

Wind and Transmission Working Group Summary Notes – March 23rd, 2017

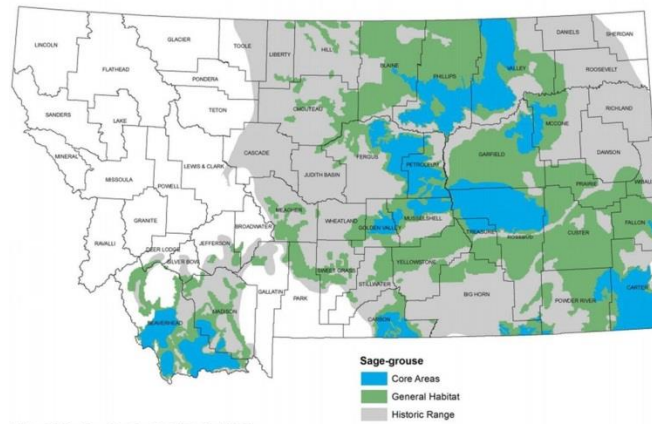
Goals and Purposes, Name of Group, Frequency of Meetings

- Goals and purpose
 - Background – This group was created by the Governor's Energy Blueprint to discuss challenges and opportunities around wind and transmission. The Energy Office at DEQ is open to expanding the purpose and would like to hear from others (stakeholders, other agency personnel, etc.) what they think the purpose and goals of the group should be.
 - Discussion on Goals and Purposes
 - Jeff Fox – The state will see a lot of challenges and changes coming to the electrical system with the retirement of Colstrip 1 & 2 in 2022. The group should keep a broad focus on repurposing the transmission lines (Colstrip). The group shouldn't take positions at any point, but DEQ should facilitate coalitions within in the group to communicate regularly with Governor's Office and legislature.
 - Dustin de Yong – This group's discussion has broadened since Tom Kaiserski originally created the group about 10 years ago. It's forums like this where we have open conversions where people bring things up when they normally would not in front of their industry cohorts. It's important to have a level of compromise in the group. A broader name outside of wind and transmission such as; Generation and Transmission or Montana Energy Working Group to include everyone so they can come to the table and talk about their grievances and find compromises as we move forward with policy.
 - John Fernandez – Around the country you have states talking about jobs and investment and by keeping this group broad it can show the decision makers in a company how many stakeholders and parties interested in doing business in Montana.
 - Kyla Maki – Reflecting on the statements made, the group should remain broad so different interested parties can be brought in to have an open discussion. Should there be a structure to each meeting where there are the same general topics and discussion/speakers on those topics? Should there be updates from utilities at each meeting?
 - Casey Johnston –One thing from NorthWestern's perspective that would be valuable in this type of forum is the education side. There's a lot of misinformation and information that people don't know how to find. NorthWestern Energy's goal is to make sure people understand what is happening, what could happen, and what's available as far as transmission. One of the purposes of this group should be to share information about transmission in Montana. Utilities updates should also happen on a periodic basis, but sometimes things don't change very quickly so sometimes the update will be brief.

- Dustin de Yong – It might also be helpful to develop mission statement between now and the next meeting. We need to make sure this group is an opening and welcoming place for anyone to voice concerns.
 - Chris Pope – There may be several different bodies creating energy policy, most certainly the Governor's office. But there are also entities creating policy on their own including the Public Service Commission (PSC), the Legislature, and private industry. This group in the future should look at forming something more formal to help facilitate the future of energy.
- Name of the group
 - Suggestions from last meeting:
 - Renewable Energy and Transmission Working Group
 - Transmission Working Group
 - Generation and Transmission Working Group
 - Discussion on new name:
 - Keep the name focused on the electrical market so people who come across the group know what it's about
 - Don't specify renewable energy
 - Make sure Montana is in the title
 - Montana Energy Working Group
 - Montana Electrical Markets Working Group
 - Generation and Transmission Working Group
 - **Final outcome:**
 - **Montana Generation and Transmission Working Group**
 - **MT G&T**
- Meeting schedule/frequency of meetings:
 - Discussion:
 - Quarterly as needed, but at least twice a year
 - Originally when Tom Kaiserski ran the meetings, the target was every quarter but that was too frequent. 2-3 meetings a year is realistic.
 - Longer than one day would become too costly with hotel and travel costs
 - **Final outcome:**
 - **2-3 one day meetings per year**
 - **Create a mission statement for the group by next meeting**

Navigating the Sage Grouse Consultation Review – Carolyn Sime Department of Natural Resources and Conservation

- Historic Sage Grouse distribution
 - Historically, Sage Grouse were found in the gray shaded areas in the eastern 2/3 of Montana
 - Montana is one of the strong holds for Sage Grouse with Oregon and Wyoming being other key states
 - The other colored areas are areas with a special focus on conservation



- Blue areas are core areas with the highest conservation efforts
- Green areas are general habitat areas with a less dense Sage Grouse population

- Conservation Concerns
 - Decline in sage brush habitats is a key component in the decline in Sage Grouse
 - Decline in sage brush can be caused by land development, road construction, fire, and invasive species such as cheatgrass
 - Sage Grouse are a trust wildlife species meaning they're maintained by the State of Montana
 - In 2015 Sage Grouse were nearly classified as an endangered species
- Conservation strategy and regulatory mechanisms
 - Executive order 12-2015
 - Took effect January 1st, 2016
 - Stewardship act in 2015
 - Passed in the 2015 legislature
 - Created oversight team
 - Created stewardship fund for grants
 - Private land stewardship
 - Most habitats for Sage Grouse are found on private lands
- Montana's conservation strategy goal:
 - Maintain viable Sage Grouse populations
 - Conserve habitats
 - Maintain management of the species in Montana with local professionals
 - Maintain flexibility to manage land, wildlife, and the economy
- More on Executive Order 12-2015
 - Largely mirrors the state Wyoming
 - Established state program
 - Established the Montana Sage Grouse Oversight Team (MSGOT)
 - Designates key habitat areas for conservation work

- Establishes a process for consultation for those who need a state permit for activities/projects that may interfere with Sage Grouse habitats
 - Any project that has state grant funds requires some sort of state authorization prior to the start of the project
 - Takes a proactive approach to protect the Sage Grouse population from the beginning (design, planning, siting, etc.)
- More on the Greater Sage Grouse Stewardship Act (2015)
 - Established the Stewardship Fund Grant program
 - Fund conservation efforts to benefit Sage Grouse and habitat
 - Create conservation credits to sell (market place – offset impacts)
 - Sets forth that Montana will require mitigation as an offset
 - Address impacts of habitat loss proactively
 - Mitigate and offset impacts in a way that makes up for the loss
 - First try to avoid impacts, then try to minimize impacts, restore or replace what was lost, or compensate for the loss
 - Montana is set up to establish a mitigation marketplace
- Consultation Process
 - Does the Executive Order apply to me?
 - If you're outside of the core and general habitat areas, then the executive order does not apply to you, if you're inside those areas the order does apply
 - If your project requires a state permit, involves a state grant, requires technical assistance, requires state authorization then the order applies
 - Is the activity exempt?
 - The executive order does exempt certain activity such as certain agricultural activity – the kind of work this group does will most likely not be exempt
 - MSGOT
 - All activity runs through MSGOT
 - Approve mitigation plans
 - Have the ability to fine tune the implementation the executive order
- New website launching April 7th, 2017 – website is still in development
 - Website link will remain the same - <https://sagegrouse.mt.gov/>
 - Website will require a login through Epass which sets up a user account
 - New website has the same information as the old, but laid out more simply and allows a simpler process by gathering all necessary information about a project upfront
 - Preliminary information will be generated as you submit information
 - If your project submittal was successful, you will receive a confirmation e-mail with a confirmation number
- What the Sage Grouse Program reviews:
 - Review project proposal:
 - Does the executive order apply?
 - What is the activity?
 - Is it a new surface disturbance or activity?
 - Where and when would the disturbance occur?

- Sage Grouse Program coordinates with all other agencies and the Sage Grouse consultation is designed to be a one stop shop so all of your permitting needs will be taken care of during the review process
- Consultation tips and hits:
 - Pre-meetings are very helpful
 - Provide complete information
 - Allow sufficient time
- Questions:
 - Bryan Rogan – How do we get involved in the stakeholder process?
 - Contact Carolyn Sime to get added to the email distribution list. Next meeting is scheduled for April 4th and 5th in Bozeman. Each meeting has sections devoted to the technical aspects of how to quantify habitat and policy guidance development.
- Links to Handouts
 - [Sage Grouse Conservation Program Brochure](#)
 - [Sage Grouse Conservation Program Quick Facts](#)

2017 Legislative Update – Garrett Martin Department of Environmental Quality

- Transmission and Distribution Bills
 - SB 42 – Revise Major Facility Siting Act (MFSa) to narrow facility review corridor from ½ mile to 500 ft.
 - Trying to help streamline the process of developing transmission and pipelines
 - HB 297 – Right-of-first-refusal given to incumbent electric utility in eastern Montana
 - Passed through the House & Senate, moving to Governor's Office
 - SJ 18 – Resolution in support of advanced transmission lines
 - HR 2 – Resolution encouraging elimination of Montana Intertie Rate and changes to Eastern Intertie rate
 - HB 365 – Creates additional protections for underground utilities
 - SB 357 – Sunsets Clean & Green 19 year, 50% tax abatement that applies to C14 transmission
- Renewable Energy Bills
 - HB 20 – Repeal Renewable Energy Credit (REC) reporting requirements to Dept. of Revenue/Energy and Telecommunications Interim Committee (ETIC)
 - Passed through Legislature
 - SJ 2 – Study RECs and reporting
 - Passed through Legislature & signed by Governor
 - SB 32 – Repeal community renewables energy project (CREP) requirements
 - Passed through Legislature
 - SB 146 – Loosen CREP qualifying requirements
 - Similar to SB 32 and was pulled
 - SB 209 – Require 75% Montana residents employed on renewable energy developments for preferential tax treatments (class 14)
 - Bill died in committee

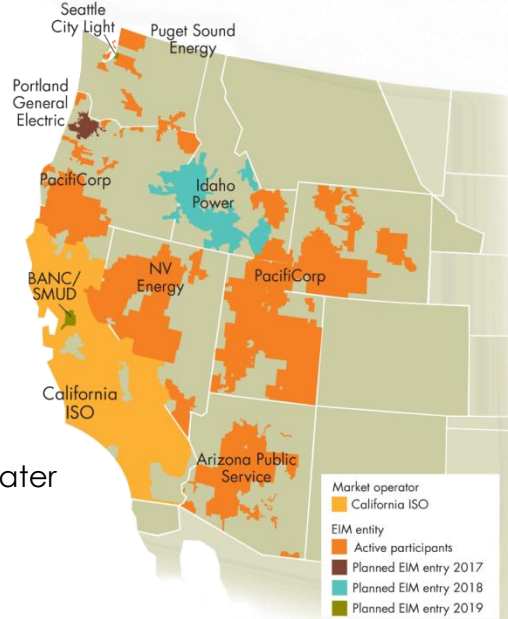
- Bonding
 - HB 216 – Require wind farms 25+ MW to provide a decommissioning plan and bond to DEQ with some exemptions
 - HB 363 – Require wind and solar farms 35+ MW to submit reclamation plans and decommissioning bond to DEQ
 - Died in committee
 - HB 625 – Require remediation bonds for Colstrip units 1 and 2
- Miscellaneous
 - SB 36 – Eliminates electrical licensing exemption for grid-tied generation
 - Passed through Legislature & signed by Governor
 - SB 102 – Allow Public Service Commission (PSC) to set qualifying facility (QF) contracts at no longer than 20 years in length
 - SB 330 – Allow counties to establish Property Assessed Clean Energy (PACE) program
 - SB 210 – Change MT PSC to Public Utility Commission (PUC) with appointed commissioners
 - Died in committee
- Utility regulation
 - HB 475 – Would empower PSC to order a rate case when deemed in the public interest
 - HB 193 – Limits NorthWestern Energy's ability to pass through electricity purchase costs without PSC review
 - HB 189 – Eliminate automatic rate adjustments for taxes and fees
 - Died in committee
 - SB 168 – Shortens PSC review time for procurement plans to 9 months and requires two public meetings on proposed plans
- Colstrip Bills
 - SB 37 - Would grant DEQ commissioning and remediation authority over retiring Colstrip units
 - Died in committee
 - SB 339 – Requires Colstrip unit owners to submit remediation plan to DEQ
 - SB 38 – Impose fees for the retirement of Colstrip units 1 &2
 - SB 338 – Impose decommissioning fees on Colstrip units upon retirement
 - HB 22 – \$130k to intervene in out-of-state proceeding affecting Colstrip
 - HB 60 – Double Wholesale Electric Transmission (WET) Tax to support Colstrip community
 - Died in committee
 - HB 585 – Allows \$10 million low-interest loan to Colstrip owners from coal trust fund
 - SJ 5 – Study impacts of potential coal phase-out
- Net Metering (NM) Access Bills
 - SB 11 – Require biennial PSC review of interconnection standards
 - SB 12 – Require PSC to review metering requirements for NM
 - SB 1 – Require advanced meters for NM customers
 - Died in committee
 - HB 504 – Omnibus pro-net metering bill
 - Died in committee

- HB 34 – Increase cap to 250 kW for government buildings
 - Died in committee
- HB 52 – Grandfather existing net metering customers
 - Died in committee
- SB 201 – Allow for aggregate NM
 - Died in committee
- SB 154 – Limit NM access to renewable energy tax credits and the State Buildings Energy Conservation Program
- SB 277 – Prohibit Alternative Energy Revolving Loan Program from loaning to virtual NM customers
 - Died in committee
- Net Metering Rate Review Bills
 - HB 219 – Would require PSC and NorthWestern Energy to conduct a net metering rate review with next rate case
 - SB 7 – Require PSC to analyze and address NM cost shifts
 - SB 78 – Require PSC to set new NM rate at avoided cost

Western Energy Imbalance Market (EIM) – Travis Kavulla Montana Public Service Commission (PSC)

- What is an energy imbalance market?
 - Real time energy market
 - Imbalance exists between individual utilities and their balancing areas in the U.S.
 - Imbalance occurs when there is a mismatch in the scheduled consumer demand and the actual amount of energy available on the system
 - In the western U.S. each utility controls their own area; there are 37 balancing authorities in the western U.S. and trading between them only happens on hourly schedules
 - Example: If utilities A & B scheduled 100 MW of wind on their perspective systems in a particular hour and utility A only had 90 MW up on their system and utility B had 110 MW. Under the practice now used utility A would increase another energy source while utility B would decrease another energy source unless there was trading possibly within the hour, which is rare. An EIM allows the mismatch to net one another out as long as the energy is deliverable within the timeframe.
- EIM provides an easily scalable extension of real-time market to a broader region
 - Builds on existing market: automated dispatch minimizes costs, facilitates renewables, resolves imbalance, and avoids congestion
 - Situational awareness enhance reliability
 - FERC staff paper documented EIM benefits:
<http://www.caiso.com/Documents/QualitativeAssessment-PotentialReliabilityBenefits-WesternEnergyImbalanceMarket.pdf>
 - Easily scalable, low-cost, low risk, no exit fees, voluntary option for new participants
 - Utilizes reciprocal transmission availability

- Preserves the balancing authority area's autonomy, including compliance, balancing, and reserve obligations
- EIM preserves NorthWestern Energy's (NWE) autonomy
 - NWE maintains control over all transmission and generation assets
 - NWE maintains all compliance obligations and obligations to procure and maintain operating reserves for balancing
- EIM Entity Update
 - Operational as of October 1st, 2016
 - Arizona and Puget Sound
 - Implementation phase
 - Portland General – Fall 2017
 - Idaho Power – Spring 2018
 - Seattle City Light – Spring 2019
 - BANC/SMUD – Spring 2019
 - Entities exploring future entry
 - CENACE – Baja, CA
 - Los Angeles Department of Water & Power
 - Salt River Project
 - NorthWestern Energy



- Questions
 - Rhett Hurless - Entering the EIM market is predicated with seeing financial benefits down the road. How are those passed back to the consumer?
 - Captured in one of two ways. They would either be captured in NorthWestern Energy's baseline of costs that are presented to the PSC whenever the utility files a rate case. They would more likely show up in a power supply tracker, whatever the form of that tracker may be.
 - Chris Pope – With regards to current existing transmission capacity coming in and out of Montana, could you comment on what would we need to build to be fully into the EIM?
 - I first became interested in this topic when looking at the difficulty of building hardware solutions. It was so frustrating it drove me to look at the software and optimization solutions that could be implemented before building larger transmission lines. EIM takes residual unused capacity of the transmission system in real time and opens it up to greater economic use. There is a small amount of firm capacity out of Montana, but it is not subscribed at the moment.
 - Laura Andersen – Can you talk about the different roles and decision points of utilities in Montana and how different stakeholders can stay engaged?
 - The grid in Montana is divided into two. East of Miles City and Fort Peck is part of the eastern interconnection and west of those points is part of the western interconnection. From a developers perspective it is difficult being on the eastern most frontier of the

western interconnection and the western most frontier of the eastern interconnect. In the west there have been a series of conversations going on for 20 years about trying to stitch together a more efficient liquid wholesale market for electricity supply. Each of these discussions have fallen apart for various reasons, but primarily due to concerns of public power entities in Washington being regulated by the Federal Energy Regulatory Commission and greater exposure to price risk since their own supply of power from BPA is at so low of a price now. When it was merely an issue of dispatching gas plant and coal plants to meet variable load the value proposition was one thing. Now we have load that goes up and down over the course of a day and we also have electric generating resources in the form of wind and solar that we don't control. Now there are two big variables on the power supply system and that has increased the attractiveness of knitting together a more efficient market.

How do you follow this? For Montana, NorthWestern Energy will begin its next round of electric resource planning, so people who want to follow EIM developments can do it there. People can also follow the Regional Issues Forum for EIM and they have 2 meetings per year to discuss current issues in market design. On the other side, Montana-Dakota Utilities are already a full member of an ISO and it has allowed them to plan for their customer's need at the point of the system wide peak.

- Kyla Maki – On decision points and oversights of the PSC, you mentioned approval for cost of market entry into the EIM. Are there other oversight rules that the PSC plays in the EIM once a utility joins?
 - Yes there is. The body of state regulators is a central feature of EIM governance. One of the difficulties of using the California ISO as a market operator is that the people of their state legislature regard them as a quasi-state agency. They're actually a 501C organization that is regulated by FERC and their board of directors is appointed by the Governor of California and confirmed by the Senate. Most people do not want California running their state's energy policy. Part of the design of the EIM was to make the market rules subject to the decision of an independently nominated board of directors and to then have their decisions checked and balanced by a body of state regulators from the entire footprint of the EIM. Unless the EIM board approves market design rules they are not approvable by the California ISO board. There is a real system of checks and balances in the governance of EIM.

Panel – Energy Storage Opportunities in Montana

- Facilitator – Laura Andersen, Department of Environmental Quality
- Panel Members:
 - John Carmody, NorthWestern Energy
 - John Fernandes, Invenergy
 - Rhett Hurless, Absaroka Energy
- Panel Introductions:
 - John Carmody
 - One of the ways NorthWestern Energy is looking at storage is from a reliability stand point. How do we use technology such as batteries, solar, etc. in areas where reliability isn't where we would like it to be?
 - About a year and a half ago NWE kicked off a pilot project at Beck Hill which is about a mile from Garrison Junction. NWE looked at an area with about 17 customers that were having outages and examined their load profile and developed a battery bank with about four hours of storage. When this area faces an outage, it is isolated from the system and the battery bank kicks in to serve the customers until the system is back up.
 - NWE is not only looking at storage, but looking at the appropriate size for the batteries. In the future NWE is looking to expand and use batteries for backup for even larger communities.
 - The second aspect is looking at how the batteries providing backup are supporting the grid.
 - **John Bushnell, NorthWestern Energy** – NWE has a request for proposal (RFP) for flexible capacity resources. Within the portfolio of resources that are eligible to bid includes storage which would encompass wind with storage, solar with storage, and storage solutions. While NWE does not have experience modeling storage Ascend Analytics does and the independent evaluator running the RFP does have experience running and conducting storage RFPs.
 - John Fernandes
 - Invenergy is a large developer IPP with wind, solar, natural gas, and energy storage with close to triple digit MW storage.
 - Storage development history and what can be done in Montana -
 - Early interest in energy storage was on the east coast in the organized markets. The nice thing about a true wholesale market is all of the services have a defined market price. With that defined market price it is easy for a developer to find the pricing information without having to go through a load serving entity or transmission distribution operator.
 - Battery storage can carry up to a 20 year contract. Additional batteries may be added because they do degrade overtime, and components may have to be replaced, but they can be a long term storage solution.
 - When looking at cost, keep in mind there are few instances where a storage plant will be built solely for storage. These plants can also

act as traditional transmission and distribution infrastructure as well as a possible supply resource.

- Rhett Hurless
 - Absaroka Energy is developing the Gordon Butte Pumped Storage Hydro Project – for a briefing document, click [here](#). The project will capture energy produced on the grid at night and store it for use during the day at peak usage times.
 - There are approximately 514 MW of wind in NorthWestern's energy mix, but because it doesn't occur at the time NWE needs the power the capacity benefit to the system is only about 3.4%. There is an opportunity for storage there as well.
 - Storage is only one thing a project like the Gordon Butte project can do. There are other ancillary services provided with this type of storage project.
 - Another aspect of having storage on a system is looking at how to utilize transmission lines. A property loaded transmission line lasts longer and has fewer losses in transmitting energy. It is difficult to put a new transmission lines on a system, so it's important to look at how to optimize the current lines.
 - Storage has a lot of different faces and has many different values. As NWE looks to the future, it is a changing horizon with a potential energy imbalance market. Having facilities with the tools to adapt to changing energy markets is something worth looking into. There is a great future for storage in Montana.
- Questions
 - Gary Forrester to NWE – What are your projected costs for battery storage vs. what you can buy power for?
 - John Bushnell – Cannot recall what was included in the 2015 plan when NWE looked into batteries. At that time, they did not appear to be cost effective. The RFP is open to batteries, but until the RFP is conducted NWE won't know what bids will be received. Prices continue to drop in battery storage.
 - John Carmody - Additionally, on a rural level, what are you asking the battery to do? There are different responses batteries can give from a flow battery to lithium. You have to look at the application you're using the battery for and that dictates price. NWE's needs are simple, working as a backup so costs are low.
 - Jeff Fox to NWE – What technology have you launched at Beck's Hill and is there any difference in the technology of the batteries there?
 - John Carmody – The Beck Hill project uses alkaline batteries because it is a bio project and the life of the project is 5-7 years. The technology used is basic inverters, but NWE has controls that are working with the inverters for monitoring.
 - Chris Pope to Rhett Hurless - Is an energy imbalance market a competitor for a storage project, or does it add opportunity for storage?
 - Rhett – It does provide an opportunity. Can we take full advantage of that opportunity? That is unknown. If there is inexpensive energy on that market, that will push back upstream. Doing that will

impact upstream markets and provide an opportunity to recharge batteries or in Absaroka's case the pumped storage.

- John Fernandes – It works in the other direction as well. There are amazing resources in Montana and the reason developers aren't flooding the state with development is because at the moment there isn't a lot of places to store the energy produced. Storage enables developers to reach markets outside of Montana.
- Laura Andersen to Panel - A number of states have adopted storage requirements similar to a renewable portfolio standard (RPS). What do you think about the states using the requirements? What do you think it would mean for the future of Montana if the state pursued storage requirements?
 - John Fernandes – Developers like procurement mandates because it creates an automatic interested audience in services. When looking at states using storage requirements correctly, it's not the state telling utilities, "You have to go buy storage". That is risky for rate payers and the utility. It does create a situation where companies who propose projects know what they are doing. Access to data is a must to model a project, and it doesn't come at the expense of security or customer privacy. Without access to a wholesale market, granular system data is needed to model a project. With data a developer can go to a utility with solutions and if economical, the project can move forward.
- David LeMieux – Question on price points, what is a valid multiplier from base retail/wholesale to the value of stored energy? 1x, 2x, 3x, etc.?
 - John Fernandez – Cannot answer at this time, will get back to DEQ at a later date.
- Jeff Fox - Are there any policies that you can think of, or have seen that can allow a state to promote energy storage for regional markets to increase its position in terms of exports?
 - Rhett Hurless – There was an interesting bit of legislation in Washington State looking at future procurement by the utilities to cover additional load. That legislation looked at using distributed energy resources (DER) and sustainable energy going forward. New additions to cover additional load would come from these two sources exclusively. The hearings on that piece of legislation lead the resident utilities to come forward and say they have to plan years ahead to calculate load will be how to cover that load, and what the asset mixture looks like to provide secure electricity to consumers. With the reasoning brought forward by utilities, that piece of legislation failed at its first pass. Communities are looking at this kind of legislation as a potential solution. Does this kind of policy drive asset choices for the future, or does that determine how utilities must operate in the future?
 - John Fernandes – In terms of exporting value from Montana elsewhere, it is important that there are no barriers leaving the state. Make sure Montana resources can reach into other renewable portfolio standard (RPS) markets.

- Jeff Fox – Because storage offers such a multifaceted stream to utilities, in the procurement process is there a fundamental difference in the RFPs for storage and what are those differences?
 - John Fernandes – The one big roadblock right now is being able to cross asset classes with a single storage plant. Whether you're talking to utilities or an ISO/RTO, when storage is used for peaking capacity or ancillary services, you're speaking in market terms. When storage is used for transmission and distribution, you're speaking more in terms of system operation and planning. So far it has been difficult to get both applied in a single storage plant. FERC recently issued a policy statement saying storage at the wholesale level can get fixed cost recovery as transmission, and revenues can be collected where services are available.
- Laura Andersen – What are the basic difference between chemical storage and mechanical/physical storage in terms of response time? Which would you prefer to see in service first?
 - John Carmody –NWE is looking at super capacitors because they have the ability for instantaneous response.
 - Rhett Hurless – One thing in Absaroka's facility is a ternary configuration where one piece goes in one direction all the time. The facility can generate or pump and because it's the same direction the time between stitching from one mode to the next is seconds rather than 30+minutes. Equipment choices to fit problems are a big part of how you look at storage.
- Dustin de Yong – On the utility side, is the question of what to do with dead batteries entering the conversation?
 - John Fernandes – Absolutely, second life is coming into the conversation. Second life for vehicles batteries is good for grid applications. It can be difficult to estimate what kind of life is left in car batteries because you cannot determine how the driver drove the car, it is less technical concerns and more contracting concerns that may be the holdup. As for what happens to the batteries after the grid, there are global companies interested in them to take them apart to recycle, resell, and reuse the individual components.
- Chris Pope – There was mention earlier of a substation that was an avoided cost in Brooklyn, with the storage being the bridge technology to get past that. With those avoided costs, the substation was valued at 1 billion dollars, which goes a fairly long way to address some of the costs inherited while building storage. Could you comment on that?
 - John Fernandes – The substation upgrade project cost 1 billion dollars. In this instance instead of a stack of services in a single storage plant, storage was part of a stack of solutions for the upgrade deferral. It is a simple arbitrage model that justified the cost portion of the storage component. The peak usage in Brooklyn, NY is approximately 11pm. The battery is charging during the early hours of the morning during low peak times and the charge is being used during the evening peak. The owners of the

project say it is deferring a substation, it could also be said it is deferring an additional peaker being built somewhere. A storage plant isn't necessarily worth 1 billion dollars, but this one was part of a solution.

- John Carmody– What we look at with those is can you bring it in and postpone it? 1 billion dollars time value money is pretty good, so you look at the traditional way of fixing the problem. There's a big price difference between Brooklyn and Montana as batteries are becoming more of an option. NWE looks at whether it's better to build a second transmission line or use technology that's available. As the technology and opportunity advances for utilities to use storage from a grid operations stand point is something NWE is looking into. The great thing about storage on a smaller scale is that it can be picked up and moved to another problem area.

Utility Updates (Transmission, Interconnection, Supply Procurement, etc.)

- Casey Johnston, NorthWestern Energy
 - From a grid operations perspective, there are certain queues people are allowed to enter; generation interconnection queue and the transmission reservations queue. Right now in the generation interconnection queue there are approximately 3,350 MW of generation. This 3,350 MW is a mixture of solar, wind and pumped storage. Being in this queue is the first step for the generator or developer to come into the NWE system. Once they enter NWE launches a study to determine what it would take to get the project added to the transmission system.
 - After the generation interconnection queue, the next step for NWE is to look at who the developer's customers will be. NWE looks at the customer potential with a transmission service request. There are two types of transmission service requests –
 - The first type is a request for a network service which means the potential developer will supply a network load on the system. A network customer using the NWE system would designate a resource and NWE would study that designation.
 - The second transmission service request is called point-to-point. This means the developer would be moving from a point of receipt on the NWE system to a point of delivery somewhere else on the system to move to another transmission system. In the point-to-point queue right now there is 7 MW in transmission requests to move out of Montana. The available capacity is about 1000 MW total on NWE's major paths that intertie with another balancing authority.
 - When looking at Montana to the northwest pathway which runs into Bonneville and Avista territory, there is about 455 MW. All capacity numbers, tariffs, and steps to get into the queues are available on NWE's Oasis site - <http://www.oasis.oati.com/NWMT/index.html>

- Mark Reller, Bonneville Power Administration
 - Bonneville's 2016 cluster study
 - In addition to the bottle neck happening getting power west of Garrison, there is another constraint on BPA's system called the south of Allston constraint which is a cut plane between Seattle and Portland. The plan of service process has been delayed and has been extended until May 31st, 2017.
 - The I-5 Corridor Reinforcement project has been identified as a way to resolve the south of Allston constraint. Unfortunately, the I-5 corridor is a large and expensive project. It consists of an 80 mile new build between Portland and Seattle along I-5. 720+ million dollar project to complete. The environmental impact statement is completed, but BPA is looking at other solutions.
 - Oversupply
 - BPA has more resources on the system than load to consume it. For perspective, in one week BPA's hydro systems produced anywhere from 11,000 MW – 14,000 MW. During the same week wind produced up to 4,000 MW, and thermal produced 1,500 MW – 2,000 MW. Together the combined range was 13,000 – 20,000 MW generated capacity. There was 2-3 times the amount of load on the system than load to consume it.
 - To combat oversupply BPA has to spill water out of the damn, but can only do that to a certain point. Also can market the power and sell to other utilities. And finally, generation displacement.
 - Finances
 - BPA has a revenue shortfall. During the last rate case BPA missed the mark on pricing and scale/size. BPA is implementing all costs savings available. The last resort is using the cost recover adjustment clause (CRAC) which allows rate increase outside of the rate period.
 - Court ordered environmental impact statement (EIS) on the operation of the Columbia River system. All 14 dams will be covered. The last EIS was done in the late 80s. The scoping has been done, and public comment has been received. Currently developing memorandums of understanding with cooperating agencies including Montana Fish, Wildlife, and Parks and Lake County. The next step is to get alternatives on the table and out for comments. Final environmental impact statement will hopefully be release sometime in 2020.
- Jeff Blend, proxy for Darcy Neigum, Montana-Dakota Utilities
 - Electric transmission has been developed in recent years to support growth in the Bakken Region in Eastern Montana and Western North Dakota.
 - This new electric transmission is now being used to support the development of additional new generation including natural gas and wind.
 - Wind is competitive with tax incentives with other forms of generation but still relies on fossil fuels when the wind doesn't blow.

- Solar is higher cost, but matches better to utilities summer peak loads.
 - Federal production tax credit (PTC) for wind is schedule to phase out for new projects which begin construction before the end of 2019.
 - The Midcontinent ISO (MISO), which Montana-Dakota Utilities is a member of, continues to make changes that impact future wind and electric transmission developments:
 - Generator interconnection queue reforms
 - Streamlining interconnection process
 - Added additional milestone payments and commitments to generators with the Intent to minimize the impacts of restudies caused by generator projects which sit in the queue or have interconnection agreements that never get built.
 - Electric transmission developments
 - Reviewing cost allocation of new transmission projects to ensure the right parties are paying for new transmission additions
 - FERC Order 1000 requires greater transmission studies across neighboring transmission owner seams which are prevalent in the area (WECC, MISO, and SPP) and competitive bidding of certain new products. It is left to be seen if Order 1000 will incentivize any new electric transmission projects in the area.
 - MISO is looking to conduct a new transmission overlay study which would support the future electric grid to account for:
 - Coal-plant retirements
 - Additional renewable resources
 - Additional natural gas fired resources
 - Storage device technologies
 - Montana-Dakota Utilities is not building new large scale transmission facilities into Eastern Montana and Western North Dakota. MDU efforts continue to be around more local transmission servicing projects.
 - Montana-Dakota is in the process of constructing a new 345kV transmission line from Ellendale, ND to Millbank, SD as part of a MISO multi-value project designation which is scheduled to be in service in 2019.
 - Montana-Dakota is going to be rebuilding a local area transmission line between Glendive and Baker, Montana over the next two years to improve system reliability in the area and replace aging facilities.
 - Montana-Dakota signed a power purchase agreement at the end of 2016 to add an additional 48 MW of wind generation at the Thunder Spirit Wind project located near Hettinger, North Dakota which will increase Montana-Dakota generation from renewable sources to 25 percent of

customer energy needs. This generation will be used to displace energy purchases from the electric market.

- Questions
 - Chris Pope to Mark Reller – You mentioned the shortfall that is both over production and under demand, can you comment on what soft demand aspect of that is? Is it efficiency coming on the grid or something else?
 - Mark Reller – In general yes, energy efficiency does play a role. BPA has done very well in the region with energy efficiency. Yes, additional renewable resources have been an issue. Yes, behind the grid meter resources have made a difference. Oversupply has been an issue with hydro off and on long before wind and other renewables were on the system. The issue has been around, but now it is more frequent. The Gorge wind tends to be in the spring when there is a lot of hydro on the system while Montana wind tends to peak in other times of the year when hydro is down. Resources that have been added have contributed to the magnitude and frequency of the oversupply problem.
 - Kyla Maki to Mark Reller – Speaking of the oversupply issue, do you see storage helping manage some of those issues or is there just too much supply at one time to think about using storage?
 - Reller – There is just too much at one time. When you look at what's going on right now on the system, BPA has the largest energy storage system in the Northwest. It is filled in the spring and is used all winter long. There has been a huge jump in the runoff forecast so room had to be made in storage capacity. There is 4-5 thousand MW of overproduction right now, so it's difficult to envision how to store that amount of power.