

**CREATING AN OFFSHORE WIND INDUSTRY IN THE UNITED STATES: A
NATIONAL VISION AND CALL TO ACTION WEBINAR**

September 16, 2010

Coordinator: Good afternoon and thank you for standing by.

I'd like to remind all participants your line will be in a listen-only mode throughout the presentation. This call is being recorded. If you do have any objections you may disconnect at this time.

And I would now like to introduce your host for today's call Ian Baring-Gould from the Wind Powering America Activity at the National Renewable Energy Laboratory. Sir you may begin.

Ian Baring-Gould: Well good morning and afternoon to everybody who's joined this call. We have about 120 attendees. And so I thank all of you for being here on today's call.

We have a very exciting opportunity here to learn about the new strategic plan for Offshore Wind energy that's being released by the wind and water program from the US Department of Energy. So every excited to get into the meat of this presentation and then get to some of the questions.

In that regard we've received a good number of questions before this presentation and what the DOE team will do following the formal presentation we'll go in and provide some discussions in regards to the questions that we did receive prior to this presentation.

A note about that they're going to be answering a lot of the questions in general. And so if you submitted a question prior to this Webinar and your question isn't specifically answered please don't hesitate to either ask a

question again in this forum or to send us an email and we'll do our best to answer that question specifically.

In addition because of the large number of people that we have on this call, we're going to request that any questions that are directed directly to the DOE team be done through the Webinar process. And we're not going to be taking verbal questions but type in your questions into the Webinar into the net meeting and we will address as many of those questions as we can verbally during the session. We will also make every effort to have those questions - the responses to those questions available in written form as soon after this Webinar as we can.

So without further ado I'd like to proceed with the meat of the Webinar. And to start that off I'm going to introduce Dr. Chris Hart who is currently running the offshore wind program. He's the Offshore Wind Manager for the US Department of Energy. Chris graduated from the United States Naval Academy and served as a Special Operations Officer for the US Navy with great distinction both in operations and during an Iraqi freedom.

Following over ten years of service for the nation in that regard he came back to the University of Michigan where he got an MBA and also did some offshore work for the State of Michigan at that time. So he's graduated with Bachelor's Masters and a Ph.D in Naval Architecture from the Academy but then got an MBA at Michigan as well. So it's with great pleasure and a very interesting topic that I would like to introduce Chris.

Chris Hart: Okay thank you very much Ian and thanks again to all of the people who have joined on the meeting here.

Before I get started I'd just like to give a little bit of a background on where the Offshore Wind program has been over the years at DOE and where it is now which is - will lead me conveniently into the presentation. Offshore Wind has had fits and starts over the past four to five years and it wasn't until about a year ago that a determination was made to actually build a substantial effort centered from the Department of Energy.

And that effort began like I said about a year ago by the creation of what was known as the Offshore Wind Tiger team. It was a team of consultants and experts from the labs who really put together the groundwork for what we're going to discuss today. And another product of that in addition to that groundwork is a comprehensive 200 page opportunity - Offshore Wind opportunities and barriers report which will be released in the coming months from the National Renewable Energy Labs.

So a lot of great work was done there, a lot of very in depth analyses and you'll see a lot of that work come forth in this presentation.

I also wanted to really quickly at the beginning here introduce two of our Offshore team members that will be assisting in the Q&A later on. We've got Patrick Gillman who's been with the program for a couple of years now and is leading our market barrier removal effort for the Offshore team he'll be joining us towards the end of the call again to help out with the Q&A.

And also Dr. Mike Robinson who is on a three month formal detail from NREL firewall just to help us make sure that the R&D effort that technology development piece of our effort gets off on the right foot. So I appreciate both of those gentlemen for joining us for the Q&A session. And with that I'll just break right into the announcement here or the presentation.

The first slide here we have a section here on background which is to help realizing that the participants on the call are from a various different - various backgrounds and have different degrees of familiarity with the topic. We want to just touch a few basic points to bring everyone up as quickly as we can to a common set of level of understanding. After that background we'll break right into the rationale for Offshore Wind discussing some of the benefits that we've identified and that the other regions of the world have identified as well.

We'll discuss some of the key barriers focusing specifically on barriers which are unique to the US market. We'll discuss in detail our strategy that we've put forward as a vision for the nation moving forward. And lastly we'll conclude with a call to action and some more specifics on how each one of us can get involved.

Moving into the background here again this is just very, very introductory, you know, wind power is generated basically from lift in the wind and translating that lift to rotational energy that's then transmitted through the drive shaft to the generator.

And the lift is generated from the blades on the turbine and as the illustration shows here these blades are large, this is a 3.6 megawatt GE turbine with 111 meter rotor diameter and it's much larger than a 747 wing span. And as we get to discuss more details of Offshore specific technology later we'll see that this 111 meter rotor is even small compared to where things will most likely be heading.

We'll also move into the evolution here of commercial wind technology over the years since the 80s. We can see that throughout time the size of the turbine both in capacity and in physical dimensions have increased but we'll see

around 2006 timeframe that there's a definite split and that the Offshore turbines take a different trajectory than the land based turbines and we can see out in the future at the 2015 timeframe there's prototypes for 10 megawatt turbines and we'll get into more detail there. But this just kind of helps us familiarize ourselves with how the technology has changed over the years.

Offshore's specific as I mentioned the larger machine in general 2 to 5 megawatts upwind rotor configurations that means the rotor is pointing into the wind. Most of the installations now have been bottom fixed either mono pile or various transitional depth type of technologies. And the (tower) - the hub height as indicated here by power height is greater than 70 meters. But as we start envisioning larger turbines with obviously larger blade lengths that 70 meter height may increase or will need to increase.

There's several 5 megawatt prototypes currently installed at a farm in Germany called Alpha Ventus and in various stages of testing those prototypes. One of the things that we've really seen in the European market is that the turbine development has outpaced the testing and validation capability and that's something that we'll address a little bit later on with our strategy.

So in Offshore Wind we have the turbine technology but we also have the foundation technology which plays a major role. And here we just see a very simple representation of how the current technology is designed and structured again focusing mostly on the mono pile foundations but also there's exploration of tripod and other methodologies for again only bottom fixed.

When you get into the future technology floating solutions become more interesting and there are two floating installations in the world, one is the most commonly referred to and one that most people know is the high wind project in Norway and that's a design different from the one represented in this

picture. This picture is a tension lake platform designed to the one in Norway is known as a Spar. So there's a lot of interesting possibilities there when you take a look at floating foundations.

So that back - that wraps up the really quick factor on technology wise. I'll transition into taking a look at the market and where the market stands. We'll start with Onshore Wind just some quick numbers and figures and points regarding Offshore. The US does lead the world in installed capacity just over 35 gigawatts and you see last year was a big year 10 gigawatts installed and that represents a roughly \$20 billion investment in 2009. The topic that's on everyone's mind these days is jobs and that does provide a substantial base of jobs as we can see here.

Some of the limits the future land based growth transmission access there's already curtailment of farms in the high wind regions of the country, the regions of the best resource and it's a transmission access are our major concerns. There's also siting issues such as radar and as we all know from the recent financial situation financing can be difficult to come by.

But how about the Offshore market? In the US we have several projects proposed in different levels of permitting different stages in the permitting process and this is a chart which highlights those projects. We've got 2.4 gigawatts proposed. Again these numbers can vary depending on the sources and depending on where you cut off how far along the permitting process - the project is.

But there are several of the projects shown here which have made substantial announcements in the past month or so with regards to progress in the regulatory timeline but also in developing partnerships with developers and some global developers. And so it's a very exciting industry right now

burgeoning industry and we see a lot of potential here especially in some of these projects that are moving forward more rapidly.

So again just to highlight Europe is far ahead of where we are. They've got over 2 gigawatts installed now. Several gigawatts proposed depending on if you look at (we) a numbers the European Wind Energy Association there numbers are up over 100 gigawatts in different phases of permitting and planning. So Europe is really, really pushing the envelope here.

And China has recently - is recently progressing very well also. Many of you may have seen the recent article proclaiming how China blows past the US in Offshore Wind. But so globally it's a global opportunity. Europe is out in the lead, China is quickly following and we've got plenty of opportunity here in the United States as well.

So I mentioned about a year ago things really aligned and pushed the Department of Energy to determine that it was time to start a formal program in Offshore Wind. And one of the things that this push can be broken down into several categories, the first would be the federal push. There's obviously with the current administration there's a strong emphasis on reduction of carbon omissions so that policy and the look to stimulate jobs and really jump start the economic recovery aligns well with the Department of Energy goals and EERE goals and the Wind and Water Power program goals.

But it really wasn't only federal opportunities that provided the needed push there. The states were very influential as well and this next slide is taken from an NREL report that was released in the last week or two with some updated Offshore Wind potential numbers. And we can see why the states are interested.

The potential is tremendous and there really is some substantial benefits in exploring Offshore Winds further and the states see that and the entities such as Atlantic Offshore Wind Energy Consortium and other entities also Senate, Senators, Congressional efforts.

There's been a lot of push from the states and a lot of work it's a lot of excellent foundational work that's been initiated and is now forming to help the US industry go forward. And then all of these things came together political pressures federal and state to help Department of Energy realize that this was an excellent opportunity that should be capitalized upon. But it wasn't only political factors that drove the Department of Energy to consider this.

There are additional benefits that are summarized in this table. They break down into energy benefits and other resource for Offshore Wind is located close to load as the previous chart indicated.

It does allow us to diversify the energy supply mix and protect from that volatility and the existing supply mix. But there's also environmental and economic benefits as well. I touched some of the economic benefits earlier but the environmental benefits aligned well again with the federal goals and with the idea of climate change and fighting climate change.

So there really are the - a lot of benefits here and the rationale is very strong. So if the benefits and the rationale are so strong why haven't we got anything together yet? Why are we lagging behind other regions of the world in Offshore Wind? And it really comes down to a set of unique barriers to the US market and to the US environment. And we've taken an effort to identify some of those barriers and I'll get into that next.

One of the - before I get into that - the barriers I did want to highlight this. This is another one of the benefits here. This is the 20% wind scenario many of you have most likely familiarized yourself with the 20% by 20, 30 report.

This is a chart that's taken out of that report or taken from the data and adapted from the data in that report. And what we see there is a fairly substantial analysis that presents a scenario whereby 54 gigawatts of wind of Offshore Wind will be realized by 2030. And we can see if we look at the 2020 line there we see it looks like around 10 gigawatts as well.

And this analysis is substantial. As I mentioned it does present one scenario and this gets to some of the questions that we'll be addressing in the Q&A session why the 54 gigawatts. But we feel comfortable with this scenario we feel comfortable with the analyses that back it up. And we also feel comfortable and we're inspired by the progress that the Onshore industry has made thus far against the projections from the 20% scenario.

So this presents the two - this presents half of the scenarios that we introduced in our strategy that 54 gigawatts at 79 cents per kilowatt hour by 20, 30 and the other one was 10 gigawatts at 13 cents per kilowatt hour by 20, 20. So that's - these are the capacity numbers for those scenarios. The cost of energy numbers came from a different set of analyses that I'm not going to go into depths in here. But it shows a set of 12 assumptions that are very achievable based on the best knowledge currently available.

And if those assumptions are followed then we can see a similar - we can see that level of cost reduction. And I'll get into a little bit of more depth but. So that's - again the benefits there.

Another benefit what's the - what's the barriers? What are some of the challenges? And we see those challenges and barriers fitting into three general categories. The top one here high capital cost and the cost of energy. I'll talk a little bit more in depth about each one of these. But there's an untested permitting process which is a substantial barrier.

And the last one is really the technical and the infrastructure challenges. So I'll break down each one of those in the next slide. Starting with the cost of energy, this chart shows many people may be familiar with this chart but it shows the Offshore Wind capital cost breakdown for a given system. And what we see here is the turbine is roughly a quarter of the cost whereas it's over 50%, you know, approaching even 70%, 80% on a Onshore installation. And we also see the substantial impact on the cost of the O&M efforts and also the rest of the what we're calling the balance of system for the wind system itself.

And so there's a lot of areas we can focus our attention on if we're trying to drive down the capital cost. But really capital costs are only just part of the cost of energy equation. What we have in cost of energy is a unit of currency divided by a unit of energy. So the typical units are cents per kilowatt hour. If we address capital cost and we attack capital cost that's only addressing the numerator and really it's only addressing part of the numerator. We also need to focus on, you know, capital cost, we also need to focus on cost of capital and reducing the risks that are associated with this new technology.

And what we'll get into a little bit more details about that. And there's other pieces of the numerator there. But if we only attack the numerator it's only getting the cost of energy down we're not giving the full effort to bringing that cost of energy down. We really need to focus as well on the denominator the kilowatt hours, the energy. How can we increase the amount of energy

captured by a specific - by a certain farm? And there are several ways that we can do that and I'll highlight that a little bit later.

But that's a very quick synopsis on high level and how we're thinking about cost of energy right now.

Other barriers fall into this technical and infrastructure challenges umbrella. We've got the site infrastructure itself, you know, foundations and the platform from the deepest water - deeper waters we don't have a set designed which has come out of the proven winter for deeper waters and that's challenging. We've also got very expensive interconnection and balance the system equipment and the interconnection and transmission question is a big challenge, a big unknown especially in the US market.

How are we going to bring this power to shores? Is it best to have a transmission backbone that collects all of the power from a set of farms along the coast and then has one single point to bring that power back to land or two points? Or is it better to actually take the power from each individual farm? And that's something that is currently being explored.

There's also challenges that are unique to the US market with regard to US flagged vessels and most of us are familiar with the Jones Act and the series of laws known as the Jones Act and how that makes it challenging for any vessel - fleet of vessels from another region globally to come and operate in the US waters. There are several potential workarounds or potential ways to address that in a more efficient manner. But as of now it's still a challenge.

There's also the ports - the US ports that have been in a state of decline for some time and there's obviously or there's potentially a need for some very

serious investment in bringing the ports up to be able to handle this sort of deployment of Offshore Wind.

There's also dealing with the ports. The ports are just the last piece there of the, you know, of the supply chain actually getting integrated into the farm but there's a lot of pieces associated with the manufacturing capacity. And there's also some technical challenges as well. So this is a, you know, again a quick summary but gives a good idea of generally the technical and infrastructure challenges that we're facing.

And this is the untested permitting process. This is an area which DOE operates as a member of a team and I can assure you that this team is working diligently on addressing this untested permitting process and trying to find areas for efficiencies here for improving efficiency. But this chart basically was created by us at DOE to help us visualize how things progress and what are the steps necessary. Now there's some key assumptions here that need to be kept in mind when looking at this timeline.

One is that this is a non-competitive leased issuance reflected here. It's assuming timely regulatory review and coordination. It's also assuming other state and local permits are reviewed and approved in parallel. And there's several other set - you know, another set of assumptions that are reflected here. But what this chart does is it allows us to recognize that there are some challenges here, there's some opportunities for increased deficiency. And as the bullets point out in the key points the federal agencies are working together.

There is an MOU between the Department and Energy and the Department of Interior Bureau of Ocean Energy Management and we are working diligently to address this particular barrier.

So that's where we stand right now. That's what we saw at the end of that - those analyses with the Tiger team and that's something that we are going to - that's the reality that we operate in. A substantial set of benefits that a strong rationale for Offshore Wind but also some barriers which are - which cannot be ignored. And that's what led us to put together this strategy and to create the Offshore Wind innovation demonstration initiative or Offwind.

What we see here is the scenarios that I discussed. We see critical objectives that are taken obviously directly from some of the barriers that we summarized reducing the cost of energy and reducing the deployment timeline. And I'm going to go into now how the strategy that we've developed as a vision for how the industry can develop - can progress some of the details of that strategy.

As I mentioned two critical objectives, how are we going to attack these critical objectives? And this ties into the discuss of cost of energy before. It's very, very important. In the United States we're not going to get the same sort of policy support that is available in other regions of the world. We're not going to get fleet and tariffs most likely. We need to innovate in order to drive the cost of energy down and that will not only make us more competitive in our own market but it also increases the possibility for success in the global market as well.

So it's a very worthy objective. And we're going to reduce the cost of energy in four main ways. I talked about reducing the capital cost that's key, that's obviously extremely important and that's going to take, you know, mostly focused on technical innovation and that's one of the three focused areas for the strategy.

But we also need the decreased installation of operation of maintenance cost and that is done through innovation and installation techniques but also in improving reliability and improving availability of the systems themselves, making these systems more rugged so there is much lower maintenance requirement. And it looks like the industry leading reliability is up around depending on who you talk to 98% we want to take that to 99.6% and really take a hard look at what we can do to bring those own end cost down.

The financing cost there's some interesting logic here that may not be originally or readily apparent. And when you decrease financing cost it's not just - it really is decreasing risk and all the different facets of risk. And one of those facets is permitting risks especially when you deal with Offshore Wind. And so taking a look at reducing the permitting risks is definitely a piece of decreasing the cost of energy.

Lastly this gets into the denominator that I was talking about before. You need to increase energy capture for a given system and a given farm. How is that done? Larger turbines, longer blades, taller towers possibly to bring the turbine up into the higher wind speeds and the better wind regime. But it also means putting the turbines in the right location and knowing where the winds are the best and really taking advantage of that increased wind speed relationship with power.

But it's also improving the reliability and it's improving the availability of these systems and that's something that we'll focus on as well.

The second objective again reducing the cost of energy and then the second piece here is very important reducing the deployment timeline. We understand that there's effective permitting that exists and a substantial amount of effort has been put into developing the existing permitting timeline and we're

looking forward to further testing that timeline and further identifying efficiencies and ways that that timeline can be used the timelines that exist as a building block for improvements and like I said, better efficiencies more realistic application of the timeline.

So again technical input DOEs were all here, we can definitely provide technical input and assistance to the federal and state agencies, the regulatory agencies. Again DOE isn't responsible for developing the regulations. Also there are several opportunities for applied research on key issues. One that has arisen recently is radar. We've taken that to mean more broadly national security concerns and the radar and also there's been discussion of passive sonar and other capabilities which could be impacted by an Offshore Wind installation.

But also there's policy and economic analyses which must be executed in order to make sure that all decision makers are informed to the necessary level.

There's also a big push recently for research characterization and the realization that if we don't know where the wind is best it's difficult to put the turbines where the wind is best. And so that gets right to that energy capture piece but we're looking to support the creation of a more robust resource characterization framework and we're working hand in hand with NOA and the Department of Defense and other federal agencies to make sure that we leverage all existing efforts and make sure that we harmonize all those efforts towards a common set of goals.

Now there's also infrastructure, I touched on that a little bit earlier. I think it's an excellent opportunity to make sure that the manufacturing supply chain is

analyzed and any gaps are filled and that will be done through the public private partnerships and potential solicitations in the future.

Now that'll bring us here to the structure and as with any structure or any model there are strengths and weaknesses. But what we see here is the focused areas we've got technology development, market barrier removal and advanced technology demonstration. And those three focused areas we think give us the best organization and allow us to focus our resources in the most efficient manner to address the critical objectives that we just talked about.

Especially important here I'll talk a little bit more in detail about each one of these focused areas. But you'll see those are broken down into activities and then there's even a further breakdown below that. But one of the things that came on the radar scope recently is this Marine systems engineering opportunity here the third box down under Technology Development. There is just a phenomenal amount of experience here in the United States dealing with Marine systems engineering in the oil and gas sector.

And we think that that's an excellent opportunity to really leverage that experience and melt that experience with some of the things we're hearing from Europe and in our connections there and really help build the best industry that we can here in the United States.

Again the third block in market barrier removal you'll see research - I'm sorry resource planning and that gets directly at the resource characterization and design planning for the farms themselves.

Getting right into the technology development we've got short term and long term vision here that the short term vision is to really reduce the risk by working hard on the computational tools and test data. It's difficult to really

innovate if we can't effectively model how those innovations will perform. So there's noticed gaps there in that computational tools land test data and we'll be looking to fill those gaps in the coming months.

Now the callout bubbles here indicate as the members here the people who are on the Webinar if you fit into any of those categories these would be areas where you may be interested just to kind of start the discussion and the thought along those lines.

We've also got a strong effort on innovative turbines and really working to try and push that boundary and have half of a generation or even a full generation leap frog so to speak of current technology again with the main driver being lowering that cost of energy. And the rain systems engineering piece is also highlighted there. As I mentioned these constructs have weaknesses. One of the weaknesses here is that it's difficult to show the interaction between the pieces.

I'm going to really quickly go back to the previous slide. But one of the interactions here is that the technology development, the market barrier removal piece and the advanced technology demonstration all very affect one another in very real ways and that's not shown very well in this representation. But it's something that we're taking into consideration as we plan the program.

And it goes for this slide as well. If we look at trying - one of the major opportunities here is to innovate and optimize the system, the entire system the turbine all the foundation and the rest of the hardware and software that goes into making sure that the system operates the most efficiently that it can and efficiency determined as a function of the cost of energy. So lowest cost of energy and that's something that we're looking at as an entire system. How

does this whole system play and we look forward to continuing those conversations.

So long term goal is to really establish a substantial national R&D effort.

Market barrier removal piece again, resource planning here. We've got a substantial effort in siting and permitting that's currently under way. Last week we had a very positive, very effective meeting between 16 federal agencies that have equities in Offshore Wind.

And we had around 45 to 47 attendees and we really got down and talked about how especially in siting and permitting but also in the other areas how can we work together to establish a unified national vision towards this end? And we look forward to having similar discussions.

Today this Webinar is more of a kind of an introductory effort but we look forward to doing that and some follow on events that I'll hit at the end.

Lastly the advanced technology demonstration projects, this is really an effort to try and get steel in the water and try and do it in the fastest, most efficient way that we possibly can. And we think that there is potential for very strong partners here.

I just want to highlight very quickly some ongoing inner agency activities. There's - I said earlier but I just want to highlight again substantial interaction between the agencies that are interested in Offshore Wind and will be effected by Offshore Wind and that interaction will continue and it manifest itself in several memoranda of understanding and with NOA and the Department of Defense and BOEM it's just really progressing fairly well. And there's a lot of probably the excitement that a lot of you feel is mirrored by what we feel in

the federal agencies as well. And we really see that sense of urgency to get this moving.

There's also substantial ongoing efforts currently in the technology development field as well.

So in - to sum this all up we can't do it alone okay. The most single entity we can't do it alone at DOE, we can't do it alone even as the US Government. It's going to be very challenging for all the agencies to come together and actually deploy this technology. It's going to take public private partnerships it's going to take this inner agency collaboration which is already ongoing and it's going to really take the best and the brightest minds to do this.

And it's going to take a mobilization of national scale to bring the nation's resources towards this challenge to overcome the barriers that we've mentioned and reach the - and realize the benefits that we discussed. So there's some key DOE roles here, we're starting on this path right now through this role out of the strategy and trying to welcome comment but also share the thought that we have put together and the vision that we've tried to create here. So that's the call to action and definitely excited to continue to engage in the coming events.

I'll just very quickly highlight here. We've got a seminar in Cleveland in person it's short it's an hour and a half. We'll have about an hour for Q&A there at Case Western Reserve University in coordination with the Great Lakes Wind Collaborative third annual meeting. We've also got an event 9-28, September 28 there. I just - about right before this call was started we solidified the location of the - of that event it's going to be at a hotel here in Washington, DC and we'll forward that information out to everyone once the contract is signed.

And lastly we've got several events going on in coordination with the Offshore exhibition. So a lot of great things going on looking forward to interacting with everyone. And Ian we can start up the questions.

Ian Baring-Gould: Great thank you all. I just wanted to let everybody know that we will also include the location for the Washington meeting on the Wind Powering America Web site in our standard meeting and conference event schedule. So please go ahead and check there.

We do have one more general question and that's whether the slides will be available and both the recording and the slides will be available. It'll take us a little time to get them up on WPA Web site but they will be available there for anybody that's interested.

And so now we are going to move onto questions and I'll again let everybody know that both Chris, Patrick Gillman from DOE and then Dr. Mike Robinson from NREL who is now sequestered at DOE will take a few minutes to more generally answer a number of the questions that were received prior to this event. And again let everybody know that if your specific question is not answered please don't hesitate to let us know and we will do our best to answer that. And then after that we'll go into some of the more specific questions that were brought up during the session.

So back to you Chris.

Chris Hart: Okay great Patrick Gillman's going to start us off. And again just to reiterate we had 11 pages of and, you know, we're document of some very thoughtful questions and we did see some trends and we're going to attack the trends rather than hitting any real specific questions so.

Patrick Gillman: Thanks Chris. Hi everyone this is Patrick Gillman I work on environmental and siting issues for the program and I'm leading up our market barrier removal effort. I wanted to start off by thanking everyone for their questions, there's a lot of really fantastic ones in here. I lot of ones frankly that are going to be thought provoking for us as moving forward.

A couple of themes that I wanted to hit on that a number of questions addressed. And the first is about asking us how in pushing towards the national Offshore Wind industry how to better coordinate federal and state agencies on issues like on environmental issues on siting and permitting and best management practices.

And I guess I wanted to start by saying that, you know, as Chris point out coordination is really, is clearly essential. Obviously the challenge is too big for any one of us, you know, in siting and permitting issues DOE doesn't have a formal role that's held by the Department of the Interior.

But I think where we see that we can fit is we can play the role of a convener and serve as an intermediary between parties make connections between the regulators and the industry between industry and states and provide information to facilitate conversations there. And we're doing that already in some ways.

The first one is as Chris mentioned we've got a memorandum of understanding already with the Bureau of Ocean Energy Management at the Department of the Interior. We are engaged also with DOE and Mid-Atlantic Northeastern states through the Atlantic Offshore Wind Energy Consortium. And we have been more formally - we've already got money out the door jointly on several million dollars of environmental research. It's actually just

being finalized right now through a joint solicitation we issued through the National Oceanographic Partnership program with NOA and BOEM.

And we envisioned that that process continuing into the future has deepened in that collaboration. But on coordination certainly welcomed any input that you all have.

The second theme I think that a lot of questions touched on was the notion of ocean planning and how to plan the use of ocean space such that both sensitive to all of the competing uses of the ocean that are out there and all of the environmental sensitivities that exist.

And I think the first thing to point out there is that we're - we are deeply engaged in the National Ocean Council, that was just announced by the President and we are - we're going to be working to ensure that Offshore Wind is well represented in the coastal and marine special planning process that's taking place under the National Ocean Council.

And more narrowly we're working with (DUI) to do some - start up some analysis and do some real thinking about where Offshore Wind makes the most sense in places where it might not make the most sense as far as prioritizing both research and for planning. And then we're collecting information on existing studies that have been done in Europe on Offshore Wind of relevant studies that have been done in other sectors.

I know the Navy's done a lot of work in putting that together into a database building off of work that's already been done here at DOE with marine and hydro kinetic energy to make that information public so that it can be fed into those coastal and marines special planning processes so that decision makers

and stakeholders have the best available data to work with as they're making planning decisions.

Chris Hart: Great thanks Patrick. We're going to let - we're going to try and do a couple of rounds here. We're going to let Mike Robinson share with us some of his thoughts regarding the technology development eccentric questions from the batch. So the floor is yours Mike.

Mike Robinson: Thanks Chris. Let me also add my thanks to everybody who participated today. I'm actually the new guy on the team. I've been in Washington for a grand total of one week participating primarily on the technology side. It's a great opportunity and I've enjoyed it thus far. This is kind of like being thrown under the bus a bit being so new but I do have a little experience, prior experience in wind energy. And so I'm going to take on some of these more thoughtful technology questions that have been put forward prior to the Webinar.

And I've also been monitoring some of the questions that have been coming in real time. They kind of fall into three different categories, there are specific questions about technology and technology choices that came in this - that came out of the strategic plan. There are some questions about posturing and partnering on potential future solicitations. And last but not least is resource assessment. So let me go ahead and tackle these one at a time.

On the technology choices, there's a real question as to because there was some specific examples that were put in the strategic plan that there was a pre-disposition by the department that we are pre-selecting. For example permanent (magnet) generator technology as the preferred technology that's going to be funded and any future solicitation, that - there's nothing further

from the truth in that. What we're really trying to do is, you know, there really are no pre-determined choices.

We're really going to be looking for creative and very innovative ideas to as Chris has pointed out lower the overall energy cost for Offshore Wind technology. We're also very cognizant that you can't do this in a vacuum. Obviously the wind technology choices one would make for floating platforms and the foundation structure is going to be very different for shallow water and the infrastructure.

So, you know, we're very open to those technologies that as Chris has pointed out we're going to leap for the current capability and give us the long term or help us meet the long term cost objectives for the Offshore Wind program. I will say that we do envision that there will be specific cost metrics. You can't for example do a systems - you have to do more of a systems sort of evaluation when you're doing these types of very large systems especially for Offshore.

You can't do it based on part of an individual component because often your choices for example, foundations affect the overall integrated systems in the turbine design. We're aware of that and so we'll be taking much more of a holistic approach. And what I mean by that is when for example we're doing evaluations we'll be looking at the overall total improved system cost of energy not necessarily that we can drop one cost and it's going to promote a problem or a cost in another part or another component of the system.

On the (unintelligible) cost sharing and partnering, we envision because the percentage there's usually a percentage of cost share on solicitations. Several questions have come up about making sure that they were not going to be excluded as a result of cost sharing requirements. Actually we envisioned

under future solicitations a range of activities that are going to go on especially on the technology solicitation side. There have been no cost sharing criteria or requirement set or even discussed at this point.

The cost sharing whenever cost sharing comes up we'll be under very specific guidelines that DOE has and maintains. We envisioned for example on one end we are doing paper studies and compu - developing computational codes for analysis et cetera. There really aren't hard cost share requirements. And on the other side you get closer and closer to evolving commercial technology. There are more and more cost sharing requirements when you're developing commercial products.

So with a range of activities we also see that they'll probably be a range of cost sharing activities but that at this point is all kind of TBD.

The other issue that came up on cost share is partnering. There is a concern that there may be an attempt to drive people into partnerships between industry and universities and with national laboratories. That is also hasn't even been discussed at this point and I don't think there's any intent to do that. The - it's sort of our position that whatever partnering on any future solicitation should really be driven by the overall benefit to who members of proposers are and developing a strong and more comprehensive proposal that an execution team that's not going to be dictated or mandated okay.

So I hope that puts that issue to rest.

Last but not least is resource assessment questions they fell into a couple of different categories of the first work in where's the most recent available data for Offshore resource assessment? You would find that in a report that Chris had mentioned.

On the NREL Web site there is an assessment of Offshore Wind Energy resources that has just been posted. I will refer you to there you can look that up. We're also anticipating in October NREL will release - will release another technical paper on large scale Offshore wind power in the US that will also address the Offshore resource assessment.

There are also a few questions about a national repository and database. I think Chris also addressed this. This is an ongoing discussion on how to close that as a barrier and a gap. We see a very strong collaboration between DOE and NOAA on this particular issue and so I believe that that is evolving and the specifics of a future approach are also evolving and are going to be worked out in the near term.

That's about all I see Chris. I'll turn it back to you.

Chris Hart: Thanks Mike. I do want to help shed a little bit more light onto a couple of the questions here that regard - are in regards to specific funding dates for solicitations, different FOAs, Funding Opportunity Announcements, you know, how are those to be structured? And really that's - it's way - it's premature to comment on those details right now. But what I would like to say is that we did submit in our request for information in June, we got the responses back in July and we had 123 responses to that RFI from 113 different entities.

And if you're watching I don't know if you can see it on the Webinar or not but we had over 250 attendees here. So there's a tremendous amount of interest just looking more detailed at the RFIs. We had broad deep, very thoughtful responses. And, you know, we're still kind of collating and pulling the best takeaways out of those RFI responses.

But the two that came loud and clear, one was there's a lack of a national vision, there's a lack of a set of goals. And what we tried and present here is that national vision. And we're trying to present it in a way that show that it's not just a DOE vision it's not just, you know, it's much more than that. It's all the agencies working together and hopefully we're able to bring along several of you as well in trying to reach the scenarios that are put forth there.

Secondly I wanted to talk, piggy back on some of Mike's comments with regards to partnerships.

Mike's exactly right when we're talking about technology development and when we're talking about market barrier removal, partnerships are - will not be mandated and will not be required but one of the things we're considering for advance technology demonstration projects is that the magnitude of this challenge is so great that it's going to actually try and get the installation sited and permeated and get the right technology, you know, really provide that impetus and that extra push to the technology to get it to the market faster that very strong partnerships are going to be necessary.

And one of the things that we're going to highlight in the next coming months again on the - to highlight in the next coming months is just the details of how any potential solicitations are going to be coming out. So one of the things you can bank on is that there's a historical precedent with regard to timing for funding opportunities and, you know, there's a set of events which happen right after the other, the RFI then there's an NOI which is a Notice of Intent. And then comes, you know, the solicitation and we're going to follow that path.

And so in the near future we can expect for a discussion of potentially where we'd be looking to go with any solicitations.

And that gets to the second take away, the second thing that came loud and clear from the RFIs and that's the sense of urgency. And really this needs to happen now. Again the benefits are tremendous and actually it needs to be taken now. So for advanced technology demonstration projects partnerships, you know, probably augmenting some of the things that Mike said, partnerships are going to be strongly encouraged especially given the complexity of the task of actually putting these projects in the water with advanced technology in a shortened time period.

So we got just a couple of minutes now. I wanted to give - Mike you had a chance you said to take a look at some of the live Q&A questions. Did you get those covered that you wanted to cover?

Mike Robinson: I did - I got them in the categories that we had in terms of the pre-questions. So I'm good unless anything else shows up on the screen.

Chris Hart: Okay did you have any Patrick that you?

Patrick Gillman: Not specifically I'm happy to, you know, I think we'd be happy to respond in writing to everyone who's asked a question here. I don't know we certainly don't have enough time to go through all of the ones that we have in front of us.

Chris Hart: Okay along those lines what we're going to do is after we've finished the Webinar we'll incorporate the questions that lend themselves to this as comments in our strategic plan. And that is as you all know the document that's out there publicly is a draft and is a pre-decisional draft so we're still

going through edits as we speak in fact. And we'll be readdressing those comments from this Webinar.

But also from the seminar that we had last week with all the federal agencies and seminars that are coming up in the - excuse me in the coming weeks for the broader audience. And we'll be taking those comments and incorporating them in the strategic plan. And again as Patrick said, they're really stimulating thought and helping us to further refine the vision that we put out there.

And with that last piece of detail I did want to hit one more group of questions here. And that's dealing with the levelized cost of energy. You know, I touched on that a little bit in the discussion there in the presentation but, you know, we really are looking for a 50% price reduction and that's going to be done through attacking those - both the numerator and the denominator of the LCOE unit, the cents per kilowatt hour. And so you really do think that there's an opportunity for that level of reduction given when compared to the current technology.

And I'm getting the cut off in here from our host and again thank you very much to everyone who participated in the Webinar today and we hope that we're able to meet you in person in either the three events coming up and I'll turn it over to Ian.

Ian Baring-Gould: Great thank you Chris and thank all three of you Pat and Patrick and Michael for the overview of the Offshore program. Just to restate the three events that are coming up Cleveland at the Great Lakes Wind Collaborative meeting and then also the one that we know of at the (unintelligible) Shore Exhibition. Check in with WPA and other locations for information on the Washington Workshop that should be coming out very quickly.

And then for those that did miss it there is a strategic document that is available it can be downloaded it's not a publicly released document at this point in time so it's not featured at DOE's or the WPA Web site.

But if you got a - if you received an invitation to this Webinar look in there for a direct link to the document. And I would encourage everybody to look at that document if you haven't already.

So again thanks to our three speakers and I'm sure we'll be talking to many of you over the next couple of weeks. Thanks again and have a good day.

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