines which add to the cost.

Lee mentioned problems she uncovered. She found that power sales contract pricing can be hard to determine and that projects were stalling because of lack of a market. She noted the basis for pricing is natural gas and if there was a greenhouse gas displacement fee it would speed up hydropower development.

Charles opened the discussion to questions.

Sandra Elverud asked if any of the studies addressed decommissioning existing dams. Lee stated no.

O'Neil asked Lee if she thought of breaking out the study by state instead of by protected areas, noting that Oregon has some tough regulations. Lee said that would require agency work on a state by state basis but mentioned that Oregon has incentives that WA doesn't. She continued, stating that despite its strong regulations OR has incentives so it's a balanced playing field.

Jed Jorgensen, Energy Trust of Oregon, insisted that he can't speak to the other states but the places where we do see developments are supported by incentives. He then clarified that the conduit project in Oregon has other benefits so the costs is not all hydropower.

O'Neil suggested that the protected areas are a data set that can be used as a screen because it's intended to act as a prohibition. She then pointed to the fact that there are many factors that make a site valuable. O'Neil wondered if there could be a next stage study. Jorgensen agreed and suggested a fish passage study. O'Neil agreed and called for any obvious issue that could move the number up or down. She pointed to Charles' earlier statement that the study went from 16 GW to 2000 MW really quickly and wants to find more realistic numbers.

Lee pointed out to O'Neil that those were run of the river projects which accounted for the shift in numbers. Lee continued stating that people in irrigation districts were putting some of their water in stream to garner money for the pipeline. (She used the Deschutes as an example where people were putting up to 20% of their water in stream to help the project move forward.) Finally, Lee stated that even if a project was exempt from the protected areas there are still federal and state requirements that affect reviewing. Charles noted a memo from the Bonneville Environmental Foundation that brought up many of these points.

O'Neil stated that it is easy to focus on the big numbers but feels that there is opportunity on the conduit side. She said the big numbers look shiny but mask true opportunities.

O'Neil then asked about ocean values. She stated she was surprised to see the numbers in this report and feels that it is a completely different issue. She recommended that that information is kept separate until the technology matures. Lee admitted that she doesn't see that technology moving forward in the near future but it is part of the hydropower industry.

Miller told an anecdote about the NYC East River project to illustrate his point that there aren't enough electrons for a business model. O'Neil agreed but stated that ocean energy might be different.

Charles reiterated the GRAC methodology of analyzing resources differently by sorting them into three buckets: available and most likely to be built (gas, wind), resources that are technically and commercially available but might not have as much potential availability in the PNW (biomass, geothermal), and resources that have a longer term potential but with technology that is still being developed (offshore wind, tidal, wave).

Jeff King, J.C. King and Associates, stated that the findings boil down to 2600 MW of pumped storage in three projects and 600 MW of everything else. Of that 600 MW, about 400 are upgrades to existing projects which leaves about 200 MW at the individual project level. He continued, stating that unless there is a big block of projects at existing facilities that have been missed, this is a level that is appropriate for the Council to engage in, with the exception of pumped storage.

King then called pumped storage a completely different animal in terms of what it does for the system. He stated that pumped storage is not to be compared to the kinds of generation Charles listed but to entities that provide capacity services. King stated that to further refine a look a pumped storage you must look at how it competes and compares to other capacity services.

King acknowledged that this report confirms what the Council has been saying about small hydropower for years but adds good cost information. He said it leaves open the question on where you go next in pumped storage which is a question that the Council has looked at for 15 years. He then suggested that additional energy should be focused on competing technologies where less is known.

Charles agreed stating that this value lines up with findings from the Fourth Power Plan, which was the last time the Council assessed in detail the potential of new hydropower in the region.

Dave Nightingale, WA Utilities & Transportation Commission, wondered if the main report from this study on the website. Charles stated that all information – including the final report, appendices, presentations, and memos - is available on the Council website - http://www.nwcouncil.org/energy/grac/hydro/.

Fred Huette, NW Energy Coalition, commended the Council and NWHA on the report. He took exception to the comments on 111(d) and said that speculation on the rule is inappropriate in this arena. He quoted the report as saying "a number of factors and assumptions in the rules appear to drive some

inequity in hydro-rich states." Huette felt that the NW has not been singled out for mistreatment and that the reduction of emission in OR and WA looks large precisely because we have a large hydro base. He acknowledged that there are disagreements about 2012 being chosen as the base year but reiterates that he felt it inappropriate to make a statement of this nature in the report itself.

Jessica Graber, PGE, brought up the difficulties of securing financing but wonders if the owners show interest in operating the facilities themselves if funding was there. Graber asked if the landowners are interested in developing projects themselves or are they open to third party involvement. Lee answered that there is a range of interest, and said that city irrigation districts are interested in controlling the projects but will use a third party financier. She used Portland as an illustration.

Keith Knitter, Grant County PUD, asked if the report looked at new technology improvements in the field of small hydro. Lee said that to some degree the study is technology neutral but the US DOE report does talk about equipment choices. She also pointed to a tool from the Bureau of Reclamation that allows a look at different technologies.

Charles noted that the Council will continue to digest the report and develop next steps for the analysis. She thanked the team for their work and ended the meeting.