

**Northwest Power and Conservation Council
Generating Resources Advisory Committee
May 18, 2017**

Mike Starrett, NPCC, opened the meeting at 10:00, reviewed the agenda and the role of the Generating Resources Advisory Committee (GRAC). He urged GRAC members to attend the NW Demand Response & Energy Storage Summit, September 27-28, 2017.

Seventh Plan ANLYS-16

Dave LeVee, PwrCast, stated that he sees the updated value streams [Slide 6] from a bidding standpoint where lead time is important. Starrett asked him to clarify. LeVee stated that he is in line with Starrett's thinking, clarifying that resources optimize their bidding value in how they provide energy. Starrett agreed that a full dispatch model should pull this information out in the most economical way.

Starrett noted that he summarized PGE's modeling work in the appendix.

Tomas Morrissey, PNUCC, asked if avoided curtailment is part of arbitrage. Starrett answered that PGE also commented on avoided curtailment. Starrett then agreed that negative pricing could be under arbitrage, but pointed to market paradigms, like BPA's, where you pay to curtail as a reason to add a new value stream. Jimmy Lindsay, PGE, pointed to the value of RECs as a reason not to curtail as well.

Starrett suggested leaving avoided curtailment as is with an expanded description and adding a new value stream for curtailment. Ken Dragoon, Flink Energy Consulting, commented that curtailment deserves to stay in. He then said these are generic value streams and the bigger question is who the value stream goes to and for what purpose.

Zac Yanez, Snohomish PUD, agreed with Morrissey and Lindsey that avoiding negative prices is arbitrage but the REC benefit on energy is part of the avoided curtailment. He said it makes sense to separate them. Starrett agreed to take out the concept of a negative price, but stated that BPA would still have to pay a fee.

Starrett then asked the GRAC to address Dragoon's concern about other, non-energy benefits like spilling less water. Yanez stated that the Bonneville fee is just a different flavor of arbitrage.

Starrett pointed to a scenario of spill during times of negative effect calling it a kind of curtailment. He asked if this is picked up by arbitrage. Lindsay pointed to hydrological conditions where inflows exceed maximum generation capability. He said this subset of storage wouldn't have an impact. Starrett asked if negative pricing while spilling for flood control or greatly exceeding energy needs seemed reasonable. Lindsay agreed that storage has a role to play when there is lack of load.

Yanez pointed to a table in the paper and suggested noting that, as a whole, the industry does a good job evaluating peaking energy capacity for all resources including storage but not for things below peak. He suggested this might impact storage differently, making it less attractive.

Starrett agreed that there is a push to evaluate all the benefits of storage, while the same effort is not there for other resources.

LeVee stated that negative prices motivates customers to change their behavior and should be included as an option. Starrett agreed that this should be part of the discussion.

Starrett stated that he would like to keep the Transmission Upgrade Deferral on the table and asked for comments. LeVee agreed that it should stay as it would provide tremendous benefit.

Mitch Green, BPA, asked where the value of a black start-up situation would go. Starrett agreed to add that. Lindsay cautioned the room to think about the credit already attributed to the resources for deferring peaking capacity. Starrett agreed and added that the services are competing and would need to be scaled down if both were included. Dragoon suggested putting black start-up under "Local Outage Mitigation and Recovery." Again, Starrett agreed, saying that using a battery primarily for a black start-up is likely not a justification for economic development of storage.

Morrissey asked to have a center point around the Overnight System Cost [Slide 8]. Starrett said he would try, admitting that it will be challenging as some of the information is not public.

Dragoon asked if power to fuels will not be included. Starrett explained that the technology is not mature enough yet for an IRP. Dragoon countered that this technology is being pursued in parts of the world and could be competitive on a cost per KW basis. Starrett said he is not opposed to adding this and asked for hard numbers.

Phil DeVol, Idaho Power, agreed with Dragoon's point, calling power to fuel a seasonal resource that should be considered.

Yanez pointed to the \$/kWh column saying some would like to see \$/kW. Starrett noted the difficulties of assessing lithium batteries in \$/kW. Yanez agreed, but then stated that he would get more value if we looked this information both ways. Starrett offered to try with some example project costs.

LeVee encouraged Starrett to break down the service of each energy commodity based on lead time and capabilities. Starrett agreed.

Ocean Energy Technologies

Cameron Yourkowski, Renewable NW, stated that he is less interested in cost information and more intrigued by solid performance data. Starrett agreed that this information is also important.

Starrett ended the meeting at 11:00.

Attendees on Site

Mike Starrett	NPCC
Cameron Yourkowski	Renewable NW
Zac Yanez	Snohomish PUD
Tomas Morrissey	PNUCC

Attendees via Webinar

Alaine Ginocchio	Western Interstate Energy Board
Bryan Neff	California Energy commission
Cindy Wright	Seattle City Light
Dave LeVee	PwrCast
Philip DeVol	Idaho Power
Diane Broad	Oregon Dept of Energy
Elizabeth Osborne	NPCC
Erin Erben	EWEB
Frank Brown	BPA
Fred Heutte	NW Energy Coalition
Henry R Tilghman	Tilghman Associates
Elizabeth Hossner	Puget Sound Energy
Jason Busch	Pacific Ocean Energy Trust
Jeff Kugel	PNGC Power
Jimmy Lindsay	PGE
Ken Dragoon	Flink Energy Consulting
Kevin O'Meara	Public Power Council
John Lyons	Avista Corp
Matt Sanders	Oregon Wave
Paul Hoebing	PacifiCorp
Dawn Presler	Snohomish PUC
Jose Restrepo	
Kathi Scanlan	WA-UTC
Jeremy Twitchell	WA-UTC
James Vanden Bos	BPS