ELECTRICITY ADVISORY COMMITTEE MEETING

Washington, D.C.

Tuesday, March 6, 2012

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P R O C E E D I N G S

(8:00 a.m.)

MR. COWART: While you're settling in, let me just take a moment to welcome our friends from NARUC. Chuck Gray from NARUC is here, and Commissioner David Gardner. They're going to be -- or David will be on the agenda in a few minutes.

And also -- I'm sorry.

SPEAKER: Jim Gardner.

MR. COWART: Oh, sorry. Yes, you're right. I'm thinking of a high school friend.

Welcome to them and also to Lauren Azar, a former member of this committee, who is going to be here just for a while this morning. We're going to begin by talking about transmission, and I think Mike is first up.

Oh, excuse me. There are a couple of announcements. Elliot?

MR. ROSEMAN: Our reporter here asked that I come up to the podium and do it from here, so I'm following orders.

There are just a couple quick items.

First, thank you all for being here at 8:00. We do have a full agenda.

For those of you who are interested in WiFi, I just wanted to make an announcement that there is availability of WiFi here in the room. If you go to your browser, it says Ronald Reagan Building, and you click there, and it's the login. If you want to write this down, if you're interested, the login is "icf12" -- lower case "icf12" -- and the password is "5616." 5616.

And Rich, at some point, I think you and I talked about that signup sheet which is, I think, out at the registration table, also for committees. However --

MR. COWART: You have it in your hand.

MR. ROSEMAN: I have it in my hand, right.

MR. COWART: Why don't you just start here? The signup sheet for subcommittees, for those who would like to sign up for an additional subcommittee or make a change in your current assignments --

MR. ROSEMAN: Great.

MR. COWART: -- please indicate your preferences, and we'll send it out around. Everybody should remember -- I think the committee members know -- that by law, this committee is required to have certain subcommittees with certain numbers of people on them. And so, that means that sometimes assignments are made in order to comply with the law, but no one has been refused admission to a subcommittee that they have signed up for.

MR. ROSEMAN: Great. So I'll just maybe start that over here, and during the morning it can work its way around. Would that be a good idea?

MR. COWART: Yes, thank you. Yes, let's just start there.

MR. ROSEMAN: Great. Thank you.

MR. COWART: Any other announcements? Anybody? All right. Well, I want to congratulate you all for being here even though there's not coffee in the room. I think next time we'll do better on that.

We'll be in a different location.

All right, thanks very much. Mike?

MR. HEYECK: Well, good morning, everyone. I promised David Meyer I wasn't going to go into a philosophical rant today. I wanted to -- however, I wanted to make sure that what we focus on is what would help the Department of Energy, not help somebody else through the Department of Energy.

And my topic yesterday was to recognize that the DOE has an enormous amount of talent in the science area and with their national labs, and you'll hear that thread as I go through these five categories.

You already have the work plan that the subcommittee has narrowed down, and I'm really just going to talk about this in five parts, and that's really what's up on the slide right now.

The first is the fuel dependency issue. This is really the intersection of gas and electricity if you really want to narrow it down, but it also treads on the issues of the retirements, the changing fuel mix, the

increase in variable energy sources, and so on. So it's a very broad topic, but when we talked about this, the most narrow and most urgent was the intersection of gas and electricity, particularly the market elements.

There's some reservation about pursuing this, given that FERC is also pursuing it as well and what kind of space can we provide, or advice can we provide, to the Department of Energy. So I think there's a limited space in that regard except for maybe infrastructure security.

The second item is actually a wealth of issues that we can work on. It's technology and its role in grid reliability. And I think this actually does tie into the fifth item, which is what we talked about yesterday, dovetailing into the long-term vision of the grid that Bill Parks spoke about yesterday.

This is more than just inventory and what's out there, but this is also going -- taking a deep dive and looking at what DOE is doing and what areas we have as identified as

gaps. A few of those, I mentioned yesterday. The ARPA-E projects are outstanding projects, and I really think we ought to -- I know we're going to have a presentation on that to show the kind of things that are actually, some of them, born in a student's garage and what it could do for the future of the grid.

Just one example I mentioned yesterday, just a development of power electronics to replace transformers, and also a DC breaker, would have a game-changing effect on the technology of the grid.

So the question is going to be there -- what can we provide the DOE for our help? And I think the gaps that we see as an industry might be relevant.

The third is transmission siting. I don't know why these are there. Lauren is going to solve the problem, and we're going to just move on.

MS. AZAR: (off mike)

MR. HEYECK: Yeah, we're waiting. On transmission siting, we talked about some of the elements that are akin to the third

rail. That's why you don't see cost allocation up here, again, because the Department of Energy really hasn't -- doesn't have a dog in that fight. But siting, the Department of Energy does have the federal role given to it by the Energy Policy Act of 2005.

I would suggest here that since there was an invitation per the Federal Register to get comments, that maybe the role of this committee would actually be to help review those comments to discern what can or cannot be done.

But I do believe that the fast-tracking process that is being pursued now over federal lands might give us an opportunity to identify best practices that could be applied not only in the federal space but also in the state space. But again, there's that disconnect; the DOE does not have authority in the state space.

The fourth item is really not something that the group would do. It was really a report by the Department of Energy on

things we've already offered -- grid security, the intersection of gas and electricity -- two of them that, Pat, you reported on per your memo.

The only gap I identified really is we still don't have any industry movement toward coming up with hardening solutions for electromagnetic pulse. The NERC has already offered a very good report with respect to geomagnetic disturbances that basically says that the grid is going to be fine. There may be some local issues with respect to reactive power, but when it comes to electromagnetic pulse I still believe that we could, in a smart way, build it in without breaking the bank as we replace assets over the next 20 or 30 years.

One of the examples I would mention to you is -- I'm not sure if I mentioned it in this space, but an example is what my company is doing. We're developing drop-in control houses where they're pre-fabbed at a vendor location. They come in for half the price of retrofits. You could actually put the control

house next to the old one and then wire it in and then dismantle the old one.

I mention this because the impetus for this was NERC compliance, redundancy of relaying; the retrofits cost a lot of money.

But we're actually working with the vendor to test if we should develop a Farraday cage to see if it could respond to the E-1, E-2, E-3 wave of an EMP. But frankly, we're novices at that.

And that's just one element. AEP is not the only company trying to solve it, but I think our impetus was to have the national labs engaged in that.

The fifth category I mentioned as part of the second category -- basically, plugging into the long-term vision that Bill Parks opined on yesterday. I seriously think that the area of power electronics would be a natural for transmission to dive into because that is really not only the past but also our future.

There are many things that weren't on the table, many ideas that did not make it

to the top five, and probably the biggest one is the cost allocation issue. That is something, as I mentioned, the DOE is probably not capable of influencing. That's through a FERC action.

The other is it is absolutely nearly impossible to build in regional lines, transmission lines. It is easier to build in regions, but absolutely impossible. But again, that falls onto the cost allocation issue. So it's very difficult.

So those are the types of things that didn't make it to this top five, but they certainly are relevant as impediments to transmission.

I'm going to stop there and take comments as to -- well, let me just give you a summary. I think probably the second topic is probably the area that we ought to look at with respect to our subcommittee. The first topic is being looked at, at FERC. And on siting, we ought to wait for the comments that return per the Federal Register invitation.

Thank you. Rich?

MR. COWART: All right. Comments or additions from other members of the subcommittee?

Comments from Lauren.

MS. AZAR: Thank you, and I welcome the offer of assistance with regards to the comments.

The comments with regards to the 216-H rule have already been received. That deadline was on the 27th. There is a new request for information out, which we can talk about in a minute.

But I would welcome if this group wants to take a look at the comments on 216-H. Eight sets of comments were received. The timeframe for this is very quick because we need to begin negotiations with the nine agencies who are part of the nine-agency MOU over those comments.

So let me just step back so that people who aren't on the Transmission Subcommittee know what we're talking about.

In EPEC 2005, there was a law that indicated that once an application is complete

for transmission you have one year within which to get the federal approvals completed. The definition of when the application is complete essentially has been deemed after the DEIS is done, which is, as we know, pretty late in the process.

So one of the questions was: Is there any way in which we should be defining when the application is complete in a different way to make the one-year deadline a little bit more probably in sync with what Congress was thinking?

And let me just tell you; when I was just mentioning the one-year deadline yesterday with the RRTT, and every time I do that, people's faces turn white, right. So we've got a little bit of disconnect about what Congress wanted and what the agencies think is feasible.

So that's on one side. We've got the results of the comments that came in.

There's another RFI out right now, and comments are due probably within three and a half weeks now. It's getting to the same

question, okay, which is how long should the federal government be allowed to take in permitting its transmission lines.

And the second RFI approaches it from a different metric, which is the chicken and egg problem with regards to generation of transmission, right. One reason the transmission doesn't get built is because it takes so much longer than generation. They can't get the subscriptions to make the business case. So to the extent we can make the development times between generation and transmission commensurate, we're going to be more likely to get -- that's what -- so here's what -- because I've got the one year on one side as one benchmark, right, which makes everybody turn white and probably run out to the bathroom.

And then, I want another benchmark to say, guys, actually, if we're going to get transmission built, this is what we've got to get. So that's what the second RFI is intended to do -- is get those information points.

If I have those two information points, then I have -- then I can negotiate, okay.

Right now, all that we're talking about is improving the process, and I keep saying we can improve it all we want, but if we don't get the generation and transmission times commensurate, it ain't going to matter, right.

If we go down to 14 years, down to 10 years, it ain't going to matter.

And so, all I can say is first of all, please get comments into the RFI that's out there. And number two, you can see what my intent is -- trying to come up with these two different points. So then I can go back to the nine agencies that are part of the rapid response team and say, look, guys, these are our bookends, so let's figure out how we're going to get there.

Does that help you, Mike?

MR. HEYECK: Yes, it does, and 44 months.

MS. AZAR: Okay.

MR. HEYECK: I think that's interstate pipeline.

MS. AZAR: That doesn't help us. So you've got to tell me. Drive it down to what the generation, the PPAs are, or how long it takes to do generation.

You can't pick something out of the sky and say, do it, because it's an interstate pipeline. Those are sited very differently than transmission lines. So it's got to be driven by the data.

Send in comments. You can do the interstate pipelines, but it's not going to be persuasive to people. That's sort of what I'm indicating.

As far as timelines go, really rapid. So we're a rapid response team. Once we get -- it would actually be helpful to have the comments of the current 216-H stuff in soon. Like I'm talking a week or two. And then, once the RFI comes in, same thing, because we're on a fast track on trying to get this done.

So did your faces also -- did you

turn white when I said -- yeah. We can get you the RFI. I don't have it. It's on the DOE web site.

Okay, I'll shut up now. Thank you.

MR. COWART: I think Cheryl is here. So we can make some room for her.

MS. LAFLEUR: Sorry that I'm late. And Chairman Gardner from NARUC is here. So we're just collaborating on where you want us.

MR. COWART: Good morning. Okay, commentary. Let me just try to figure out the schedule here because we sort of began with the Transmission Subcommittee report. Lauren is here.

I want to figure out this, whether you have timing constraints, Commissioner. Are you guys okay if we keep up the discussion of the subcommittee work plan for a minute?

I'm looking for comments on Mike Heyeck's recommendation that the Transmission Subcommittee focus on the second thread of his five groups here, number one. And then, secondarily, is there -- I hear an invitation from Lauren Azar that it would be great if the

committee or its members could opine on the current RFIs, the one that's out with a really short timeframe on it and the second one that has only a really short timeframe on it, and whether that's even possible for this committee, so looking for reactions on both of those things.

MR. HEYECK: I welcome the committee's input. I do believe that that's really a short fuse for a subcommittee of that size.

But Gordon, you had your hand up.

MR. VAN WELIE: I was just going to say I support your proposal to pick the second item even though I have big vested interest in the first. It is receiving attention at the FERC, as you said. So I think the second topic makes sense to me.

And I guess to Lauren's -- I mean, I guess we could look at it and then determine rather than make the decision today.

MR. COWART: All right, Dian.

MS. GRUENEICH: I think I'm on the subcommittee. So I definitely do endorse as

well focusing on the second area, and I think very much looking at the information that's coming out from the ARPA-E projects and then understanding how that could be more comprehensively than used in the transmission system.

I believe for quite some time that we could do better, all of us, collectively, on transmission, of understanding what are the new technologies that we can bring into the transmission system and how we could actually make that effective. So I totally agree with that.

And to the extent that we can offer any observations on the comments that come in, I think we should. But knowing how hard it is to get conference calls together, and then my understanding is from what you said yesterday, David, that the subcommittee could not, per se, give any recommendations back to DOE. It would then have to go through the full committee as far as any recommendations. It seems to me that given the timelines it's going to have to be pretty ad hoc actually,

any feedback back to Lauren.

MR. MEYER: There is the possibility of we don't have to wait for another face-to-face meeting before the EAC itself can act. There are ways to do that by email and so on. It just takes a little extra effort and quick response on the part of the members.

MS. GRUENEICH: Lauren, can I -- maybe everybody else knows, but for the RFIs that go out, will that end up being a formal rulemaking, a rule that the secretary adopts, or is the feedback back to you something that, as you said, you will use in your, I guess, informal negotiations?

MS. AZAR: Yes, there are two things happening. Number one, the 216-H was a NOPR, and so the comments we received as of February 27th were in response to a NOPR. So if I can't get the nine agencies to move on that, then that actually is a rule.

The subsequent, or the RFI that's out on the street right now, would not be -- let me back up.

We may be able to -- it's going to

help with the negotiations on the NOPR, but that in and of itself is not going to result in a rule. That may result in other things but not a rule at DOE.

Was that haiku or was that okay? Okay.

MR. COWART: Rob.

MR. GRAMLICH: Thanks. I am on the subcommittee and generally think the proposal is sound. I thought there was some discussion by email about the focusing a little more on what DOE has the authority to deal with, and one of the suggestions in there was on the power marketing administrations for which the department, which oversees the PMAs, is making a number of important policy decisions, and this committee could discuss and advise on those. Was that consciously left off?

MR. HEYECK: It's my oversight. Provide some more context on that.

MR. GRAMLICH: Well, there have been a number of activities from WAPA and the Bonneville Power Administration in particular that do relate to transmission service in

interstate markets, and there has been a lot of discussion on that. And the department is making very tough decisions on these issues, and I think it would be something that we could all fruitfully discuss and advise the department on.

MR. COWART: Just to follow up on that point, can you be more specific about topics where you think the department is in need of assistance from the committee?

MR. GRAMLICH: Some of the issues are third-party transmission financing, which was a provision in the Energy Policy Act of 2005. It's a new authority. It's not been used yet. But there have been applications in for that, so that's still before the department.

There have been issues of open access up in the Northwest with Bonneville and curtailing certain generation and letting other generation operate. That has serious transmission service and market impacts.

And just generally, building transmission -- there has been a lot of

progress, I think, from both Bonneville and WAPA on that, or Western on that, with the Recovery Act funding. I'm not sure that one needs quite as much attention, but it's an important issue.

MR. COWART: Okay. Thank you. Commissioner LaFleur.

MS. LAFLEUR: Well, first of all, I apologize again for being late. I will spare you the gory details except to tell you that I did have a reason, but I apologize.

This was a chart that was circulated earlier, and I think I broadly agree with the part of the conversation that I heard, which is that this group might be uniquely situated to help on the technology piece.

A lot of work is going on, on gas/electric interdependency at NERC and for David Nevius, and hopefully, FERC will add something. That doesn't mean that we can't do anything, but it will be another report, another study and a body whereas a technology piece, I think -- certainly, I don't think FERC, other than somewhat feebly attempting to

evaluate technologies and incentive applications, is pushing technology. You know we're not situated there.

I think DOE has a tremendous amount they can contribute on siting, and I guess this question of whether it's right for this group.

And just to pick up on Rob's comment, I mean that underscores why I'm not a voting member. If you want to talk about Bonneville all day long, then I'll go do email. But I leave to others whether that is -- you know, where that would fit in.

But I do think the technology is a little bit freewheeling right now in the sense it's not clear who's doing it.

MR. COWART: Any other comments? Any other comments on the Transmission Subcommittee's leading proposal?

MS. HOFFMAN: I'll just add one more thing. I think we could probably end up grouping this in two categories -- the technology categories and DOE authorities. And then, we actually could run through

basically 1222 and all the authorities from 216-H that DOE has, and if there are any opportunities or flexibilities or challenges, to look at a different viewpoint on some of those authorities, I think that would be good advice for the department.

MR. HEYECK: We have monthly calls, and hopefully, the subcommittee knows that March 8th is our first. So this will be fresh in our mind, and I think we need to flesh out very narrowly what we need to work on.

And if we address the PMA issue, it will probably be within the context of the DOE authority. So I'm aware of 1222 really being dormant.

MS. AZAR: Can I just speak to that? 1222 is actually not dormant. There's going to be a decision soon.

MR. COWART: All right. Any further discussion on the transmission topics?

I was going to ask Lauren if you would, if you don't mind -- you're sort of asking for input from the committee, and I wonder if you could state in a few sentences

the questions that you would most appreciate the committee or its members providing input on. Are there specific topics, specific challenges, specific questions that you would want us to answer as opposed to well, we have these notices out, we're soliciting comments and we'd like you to comment?

MS. AZAR: Well, I mean, if you take a look at the RFI, it's actually pretty specific. It's a surgical strike RFI. I guess I don't understand the question.

MR. COWART: Okay, if it's apparent on its face.

MS. AZAR: I think -- I hope it is. If it's not, let me know because that means we failed.

MR. COWART: But it just might be that there's something in particular that you think this committee and its members are especially apt to comment on or where it would be useful for us to say something.

MS. AZAR: The goal is to define the timelines. We're trying to make generation, whether it be PPAs or developing generation,

and transmission commensurate. And so, we need to figure out what that outer timeframe is. That's it in a nutshell.

So the entire RFI is driving towards that, and there is a series of, I don't know, five questions.

But ultimately, that's what I want to get to because I can say to the agencies: Guys, if we want transmission to get built, this is our outer timeline. This gives us the bookend.

So that's one thing. And let me just get back to the 1222 question just quickly. Sorry, but there is a decision coming out on 1222. That doesn't mean that we can't do better, and so Rob's suggestion with regards to the PMAs might be very good, to have the committee make some suggestions. We're always open to suggestions.

Did I answer your question?

MR. COWART: You did.

MS. AZAR: Okay.

MR. COWART: Thank you. Any further discussion on this topic? Next, we have a

presentation from Commissioners Gardner and LaFleur on the FERC/NARUC Forum on Reliability. And you all have arranged the agenda between you? Okay. Thank you so much.

MS. LAFLEUR: Well, thank you, Rich, and thank you, Commissioner Gardner who was here right on time. I'm sorry we're not sitting together.

And somebody else from FERC, my advisor, Kurt Longo, who has been in the middle of this, just joined us also.

What we divided up is I'll do a little bit on the genesis of the forum and where it's been, and then Commissioner Gardner will do a bit about the NARUC. Or, maybe I'll do a little bit on the white paper and the comments we've heard so far and ask Vice Chairman Gardner to talk about the NARUC comments and a little bit more about the forum. So we'll toggle back and forth.

Obviously, as this group knows, FERC doesn't normally get involved in EPA proceedings. When I come to the Ronald Reagan Building, it's usually for something else. I

believe they're here somewhere in our greater complex.

But we've gotten involved recently in some of the new suites of regulations because of the fact -- I'm glad you're here -- that we have responsibility for the reliability of the bulk power system and there have been suggestions that the pace and numerosity of the new EPA suites of regulations could impact reliability.

We held a technical conference on this last fall that I chaired, and I would say the one-line summary was we're going to need a lot of coordination and flexibility to make this work in an effective way for everyone.

Coming out of that, it seemed that there was a lot of discussion, and we had probably 10 times more requests to speak at the tech conference than we could accommodate. So that was the genesis of my calling Chuck Gray and others to suggest an ongoing forum between the state commissioners and FERC because we both clearly had a role in this, and that led to the FERC/NARUC Forum on

Reliability and the Environment that David Nevius of Indiana, Phillip Jones of Washington, Phil Moeller and myself are chairing.

So we met in February. Some of you were undoubtedly there. Lauren was kind enough to be a witness, or not a witness, but a speaker for us. Tried to have a star panel forum. And it was a standing room only, 700-person crowd. I don't know. I'm not sure they went away feeling they got the price of admission.

But Gina McCarthy spoke, from the EPA, and then we had speakers from a lot of the organizations that have been identified as potential advisors to the EPA under the Administrative Order on the Mercury and Air Toxic Standard.

We heard from an RTO, from several state commissioners, including Vice Chairman Gardner, from NERC, from a regional entity, and so forth.

And it was a good airing of views, and from DOE on their potential authority

under 207. Or, 202. I can see I haven't had my coffee. We're the ones with 207. But their potential emergency authority.

It was a good airing of views. There wasn't a lot of consensus on a way forward, I don't think, except that there clearly had to be the need for conversation. And there was conversation in real time and a groping toward understanding all the dimensions of the possible ways to extend time formats and how we were going to get there, and I think a consensus that this was a good group to keep meeting.

And with that, maybe I'll turn it over to Vice Chairman Gardner to talk about his impressions of the group, and then I'll talk about the FERC staff white paper, which was one of the live discussions and which is about the only news I have this morning. We now have the comments in, so I can give a little summary.

MR. GARDNER: Thank you, Commissioner LaFleur. What I'm going to do is talk about the forum, my impressions of the

forum, for a couple minutes. And then, I want to talk also about the new -- NARUC's new -- Task Force on Environmental Regulation and Generation of which I'm the chair of, and it was in that capacity that I was invited to talk with you all, and then talk about NARUC's -- how NARUC responds to the white paper. And then, Commissioner LaFleur will talk again.

First of all, I want to say that being from Kentucky this time of year we usually talk about basketball, but let me just talk about the weather for just a second and how it indirectly or directly affected me.

Last Wednesday, there were a couple tornadoes in Kentucky, which is unusual for this time of year. It's rare for this time of year. We get maybe a tornado or two a year, and it's usually in far western Kentucky.

Last Friday, Kentucky had 16 tornadoes as part of this big storm that went through. I happened to see my first funnel cloud. I was in southeast Kentucky, and it was about five or six miles away.

And then, this coming Saturday, I

was going to go to the town in eastern Kentucky where I went to the second grade and where I was baptized. It's West Liberty, Kentucky, and that little town just got wiped off the map. So it was wild.

And then yesterday, coming up here, I spent more time on the tarmac trying to get out of Lexington than I did in the air flying to D.C. because of the snow. So we had four inches of snow yesterday, and Kentucky is just not equipped, particularly this time of year, to deal with that.

So whether you call it climate change or whatever, it was interesting, in trying to get here and deal with these issues.

The FERC/NARUC Forum on Reliability and Environment; first, I'd like to give thanks to Commissioner LaFleur. She understated her role in putting this together. It was her idea and helped to get the right people in the room at the same time. It seems as if in the past there had been an awful lot of people talking past each other and the February meeting, as Commissioner LaFleur

indicated, really got the folks in the same room together, talking with each other.

My general impressions, from someone who is not a Washington insider by any means, is that there are vast differences, and among the states and regions, with respect to these EPA regulations as it relates to reliability, as it relates to cost impacts, and that the average of those that we hear about really don't do justice to those areas that are really impacted and will be impacted by these.

Another impression that I left with is that timing is very crucial. We heard from experts such as Mark Lauby of NERC and John Bear of MISO, and it struck me as it was -- I mean, they're worried. That was one of the impressions that I left with, and that timing and coordination of the planned outages and retirements is really a big deal. And they talked about how we really have to get it right.

And that really surprised me, to hear that from them.

There's a lot of work to be done on

the coordination of this. One of the things that I -- John Bear, as you all know, is the President of MISO. He -- or, CEO. He talked. He gave three main points, and one of his points, which was interesting, is he's worried about the construction and the ability to make this happen as all of these retrofits are going to occur.

So those are some of my impressions, general impressions with respect to we are going to -- the forum is going to be meeting again in July at the NARUC meeting in Portland, and we hope to drill down a bit to some of the specific challenges, with possible actions to perhaps mitigate some of the reliability and cost concerns.

Second, let me talk for a minute about the new Task Force on Environmental Regulation and Generation, which we are affectionately calling TFERG. Like NARUC itself, it's very diverse, both regionally and politically. There are 10 different states on it: Texas, Maine, from the West. In addition to Texas, we've got Utah, Colorado. In the

South -- Kentucky, Florida. From the Midwest -- Ohio, Illinois, Indiana. In the East, we have Connecticut and, of course, Maine.

We are really going to be NARUC's eyes and ears and actually mouth for its interactions with federal agencies. We're also going to interact with state agencies such as NASEO, which you know is the state energy officers, as well as NACAA, the state clean air officers.

Process-wise, we're going to be advising the NARUC standing committees on the different EPA and environmental issues.

We're also going to have a major component of education, and it's going to be education going both ways. Internally, to educate our members, we're going to be having webinars for our members. And then, we also hope to have a role of educating FERC as to what the -- and EPA, as to what the concerns of the states are and the impacts that will be felt by the members.

Our task force is bound by a couple resolutions that NARUC passed -- one in

February of 2011 and one of July of 2011 -- and let me just give you just a couple of those key points. They are many pages, so I'm sure I'm leaving off something that's vitally important, but let me just give you a few of those points.

One is that NARUC has taken no position with respect to the EPA regulations themselves. Second, we urge EPA to avoid compromising system reliability. Three, we seek ways to minimize cost impacts. Four, provide appropriate degree of flexibility on timeframes. And five, engage in meaningful dialogue, encourage the EPA to engage in meaningful dialogue with state regulators, and through the forum we believe that's beginning to happen.

So those are the resolutions that set forth what NARUC's, as a whole position, is. Again, with such diverse members, you can imagine the difficulty in crafting a resolution and an approach.

And finally, let me just talk for a minute about the comments that NARUC submitted

to the FERC staff white paper. The process of the task force, what we did was we worked with Chuck and Robin, and Robin in particular, Robin Lunt, who prepared with the task force the initial draft. We then circulated it to the different standing committees, and then it was approved by the executive committee of NARUC itself.

And then substantively, in general, we agreed with FERC staff on how input will be provided to EPA, but we also took a different approach. We also recognize that the states and other reliability organizations may address issues beyond the Federal Power Act, Section 215 Reliability Standards, such as resource adequacy, integrated resource plans, and the states may consult directly with EPA on these broader issues. And that was part of the white paper message that we submitted to FERC.

So that concludes my comments and back to Commissioner LaFleur.

MS. LAFLEUR: Well, thank you very much. I think as Vice Chairman Gardner; it

was clear from his comments, and I think we all know, and it came out in our conversation yesterday. Really, all power supply decisions are the reflection of choices that people make on the cost of electricity, its reliability and security, and its environmental impact, and how you trade off among those.

And a lot of different people are making decisions all the time -- Congress, in the Clean Air Act as implemented by the EPA, the states and all their resource adequacy decision.

And what we're trying to do -- this is a staff white paper, but speaking from my own view of the commission's role. We're trying to figure out how to add value to this issue without substituting our judgment of the overarching balance for the EPA and the Congress and the states that are making resource adequacy, and figure out what's within our jurisdiction, where we can add value to this discussion without taking over and saying we'll decide what power supply is, which I do not believe is in our jurisdiction.

And so, it's with that kind of nuance that I kind of offer the white paper.

So in December, everyone knows the EPA put out their Mercury and Air Toxic Standards -- three years to comply, an extra year that your state administrative authority can give you and then potentially a fifth year that you can get under the administrative order function, which we were reassured by EPA is done routinely in other cases, under a policy memo that EPA put out that would outline how they are going to give these fifth years.

Quite correctly, I think, the policy memo was like a broad placeholder for a process that EPA might follow rather than a carefully -- you know, this many days and we go here and we go there. It outlined many people. It said on a case- by-case basis EPA will seek advice from FERC, NERC, the regional entities, the ISOs and RTOs, the planning authorities and the state commissions.

That's a lot of advisors, all having a role on this topic, and they'll give advice

as whether the implementation of the MAT standards would affect either reliability from retirements or reliability from the sequencing of retrofits, all the repairs, as Vice Chairman Gardner said. And so, those are all the advisors.

So what I think the forum and other organizations are doing is how can we pull this together in a coordinated way so we can collectively give good advice to the EPA.

So FERC staff, very timely, before the forum, put out a white paper. This is now a staff white paper, not from the commissioners, not voted on, to say here's one approach we might take up for comments on it.

And what they put forth is that when an organization, a utility or planning authority thought it needed more time either to defer to a retirement, to bring in a transmission line or a new resource, or to sequence retrofits because there were potentially an RTO might have too many retrofits to do in the timeframe, they would file an application supporting the reliability

need in detail. And we ask in this white paper, they file that simultaneously with EPA and with FERC.

And others, including all those other commenters or others, can file comments. We propose -- I think one of the hearts of what staff proposed is open an open docket, give it a docket number. It's in E-Library. It's all out in the sunshine. You can file your comments. Everyone can weigh in.

And then, the commission then has to do something with that body of material and issue some advice to EPA.

What the white paper proposes is that the commissioners would then take a vote and issue some kind of advice to EPA in each case, not necessarily -- not a hearing and an order with an appeal, and all that, but something that would actually be transparent and voted and out there.

And the white paper, in principle, asks for comment on two things.

The first was when we get all these applications saying I need more time, I need

more time, I need more time to, et cetera, how are we -- FERC -- supposed to look at them. And the white paper put forth three options.

One was to take out our NERC rulebook and say these 215 standards are what we go by. If it would be a violation of the 215 standards, we'll opine you need more time. If it's not a violation of the 215 standards, we'll say, we -- FERC -- are not opining you need more time.

The other advisors may. It might be a violation of state resource adequacy. But if it's not a violation of 215, that's what we're doing.

The second option is somewhat loosely described, I would say -- 215 and everything else in the Federal Power Act. Everything.

Gordon's organization files to delist plans with FERC, and we look at your analysis, and say yes, you may. They may grant the application to delist. You need that plant. You don't need that plant. There are ISO tariffs that are FERC jurisdictional

that relate to resource adequacy. We would look at all those FERC jurisdictional things and do our best to render an opinion to EPA.

The third, broadest option is we would look at all the body of material that's out there, including Kentucky says we need this plant, and we would somehow pull it together and render a reliability opinion, whether it was FERC jurisdictional or not. We would just be kind of an advisor. That's the third, broad option.

And the second thing we ask comment on is what's the standard of review. Do we do a de novo review like have a hearing, have people come in and explain? Or, do we just read the papers and do sort of like a paper hearing and say, oh, these papers look good; we'll give it a stamp of approval, tell the EPA it looks good?

So we got a lot of comments, like everything we do. And I have not read all of them yet, but I did read summaries over the weekend.

Almost nobody thought we should

stick to 215, which was where the FERC staff really pushed the debate in its white paper. People said, 215 is too narrow; it won't necessarily find all the places where there were real reliability issues.

But they were then vague as to where you should go behind 215. A lot of people said sort of a hybrid of stick to your jurisdiction, FERC; don't butt in with the states, but also weigh in on everything and be an all-purpose source of advice for EPA, within your jurisdiction.

And I mean, we're still mulling this. I think this will be the hardest thing. When I say we are still mulling this, it just came in and you're just getting my off-the-cuff.

I think we have to stick to our jurisdiction. It might not be limited to 215, but I do not think we can start babysitting state resource adequacy decisions. I'm sure NARUC doesn't want us to do that.

And I don't think there's any upside, there's only downside, for us doing

what's not our -- it might be efficient to have a single person funneling all the comments to, but I don't see it as a FERC jurisdictional responsibility.

And I don't think anyone really wants us to go beyond our jurisdiction although they would like us to kind of be all-purpose because of the convenience in coordination.

The second issue was the level of review. A couple people thought we should do a full de novo review. They were mostly states that have already complied and are worried other states are going to get away with murder. They were the ones who thought we should do a de novo review. The states that have compliance issues did not think we should do a de novo review.

And most people did not think -- most people thought we should do -- some people seemed to think more we should do like a record review and review everything that came in.

Others -- I know someone is here

from NRECA. Not to put you on the spot, but the trade associations, I would summarize, as basically saying in a very nice way: Don't do any review. If it looks legit, put a stamp of approval, package it up and tell EPA. They don't understand reliability, and you do.

But I mean, we can't take a vote and not do, I don't think, any review. I mean, if we're saying yes to everything, then we're not adding any value whatsoever.

But that is completely undefined, what the standard of review is, except I would say the clear thrust of the comments was: Don't do de novo review. Don't do a whole big hearing on this. Just make sure what came in is valid in some way and then opine to the EPA.

And that's literally right off the cuff. So I would very much welcome comments from this group because we're a little bit in uncharted territory here in terms of how all these agencies work together.

And I'll just wrap back into the forum. I don't think that's the panacea, but

it is a place where we'll all be together, talking about:

Okay, states, how many applications are you putting in?

EPA, what are you seeing? Who are you getting it from? Is it coordinated enough for you? Should we be timing or what can we do better on?

You know, what's happening? How's the process going so far and how can we, all the advisors, help you, EPA?

We do hope to have EPA at every one of the forums. Gina won't necessarily come up personally to Portland, but we need them there, I think, to say: What are you seeing? What's happening so far? How's the process going?

And then, as Vice Chairman Gardner said, we might want to do a deep dive where we take a company and say, how many plants do you have. Okay, state environmental people, what do you see? And, really understand it. You know, get beneath the generalities.

But with that, I really very much

welcome comments. I mean, FERC wants to keep the lights on. FERC has to keep the lights on. That's job one.

But we don't want to -- this isn't -- there's not a lot of upside in being a power grab here, to say let's take this over from everyone; we'll decide what the power supply is. So we're trying to really navigate how we add value.

I see comments already.

MR. COWART: Thank you both very much. That really put a lot in front of us. So I'll just go right to the comments.

MS. LAFLEUR: Timely, you're here right in the day.

MR. COWART: We're so happy to have this thorny conversation with you this morning.

I think Mike was first.

MR. HEYECK: I'm really pleased with the FERC and NARUC efforts. I think my company particularly has responded to the safety value, not only just for the retirement issues, but also, when you have retrofits

you're going to have outages that require generation to be available.

The two thorny things we're trying to deal with are kind of esoteric to the basic power supply, and that's black- start and frequency response. Many of these units that will be retired are -- they can load reject and actually dump to house load and be ready to black-start the system, or be able to black-start themselves.

In working with the regions, the RTOs, in trying to figure out how to provide that ability, and they're looking to the transmission owner. And in the space of a transmission owner, transmission owners don't have generation assets to have black-startable units.

And I really think that NERC ought to take the lead in determining what is the need of black-start for the grid. In integrated utilities, you have that vehicle. But when it comes to a functionalized, where transmission owners don't have generating assets, it's really very difficult to come up

with black-start.

Now I know in New England you can black-start using the ties to Quebec and things like that, but in some other parts of the country, we can't.

The other is frequency response. Given the new -- the dispatch order of things, these units will not move as fast as some of the smaller ones. We're really going to have to amp that up, and I know Joe McClelland has been looking at that particular issue.

So if I had to comment, I think we need to tee up the black-start issue as a global issue, and right now the market is not responsive, particularly in PJM, to come up with those black-start resources. And it's very costly. You have to have the unit run all the time, and those units may not be the most economic units for an event that may be once in every 25 years.

MR. COWART: Thank you. Rick.

MR. BOWEN: Yeah, I too want to congratulate you all on taking on the task and stepping up to it, I should say as well,

particularly the two of you.

I guess I take kind of a position of both a generator, because my 30 years has really been on the generation side, and transmission as well as a consumer from an ALCOA perspective because our facilities are sometimes 600 MW. So they're pretty significant consumption machines out there.

And to have them go out, I will tell you doesn't cost millions. It could potentially cost billions if you freeze a potline. So it's not a very fun day for us.

We're kind of like the silicone guys, the chipmakers who can't really afford for you guys to have the system go out. So reliability for ALCOA is number one.

So I guess -- and part of my concern is as a 30-year generation guy, what worries me is not what we know but what we don't know.

And in the new world, as David knows, there's a lot of participants in this market today who are not regulated utilities, and the inclination is that the regulated utilities will be forthright in what they know

is going to happen and how they're going to be impacted by the rules and rule changes. Unfortunately, as we know today, the regulated utilities, while they do make a good bulk of the system, they are not all of the system.

The independent power producers -- and I should say our system in general is not a state system any longer. It is a well integrated system across many states, and so it's going to be difficult to rely upon the individual states to be pulling the triggers on them. Some of these states are, frankly, inadequate as it relates to the regulation of their systems and their input into the systems. Some do it better than others.

But to rely -- you know, the bottom line is you've got multi-state jurisdictions of various transmission generation owners and you've got different generation owners who, frankly, are in many cases not really interested in telling anybody when and how they're going to turn their generation off as a result of MAT rules.

So it's going to be tough, and I

think unless you all are proactive in asking the questions. And I think it is a role that FERC has, to ask the questions that a lot of state jurisdictions cannot ask and a lot of the independent system operators cannot ask because of rules, around market rules and things of that nature.

I think we've got to pull it out because my concern is that you have many people who do not want to come out and say I'm going to shut down 1,300 MW because it's going to have a direct impact to their financial bottom lines and people will start shelling off their shares.

I mean, for those guys who live and breathe off of generation, I think we've got to figure out a methodology even if it's predicting ourselves by looking at their generation capacity, their age and what they have in the way of emissions control devices. Somehow, we've got to get that information because what I'm afraid of is what we don't know in that is, come 2015, we have a bunch of people that say: You're right. I couldn't

get there. I'm out. Right.

And as soon as they say I'm out, we're going to have a catastrophic situation of not just the system going down but a catastrophic system of cost shift because these people are all going to race to go slap gas turbines down to try to get the system back up as quickly as they can because it's not going to be there.

All of these systems that we're talking about are now in load centers because they were built 40, 50 years ago, as David knows. And when you pull them out of the load centers and you start putting gas turbines 200, 300 miles away from the load centers now because that's the only place you can site one without a lot of opposition, then you've got transmission issues and voltage sag.

I mean all the stuff that you hear Mike and the rest of them talk about are all going to become just tremendously exposed on a transmission system that's been totally undervalued and hadn't had much time on, which is really what this committee does anyway.

But bottom line is I would -- I guess where I'm kind of going with this rant is absolutely stay on it. Don't give up on it. I do believe what you all owe the U.S. is this thought, this forethought of probing and trying to find information under the guise of reliability. I think we all -- we've accepted the fact that we've agreed to this reliability system over the last five or so years, and your relationship with David's team.

And so, I think we have to ask those questions, guys. We've got to pull them out because they're not going to be easy.

And you should not expect that all these participants are going to just jump forward and tell you, yeah, I'm out and I'm going to dump this stuff, because it's got a cause and a rational nature of the whole market system as far as cost is concerned. Prices are going to go all over the place again. The cost of gas turbines is going to skyrocket again.

I mean, we've all been through -- some of us that have been here for 30 years

have all seen this up and down rollercoaster ride before. And it's just, you know, the cost structure to the consumer is just going to take away everything we got back, and now we're going to be missing it again. And we're still going to have to deal with reliability issues.

So yeah, I would say, get on it. Stay on it. Be vigilant. Don't give it up.

And I know it's a hard question, and I know it's going to be hard to get those answers, but I think you guys have got to dig.

MR. COWART: Gordon.

MR. VAN WELIE: So Cheryl, in terms of what is FERC's role in all of this, I don't think there's a one-size- fits-all solution to this issue.

And I think, ultimately, it starts with the ISOs, the RTOs. We have a massive incentive to keep the lights on. So I think if FERC were just to require of each of the regions that they have a plan for dealing with this transition because it's a transition and, in my view, it's been driven as much by the

economics of natural gas relative to everything else as it is by the EPA.

So I think the EPA rules are sort of the straw perhaps that breaks the camel's back. But in general, if I look around and I see how disruptive the low price of natural gas has been, it's going to push a lot of these older units out of the marketplace anyway. So the transition is being forced through economics as much as the environmental policy.

So that means each ISO, each RTO, is going to have to deal with this problem through their normal planning process and through their wholesale markets.

Speaking from a New England perspective, we are a little daunted by what's coming at us, and we understand we've got a set of procedures in place that actually can deal with this transition, but we're a little worried that the tools that we have in our toolbox are not going to result in efficient outcomes. So we think we can keep the grid reliable, but we might end up having

inefficient infrastructure investments.

So I think each region is going to have to look at the problem in that region and figure out the best way to get through this. And I think where FERC then gets involved is as those RTOs bring forward their decision-making and their plans, I think you're naturally going to get pulled into it.

I think an interesting case study is the Salem Harbor shutdown in New England. As Salem Harbor wanted to retire, we could let a couple of the units go and then we had to keep some of the units. That then became a contested proceeding down at the FERC. You had to sort of have a hearing on it. We submitted all of our evidence, et cetera, and you ended up backing us and said proceed with building the transmission and keeping the reliability contracts in place until such time as the transmission is built. So I think that's how FERC gets involved.

It would be good, I think, in the first instance though to have some directive from the FERC to each of the regions, to say

there's a problem coming; we want to see your plan for dealing with this problem, including issues like black-start.

So you know, we've just gone through a whole big proceeding in New England, changing our black-start program. We had a black-start program where a lot of these units were energizing the system at pre-load voltage levels because that's the way it was done 30 years ago. We had built a lot of transmission in New England. So what we wanted to do was to blacks-start the 345 KV level, which meant we have to shift the resources that are actually doing the black-start.

So there's an example of how you sort of bring a plan forward and you take it through the stakeholder process and ultimately, it ends on Cheryl's desk and she has to approve it because what we were asking for was more compensation for the black-start units at the locations that we needed them to be at.

So I think that's how you do it. I can't see how you can just sort of, with very

broad brush strokes, solve this problem for the whole nation. It has to be region by region, and everyone has to bring forward their plan.

MS. LAFLEUR: Thank you. That was a much better explanation than I gave of like what we do in the ISO regions that is beyond just 215 but relates to resource adequacy.

I think the challenge is the same one we talked about yesterday, that the country is so diverse and different structure. If every generator was in an RTO, then I think what we would do is say, okay, RTOS, go solve this; you have 90 days, or whatever. But there are different structures, such as in Jim Gardner's state, that they demand different planning solutions. And FERC might have a more limited role or perhaps a role but just a different role than in one that's governed by an RTO TRA.

MR. GARDNER: Just echoing on that, in Kentucky our largest utilities are not in an RTO although we do have AEP is in an RTO, of course, and Duke is in an RTO. But our

largest GNTs are not.

MR. VAN WELIE: In that sort of world, then it's up to the state regulator. I mean, then the regulator is performing the role of FERC.

I think what most RTOs and utilities are just looking for is some jurisdictional authority that's going to back them up if they've got a compelling case that there's a reliability problem. In chatting to Gina McCarthy, I don't get the sense that EPA is going to be unreasonable about it.

So they just need to have somebody look at it and say, this is a reasonable request. Give these guys some time. They need to work through it.

And then, I think we solve the problem that way.

MR. COWART: Barry.

MR. LAWSON: Thank you. Commissioner LaFleur mentioned that NRECA was part of a set of comments that were submitted on the white paper. Those comments were from several of the industry trade associations

including EEI, APPA and a subset of APPA, the Large Public Power Council.

Our comments focused on what the broad of the trades and looking at our broad memberships across the country, that just looking at reliability standard violations would be too narrow for determining the impacts of the EPA regs. You're looking at reliability. You're looking at adequacy. You're looking at planning. There are a lot of different issues here at play.

And there are many other entities that have an important role here, including FERC, but there's the states, the state POCs, NERC, the regional entities, the planning authorities, RTOs, ISOs. Of course, as we just discussed, not all parts of the country are covered by RTOs and ISOs. So there are a lot of important views that need to be factored into, ultimately, an EPA decision on whether to grant a further extension.

So we wanted it to -- we want to express that in our joint trades comments, so that's what we did.

Thanks.

MS. HOFFMAN: I guess I just want to add some of my comments on this.

You know, at the event that you held, one of the first things was to start out with timely notification. The second was actually identification of the problems.

And what we, as a federal government community, need to do is utilize all the resources and capabilities to make sure that we're, number one, asking the right questions.

And I agree with Rick's comments, that we need to have the outside-of-the box thinking and, number one, making sure all the appropriate stakeholders are involved, whether it's an RTO or non-RTO, but making sure the right entities are involved, we look beyond some boundaries in engaging those entities and that we deal with the very specific regional issues that are going to come about.

And I don't know necessarily that we're going to be able to generalize with respect to the implementation and the execution of the EPA regulations. So what we

need to do is have the discussion transparent enough among the interagencies that we can actually move forward in addressing issues or ask pertinent questions.

So from our point of view, when we talked earlier, from the EAC committee was making sure that we had the point of contacts, folks that could add the value-added which is have you thought about this, what about these issues that are going to result, and they can be outside of just reliability.

MS. LAFLEUR: I just want to pick up on one thing Pat said, which you used the phrase, federal government community, and I think that's how people out there want us to behave.

And when I go around the country, I mean, I'm compellingly aware that when they're complaining about something that's going on in Washington it might have nothing whatsoever to do with FERC or anyone FERC even sits with on a regular basis, but you're part of the federal government.

But I feel like I've been here about

five minutes, and I'm not a Washington person. And so, at least now with this group I'm getting to know DOE, but there are all these other agencies that regulate the same people we do. So I think efforts that -- Pat has been around a lot longer than five minutes -- can do to promote this meeting and coordination, I think is very useful because it's what people out there think Washington should do.

MR. GARDNER: And a good example of that is just the conflict between must-run orders for reliability and shutting down to meet the standards. And that was a big -- that was raised several times in the forum.

And one of the things that our committee is going to do is, really, we're going to have a webinar that will hopefully have some EPA officials on it, talking about exactly how the fourth and fifth year will work, really sort of drill down into that, to really understand that and what options are available, so our members understand it. And hopefully, this issue be looked at.

MR. COWART: Jose.

MR. DELGADO: Just briefly, to add some fuel to the fire, Cheryl, one issue that comes to mind and has been there for a long time, since being involved with NERC for a long time, is that the system can take a loss of any particular unit. Were you to look at the petition for a shutdown as one at a time, you're going to miss something. The system cannot take multiple losses.

We can even take a downtown loss. I agree with Rick. It's difficult, but we can take one of those because the system was designed so it stays on with one at a time, your worst unit.

The only problem is having multiple units easily creates a situation that it cannot happen. So it is that first one actually gets a bye, and it's just a time it's using line. You know, the first one is okay. The next one, uh-huh, sorry about that.

So what you find is unless you look at it globally -- the same thing with the states. You may say we're okay in this state,

but the state next to you is not okay. All of a sudden, you have an unstable situation in your own state. Very important that we look at the whole thing broadly.

So this supports pretty much what I think everybody has been saying.

MR. COWART: All right. Now for you all, is there anything -- this is great conversation. It's great information. Is there anything that would be -- that you'd like to ask this committee to pay attention to or to do?

Or, is there any committee member who wants to make a recommendation for any action that you think we should do other than just give the feedback we just gave?

MS. LAFLEUR: Well, I'm trying to resist the temptation to make every meeting that I go to be about the EPA and reliability because of all the other -- couple of things we have to do. But I think there is a direct role for EPA in this in terms of potential emergency orders and the work.

EPA, I think, is planning to do

work. I know they just stepped out on supply chain, for some of the equipment and so forth. And so, to the extent there's an EPA role, I think it would be good for this committee, which is supposed to be advising EPA, to be aware of that and making sure they're doing what they can do.

I'm sorry. I just said I was brand new. To the extent there's a DOE role, where DOE might be like working on supply chain for baghouses or whatever, this is a good forum to kind of say what are you doing, how are you doing that, because they have direct things they're working on, on this.

MR. COWART: Ralph.

MR. MASIELLO: This is sort of a nitty-gritty question, and perhaps ignorant, but someone like Gordon could answer quickly. We don't get to practice black-start. Are the engineering studies and simulations that are done to do a virtual practice of a black-start sufficiently rigorous, when you look at the lessons learned, like from the San Diego outage in the detail of the different

components?

MR. VAN WELIE: I think most regions do some form of practice of black-start, but I think that there's lots of room for improvement in terms of simulating through some sophisticated model, what the system would look like. And we realize that, and we're putting more effort into that as well.

We're on a trajectory to systematically improve that, but I don't have any idea how what we do compares with the region next to us. I think that is a valuable opportunity for further study.

The other thought that occurred to me, Cheryl, was that if you think about this interconnection-wide planning, it was sort of launched with the intention of sort of saying how do we deal with interregional transmission issues. But there's a mechanism now for the DOE and FERC to sort of study the grid impacts of losing large amounts of generation. So I think it's just -- and I think everybody anticipates that this effort will continue.

So I think there's a mechanism there

for the DOE to say, okay, we want to understand in the details where the reliability impacts are going to be, which units are going to be most exposed to from a reliability point of view.

We're doing it in New England anyway. We need to understand because where we're going with this discussion in New England is to say we want to understand which units are going to create the most reliability problems were they to retire. And then, we need to figure out what we're going to do to replace those units, either by creating an incentive through our market structure to go and buy something to replace it or to build a transmission line to basically displace the need for that unit.

So I think that sort of mechanism can be done on a bigger scale to get at some of the issues that Jose just mentioned, which is: Okay, what are the interregional impacts? What happens if we -- you know, I'll give you one small example that's close to home, which is what happens if Indian Point retires.

Okay? What's that going to do to both New England and New York?

So I think those are the kinds of "what if" questions that could be asked and answered through that sort of planning forum now that it's been set up.

MR. COWART: This committee addressed this question early on, more than a year ago, and one of our recommendations to the department was that the department should work with FERC in particular, and also with the state regulators, to establish a process whereby these reliability challenges could be directly put in front of decision-makers for an evaluation in the open of the situation in particular cases.

And I guess it bears noting that you've done that and that over the course of the past year and a half -- in fact, the past year -- this process has been created and the forum with NARUC has been created. My comment is to say that congratulations for moving ahead with that.

Thank you very much for coming.

You're welcome to stay as long as you'd like.

Anything further on this topic because we're going to move on to the next agenda item?

MS. HOFFMAN: So I guess what I'd like to do is introduce the next topic and introduce Bill Bryan. He's the Deputy Assistant Secretary for Infrastructure Security and Energy Restoration Division within my organization.

And a lot of what we do is help plan, prepare, respond, mitigate any sort of emergency and disruptions. I think some of the topics from the EAC have been timely in this area as we look at how we're doing business, how we want to improve doing business, and some of the things, some of the urgent things, that we're looking on.

I know that Mike brought up AEP. He brought up EMP. Too many acronyms. But we're doing a lot in working with NERC on those, the solar flare issues, and I think there are additional things that we should concentrate on.

You brought up the hardening. Hopefully, Bill can introduce and talk about a little bit of the activities going on there.

So what we wanted to do is actually give you an overview of what we're doing in the energy infrastructure with respect to emergency response and restoration, planning and preparedness, and then we can talk about the EAC and some of the topics for future discussion.

So with that, Bill, thank you for being here.

MR. BRYAN: Thanks, Pat. Wow, this is a loud mic. Sorry. Thanks for the opportunity to be here. Rarely, do I get a chance to talk in front of my boss, so I wanted to move around, so I can be a moving target. I didn't want the eyes being locked on me while I was sitting at the table. That's not always a comfortable thing. So I figured I could move around a little bit.

When I was first approached to come to the EAC, I got to tell you I was very excited about doing this. David Meyer came

and approached me first about talking to you guys on the wide range of things that we're working on within ISER.

And I've got to tell you even though I focus on the security side of electricity, oil and gas, I probably spend more time on the oil and gas side of things because when you work in an office of electricity delivery, everybody is an expert on electricity. And I'm certainly not one of them. So when the opportunity came up for me to talk to this group and I further learned how wide and broad of expertise that this group provides, what an opportunity, what an opportunity to tap into this resource.

So, thank you again for being here. Very briefly, I want to talk about what I do in the office. Again, it will be brief -- infrastructure security and energy restoration. But I've got to put it in context.

How do we define security? Of course, the Secretary of Energy will say security is energy independence. But within

the area of infrastructure security, we look at the world in three areas -- reliability, survivability and resiliency.

There are some familiar faces. Some of you have heard this from me before, but I think it's important to stress. Everything that we do fits at least into one of those three.

Reliability. What do we do before an event occurs? What's the steady state to make the grid, or the energy system, more reliable? So I'm more focused on systems than I am individual sites. That's important.

The second thing is survivability. That's during an event. So you do have certain key golden nuggets that you have to protect how you're able to sustain an event from occurring, whatever that event is, a natural disaster or manmade.

We built this whole infrastructure in the United States about protecting against a terrorist attack, but we've had over 50 storms of significance since that time that we've had to be prepared for. So it's very

important to know what that threat is and be prepared for that and be able to survive it.

And thirdly is resilience. How quickly can we respond and recover from an event occurring? That's post- event.

Bottom line is within our office, two primary things -- infrastructure security and energy restoration.

On the infrastructure security side, we do promote infrastructure security policy, working closely with the White House, working closely with the interagency for all three of those -- electricity, oil and gas -- as I mentioned before.

We are the sector-specific agency for energy. That authority has been delegated down to Pat to execute. She has given that to me to make sure that we fulfill that obligation under the National Infrastructure Protection Plan as the sector-specific agency for energy.

We also have a response mission. Whenever there is a natural disaster, we are responsible for the Emergency Support Function

12, which is the energy response. So we actually have folks deploy under the National Response Framework, sent out there in the field forward and help facilitate energy restoration.

Matt, here, is one of our responders. So any questions about that, he can go into more detail.

The key to take away is that we like to see ourselves as providing the tools to enable reliability, survivability and resiliency more effectively.

Who could have planned, who would have thought about writing a plan to rescue 100 people off the wing of an airplane in the Hudson River? Who would have thought of that, right?

So how do you plan for something like that? But it worked, and it worked effectively because people have the tools to do it. So that's kind of how we see what we're doing.

I want to give you three things that we're working on and, hopefully, see this as

an opportunity to where we and ISER can better leverage the expertise sitting around this table. But before I do that, I want to share a little.

I'm reading a book called the Total Money Makeover, and it had a story in there, an illustration I think is really pertinent for this. There was a test done in a lab with some chimpanzees. They had a pole, and they had these ripe bananas on the top of this pole. And so, they had these 12 chimpanzees, and of course, they immediately started to climb the pole to get after these bananas.

So what do they do? Every time a monkey got on that pole they hit them with a water hose and knocked them off the pole. The next monkey would get up there; they'd knock him off the pole. And they kept doing that and doing that and doing that until the monkeys started pulling each other off the pole before they got hit with water because they realized that it's not good trying to climb that pole and get up to those bananas.

Then the next phase of this exercise

was they started replacing the monkeys with new monkeys -- monkeys who had never seen the water cannon go off. And after awhile -- and every time a new monkey would get in there and climb the pole, the other ones would pull him down and pull him down and pull him down.

Finally, the entire cage was filled with new monkeys that had never seen the water go off, and none of them would ever allow anybody to climb that pole and get at the bananas. They were programmed but not knowing why. No one knew why they didn't climb the pole to get the bananas. They just knew it wasn't good to do.

I think we tend to look at problems from the past and not look at things creatively and openly. And we're faced now with some threats and situations facing our energy systems that are, frankly, things that may have been around a while, but we just haven't really had to focus on them like we do now. So they're going to take creative solutions, and it's going to take all of us working together to do that.

First one, Mike mentioned it earlier, and I got here just about an hour, hour and a half ago -- geomagnetic disturbances. I'm not going to embarrass this group, but I will tell you that nine months ago we hosted a working group on geomagnetic disturbance with just the industry. Just the industry.

And I asked the question of that group, and there were probably 60 people in the room: How many of you know what this is? And about 60 percent of them didn't know, never heard of it. This is the industry out there running the grid, and they'd never heard of it.

One big takeaway from that was education. Somehow, we've got to get the word out, that this is, no kidding, a serious problem and people have got to start thinking about this.

There is no silver bullet. There are a lot of technologies being talked about, technologies that are on the horizon, but these are things are going to have to be

tested. We want to involve this group in looking at some of these options that are out there. What are the ones that are viable to be tested?

We are currently installing sensors, as you know, up in Canada. There are some sensors on the grid right now, collecting data on how this phenomenon propagates on the transmission system. There is just a handful of these sensors right now.

We are working with NASA; we are working with EPRI, to install some of these sensors in the northern part of the continental United States and figuring out where to place these things so we get a better understanding of how the transmission grid receives these types of disturbances and how it affects and how it propagates, so we can better baseline what we're dealing with.

We are notorious in the federal government for throwing a problem out to industry, saying fix it, without scoping the problem. We are notorious for that. And I think there's a definite will in industry to

help us fix the problem. But if you go to industry and say, listen, we want you to prepare so we don't have this problem, you're going to prepare for what? The 100-year storm? The 1,000-year storm? What are we preparing to?

So we have to better understand how this phenomenon affects our system and baseline that before we can decide how to go forward and fix it.

We're also looking at technologies to better measure the life of transformers. There are very two distinct camps in this area of geomagnetic disturbance. One side of the camp will tell you that the world will end as we know it and we're going to go back 20 years if something like this every happens. Another side of the camp will say, you know, it's not quite that bad; we need to have a measured response to this situation.

And we're somewhere in the middle. We don't really know yet enough to be able to make one of those determinations. We do know that it can take the life off of transformers

if the event is strong enough.

So by measuring, using technology to better measure the life of these transformers, we're going to know if that 25-year-old transformer just lost 10 more years of its life. That would be nice to know if you're having to replace it, right, or if it lost five years or wasn't impacted at all. But the fact is we do have a lot of old transformers, and that is a concern, and we have to be able to better predict and understand the impact on these transformers. So as I mentioned before, we need to scope the problem.

And a couple of the questions that we wanted to pose to this group -- and of course, this could take many forms which we can talk about later, but: What should the federal government do to mitigate this? What is our role? What would industry like to see as our role?

You have a lot of people looking at this. You have regulators looking at this. You have legislators looking at this. You've got the federal government looking at this.

And I'll tell you legislators will legislate a solution, regulators will regulate a solution, and us in the federal government, we're hoping can get to a solution through participation.

Legislation is good; regulation is good, if it's smart and if it's right and if it's focused. And sometimes you may only get to the 70 or 80 percent solution and have to use legislation or regulation to fill that gap. But we've got to do it smart, and we're going to do it smart by working together as a team, so when that time comes we can better address it.

So what is our role in the federal government, and also, with whom should we be engaged with in addressing this?

It's easy to say everybody, right? It's easy to open the aperture up and say, let the whole world come in and help us solve this problem. That might be the solution in this case, all right. It might not be.

And at what stage do we engage certain folks? And that may be even a better strategy. Who do we deal with now as we're

trying to scope the problem and come up with solutions, and how do we work that down the line and pace that engagement?

The second area, we've developed a criticality methodology. The key takeaway from this is it's an objective approach. It's also consequence-based as opposed to risk-based, to identify infrastructures of concern.

Why is this important? Well, number one, people -- I'm talking White House.

I'm talking Congress and everybody from there on down -- want to know what's critical. Right after 9/11, everybody was wrapped up around developing critical asset lists, right.

And we learned some very -- we learned a lot from developing lists. Number one, they don't work, all right. There are always going to be golden nuggets out there somewhere that you really want to protect, and by and large, criticality is fluid. It's dynamic.

I came out of the DOD world. What was critical today was not critical the day

after that, all right. It was scenario-dependent. It was time-dependent.

And I would submit that in the energy sector, in the electricity sector, it's also scenario-dependent, all right. A great example, when the Olympics were in Salt Lake City -- and some of you may have been around. All of you were around. Most of you were around. And some of you may have been involved.

At that time, I was with DOD. But we had a mission, and that mission was to model the electric grid around Salt Lake City, and they wanted us to identify the nodes that would take down any venue. And this was right after 9/11. So they did not want a terrorist to turn the lights out on the Olympics for the world to see. That was a huge priority.

So we did that, and we identified all the substations that provided electricity to all the venues for the Olympics, right. In that two-week period, they cannot have the lights go off, right.

And that's kind of an easy fix

because you could put people all around substations for two weeks, right. You can really beef up security for two weeks.

But a little know fact is there was a deliberate attack on a substation during the closing ceremonies. Actually, eight hours before the closing ceremonies. There was a satchel charge placed at a substation that took out about a third of the power at the airport, a couple of hospitals, some police stations and fire stations, but it did not affect a venue.

So were we successful in the mission? We were. If your metric was keeping the lights on at the Olympics, it worked, but there was an attack.

My point is bad things are going to happen. You're not going to protect it all. But if we know the scenario, we know the objectives you're trying to reach, we can certainly model that and we can certainly make a determination that these are the most critical nodes that you have to be sensitive to and aware of because this is where you need

to invest your time and energy, because your risk is high that if this goes out you're not going to meet your objective. And that's the whole purpose of having this criticality methodology.

So now, instead of the White House calling us up and saying, what are all the critical electric nodes in the United States, we'll have to say: Critical to what? Give us a scenario. Give us an objective. Then we'll be able to tell you. Then we'll be able to tell you.

The benefits. It's based on a sound risk framework. It's dynamic and responsive to different objectives. It's scalable.

So we can do it locally. We can do it in a metropolitan region. We can do it regionally and much broader. So it is a scalable process.

And it is, like I said, consequence-based and repeatable, and it's also defendable, which is also important. You can't have a process so complicated that no one else can do it but a couple guys sitting

in a lab. All right?

So how do you guys get involved in this? There could be scenarios that keep you guys awake at night, and those would be nice to know. We would like to test this process, this methodology, on some of the things that you would throw at us.

What if -- what would we do? If we had this scenario and this objective in this part of the country, what would you identify as being critical? And kind of bounce it off you. Do a validation and a vetting of this process.

Who else should we engage with to flesh this process out?

And also, what should we do with the results? I mean, we're doing this because we get asked a lot of questions and people want to know answers, up at the top. But in order to do that, we rely on a lot of information.

Most of it, I've got to tell you, is open-source. Very little of it -- and Matt can go into more detail, but very little of it is proprietary, if I'm not mistaken. Most of

it is open-source information, all right. But we're still getting that information from industry, from some place.

So what's the value for industry? What could we be giving back to them as part of the results? That's something we could certainly use this group's help with identifying.

And the third piece is electricity reserve. Now Pat, she's the electrical person, right. So she's says, well, that's just nothing more but distributed generation. And she's probably right.

I'm the non-electrical guy trying to come up with some kind of ideas, right. But I want to throw this out to the group, and I think it's a great project to look at.

We have a strategic petroleum reserve. Anyone care to guess how much money it takes to maintain the strategic petroleum reserve?

It's mind-boggling, right. Figure out the cost per barrel of that, all right.

Now think of -- if you can step back

a little bit, what would something like a strategic electricity reserve look like? Maybe you have 25 MW units that are mobile and transportable stationed throughout the country. I know there are companies that have large mobile generation capacity, that could be on a site in a very short period of time.

And a great scenario that I'm thinking -- usually, in a natural disaster we don't lose generation. In most natural disasters, as you know, we lose distribution; we lose some transmission, but we rarely lose generation.

But you take a New Madrid earthquake or you take a significant geomagnetic storm, and you could potentially lose some significant amount of generation, possibly. Right?

So take the New Madrid, for example. If that were to happen and we could roll in with 6 or 8 25 MW, 50 MW portable units, set them up around the area within 24 to 72 hours, you've got a significant number of people getting power; you've got nursing homes

getting power; you've got hospitals getting power, until everything gets back in order and the grid gets back up to where it's supposed to be.

Several lines of thought -- it's really power when you need it in a very short period of time. We, in America, are just not used to not having power. You guys know it.

I've been out to areas that have lost power. After, or within, eight hours it's a party. Everyone breaks out the meat out of the freezer, they start having a barbeque on the street, and the neighbors all get together. But after about three days, that gets old and they wonder where their power is.

So looking for a plan that will allow something like this to happen within 24 to 72 hours, I think, is very vital.

And of course, some of the areas we'd want this group to look at is: Is this thing feasible? Is it cost effective?

One of the terms Pat had is -- okay, don't worry about who's going to pay for it

yet. Just is it feasible?

And Pat's concern was we don't want these things sitting in warehouses. Seals can go bad. They need to be run up. They need to be used. Is there a way to keep these things feeding the grid at peak in some areas where they're located to keep them operational, where they can quickly be broken down and moved?

These are things that we would like this group to consider seeing if it's something that would work.

How should they be deployed? What size should we have? What location should they be at? And how will they be used when they're not being used for an emergency? I'll tell you with the experience in this room, some of you out there have answers to some of these questions. I don't have all of them, but I think it's certainly something that the EAC could contribute to, working with us on some of these issues. So I throw that out to you.

That was my last slide. I throw

that out to you. Remember, we have to start climbing that pole after those bananas. We can't just stay on the ground anymore. And so, if this is something that's of value to the EAC, it certainly would be of value to us, if it's in the form of a working group or whatever.

But I want to thank you for this opportunity to be here and look forward to the discussion following.

Any questions? Great. Thank you very -- oh, yes.

MR. NEVIUS: Back when Don Hodel was Secretary of Energy, there was a concept introduced whereby new transformers would be acquired and installed in place of older transformers. And the savings in the losses by having more efficient, less loss transformers would be used to pay for this inventory of spares. You'd put the older transformers into a spare capacity to be used in case of a major emergency, whatever it was that would cause significant losses of transformers.

I don't know if that has ever been discussed more recently, but it was a proposal. All the economics were done, and supposedly, it was a money savings issue, or at least you'd have enough money saved from the reduced losses to pay for the new transformers.

MS. HOFFMAN: I can go back and look into it, but I haven't heard of it.

MR. COWART: Mike.

MR. HEYECK: Speaking of David Nevius, you know when we, the Transmission Committee, first put out a draft of grid security, it was that we were recommending to DOE do everything. And I was reminded by some folks, and the committee was reminded by a lot of folks, that NERC was doing something.

There's got to be a point where, where can DOE help. And the areas that the subcommittee had identified, and then this full committee identified, were in the area of modeling and testing, to harden the system because we have EPRI also doing work with respect to GMD. But one area, again, that the

industry is not developing hardening techniques is for EMP.

Now you'd hope that the DOD is working on making sure it never happens, but if it does happen I'm sure the hardening that we could deploy is not going to break the bank, and as we replace these assets over the next 30 years it won't break the bank.

The point on transformers, we do have the EEI Step Initiative out there for particularly 345 KV transformers, and that's been pretty effective. We all committed to have these units.

But one of the things that we're looking at, at AEP is particularly 765 KV units. We're kind of a one of a kind. Hydro-Québec does have them, but we're one of a kind.

So as we replace these units with units that are much more efficient, what do we do with the old ones? So we're trying to retain the best of the best, the best of the old, as spares just in case an event occurs. And we're looking at low cost ways of actually

maintaining those.

So going back to the original question, what can DOE do that is not overlapping with NERC and actually works with NERC, on the resiliency and reliability side?

MR. BRYAN: Right now, we work very closely with NERC. Every event, every activity that they've been involved in, we've been partnering with them on, to go down there, keeping -- also keeping Joe McClelland over at FERC involved.

Frankly, there's not a lot of funding to do this kind of stuff. When you start talking about testing of large transformers, testing of certain devices that are out there, all the recommendations that we've received to hey, what would it take to fund something like that, always seem to come at the off-cycle of the budget and never come when the budgets are due. So putting these people who would want to fund something like this, it just doesn't get into the appropriate budget cycle.

We're working with that. I will

tell you that the White House is right now very energetic about trying to find ways to fund these kinds of things. They recognize that's a concern.

So we're looking really on what exists out there right now in tactics, techniques and procedures. Some of them, there are. Some of this can be combated through tactics and techniques and procedures in how you manage and operate the grid, but you've got to have that early warning.

MR. HEYECK: Let me just address the funding issue. In EPRI, down the road, these neutral blockers for transformers to block these currents -- these neutral blockers are great to block the currents, but they're also the failure mode if they're put in at the wrong time and it could actually fail the transformers when you're trying to.

But from a funding perspective, we looked at modeling and operating procedures as our initial foray into it, and that's what we're addressing.

The DOD, I believe, is also looking

at micro grids, to live on their own. If the DOD has got some funding on that perspective, there may be funding from that perspective to actually get into hardening, which you might not need in a micro grid in the first place.

MR. BRYAN: Well, Pat can even elaborate on that. We have many activities with DOD that we're engaging in. We are joined at the hip, so to speak, with what they're doing and what we're doing, and we're trying to merge those R&D activities to better -- so we have more efficiency in doing the research and development on these types of things.

MR. COWART: Barry.

MR. LAWSON: Thank you. I did want to mention -- and I think it's been mentioned before, but NERC just issued a GMD report, and it is a very good report. It has some very thoughtful recommendations, not only for industry but for other entities, such as what the industry needs from the government side of things. So I think that NERC report should be looked at very closely as sort of a road map

for where we might all want to go on, especially on the GMD issue.

And just one other thing, I know we -- you started off with well, there has been some talk about the EMP side of things -- the weapon, if you will, not the solar storm but a weapon. Some of the things that you can do, or some of the possible solution on the GMD side can have some benefits for protecting on the EMP side. It's not one for one, but there are some benefits. So some of the steps that can be taken for GMD can have some benefits on the EMP side.

But I do agree with Mike, and that is we hope DOD is going to not allow the EMP thing to happen. That's not something we as an industry can prevent. We don't have a military, and I don't think we're going to have one anytime soon.

Anyways, that's it. Thanks.

MR. COWART: Gordon.

MR. VAN WELIE: So Bill, a thought that occurred to me was that it might be useful for you to have a conversation with

NARUC because your issue of electricity reserve, I think, is going to be expensive. And the states, particularly the states that have been affected by big storms recently, are thinking about the same problem. I know this is a discussion in states like Connecticut and Massachusetts because of the Halloween storm that knocked out the power system for close to two weeks.

Some of the ideas that have been floated there are how do we create resilience in the power system through essentially micro grids of some form. So how do you sort of deploy at schools and so forth, back-up generation so that if the power systems go down for a week or two, you've got some sort of basic level of support.

So perhaps, there's a way that you can look at what you're trying to achieve from a national perspective and what they're trying to achieve from a state perspective and see is there an intersection point because, ultimately, it's the same electricity; consumers are going to have to pay for all of

this.

MR. SLOAN: I want to pick up on that and bring something else to Commissioner LaFleur's attention, and that is that EPA has been issuing rules that have impacted generally municipal, but it can be REC, diesel generation units that have been used for peaking purposes. They, in effect, have been a micro grid, particularly in the Midwest where we have storms that take out transmission lines. And the only way that we maintain some semblance of the integrity of the system is that these summer peak units come on in the fall, spring or winter, and they tend to then violate EPA hours of regulation -- or, of operation rather and emissions.

So as you're looking at your reliability/resiliency issue, you might want to be tying into that.

Then I'll just throw out -- since Brad and Ralph are here and I'm going to suck up -- as you're looking at having portable generation, you might also look at having

portable storage that could roll in, and that might be quicker since those things are on wheels and in trailers and can provide you that first response while you're waiting for generation to come back.

MS. HOFFMAN: So I just want comment. I know Mike brought up the DOD and hardening, and I think the approach is to look at the system as a whole and take a holistic approach to how can we provide resilience either by hardening or looking at fuels, generation, upgrades to the system as a holistic perspective for improving services.

But it comes back to, I guess, the fundamental crux of the issue is what are the expectations for reliability and restoration times by a customer, and I think some of those expectations are changing. I mean, the Connecticut event and other events have shown that there is very little tolerance for a week-plus nowadays for restoration times.

So as utilities are looking at their business model, some utilities are really taking, I will say, the micro grid term and

evolving it into their own ownership, which we had a EAC discussion on that a couple months ago, and saying: Okay, how do we start tailoring some of our services to meet those expectations, depending on the customers, and how do we work some really creative solutions of assets that can be placed at a customer's premises but operated by utility, but in an emergency have an innovative structure where they provide certain services, depending on the customer and what they need.

So I think we need to continue to think of all of the above, kind of. There's not a silver solution in this, but there are multiple solutions that we need to go after -- hardening the system, looking at improvements and upgrades in the system, looking at specific loads and load isolation, depending on what the circumstances, getting better in touch with customers on reliability expectations and restoration procedures, and other things that I would say even go beyond that.

You mentioned EPA. But you're

talking, once again, the fuel infrastructure of not only is it the reliability of electricity, but it is the reliability of natural gas and the other resources that are going to impact the electric system.

So we are taking a holistic approach. We formed a public-private partnership with the DOD. It's called ES3P -- Energy, or Electric, Sector Public-Private Partnership.

But the push and the focus is we've got to look at all of this because in some cases it may be a simple solution of doing some upgrades here and there, and adding some redundancies. In other cases, it's going to be a more complicated solution. So it's going to be very tailored and specific to the customer.

And that's why some of the criticality analysis started focusing on the customer and the consequence point of view because that's what we're ending up really starting to focus on -- is the confidence.

I think at one point in time we

talked about oh, the world is going to change to distributed generation. Well, why is that? Is there a lack of confidence in the electric sector, and what can the electric sector do to build the confidence?

And can rules change as we talk about partnerships with the PUCs to help with that messaging or those expectations? I think we need to keep pace with the consumers and what they're expecting.

MR. HEYECK: You really hit on a subject -- the holistic approach. But if you do have an EMP event, what good is the grid when all of the load will also be disabled as well? So the definition of what critical load means today versus what it meant to state regulators 30 years ago is very different.

I really enjoy the discussion. You know my passion on this. I think it might be something that the Transmission Subcommittee could take up as an ad hoc approach.

MS. REDER: Yeah, I just want to compliment the efforts to have DOE reach out to DOD and work together because there is a

lot of activity in DOD, and I think it's important that we really cohesively understand the impacts.

It's easy to have a demarcation in our thinking on micro grids versus kind of traditional electric system. And I think really it is an issue of resiliency, hardening and where are the bets best placed.

It's a moving target, without a doubt. I think in many respects we need a better mechanism to make sure that we have consistent language and metrics, and that's not necessarily out there right now. So that's probably an area where there could be some focus.

But clearly, to the extent that we look at it holistically and think about the consumer's expectations and how they're evolving, while it's in a context of traditional delivery system and micro grid, I think that's definitely the best approach.

So, congratulations on working together with DOD.

MR. VAN WELIE: This is a rhetorical

question to the group at large. I'm not sure this is DOE's problem, but it seems to me there's a complete disconnect between the average consumer's expectation in terms of the quality of service they want and what they're prepared to pay for.

I mean, you just have to sit and listen through two days' worth of discussion here about all the problems we're trying to solve -- gas/electric issues, EMP issues, getting spare transformers stashed away. I think -- but people don't want to pay for it. So all of these things are on a trend to sort of drive electricity costs up significantly, I think.

The transition that's going to occur with the generation fleet across the nation as we take fully depreciated assets off the system and replace them with brand new assets, that's going to be something to watch over the next 10 to 20 years.

So I just wonder about the sticker shock that's coming and whether there's something that needs to be done on a

coordinated basis to get people to understand that this is infrastructure that's old, it's been around for a long time, it's been fully depreciated, and we have to spend some money on it, given the new challenges facing us.

MR. MEYER: Gordon, let me raise a question with you. If there is a lot of this change in innovation and turnover coming, doesn't that -- as Mike has said previously -- doesn't that give us a chance to achieve some of these associated objectives at a comparatively low cost, or little incremental cost, in the process?

MR. VAN WELIE: I may be just missing, but I don't see it. I just see that there's going to be a fairly massive infrastructure investment required over the next couple of decades.

So I agree with you that the better coordinated the investment is the more value we'll get out of it. If everybody is sort of rushing off in different directions, trying to solve the problems independently, you increase the risk of bad investments. I think that's

the big question.

But I don't see how we're going to escape spending a lot of money to solve some of these problems, and I don't think consumers know what's coming yet.

MS. REDER: Picking up on Gordon's comments there, I do think that it's really important to understand the resiliency aspect on the delivery and the impacts on the micro grid because to the extent that we don't do that, you can easily have those few that are very, very, very interested in high reliability and are investing in it.

Rick brought up ALCOA's situation earlier, where there are certain pockets where people will pay for it from a micro grid perspective, and then the ramification back onto traditional rate-making philosophy and what happens on how do we get that infrastructure so that it continually is reliable.

I think it's just important to think about it holistically because to the extent that we don't we may end up having situations

where we have customer classes ultimately paying for reliability that the overall population, at large, benefits from, and it may not be the optimum.

MR. COWART: Sonny.

MR. POPWSKY: Yeah, just to response quickly to Gordon, I mean that's the issue I face all the time. You know, a group of angry consumers who is out of power for a week or two.

One of the things I do try to tell folks is that the cost of losing a refrigerator and freezer full of food really does hit hard, and it's hard. As hard as it is for me to say that, it is worth it for customers to pay an extra couple dollars a month to do what's necessary to make sure the system is reliable because once you've been through that, or two or three times, you can understand the arithmetic of that.

On the other hand, there are priorities that have to be set, and some things are more valuable than others. That's one of the things we're going to be talking

about.

MR. COWART: Ralph and then Mike, and then pretty soon we'll call a close to this conversation.

MR. MASIELLO: When we had the panel on micro grids in the fall meeting, one of the things that came up was interconnection standards where the micro grid projects would say, first principle of being a micro grid is you can island and operate independently. And there was a lot of concern expressed about if micro grids are backfeeding at the moment of an event and disconnect, to island, you've aggravated a contingency.

The same issue is a hot-burner item in California now where DG interconnection standards, especially photovoltaic, are up for question because of the need for fault ride-through, low voltage ride-through. It's, again, the same issue.

But this whole blackout discussion then triggers, I think, another question. Interconnection standards could be looked at as a way to say if you're a micro grid or a

virtual power plant or distributed generation, your inverter and your protection need to be able to provide black-start. But this gets into issues of control and monitoring. It's not just simple protection.

But that's a lot less expensive than putting megawatts of batteries on tractor-trailers to drive around.

MR. HEYECK: Just some anecdotes. The first 345 KV line was put in, in 1953. The first 765 KV line was put in, in 1969. And I just read a Sid Gray study that says the average life, the median life of an ASCR conductor is 46 years, plus or minus.

We are going to be replacing these assets, and actually, those assets are not the ones that desperately need replacement. We have some assets -- we, being the industry, have some assets that were built when Taft was President. So they need to come down, and they need to be rebuilt, and they need to be built in a very good way, a very smart way.

Here's another. We had a storm, an ice storm in western Oklahoma about two years

ago, and two major lines into that area were down due to the ice. And so, we responded very well. We got those lines back up in a matter of a few days.

So the chief operating officer of AEP asked me, saying, did you put them back up the same way? I said, yeah, because we're not going to reengineer it and we're not going to put new foundations in.

And so, we actually went back and said, why can't we guy every five towers or every few miles so that it doesn't cascade? Why don't we go back and replace every three miles, one of the towers, so that we don't cascade?

And so, there are smart ways to do these things even in the storm scenario, but you're right; getting the light son makes us put it back the same old way.

There's a lot of need out there to replace these assets. There's no question about it. I think I would say that two-thirds of the assets in the United States -- and this is just a guess on my part -- are at or near

life, or over life. So what we're going to do is let's replace them with something that is going to withstand some of the tests of either GMD, EMP or some of the others.

And getting back to the question at hand, I think the question is should an ad hoc group be formed to advise DOE, and I would like to volunteer the Transmission Subcommittee for that effort. Pat knows how passionate I am about it.

MS. HOFFMAN: And I'm also passionate since I have to deal with the hurricanes, but I mean, you talk about all the issues we have to deal with. We've got to put it on the table, look at prioritization and look at what can DOE do in support of that as well as some of the partnerships that we're doing with the other federal agencies.

I look at even just rethinking about the strength of hurricanes and the issues of the events that could happen in the near future, and probably some of them, we are seeing more extreme weather events, and how we can look at that and respond to restoration.

MR. COWART: All right. So at least you anticipated my question, which was: Okay, we're at the decision point. What should the committee agree to do or not do?

We have a proposal from Mike on that, and I saw Wanda's eyes open, and Dian has got her card up. So, comments.

MS. GRUENEICH: I'm fine with the Transmission Subcommittee taking it on.

I just wanted to make one quick note which. Hearing this discussion and remembering our discussion yesterday on the whatever it's called -- vision grid of the future. I think that this whole element; it would be very useful to make sure it's also reflected in that document and maybe -- I can't remember if it was, but there's a lot of stuff here that we've talked about that I would love to be seen incorporated in that document as well.

MR. COWART: Any other comments? I suspect your offer of assistance will be accepted.

MR. HEYECK: I'd like to add that

micro grid is probably about to drift into the Smart Grid Committee, and Ralph has got a play in this too, and storage. So there's multiple plays, but I think the security aspects of it, we're offering.

MR. COWART: All right. Thank you very much. Any further discussion on this point? We're about time for our break. All right, let's take a break, reconvene just about on time, at 10:30.

(Recess)

MR. COWART: Well, while we're waiting, Elliot, maybe you could help us by making the announcement about the ethics. You'll remind us again later, but we're just waiting for Eric.

MR. ROSEMAN: So for EAC members there will be an annual ethics that we're all -- you're all -- required to hear. And that will be -- and we'll make this announcement -- in the Meridian C Room.

Now we're going to make it real easy to get there, but I'll just tell you. Take a right out of this door, you take a right at

the end of the hall, and Sheri Lausin over here will be at the elevators that you then need to go down to get to the Meridian C Room.

So we're going to ask that after the next set of discussions, that you go there before you get lunch. So we'll keep it short and sweet because your stomachs will be grumbling. But if you will go there, we'll take care of that business, and then you'll have plenty of time to still be able to get your sandwiches or whatever, to be back in time for the afternoon session.

So, thanks.

MR. COWART: I think that's right. There's a presumption that we need to be reminded every year.

MR. MEYER: Let me add that the DOE staff; we have our own annual ethics briefing requirements. So don't feel singled out here.

MS. HOFFMAN: Okay, I'd like to introduce the next speaker. Eric Lightner has been in our organization for ages and has been one of the founding fathers in the smart grid area even though he hates when I say that, but

has had a lot of thought and vision with respect to smart grid, the need for communication and controls and research in this area.

So I'd like to introduce Eric and thank you for coming today.

MR. LIGHTNER: Thank you, Pat. I appreciate the introduction and the opportunity to brief everyone here today.

I had to really think first when Wanda asked me to present. I was thinking okay, I've got a half-hour, 45 minutes or so.

And then I see the agenda. I've got 20 minutes, and me and Joe are splitting 45 minutes. So I was like oh, geez, I've really got to pick what I'm going to talk about.

So you'll have to excuse me if I go too fast on some things, but I figure I at least want to touch on some key things that I think are important to let you be aware of, and you can always ask me questions afterwards or whenever. Give me a call. Send me an email, whatever.

So I'm going to talk about some of

the OE's R&D Division's smart grid activities.

Okay, so I thought I'd start with this slide just to give you an overall picture of really how we're operating, how we're working within the R&D Division.

So you might think from the outside perspective: Geez, they're doing a lot of stuff. It doesn't really seem coordinated. I'm not really sure what all this is. They seemed to be here and there on different activities.

But actually, we actually have a plan, and it's called our Smart Grid Implementation Plan. And our vision is more or less, leverage, IT communications, technologies to increase reliability, efficiency and engage the customer and give the customer more choices, opportunities, deliver value to the customer. So everything sort of stems from that.

And some years ago, we held many regional meetings to really define what smart grid was. If many of you remember, we came up with characteristics, market characteristics.

That was basically our definition, if you will. Hey, here's the kind of functionality we want to try to enable, and that's really our starting point.

So we have smart grid characteristics. Those present certain challenges, and all of our key activities here really feed into those.

So we have demonstration and deployment projects, which Joe is going to talk about a little bit later. We have R&D programs. We're involved in standards along with NIST. We're looking at interconnection planning and analysis. We have workforce training. We have a stakeholder engagement and outreach effort, which I'm going to talk about today a little bit. We also monitor national progress.

And I'll just give a real quick plug for our newly released -- newly released -- 2010 Smart Grid System Report. So that is just out. It is available on SmartGrid.gov if you're interested in looking at it.

This group actually reviewed it over

a year ago, and we finally got it through all the hoops and hurdles and everything n the U.S. Government side, and now it's actually a public document. So that is available.

You probably remember reading it, about last February or March or so. That is out.

The R&D program, specifically the smart grid R&D program, which is one of a few R&D programs within our division, really looks -- it has a multi-year program plan that sort of guides what the investments are. And this was really developed through a multi-stakeholder process as well. So we went out to utilities and other R&D entities, like EPRI, and really tried to define what the needs were for the future. So really, our investments are based on that.

This is, more or less, where we're at as far as spending. Again, we're looking at using IT technologies, right, to improve reliability, to improve efficiencies, to give the customer more choices, add value there. So that's really what it's about.

So again, real quickly, the goals specifically for the R&D smart grid program really look at what those seven characteristics are and how we're trying to enable them, what our long-term targets are associated with those. So a 20 percent reduction in SADI, a 98 percent reduction in outage time, of critical loads, and increase the load factor or utilization by 20 percent -- those are some of our long-term goals. And really, that feeds into really looking at self-healing and improve reliability as well as integration of demand response, DER and plug-in electrical vehicles.

I put the word, illustrative, in here because this is just a quick listing of some of the projects we have ongoing.

Back in 2009, we funded 9 demonstration projects which we term Renewable and Distributed System Integration Projects, or RDSI projects. These projects predominantly look at how can we reduce peak demand on circuits in the network, and so those projects are all geared at, in some

fashion or another, utilizing technology and distributed resources, renewable energy resources in particular, to reduce peak demand on specific feeders. So it's more of a feasibility thing, to show it can be done on a regular basis and a repeatable basis.

Then we also have some technology development. We have a DECC facility down at Oak Ridge National Laboratory, which is really looking at sort of the interactions between multiple inverter devices on circuits and what the impact of that is.

What else do I want to say? We're also looking at the impact through some modeling of smart appliances and what their impact might be on the distribution grid.

We developed over the years something called GridLAB-D, which I actually have a slide on, so I won't say too much about that now. But one of the things we looked at -- some time ago, we started thinking, hey, wouldn't it be great if instead of waiting for five years for all our SGIG projects to be done and have the value and the benefits

associated with that; wouldn't it be great if we could somehow estimate those in advance, if we model those projects?

So we started thinking about it. We started looking at the projects, what kind of technologies they were implementing, and we came to the conclusion that we couldn't really model the projects specifically because they were too diverse. There were too many kinds of projects. We'd have to really spend a lot of effort on customizing the model to look at specifically those projects.

So what we decided to do is look at the kinds of technologies being implemented by those projects and, as a group, analyze and model those buckets of technologies and try to get a sense nationally what the value, what the impact might be. So we did that.

We looked at four specific areas, and those reports just came out a couple weeks ago. This is just the title page of those. So we looked at distribution of automation technologies. We looked at DG technologies. We looked at energy storage technologies and

demand response.

So those are four reports out, and there's going to be a summary report that comes out, I believe, next month sometime. But I only brought the title page because these are about 380 pages each, these reports. If you're really interested, you can download these also from SmartGrid.gov.

That's the kind of thing we wanted to use this model for. That's why we developed it. So I will tell you a little bit more about that.

So what is GridLAB-D? GridLAB-D is a -- it says it pretty good down here. Basically, it's an open-source time series simulation at the distribution level. So it's looking for the substation all the way down to the loads. It's a very detailed model to really look at. It doesn't use a lot of estimating of what a bulk circuit might look like. It's actually looking at all the devices, all the loads on that circuit and doing a very high resolution simulation of that.

Some of the key aspects of this tool are: It can be done on a time scale from seconds to years. It's open source so anybody can use it. It's free. It can be downloaded and used by anyone.

And the reason we did that was because we wanted to make this available to third-party providers of services to utilities. They could say, hey, I can use that model in some of my product offerings to utilities and help them make some decisions. It's a decision support tool. Hey, if I want to install X, Y and and Z, what might the effect be on my network?

So one of the key aspects of this model is -- the way it works is we developed a set of what I want to call representative feeders of circuits so that you could take a different collection of these feeders to closely model whatever specific system you're looking at. So it's not going to be an exact model because that customization would cost way too much money, would take way too much time.

So we built these feeders that were representative of different kinds of configurations in a utility. And the way you do a simulation is you look at that utility. You say, okay, I need feeder 8, 2 and 25, and I'll put those together in different ways, and I'll run my simulation. And that's going to get you about 85 percent, 90 percent of the way there, which is pretty good.

So we use this. So we spent a couple of years developing the tool, and now we're starting to using it to do some analysis.

So like the one I already told you about, with the SGIG projects, we did that analysis. And there are others, but I thought I'd point out this one.

So one of the things we wanted to look at was conservation of voltage reduction on a national scale, what might be the impact. And it really had some pretty cool takeaways, some pretty cool outcomes. And one of those is -- oops, wrong one -- if you put in CVR everywhere in the country, you'd save about 3

percent of the energy, which is huge. Right?

But more importantly, 40 percent of the deployment saves 80 percent of that energy, so 2.4 percent. Right?

So what that says is hey, we don't have to put this stuff everywhere to really get the value. We've just got to find those 40 percent types of circuits where it really makes a difference.

So what this tool shows is where this technology would really make an impact. So from that standpoint, it was rather revealing.

So changing gears now, away from that, something that we developed over the past is called Smart Grid Maturity Model. The Smart Grid Maturity Model was really a decision support tool for utilities to use in their planning process towards modernizing their company really. Right? So it's not just what technologies can we install -- and I hope you can read all that -- but it is, more or less, a thought process to go through.

Hey, I want to modernize my network.

I know I have certain objectives, certain things I'm trying to accomplish. What's the thought process I need to go through to arrive at how we should move forward?

So we've developed something called the Smart Grid Maturity Model to do that. It's something that we fund under the Software Engineering Institute out of Carnegie Mellon. They have folks there that step any utility that wants to do this through this process of they first have a workshop where they go through these eight domains, six maturity levels.

And these are characteristics in here. So you'll spend a whole day with a utility in a workshop, going through trying to determine where they are as far as the domains and the majority level, to say, okay, here's where we are as a company.

And then, the next step is we analyze that, and then we have another workshop that says where do you want to be. So if I'm currently a 1 over here, and I want to be a 4, what's it going to take to get

there?

So the idea is this is a tool that's going to help you think through all those different decisions you might have to make as a utility. And it's also free, but if you want the SEI to facilitate your workshops there's a minimal cost, I would say.

So some of the results from the utilities that have used this -- this is a little data. I think we have a little bit more than that now, but basically, 119 utilities in 21 countries have been using this thing.

And this is an overall compilation average of those scores from some different classifications of utilities -- leaders, fast followers and followers. So you can see the leaders are slightly ahead in certain categories, the fast followers are here and then the followers are about where you expect most people. You know, we're just kind of starting this journey, right.

So most folks are 1 and 2, but that doesn't necessarily mean a bad thing. That

might be where you want to be. Right? So it's not a one size fits all. It's customizable to your objectives.

So another thing I wanted to mention -- you can see I'm kind of jumping all over the place. We are looking at how to use electric vehicles to better integrate renewables.

So we commissioned a study at PNL to look at using plug-in electric vehicles to help with integration of renewables. And specifically, we looked at what if we had 10 GW of additional wind; what's the balancing requirement for that in the Northwest Power Pool, which represents about 12 percent of the RPS.

So that's our objective -- how can we use vehicles to mitigate that?

What kind of -- we looked at what kind of driving habits. So where are cars? How are they driven? Where are they parked during the day and at night?

And then, we looked at two scenarios -- one at full V2G and half V2G, right. Full

V2G is charging and discharging of the battery, and half is only regulating the charge; there's no discharge.

So we got some pretty interesting results from that analysis as well. All the balancing requirements for the 10 gigs of new wind capacity could be furnished from electric vehicles is the bottom line.

And the interesting part -- or some of the interesting things here -- is it's insensitive to the battery size. It's kind of intuitive, I guess, right, because you're really just regulating the charge. So it's sort of insensitive to the size of that battery. You're not draining the battery in any way, which was an interesting outcome, I thought.

And really, you don't really need to go to V2G full to really get the benefits. So there is a lot of cost and extra infrastructure and requirements involved in full V2G.

So what this is saying is you can really capture most of the benefits just

regulating the charge on the battery.

And where the cars are parked makes a big difference. So if you're only going to regulate the charge when they're parked at home, you won't have enough vehicles to do it. You would need 180 percent of all the vehicles. Right? Or, 126 percent of purely electric vehicles. So you wouldn't be able to do it.

But if you were able to have access to them when they're parked at work, then you'd only need, on average, about 10 percent of those vehicles to be available to be able to mitigate this 10 GW of wind.

So it was a pretty interesting study. And you can see this graph shows you diminishing returns. This is the percentage of vehicles that are available during work hours, and you can see you kind of get diminishing returns past the point of somewhere in here where you're really getting the maximum benefit for the minimum number of access to these vehicles.

MR. VAN WELIE: Rich, could I ask a

question, or do we save questions for the end?

MR. LIGHTNER: It doesn't matter to me. It's up to you. It's your meeting.

MR. COWART: Go ahead.

MR. VAN WELIE: I just had a clarifying question. I'm assuming what you're looking at there is regulation and not ramping.

MR. LIGHTNER: That's correct, regulation.

MR. VAN WELIE: Okay.

MR. LIGHTNER: I don't know how I'm doing on time, but I wanted to spend a little bit of time talking about the task force and the different activities and things that the Smart Grid Task Force is involved in.

And if you don't know, the task force is a group of federal agencies that coordinate smart grid activities across the federal government. These are the member agencies here.

NARUC is also an ex-officio member, I would say. So they're not an official member since they're not a federal agency, but

we do invite them to our meetings. So they have participated on a regular basis.

So every year we put together a work plan. These are four activities that we were pursuing this year. Our new work plan -- this work plan ends in June, so a new work plan will be developed and begin starting in June.

But these are the activities that we're currently pursuing as a group. So we're looking at the federal government as a driver of smart grid, and what we mean by that is we're looking internally at our agencies, to say: Hey, are there policies, executive orders; are there processes, that we can leverage? Are there efficiency requirements that maybe we can say, hey, we could do that better with some smart grid technologies?

So we're looking internally, to say, what can we be doing? You know the federal government owns a lot of buildings across the United States, and there must be a way that we can influence some of the activities that those buildings participate in. So we're looking at that.

I probably won't even spend time on that. This group drove the formation of what we call our Smart Grid Data Access Funding Opportunity Announcement, which just closed last Thursday. So I probably can't talk too much about that, but this group was instrumental in defining what that FOA was, what the requirements were. They will be very much involved in the review and selection of those projects. That was, I would say, a big success.

It's really hard to get coordination just within DOE, let alone like 12 agencies. So this was a big success, I thought.

So what else are we doing? Green Button. You all have heard of Green Button, I hope. Download my data now, right?

So what is Green Button? It's really looking at how can we give something to customers to make them think they're getting value out of all these market investments. Something real simple, something easy, right? So let's give them access to their data. Let them have their data and let them do whatever

they want with it. That's the idea behind Green Button.

So a common-sense idea -- electricity customers should be able to download their own energy use information in consumer-friendly, computer-friendly format. That's very important. It's a standardization thing, right. So if you download your data in California and you download your data in New York, it's the same data and you can use the same applications that are developed by a third party, in some way to help you with your energy decisions or whatever the application might be.

So it's really to give you power, give you more control. And this goes back to empowering the customer, right, which is one of the characteristics of the smart grid -- empowering the consumer.

It was also one of the tenets, if you will, in the Smart Grid Policy Document that was released last June by the administration. Empowering the consumers, that's what we're trying to do here. And it's

an easy, simple step towards that.

So I stole this slide from Chris Irwin in our office, who gave this presentation last week, but basically, he kind of really like this catchy phrase here -- an overnight success years in the making, which is kind of true, right. There's been a lot of work on standardization through the North American Energy Standards Board, the PAP 10 Energy Usage Information Standards, the Energy Service Provider Interface Standards through REQ 21. There's been a lot of work over the years on these things, and all the Green Button does is implement that.

Hey, let's reference those standards. Let's give people their data in a standard format. And that's really what this is about.

So we're going around the country, trying to convince utilities that this is a great idea. It's good for your customers, to empower them with information. And so far, I know that California has signed up for this, Texas, Maryland, Delaware and others. It's a

growing trend. So we're happy to see that.

So what kinds of things could you do with this? Well, there are all kinds. It's kind of like the iPhone app or the cell phone. You know, 10 years ago, you would have never thought there would be over 5,000 applications for the iPhone, but there are.

So we don't know what the applications might be by liberalizing the data, right. They could have something to do with better utilization of your home energy, right, your heating and cooling systems. You could use it in education scenarios. You can look at better being able to size renewable energy for your home in some ways, depending on what your objective is going to be, if you really know the information. There is going to be a whole host of applications that develop around that information.

So the FOA that I talked about earlier very much leverages the Green Button effort.

So the FOA, the Funding Opportunity Announcement which just closed, said oh, this

is all well and fine, right. We're giving customers access to their data. But the customer still has to go download this stuff, find an application, upload it to that application provider. Then that provider gives them some sort of service in return for that, right.

So wouldn't it be great if you could just say, hey, you sign some kind of thing that says I want to give access to a third party provider. Why? To get my data and deliver my service directly. I don't want to be involved in having to be the middle man here, getting the data and passing it along.

So the FOA tries to incent that, if you will. So let's look at being able to incent utilities to put in place procedures and a process and a policy for allowing third-party access directly to consumer information based on permission from the consumer. So that's what this is really trying to look at.

The phase one is can we at least demonstrate that with at least 1,000

customers, with a third-party provider and showing that your policy and procedures are effective in delivering some value to the customers.

If so there's a phase two where we're hoping that this is no longer a pilot, but you roll out this benefit to all your customers, and the phase two is worth up to $2 million.

Both these phases are cost-shared 50 percent. So that's what the FOA is, and it's really taking the Green Button one step further, right. So the third leg of this stool is privacy, right. So the administration, two weeks ago, released a document. Actually, I have it with me. It's called "Consumer Data Privacy" in a Networked World, but it's basically an internet privacy framework for data, and it has a consumer bill of rights in it for what consumers should expect with how this data are handled.

And what the administration is now doing is seeing how that might be applied in different industries. One of those

industries, obviously, is the electricity industry, the utility industry, and our Green Button effort is very much right on top of that.

What are the privacy policies, and how might we implement this consumer bill of rights in the electricity sector through initiatives like the Green Button and other things?

So we had a workshop back at the end of June, to say okay, how can we as an industry develop our own voluntary code of conduct, implementing this framework that the administration has put out? And these are some of the things we heard -- that it would be helpful, but we want guidelines, not mandates. Right? So give us a framework. Give us a voluntary thing. Give us some suggestions on best practices. But don't mandate anything to us because we don't like that.

So we heard that loud and clear, and I think that's what we've done in the past to help deliver value, right. We do models and

guidelines and things like that. What we want to do is convene some sort of multi-stakeholder process to begin work on this voluntary code of conduct in the electricity industry.

So I won't spend too much time on that because I'm sure I'm over.

And the last thing -- I think this is my last thing -- is one of the other things we're doing is try to capture best practices in the industry, right, specifically to consumer engagement -- is what this set of meetings is about. So we've been going around on a regional basis, convening utilities to talk about how are you engaging your customers on education, how are you engaging them on deployments of smart grid technologies, and let's have a peer-to-peer forum where we talk about this stuff and share best practices.

So we've had a few of these so far, and I'll show you where and when in a second. But basically, these are the themes that are coming out of the discussions with the utilities, right:

One size doesn't fit all. Address customer's concerns right up front. Don't think they're going to go away or don't hope somebody doesn't ask the question about brain damage from my meter because you're going to get those questions and you've got to be ready to answer them, right.

And communication with the customers and public, and really, what that means is on a constant basis, right -- before, during and after, constant communication with your customers about what you're doing, when you're doing it, how you're going to do it, what they can expect.

And that's the fourth one here. Set reasonable expectations, right. So don't talk about all the hype and all the things you're going to be able to do with this information if you don't give them services and products that actually do something with the information. So Green Button can help in that category.

So, the peer-to-peer. I don't know how many this is, but seven or eight. And

we've already had a Northeast one, a Southeast one. We had one in Texas. We have one in two weeks in the Southwest. NV Energy will be hosting that one. And that will be followed by one in May at Portland General, May 9th and 10th. Then we're still kind of working on these guys here and a Mid-Atlantic one. So there are three more to go, but we haven't nailed those down yet, but we'll be doing that in the next month or so.

I think that's it. So with that, I thank you. And Joe, I think you're up next. And any questions, again, you can email me or talk to me later, or whatever. So, thank you.

MR. COWART: Please, let's do it.

MR. DELGADO: The question is an inquiry. About two years ago, we had somebody from Google come over and tell us an initiative that they had to take meter data from customers and showing it back to the customer. Is this something the department has looked at, or is that everywhere? Are you aware of that?

It was Google with a program that

would take the data from the utility meter and then give it back to the customer and compare it with similar houses, or with a similar number of people, the whole bit.

MS. HOFFMAN: Google dropped it.

MR. DELGADO: They still have it?

MS. HOFFMAN: They dropped it.

SPEAKER: No, they discontinued it.

MS. HOFFMAN: They dropped it because of the data, the meter, the access, the privacy permissions. It was so complicated, that they had to sign up with each customer, so the whole privacy.

MR. PALADINO: Again, my name is Joe Paladino and thanks for having me here. I guess it's the second time I've been here. This is, I guess, a bit of a follow-up but a little bit more of a targeted discussion.

I want to shift gears a little bit from where Eric was.

MR. COWART: Joe, your mic isn't working.

MR. PALADINO: Oh, it's not?

MR. COWART: Yeah.

MR. PALADINO: So you couldn't hear the whispers that you gave me, Eric, after you left.

Sorry about that. Thank you. Appreciate it. So I'm going to shift gears a little bit. What I'm involved with, what many of us are involved with also in the office is working specifically with the ARRA-funded projects, and the smart grid one specifically is what I'm going to get into. Again, there's a team working for Hank Kenchington here that is overseeing that. My particular involvement with that is actually to try to describe what the technologies are doing, what the recipients are doing and how that relates to impacts and benefits.

So I'm showing this slide because it's a large job. What you'll see here is an estimate by EPRI that it would take about $340 million to $480 million -- billion dollars -- to 2030, to implement smart grid technology, and that's in the customer space, in the distribution space as well as the transmission space. Okay. That's a huge amount of money.

That's a huge effort.

If you take a look at how much money ARRA provided to the advancement of that technology, it's about -- if you take the Smart Grid Investment Grant, it's close to $8 billion. If you add the demonstration program on that, it comes to about $9 billion, which is fed money and cost-sharing money. Okay.

So the amount of money is obviously small compared to the overall job, but the ARRA funds are definitely going to provide an incredible catalyst with respect to moving this technology forward. It already has.

But what this is also pointing out, and the point I really want to make here, is that we basically have two jobs.

One job is to be able to describe what the lessons learned that we're seeing now and really take advantage of the information coming out of these ARRA projects so that we can actually educate the industry, so they can undertake this process in a really efficient manner. That's one job.

The other job is we should be

getting information that will talk about what the value of smart grid technology is. Okay. And hopefully, that will -- that information will inform decision-makers like public utility commissioners, et cetera, with respect to if I invest in this kind of technology this is the kind of benefit I expect to get, with some level of certainty.

So that's the job, I think. That's one of the main jobs we have -- is basically to take advantage of the information coming out of these projects to inform the industry as well as those investment decision-makers.

I'm guessing most of you know about the demo program and the grant program, but essentially, we're deploying technologies across the spectrum. There are customer system- based technologies, like in-home displays, et cetera, that are being deployed. There are pricing -- many of the projects are deploying pricing programs. There is advanced metering infrastructure. Smart meters are being deployed. There are systems like automated switches and automated regulators,

capacitors and sensors that are being deployed in distribution systems, including sensors that you would put onto equipment to be able to sense what the condition of that equipment is and to operate it at a more efficient level. And there is Phasor Measurement Unit technology that is being deployed across the country.

With respect to meters, we'll probably get 16 million, approximately, meters deployed by the end of this program. That's going to represent at least half of the meters, I believe, that are going to be deployed in the United States over the next three or four years.

We will impact about 5 percent of the distribution circuits across the country. If you estimate there are about 160,000 distribution circuits across the country, we're going to affect about 5 percent of those.

And then, with respect to advancing and deploying Phasor Measurement Unit technology, there were about 150 or so network

PMUs in, and at, substations, embedded in the transmission systems before we started. When we're done, there are going to be about 1,000 of those. Okay.

With respect to movement, advancement of the technology, I think it's moving fastest and it's being probably accepted and deployed fastest probably in the distribution arena. I would say I think utilities are more comfortable with that. That includes deploying smart meters to help with distribution system operations.

So the job that we have, one of the major jobs that we have is really to describe -- and this is where I spend most of my time -- is to describe how the technology is being applied and how those applications of the technology are leading to benefits.

So for instance, when it comes to AMI, one can use AMI to support pricing programs, to support engagement of a customer in the management of electricity, but utilities also use meters to improve operations, like remote connections,

disconnections, et cetera, to be able to identify where there are outages.

And so, just with AMI technologies, pricing will lead to things like reduce peak demand -- reduction, hopefully -- reduce energy consumption.

So what we hope to see as a result of that and what we're trying to map, what kind of deferrals of generation capacity there will be as a result of deploying pricing programs or how much energy use is being reduced, peak demand reduction is being reduced. So we want to be able to measure those things in these projects.

And obviously, we want to then be able to see does that lead to lower costs to consumers and society. Are their bills actually lower?

There is evidence right now in the Oklahoma Gas and Electric work that we're doing where they're deploying a pricing program and they're actually seeing major peak demand reductions as well as lower prices to customers because they're using less energy.

So we're starting to see some evidence of results.

With respect to distribution systems, we're looking at optimization of voltage and reactive power. There are a lot of benefits that accrue as a result of doing -- of optimizing voltage and bringing voltage levels down to a greater extent. We're looking at technology where we have got automated feeder switching, and we're trying to improve outage restoration. And we're looking at, obviously, synchrophasor technology and how that can be applied in real-time and off- line analysis.

And again, one can map these applications to very specific benefits. They include enhancing overall system flexibility to accommodate things like variable and distributed generation, energy storage, electric variables and demand response. There is a whole set of benefit streams that accrue as a result of applying this technology.

So what are we actually doing? Okay. We've got information that's being

created. Obviously, as the technology is deployed, it results in certain benefits.

How do we get this information out? Okay. And I think this is a major concern by people with respect to we're sitting on all this great information; how do we get it out. Okay.

So we've been working on a methodology that actually maps technology to benefits. Okay. And in fact, a lot of that methodology is captured in this joint DOE/EPRI report on methodology for cost-benefit analysis. That's freeware. It's on the EPRI site. It's on the SmartGrid.gov site.

We developed guidebooks that have gone to the recipients, that talk about if you're deploying this kind of technology, these are the build kind of things we want to see: What kind of assets are you deploying? How much do they cost? What is the extent of your deployment?

And we want them to also be able to tell us what impacts they're seeing. So one of our guidebooks actually maps impact types

of metrics to the kind of technology that's being deployed. Okay.

There's a computational tool which is a spreadsheet model, which we were using. We have shared it with industry. We have shared it -- it's being used internationally. It's all freeware. It's on SmartGrid.gov. We've shared it with electric -- Edison Electric Institute, et cetera. They've shared it with their members.

So that computational tool exists. It's freeware. You can download it.

GridLAB-D is a tool that Eric had mentioned. NRECA is one of our major recipients on the demo side. They're actually advancing this tool so it can be -- and putting an interface layer on it and making it so it's more easily used by industry so that GridLAB-D can be used more readily by the private sector, to be able to determine if I deploy these kinds of technologies, these are the kinds of benefits that I might be able to see in the distribution space.

And we are actively documenting all

our analytical methods, all the calculations. Where we've got PowerPoint presentations on that, they're on SmartGrid.gov. We're trying to turn all of that into actual sort of Word documentation.

And we hope to advance those methods through this process over the next like two years so that in the end, we will codify all the calculations and they'll be able to be used in business case analysis that utilities need to undertake. Okay.

And there's one other thing up here, and that is a tool that the Lawrence Berkeley Lab developed, which a utility can use to determine how much reliability improvement it's getting, and it applies the IEEE 1366 standards. Okay.

These exist. They're on SmartGrid.gov. They're downloadable, et cetera.

With respect to reporting, there is a Smart Grid Investment Grant Progress Report that we're working on right now that's going to talk about where we are with respect to

technology deployment and kind of some of the impacts that we're seeing. But we're also actively engaging in more detailed reports, and we're trying to get those out twice annually, that really take a hard look at here's how the technologies are being deployed and this is specifically how benefits are derived and this is exactly what we're seeing in the projects. Okay.

We're working on that right now, and we hope to have something out within the next like eight weeks. Okay.

Now one caveat here is the projects are fairly still early on in deployment. They've never -- many of them have never done this before. They're are all at different levels of understanding. Okay.

They've got to take this technology. They've got to integrate the technology. They have to make it operational. They have to be able to trust the data they're getting from sensors, et cetera. This has never been done before, largely. Okay.

So our projects are working through

systems integration issues that they've never had to do before. Okay.

So it's taking a long -- it's going to take a while. We're seeing impacts in certain places but not across the board, and it's going to take a while to really see permanent impact.

There is a Technology Configurations Report which is right here, which is sitting on my desk, that's not released yet, but this -- I will share this with you. Okay. It's incomplete, but you had mentioned that you were interested in getting information to public utility commissioners.

This talks about -- the intent of this was to talk about how the technology is being deployed, what kind of functions it provides, et cetera. It's at a very -- fairly high level. And I would invite you to take a look at this because it may feed your desire to develop something for the public utility commissioners that explains how the technology functions.

In addition to that, there's an

annual update to NASPI. That's the National Association of Synchrophasor -- that's the North American Synchrophasor Initiatives RAPIR report. And what the RAPIR report is; it has to do with the application of synchrophasor technology across the nation.

The first RAPIR report talked specifically about our synchrophasor technology, how it's being applied and what our projects are doing, that are deploying synchrophasor technology.

We're developing an annual update to that. In fact, we've got a chapter developed, which talks about how much progress our projects have made to date, and that is also going to be issued on SmartGrid.gov. That chapter is, again, in draft form, but it's close to being finalized.

We have 11 very rigorous consumer behavior studies that are ongoing. Okay. We expect to get interim and final consumer behavior study reports developed by each of the recipients.

Oklahoma Gas and Electric is going

to have their -- there's an interim report that's up already on SmartGrid.gov. There is a final report that's going to be probably put up in the next month. The final report is being looked at right now.

Marblehead is another one of the recipients engaged in a consumer behavior study. They'll probably have an interim report done in mid-summer. Those are all going to be posted on SmartGrid.gov.

In addition to that, we're also going to undertake a cross-study report which looks across all of these projects, all of these consumer behavior study projects, and gets into at a real analytical level customer retention, customer acceptance and customer response with respect to pricing and what the influence is of either education or technologies like information technologies and control technologies. Okay. We're expecting our first report that will probably take a look at customer acceptance at the end of this fiscal year 2012.

And we have a schedule for when the

interim and final reports are coming out and the cross-study reports are coming out.

And then on the demonstration side, each of the demo projects are developing interim and final technology performance reports which are going to talk about the technologies they're demonstrating, the kind of performance they're getting out of those technologies as well as what kind of impacts those technologies should have on grid operations. Okay. There is a schedule that's developed for when those reports are coming out.

And then we will undertake an energy storage meta- analysis which will take a look at all the energy storage projects.

Just moving, stepping back a little bit, there are demo projects -- 16 are energy storage projects, 16 are smart grid projects. And the energy -- we're going to take a look across the energy storage projects and undertake a meta-analysis. And then, we've got efforts with EIA. So for instance, EIA, with funding from us, actually developed a

report. It's on their site. That gets into legislative and regulatory policies, with case studies across the nation. What are the regulatory and legislative policies that actually may affect and incentivize the deployment of smart grid technologies that exists?

And then, we are going to be updating Forms 861 and 441. Those forms go to the industry now, and they're asking industry what kind of technologies they deploy. Okay.

We're augmenting those forms so we can actually gather now from industry how they're deploying smart grid technologies -- again, meters, distribution space and transmission space. Okay. And that will feed things like the systems report, et cetera.

Let me get to the end here. In terms of an outreach strategy, because I know I've read the scope of work --

MR. COWART: We're running out of time, so I hope this part will go quickly.

MR. PALADINO: Okay. Thank you. Sorry about that. Okay.

So first of all, we want to get products on SmartGrid.gov. We're reorganizing SmartGrid.gov just a little bit, so it's really obvious where things will be nested on that web site. And we want to use a listserve, obviously, to get -- we developed this report. We want to be able to tell people that it exists and they can grab it off of SmartGrid.gov.

We have been actively engaged with industry groups and regulators. In fact, right now there is a webinar with public utility commissioners that I wasn't able to be on because I'm here, but it is with a smart grid working group. Okay. We set it up through NARUC. And Peter Cappers who supports us from Lawrence Berkeley Lab is talking about results seen to date on the consumer behavior studies. Okay, so trying to inform them.

We have relationships with EEI, EPRI, NRECA, APPA, NASPI, consumer Advocates, NARUC and PUCs. We have been in active discussions with them. We could probably formalize this to a greater extent, but we

talk to them with respect to the analytical approach. EEI is very interested; NRECA is very interested, in working with us to advance this analytical methodology. And we talk to them about sharing results.

We've had webinars. Another strategy is to provide webinars to communicate findings to targeted audiences.

Again, I mentioned the meeting that we're having today on the consumer behavior studies, but we've also had meetings with the recipients. For instance, we had a meeting on volt/VAR optimization. There's a rich dialogue that's going back and forth between the recipients. They want to learn more from each other about their experience with respect with volt/VAR optimization.

The trouble with webinars is they're usually one- way. It's hard to get a real dialogue. So we also want to encourage peer-to-peer exchange.

With respect to the consumer behavior studies, we think there are a couple of conferences. Like there's the town hall

meeting coming up, et cetera. That's just an example of a demand response conference. There's the annual DOE/NARUC Electricity Forum Conference. This is where industry will come together, share their experiences and exchange and learn from each other, and we want to encourage that.

With respect to AMI distribution system automation, DistribuTECH would be a great conference to focus, and in fact, we're working on developing a major session at DistribuTECH next year. But there are obviously other conferences.

In the transmission space with respect to synchrophasors, NASPI is already a public-private mechanism. They meet three times a year. The industry comes there, and they're sharing across with each other, what experiences they're having with respect to deploying synchrophasor technology. It's a very good, strong working platform to exchange that kind of information, and we support that program.

And then, there's obviously specific

technical assistance, for instance, to public utility commissioners.

I'll stop there. I think that sometime we should -- we're not -- we probably have another couple weeks, I think, before we're ready to like really introduce how we've changed SmartGrid.gov. We haven't changed it that much, but we really want to be able to explain what we're doing and what kind of impacts we're seeing in a really organized way and simple way on this web site.

So we'd be happy to have a webinar or whatever with you to explain exactly how that is set up and you can access information off of it.

That's what I have.

MR. COWART: Thank you.

MR. PALADINO: Okay.

MR. COWART: Wanda, how are we doing for time? Are you okay?

Okay. Great. I think you're up next. By the way, Joe, the webinar you just mentioned that Pete Cappers is doing, would that be the kind of thing that would be posted

on SmartGrid.gov?

MR. PALADINO: Yes.

MR. COWART: So once it happens, it will be there and we could go look at it.

MR. PALADINO: Yes, and in fact, there are other webinars that we've given that are on SmartGrid.gov, and some of these have the audio portion with them. There are a couple of them like that right now. For instance, this volt/VAR discussion that we had, that's on SmartGrid.gov. The audio is there. You can listen in.

MR. COWART: Just turn it on and on listen to it.

MR. PALADINO: Yeah, but we're also trying to get all the presentations on SmartGrid.gov, so you can just take a look at a presentation and understand what we're trying to convey.

MR. COWART: Thank you.

MS. GRUENEICH: While we're getting set up, the problem, I think, is the tremendous amount of information that is available.

I mean, I'm wondering if sort of outside of the work plan, you and Eric might put together maybe a one-pager of the most important or significant reports or stuff you would think for us just to be on top of. I don't know. It's clear we could all spend full time looking at everything you have or be pretty haphazard of what's out there.

So I don't want to take time, but I just want to throw it out that maybe there's a way to synthesize what would be the most important things to look at.

MR. PALADINO: We will do that. There are some very specific things that you should probably look at and comment on. We will do that.

MS. REDER: Yeah, Dian, following up on that, I think one of the challenges in thinking through the work plan for the EAC as it relates to the Smart Grid Subcommittee is just to get in sync with all of the very good that's gone on at DOE. I mean, it's just amazing how much is there, the phenomenal effort that's gone forward, and the results

speak for themselves.

So you know, it's been a challenge to try to get in, understand it and figure out what our role is, to truly add value. And that really is, I think, the essence of what we need to do.

We actually started out fully recognizing there's a bunch of effort underway and those projects are now yielding some results. We looked at the statute because some people said, what is our role in this? So Sonny actually stepped in and tried to figure out. It's very broad-reaching in some respects.

So within this context, we realize that we need to work closely with the information that's already there, be forward-leading and try to help establish priorities through the course of 2012.

What we don't want to do is get in the way, duplicate, redirect, that type of thing. That's certainly not our intent. We want to add value.

So you know, to Dian's comments,

which were really a good set-up here for this presentation of the workforce, or on the work plan, is that the first thing is to try and figure out how we take the lessons learned and the benefits and truly take extrapolations from that so we have forward-looking recommendations as a result. And that will ultimately facilitate smart grid investments in the future.

So we're at this critical point in time where there's just a rich amount of information. How do we take that and move it forward so that it truly is a catalyst, like Joe mentioned before, leveraging that seven to eight billion dollars in order to try to get it to the broadest reach possible?

As we talked about it from a subcommittee perspective, there were varying degrees of opinion on how much effort that would take. In fact, some people said we could spend of our effort through the course of 2012 just on point number one, and we may well do that. But we realize that getting the foundation built out of point number one, so

that there really is a good platform of recommendations, becomes a springboard for the other pieces.

So the other pieces are to map a communication outreach framework with these findings and recommendations so the messaging is clear, and it's very much in sync with what Joe suggested, that we need an effective outreach tool that reaches the stakeholders. There is a lot of opportunity to get this information in the hands of folks that can use it. And so, that would be the essence of point number two.

And then point number three is to develop a connection with the regulators so that the materials and education wherewithal is there to guide questioning and, ultimately, make sure that the lessons learned are there and understood.

So the specifics around that are in the next three slides.

Eric referenced that this 2010 Smart Grid System Report has just been released. One of the things that we thought would be

useful is to look at that report and various other materials that have been in development and provide guidance on the frequency, the value of the meta-analysis, the use of the findings, but actually get in there and be a sounding board.

We do realize that to the extent that we can take this and create an overarching framework that will guide incremental investments going forward, that will be useful to actually leverage this seven to eight billion dollars to spend into the macro marketplace. Understanding the type of data that needs to be presented and providing guidance along those lines, we think would be perhaps a useful effort from our perspective -- where the key messages need to go, that type of thing.

And the last one, of course, is making sure that the metrics are in place so that as we transform the industry we are what we measure, ultimately. So probably, the metrics that we've been using in the past aren't necessarily the ones that we want to

use going forward, and we can be a good sounding board for that as well.

So that is really the essence of number one, and like I said, that is foundational for the other two pieces.

The other two, we will apply our efforts, to the extent that we have time, for this outreach framework. We believe we can add value to try and get the messaging out, make sure that we understand and have a cohesive definition of the audiences that we're trying to reach, making sure that the partnering organizations are identified so that we are fully leveraging the community and those that are willing to help cascade the vision and the messaging as an industry.

It was mentioned yesterday that we as engineers aren't necessarily always the best ones at connecting with the media and driving key messages. And so, to the extent that we can make recommendations along these lines, to get better leverage out of the good work that's been done, we think there can be a lot of value to the industry at large.

And then, last but certainly not least is to get feedback and coordinate with the federal Smart Grid Task Force and others.

So that's point number two. And then, point number three we think will take a while. In fact, there's already good outreach with NARUC, but to the extent that we can continue to facilitate and build collaboration there, it will likely build momentum and understanding so that the utility and state relationships will foster and it will be easier for dialogue for ongoing smart grid investments.

And I think some of the discussion in the last iteration that we had on grid modernization -- certainly to the extent that we understand these technologies -- the value extrapolation and how do we keep from doing a like-for-like replacement becomes very, very important as investments go in for grid modernization, so that we make sure that technologies are finding their way in as the grids are getting updated and investments are finding their way.

So one of the things that you guys asked about is what aren't we doing. And a couple things that bubbled up were we're not suggesting that we're going to get involved in understanding consumer opinions and customer behavior, and we also are not going to get involved in our role in smart grid privacy and standards. We think that in both cases they're either well underway or we're not necessarily well equipped to be involved in consumer behavioral studies and scientific research that corresponds to that.

So the bottom line here is that we want to make sure that we develop the relationships effectively and the messaging is in place. We want to make sure that we're closely coordinating with DOE and understanding the activity that is already there, so that we're truly adding value.

And, the next steps. We have monthly meetings already on the docket. We know that we're going to be adding some members which was discussed yesterday.

And that's really the essence of the

2012 plan. I look forward to your discussion and feedback because I'm sure there will be some. All right.

MR. COWART: Thank you. Thank you, Wanda.

MS. REDER: You got it.

MR. COWART: I have a question which I'll defer. Rick has got his hand up.

MR. BOWEN: Thanks. I guess my only suggestion -- and it was pretty obvious by the two people that spoke before you. Boy, this is one particular thing I think as a subcommittee where communications, or communications, frankly, has to be a fundamental piece to it.

Unlike looking at the technical issues that Mike and I and some of the others do on devices or things that we could work together on, there is just an enormous -- and I don't have to tell you guys who are working on that subcommittee -- enormous amount of data, information, desire particularly by device communities out there who are looking to try to do something with this, right. And

so, boy, if there's any getting it together, conciseness and getting focus is so fundamental to that because it's everywhere.

MS. REDER: Yeah.

MR. BOWEN: And I don't know how the DOE does that, right, because it is just everywhere. And as these two guys know, who are supporting inside DOE, there's just an incredible amount of stuff that's there, right, to be worked from.

So I think you're on the right track. I don't think I would ever get off into the public opinion. I mean, there are a lot of people who are in the foray of doing those studies, and I would assume that the manufacturers by themselves are probably out trying to get that, to try to get some focus on their devices and stuff.

But boy, I think there's a significant communications piece here, Pat, that we've got to deal with, right. I mean, how is it we can recommend to you all how to communicate that better and how to get the public to embrace it and to ask for it?

You know, it's a push-pull thing, right, where we're trying to pull the community with us. Right? And instead of maybe getting them to push -- you know, that side of it. And then, who's caught in the middle is the utilities trying to satisfy all players, right. Or, I should say the people who are trying to distribute it.

So man, to me, it's the challenge just getting focused with the things that have the higher potential to have success quickly because what we found out in the community that we all live in here is people see so many things, they get distracted and they lose interest, right, because there's too much. And I will say we're all -- I mean, that's just human behavior, right. We just kind of do that.

So if there's anything your team can really do to get people focused that way and to not be all things to all people and to really take the things that maybe are a high ranking, if you will, of what you think will have the greatest impact the fastest, so we

don't lose people because that's what will happen. It will just be -- you know, people just get so clouded up. They'll just: This is too much for me. I don't know how to do it, right.

And I say that relative to all of us in the industry as well as those of us as consumers, right. It just becomes too overwhelming, and we can't put enough people on it, right.

So get it focused fast and then figure out how we can use you all to make that communication, either through the NARUCs or through whatever it is that we've got, to make that communications piece.

But I think you're on the right track. Stay away from the stuff that's too soft and can get you distracted with trying to deal with people's opinions and what works, what doesn't work. I think your device owners, who are the people who are trying to bring it forward, can do that for you.

It's going to be more about how do you keep people concentrated on low-hanging

fruit, what will hit the ground, what will work the fastest, what will have the greatest impact and then how do you get people to actually communicate that.

MR. COWART: Dian.

MS. GRUENEICH: I had three comments. One was actually -- I guess I'll list all three, and then we can --

MS. REDER: Sure.

MS. GRUENEICH: The first was to me it actually seems a fundamental issue -- is the first slide that we saw, which said that there's $8 billion in ARRA funding and the need for the smart grid is -- what was the number?

SPEAKER: $340 billion.

MS. GRUENEICH: So this is like -- I don't know -- 5 percent, 2 percent. You know, pick your number.

What is the game plan that anybody has for where the remainder of that money is coming from, and how is all this effort at DOE actually working towards thinking through, strategically, where that funding is coming

from?

Is it coming from state utility commissioners authorizing rate increases to fund that? I don't think so. I mean maybe a portion of it.

Is it coming from additional somewhere-down-the-road federal budget money to have grants?

Is it coming from the private sector where there are some new business models authorized by state commissions to be bringing that money in with the utility?

I just want to say I didn't see that anywhere, and it seems to me it's the elephant in the room, which is what is going to be a game plan, strategically. So somewhere between what DOE is thinking about and maybe what we're thinking about, it just occurred to me we should put that one on the table.

The second one was it seems to me for the monthly phone calls if we could have -- I don't know if it's Joe and Eric. Are they going to --

MS. REDER: Yeah, they're going to

be on there.

MS. GRUENEICH: Fabulous. And the third one was I thought that we actually had discussed for the third work product that it wasn't a commitment to develop a handbook this year because that seems to me one -- if there's going to be a handbook developed, it would probably be by DOE itself with our input.

MS. REDER: Yeah.

MS. GRUENEICH: And two, I think we discussed we're still not entirely sure how much DOE is actually doing.

So I'd put a little bit more nuance around how we list that third work product.

MS. REDER: That's a good point. In the subcommittee, while the handbook was thought it would be a really good idea -- and kind of following up on Rick's point that there's a hodge-podge of things out there, it would concentrate the high value-added and be a good communication tool -- we fully recognize that DOE would have to be a big part of it and it could take a while to get done.

So we didn't think that it would be likely that that would be in the 2012 plan itself, but we would probably be doing some front running so that we could get that successfully teed up for a rollout later.

Good point, yeah.

MR. COWART: So I have a couple comments, I guess, and maybe a couple of questions that flow from it.

First, just going back to the first presentation, I guess this is a comment on Eric's slide. I noticed the emphasis on improving load factor and reducing peak. I would have added to that improving the ability of the demand or load to respond to the availability of variable renewable resources, which is quite a bit different than improving load factor.

I mean, it's improving the alignment of resources that are available at low cost on the system to when those kilowatt hours are being used.

And I know you all have that in mind. The smart charging of vehicles is the

classic example. But there are other ways, as we've discussed in the storage environment, for heating hot water or making ice when the wind blows, or the sun is shining as it were, and that's an attribute of the smart grid as well that I think deserves to be put on that list.

And then related to it, we talked about reducing peak, for example, and then secondarily, later, with the conservation voltage reduction talk about reducing consumption. But actually, using smart grid technology to reduce total consumption efficiently is also an important public policy goal. And so, just presentationally, I would think that you'd want to add that to the list of high priority items.

A lot of people will ask, when we get around to answering Dian's question, why should we spend $400 billion on this stuff if we're not actually helping customers use electricity more efficiently? You know, we're going to be scratching our heads collectively.

I mean as someone who has worked in

energy efficiency for a long time, I know we're spending maybe $5 billion a year now, collectively, on energy efficiency. When I look at a number like $800 billion for smart grid, I'm thinking hey, that's 100 years worth of energy efficiency spending. What are we getting for it in terms of making our entire system more efficient? That's a lot of money.

So second -- you all nodding so maybe you can respond easily to those questions.

Second, it seems to me that one of the huge challenges that we face, DOE faces, and certainly the state regulators face is not just in well, what can these technologies enable us to do, which is really important. But totally hand-in-glove with that, or hand-in-hand with that, is what are the policy reforms that are needed in order to make it possible for these technologies to deliver what we believe they can deliver.

So what are the market rules? What are the regulatory rules? What are the financing rules? Whatever, including what are

the tariffs and what is the information customers have to see in order to actually make the technology work?

People don't want smart technology, especially expensive smart technology, unless it's linked to policies that will actually deliver as much of the benefits and the technical potential as we could realistically capture.

So it does seem to me that one of the objectives of the Smart Grid Subcommittee here would be to keep asking and keep a list of those, like what are the policies that really would help to unleash the potential here, because without the right policies it doesn't matter how smart the meter is, for some of the benefits.

I mean, you can get -- you know, you can track interruptions. You can get rid of meter readers. But we're not going to get the other things.

MS. REDER: Yeah, that's a good point, and I think we can and should be tracking the policy issues and weaving that

back into the process. So we'll do that.

MR. POPOWSKY: I have a question, I guess for you, Eric and Joe.

The ARRA funding created some sort of I guess you'd call them controlled experiments where you can actually track how this stuff is working, but we've also had some uncontrolled experiments recently in the Mid-Atlantic and the New England states with the outages and the difficulty of restoration.

At least in my discussions with Pennsylvania utilities -- you know, for example -- you know PPL, for example, is pretty far along, advanced, on some of their smart grid technologies. And I believe that they have a story to tell with regard to their ability, not obviously to prevent the outages, but their ability to restore outages, to do restoration activities perhaps a bit more efficiently than their neighbors, through some of the grid technologies that they've already put in place.

I was wondering if you folks have tried to at least talk to utilities that have

-- you know, went through what we just went through last year in the outages and see where the new technologies have been of assistance.

MR. PALADINO: That's a good point. No, that's an excellent point.

One thing that we've tried to do is develop case studies where we speak directly, we work directly, with a specific utility that is typically a recipient.

I'm not sure whether PPL is on the list, but there are several -- and maybe they should be. So I've noted that.

There are several case studies that we've developed. They're all on SmartGrid.gov. We're trying to -- they're like two or three pages long. They talk specifically about what they're doing.

There are a couple of them that talk specifically about outage and storms that have come through. So for instance, I think it's Chattanooga. Electric Power Board of Chattanooga has had some very successful outage management experiences because they've deployed automated switches and things like

that, and they're actually seeing improved reliability.

Your comment is well taken. We'll try to focus more on the case studies. They're posted on SmartGrid.gov. And we'll get PPL up on the list. But especially to capture the last season of storms, if there's an event that happened, follow up with the utility to see if the technology worked and how well it may have functioned.

MR. COWART: And try to figure out a way to test the reality of what their response is to the question too.

MR. PALADINO: Okay.

MR. COWART: It's certainly likely that people would report that the meters really helped or this new stuff really helped. Obviously, you have to test that against some control group to find out whether --

MR. PALADINO: It really did.

MR. COWART: -- the perception that it helped is really true.

MR. PALADINO: Well, you know, that's a good point because in all of this we

have to be technology-neutral, right. And so many of the stakeholders we work with have said, we don't want to promote this technology; we want to be able to say tell it like it is.

So we're trying to conform to that.

MR. COWART: Brad.

MR. ROBERTS: In the discussions, going back to Bill Bryan's restoration presentation and then talking about Eric's smart grid activities, which focus on the dynamic aspects of the grid, what about just simple things -- having lived through a lot of outages, storm-related -- about putting more of the distribution system underground?

I mean is there any effort? I know it's expensive, but I've had my distribution system torn down 3 times in 11 months and put back up, and that money is given by -- recovery takes place under the PUC to get that money back.

And it's expensive, but there seems to be some logical steps that need to take place in figuring out what parts of the

distribution system should be buried, as a step in that whole process.

MR. LIGHTNER: I don't think, I mean, we look at specifically what could be undergrounded or what the cost would be of undergrounding. But we have looked at, from a technical standpoint, the condition of cables and how they fail, specifically underground cables, and looking at how to better evaluate the condition of cables while they're in service and be able to predict when they might fail, to better schedule maintenance and other kinds of things. So we've looked at it from a technical standpoint as far as longevity of those lines and what some indicators might be of life and capacity and failure and things like that.

So we've been looking at it from that point of view, not necessarily from a planning or a decision-making as far as undergrounding, which would pretty much be out of DOE's jurisdiction anyway.

So from a technical standpoint, hopefully, we can inform the decision-makers

that would think about those kinds of things as far as the kind of cable and its expected performance.

MR. LAWSON: I've got two comments on the Smart Grid Subcommittee work plan. Is that on the table?

MR. COWART: Absolutely.

MR. LAWSON: I thought it was. We go right into the details of all the issues otherwise, but just two comments on the work plan.

Number one, it seems like a lot of work to do in one year. Do we really think that this can be accomplished in one year?

It's an extensive list of work. I mean, I'm not being critical of anything that's on it. It's just, wow, it's a whole heck of a lot.

The one other comment I have is throughout this work plan -- and I didn't even hear much of it today during the presentations, but I know it is discussed from time to time. There are costs and risks and issues related to the smart grid. We tend to

focus on all these incredible benefits, and we know what the consumer wants. But we're not talking about costs; we're not talking about risks.

I think the work plan -- that needs to be somewhere in this analysis and other work that the Smart Grid Subcommittee wants to work on. I think we need to be looking along those lines as well.

We can't be just a marketing tool for the smart grid. We have to present an unbiased complete view of things. And there are costs. There are risks. There are issues. And I think we need to focus on that as well.

So, thanks.

MR. VAN WELIE: So this conversation has made me remember one of my areas of discomfort around smart grid, which is I think as an industry we get too wrapped up in defining the smart grid as the outcome, which to me is the wrong way of looking at it.

I mean, we don't -- in no other area of business do we sort of say, well, we've got

to have IT deployed across every business out there and specify the technology and so forth. People use technology to achieve an outcome.

And to Dian's question earlier on, the money is going to come from the applications. If people can find something useful to do with the technology, they'll deploy it.

So one example is as ISOs incorporate DR in their markets, people will then be looking to apply technology to provide the DR into those markets and the funding will come through those markets.

I think there has to be a logical point at which we stop talking about smart grid as sort of an end state and just let the applications take over and drive the application of the technology. I think DOE has done a great job in terms of showing what's possible.

I mean, all of this investment is really just demonstrating what's feasible, what's possible, but in the end it's going to have to come down to each state, each utility

figuring out what they want to do with this. You can't sort of mandate this from the top-down. It has to be bottom-up in the end.

So I sort of wonder when we get to the end of the discussion on smart grid and sort of say, okay, we all know now that there's lots of different technology out there that we can apply, and then start going back to Rich's point, essentially, which is to say, okay, what are the things that we want to drive in terms of behaviors?

That's a discussion between, I think, DOE, FERC and NARUC, to say, are we serious about getting DR going at the retail level?

And once you've got that, you put the energy there and then technology will follow.

So I think part of what's happened is that there's been this hype around smart grid and a lot of manufacturers are driving it as much as anything.

So I do sort of wonder when we get to the end of that. I was just wondering

whether Pat or somebody has a view on that from a DOE perspective.

MS. HOFFMAN: I have a view. You headed down a direction of some of the notes that I was driving.

I mean as we're talking about -- whether we're talking about cyber security, smart grid, some other things, what capabilities and functionalities do we want and do we need to have in the system as we look towards the future, and how are they complementary to some of the issues?

So how does smart grid enable some of the other things to happen on the system?

So restoration and recovery -- SADI safety -- is an easy kind of here's the first out of the door, kind of value- added service that can be built from some of the smart grid technologies. Then you've got peak load reduction. Then you've got system efficiency. We talked of some of the characteristics of volt/VAR optimization. You know, you can build all those buckets.

Then you go down later on; it's

going to be some of the consumer applications. As we have demonstrated, it's not the first one out the door. But as part of consumer applications, you pull in your DR, your energy efficiency validation and verification, measurement and verification that can be supported by some of the devices and technologies out there.

So from a high level those are at least some of the introduction kinds of framework that I see the value added, but I think that's where we've got to focus the conversation -- is how do we want to frame this.

And it may be taking a hard look at that systems report -- I hate to say this, but I am going to say it -- and how do we structure the systems report to look at some of these capabilities and grouping them for restoration purposes, peak load reduction purposes, customer services.

But the other thing that I guess I wanted to dive into is we spend a lot of time at DOE saying, okay, let's start with the data

and drive consistency of data, standards in the data, use of the data, and privacy, and trying to handle that part of the discussion.

Another part of the discussion that I think might be interesting, if we really wanted to take a specific area to concentrate on, is really the different architectures that are out there -- your wireless, your WiFi, the different architectures, and the pros and cons, and the evaluation that occurs for values to the munis and the co-ops, with microwave, versus a city location. There's a lot of, I think, education that can be just talked about on how to optimize the investment based on the architecture design and the security requirements as a result of that.

So we could talk about communications in general, or we could pick a couple topics within that to focus on.

So that was my only other comment that I would ask the committee to consider.

MR. COWART: Any further questions? Or, responses, Wanda?

MS. REDER: Yeah, responses. Well,

I appreciate the feedback here. I think that there's been some really good suggestions.

Some of the things that I picked up just in a recap quick is when we look at the handbook and the regulator outreach peace, we certainly had suggested that could be a multi-year thing, but we want to try and position it so that it will be successful. And we do -- we've had discussion with the subcommittee, realizing that education with the state regulator and getting this information into their hands, especially with a quick turnover, is a really critical piece. So doing that successfully is important.

Some comments that didn't come up -- and it kind of stems off of Brad's discussion -- is from a grid modernization perspective, how do we get the dollars flowing and what's the business model that ultimately will move us from where we are in an aging infrastructure perspective to something that's the forward-looking? What are the resiliency aspects? What are the smart grid aspects?

And I'm not sure that we can get at

this, but I do think it's a scope of work that needs to be on the forefront.

And Joe, you may have some efforts already underway in this area, but making sure that we are at least teeing up and understanding, so that as these decisions are being made it's not a like-for-like and we're guiding those outcomes. I think that's a bit peripheral right now, but I do think it's something we need to keep our eye on.

The policy piece and keeping a list so that can be addressed, I think would be something that we could do and would probably add quite a bit of value.

Picked up the risks, and it's not only a benefits stream, but it's also what are the risks with more complexity. We need to tell that story.

And I think the idea in that statement number one, where it suggests we need forward-looking recommendations, behind that there certainly was dialogue to that extent. But it's a good point, and it didn't really pop out.

So that's largely, I guess, what I picked up here. We will take a look at that systems report, Pat, and try and think through a little bit about the structure and what it might take in order to get the grouping so that it would be more applicable as well.

MR. COWART: Wanda, I'm going to pick up on Gordon's point and just toss out a thought about any report that the subcommittee does. It would be useful if we started by talking about capabilities; that is, system capabilities that we would like to see.

MS. REDER: Right.

MR. COWART: And then ask the questions that flow from that as opposed to starting with the technologies and saying, well, there's this technology and this technology and this technology, and what can they do and who can sell them.

I mean really, Gordon's point is we're starting with system capabilities that provide resilience, security, restoration, efficiency, integrating renewables, et cetera, but those are the services that we seek from

the investments in things that we lump together and call smart grid.

So looking at it through that lens, it seems to me is a useful thing for the subcommittee to do and then to urge upon DOE.

MS. REDER: So turning it back from a capability perspective rather than a technology for technology's sake.

MR. COWART: Yeah. I mean, as everybody says, you hold up your smart phone and you say, why do I have this? Is it because it's cool technology? No. It's because it has applications that I value.

And everybody will make that same point.

MS. HOFFMAN: Or, you could flip it and say there are requirements that I have to communicate with my boss or there are system requirements. So I think we interchange capabilities and system requirements --

MR. COWART: Yes.

MS. HOFFMAN: -- whether we're talking -- so from the same philosophy.

MS. REDER: It's a good point, yeah,

and it's timely to do that.

MR. SLOAN: All right, the policy person here. When you're talking about capabilities, is that a euphemism for priorities? What should the utilities and the commissions and the DOE be advocating for?

I mean, what I'm looking at is for the last day and a half we've talked about how much money is going to have to be invested, and a couple of times we've had discussions about so how important is A relative to B. And so, should we be helping to establish what those priorities are?

Affordability is something that gets mentioned in passing, and yet if you're a PUC commissioner or someone like that, that can often drive things. Or, for Sonny's purposes, I mean that can drive him.

MR. COWART: I don't disagree with it. Believe me; I've been there. I don't disagree with that at all.

Wanda, do you want to have the last word?

MS. REDER: Oh, I didn't realize my

mic was on. I hear you loud and strong on the capability piece, and I also think that that is fundamentally the same thing as priorities. I think that is a conversation that this topic is in need of, now that we've had some proof of concept, if you will, and that really is a big part of the catalyst in order to move it forward.

Point well taken.

MS. HOFFMAN: I'm sorry you gave her the last word, but I am going to jump in.

But I think part of what we did with Recovery Act is help in looking at where do we get the biggest bang for the buck. As we look through all these demonstration projects, we'll be able to say: Okay, from a priority point of view or a cost effectiveness point of view, here are some of the early hitters. Here are some of the easy wins. Here are some of the things that you get the most value out of.

And then it's as we look at grid modernization we have to really start figuring out how we want to leverage all the different

technology deployments.

MR. COWART: All right. We are now officially at the time of our lunch break and our ethics break. So everybody, all the members of the committee -- Elliot, are you going to remind us? Maybe just take us all in a herd down the hall, and we'll begin with that.

Now we're going to reconvene at 1:30, for members of the public or others who are here.

I guess I should -- this is a good time to ask once again, are there any members of the public who have signed up to address the committee this afternoon?

The last time we checked, there were none.

MS. REDER: What did you want to do with that workforce follow-up topic?

MR. COWART: We should take that up right after lunch because I think we're a little --

MS. REDER: Okay. Can we leave stuff here?

MR. COWART: I don't know.

SPEAKER: Keep someone here.

MR. COWART: Somebody will be here, okay. Thank you.

You can leave things here. Someone will be here.

(Recess)

MR. COWART: Good afternoon, folks. We're getting ready to resume here, so please take your seats.

MS. HOFFMAN: Before we get started with Imre, I have to go to a meeting at 2:30, so I'm going to be taking off at 2:00, but I wanted to give you guys maybe a couple of messages from my perspective.

There's a lot of work that we're talking about doing with this committee, and I think we have to figure out how do we want to streamline some of the stuff, prioritize and focus in all the activities that we're working on. So I thought I'd give you at least some of my priorities.

From my perspective, I would like to have in each of the subcommittees, or the

groups, a sense of the technology priorities and the technologies opportunities in each, and what are some of the focus areas that we should have in each of those subcommittees. So what are some of the technology opportunities?

As we look at it, resiliency -- so, I'm sorry, back to technologies.

How do we strengthen the distribution system? It's a key thing that we need to work on -- is strengthening the distribution system. So that's just one priority or one pressure, strain that I feel that's occurring, that I would love your help in organizing around the strengthening of the distribution system, the technologies, the priorities around that.

The second area is on transmission technologies. How do we look at the transmission system in the future? How do we utilize the system in the future? How do we balance AC versus DC? You know, really taking a hard look at that.

So that is the technology kind of

category. And then, I think it comes down to the other activities at the department area. So under transmission, you've got your authorities that we can deal with. On the distribution system, it's how to leverage the Recovery Act funds to get the most value out of it.

I don't know whether it's a complete messaging but really diving down into a couple key points over the next year, to say, look this is where we can get the most advancement and help aid some of the discussions that are occurring.

The second area, as we talk about each of the working groups, is really how do we build in resiliency as we're talking about whether it's transmission technologies, whether it's the distribution system, whether it's smart grid. How do we get some of the resiliency components in there?

And -- because as we look at security and issues that are coming up, we're going to have to really look at the system and take a hard look and figure out how we can

build in additional resiliency. I'll say capabilities but functionality. So, anything that we can do in that area.

And then, the third area as we look at each of the subgroups, as I listened to the conversation, is really optimization, efficiency. I'm not sure how to characterize it. How do we drive some of the discussions that leads to here is an optimized -- here's where we should be heading versus kind of the near-term reaction?

I mean, we've had some conversation with like the EPA where ultimately this would be the ideal structure, but we're probably going to end of reacting if we place a lot of gas turbine units out there.

So back behind everything else that we're talking about is really just a point of how do you optimize on the system.

So I guess what I'd like you to do is think about that as we decide the work plan for 2012.

I would prefer not to have a broad, general document than a very set of focused

point papers that do pros and cons, and really helps explain and clarify the issues. So as we move forward, I guess I would just ask you to all think about that and think about how we can actually try to accomplish some very well thought out pieces that help continue to move the discussion forward.

Last year, we had some really fantastic conversations on very specific issues, that as people looked at the minutes and the notes, they said, wow, there was a lot of thought and discussion that occurred. And they were able to use that to build additional meetings and other activities around that.

So I just encourage us not to lose the value that I really appreciate in this group, which is the debates, the discussions, the pros and cons, and really getting into an issue and a topic.

So I just ask you to keep that in mind, and I thank you for all that you've done.

Do you want me to introduce Imre?

MR. COWART: Thank you, Pat. No,

we're going to do the workforce thing first. That's right.

Before we get to our next presentation, we have the follow-on to our discussion yesterday on the Workforce Development Working Group proposal. And Wanda has thought about everything that happened yesterday and woke up this morning feeling even more brilliant than she felt yesterday, and she's ready to give us some of her conclusions.

MS. REDER: All right, a couple of slides here, a couple context points before I go into, I think, the themes that emerged last night over several discussions.

One is why should DOE care about education, and what is the space that drives the interest. I don't think that the idea is to go after the broad space of education, but really, the fundamental points of where and why they should care is to the extent that it provides the nation with reliable energy, one, create innovation to secure leadership position with related technology advancements,

two, and to achieve the vision of future. So it's very focused and contained.

And the approach -- you know, certainly there's a lot of wherewithal within DOE itself that can be brought forward. There's smart grid education stimulus money. There are other projects. So all of that can be brought forward and leveraged with other organizations that have interest.

So those set the context, if you will. Then there was a question around what are the steps, what are the actions, what are we looking at doing. First and foremost is to identify the potential partners, those others that have interest. And then, ideas that were being mulled around last night on what we might pursue were things like:

Performing a reassessment of the situation, given the changing landscape, and we talked quite a bit about all of the changes;

Defining the gaps that emerge in grid transformation and trying to hone in on what those might be to provide some

suggestions on how to fill in that space;

Looking at the developments and initiatives that have been underway and try to further leverage and connect those;

Looking at emerging areas and if we have those fully satisfied in the education process, i.e., convergence of technical domains, cyber security, privacy and the like;

This next piece, I think mapping a cohesive energy hub strategy that connects resource investment to workforce development needs;

And the last two are really enhancing related career awareness and emerging opportunities through the STEM process and defining an approach that aligns.

It's interesting how if you talk to educators versus research and industry, you don't always get an aligned perspective on what should be done. So a little suggestion along those lines would probably be a more efficient outcome as well.

So that's what I heard in discussion last night as some of the themes that could be

pursued, not that we would do them all, but that's what bubbled up through discussion.

So with DOE's assistance, I invite selected participants to a discussion to kind of further vet out and identify this, utilize this as inputs to ultimately frame a plan that could be put together, bring that forward, get approval and then have DOE receive it and move forward.

MR. MEYER: Wanda, could you go back to your previous slide?

MS. REDER: I can.

MR. MEYER: The third bullet from the bottom, cohesive energy hub strategy -- we are talking about a hub with respect to the grid modernization work that Bill was talking about yesterday, or a series of regional centers.

But there are other hub entities already in existence that DOD supports. There's one for buildings. There's one for batteries. Every one of those hubs could have a workforce component, and we should not ignore that. We should broaden our focus to

get all of those aboard.

MS. REDER: Excellent point, and that's really the connection that's trying to be made here -- is that there are already efforts underway, really good efforts. But a little bit of connection to think about the workforce development needs, we could further leverage that.

Okay, that was my over-the-evening collection and PowerPoint work.

MR. COWART: Thank you, Wanda. I also should note that this is the result of a great conversation we had last night after our meeting here. Pat was with us, and we chewed on this for quite a while.

One of the -- I think this is the time at which you just simply invite other members of the committee who want to work with you on this to volunteer.

MS. REDER: So I'd be glad to take names, yes. Very good.

MR. COWART: Everybody has your email and let you know if they want to participate in this.

At this point, it isn't -- there is no official action for the committee to take. Rather, this is -- your list of activities is an exploration at this point.

MS. REDER: Correct.

MR. COWART: Okay. Thank you very much. Tom?

MR. SLOAN: Don't we have to formally accept the working group? Otherwise, she's out there by herself.

MR. COWART: I don't know if we have to, but I'm certainly willing to. So if you're, in essence, making a motion that --

MR. SLOAN: I am.

MR. COWART: There you go. You're making a motion that we endorse the creation of a working group that at this point in time will take those steps, and then you'll be coming back to us with action steps that the committee might take. Is that correct?

MR. SLOAN: That's my motion, Mr. Chairman.

MR. COWART: That's your motion. That was excellently put in.

SPEAKER: Second.

MR. COWART: And seconded. Is there any discussion? Can I ask for all those who will accept the motion to say aye or raise your hand.

(Chorus of ayes.)

MR. COWART: Any opposed? All right, so we have taken a positive step. Thank you very much, the Honorable Mr. Sloan for recognizing the need for that.

MR. POPOWSKY: It might be helpful also, perhaps, Elliot, if you could help Wanda by sending out a message to look for volunteers because a lot of people are already gone here now.

MR. NEVIUS: Could we include the slides in that package, that you just showed?

MS. REDER: Sure, yeah.

MR. POPOWSKY: Good idea.

MS. HOFFMAN: So I have the opportunity to introduce our next speaker, Dr. Imre Gyuk. He has been working -- gosh, I keep saying this, but a very long time in energy storage. I don't know anybody that's

considered more of an expert in the area of energy storage than Imre and has spent a lot of time working in partnership with the states, looking at research opportunities, looking at cost-benefit analysis and really trying to drive hard what some of the needs are and what some of the opportunities in the energy storage area.

So with that, I thank Imre for coming today and talking about energy storage.

My apologies. I'd also like to introduce Rachna. She's also in our organization. Rachna, I can't remember --

MS. HANBAH: Hanbah. Thank you. Hanbah. That's really bad. Okay. And she's also supporting Dr. Gyuk in the energy storage area as well as the smart grid activities and doing some projects in that area.

DR. GYUK: Can you hear me now? Good. Well, it's nice to be here and to talk to you about energy storage. As it says, I'm the Program Manager for Energy Storage Research and have been so for -- I don't know -- 10, years, something like that.

Now the notion of energy storage is very simple. Energy storage basically provides energy when it is needed just as transmission provides energy where it is needed.

But in spite of this pleasing symmetry, transmission has been developed into, well, what is considered one of the marvels of the technological world whereas storage is slowly beginning to become an important subject. In fact, when I started this program, hardly anybody was even able to recognize the notion of energy storage -- utilities, others. There were a few researchers in the field, and the Electricity Storage Association met once a year, and my program held a review once a year with somewhat scarce attendance.

Well, since then, things have speeded up very considerably to the point where now energy storage, along with smart grid, is considered one of the hottest subjects in the electricity field, and right about 2010 is where it happened. Suddenly,

there is a plethora of conferences. There are more researchers in the field. There are demonstrations, largely due to the efforts, or at least partially due to the efforts, of our program and the people involved with it and working at energy storage.

Right about that time, a lot of important people suddenly decided that yes, storage was indeed an important thing, and we got affidavits from people like Secretary Chu and Chairman Wellinghoff and Terry Boston from the PJM.

Now why would we want to be doing storage? Well, for a variety of reasons, but one of them is we have 29 states that have renewable portfolio standards from between 10 to 40 percent renewable, and as we all know, the wind more or less, or frequently, blows at night and not in the daytime. It doesn't always happen that way, but it happens often enough to be disconcerting.

And in fact, if you look at all the ISOs across the United States, in each of them, the capacity during -- the actual wind

available at peak is about 10 percent of the nameplate capacity. That's somewhat of a problem, and it would appear to be something that storage could help with.

And of course, this sort of thing is going to become more so. Look at the development of wind, solar and hydro over the years. And obviously, we are not expecting a linear extrapolation there, but nonetheless, it's going to happen that way for a while, and they are moving upward into greater and greater roles on the grid.

Now there is, of course, storage already on the grid. Notably, there is pumped hydro. This is the worldwide one, and it's a couple of years ago. There is pumped hydro like the sun surrounded by these little planetoids of various other technologies.

In the U.S., pumped hydro represents about 2.5 percent of the U.S. electrical baseload capacity. So the existing storage is already something fairly serious in the overall electricity budget.

Now what is happening now is pumped

hydro isn't going anywhere very fast. We may well get more pumped hydro eventually, but industry prognoses are that we are not going to get more than perhaps four plants in the next ten years.

On the other hand, the battery and similar storage is moving much, much faster. In fact, here is a list of major projects around the world, and you can see these aren't just cobbled together car batteries. These projects are beginning to play a role on the grid -- our own 27 MW, but very briefly only, up in Fairbanks, Alaska; the humongous Rokkasho one, 34 MW, 245 MW hours. But then in 2011, 2012 and 2013 these are snowballing and we're seeing substantial projects coming online.

And by the way, as a matter of pride, the Hebei Province, China, project -- 14 MW, 63 MW -- is not the biggest one in the world now, and it certainly will not be the biggest one in the near future either. It's touted as the biggest storage in the world, but hey, it isn't really. But it's there, and

it's very encouraging that China is doing an all- out effort in involving storage on the grid.

If you look at people whose profession is to make prognosis, like Pike Research, but others like KEMA and so on as well, you see a very sanguine picture. Pike Research, for example, estimates 121 MW in 2011. That's annual new deployment. And in 10 years, they see that growing to 2,353 MW annual deployment.

So things are not only interesting. Now they're going to get even more interesting, eventually.

Now as I mentioned, we have had a storage program for the last decade, and the way I see this program; it really encompasses everything. You might also remember that this was before science got involved in the issue. It was before ARPA- E. It was before the hub. In the beginning was energy storage, our program.

And we did everything and still do everything because I believe that you can't do

these things in pieces; you have to have coherency from researchers to companies that deploy things to venture capital and so on.

So we have research projects with grants that develop technology, not as far down as Office of Science where they're really just looking at electrochemistry, but this has to do with device development.

We then get into cost-share projects as soon as devices are ready to be fielded. Cost-share is very important. I've always done cost-share projects. We don't throw money over the wall and hope something will happen to it. It's got to be a close relationship.

And then, loan guarantees -- well, some of those are fortunate; others are not fortunate. But nonetheless, in principle, they play an important role.

Meanwhile, other things have to happen, and these are things that we are in contact with and we partake of those communities. Venture capital -- very important to bring into the field. The FERC

is absolutely essential, and FERC has taken this all very much to heart. And particularly in the frequency regulation business, they have come up with some very good rules that help the industry, and they continue to do so. They are now thoroughly involved in the storage picture.

Then you get mandates, notably California, with its AB 2514. It's not exactly a mandate for storage, but it is a mandate to look at storage in a serious way and have it as part of the planning process. And even though it does not force people to do storage, it, nonetheless, has already had very beneficial influence by making people aware of it and considering the storage angle in planning.

There is also a part of the self-generation initiative where storage has now become a serious player, and Texas has recently gone into this game. I believe today, in fact, they are considering passing a bill which would be in some ways similar to AB 2514.

And then, there is the possibility of tax incentives like the Wyden Bill, and although the present Congress probably does not give too much encouraging -- encouragement for passing it, again, its existence has been very heartening in the community and it has alerted people that it really would be a good thing and why shouldn't it be along with -- supported along with renewables.

And within the program, we don't just think these things up on our own. We interact very strongly with the community. The other year, we held a series of workshops, one with the utilities and one with the material scientists, and we did these together with the PV folks from EERE and with ARPA-E. And we generated these reports on the needs and opportunities of storage.

And out of that, we developed an OE Energy Storage Program Plan which had considerable buy-in from the other offices involved in storage.

Now our main laboratories are PNL and Sandia. I'm not going to go into the

technicalities too much, but there are interesting projects. Like at PNL we are doing redox flow battery development, two new chemistries. One involves a -- is a vanadium -- well, they're both vanadium, but one involves a mixture of solutions which -- electrolytes, which very considerably enhance the efficiency of the batteries. The other one involves vanadium iron batteries. Both of those are now seriously in the process of commercialization.

So the main research on improving devices goes on, but we are already on the verge of having spin-offs, some of them with considerable funding returning back into PNL.

We do sodium metal halide battery. This is the plainer model.

We work at low cost, long life lithium ion batteries. This is quite different from the kind of lithium ion batteries that you would look in -- use in your laptop computer and so on because the aim here is to really have low cost, large assemblages rather than small footprint and

higher cost.

Sandia, similarly, has a program. They have developed an entire new class of electrolytes which are very cute because instead of just being simple things like sulfuric acid, they are ionic liquids with a metal at the core and then sort of organic tendrils coming out, so that the electrolyte is also the electrode at the same time.

And this is not just stuff that we're doing at the lab. These are worldwide-accepted research efforts as witnessed, for example, by publication in well thought of journals. In fact, they got the front page.

We also have a small effort in power electronics, largely connected with storage, and we do very well also. We have two of those with both of them with R&D 100s in the last 3 years. Incidentally, ARPA-E has now taken these projects over, and they will make incremental, if not transformational, improvements on them.

Now the biggest thing on the stage

is still the ARRA stimulus funding. For storage demonstration projects, we received $185 million, and we have managed to garner a $585- million cost share. That is almost four times the amount. Very proud of that because it shows the considerable degree to which industry and utilities are willing to come up with their own money provided a certain amount of federal money is used to seed the project.

So we are doing large battery systems. We're doing compressed air, frequency regulation, distributed projects, and I snuck in a little technology development because we always have to start something new and improved if we're going to progress.

Now it turned out all the large battery projects I have were for wind integration. In principle, they would have been open for solar as well, but people chose to do projects integrated with wind.

Now I've shown you this graph before, where the wind blows at night and less during the day. That's a big task because it means large amounts of energy over large

periods of time. More easily tackled are ramps, for example.

Now these wind ramps do occur, and they don't always necessarily occur just locally. Here, for example, you can see wind ramps going all the way through the Bonneville Power Authority territory. And of course, when that happens, you can't compensate by shuffling electricity back and forth locally. You'd have to borrow it somewhere else.

If you want something impressive, the February 24th, 2007 ramp in Texas, which extended over all of Texas, and it went about 500 MW in a 2.5-hour period. Not 500, it's 1,500 MW in a 2.5-hour period.

Now the interesting thing is yes, they recovered, okay, mainly by letting a lot of major users lower their demand. But the point is to make up for this they had to buy electricity on the spot market for as much as 30 times the usual price. That doesn't get into your average benefit calculations for storage because if you have one of those, the spot prices are way out there and you can

clean up.

Actually, it turns out these ramps aren't that infrequent. Twenty-five percent ramps occur every two days or so, and fifty percent ramps occur about once a week.

If you have storage, you have a buffer. If you don't have storage, well, you have other things and prayer.

Here's an example of one of those wind-connected storage units -- Primus Power in California, 25 MW for 3 hours. And this is to provide firming for 50 MW of wind in the system. This is a small utility. Okay.

And they worked out what it would cost them to do this with gas turbines and what it would cost them to do it with storage, and with gas turbines it's about $75 million, with storage considerably less. And if you do the balance sheet -- and the utility has done the balance sheet -- storage comes out much better than the gas turbines.

Another project at the Tehachapi Wind Field, this one by Southern California Edison, using A123 lithium ion technology --

and again, this is not going to solve the fluctuation problem of the Tehachapi Wind Field, but it is there to be online but to learn how the storage unit performs and how it would benefit the situation. So that's 8 MW for 4 hours.

Frequency regulation is a field that is very interesting and that may very well be the first cost effective storage technology on a wide scale.

The one that you see here by Beacon was built with a DOE loan guarantee and a somewhat complicated history because the loan guarantee basically wanted their money back in a hurry because they thought the company wasn't making enough money in time for payback. Eventually, the company was sold with all its assets.

And the new company, basically a finance company, intends to manage the New York State project, build the Pennsylvania project and then go into production, creating a lot more. So we basically are all set. There was a flinch in the management, but I

think we are online now.

Similarly, you can do this, of course. You can do it with flywheels very nicely, and you can do it with lithium ion batteries. AES has fielded it, together with A123 has fielded 8 MW. Eventually, they want to do 20 MW. And what they're all waiting for, to some degree, is the FERC order which asks the ISOs to pay for performance.

The thing is flywheels and batteries can come on almost instantaneously whereas fossil fuel takes, well, several minutes to come on. And during those several minutes, they are not really providing a service up to their capacity.

So the idea is to keep track of how much the technology actually provides. And it turns out instantaneous response, like with batteries and flywheels, is worth about, say, twice of what fossil fuel is worth. Also, it has a 70 percent reduction in carbon footprint. And we have reputable companies that worked out these details.

Another technology that seems to be

coming back is compressed air. Compressed air works very nicely. Basically, you take electricity off-peak -- at night, say -- preferably, when the wind is blowing, and you use it to compress air. And you put it into aquifers, salt domes, caverns, abandoned oil or gas wells or even in above-ground pipes. There, it sits under very high pressure, and during peak, you feed that into a gas turbine -- special gas turbines, of course.

So you don't need to compress the air and the gas turbine is then much more efficient. Essentially, you've scooted the energy from off-peak to on-peak.

Unfortunately, there are only two of these in the world -- one in Huntorf, Germany and one in McIntosh, Alabama. Both of those were built during the nuclear heyday, as were most of the pumped hydro projects. In fact, if you look at a graph of pumped hydro project construction, it mirrors completely the construction of nuclear power plants.

So they've been there, and they've worked for the last 30 years. And there

wasn't much incentive for building new ones, but with the advent of extensive renewables there is now a groundswell of interest in compressed air.

And correspondingly, we are doing two projects -- one on the East Coast, one on the West Coast. They may not eventually turn out to be constructable for whatever reason, like economics or geology, but at any rate it's a good try.

The PG&E, for example, is going to use depleted gas wells, and they have a gas pipeline nearby the existing transmission line. And because the site is right in the middle of the Tehachapi area and here's the area of depleted gas wells, you have a very good match there. The geography works for you.

Now I get to some of the distributed projects. The idea of the distributed projects was to let smaller utilities or others try out a smaller 500 KW, 1 MW, 2 MW project and see and gain experience in it.

This is one which is already

commissioned. It was commissioned in September of 2011. In fact, this was the first of my projects that was commissioned. And it is based on a lead carbon technology.

Now this lead carbon technology is very interesting because it looks pretty much like a regular lead acid car battery. But you look at the behavior and the lead acid car batteries goes like this over the cycles and the lead carbon battery goes like that. The lifetime is about 10 times longer, the cycle life. Okay.

So you get something that has roughly the price of a lead acid battery, but you have 10 times the cycle life. Okay.

Well, based on this testing at Sandia and other input, East Penn went into production of these batteries, and they won an award for ARRA, and together with Public Service- New Mexico. It integrates photovoltaic field with 500 KW, 2.5 MW hours of storage for smoothing. Everything has been going very nicely. I get reports now and then.

And they will try this in various combinations -- like you can put it all into the peak, you can stretch it out so that you have electricity for a longer period, and there are other modes in which we are exercising this demonstration.

Another area in which we are very much interested in is community energy storage. In community energy storage, you go smaller, you build a lot of little units, but you gang them together so that they can serve as an aggregated opportunity for the utility.

Basically, the idea is that you put four or so into a group, and they can serve for in case of backup, in case of outages. You can put your rooftop solar on them. You can use it for EV charging, all those things which the utility would like to have smoothed out and done locally.

Here, we have 80 of them for each one is 25 KW in 1 hour, and well, those are being built in the AP territory. Another one is being built in Detroit, slightly smaller.

Among the research projects, there

are a few notable ones -- for example, Aquion Energy, which was the winner of the 2010 World Technology Award and has amassed about $30,000 in venture capital. And they are building a battery with a cost of less than $200 per KW hour, environmentally benign because it's built on readily available materials. With their venture capital, they're in the process of building a factory now, and they expect to have a market input in the reasonably near future.

Another project has a look at compressed air, and basically, they want to have smaller compressed air units. But by carefully juggling the temperatures involved, they intend to get along entirely without extra fuel input, so no gas like regular compressed air. It will be a totally green energy storage unit with considerable efficiency.

And you can do it in buried pipelines. You use regular gas pipelines. They have enough ability to withstand pressure, and you bury them in a shallow

grave. And -- well, we'll see whether it works.

But again, they have attracted considerable venture capital and all kinds of awards.

Another one is EnerVault which uses an iron chromium flow battery, and their first application is going to be in an almond grove where there is tracking PV. What they intend to do is they intend to collect basically the entire PV input and concentrate it into the peak hours where electricity is the most expensive and where the almonds want to be watered.

Again, they have just attracted $15 million in venture capital, and we are working at fixing them up with a major wind manufacturer for an integrated storage wind unit.

We also are doing a consortium to evaluate reuse of EV batteries. It's a looming problem because if EV hits the market seriously, as they hope, after five years of use you're going to have millions of used EV

batteries.

Now lead acid batteries can be recycled wonderfully. Ninety-five percent is recycled. In fact, the price of a lead acid battery relies on reusing the lead and the acid, and so on. But nobody has figured out a good way to reuse a lithium ion battery unless you do a whole lot of environmental sculptures.

We have a chance there of, if the economics works out, having both cheaper EV and cheaper stationary storage. We do this at Oak Ridge together with a consortium that involves General Motors and some of the other car manufacturers. And EPA is in the game, and our EV program.

Now we were talking before about -- or, you were talking before about education and outreach. Well, we are beginning to take outreach very seriously, and we have a suite of outreach programs which are just rolling in.

We're going to have an International Energy Storage Project Database which will

have essentially list all the projects in the world, subject to consent, so that anybody who wants to build one of those can check out who else has built something, with what technology, of what size and for what application.

We are working an Energy Storage Handbook in partnership with EPRI and NRECA. This is actually a follow- up. We already did one with EPRI a few years ago. It's time to update it. It will have updated information from 30 or so manufacturers so that we have current prices in it. It will be a thick thing. And it will be available on the internet, so none of this pay $10,000 and we'll give you a copy.

This will be available on the internet, and it will be a compendium of just about everything we know about storage at that moment.

We have also put on our Sandia storage web site a tool, an energy storage selection tool. And what this does -- this was developed by KEMA, and it allows anyone

with fairly simple input to get an idea of how storage would work in their situation.

And the interesting thing, to me, is it doesn't give you a number. It doesn't tell you if you can buy storage for this price you'll get those benefits, et cetera, because it's never possible to really tie this down. So the answers, essentially, are given in terms of probability distributions. It tells you, you've got to be within these limits if it's going to work out.

I think this is an excellent approach and this will be helpful to whomever wants to get involved in storage, and there are more and more people like that.

We are building a storage guidebook for regulatory officials -- PUCs, basically -- because PUCs are being hit by all these publications or will be hit by all these publications for installing storage and they have no experience. They have no idea what to do with this, and we would like to provide them with all the guidance we can so that they can avail themselves of this, and of course,

with linkages to where they can get more.

We do this with a panel of an advisory committee, which is composed of industry and government experts, to help us in putting together something realistic.

Another thing that it's about time for -- because we're getting enough technologies involved and with things like the self-generation legislation in California more and more technologies are going to try and enter the market -- is to develop a standard.

Well, a full IEEE standard takes a long time, and we need something fairly soon. So this is only going to be an interim standard, but this will involve EPRI and many of the manufacturers of technology to develop this pre-standard for the industry so that the vendor can put down exactly how their storage units perform and the user can have some assurance that what is stated will actually be what he will get because you can write performance statements in a wide variety of different ways. You know, is the PC included or not, for example.

We just had a kick-off webinar February 28th, and EPRI is on board, as I said, and it's going nicely.

We're also doing a collaboration with the Clean Energy States Alliance, and this has two purposes. First of all, it is to get the states informed and involved. There are a lot of states in the United States, and they all have energy offices, and, except for California and New York, most of them know relatively little about storage.

So by working with the Clean Energy States Alliance we are doing a whole series of webinars involving the states and with very good response. I mean, we get 180 people or so usually. And we did storage and portfolio standards, renewable portfolio standards. We did storage and federal regulation. We are going to do storage and states and the organizations like TESA, SISA and ESA, the local storage associations next.

But besides that, we are also launching a request for information. We would like to get a number of smallish energy

storage projects going around the states and with heavy involvement of the states. So the idea would be that DOE, say, provides one quarter of the funding, the state provides a quarter and the owner provides half of it. Okay.

That way, nobody has a serious burden, and we will be able to kick off interest and not have it led by a federal entity but actually to involve the states.

I used to do a lot of this before ARRA, working with California Energy Commission and NYSERDA, and that was very successful because you have local experts who know the local scene and it's also an educational effort.

So this is rolling. We just had the kick-off on February 29th, lots of interest. Some of those projects may come from ARPA-E technologies. Some of them may come from NRECA. Others will just materialize locally.

And that's it. Thank you.

MR. COWART: Thank you. Questions and comments? David.

MR. NEVIUS: Our organization has developed a generating availability data system, and we track the performance of generating equipment, and we just recently added a feature to do that for wind generation.

I was wondering. I know you're working with EPRI on this performance measurement. Is that something that -- well, I think it may be something you want to interface with NERC as well and the folks who are collecting data on other types of generation equipment.

MR. GYUK: Okay.

MR. NEVIUS: We've had a number of years of experience doing this, probably over 30 years now. So it's something that we may be able to provide some assistance.

MR. GYUK: Thank you. Excellent point. We'll appreciate that.

MR. COWART: Wanda.

MS. REDER: Yeah, excellent report. In your benefits reporting from the stimulus projects, will you be -- I assume you'll be

summarizing the economics and the applications where there are crossover points so that you're recommending go-forward technologies in different scenarios. Can you expand upon that a little bit and what you see coming out?

MR. GYUK: Hank, can I be candid or do I have to be political?

MS. REDER: Candid, please.

MR. GYUK: Okay, this is among ourselves. You know, this doesn't go any further. I know, but it's still among ourselves. That is a sore point because the contracts as they were written by NETL do not have adequate monitoring and they do not have adequate reporting. They have reporting, but it's aggregated. You know, it doesn't have the minute-by-minute type thing that we need. And moreover, while they are required -- the companies are required -- to collect the data, they are under no obligation to let us have those data.

Now in many cases, we have access to those companies because we have known them from before ARRA existed. And we already

have, for example, the PNM one with the lead carbon batteries. It's right next to Albuquerque. So Sandia is going to work extensively with them and with the University of New Mexico to dig into those data and find useful things.

But it will be a struggle to actually get those data to be as fully useful as I would like them to be, but we'll get a lot of information out of them. I mean no doubt.

Was that over the top?

MR. SLOAN: Do you have projected dates for when your storage guidebook for regulatory officials will be available -- I noticed that you've got a draft being reviewed -- and the Energy Storage Handbook will be redone?

MR. GYUK: The Energy Storage -- well, both of them are in draft form. They should come out in the reasonably near future.

MR. SLOAN: Does that mean this year or next year since we just --

MR. GYUK: I would think this year.

MR. SLOAN: This year. Is the draft generally available, or is it --

MR. GYUK: No, it's an internal draft at the moment. But as I said, we have an advisory committee, and if you know people who would like to participate in the process, we'd be happy to bring somebody new in.

MR. COWART: I'd like to ask you a question about sort of your definition of storage because you started off talking about energy storage, but all the examples seemed to be grid-to-grid storage.

MR. GYUK: Exactly. It's the Office of Electricity.

MR. COWART: I'll make a statement anyhow, and then we can discuss it, I suppose.

If I have excess wind generation at night and I'm thinking about storing that so I can use it tomorrow to run air conditioners, I could have a compressed air or battery system to do that, or I could make ice and use that to lower my cooling load in the same way. And that's a form of storage.

MR. GYUK: Absolutely.

MR. COWART: And so, I guess what I'm asking is when you talk to decision-makers about storage it seems to me to be important that DOE be sort of technology-neutral or agnostic on different ways that capabilities for delivering services across different time periods are neutrally and holistically represented somewhere in the policy realm.

So this isn't the first time I've seen presentations about storage that seem to be all about grid-to-grid instead of a broader view of capabilities for integrating renewables or dealing with demand peak problems.

MR. GYUK: Okay, first of all, I agree with you completely. Okay.

In fact, I used to run the Thermal Energy Storage Program at the Department of Energy. So thermal energy storage has a warm -- or, as it might be, cold -- place in my heart. Okay.

And I keep track of efforts in thermal energy storage, both abroad where the Scandinavians have adapted many of our

technologies that we developed umpteen years ago and which were closed out by DOE and Congress, but here in the United States as well.

We have a number of companies for both heat and cold, but particularly for making ice, which are quite successful. And the reason why they are successful now is because they have caught onto the fact that they should not be selling to the individual homeowner but to the utilities, basically.

I mean, the individual homeowner may buy it, but the utility will make terms that will make this useful. And then the utility will have benefits because if they have 80 of those in a particular area where the marginal price is very high, then that's money in the bank for them. Okay.

But yes, it's a perfectly valid technology, but it's not in the purview of the Office of Electricity. DOE should certainly be concerned about it, but at this time it's not in what we're doing.

MR. COWART: I'm sorry to be so

ignorant because it seems to me it's providing a solution to an electricity problem. But it lives in some other department?

MR. GYUK: Well, actually, building system, but not from this point of view, which is the one that's valuable from my point of view.

MR. MASIELLO: If I can --

MR. GYUK: It's very mature.

MR. MASIELLO: If I can join Imre on this.

MR. GYUK: As Hank points out.

MR. MASIELLO: The technology is mature.

MR. GYUK: The technology is mature.

MR. MASIELLO: It's a policy problem, right?

MR. GYUK: Yeah.

MR. MASIELLO: Which is why Imre is saying the utilities have to get involved because absent very stiff time- of-use rates a homeowner has no incentive to do this.

MR. COWART: Unless the utility is involved. I mean, Terry Boston talked to this

group, and one of his comments was there's enough hot water heaters in PJM that equal the size of their entire pump storage fleet.

MR. GYUK: Yeah. But again, I mean, it's not a research-y topic.

MR. COWART: I understand.

MR. GYUK: Yeah.

MR. COWART: Okay. I'm not assuming hostility. I'm only wondering if we're discussing delivering policies to regulators, that we need to deliver them in a way that reminds people that there's a whole suite of answers here.

MR. GYUK: The draft of the PUC document is not closed, and I've been playing with the idea of putting thermal storage into it as well, where it might pop up.

And incidentally, when I do presentations to other groups, I usually include the slide on thermal storage, with high praise.

MS. GRUENEICH: As a former state regulator from California, I'll just echo if you can put a little something in the draft

report for the regulators on this it would be terrific because when it's a state regulator trying to make a decision on whether to approve money, they typically -- well, not typically, but they may look at a full range of alternatives.

MR. GYUK: Yeah.

MS. GRUENEICH: And so, to have something in there that at least says this could be an alternative, pluses and minuses -- I don't know what you'd say -- that would help the state regulators.

MR. GYUK: Yeah. Okay, done.

MS. REDER: I'm wondering if you can comment a bit on the tools and models that are available and where the gaps exist to truly bring this into the planning domain for users.

MR. GYUK: Well, the outreach projects that I described, at least some of them, are definitely, currently gaps. They will not only bring people together, like EPRI and DOE and so on, and the regulators and others, but they're intended to be hands-on tools.

Now we have also -- and I've mentioned much about it. We have an analysis group both at Sandia and at PNL, and there's a lot of other people who use analysis to either prove or disprove that storage is useful. Companies like KEMA, for example, are very competent to do this kind of thing. I mean, there are companies of this type that we have been working for quite a while, and they do responsible work, et cetera.

Again, to be candid, I am not absolutely sure how convincing analysis ultimately is. To me, actually having things out there and having them work is the proof of the pudding. You know, you can analyze it to death. Unless you build one and it works, it won't work.

But nonetheless, we have these analysis efforts, and the people involved in those have done a presentation to you. And I think your analysis aims and our analysis aims for the future and present are fairly congruent. You know, we have the same sort of thing in mind.

The trouble is, of course, funding. With a $5 million cut in funding for fiscal year 2013, some of these things will get shorter thrift than they would otherwise get. That's why I'm trying to scrape money together from the states -- because we need to widen the financial involvement as well as the educational involvement.

MR. MEYER: In general terms, you've sketched out a future of expanded deployment of these technologies. So I want to ask you, to what extent should these people be thinking of storage as what other people call a disruptive technology, or at least some of them -- some of these technologies, disruptive?

And if so, what are some of the policy-related challenges, institutional challenges that ought to be anticipated and addressed?

MR. GYUK: Okay, several strands of thinking. First of all, storage is, of course, not the only solution offered to a lot of these things. We always have to -- I mean,

I talk about storage, but I fully realize that demand response is in there too. A greater degree of intelligence on the grid, not in the smart meters but actually on the grid, is an important thing. A certain degree of transmission expansion, although probably not all that much if I read the signs right -- but there's a whole suite of solutions, and storage is one of those. And even the electrical and thermal storage work hand in hand.

Nonetheless, the idea of having storage in a major way on the grid is a disruptive technology, similar to the invention of banking or even the invention of money because basically the electricity world is still in the hunter- gatherer stage, where you eat what you catch, like immediately. Otherwise, it will rot.

It took a whole transformation, like inventing the pot where you can store things. The pot is fundamental because if you don't have a pot you have what you can hold in your hands. If you put it on the ground, the ants

will eat it. So invention of ceramics, pottery, was fundamental in the transition from Paleolithic to Neolithic.

Well, essentially, in the electricity business, we're going from Paleolithic to Neolithic if we have storage. And storage can now be -- with storage, electricity can be warehoused. There are all kinds of financial instruments that become available. There are all kinds of dangers as well, of gaming the system and what have you.

And if you look at the policy world, in terms of storage, it is in absolute infancy. There is no real fixed set of rules and regulations applying to storage as yet. FERC is beginning to dig into that.

And it will go hand in hand with having more storage because it's pointless to think of elaborate regulatory structures when you only have a few examples. So they will have to grow together, and all indications are that in fact they are growing together, both on the state level and on the federal level.

So yes, disturbing, but I hope not

too much.

MR. COWART: It's hard to beat that answer, I've got to tell you.

Ralph.

MR. GYUK: Oh, are you next? I will yield the microphone to you. I yield the microphone to my distinguished colleague.

MR. MASIELLO: Thank you. This is a short presentation. It's too bad Gordon and Rob have left because, along with Tom and Brad and Wanda, they put some effort into this.

We reviewed the work -- the draft work plan with DOE some weeks ago, and with ICF, and these were the line items that survived that review after redundant activities were dropped.

There's a legislative requirement that this group prepare a report to Congress, biannually. So we're a year or so late with the second one. And I'll go through an outline of what we're suggesting will be in that report this year.

Second -- and Gordon is the strongest advocate of this -- an analysis of

the need for truly large-scale, meaning pumped hydro-scale, storage deployment needs to be done, and there's somewhat of a perception that the focus has not been here. So again, there's an outline of that.

And then a third item, for which we don't have an outline yet, is an analysis on the regulatory issues, especially around valuation and cost recovery. After hearing Imre's presentation, I think it's apparent we've got some work to do to align this third work item with what the alliance is doing and what Imre is sponsoring as a regulatory guidebook.

On large-scale storage, on the left, you've got the headline and the outline, and on the right, the outline.

I think we all understand variability. There is, by the way, a document from the ISO/RTO Council submitted to FERC 18 months or so ago, on the notice of inquiry about accommodating variable resources. It's very comprehensive as of that moment in time. That would be a resource.

And identifying the policy issues which, as with all storage, include business models and cost recovery, and some of the consequences of inadequate storage in a regime of very high renewables' penetration and then surveying some of the technologies.

And Richard, you see thermal storage is indeed on the list as are gravity systems, offshore and so on.

There's actually one proposal out there, by the way, to have sort of an inclined railroad and you use electricity to run the train up the mountain and then let it regenerate as it comes down. I'm serious. So gravity storage is real.

SPEAKER: (off mike)

MR. MASIELLO: No, no, no. I liked model railroads as a kid, but I never thought on that scale.

And then, for the report to Congress, this would subsume many of the other individual items we had thought of, but it's reviewing the technologies and applications, and I think the novel contribution would be an

independent statement of the market readiness of the different technologies.

It's required to review the existing DOE programs, and we would look at FERC and NERC activities and standards activities. This was alluded to earlier, but existing IEEE standards are really written around lead acid. And the industry has complained that in the details some of the standards are not reflective of lithium ion or sodium sulfur or other technologies. And EPA impacts -- for instance, a lot of data center operators are starting to look at replacing back-up diesel with storage.

And then specifically called out are the goals, and the first one here needs a little discussion, and I think our group is to blame for this. In the 2008 report we said ah, DOE should finance the study of the materials, genome or otherwise called the periodic table. And this was an idea put forth by Donald Sadoway at the time, at MIT, that said you should go look at all of the electric potential of different chemistries

possible across the periodic table and identify the high potential ones.

I think, Imre, that's probably not on the current research list and may indeed be a recommendation that we can take the blame for and say this wasn't such a good idea.

The detailed RPS studies regionally, which are being conducted as we speak, the demonstration projects, certainly, and there was a recommendation for storage research centers probably subsumed now by the budget request for the energy storage hub and so on.

So that's the work plan. This is really the full committee's work plan though. So we should probably look at it and discuss.

MR. COWART: David.

MR. NEVIUS: Ralph, could you go back to the next slide I think you had, where -- that one there.

MR. MASIELLO: Yeah.

MR. NEVIUS: Under benefits, did we decide that we were going to include the effect or the benefits of transmission -- in other words, the deferment or replacement of

transmission as part of the benefits?

MR. MASIELLO: I'll add that. Good. I might have left it out.

After this morning's discussion, we might want to add black-start.

MR. COWART: Sonny.

MR. POPOWSKY: Ralph, under the third one, the cost recovery --

MR. MASIELLO: Yeah.

MR. POPOWSKY: I guess it was on the prior slide. Have you looked at the difference between how you value and recover costs in a regulated, traditionally regulated market as opposed to the restructured markets?

MR. MASIELLO: We only got 10 minutes. These are personal opinions not necessarily reflective of the group, and people might take issue.

If a merchant developer is looking at let's put storage in to do ancillary services, right, or a wind farm developer is saying let's put storage in to avoid congestion curtailments, they're big folks; they know how to value that in the wholesale

markets. Right? And that's kind of well plowed ground.

On the other hand, if a distribution utility wanted to go to the California PUC and say, we're going to deploy 200 KW batteries along our feeders to mitigate the variability of photovoltaic, the planning tools don't exist, the basis for the economics don't exist, and then there's a subtle problem that says that utility in California isn't allowed to pocket the time arbitrage on the value either, should there be one.

So that question -- your question is like turning over the first of a tier of rocks, right.

And then if it's a municipal, obviously, the rules are different. And if it's not in a restructured environment, different again, right.

Once you move away from wholesale, unregulated market-based applications, the cost recovery issues are complicated.

Mike left too. When American Electric Power put their sodium sulfur unit in

Presidio for deferring transmission expansion, to improve reliability at the end of a single line, interveners came and protested: You're charging that thing with cheap power and discharging expensive power, and you're not allowed to do that.

In that case, I think they were overruled. But as I said, you've just turned over the first rock, and that's why we want to talk about valuation and cost recovery in the report, to just identify the issues.

MS. GRUENEICH: Just on the list here, this will be a report then that the EAC subcommittee drafts and prepares.

MR. MASIELLO: For the full committee, right.

MS. GRUENEICH: Okay. And as I understand it, it's due in part because on the briefing we just heard most of the work that's going on within DOE is on the smaller scale, and so this is filling the gap and saying let's really look at the large scale.

MR. MASIELLO: Gordon raised the issue because the big renewables integration

problem is a day that the sun doesn't shine and the wind doesn't blow. And today, the answer is gas turbines. Okay. Large-scale storage meaning thousands of mega watt hours.

MS. GRUENEICH: Well, what I'm thinking of is the audience for the report, of maybe doing a little bit of -- will this be then a recommendation to DOE that in its round of R&D funding or grants, that it includes some funding for the large scale, or is the audience to the state level via DOE?

I'm just saying it's -- you know, it's a little bit unclear.

MR. MASIELLO: Yeah.

MS. GRUENEICH: At the end of the day, what would this report be recommending?

MR. MASIELLO: I think we'd be pre-judging the outcome of the discussions. Some people would say yes, that's one of the conclusions, right. But it could be that in looking at it you say, projections show enough smaller-scale storage will be deployed to obviate the need.

MS. GRUENEICH: Okay.

MR. MASIELLO: I don't want to pre-judge it.

MS. GRUENEICH: Then the last one I had is -- keeping in mind what Pat said, that she's looking for reports that are both the costs and benefits -- we may want to have a little bit not just the benefits but maybe risks or whatever, however you would characterize it.

MR. MASIELLO: Risks or costs. Okay. Good.

MR. ROBERTS: Well, you know we've had this big focus on distributed storage, and so in the last 20 years there have been some major improvements in pumped hydro due to variable speed drives on the pumps so that they can do more functions, pumping and discharging.

And I think we tend to forget that these big opportunities exist. There are some siting requests out there for some big pump hydro. One new plant just came on, 400 MW. Last year, I think it was.

So it's still -- it doesn't appear

to be getting any attention or consideration, and it really should not be just dismissed or we're just focusing on distributed stuff.

So I think it's good that it kind of reappeared in this report because it wasn't discussed in the first big report we did to Congress. It was mentioned as being there's GW out there, but that was kind of it.

MR. COWART: A very good point. And I guess I'll ask the question whether the term, large-scale storage, here is intended to mean individual projects of large scale --

MR. MASIELLO: Yeah.

MR. COWART: -- as opposed to a distributed -- many small distributed things that are connected by a policy or a price signal or a signal that turns them on and off.

MR. MASIELLO: Yeah, I don't want to -- one thought I believe is a gigawatt-scale storage facility can be a direct participant in the wholesale market on a straightforward basis, and that's the case today in New England and New York and California. Fifteen hundred KW units can't be. So there are

inherent difficulties in managing those for firming wind, for instance. That's, I think, part of the thinking.

MR. ROBERTS: Do we have a definition of large? Do we need one?

MR. MASIELLO: I guess.

MR. ROBERTS: I mean, we need to define it and offer some breakdowns.

MR. MASIELLO: Okay.

MR. ROBERTS: I mean, you can build a 100 MW battery plant. Okay.

MR. MASIELLO: Yeah, but if it's got -- and if it's got one interconnection point, it's large. Good point.

MR. COWART: I'm still just scratching my head. I get it, that there's an interest in looking at this topic, but it would seem to me that maybe it's just dealt with somewhere else.

There's also an interest in figuring out how to allow a demand response aggregator to gang up 1,000 customers and have them connected through the internet or through a wire signal to respond to the load.

MR. MASIELLO: With due respect, that's Wanda's problem.

MS. REDER: Thanks, Ralph.

MR. COWART: So, okay. I just think from the point of view of this committee that characterizing things like what they do and what capabilities they deliver to the grid is the way we ought to be going as opposed to coming up with some other way of thinking about it. Okay.

So we're in agreement that from the point of view of the grid these things might be equivalent, but you just want to direct attention to one part of it, one category of it. Is that right?

MR. MASIELLO: I just want to focus on this particular aspect.

MR. COWART: For this one report?

MR. MASIELLO: Right.

MR. COWART: And while we would take pains to point out --

MR. MASIELLO: Not to the exclusion of all other possibilities, right.

MR. COWART: Of course, of course.

But I just -- I mean, I am so conscious of the fact that we're now looking in PJM, for example, at the need for dealing with greater integration of renewables, and they dismantled a huge water heater control program that they used to have.

It's sort of a crazy policy world in which we undo load management and then we say hey, we need storage.

MR. ROBERTS: Well, back to -- one of the original drivers is if you believe in the vision for major expansion of wind, okay, which typically blows mainly at night, when using that energy becomes more and more difficult, wisely, trying to capture it for delivery is the issue.

MR. COWART: Absolutely. We're in agreement on that.

I don't want to bang on this point. It's just that it's going to make me crazy if we issue reports that appear to be myopic when we all know better.

Today, we're talking about smart charging of electric vehicles. You know the

wind blows at night. Charge your car. That's a form of storage.

Thank you. I'm sorry. I can't help myself. We're doing terrifically well on our agenda.

SPEAKER: (off mike)

MR. COWART: Well, maybe there's a cause-effect relationship there.

I just want to officially ask whether there's any member of the public who signed up to address the committee.

So if not, I believe we have concluded our business for today. The time and place for our next meeting are set.

Elliot, have you got any announcements for the group?

Okay. All right. I thank you all very much. We are adjourned.

And I appreciate everybody's great ideas and hard work. Thank you very much.

(Whereupon, at 3:05 p.m., the PROCEEDINGS were adjourned.)

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CERTIFICATE OF NOTARY PUBLIC

DISTRICT OF COLUMBIA

I, Carleton J. Anderson, III, notary public in and for the District of Columbia, do hereby certify that the forgoing PROCEEDING was duly recorded and thereafter reduced to print under my direction; that the witnesses were sworn to tell the truth under penalty of perjury; that said transcript is a true record of the testimony given by witnesses; that I am neither counsel for, related to, nor employed by any of the parties to the action in which this proceeding was called; and, furthermore, that I am not a relative or employee of any attorney or counsel employed by the parties hereto, nor financially or otherwise interested in the outcome of this action.

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