



**U.S. Department of Energy
Electricity Advisory Committee Meeting
Capital Hilton Hotel
Washington, DC
June 12, 2012**

Minutes

EAC Members in Attendance

Richard Cowart, Chair
Regulatory Assistance Project

Irwin Popowsky, Vice-Chair
Pennsylvania Consumer Advocate

William Ball
Southern Company

Merwin Brown
Alcoa

Clarke Bruno (Representing Edward Krapels)
Anbaric Holdings

Ralph Cavanagh
Natural Resources Defense Council

The Honorable Paul Centolella
Public Utilities Commission of Ohio

David Crane
NRG Energy, Inc.

The Honorable Robert Curry
New York Public Service Commission

José Delgado

Robert Gramlich
American Wind Energy Association

Michael Heyeck
American Electric Power

Val Jensen
Commonwealth Edison

Joseph Kelliher
NextEra Energy, Inc.

Susan Kelly
American Public Power Association

Barry Lawson
National Rural Electric Cooperative
Association

Ralph Masiello
KEMA

Clair Moeller
Midwest Independent Transmission System
Operator, Inc.

EAC Members in Attendance (Continued)

David Nevius

North American Electric Reliability Corporation

Wanda Reder

S&C Electric Company

The Honorable Phyllis Reha

Minnesota Public Utilities Commission

Brad Roberts

Electricity Storage Association

The Honorable Tom Sloan

Kansas House of Representatives

David Till

Tennessee Valley Authority

Gordon van Welie

Independent System Operator of New England

Mike Weedall

Bonneville Energy Administration, Retired

EAC Members Not in Attendance

Guido Bartels

IBM

Rick Bowen

Alcoa

Clark Gellings

Electric Power Research Institute (EPRI)

Dian Grueneich

Dian Grueneich Consulting, LLC

M. Granger Morgan

Carnegie Mellon University

The Honorable Rebecca Wagner

Nevada Public Utilities Commission

DOE Staff in Attendance

Sonya Baskerville

Bonneville Power Administration

Anjan Bose

Office of Electricity/ Washington State University

Caitlin Callaghan

Office of Electricity

Jay Caspary

Office of Electricity

Imre Gyuk

Office of Electricity

The Honorable Patricia Hoffman

Office of Electricity

Holmes Hummel

Department of Energy

Larry Mansueti

Office of Energy

Mike McElhany

Western Area Power Administration

David Meyer

Office of Electricity

DOE Staff in Attendance (Continued)

Andrew Morris
Office of Electricity

Titilayo Ogunyale
Office of Electricity

Bill Parks
Office of Electricity

Joe Paladino
Office of Electricity

Brian Plessner
Office of the General Counsel

Non DOE Staff in Attendance

Will Agate
PIDC

Venkat Banunarayanan
ICF International

Susan Blaine
ICF International

Angie Beehler
Walmart

Patrick Brown
Canadian Electricity Association

Nicole Businelli
Federal Energy Regulatory Commission

Larry Camm
SEL

Ken Collison
ICF International

Nicholas Colombo
Stateside Associates

Abbey Reller
Office of Energy

Matt Rosenbaum
Office of Electricity

Merrill Smith
Office of Electricity

Ben Steinberg
Office of Electricity

Jim Creevy
NEMA

Erich Gunther
GridWise

Paula Klein
ICF International

The Honorable Cheryl LaFleur
Federal Energy Regulatory Commission

Janine Migden-Ostrander
Regulatory Assistance Project

Phil Mihlmester
ICF International

Elliot Roseman
ICF International

John Shenot
Regulatory Assistance Project

Microgrids Panel

Ralph Masiello introduced the microgrids panel. He stated that the Defense Department, private, and semi-private industry are all working on microgrids because it makes business sense as the panelists will present.

Microgrids Panel: *Will Agate*, PIDC (Philadelphia Navy Yard)

Mr. Agate began by giving a background of the Philadelphia Navy Yard, which is its own economic grid that is not technically a part of the city of Philadelphia. The Master Plan since 2000 has been sustainability. There are 6 zones, or magnets, created around the infrastructure. The Navy Yard is growing in their industrial division, office operation, and in research and development. The Navy Yard is an “un-regulated” grid operator because it was in operation by the Navy before being made public. Forty percent of the Yard’s systems date back to 1930’s and 40’s; therefore, there is the question of how to get money invested into system. The Yard’s ambitious growth strategy is to grow the community by three–four times its existing size, which would make an impact on the electronic infrastructure. The Sandia National Labs Study identified Navy and commercial mission critical usages and needs and looked into ways of potentially marrying up commercial assets. This partnership would help to strategize potential supplemental demand requirements.

Mr. Agate presented the Clean Energy Campus: Energy Master Plan, which is a comprehensive way to think of Navy Yard:

1. “Smart Grid” infrastructure, rather than outdated infrastructure.
2. Business Model helps to justify the plan in a poor economy without using public dollars. This has become the central part of the master planning effort.
3. Building Owner Opportunities, which encourages individual stakeholders at the Navy Yard to work on distributive generation.
4. Test Bedding Outreach and Protocols states that the Navy Yard wants to be a test bed where new technologies can be implemented. The Yard will continue to test and implement while testing is going on in background.
5. Carbon Reduction and Sustainability.

The purpose of the plan is about balancing supply and demand and to find ways to self-generate and self-store. The Smart Grid Implementation Plan outlines three pockets to focus:

1. Smart Grid Foundation and communication system.
2. Smart Distribution Phase.
3. Think about this as an on-going project.

One of the current projects is the DOE Grid Star Center Project, which is an example of putting theory into practice. The Yard is building a high-efficiency modular home what will be located on the property and will measure inflows and outflows.

Microgrids Panel: *Angie Beehler*, Energy Regulation/Legislation, Walmart: Walmart Microgrid Contributions by Customers

Ms. Beehler began by discussing Walmart's goals, which are: to be supplied by 100 percent renewable energy, to create zero waste, and to sell products that sustain our resources and environment. Several renewable energy projects (solar, wind, fuel cells, green power purchases, organic waste from renewable energy credits RECS) that Walmart has taken on are:

- Daylight harvesting, which uses skylights on store roofs to reduce lighting in stores,
- Ground or roof mounted solar systems,
- The solar carport concept,
- Wind turbans on parking lot lights,
- Large scale wind energy at distribution centers, and
- Microwind parking lot installations.

Walmart must also keep RECS to be able to claim that they are renewable. Due to good negotiations, great partners expanding their renewable and updated legislation on the definition of renewable, Walmart is getting closer to their goal of being 100% renewable. Additionally, Walmart is turning their organic waste to energy. *Ms. Beehler* identified the Walmart Global Sustainability Summit for stores world-wide to focus on energy consumption, energy efficiency improvement, and increasing Walmart renewable energy projects. The current Walmart sustainability report shows that renewables increased to 4%. *Ms. Beehler* presented that Walmart is an EPA Green Partner leader for renewable energy. She also discussed how energy efficiency allows for Walmart to decrease product costs, which benefits the customer. *Ms. Beehler* outlined nine elements of a successful demand response program. Demand response is done for 11 different reasons from price reductions to helping the customer to helping the environment to improving the ROI of their own meters to sharing with others to ISE Programs.

Microgrids Panel: *Jeff Marqusee*: Department of Defense (DOD), Office of the Secretary of Defense: Environmental & Energy Technology Programs

Dr. Marqusee identified DOD's Environmental and Energy Technology programs, which include science and technology, and demonstration/validation. DOD is the largest energy user in the world seeing an increase in energy costs between 2010 and 2011, which were mostly operational costs.

Facility energy is important because those costs are likely to increase as troops return home from overseas engagements. Mission assurance (DOD's reliance) and keeping facilities operational is a significant and growing risk, especially after the 2011 San Diego blackout. DOD is working hard for renewable energy and microgrids. DOD's core strategy is to reduce demand, expand supply, enhance security, and leverage advanced technology. DOD facilities are a large consumer of electricity and are built like most consumer facilities, meaning they are in a fragile market. *Dr. Marqusee* expressed that there is extreme concern of security of the grid. DD is looking into smart microgrids as the answer to the security problem. Although the fundamental concern is security, microgrids must be done cost-

effectively. Microgrids across DOD are different between all military branches. *Dr. Marqusee* expressed that this is not a research project as most of these technologies already exist, but there are challenges regarding cyber-security and renewable generation.

A program to address future issues is the Installation Energy Test Bed Program. This Program uses existing infrastructure as test bed for energy technology. It is in DOD's interest to use a little risk to test first and then implement if a success. DOD wants to be a leader, and by leveraging past DOE and other investments, DOD will be able to use new/recent energy investments. The Installation Energy Roadmap will retro-fit older infrastructure with new technology and implement on-site energy generation. *Dr. Marqusee* gave examples of some current and future demonstration projects and the contractors working on these, such as the MIT/LL Study, BENS Study, and ICF Study. *Dr. Marqusee* concluded by outlining some microgrid benefits, such as increased reliability at a lower cost, greater efficiency, and enables the renewable generation.

Questions and Answers for the Microgrids Panel

Mr. Popowsky complimented *Mr. Agate* on the tremendous things that are taking place at the Philadelphia Navy Yard, and asked him to talk about their relationship with PECO. He asked if they were an islanded institution, and if they were still reliant and had tariffs with PECO, were they looking at operating more independently. *Mr. Agate* replied that it is their intention to remain a PECO customer indefinitely, and that the partnership will remain necessary as their energy needs grow. He said that they are at the beginning stages of their own internal grid and that is affected by the ways in which the services are coming into the property. He said that working closely with PECO to make sure what works best for Navy Yard also works well for the PECO grid outside of them is crucial. He spoke about their aggressive plans to achieve energy efficiency, and to encourage companies to put in distributive generation, as more than 20 percent of all the Navy Yards power will be produced via these two means, but the rest will have to come through the PECO system. He said that they pay PECO as a large user, and that before 1-1-2011 they had a discounted rate through a tariff.

Mr. Heyeck commented that as we head towards more and more distributed generation and microgrids, more control and monitoring issues in the grid will be created. The other comment he made was that regardless of provider, the grid is going to be your backup. He asked what the financial paradigm will be based on this system, either full service or discounted in some way.

The Honorable Robert Curry added that the primary concern and responsibility of state commissioners is ensuring safe and reliable service. When looking at any microgrid or distribution generation situation, he said he always asks if they can confer a benefit from it. He said that it is critical to discuss these issues through the significant spend and to have the confidence of the rate payers who will ultimately bear the cost of this, that we've thought it through, that we're doing the right thing, and we're not needlessly replicating, we're intelligently replicating various aspects of the delivery system.

Assistant Secretary Hoffman thanked all the speakers who presented during the meeting so far. She reiterated Mr. Marqusee's point that there is no consistent definition of microgrids from a DOD perspective; a range of things have been investigated from a seamless integration within the utility all the way to the other end of the spectrum where certain buildings and things are isolated from the grid. She suggested that the EAC investigate some of the regulatory inhibition that may have to occur, and what some of the states are doing and put together a panel about this. The next comment *Assistant Secretary Hoffman* made was about optimization at the distribution level, and how sophisticated the system is getting in terms of use and advancement. She talked about the optimizing the size of solar systems, and how to pair it energy storage, demand response, natural gas, and how do you go through the optimization or evaluation.

Mr. Brown commented that there is research needed in the area of integration of the mentioned components. He asked the EAC to consider whether the components considered the economic costs or if there is more research needed to bring the cost of components themselves down also. Additionally he asked about gaps in broad technology development. *Dr. Marqusee* replied that there are many components that allow for testing and implementation of smart microgrids. He said that there are a lot of claims for future costs of storage, which he is skeptical of. Storage is a huge lever that can change the architecture of what people will want to use, which is why it deserves the level of investment it is getting. *Ms. Beehler* added that the tax production credit has been very useful in undertaking big renewable installations. While incentives cannot last forever, they help get over the first hurdle and then the technology increases in frequency and becomes more affordable.

Mr. Agate commented that a knowledge base is the most essential thing. He asked how best to bridge the gap for entities that want to develop the microgrid, but that are not in the business of doing so. He discussed technical assistance through the DOE and that managing a micro community must be done in an organized way. He suggested promoting a way in which the utilities and entities like the Philadelphia Navy Yard could go forward on projects like this. *Mr. Brown* followed up on this comment by saying that he is based in California and has been heavily involved in research in the area of high penetration renewables, and has thought about the role of the microgrid a lot. He said that in the future they will have to consider the struggle of being able to integrate large amounts of very small distributed generation, particularly a variable kind like photovoltaic and electric vehicles. The microgrid will become necessary for stability of the grid as a whole. He suggested that the real question will be where is the sweet spot where the microgrid quits growing and interfaces with the wide area grid, and will this be a dynamic sweet spot that varies according to the current situation on the grid.

Clarke Bruno, Anbaric Transmission, asked Mr. Agate about the price for tenants, and whether retail cost of electricity would be cheaper in the Navy Yard, or in downtown Philadelphia. He asked Ms. Beehler if they have a target time period in which to recapture their investment in renewals and other technologies. *Mr. Agate* replied that when they think of costs, they do not only think of the operating costs. They have to be competitive. If they are buying their power at a reduced rate but also have to pay a big price. We need to get money into our grid and maintain a rate structure that is comparable. Also, he said that they believe one of the big costs is the development cost of getting that infrastructure in

place. As opposed to traditional model, they are trying to come up with one where we could bring some of them under the umbrella of how they are developing the microgrid itself. *Ms. Beehler* replied that Walmart's objective is to provide low costs to their customers, and so they must be mindful of the cost of renewables. They make sure their renewables projects are beneath the cost of brown power, and many of their projects are purchase power agreements.

Mr. Roberts commented that on average in the United States, power quality or power availability is 99.99 percent, but that most businesses are moving towards a point where that is not acceptable, and need to be at 100 percent. The load factor has always been an issue in the US, and he said that what needs to be considered is how to get the base load actual demand closer to the base load. He suggested electric vehicles will help drive that, but many other changes will be taking place.

The Honorable Paul Centolella asked Dr. Marqusee if he sees any advantages or relationships between microgrid development and cyber security. Specifically, whether or not there are research questions about how we look at cyber security that are different in a world where we have more distributed intelligence and more microgrid architecture than our current architecture based largely on centralized dispatching control? *Dr. Marqusee* responded that there is no easy answer to that question, but that it is something DOD is very concerned about. He talked about the technical challenges and that there is a lot of red teaming going on between DOD and DOE on this issue to try to understand the vulnerabilities. He said that they are concerned about being a target, but that they have a huge history of doing a lot, from business practices to military information processing, which we're all an extreme target for cyber attacks. This is something that DOD is concerned with and is investing some resources, mostly jointly with DOE and then in combination with NIST. *Ms. Beehler* added that Walmart's ADR 2.0 pilot with PJM had cyber security components within it, and suggested that he consult with PJM or IPKeys.

Mr. Masiello wrapped up the panel by summarizing four compelling data points. First, Dr. Marqusee had referred to the electric grid as fragile, meaning that it is not meeting the reliability needs of one of their largest customers. Next, in the list of Walmart's energy needs, renewable energy from the grid was the lowest ranked item. Then, Mr. Agate said that as they grow jobs, they could grow from 25 megawatts to 100 megawatts, but that they will not. If Philadelphia Electric tried to charge the Navy Yard, the cost of solving the congestion problem could result in an additional 25-50 megawatts of delivery, which would change the economics of becoming independent. Lastly, he commented that the State Senate in Connecticut passed legislation mandating five cities in CT consider microgrids because of lack of reliability in the hurricane last year. He said that this trend is a giant wake up call to the world of electricity.

Mr. Cowart complimented the summary and thanked the panel.

EAC Transmission Subcommittee 2012 Work Plan Status

Mr. Heyeck presented the Transmission Subcommittee work plan, and said that he welcomes any comments the EAC may have. The three parts of the work plan are grid infrastructure resiliency, technology, and Power Market Administrations (PMAs).

For grid infrastructure resiliency, he explained that “guidelines” is the operative word, and said that it would discuss electromagnetic pulse (EMP), particularly high altitude EMP and geomagnetic disturbances (GMD). Another tenet of this resiliency work plan is to follow on that letter we offered last year to determine gaps in current resiliency efforts. NERC is very active in the resiliency area, DOE is partner to that, and the industry is partner to that. But NERC's efforts are largely in the GMD area, and is there a way that we could cover both GMD and particularly the high altitude electromagnetic pulse with something simple as better standards or better guidelines. Lastly he spoke about the potential deployment of mobile generating sets, and developing these for government versus private needs.

For technology, *Mr. Heyeck* explained that there are two prongs they hope to investigate. The first prong is to investigate gaps in the efforts DOE already has underway, and the second is next generation EMS. The energy management systems today are built on a seconds technology, but yet we're funding a lot of technology to deal with milliseconds on the grid, and these are the phase or measurement units. We have many hundreds of phase or measurements units out there.

He explained that DOE already leads many research projects in this area through partnerships with industry and research underway at the national laboratories and universities. The major impetus -- a major effort by DOE in this area has been the phase or measurement unit. So as we look to the future, the next generation EMS is a necessity as we integrate our energy futures. The hurdles are we're still living with the same algorithms that were developed over 40 years ago. So for this issue, the subcommittee would elect to develop a document, a vision of what grid 3.0, as EPRI calls it is, the next generation EMS, and also recommend a road map to collaborate to get there. Certainly this committee, nor should DOE, be the only people working on this. We have to develop a road map forward. This isn't something that's going to come in the next year or two, but we would hope that in 2012 we would have a recommendation for this committee.

For the other portion of this paper, the gaps in technology, he talked about the discussions that have already taken place with DOE about potential areas to consider. One of the areas that may come up is the advent of greater use of power electronics. Certainly, power electronics have been used for many, many years. But in the United States, its penetration is not as great as other places in the world. Also, Mike Weedall has volunteered to draft a white paper regarding non-wires alternatives. *Mr. Heyeck* then turned the conversation over to his co-chair Ralph Cavanagh, to discuss PMAs.

Mr. Cavanagh spoke about how important the PMAs are to the electricity system. They are most known as entities established to market federal hydropower to preference customers who are public institutions, but are also a tremendously importance force in transmission. The Southwestern Power Administration alone operating almost 1,400 miles of high voltage transmission, Bonneville and Western Area Power Administration (WAPA) obviously being much larger operators. And the hope here through

the recommendation that is before you, and that Ms. Klein distributed in her last transmission, is to provide a recommendation that is calculated to inject more capital into the transmission budgets and plans, in particular WAPA and the Southwestern Power Administration, using as a vehicle Section 1222 of the Energy Policy Act of 2005.

He believes the language they put together represents a consensus of the PMA constituencies and all who have an interest in upgrading the transmission system. And it is in particular enough to realize the ambition and aspirations of Section 1222, which was a way to try to open the door for the injection of private capital into, in particular, the WAPA and Southwestern systems, where there is agreement by the preference customers and the other stakeholders that this makes sense, and where the transmission upgrades and enhancements are following a plan that is been developed for the region, and also where there is a federal identification of national interest in the form of a transmission quarter designation. The proposal is for this body, and so he highlighted that it is a recommendation of the collective, and hoped everyone was comfortable recommending that DOE encourage WAPA and Southwestern to exercise their authority under Section 1222 following consultations with customers and other stakeholders.

The impetus for the recommendation is that although this authority was created in 2005, it has not been exercised yet. Our hope is that it will be in cooperation with all of the stakeholders that matter. He moved, at Mr. Lawson's request, that when the piece calls out consultation with customers and other stakeholders, they make clear that it is talking about preference customers and other stakeholders since the preference customers are the core constituencies of the PMA's.

EAC Discussion of Transmission Subcommittee Topics and PMA Filing

Mr. Cowart asked for comments and recommendations on the work plan.

Mr. Ball said he was particularly excited about the EMS work. On the resiliency side, as a major owner, he said that they do not need another report to highlight the aging assets and failures. He commented that it would be very useful, as long as it is not another document that says "the world is falling apart."

Ms. Reder said that she supports the white paper and applauds the EMS piece. She expressed interest in future dialogue about how this is bound on the distribution side – coming out of the transmission area – as we look down we are likely to have more solutions from a distributed focus.

Mr. Roberts asked if this relate to the Transmission study that the EAC issued three years ago. *Mr. Heyeck* responded that in 2008 they established the problem, and here they are trying to reduce the scope and focus on things that DOE can work on rather than general policy initiatives in NERC or FERC.

Mr. Moeller said that he liked the work plan so much that he is going to join the transmission subcommittee. He wanted to make sure that they focus on the financial issues surrounding this, so they can talk about the investment being a good idea. The second point he made, was that as they

contemplate the EMS questions they should think about predictive tools. If all we do is look faster, we will know we are in trouble quicker, but that is not the same as staying out of trouble. So with those two caveats, it is a really good plan.

Mr. Lawson urged that the white paper recognize issues regarding high altitude electromagnetic pulse, and how the nation depends on the federal government to help defend against that occurring. He thought they could clarify the second bullet under technology to say until it becomes cost effective. Finally, he suggested recognizing that it might become cost effective for different types and sizes of entities at different times.

Mr. Brown suggested adding hardening to the resiliency section, such as fall current controllers and better protection against earthquakes and fires. *Mr. Heyeck* replied that the work plan mentioned that and pointed him towards the section.

Dr. Bose clarified what the DOE can do from a research and development perspective.

Mr. Heyeck suggested that the Grid Tech team be on the July subcommittee call so they can make sure efforts are not overlapping.

Mr. Cowart asked if anyone wanted to move the work plan for approval.

Ms. Reder moved for approval.

Commissioner Curry seconded it.

The work plan was approved unanimously. Next they moved into a discussion on the PMA documents.

Assistant Secretary Hoffman asked if there had been conversations between the subcommittee and Southwestern Power Administration (SWPA) and WAPA on the 1222 process. *Mr. Cavanagh* replied that the proposal had been vetted widely through the public power community, but that they have not yet spoken to Southwestern and WAPA management.

Commissioner Curry moved to accept the draft document.

Ms. Reder seconded.

Mr. Popowsky asked which customers would be excluded from the consultation process if they are just going to WAPA and SWPA.

Mr. Cavanagh said that they are not intending to limit at all, just calling out a preference.

Mr. Ball wanted clarification about what this letter is asking DOE to do. *Mr. Cavanagh* responded that it was calling out section 1222, a specific item that was not highlighted in secretary letter, and suggesting that DOE provide a less contentious basis to provide capital for those two PMAs.

Mr. Cowart asked that all in favor say aye.

All EAC members said aye, the document carries.

Interoperability Presentation by Gridwise Architecture Council

Wanda Reder introduced Erich Gunther, GridWise Architecture Council (GWAC).

Erich Gunther began with a brief history of GWAC. He noted that it was formed in 2004 and is made up of five areas of stakeholder communities that the Council tries to support. GWAC members represent as individuals in their own areas of expertise and not as an employee of their organization. GWAC focuses much of their time on organizational, technical, and informational interoperability. Interoperability enables the creation of new products with a wide range of price points and features. *Mr. Gunther* discussed the GWAC activity areas, otherwise known as the GWAC Stack. The activity areas are interoperability, managing complexity, transactive energy, strategic forum, and organizational support. He next went over the phases of GWAC's progress from 2004 through the present. The goal is to develop a culture for implementation-ready electric automation products and services. The phases began with principles of grid modernization, next moved to a how-to framework, to industry engagement, procurement and implementation with vendors and are now moving forward to sustain the progress. *Mr. Gunther* discussed the GridWise Web site, which includes an outline of the benefits of interoperability from various points of view, as well as a series of proceedings from the Grid-Interop Conference. He also outlined GWAC's impact on metrics: the GWAC Constitution, 2011 Document download, paper references (40% of IEEE conference papers have referenced the GWAC Stack), and the H-Index. *Mr. Gunther* presented the Technology Adoption Lifecycle from both a manufacture and utility context. The industry is faced with new challenges to bring in new technology, so GWAC has provided tools to assist in this process. Industry challenges were addressed, including transactive energy, enhanced reliability, and concepts and strategies for pervasive DER. *Mr. Gunther* shared the success story of Green Button. This success proves that with a little bit of leadership and no mandate or budget, people can be mobilized to address a common concern.

The next steps for the GWAC are to ensure success is achieved and sustained as well as to increase outreach. In conclusion, *Mr. Gunther* reiterated that all of these industry experts are donating their time, GWAC has a successful historical record, GWAC offers their support to the DOE and EAC to assist in fulfilling their missions, GWAC would like for DOE and EAC to provide advice to their council, and that GWAC invites them to participate in any of their numerous venues.

Questions and Answers Regarding Mr. Gunther's Presentation

Wanda Reder asked where the industry stands on the journey to true interoperability. *Mr. Gunther* replied that there is no clear end game; therefore, there is an infinite way to go. However, the industry is well on the way. There is a drive and procurement practices are already in place, which is why GWAC is focused on sustainability.

The Honorable Tom Sloan said that he had two comments. First, he suggests that GWAC takes the philosophy of taking a systemic approach when looking at various subcommittee activities. He then commented on continuing to modernize the SmartGrid and new technologies with the legacy systems. He suggested that the interoperability focus of the Architecture Council by integrating legacy and new systems with evolving standards is kept in mind.

Richard Cowart commented that federal entities needed to regulate at a state level. He asked for examples of where state regulation has locked in standards that make it not interoperable? *Mr. Gunther* replied that it is always a bad idea when a regulatory body specifies a standard and he gave two examples. First, a standard embedded in regulation doesn't allow for progress to occur. Second, there is a wide variety of pricing structures and the vendor community would like to have some uniformity. *Mr. Cowart* asked how GWAC is attempting to fix this problem. *Mr. Gunther* responded that GWAC is trying to get additional interaction with National Association of Regulatory Utilities Commissions (NARUC).

Mr. Cowart addressed security. He commented that having different systems in place means less chance of cyber-hacking and viruses. He asked for the answer from the council on security. *Mr. Gunther* replied that GWAC not addressing security, they are only looking at high level and are not intending to go further.

Merwin Brown asked how the DOE can assist on a leadership level. There's a lack of data to support the distribution side. He asked for examples of the actual problems for both distribution and transmission. *Mr. Gunther* answered that this question goes back to leadership. The technology is in place, but proprietary licenses exist. When there's an RFP in place, DOE should require standards to be in place and to use standards-based implementation.

Mr. Brown asked if the correct standards are in place. *Mr. Gunther* said yes, the correct standards have been in place since the early 1990's, but they are in multiple generations and need to be merged together in a manageable, sustainable fashion and that requires some work.

Ralph Cavanagh asked if GWAC is looking for uniform tariffs. *Mr. Gunther* replied that they would like at least for there to be a framework for how the vendor community can write variances in the detail. *Mr. Cavanagh* asked for clarification between a uniform tariff and a uniform tariff structure. *Mr. Gunther* answered that they need programmers to represent inexpensively and for consumers to readily respond. GWAC is working closely with major vendors of smart appliances to understand their needs. *Commissioner Centolella* commented that appliance vendors and consumer electronic association are looking at RTOs and that they want to get to a point to broadcast out future processes. *Mr. Gunther* says that GWAC works closely with 1 ISO and some IOU's and that he wrote a white paper, but never

papered it for fear of the politics. He said that the down side of doing things differently makes communication a challenge.

Mr. Masiello asked how *Mr. Gunther* saw that unfolding today. *Mr. Gunther* responded they are that close to making this a reality. The SGIP guidelines are available and they are on a fast track to Green Button certification, which they are working to approve. Before the end of 2012 GWAC should have actual guidelines in place.

Mr. Masiello asked if he saw the manufacturers as certified. If so, who will certify the certifiers? *Mr. Gunther* answered that no one entity will certify. They will begin with SGIP and then move to existing associations that already do accreditations. This already exists; it is just a framework that is needed.

EAC Smart Grid Subcommittee Work Plan Status

Ms. Reder introduced Joe Paladino, DOE liaison to the Smart Grid subcommittee.

Mr. Paladino gave a status report on where the Department is with the Smart Grid Investment Grant Program, and showed results they have received to date. They are about half way through the deployment of these technologies. Half of the \$9 billion worth of funding went into meters, the communication infrastructure behind meters, and the meter data management systems. By the end of the program, they anticipate installations of 16 million meters, the majority of which will be residential. The Smart Grid Investment Grant Program will contribute about a quarter of the meters that are actually deployed in the nation.

With respect to distribution automation, about a quarter of the money to a third of the money goes into devices and systems to improve reliability, such as automated feeder switching. He added that distribution circuit technology is going to advance significantly over the next 20 years, to be able to accommodate things like electric vehicles, to distributed energy resources, energy storage. These systems are going to have to get much more flexible. We're very early on in really advancing the capabilities of distribution circuits even with the deployment of these technologies.

Finally, with respect to transmission systems upgrading, *Mr. Paladino* said that most of this effort is installing phaser measurement unit technology, and again, the underlying communications systems to communicate information from PMUs back to operators. Hopefully, they will impact the ability of operators to have this wide area of visibility capability. The analysis focus, and again, this body, the group review have mentioned to us we really need to focus the analysis, and we have, and we're actually looking at these five areas. We're looking at how advanced metering infrastructure with pricing, with customer systems will actually affect peak and overall demand reduction. And again, that leads to improved asset utilization, deferring generation capital expenditures and energy requirements, et cetera.

The other place we're focusing is how meters and that meter data infrastructure actually improves the operational efficiency of utilities. With respect to distribution automation, we're looking at what kind of reliability improvements we can get with respect to systems that can reconfigure circuits. And then finally, we're working, again, at the impact of PMU technology, super phaser technology, on improving operational efficiency at the transmission level, as well as reliability there.

He ended by talking about voltage reduction. Many of these utilities are trying to manage their voltage levels to reduce peak demand, so there's a great deal of efficiency improvement there. Some utilities are actually trying to apply conservation voltage reduction techniques to be able to keep the voltage levels down for a longer period of time. That means less power being used by customers, but still being able to meet customer's needs. And there's potentially a huge amount of energy efficiency that could come out with that practice.

Ms. Reder thanked Mr. Paladino, and wanted to provide a sense of scale for the projects he talked about that are underway. Looking at the lessons learned and how to scale, cascade the benefits, and discuss the barriers will be important to capture. These are what the subcommittee has been focused on, namely the outreach portion. She said that they think that it is really important to connect this effort to broader reliability and sustainability infrastructure goals. So often it's easy to hone in on the technology for technology sake, and she thinks as an industry, we've kind of missed the big picture messaging.

EAC Discussion and Approval of Smart Grid Subcommittee Work Plan

For the white paper, the subcommittee suggests starting with a preface on those objectives and then give a brief overview of the projects for context sake only, staying pretty light on the review, but we thought it would be important at least to put us in a state of the journey. Next, they intend to go into a bit of review of the gaps. And actually, the gap analysis is thought about in terms of ultimately assessing the current outreach strategy, what's happening now, what needs to be done, and then also, in addition, figuring out when improvements can happen. They think that the gaps are really the crown jewels here and can drive incremental efforts. Ultimately, she explained that they want to lay the framework for a multiyear plan, and create a road map to describe the DOE R&D education efforts.

Mr. Cowart asked if they have an approximation for the size of the document. *Ms. Reder* responded that it would be about 10 pages long.

Commissioner Reha commented that the white paper hits the nail on the head. There is a value synergistically with adding the technology in this way and there has been a gap in communicating that value to commissioners. She added that dialogue with NARUC is extremely important.

Mr. Nevius suggested adding information about the work that has been done into the references section, and draw on what has been done rather than developing it again.

Ms. Reder replied that she would be glad to do that, and they have vowed not to recreate anything.

Commissioner Centolella said that there was a real need to get more specific and step up these dialogues. He discussed four specific areas: understanding what reliability will look like in a smart grid world, demand optimization, lessons learned from the implementation method, and cyber security. Commissioner Centolella will be joining the smart grid subcommittee.

Mr. Brown asked about the DOE R&D and education road map, and whether they are considering what could happen once the American Recovery and Reinvestment Act (ARRA) money goes away. *Ms. Reder* replied yes.

Mr. Weedall asked Mr. Paladino of any regulatory entities that are taking on the lost revenue issue. *Mr. Paladino* said that it is in a state of flux.

Mr. Cowart asked for clarification about whether the discussion was about cost recovery for devices or lost revenue from the reduced kilowatt hours, as in a straight decoupling question. *Mr. Paladino* replied that it was a decoupling question, and he is hearing that this is an issue from every utility he has talked to. *Mr. Cowart* commented that it is a good topic to take to the regulators.

Mr. Cavanagh spoke about the C action forum that is taking place within DOE, and that it was important to discuss options surrounding it.

Mr. Lawson said that in the document there is a statement about supporting end use, and what is missing is an identification of cost savings and benefits to the consumer and what those are.

Ms. Reder replied that they could add a friendly amendment to recommendations with some supporting text above around the lines of convening direct dialogue for reliability management, optimizing demand, cascading best practices in cyber, and that might tee up the opportunity to get the right folks involved and cascade a bit more of a vision to, you know, the effort at large.

Mr. Cowart asked if it was appropriate to move it.

Ms. Reder moved to approve.

Commissioner Reha seconded the motion.

The EAC approved the plan unanimously.

Mr. Cowart said they would move into discussion of the workforce piece.

Ms. Reder moved to approve the work plan.

Mr. Sloan seconded

It was approved unanimously.

Mr. Roseman made logistical announcements.

EAC Storage Subcommittee Work Plan Status and Discussion

Mr. Masiello said that the purpose of the discussion is to review the outline for the storage report to congress.

Assistant Secretary Hoffman announced that Dr. Imre Gyuk, DOE OE, was there to participate in the discussion.

Mr. Roberts asked if they should give background on the last storage report to Congress they had done in 2008. The 2012 report will build on the 2008 report.

Mr. Masiello said the legislation was scant about the required content of the report. It is to serve as a report card to Congress. He went over the various sections of the draft outline and who volunteered to contribute to each section. They will be taking advantage of the EPRI handbook and DOE handbook.

Assistant Secretary Hoffman asked that they consider storage from a technology point of view, the different types of storage technologies. In prior conversations in the EAC, there have been talks about what services it provides, and she has struggled with organizing a report via technology versus application service

Mr. Masiello replied that this is why they put applications of storage up front.

Assistant Secretary Hoffman asked if they could look at the market potential and how big the frequency regulation market is.

Mr. Masiello replied that the market potential for different applications should be included.

Mr. Nevius asked how this report would differ from the previous report.

Mr. Masiello replied that the draft outline has comments in the first section talking about updating tables from the first report.

Mr. Roberts added that the 2008 report had targets and goals, near-term, mid-term, and long-term, so there are a lot of things that need to be updated.

Mr. Masiello said they would also incorporate how the storage technologies map to the applications.

Mr. Meyer commented that one of the parallel activities that is going on right now, there is just a burgeoning literature about the impacts of large amounts of low cost natural gas, and the implications for the electricity sector, so that that part of this report is going to get a lot of attention. This is going to be one of the most important subsections of the report.

Mr. Masiello added that cheap gas undermines the time arbitrage and renewable firming value of storage, and sets the price point lower.

Dr. Gyuk wanted to draw attention to several projects taking place at DOE. The first is the international database, which is going online and deals with projects and policies. The next activity underway to develop an interim performance based standard for storage applications, which is intended to be essentially the basis for a future IEEE standard

Mr. Masiello asked if *Dr. Gyuk* could provide the specifics of this.

Dr. Gyuk said yes. Finally, he said that Pacific Northwest Laboratories (PNL) has produced a very detailed paper on the economics of the frequency regulation market, coming up with the conclusion that the structure of the grid requires about 10 percent of the renewables generation to be storage or demand response or something.

Mr. Masiello agreed, and thinks that other studies that look at the issues should be cited.

Mr. Cowart added that they should talk about thermal storage, and many of the services that storage offers to the grid can be accomplished through thermal storage or the smart charging of vehicles. This is a big resource, and the technologies are relatively close at hand.

Mr. Masiello said that the outline deliberately did not list all the technologies, but thermal storage, mechanical storage, compressed air, new variations on compressed air, etc., are all important to consider. The report will draw on accepted references for how technology has mapped applications and discuss what we know of others.

Mr. Cowart said that he is pursuing this is because the Secretary specifically mentioned finding a price point for batteries. Based on current technology, numbers could be named, but what are the price points for managing the times of the day in which we heat hot water in hot water heaters, the price point is different.

Mr. Nevius asked if there was a place in the report to talk about some of the challenges for modeling energy storage in system studies. Are there any unique modeling challenges associated with the different technologies that we're talking about?

Mr. Masiello said there was a place in the report for gaps and evaluation tools.

Mr. Nevius suggested evaluating the economics than the system reliability effects.

Mr. Sloan moved to adopt the Storage subcommittee draft report to Congress.

Commissioner Curry seconded.

The report was approved unanimously.

Mr. Masiello discussed the timeline for each section.

Mr. Meyer said that the calendar year 2012 would be sufficient.

Mr. Kelliher asked about reliable impacts of potential EPA rules, and in particular the pending legislation in the House. There's legislation moving through the House that gives DOE some authority to act to prevent a generator from being in a situation where that -- which law to violate, the Federal Power Act, Section 202, or the Clean Air Act, and that legislation has been approved by the House and it's coming to full committee and it gives the department an important role. He was just curious whether the Department has taken a position on that legislation, and if so, what position they have.

Assistant Secretary Hoffman said that the Administration does not have a position on the bill at this point in time, but she knows that there are some technical comments that are going to be provided to the committee.

Wrap up

Mr. Cowart congratulated everyone on coming to the meeting and thanked all members for their participation.

Adjourn

The meeting was adjourned at 2:45 pm EDT.

Respectfully Submitted and Certified as Accurate,



Richard Cowart
Regulatory Assistance Project
Chair
DOE Electricity Advisory Committee

8/20/2012

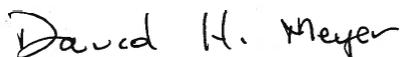
Date



Irwin "Sonny" Popowsky
Pennsylvania Consumer Advocate
Vice-Chair
DOE Electricity Advisory Committee

8/20/2012

Date



David Meyer
Office of Electricity
Designated Federal Official
DOE Electricity Advisory Committee

8/20/2012

Date



Matthew Rosenbaum
Office of Electricity
DOE Electricity Advisory Committee

8/20/2012

Date