U.S. Department of Energy
Electricity Advisory Committee Meeting
Ronald Reagan Building and International Trade Center
Washington, DC
March 5, 2012

Minutes

EAC Members in Attendance

Richard Cowart, Chair
Regulatory Assistance Project

Irwin Popowsky, Vice-Chair
Pennsylvania Consumer Advocate

Rick Bowen
Alcoa

Clark Bruno (Representing Edward Krapels)
Anbaric Holdings

Lisa Crutchfield
National Grid USA

José Delgado

Robert Gramlich
American Wind Energy Association

Dian Grueneich

Michael Heyeck
American Electric Power

Joseph Kelliher
NextEra Energy, Inc.

Barry Lawson
National Rural Electric Cooperative Association

Ralph Masiello
KEMA

David Nevius
North American Electric Reliability Corporation

Wanda Reder
S&C Electric Company

Brad Roberts
Electricity Storage Association

The Honorable Tom Sloan
Kansas House of Representatives

Gordon van Welie
Independent System Operator of New England

Mike Weedall
Bonneville Energy Administration

EAC Members Not in Attendance

Guido Bartels
IBM

Frederick Butler
Butler Advisory Services

Ralph Cavanagh
Natural Resources Defense Council

The Honorable Robert Curry
New York Public Service Commission

Roger Duncan

Richard Vague
Energy Plus Holdings, LLC

Brian Wynne
Electric Drive Transportation Association

DOE Staff in Attendance

Lauren Azar
Office of the Secretary

Anjan Bose
Office of Electricity/ Washington State University

Bill Bryan
Office of Electricity

Caitlin Callaghan
Office of Electricity

Jay Caspary
Office of Electricity

Kerry Cheung
DOE, AAAS Fellow

Michael Ducker
Office of Fossil Energy

Louise Fickel
Office of Electricity

Imre Gyuk
Office of Electricity

Debbie Haught
Office of Electricity

The Honorable Patricia Hoffman
Office of Electricity

Rachna Honda
Office of Electricity

Hank Kenchington
Office of Electricity

Michael Li
Office of Electricity

Eric Lightner
Office of Electricity

David Meyer
Office of Electricity

Doug Middleton
Office of Fossil Energy

Brian Mills
Office of Electricity

Joe Paladino
Office of Electricity

Bill Parks
Office of Electricity

Brian Plesser
Office of Electricity

Matt Rosenbaum
Office of Electricity

Non DOE Staff in Attendance

Tim Bagley
The Bagley Group

Venkat Banunarayanan
ICF International

John Bear
Midwest ISO

Jay Clark
Battelle

Don Digg
Crowe Horwath LLP

The Honorable James Gardner
Kentucky Public Service Commission

Katherine Hamilton
Electricity Storage Association

Tom King
ORNL

Paula Klein
ICF International

The Honorable Cheryl LaFleur
Federal Energy Regulatory Commission

Larry Lamm
SEL

Sheri Lausin
ICF International

Kurt Longo
Federal Energy Regulatory Commission

Janine Migden Ostrander
Regulatory Assistance Project

Phil Mihlmester
ICF International

Gabe Nelson
E&E Publishing

Elliot Roseman
ICF International

John Shenot
Regulatory Assistance Project

Elizabeth Stipniek
Edison Electric Institute

Peggy Welsh
Energetics, Inc.

Welcome and Opening Remarks

Richard Cowart, Chairman of the Electricity Advisory Committee (EAC), opened the first 2012 meeting at 2:00 pm EST by thanking EAC members for coming. Mr. Cowart then discussed the procedural changes that would be taking place for the EAC. First, he explained that ICF International (ICF) has taken over from Energetics, Inc. as the supporting contractor to the EAC. He thanked the staff at ICF for their diligent support thus far, and then asked *Elliot Roseman*, Vice President at ICF, to introduce himself.

Mr. Roseman thanked the Department for the opportunity to work closely with the EAC, and then introduced his colleagues *Phil Mihlmester, Sheri Lausin*, and *Paula Klein*, who are providing additional support on the contract. He noted that ICF has assigned staff technical experts to each of the subcommittee areas, and that these subject matter experts can be utilized by the EAC members to assist in research and producing work.

Next, Mr. Cowart announced that *Sonny Popowsky*, Pennsylvania Consumer Advocate, has agreed to serve as vice-chair to the EAC. Mr. Popowsky has been providing invaluable advice to the Committee for years, and Mr. Cowart appreciates his willingness to serve as its vice chair.

Finally, Mr. Cowart explained to the EAC that a vice chair was to be appointed to each one of the subcommittees. Who will be serving as vice chairs was still being finalized at the time of the March meeting, but all of the subcommittee chairs agreed that it would be a beneficial structural change. *Janine Migden-Ostrander* and *John Shenot* will be providing additional support to the EAC from the Regulatory Assistance Project (RAP), and will be included in the correspondence of the leadership team, which consists of Mr. Cowart, Mr. Popowsky, the Subcommittee Chairs and vice-chairs, David Meyer, Matt Rosenbaum, and the ICF staff. He explained that the leadership team hopes to tackle the issue of providing serious staff support to the committee members, and that the staff from RAP and ICF will lend greatly to accomplishing this. Since the members of the EAC serve voluntarily, it is important to use them for their expertise, rather than ask them to do all the work involved in creating a final work product.

David Meyer, United States Department of Energy (DOE), discussed the roles of the newly identified DOE liaisons. He said that the Department realizes that in order for the committee to be effective, there must be strong working relationships between subcommittees and the relevant staff experts. These working relationships must exist across the Department, and not just within the Office of Electricity Delivery and Energy Reliability (OE). Mr. Meyer stressed that it was the Department's job to ensure this ongoing working relationship between themselves and the EAC. He said that the General Counsel's office is mindful of the idea of subcommittees advising the Department, so all communication between the liaisons and subcommittees must be provisional and go to the full committee before it can become a formal recommendation.

Matt Rosenbaum, DOE, named the staff level liaisons that have been appointed for each of the subcommittees. For the Transmission subcommittee the assigned liaisons are Michael Li and Caitlin

Callahan, for Storage the liaisons are Imre Gyuk and Rachna Handa, and for Smart Grid Joe Paladino and Eric Lightner.

Mr. Cowart reminded the EAC that the next two meetings would be taking place at the Capital Hilton on June 11-12 and October 15-16. He then turned the meeting over to David Meyer and Bill Parks from the Department of Energy.

Update on the U.S. DOE OE's 2012 Programs and Policies and Feedback on EAC 2011 Recommendations

Dr. Meyer spoke on behalf of Patricia Hoffman, and said that she appreciates all of the work the committee did in 2011. They systematically went through all of the work products that the EAC produced, and came up with responses to each action. He told the committee that questions were welcome about the responses. Rather than go through the priorities of OE, Dr. Meyer explained that William Parks would walk them through the broad OE vision, which covers some of the priorities and questions that the Department has identified as vital for the coming year.

William Parks, DOE, noted that the Department was present at the EAC meeting in force. He mentioned specifically Brian Mills, Hank Kenchington, Jay Caspary, and Anjan Bose.

Next, Chairman Cowart introduced Commissioner Cheryl LaFleur. He said that he has already come to see Commissioner LaFleur as a member of the EAC rather than an honored guest, and that now via an arrangement with the Federal Energy Regulatory Commission (FERC), she will be the official point of contact between FERC and the EAC.

Commissioner Cheryl LaFleur, FERC, spoke about her role on the EAC. She stressed that she will not be a voting member, rather an observer who can involve as many relevant FERC commissioners in the dealings of the EAC as she can.

Mr. Cowart thanked Commissioner LaFleur for her willingness to attend the EAC meetings and facilitate the coordination between FERC and the Department.

Mr. Meyer then discussed the new members that are in the process of being appointed for the June EAC meeting. They membership package is being processed by the Secretaries staff currently, and they are doing as much as they can to expedite this process. The department is mindful of the need for more expertise in certain areas to strengthen the committee as a whole. With that he introduced Mr. Parks, who discussed the broad DOE grid vision.

Update on DOE's Vision of a Future Grid

Mr. Parks presented "Visioning the 21st Century Electricity Industry: Outcomes and Strategies for America."

The last time he addressed the EAC, he spoke about what was being done internally at the Department as well as a vision for what the grid might look like in the future. His objective during this meeting was to give a status report of what has been done. On the subject of the future grid, public meetings have been held and they made sure that it was a focus of the 2012 National Electricity Forum. He said that several

questions had been asked that ranged from what should the future grid look like, to how to enable consumer participation. The issues are further complicated by considering what the various roles of industry, regulators, and the DOE should be. Mr. Parks explained that these are issues that would be very pertinent for the EAC to provide insight as they move forward on these complex issues and processes.

He brought up the Grid Technical Team, which has representatives from DOE, Office of Science, Advanced Research Projects Agency-Energy (ARPA-E), the applied programs, the EERE, Fossil Energy, various OE groups, and special advisors. This team is beginning to expand its presence by communicating from a broader perspective about grid issues than any single office. He underlined that the balance of policies, market and technologies in this effort is shaping the power electronics projects and some grid related activities that are coming out of ARPA-E. Mr. Parks reiterated that the most important thing is to consider how these things play into the DOE structure, as well as how to get them into the marketplace.

Next, Mr. Parks talked about the increasing changing supply mix, demand transformation, grid complexity, and infrastructure vulnerability. He explained that all of these things have been increasing in a nonlinear way over the last decade, and that there is connectivity between all of them. Despite all this complexity, the Department has put together a straw vision and they have been collecting stakeholder feedback on it from the National Electricity Forum (NEF) participants and participants of the public meetings they have held. He said that they are going to gauge the need for additional regional meetings and would love suggestions on how to engage. Looking across the entire department, these initiatives compliment the 2013 budget; the end goal is to have an implementation plan defined and laid out.

Mr. Parks mentioned specifically the Grid Initiative Workshop that the Power Systems Engineering Research Center (PSERC) put on for OE. This meeting examined credible scenarios for the future, and considered what the architecture would look like to get there. The workshop took an academic approach to the issue, which complemented the meetings and other outreach that have taken place. Additionally, PSERC is has been putting on a series of seven workshops/ webinars, the result of which will be a public meeting in June in Washington D.C.

He showed the DOE strategic plan, which includes some short term goals for OE in particular and the broad Department goal of 80% clean energy by 2035. He said that despite robust conversations around it, the vision has not changed since the EAC saw it several months prior. Mr. Parks asked that the EAC provide feedback on the comprehensiveness of the vision, as well as the validity of the statements within it. He highlighted a few of the complexities of the vision to the EAC. He spoke about the microgrid work within OE, and the joint efforts they have worked on with the Department of Defense (DOD) through the Smart Power Infrastructure Demonstration for Energy Reliability (SPIDER) program. He also spoke about the SunShot Program, which looks at Photovoltaics (PV) and the ways to make advancements and get it to market.

Mr. Parks then discussed centralized systems, and the important questions to consider that surround them. People are curious as to what they look like, what they are comprised of, what gen-sets will look like in the future, what are the small distributed natural gas-fired vs. other fired systems, and how does all of this come together? He explained that the data coming out of synchrophasers are providing some of the answers to where each piece fits in. One major thing that has been discussed is seamless integration, which means different things to different people explained Mr. Parks. One way to describe

seamless integration is a system that takes all the electricity issues, all the data issues, and all the pricing issues and merges them into way that works without creating vulnerability within the system. This mandates having a system of nodes that protect cyber information, as well as protection for physical infrastructure. Furthermore, all of this must be customizable to a variety of situations and regions. The EAC could provide insight into these questions.

Next, he spoke about the AC/DC hybrid systems and associated solution sets. Questions surrounding this include: can existing be retrofitted now to avoid the issues with siting, how does DC work at the distribution level, can efficiencies be gained by having inverters throughout the entire system, and how should the different kinds of linkages be thought about. The complexity of regional diversity in this case is critical. Mr. Parks spoke about how regional diversity can mean different things to different people, and discussed an approach that acknowledges that many of these definitions will invariably come into play at once. Moving forward with all of that in mind is a major goal of the Department.

He spoke about the 2035 goal of achieving 80% clean energy, and noted that reaching this goal will require a lot of different kinds of technology. This goal is very crucial and will require them to take a hard look at what consumers really want, and how they play into this. Looking at the budget, it is clear that Smart Grid investment will continue to be a priority. Additionally, Mr. Parks mentioned six areas of focus that the grid tech team identified: Smart Grid, renewables integration, advanced modeling, energy storage, power electronics, and cyber security. For smart grid, he spoke of how investments can be translated into benefits, and what comes next in the smart grid world. For Renewables integration, he spoke about the various mandates that currently exist, and inquired about how these will be met. For advanced modeling, he spoke about how the OE budget and Science budget would be increasing in the smart grid requests for 2013. For energy storage, he explained that Imre Gyuk would be going more into depth on the topic in his presentation to the EAC the following day. He added that there is coordinated efforts taking place with ARPA-E that links the work coming out of the battery hub and transportation. For Power Electronics, he said that they continue to see promise, and there have been some breakthroughs recently that could lead to some advanced components that are not even seen today. Lastly, he explained that cyber security is an issue that is continuing to grow, and therefore has a strong presence in the OE budget.

Mr. Parks discussed the other factors that tie into this, noting economics, regulations, consumers, analysis, and planning. He explained that how these things are prioritized in a post ARRA world is going to be really important. Who is going to pay for what and how will these things be engaged by the private sector, and he hopes that conversations like these will provide some of these answers. He spoke about the Energy Hub model as an example; it is both defined in the 2013 budget, and there is room for people to bid into it. For Power flow, he explained that the vision discusses the different regulations on both sides of the issue, and how those will eventually merge. Currently in the utility world, there is no desire to be first, there is no desire to be an innovator in the field unless there is a commercial guarantee, because they are putting themselves and their consumers at risk in a real world situation. He explained that the question becomes how can we get innovative things out there to test them and push the technology envelope in a way that fits into the actual market.

The blurring of transmission and distribution presents a lot of challenges and a lot of opportunities for innovation and for research. Mr. Parks explained that this is a big request coming out of the OE side, with support from the Grid team, to look at what is coming next. This is something he pinpointed as a focal point for the Department. He closed the presentation by talking about the next steps: continue this

dialogue, develop a vision document that continues to put stakeholder input in, decide exactly how to take regional input and deal with it, and then look at how to move forward via development implementation strategies. He thanked the EAC members and asked if anyone had questions.

Dian Gruenich, Morrison and Foerster LLP, asked Mr. Parks to clarify the 2035 vision of having 80% clean energy. Is natural gas included within this definition, and is the 80% down to the level of each utility or each state or other?

Mr. Parks responded that 80% is a national goal of the Obama administration that was incorporated into DOE's strategic plan. This goal includes everything from natural gas to clean coal. It uses a very broad definition for clean energy, with an overall goal of moving toward a less carbon-intense future.

Ms. Gruenich followed up by asking if there was any goal on the demand side that complemented this.

Mr. Parks replied that there is not a broad, national-level demand goal that he is aware of. People have talked about different issues and efficiency, and he explained that the simple answer is that none exist on a broad scale. He spoke about a few things that have been done at the state and regional level, using Hawaii as an example. Hawaii set up a 40% Renewable Portfolio Standard (RPS) and a 30% energy efficiency goal at the same time, together they are supposed to achieve a 70% clean energy rate. This debate has not been settled at the national level yet.

Ms. Gruenich said that she is worried about the vision translating into and implementation plan if there is no inclusion of a vision plan on the demand side.

Mr. Parks agreed that she raised an excellent point, and said that he would agree with her completely that efficiency can be very productive. They have demonstrated this though the work they have done with California and Hawaii. He said that how this is done, how it is structured, and how the benefits of it are all important. He thanked Ms. Gruenich for raising this issue.

Mr. Meyer added that when they talk about an implementation plan, it is strictly a set of next steps for the DOE. He explained that they want to emphasize that the vision is a dialogue, a process that they must work with others to fully flesh out. He said that the document Mr. Parks presented is in no way prescriptive, as so many other factors will have to be considered. The Department thinks that it is important and valuable to take it out to the regional level and enlist help from various people on it; once it is executed at the regional level it is going to vary drastically from area to area. He delved into the point further by talking about the specific issues that arise out of each region. The resources, concerns, and opportunities specific to that region will affect the approach that is taken. It will be critical to learn what works why in different areas, and to pay attention to anything that is common across regions.

Mr. Parks added that he had not intended to make it seem like clean generation was the only focus. The demand response side of the situation and the efficiency side must be evaluated in tandem. Energy efficiency investments must be cost effective enough to be deemed worthwhile. He talked about serving on the original California Alliance for Distributed Energy Resources (CADER) in the mid '90s, and it is interesting to see how these issues have evolved.

Mr. Cowart asked to what degree does the Department consider the vision ground-proofed? Is there an extent to which are all the ideas contained within it being tested or modeled against physical reality, or is it just a collection of visionary concepts?

Mr. Parks responded that as of now, that is unknown. When they issued the 2003 vision, it had the beginnings of smart grid laid out, and the Phasor effort, and PMU development. The vision provides a record, and allows for a sense of prioritization to emerge. He stressed the importance of having these topics be well vetted and discussed by a variety of people. The goal is to identify elements that are truly common, regardless of the scenario in the future, and to emphasize these.

Mr. Cowart then began taking questions from the members of the EAC.

Michael Heyeck, American Electric Power (AEP), gave kudos to Mr. Parks and the Department for putting out the vision document. He said that he was really intrigued by the concept of blurring Transmission and Distribution (T&D), as it is actually the blurring of everything. Mr. Heyeck wanted to focus on the area of Power Electronics. He does not believe the vendors are doing enough in this area. An issue is the useful life of power electronics, which is about 20 – 25 years. The elements in between are very efficient, but the Power Electronics themselves are very "loss-ey". This is one of the areas of interest that the Transmission subcommittee plans to address, so he asked Mr. Parks to comment on what specific areas in Power Electronics the Department is going to tackle.

Mr. Parks thanked Mr. Heyeck for his comments. He said that the Department, and ARPA-E in particular, have been issuing awards in the last couple of years that indicate what the primary focus has been on. He said that it is an area they have a great deal of interest in, but for which a clearly defined roadmap has not been created. He agreed that collectively with the component developers, they need to spend more time thinking about how to build a critical mass in this space. There are really great projects that are going on, but no real dedicated campaign at this point. Mr. Parks stressed that part of the current discussion is how to move towards this.

He said that power electronics may be the weakest area in terms of funding and robust research. Internally, some things have been put out to test and discussions have arisen from this, but no roadmap or goal has been set as a result. Recommendations from the EAC would help guide the development of a roadmap in this area.

David Nevius, North American Electric Reliability Corporation (NERC), asked Mr. Parks to elaborate on what he meant with the phrase "operating closer to the edge." Specifically, he wanted to know if Mr. Parks meant full utilization of assets or compromise of reliability.

Mr. Parks replied that this phrasing scares a lot of people, and what they really mean is better utilization of assets. Is the reliability that has been counted on up until this point the same as the reliability that will be needed in the future? The intention was not to put anyone's system at risk in this discussion, but rather to put effort into identifying predictive tools that will allow people flexibility in asset utilization.

The Department is interested in the reliability we count on in the future, and what can we learn about predictive tools that allow people flexibility. Getting a balanced view of what the entire needs are is difficult when, for example, a person continues to electrify all personal devices, and their power quality

needs go up. The question becomes what are the requirements and how that impacts reliability needs. Mr. Parks explained that comprehensive solution sets do not exist yet.

Mr. Nevius added that the individuals who request lower fees for less reliability, usually only say this until they experience a power outage.

Mr. Parks agreed.

Lisa Crutchfield, National Grid USA, thanked Mr. Parks for his presentation, specifically for the overview he gave regarding where the Department and the administration want to go with respect to the 2035 clean energy target. She explained that the European Union (EU) is about 10 years ahead of this goal, particularly the United Kingdom and some other developed countries. She suggested that it may be beneficial for the Committee to hear about how far along some of the countries in the EU are to achieving their goal, as well as what technologies are prevailing and what is enabling them to get closer to their target.

Additionally, she asked about a slide Mr. Parks had presented that showed a map of RPS, where the states are colored in terms of RPS goals. A huge portion of the country in the south and central sections seemed to have no goal and were white, and she asked how the Department was engaging these states.

Mr. Parks said that the first question she asked was actually much simpler to respond to than the second. He and Patricia Hoffman met with the planning group of the EU several months before the EAC meeting, and he absolutely encourages having them come in and address the committee. They gave a great talk, and the resulting conversation lasted about four hours. He explained that there are a lot of similarities in trying to put 42 countries together, than there is in trying to put 50 states together. They witnessed more similarities in the efforts than differences. Having the actual carbon mandate was a tremendously different driver, and changed the economics of the situation considerably. Mr. Parks said that there was mutual agreement to continue to track one another, as this is the best example of what can be benchmarked in the world. There are great lessons to be learned, such as the benefits of offshore wind, argued Mr. Parks.

On the other hand, the list of challenges they have identified is also similar to that of the EU, and rather daunting. It is important to recognize the vastly different circumstances the US is in than is China or the EU, especially in terms of our legacy system. He explained that their ultimate goal is to do what is best for the consumer and ultimately the use of that legacy system. The lack of a National goal is indicative that there is currently no consensus on what a clean energy future looks like. He spoke about the importance of a portfolio approach rather than picking a single course of action. If the decision is made to export LNG, then this will be a very different game than natural gas combined cycles, and the complexities must be understood before everyone goes for this technique.

In response to Ms. Crutchfield's question about the RPS slide, Mr. Parks said there are places the Federal government will be able to be effective, and places where it will not. Attempting to tell California, Alabama, or New York what to do would not yield success, yet the debates and discussions that make sense within those regional presences is worthwhile for the DOE. It is healthier to go forward in a non-confrontational way. He used work he had done in Texas and California about NOx reductions as an example of occasionally having to reevaluate and move forward on other reductions, rather than pay an astronomical amount. He explained how necessary it is to differentiate what is achievable.

Wanda Reder, S&C Electric Company, applauded the effort to get consensus on the vision and make such an aggressive outreach effort. She asked him to expand upon two different areas. First, she asked him to delve into the topic of consumer engagement, the criticality of it and how they expect to roll it into the vision itself. Secondly, she asked about the lessons learned from the $4 billion for Smart Grid stimulus money, and how that will impact the Department's effort.

Mr. Parks explained that there are several awards in the Smart Grid that looked at the consumer side, and that these are being tracked carefully. Additionally, a team has been tasked with compiling the lessons learned from the consumer benefit side of the Smart Grid investments. In terms of consumer engagement he said that they have had mixed successes with workforce education issues, and that the consumer benefit side is receiving funding from Congress and others. He explained that the role of the DOE in this issue is still undefined, and a significant ground swell will need to occur before a consistent view emerges.

Hank Kenchington, DOE, added that on the smart grid investment grants and demo projects, they are trying to collect data on the projects, the cost, and the benefits, and provide case studies of them. He went on to talk about build impact and the build matrix, and what overall benefits the various technologies, configuration, and architecture will have on the consumer and the utility. Consistency in documentation is something he identified as crucial. This leads to an ability to measure benefits and compare where it makes sense to deploy what technology where. Additionally, they are hoping to release a progress report within the month following the EAC that gives an update on what has been done thus far.

Mr. Popowsky asked Mr. Parks to clarify what he meant by clean coal, and whether or not that included carbon sequestration.

Mr. Parks said that it did include carbon sequestration.

Mr. Popowsky asked what the extent of the greenhouse gas (GHG) reduction by 17 percent by 2020 and 83 percent by 2050 entailed.

Mr. Parks clarified by saying that the goals in his presentation were in DOE's strategic plan that was released in 2011, and are the overall energy goals for the nation.

Mr. Popowsky expressed a concern for how feasible it will be to get 83 percent reduction by 2050.

Mr. Parks agreed that it was a very ambitious goal. He said that once they see short term impacts of things, such as carbon regulations, they can gauge how these will affect the long term reduction targets. For implementation, they want to know how holistically five-year increments can be evaluated from the electricity sector side. Ultimately, they must consider how the goals of the Department tie into the goals of the overall Administration.

Mr. Cowart asked if the ultimate intention for the National vision for the Grid of the future is to meet all the goals Mr. Parks mentioned.

Mr. Parks replied that it is to be determined depending on whether the vision is made to be a public or private one, and what jurisdiction the DOE will have.

Mr. Cowart followed by asking if this could be considered a process for a vision.

Mr. Parks agreed with this terminology, saying that eventually they hope to develop a vision with actual milestones for the public and private sectors. DOE would then have a subset of those milestones that would be comparable or more aggressive than the private sector's action items. The vision as he presented to the EAC is not the complete answer, but internally the DOEs metrics are focused on achieving the goals outline within it.

Mr. Meyer said that this feedback and discussion verified the value of this approach. The intention is to be holistic and identify the extent of the complexities. It is important to discover where the disconnects and colliding points exist in order to figure out their internal priorities. The Department has a huge task in front of them, and limited resources to complete it.

Mr. Parks agreed with Mr. Meyer and said that the hope is that the sum will be greater than the individual parts. DOE will be able to contribute to what is hopefully just a subset of the totality of the effort to reach these goals.

Mr. Cowart asked if it would be worthwhile for the EAC to have more in depth discussions and / or workshops around the vision. Given the talent and expertise on this committee, it seems like a wasted opportunity to not have a more robust lengthy conversation.

Mr. Parks replied that having a dialogue would be very helpful.

Tom Sloan, Kansas House of Representatives, asked if they had thought about who their target audience was for how to disseminate the lessons learned from the various stimulus project reports. A technical summary may be appropriate for the utilities but not necessarily for the National Governors Association (NGA) or the NARUC Regulatory Community. If these lessons and benefits are translated, then policy makers can put additional pressure on their utilities to encourage them to do this. In order to be effective, the Department must get the message to the correct audiences in order to elicit behavioral changes.

Mr. Parks admitted that the DOE was historically bad at this, since they are technocrats, and guidance they have received from the Hill is to stay away from this space and be exclusively science oriented. Smart Grid activities have been the first step towards broadening this impact, and is something that needs to be taken advantage of. Young people need to be inspired to take on the mission and pursue it via higher education.

Mr. Cowart said that he was surprised that the portion of the presentation that covered smart grid and consumers did not mention rate design. For some of the smart grid pilots, the department is looking at rate design as a component for the consumer interface. He asked Mr. Parks to comment on this.

Mr. Parks responded that there is not one single DOE answer to that question. In some cases, people within the Department have worked with NARUC and NGA, and in others people have been working

with the individual states on efforts such as SunShot. It has been more of a technology or single focus implementation than an orchestrated effort.

Mr. Cowart suggested that this be a topic they discuss further. He said that the technology of the Smart Meter is useless without a consumer interface that is delivering information that consumers can use and become motivated to act on. This is one element of Smart Grid capabilities, and should therefore be included in the vision.

Mr. Parks agreed that it is crucial. Because it is at the state regulated distribution level, the federal government cannot facilitate discussion without sounding proscriptive. He said that advice from the EAC on this would be helpful.

Mr. Kenchington said that this would be a great question for Joe Paladino, who would be presenting to the EAC on the second day of March meeting.

Mr. Meyer explained that this problem is even bigger than it seems. A lot of the action the Department is interested in is at the intersection and the blurring between the transmission and distribution spaces. Currently they are developing some well-defined institutional mechanism for doing transmission planning, yet there is nothing comparable to that on the distribution side. This transition has raised a lot of questions that there is no ideal institutional way of dealing with yet. The issue is bigger than consumer education alone.

Here Mr. Cowart took a minute to welcome Assistant Secretary Patricia Hoffman, who had just arrived.

Ms. Crutchfield spoke about coordinating rate design to advance Smart Grid. Regulators utilize NARUC to share information, and it is important to pass information about the smart grid pilots on to NARUC as quickly as possible. Regulators love adopting ideas from one another, so if there is a rate design that enables quickly deploying technology, that message should be shared with NARUC immediately. Additionally, the Edison Electric Institute (EEI) has a rates committee where rate policy is shared often. This committee could learn from the evidence of the pilots as well. She suggested having representation from NARUC, EEI, and the American Gas Association (AGA) at an EAC meeting so that they can hear everything the Department has underway.

Mr. Parks thanked her for her comments. He said it is important to remember all the impacts that affect the consumer, and how this alters the final price tag. Controlling the impact on consumers is a priority.

Gordon Van Welie, Independent System Operator of New England, was concerned that the DOE was putting too much burden on itself in the straw vision. He said that the Department has set goals for itself that should be goals for the entire country. The Department neither holds the purse strings nor can build the infrastructure required to make this straw vision come to completion. He went on to say that the DOE has a unique vantage point to know what is going on across the country and become in many of the activities, but should take the role of scorekeeper. A mix of individuals from the public and private sector will embrace what recommendations are being made, while at the same time a mix will not. The vision should be for the country to achieve a certain objective and to subsequently define the specific role of the Department in achieving that.

Mr. Parks responded that this was a great point. This vision started as an internal discussion, and the reason for involving stakeholders is to figure out how to make it a national one. The majority of the investment that is going to change the Grid in the future is not going to come from the DOE. He explained that the goals he presented came out of the DOE's strategic plan, rather than being defined as goals of a national energy plan or as private versus public sector goals. This is not a national energy plan, and should not limit what the nation does.

Mr. Van Welie replied that the issue still remains in how the department plans to achieve these goals. The answer will have to be that the Department cannot achieve them on its own. There is a general consensus that the nation must move towards cleaner energy, but it is the details of how to do so that is still argued. Rather than making these date-specific goals that the Department is imposing on the industry, it should put out a road map that shows what will need to take place for the nation to reach them.

Mr. Parks agreed that the message will need to be clearer. He believes they are in agreement that the vision needs milestone to measure, but that these need to be set up without turning people off. He said that it would be helpful for the EAC to help with this messaging and figuring out how to walk this line.

Ms. Grueneich raised the issue of whether this is a top down or bottom up issue. A lot of valuable work has gone into this vision, but she argued that DOE does not have the jurisdiction to implement nearly 99 percent of what is in it and after the stimulus money is gone they will not have the means to incentivize either. She suggested staying away from words that make the effort appear top down, like plan and implementation. Fundamentally she agrees with each goal presented, but asked what the plan to reach them looks like. Defining the role of the states versus the regions and how to get them to embrace the vision is a necessary step in making this vision actionable. Ms. Grueneich said that the Department must address issues such as how substations will have to be changed, and how the grids will operate. She ended by promoting the notion of DOE re-adopting the policy of having technical assistance in regional areas as a method of achieving this vision.

Mr. Parks stated that there was more agreement than disagreement in this discussion, and it has been incredibly informative. He spoke about the traditional boundaries of federal and state as an example, and asked if it is the same as it once was or has it been redefined. Dealing with these types of jurisdictional boundaries is something that the DOE would like to help facilitate in a constructive way. He explained that there will not be a single national answer due to the legacies, constituents, and activities that vary across the country. He emphasized the need for regional solution sets, and creating dialogue about the role regional entities play. The regional offices that used to exist primarily acted as grant application offices, and posed the question to the group that perhaps a different regional structure is needed than the one currently in place.

Mr. Sloan said that if DOE and FERC and the Regional Transmission Organizations (RTO)/Independent System Operators (ISO) focused on line losses and other technology driven issues, it would save the consumers money. He expressed that this would enable them to manage costs from the front end, which involves more of the infrastructure, federal agencies, and regional organizations. He said that future generations will be more adept managing their electric use on an hour by hour basis, but in the interim it would be beneficial to focus on the big players and how to stimulate the investment to manage the system better.

Mike Weedall, Bonneville Energy Administration, expressed the importance of reaching out directly to utilities. He explained that a lot of companies are reinventing themselves in anticipation of the future, and the DOE should make sure that they keep these issues in mind as they do so.

Mr. Parks spoke about his work with Hawaii, saying that the three things they focused on balancing were a healthy utility structure, protection of consumer interest, and opening the market to new technology solution sets. Thinking about what the utility future business model will look like is really important. Additionally, in the telecommunications world, some companies have totally reinvented themselves. Knowing that the Department is looking at the development of these new business models will hopefully stimulate the discussions that are taking place.

Commissioner LaFleur said that there is a lot of value in this vision that is not necessarily tied to acceptance of the 80 percent clean energy standard. She referenced a chart of states Mr. Parks had shown to the EAC and said that it demonstrated that this is a very complex ecosystem with a lot of different decision makers. Despite this, there are a large number of initiatives occurring that DOE and the vision could be a contributing facilitator of. She mentioned renewable portfolio standards and smart grid at the distribution level as specific examples. Through Order 1000, she expressed a hope that the whole country will be doing regional transmission planning. Regardless of the actual clean energy and carbon reduction targets, the work DOE put forth in the vision is facilitating these efforts. These efforts are dependent on FERC determining how these renewables will be integrated into the grid and so forth. She ended by encouraging everyone to think about the overarching mega goals, rather than being caught up in individual opinions.

Mr. van Welie built on the Commissioner's comments by asking how the Department can create a vision that can survive multiple administration changes. Creating an architectural vision that creates consistency in the discussion can be the foundation on which to form a national energy policy.

Mr. Parks agreed with Mr. van Welie, and said that they want the vision to have a life beyond the present. It is important to create a dialogue that has consistency and creating a conversation and infrastructure collectively will help move the vision forward. He said that failing to do this in the past has created more expenses in the end.

Mr. Cowart commended everyone for their participation and for making the conversation fascinating. The Committee seems to be in agreement about not leading with precise goals, since they are not necessary to the underpinning of the document. More important to the vision is a clear statement of direction, than statements about dates and percentages. In addition, it has to be about more than technology. In the presentation there was a triangle, which said markets, policies, and technology. Market innovations, design innovations, and relevant policies are all necessary complements to the technology piece. In many instances, neither the technologies nor the policies are within the definition of DOE or FERC, and rather lie with the states, but it is still okay to include these pieces in the vision.

Jose Delgado asked what the main objective of the smart grid is. He explained that he has heard claims from every direction thus far, including energy savings, lower prices, and clean air from carbon. This is too much to demand from one set of technology. There needs to be a very strong, successful example that will provide a specific goal to work for. He said that this goal would likely be different depending on the place. In some areas where there is a lot of access to solar and wind, integrating these may be the goal, but that will not translate nationally.

Mr. Parks thanked Mr. Delgado and addressed a few specific points from his comment. First, the smart grid definition is not universal; rather it is used broadly to mean many things. Secondly, specific demonstrations of things have been used to move the ball forward, and he agreed that this tactic should be utilized here too, but not at the cost of synergies between certain areas. The specific short-term deliverables should be identified, and characterized within a bigger frame work with suggestions for how to lead the effort. He said that the combination of all this could lead to the development of a public/ private roadmap or set of activities.

Mr. Delgado followed with a comment that this approach will continue to confuse the public and private sectors. He argued that not having a specific definition of what a technology is will ultimately limit the deployment of it. He emphasized that vagueness can be deadly.

Mr. Parks responded that this was a good point. If 10 or 12 subjects could be moved meaningfully, then it would have an impact on the national vision, but he agreed that they must work towards getting specific demonstrations and activities to occur.

Ms. Hoffman responded that the committee could spend a lot of time debating the smart grid, but that it is already out there. The question then becomes is it delivering the value that was expected. Ms. Hoffman argued that value is coming out of it and listed examples of where this is the case. These examples are not ubiquitous across the United States, mostly because they are tailored depending on the business and growth of the utility. She expressed the belief that if you take many of the different examples of funding that has been deployed, it shows exactly how the utilities are fitting that technology and creating innovative solutions within their boundaries. In some cases, the utilities are being proactive in how to be sustainable past the stimulus funding.

Mr. Delgado thanked Ms. Hoffman for her comments. He agreed that the big nationwide goals may not justify the technology, but rather the tangible smaller scale examples that have measurable value. His main point is that it is ineffective to make a lot of generic promises about the technology instead of identifying that it has been applied successfully and smartly in many different places. These success stories need to be highlighted in a national way.

Mr. Heyeck expressed concern about getting stuck in what can be done currently versus what can be done in the more immediate future. He said that he is okay with the chaos, but that it is correct to think about having top down goals with metrics and identified years. It would be beneficial to have a conversation about what ARPA-E is doing currently, such as the Smart Wire, transformer, and DC circuit breaker. He reiterated the need to explore these areas and have conversations about them despite how chaotic they might be, as the wealth of information available can enable the US to be world leaders these areas.

Mr. Parks thanked everyone for their comments and said that due to the complexities of the issue, the conversation should continue. The contributions of the EAC will be helpful as the DOE attempts to create their public/private vision.

Mr. Cowart said that the EAC seems to be interested in hearing from the Department on the results of ARPA-E projects at future meetings.

(Here they took a short recess before reconvening)

Discussion of Establishment of Ad Hoc Workforce Working Group

Mr. Cowart congratulated Wanda Reder for her recent elevation to Institute of Electrical and Electronics Engineers (IEEE) fellow, and then invited Ms. Hoffman to address the EAC.

Ms. Hoffman thanked all the EAC members for their attendance and participation over the course of the year. She spoke about the time they spent time working through all the EAC recommendations from 2011, and referenced the responses that were put together from the Department. There are very specific things that she expressed wanting to speak to the EAC about, with security being the first that came to mind. Her objective is to drive these issues forward, and seek feedback about additional issues that the committee as a whole was interested in addressing.

Ms. Reder began her presentation about workforce development. She was thankful to follow Mr. Park's presentation on the future of the Grid because of all the pertinent points raised during their discussion. The purpose of the presentation was to suggest that an ad hoc working group form under the EAC that looks at the changing landscape and put forth recommendations to address the workforce issues.

About five years ago, the National Science Foundation (NSF) worked with the Power and Energy Society and others to put on a workshop, which yielded a whole host of recommendations. At that point, the Center for Energy Work Force Development (CEWD) was forecasting that about 50 percent of the work force in the power and energy space predicted to attrite or leave the industry in a five year period. Since that prediction, the number has been incrementally increasing. This became the call to action in creating this ad hoc working group, to investigate if there is enough pipeline in place in anticipation of so many people leaving the industry. Demand is increasing and infrastructure is aging, but at the same time the trend towards people exiting the industry is increasing.

Additionally, she spoke about how modernization aspects and the digital economy is creating concern about the work force readiness and preparedness factor. FERC has stated on multiple occasions in long term reliability assessments that reliability could actually be at stake because of the competencies and wherewithal in place from a workforce perspective.

All of this culminated in a report published in April 2009. She explained that at the time of this report, they forecasted a need to double the rate of personnel in the pipeline in anticipation of attrition, and this lead to six fundamental recommendations. Three of the recommendations focused on scholarships and internships to attract the best and the brightest students who are already immersed in the technical engineering field to some degree. The other three focused around education infrastructure, namely recognizing that the demographics of those that are teaching are also skewing and looking at retirement, and creating centers of excellence. This 2009 report contributed to the stimulus dollars that went into the Smart Grid education effort, with $100 million of the stimulus going towards education.

The Power and Energy Society created a scholarship / internship program where they continue to look for private sector funding in order to attract students into this domain. She said that there are many initiatives underway that stemmed from this work, but today new issues are emerging and the education, skill set, and development must be addressed in the existing and emerging workforce in order to combat these new challenges.

She mentioned interoperability, cyber security, grid reliability with increasing complexity, data and monitoring, Phasor Measurement Units (PMUs), bidirectional and multidirectional power flow on the distribution side, DC, power electronics, and more. She said that the question becomes what is the recognition as this landscape changes and how are we looping that back into the work force that is being developed now. More importantly, is a workforce being developed that can position our nation as leaders in this space?

In the last five years, a great deal has changed. The economy forced individuals who had planned on retiring not to, and this is continuing to be delayed. The forecast that 50 percent of the workforce would be leaving for retirement is being altered. The number of jobs within the industry has actually decreased by 11,000, rather than increasing by double as was predicted. The average age of the workforce continues to increase, but incumbents are not necessarily being brought in. Ms. Reder said that what must be assessed is whether a problem actually exists, and if it possible that an even larger problem than predicted is building and it is camouflaged. Anticipated jobs have not been incrementally added, so bringing people in and retaining them is more difficult than predicted. Also, there is a predominant phenomenon of outsourcing rather than doing work in utilities.

She pointed out that understanding the balance of where work is being performed is a crucial element in assessing the workforce issue. Looking at the education side however, the power engineering academic community is aging and needs to be a concern. Teachers are observing emergent student interest in green jobs, along with a passion for areas where there is a large societal impact. She said that the issue with assessing these areas, is whether or not the information is being shared appropriately. Next, she spoke about competency requirements for emerging areas. When considering the education piece of this issue, it is important to make sure that curriculums are connected to the effort.

These new pieces set the stage for a few questions that she hopes the working group can address. First, what are the impacts to all of this changing landscape, and should course corrections be made. Next, revisiting the past recommendations is a critical step. Also, it would be useful to evaluate how the programs that have been launched are connected, and whether or not they are being leveraged to their maximum potential. Finally, she spoke about the amount of time it takes to develop a pipeline, and so looking at the attrition rates in spite of later retirement is important as well.

All of this should eventually be brought together in a collaborative plan or effort that maximizes effectiveness. She proposed that EAC members as well as outside experts with a background in this area evaluate the issue in lieu of the changing landscape issues, and provide recommendations on how to go forward. Figuring out what DOE's role in this, with respect to other departments will also be interesting to frame. She told the committee that she looked forward to their comments.

Mr. Cowart asked what she envisioned as the next steps.

Ms. Reder responded that the next steps would be to put together an ad hoc working group that included EAC members, NSF members, and others. From there, she argued that a quick assessment of what already exists in terms of initiatives and programs would be useful. There has been talk about doing another workforce workshop with the NSF as a venue to pull all of these things together. She thinks that a good place to start would be with the CEWD efforts and the assessment they had done.

Education recommendations that would be required in order to address the most critical aspects of changing elements and security interoperability will also be a large portion.

Mr. Weedall agreed that this is an incredibly timely effort. He said that the problem is increasing and will likely erupt once people begin to leave industry. No matter how many bright minds are brought in, institutional knowledge is detrimental to lose.

Ms. Hoffman commented that this is a wonderful idea. She had a few recommendations for the ad hoc working group. First, bringing in people for the Department of Labor (DOL), Department of Education, and NSF could come to an EAC meeting and go over some of the activities and strategies that their agencies have in their path forward would be useful. That way this committee could provide feedback to relevant individuals, as well as gather insight from the Work Force grants that are already underway. She also said that having graduate students go into high schools and encouraging students to get into this career field has proven effective, as they are better able to connect with this demographic. Knowing how to encourage efforts like this, and creating partnerships between the utilities and the universities and community colleges has to be a part of this dialogue. Another piece that must be worked on are building the centers of excellence and their capabilities in a way that leads to universities and utilities sharing data. Setting up the rules for how to share sensitive data with utilities from a research point of view and getting value out this should be a piece of this discussion as well.

Barry Lawson, National Rural Electric Cooperative Association (NRECA), asked about the logistics of how this working group would fit into the structure of the EAC, and who it would be advising specifically. If it is advising the DOE, what will the DOE's role be in the working group.

Ms. Reder said that she would be interested to hear Mr. Meyer and Ms. Hoffman's response to this question. The challenge has been achieving a cohesive direction on this issue, as it spans so many areas. How the working group is organized is something she thinks Mr. Meyer could have insight about.

Mr. Meyer responded that the committee is aware of how critical the electricity sector is to the national economy. This fact is not as apparent to the DOL or Department of Education, and so it is important that the DOE make it a priority to elevate this strategy, without encroaching on their role.

Ms. Hoffman responded that there is a need to continue to develop the partnership between utilities and universities and information sharing. Under Energy Project Assurance Corporation (EPAC) they did a workforce assessment for the trade skills and the retiring workforce, and this needs to be reevaluated.

Mr. Lawson asked how the EAC as a group are going to function in this role without duplicating past roles and studies.

Mr. Nevius commented that there is an activity called the Energy Systems Engineering Institute that was created by several utilities at EPRI some time ago. He had the opportunity to speak to a group of graduate students at Lehigh University that have formed one of these institutes, and it is the kind of cross-cutting program that is very needed. He is not aware of how many schools have similar programs to this, but found it to be a really exciting opportunity for students coming from undergrad and going on to graduate programs.

Ms. Reder said that this was a good comment. Looking at the lessons learned from stimulus dollars that went into education forums would also be useful. Also, identifying gaps and challenges where workforce development might be required. There is a lot diversity now that is emerging. We need to be able to share best practices.

Mr. Heyeck agreed that this topic is very important and used examples from AEP to illustrate the importance of partnerships. Two areas that are important to leverage are the outsourcing of utility, which leads to reliance on expertise in the contract space. Another issue, is that at universities like Ohio State, there is incentive to admit and train foreign students since they pay so much more than in-state students. These students are less likely to remain in the United States once they graduate. He also spoke about that in the waning days of the stimulus, public /private partnerships are going to become increasingly more critical. He suggested investigating what ARPA-E is doing and what can be learned from that.

Ms. Reder thanked him for his comments and said that there were three areas that she should have spent more time highlighting that are critical. The migration of two-year, four-year, and advanced degrees in engineering, there needs to be a migration path to allow the continuity in the education process. The point Mr. Heyeck made about the foreign nationals, who are educated in the country and then end up working abroad, would be interesting to evaluate in terms of how to leverage this. Finally, with the tendency for outsourcing as compared to doing work internally, the ramifications on training must be looked at to assess the preparedness and make sure that it is there.

Mr. Sloan addressed the question of protocol by saying that the EAC would have to approve the development of an ad hoc working group. Anything that came out of this group would go back to the full committee for vetting. He spoke about apprenticeships and the importance of convincing the universities and utilities to think about education flow in different ways, which would be a focus of the working group.

Anjan Bose, Washington State University College of Engineering and Architecture, said that the largest education centers at universities are almost entirely supported by private companies. Research support has been missing for a very long time, and this should be where DOE comes in. There will be no engineering education occurring if there is no research support for university professors provided. The reason power engineering programs have declined over the years is because there has been so little support on the research side, and it is only now that ARPA-E has come into being. He added that a lot of US manufacturing and companies have gone abroad in the energy area, and there are very few American companies competing in that range. This is something the President has spoken about several times, that we have to encourage the skill set to build renewables domestically.

Mr. Heyeck asked if the foreign nationals' problem persisted at Mr. Bose's university as well.

Mr. Bose responded that this is a national problem, and it is not limited to electrical power engineering, but extends to all math, science and technology.

Ms. Reder thanked everyone for their attention and input and asked if this is something that should be moved forward by the committee.

Mr. Cowart responded that he would like to hear from the Department on how the work effort should go forward and how they would use it, including how it would connect with the other agencies that had been mentioned. He suggested that they pick up on the topic on the following day.

Ms. Hoffman recommended adding it to the meeting agenda on the following day.

Adjournment

Mr. Cowart asked for any closing comments.

Mr. Roseman reminded committee members of the Dutch treat dinner that would be taking place at 6:00 PM EST, and told them to leave their tent cards in the room.

Mr. Cowart adjourned the meeting at 4:45 pm EST.

Respectfully Submitted and Certified as Accurate,

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Richard Cowart
Regulatory Assistance Project
Chair
DOE Electricity Advisory Committee

5/1/2012

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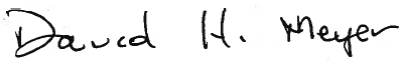
Date



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

5/1/2012

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Date