MINUTES

Technical Advisory Committee on Grid Modernization

September 16, 2016

The Technical Advisory Committee on Grid Modernization held a public meeting on September 16, 2016, beginning at 9:00A.M. at the following location:

CARSON CITY
Public Utility Commission of Nevada, Conference Room
1150 E. William Street
Carson City, Nevada 89701-3109

The meeting was also available via videoconference at:

LAS VEGAS
Public Utility Commission Of Nevada, Conference Room
9075 W. Diablo Drive, Suite 250
Las Vegas, NV 89148

1. Call to order and Roll Call: The meeting was called to order at 9:05 AM by Chairwoman Starla Lacy. The agenda item was opened up for roll call and a quorum was confirmed.

The following Committee Members were present:

Committee Members	**Committee Members Absent**
Starla Lacy, Chair (Las Vegas) – NV Energy	
Rebecca Wagner, Member – Wagner Strategies	None absent
Shahzad Lateef, Member (Las Vegas)- NV Energy	
John Candelaria, Member (Las Vegas)- PUCN	
Chris Tomchuk, Member (Las Vegas) – Valley Electric Assoc.	
Hank James, Member (Las Vegas)- NV Rural Electric Assoc.	

Members of Public in attendance

Tom Dudas
JoAnnPrevetti

2. Public Comments and Discussion

Chairwoman Starla Lacy opens and asked for any public comments. No members of the public in Las Vegas at this time. No public comment in Carson City.

3. Approval Minutes From Previous Meeting

Chairwoman calls for prior minutes approvals of edits. It was confirmed that the previous joint meeting minutes had already been approved, and from a procedural standpoint, the committee defers for approval.

4. Teleconference Presentation: Snohomish Public Utility District

While awaiting Mr. Gibson to call in to speak, the article (provided in notices and agenda on website) Utility Dive, Washington Commits $12.6M to Grid Modernization Effort is discussed. This article is related to grants funding projects proposed by the Snohomish County Public Utility District. The project allows various energy sources to be shared for multiple purposes including system efficiency and grid resiliency.

Scott Gibson calls in to provide presentation. Refer to article provided: Utility Dive, Washington Commits $12.6M to Grid Modernization Effort.

Mr. Gibson discusses the background of Snohomish County Public Utility District. Snohomish County is located just north of Seattle, Washington, and has a population of approximately 700,000 residents. Some large customers also include Amazon and Microsoft. They are mostly a distribution company. Approximately 80% of their energy comes from other resources and they only generate approximately 20%.

Their renewal standard portfolio is to reach 15% by the year 2020. They are currently at approximately 9%. The goals set forth ensure that all future growth be met with conservation and renewable energy resources. In trying to comply with the renewable portfolio standards, they are looking at hydro, wind and solar and these sources are driving the need for energy storage. Chemical batteries were considered the best solution.

There had been no standards set in place to connect batteries into the systems and control multiple systems together. How to communicate and connect modular energy storage from an architectural standpoint would allow for different battery types and power conversion systems to perform together. For example, you can put in a small system with a specific type of battery and power converter and bring in on the row, a completely different type ofbattery and they all speak the same language for connectability.

Several utilities and companies are on line with the battery storage and they are working for a standardization of storage. Two pilot projects to test the standards to apply the system of standard to ensure the connectability and system usage. The hurdle for battery storage is that the cost of batteries are very expensive. The costs of batteries are coming down as a result ofTesla Gigafactory, but the costs are still expensive.

There is much interest in disaster recovery and creating a micro grid. Giant solar systems with generator and combining battery storage with solar array connection to experiment to charge batteries and also discharge the batteries to the grid, if needed, and have back up energy and energy management system to manage the load and connect to a micro grid system. Theoretically, to use the micro-grid facility to get the main grid system back on line ifthere was such a disaster. Many government, military and disaster agencies are looking at micro-grids for this use.

The purpose would be to continue to power the mirco-grid if th main grid goes down. Smart converters, as well as some other breaking ground technology, would limit the use of an emergency generator if a main grid is off line for a long period of time. This way you can save valuable fuel to an emergency generator.

Snohomish Public Utility District is building a Clean Energy Technology Center. This will be a place wherein local businesses and universities can come and learn about the technology. Rooftop solar is also showing much interest in their area.

Challenges for this energy storage include high costs and recovering the costs as well as how to create revenue streams to assist in paying for the energy storage for a micro-grid.

Questions and Comments
A member whether hydro energy is considered a renewable.
Jessica Matlock clarifies by stating only "incremental hydro'' is currently considered a renewable for the Renewable Portfolio Standards, but that the State is currently negotiating to get other types of hydro energy considered.
Scott Gibson replies and states that the current 2 projects do not count towards the Renewable Portfolio Standards and credits.

John Candeleria asks for clarification on inverters.
Scott Gibson replies and states that California launched a change on inverters. Due to a high concentration of rooftop solar in California and all using the standard inverters, that when the grid would go down, all of the inverters would shut down and lose many megawatts of solar, which if lost, would need to recoup that lost generation very quickly. As a result, California launched an initiative to change inverters to provide grid support and voltage and sequences support. Scott is unsure what the inverter production status is. In other countries it is readily available, but not yet in the United States.

Shahzad Lateef of NV Energy asks about timeline associated with the projects.
Scott Gibson replies that they are in the process of finalizing contracts with State of Washington for funding. They currently have a tentative award and should finalize this year. It is a three year commitment to finish under the State contract. In 2017 design will be implemental. All of the planning, design and permiting will take place. In 2018 construction will begin. In 2019 they should complete construction. Afterwhich, they are required to collect data which should happen in 2019 and then reports will be generated in 2020.

Shahzad Lateef of NV Energy asks about micro-grid and disaster relief. Has NERC considered inclusion into the micro-grid system? Has NERC been involved or included in a corroboration on this project?
Scott Gibson replies No, not at this time, however as the planning phase begins that they will address that. He goes on to say that approximately 6 months ago, their attorneys did speak on the subject.

Shahzad Lateef of NV Energy asks about micro-grid "break before you make" comment and grid resilience. Separate from main grid can the micro-grid not only "give" to the main grid, but can it then be removed from the main grid and back to the micro-grid?

Scott Gibson replies that the military is testing a Spider System that will do just that, and they plan to use the reports and technology from the findings. They are trying to "sync" the micro-grid connecting back to the main grid once the main grid has gone down.

Shahzad Lateef ofNV Energy asks about black start restoration and could it be a revenue stream?
Scott Gibson replies that they have not talked about that, but is very interested in the subject. Has not yet been considered, but is making a note to discuss in future.

John Candeleria adds that cyber security and physical security will also be a subject to discuss as micro-grids are connected to a main grid.
Scott Gibson replies that will need to be discussed and clarified in the planning stages.

Shahzad Lateef of NV Energy asks about micro-grids could fly under the NERC/FERC radar if under 50 MegaWatts. If used for black start, it would become NERC/FERC.
Scott Gibson replies that to be true.

Rebecca Wagner asks about the funding source and the reference to the Clean Energy Fund- do you know how that is funded? Also asks about the Nexus to the transmission.
Scott Gibson replies that Jessica Matlock may be able to assist in answering.
Jessica Matlock (via telephone on line with Mr. Gibson) states that environmental legislature kept being passed without funding. The general fund is from the State. They need to pass funding during every cycle to get the funds in the budget, every year they have to go back and get it into the budget, it is only a one year cycle- and changes each year. Jessica can share information of costs and the Nexus ofthe integration. (Difficult to hear while Jessica is on telephone.)

Chairwoman Lacy thanks Mr. Gibson and closes out the item.

5. Teleconference Presentation: James Gazewood, National Project Manager, BLM Washington Office "Section 368 Energy Corridor Update"

The Chair opened agenda item number 5 and introduces James Gazewood for the next presentation. Please reference the PowerPoint presentation that is attached on Governors website.

The background of Section 368 Energy Corridors and the 131 existing corridors are discussed. The maps that are on the slides (reference the presentation) are discussed. There is a map of six regional reviews to be conducted by the BLM. Region 1 has 26 corridors. Trying to name each corridor in patterns for easy identification Region 3 has 36 existing corridors. The oversight committees identify and name corridors on an anticipated need basis. Region 5 has 20 existing corridors at this time.

The three year plan (discussed on pages 11 and 12 of the PowerPoint presentation) is discussed. Permitting is requested and then time frame and plan will be placed in a regional review period. Starla Lacy asks if the time table set forth for Nevada (May 2016 -February 2017) is still accurate. Mr. Gazewood replies that the time frame for potential corridor resources is correct. The BLM requests feedback or information to the BLM that can allow everyone to work together and get the lands and regional corridors created for transmission opportunities.

Starla Lacy asks when reviewing corridors, what is the type of feedback is the BLM looking for? BLM wants to understand the changes necessary and the renewable energy, and recognizing situations wherein the Dept. of Defense (DOD) may stop the corridor that is needed for planning.

Others members weigh in on the phone call relating to considerations in corridors, and the types of activities to take place in the corridors. Starla Lacy asks where you can get a copy of the corridor study? Mr. Grazewood points out that in the PowerPoint provided, there is a link to the study so that you can access the study.

John Candelaria asks Mr. Grazewood to explain what a "corridor of concern'' is. Someone on the phone (unidentified speaker) states that the corridor of concerns are those corridors that are related to a settlement agreement. There are certain corridors that for reasons from settlement agreement (i.e. habitat, coal etc) are listed as concerns in the settlement agreement. Within the website provided, there are links to the settlement agreement and the defined types of corridor concerns.

John Candelaria also asks if the corridor is not corridor of concern, can someone then build a transmission line all the way through that corridor? Mr. Grazewood states that there are different types oflands within the corridor Unidentified speaker from phone (is speaking and difficult to hear) states that in an example, some of the lands may belong to federal lands park services, or other jurisdiction of private lands, and that would be considered an encroachment.

Referencing slide 13 of PowerPoint presentation, Mr. Grazewood describes the recommendations for corridors and how to add, alter or delete corridors through subsequent land use planning actions. Identifying with planning commitments and taking recommendations for consideration. There is ongoing corridors planning. Reason for stand out corridors and what is advantage of the stand out corridor and alterations necessary are discussed.

The BLM will develop a corridor abstract to provide as much information relevant to the corridor and document any known concerns. The concerns are noted as to what types of activities will be added to the corridor, and if there is any existing structures, wildlife issues, etc. and identify these items to serve as a tool so agencies can address issues that arise.

The corridor mapping tool is discussed and how the BLM can determine any concerns and use the information for final corridor recommendations. The different agencies and stakeholder resources that are notified of corridor planning activities and so that those who are notified can take special assessment for the corridors. The stakeholder input schedule Phases I and II are discussed so that corridor input information can be considered before final recommendations can be made.

The PowerPoint presentation lists several contacts and website links for the corridor study and Section 368 Comments as well as the West-wide Energy Corridors Information Center website.

Chair Lacy thanks Mr. Grazewood for the presentation.

6. Review of proposals and concepts for legislative amendments or actions in order to support and incentivize projects related to grid modernization and enhancement.

See item 8 below. Time allows for presentation under Item 7 to begin at this time.

7. Telephone Conference Presentation: Bryan Hannegan, Assoc. Director, National Renewable Energy Lab and Co-Chair, Grid Modernization Laboratory Consortium. "Modernizing the Grid for a Low Carbon Future"

Chair Lacy introduces Bryan Hannegan to give presentation on "Modernizing the Grid for a Low Carbon Future". Refer to PowerPoint on website for details.

Bryan Hannegan begins by explaining the consumer needs for grid modernization and the growth in variable renewables for the process in doing so. The National Renewable Energy Laboratory (NREL) is researching and studying the variety of clean energy technologies and the implementation of same.

The grid in their area (Colorado) has been remarkably resilient however the architecture was insufficient for what is needed to deploy in today's market for clean energy technology.

There are over 250 million types of projects are being considered, and most have not been coordinated with the grid modernization, and NREL is working to integrate the multi-year program plan and how these projects integrate into the laboratory consortium. Trying to organize the laboratory consortium to being all strengths of industry partners with a regional focus in mind.

The types of foundational renewable energy and the information and analysis for stakeholders to enable NREL to make more informed decisions on key issues that influence the future of a modernized grid. Cyber security is discussed in hopes to have a holistic grid security and resilience system in place, from devices to micro-grids to the system. Institutional support allows information to be discussed and accelerate the policy innovation due to enhanced State and Regional technical assistance.

The three types of public-private partnerships that will accelerate transition of Foundational R&D outcomes to widespread deployment at scale include (1) Lean reserve bulk power systems; (2) Clean distribution systems; and (3) Grid Planning and Analytics.

In summation, it is the goal ofNREL to create a platform for innovation to include manufacturing, public welfare and support, while simultaneously building a resilient, reliable and secure system which is also sustainable and affordable. The goal is to try to achieve all of these items simultaneously, under one platform.

At this time, NREL is working on the foundational R&D and next year, to work with the regional demonstrations going forward to research the low reserve margin demonstration, provide clean distribution feeders and create a grid analytics platform for a modernized grid moving forward.

Data to utilize in collecting information to create a grid modernization system comes from the ground, using smart meters, weather patterns, and other smart devices to plan ahead for grid services to be ready for marketable energy based upon the weather patterns, sunlight hours and other interaction to sense from the grid to deploy energy uses based on the information.

The grid necessities are rapidly changing and the technology and devices are now creating opportunity for other services (such as communications and programming). A diverse supply of energy services and devices is critical so that if one device goes down, millions of others devices on the grid are still available to keep the grid running

if there is a cyber threat or other threat to the grid. This way a threat can be isolated and the remaining grid is protected.

There are regional partnerships ongoing for collaboration efforts with NREL and those partnerships are discussed. Bryan Hannegan states that this technical committee should consider a regional partnership in preparing the grid modernization plan.

The presentation concludes and is open now for questions.

Shahzad Lateef of NV Energy asks about slide 14 of the presentation and the advanced technologies controls which will eventually be millions of points. Has there been consideration as to the scale of this technology and whether a massive DER distribution control or a small micro-grid control system is the best solution? Has there been any direction on that?
Bryan Hannegan replies that what NREL is finding is that they need a blend of both. There is a need for the full power side to use a massive distribution control for forecasting, data and analytics. However, from an operating area, there needs to be micro-grids as well. This leaves the flexibility to operate for the most optimum domain. There is much optimization at local level and also back up to the power system. In today's technology, the EMF grid operations is a one way solution at this point, and on the grid modernization, it will be more of a two way communication system for negotiation.

Shahzad Lateef ofNV Energy asks if any consideration to the level of centralized DER or micro-grid, one of the elements of the grid modernization is sustainability. Who owns the maintenance as the systems get older? Who is responsible under the regulatory guidelines to keep the grid sustainable? Who will pay for the maintenance of the system or any upgrades?
Bryan Hannegan replies that this is a work-around support for paradigms going forward. Variety of business models that are taking advantage of market opportunities will need to look for cheaper options for upgrading the grid or supplying equipment. Different owner or customer that want the opportunity to go their own way will need to bear the responsibility of system upgrades and maintenance, but ultimately there has to be a fail-safe in place in case those owners fail to comply.

Shahzad Lateef of NV Energy asks in reference to slide 16, what are the considerations to threats which will evolve as the grid evolves. How to protect the grid ifthere is manipulation of the system, with the intended threat to make it a bigger challenge to put the grid back together vs. targeting individual devices.
Bryan Hannegan replies that the Cyber Security research directly reflects that. They are looking at not just individual devices, but if somehow a threat gets access the system in order to have a device do something that would create a reaction by other devices and cascade. Part of the research being done is to identify that threat, isolate the threats, protect against threats, restore the grid ifloss of service by either catastrophic events, weather events or cyber threats. This is a very dynamic process wherein data analytics will allow the process to evolve and build a process to protect the grid against such events.

Starla Lacy, Chair and with NV Energy asks if this Nevada task force was interested in participating in the regional partnership discussed on slide 19, how would the group go about doing that?
Bryan Hannegan replies that to become a regional partnership, there is a web portal available wherein more information on partnerships is available.

Chair Lacy thanks Mr. Hannegan for the presentation.

8. Continuation (if needed) ofItem 6 above- Review of proposals and concepts for legislative amendments or actions in order to support and incentivize projects related to grid modernization and enhancement.

Chair Lacy opens item 8 for the review of proposals. A draft of Grid Modernization TAC Recommendations is attached to website for review and is discussed herein.

Section 368 Corridor is discussed. Chair asks the committee their thoughts in moving forward.
Rebecca Wagner states that it is an important component to have access to the SEZ and corridors. Elevated as a recommendation is an opportunity to put the issue on everyone's radar and how important it is for the future of the grid modernization project. Especially with any encroachments in corridors in solar areas in northern areas.

Hank James believes the corridor is also a critical recommendation. Also looking at the BLM presentation and as it points out more critical information that will need consideration moving forward.

John Candelaria wants to make sure that maintenance and development language are useful to add to recommendations and that the Governor's Office of Energy will be the agency to act upon this recommendation. Both Starla Lacy and Rebecca Wagner confirm that the GOE is where the action will begin and a great opportunity for the task force to bring the issue to attention. Important to inform and make it a priority.

Chair Lacy asks for a motion to move forward to include Corridor 368.
Rebecca Wagner moves to advance the proposal but asks that the New Energy Task Force for the Governor's Office Participate in each activity with the administration as designated or described in the working document.

Motion passed, no opposition.

Funding Pilot Projects is discussed. Chair asks the committee their thoughts in moving forward.
The language is generalized so that the projects can be broad on the platform. Everyone in the state would have authority to participate.
John Candelaria would like to add language to be more specific and add language to include interconnections and add platform security; operations and control (drop the word protocol); communications systems; and interconnections corridors.

Shahzad Lateef would like to add integration of storage to the DER, pilot tests for any type of DER into the language.

Rebecca Wagner has no objection to language but brings up that there has already been a storage procurement target proposal in the grid committee. She is supportive of this recommendation despite it being duplicative in order to reiterate the importance of funding.

Motion passed, no opposition

Expand funding of charging infrastructure to support electric vehicles is discussed. Chair asks the committee their thoughts in moving forward.
John Candelaria would not recommend sending for recommendation because it is essentially a completion of someone else's project. Not that it is not supported, just not this committees responsibility.

Shahzad Lateef states that it could eventually help the grid expansion with considering this type of energy. Not sure it is the right platform to propose, but definitely a way to consider the controls necessary in adding this to the grid.

Starla Lacy states that there are some rebate programs and other incentive programs for electric charging options.

Rebecca Wagner states Electric Vehicle infrastructure is important but it is beyond working with the state service providers. If it is proposed, maybe charging infrastructure in urban areas of greater population should be explored. An example being an apartment complex with multiple residence, and no charging station. Maybe use language to broaden the scope in applicability.

John Candelaria States that with the PUCN review of Electric Vehicles, they have found nothing special about communications of controls in associate with the charging stations to the grid. Suggest identify the expansion.

Shahzad Lateef says that as electric vehicles evolve, it could be important to know what the demand for charging would be on a Friday, versus and Sunday, and that there might be a need for controls on the grid to monitor.

It is discussed to modify the second recommendation above (Funding Pilot Projects) to incorporate the electric vehicle charging infrastructure as part of the proposal. A motion is made to include that information in the second recommendation and that motion is passed without opposition.

Chairs Lacy asked ifthere are any other proposals or recommendations. No responses.

A brief discussion about consumer choice and energy takes place.

Rebecca Wagner asks how the recommendations get proposed and how it will be presented. Chair Starla Lacy will not be available that date and asked that Rebecca Wagner present in her place. Angela Dykma confirms that someone can fill in, however, would not have voting rights. Rebecca can report from TAC's perspective.

9. Public comments and discussion.

No public comment.

10. Adjournment

Chair Lacy took a motion to close the meeting, thanked all for their participation and attendance and adjourned the meeting. Angela Dykma also thanks everyone for their participation in this process