Attendees: TAC 5, Tuesday, October 15, 2019 at Avista Headquarters in Spokane, Washington:

Logan Callen, City of Spokane; Darrell Soyars, Avista; Terrence Browne, Avista; Garrett Brown, Avista; Zach Genta, Clenera; Clint Kalich, Avista; Linda Gervais, Avista; Justin Cowley, Clear Water Paper; John Barber, Rockwood Retirement Community; Dave Van Hersett, Customer; Kirsten G. Wilson, WA DES Energy Program; Jennifer Snyder, Washington Utilities and Transportation Commission; Jason Thackston, Avista; Cadie Olsen, City of Spokane; Kathlyn Kinney, Biomethane, LLC; Tom Pardee, Avista; James Gall, Avista; Collins Sprague, Avista; Greg Rahn, Avista; John Lyons, Avista; Rachelle Farnsworth, Idaho Public Utilities Commission; Amy Wheeless, Northwest Energy Coalition; Jim Le Tellier, 350 Spokane; David Howarth, National Grid Ventures; Michael Eldred, Idaho Public Utilities Commission; Barry Kathrens, 350 Spokane.org; and Grant Forsyth, Avista.

Phone Participants:

John Chatburn, Idaho Office of Energy and Mineral Resources; Damon Zentz, City of Spokane; Nancy Esteb, Renewable Energy Coalition; and remaining phone participants did not identify themselves.

These notes follow the progression of the meeting. The notes include summaries of the questions and comments from participants, Avista responses are in *italics*, and significant points raised by presenters that are not shown on the slides are also included.

Introductions, Updates and TAC 4 Recap, John Lyons

No additional notes or commentary.

Energy Imbalance Market Update, Scott Kinney

Dave Van Hersett: What is an organized market? *Will talk about organized markets later in the presentation.*

John Barber: Is this just a bunch of people calling back and forth? *Yes, but there is more electronic communication now.*

Dave Van Hersett: Kind of like the ICP? *Yes, going back quite a ways.*

Kathlyn Kinney: What percentage of electricity do we have to buy? *Depends. Spring, we are a net seller. Summer, we may go to market, usually at the Mid-Columbia trading prices. It changes depending on the company's needs and the market prices.*

Jim Le Tellier: Hydro percentage in mix? *About 50%.*

Dave Van Hersett: Is CAISO by hour? *It's a day ahead, 15 minute and a five minute market. Looking for optimized resources to impact dispatch cost. Readjust resources differently based on economics as we get closer to real time.*

Dave Van Hersett: Who owns CAISO? *A government agency with a board selected by the Governor of California.*

Dave Van Hersett: Easier to construct [new resources]? *Maybe, because it is looking at a bigger footprint.*

Dave Van Hersett: Savings? *Cost savings for customers based on a past operations.*

Dave Van Hersett: I'm struggling with what's the downside since ours is among the lowest cost in the region. Do we go up and others go down? *Will talk about that later, but we expect more revenues and cheaper dispatch.*

Jason Thackston (Slide 7): We do this already outside the day, but not inside the hour Since the 1980s we have been doing this on the hour.

Dave Van Hersett: Saying hour-by-hour, now into the 5 minute market? *Yes, good way of putting it.*

Cadie Olsen: What drove early adopters? *Renewable energy penetration. Lower dispatch (30 - 35%), load following costs, and some by Commissions and economics.*

Jim Le Tellier: Why did PacifiCorp join? *Utah, load pockets in Oregon. Better optimization between both utilities.*

Slide 13: A little bit optimistic numbers based on methodology, but they are indicative.

Dave Van Hersett: Gross revenue for Avista? *$800 to $900 million gross revenue requirement required. This is just the in-hour part.*

Jason Thackson: 3% of power supply expenses.

Jim Le Tellier: Does the entire EIM share a transmission grid? *Yes, participants still own their transmission. They allocate a percentage for market transactions. Allow anything to be used within the hour if not already paid for. Transmission is in effect free for EIM transactions.*

Dave Van Hersett: Will EIM reduce staff? *No, we are actually adding bodies. Technology and models allow us to trade within the hour.*

Slide 15 – It was getting difficult for us to find a trading partner around the summer of 2018. There was not enough market liquidity. All of the utilities around us – Northwestern Energy, BPA, Idaho Power – joined or are joining the EIM.

Jim Le Tellier: Where is Rattlesnake Wind located? *The Othello area, in Washington.*

Scott Kinney: PURPA changes. Recent changes in Washington expanded size qualifying for different costs and from 5 to 15 years. We have seen additional requests for PURPA. Prices are still falling, probably for a period of time as more renewables are added to the system.

Clint Kalich: Energy only. But, if bringing capacity, projects will get more benefit. Capacity over winter nights will be getting even more benefit.

Who do we talk to about PURPA? *Either Clint Kalich or Steve Silkworth.*

Dave Van Hersett: Is there a disadvantage to being in this group? *The large technology commitment is costly.* Do they get to call on our resources? *Only if we voluntarily bid in.*

Jennifer Snyder: How often? *Every five minutes. Hydro flex makes sense every hour.*

Dave Van Hersett: Typically, what is the technology needed for the EIM? *Outage management system, bidding system, and settlement system.*

Dave Van Hersett (slide 17): $6 million net. *No, gross. 8 to 9-year breakeven. Show chart 18. Most utilities actually seeing 3 to 5 times the study benefits.*

Jennifer Snyder: When was the study done? *2017 and updated in 2018; and cost done in 2015 and updated in 2018.*

Dave Van Hersett: If Avista keeps getting more renewables, does this help? *Absolutely, expect about a 35% reduction in costs to integrate renewables. Flex hour hydro allows us to bid in.*

Dave Van Hersett: In the long run, higher base of renewables might be better in the long term. *Yes, Idaho Power is similar to us and we see a similar market potential.*

Jim Le Tellier: Nice to have economic benefits, but many non-economic benefits that they might have even joined for.

Cadie Olsen: In the penultimate slide, how many city people are you interfacing with? Our citizens are our customers with 700 connections plus a generation interconnect. *Touchpoints at generators. Not anticipating city resources being bid into the EIM.*

Jim Le Tellier: As far as interconnection renewables, are they being drawn from other states? Wind from Montana? *Yes, includes renewables from other areas.*

Kirsten Wilson: Any preliminary evaluation of the shutdowns with PG&E? *Some assessment, but minimal from the EIM's perspective. More exposure in California with the only participant.*

Scott Kinney: More opportunity to integrate resources. Possibility depending on size and capability and controls. Costs may exceed benefits.

Jim Le Tellier: As Colstrip goes offline, will there be more gas or renewables? *James will be covering that later today.*

Logan Callen (Slide 18): PSE? *More aggressive air study assumption and not as integrated through BPA.*

Amy Wheeless: As Seattle comes online, will there be more benefit for PSE? *Yes, we would expect it.*

Dave Van Hersett: Does this affect our ability to stand alone? *No, we are required to be resource sufficient to be able to bid in to the EIM.*

Scott Kinney: People vs. algorithms. Dispatch is fully automated for dispatch changing but still have a final human check. This may change over time.

Storage and Ancillary Storage Analysis, Xin Shane

Dave Van Hersett: What is an example of an ancillary service? *Regulation.*

Dave Van Hersett: Can you get all out that you put in? *No, only about 70% round trip efficiency, which is the downfall of this type of storage.*

Clint Kalich (Slide 6): Only about 10% of the 1 MW cap to pull hard off system. Only a small amount of the total can be quickly used.

Barry Kathrens: Is capacity seasonal? *Did not consider it in this study. Engineers say there are many different factors like temperature.*

Rachelle Farnsworth: Is the typical performance for this type of battery to charge and recharge? *Yes, when price is high it is discharging and when low it is charging.*

John Barber: Was Avista's battery shut down? *Yes. It was the first one made by the manufacturer and was shut down for mechanical issues.*

Jason Thackston: The battery had a leak on a customer's premises, so we removed it.

Cadie Olsen: Did you learn anything different from other empirical studies? *Speed affecting overall efficiency, system setting comprehensive operational mod, testing linear model and refining it.*

Kirsten Wilson: Intent was to study quite a few (seven) operating scenarios and how batteries responded. *Different parts worked on different streams.*

David Howarth: When you say one third, is that equivalent to water availability or two thirds hydro? *Capped two units on Noxon Rapids and one unit on Cabinet Gorge – cascading system.*

Jim Le Tellier: Pumping from lower to higher levels? *Yes, that is what we are studying. Two reservoirs with a two way turbine.*

Dave Van Hersett: Two way is pump or generate? *Yes.*

Dave Van Hersett: Could we do that at Noxon Rapids?

Jason Thackston: Not a reservoir at Noxon. Hard when licensing is challenging, not a closed system.

Jim Le Tellier: With the EIM there could be pumped storage in other regions. Some in Montana is already permitted.

Jim Le Tellier: Astronomical starting cost, but a lot more benefit going forward to consider.

Clint Kalich: Some comments for the regulators in the room to consider on slide #12. It is difficult and complicated to do these studies. If we can create ancillary services, the value lies in arbitrage. The left 1/3 of hydro in the portfolio, and then saw the benefits of arbitrage. Most of the value is when we get energy in the system whether owned, PPA, or cheaper to just store renewables.

David Howarth: With the existing hydro flexibility on the system, wondering on a low hydro year how it affects flexibility. *Modestly ancillary benefit in low hydro years.*

Dave Van Hersett: Are we not looking at pumped storage yet? *Next presentation.*

Amy Wheeless: Not that many pumped storage projects in the northwest. *Got to wait until after lunch.*

Preliminary Preferred Resource Strategy, James Gall

Jim Le Tellier: Does Avista have an R&D department? *We keep up with developments and participate in new technologies. Idaho funds some R&D. We dabble, but are not focused on R&D.*

Jason Thackston: University District, Energy Impact Partners Fund investor and Clean Energy Grants.

Scott Kinney (Slide 3): How much could we drop the gap by renewing contracts as they expire, economic competition, and repowering of worn out wind projects?

Matt Nykiel: How are Idaho RECs managed and sold. *RECs are recorded and transferred in WREGIS.*

Jim Le Tellier: The goal doesn't sound real positive. If you have to have new technology, we want to see Avista as a leader.

Jason Thackston: We are working in the western US and using the Clean Energy Grant.

Jennifer Snyder: You are part of NEAA too.

Kathlyn Kinney: Does EIM help? *It helps us manage, but is not a capacity market.*

Scott Kinney: EIM participants have to show how they can meet their own resource needs.

Matt Nykiel (Slide 4): Are there asterisks to Avista's goals [100% clean] that we can read about?

Jason Thackston: The web site has a section. It is correct there is not a lot of detail on it. We need to see improvement on energy storage. 6 pm on a January night is our peak load and battery storage is not there yet. We are still working on it ourselves. Your definition of affordability may be different than mine. Hypothetically, is 15% worth it? Across the river from here, no. And we have to do this in a way that maintains reliability.

Matt Nykiel: Is Avista conducting a survey showing what is affordable?

Barry Kathrens: Is this a thing from the Nadine [Woodward mayoral] debate? *No, difference was between completely 100% renewable versus an aspirational goal. Sometimes the details in politics don't always line up.*

Amy Wheeless (Slide 5): Hydro from BPA, doesn't respond to an RFP? *We can't just assume BPA hydro availability. They have told us an RFP is not how they typically want to interact.*

Jim Le Tellier: BPA power is $90? *Yes, that is what they are required to sell at.*

Fred Huette: Transmission is a separate discussion. BPA hydro, know they have interest in a PGE capacity deal. *Difficulties in how to model it, but not leave an impression that we are not interested in it. Maybe we could model it as northwest capacity.*

Matt Nykiel: What is social cost of carbon cost? *$80 for Washington portion, see the last TAC meeting presentations for more details.*

Rachelle Farnsworth (Slide 6): How will you be excluding additional costs for Idaho? *Like the Social Cost of Carbon. Model solves for a peaker, only Washington has the cost. Then we allocate costs between the two states. Would depend on what we would do without the law. If Idaho needs wind, they pay their part. If not, all of the costs go to Washington. Also assign price of RECs, incremental cost of the resource over market, to transfer from Washington to Idaho.*

Rachelle Farnsworth: Building in costs. Need to keep track of additional costs that should not be attributed to Idaho.

Matt Nykiel: If the decision is made to keep it left open, how would Colstrip get allocated [after 2025]? *Not sure yet, it would be a Rates questions and handled outside of the IRP.*

Rachelle Farnsworth: Just because Washington doesn't take the electrons, there are still remediation costs they are responsible for.

Jennifer Snyder: Treating things as of today until 2025. After that, CETA allows recovery for remediation.

Matt Nykiel: Incremental Idaho costs post 2025.

Jim Le Tellier: On Colstrip, if Westmoreland completely goes under, do the five owners have other coal sources.

Jason Thackston: Six owners, but the air permit doesn't permit new coal. The new coal contract is being finalized.

Slide 11: Red is cost effective, black is not cost effective and orange maybe cost effective.

Amy Wheeless (Slide 11): Is this based on AEG? *Yes. Water heating does – with and without CETA required device. Not sure why yet. Didn't originally include. Added it back two weeks ago and will follow up later.*

Fred Huette: Not CETA, 1444, unless they (Commerce) grants some sort of extension. With a cost per kW-year well under $100/kW-year. What is the name of the consultant? *AEG.*

Jennifer Snyder: For variable peak pricing and time of use, are there plans to have pilots? *Still have to figure that out. Probably about 10 different things that will still have to be sorted out to make these happen.*

Fred Huette (Slide 13): Effectively, Montana wind is a 40% capacity value. *Yes, capacity contribution could be different. All sites are not equal. Also, if it is really cold here and in Montana, they [wind turbines] shut down about 25 degrees below zero. Probability of minus 25 in Montana and really cold here.*

Fred Huette: Really first of utilities putting direct value for Montana winter wind capacity. May consider across Montana. Appreciate the work.

Kathlyn Kinney: Where does renewable natural gas fit in? *Who gets it and at what cost. Levelized cost is $10 - $20 per Dth. You can sell the RIN to drive down the cost, but then the renewableness goes away. Can it clean up gas? Yes. Will it be available? Maybe, but will it go to power, the LDC, or will it even be developed? Not modeled yet, but as its gets closer to 100%, renewable natural gas competes.*

Jim Le Tellier: What is the problem with transmission? *Is it off, transmission rights allocation, and overbuilding wind. We own a portion of the line from Montana and have a BPA contract for the rest.*

David Howarth: What is long duration for storage? *40 hours per week.*

Amy Wheeless (Slide 13): Not too many sites [pumped hydro]? *Probably four to five sites and one with long duration. Will require more time and money to find other viable sites. What's available particularly for open loop?*

Fred Huette (Slide 14): Liquid air. Haven't hear much about it, but love the efficiency. *Yes, sub 70% efficiency, longer duration, long project life, and better if co-located with a thermal plant.*

Kirsten Wilson (Slide 15): Last round of the Clean Energy Grant funding went to Tacoma for Praxair for liquid air storage. *We tried for that funding too.*

Matt Nykiel: What is the risk of a stranded asset, like a gas plant in 2026 or will be required to be offset with RECs. *It looks at all costs. Mandate, no.*

Rachelle Farnsworth: How is the liquid air modeled? *Based on cost projections. Pumped hydro is number 1 for long duration, liquid air is number two for long duration and lithium ion is number 3 when paired with solar for the tax credit plus the value of short term storage.*

Slide 17: Reliability. This is where portfolio could change. Colstrip is two relatively small and significantly reliable units. 14% to 16% planning margin.

Fred Huette (Slide 17): Why does size make an impact on reliability? *Redundancy of two smaller units in the model. How much do we control versus how much we rely on our neighbors. Yes, now; later not so much. This is a regional, not just and Avista issue.*

Jennifer Snyder: Through 2045? *No, 2030 only on the reliability study. We are on the high side because of a single 320 MW resource out of 1,700 MW, the largest utility shaft risk for a single unit in the west.*

Scott Kinney (Slide 18): To clarify, this is system, not just Washington.

Clint Kalich: PURPA requires us to pay for energy and capacity, but we don't pay a clean premium under PURPA. We regard that as a put for the developer.

Matt Nykiel (Slide 24): Getting back to the transmission issue at Colstrip, there are at least five other utilities. Does Avista lose out if they don't make a decision? *We are contractually covered until the late 2020s.*

Preliminary Portfolio Scenario Results, James Gall

No notes to add.