Offshore Wind Energy Update
April 17, 2013

Coordinator: Welcome and thank you for standing by. At this time all participants are in a listen-only mode. Today's conference is being recorded. If you have any objections, please disconnect at this time. I would now like to turn the call over to Mr. Ian Baring-Gould. Sir, you may begin.

Ian Baring-Gould: Great, thank you so much and welcome everybody to another of the WPA webinars, this one focused on offshore wind energy so providing an update on offshore wind industry and we have two fabulous speakers.

Jim Lanard who's the President of the Offshore Wind Development Coalition who's going to give us an update on kind of the wind markets and what's happening within the states in regards to wind.

And then another great speaker Greg who is just a new person at the Department of Energy but he's overseeing leading all of the work that we're doing currently or DOE is doing currently in regards to the offshore FOAs that were announced a number of months ago and so he's going to give us a pretty detailed overview of the offshore FOA activities which should be fabulous.

One thing I do want to point out to everybody is that the next webinar that is scheduled for the 15th of May is actually going to be a detailed Offshore Wind 101 which will kind of take a step back a little bit and introduce offshore wind technologies.

Some people are very familiar with it. Some people aren't very familiar with it so we'll go with an understanding or provide an understanding of the

European experience in regards to offshore wind and then go through the technologies that we're seeing and the trends going into the future.

So it's a little bit more technical than we typically do. We did this partially because as people know the Web broadcast of the summit—the WPA summit—is happening the week prior and so we figured it would be a rather slow week for the WPA webinars and figured that giving an introduction to offshore wind would be a fabulous opportunity there.

So if people are not that familiar with offshore wind technologies and want to learn more, certainly encourage you to sign into that seminar so without further ado, I'm going to introduce Jim so that he can give us an update on the wind markets.

As I mentioned, Jim is the President of the Offshore Wind Development Coalition which is a business membership organization that serves to advocate for offshore wind developers and supply chain and I'm sure he'll give us a quick introduction to his organization at the start of his presentation so I won't go into that more.

Prior to his work at the Coalition, Jim was a Managing Director of Deepwater Wind which as most know is one of the big development organizations looking at offshore wind and he ran the—working with incentives—throughout the Northeast and supported the company's strategic policy development regular affairs and other things of that.

He also worked with Bluewater Wind for several years leading their strategic planning so Jim comes to us with a host of experience in offshore wind mainly from the deployment space.

Prior to his work in the offshore area, Jim worked in lots of positions in the environment and energy sector which he's done through his career, managed NGOs. He worked as a chief of staff for a U.S. House Representative, director of environmental affairs and government relations for Walt Disney which would probably be a great story.

We'll have to do a presentation on that just in itself. He comes to us with a degree in political science from Boston University and then a law degree from the University of Miami and is a member of the Bar Association in a number of states so Jim, could you please give us an introduction to what's happening in the offshore wind space?

Jim Lanard: Ian, thank you very much and thank you for that kind introduction. We appreciate you including us in the Webinar today and thanks everybody for joining in.

When I spoke with Ian about this, he told me that I should expect many of the attendees to be folks more familiar with land-based wind than offshore wind so I will be speaking to you more than folks who have been perhaps more engaged in the offshore sector and again it will be a general overview of where we are in the industry.

The Offshore Wind Development Coalition represents virtually all the active offshore wind developers in the United States and much of the supply chain so the turbine suppliers like Siemens and Alstom and many of the technical resource permitting firms, the law firms and so on and our mission is very straightforward.

We advocate for federal and state legislative and regulatory policies to move the industry forward so to give you a sense of scale of what an offshore wind

farm might look like, we could have 100 turbines. They could be from 3.6 megawatts up to 6 megawatts.

The cost of these projects will be in the billions, $1-1/2 to $3 billion. We'll provide enough energy to power 200 to 340,000 homes. As far as job creation during construction, we can expect 600 to 1,000 jobs and 50 to 70 full-time jobs in operation and maintenance for the life of the project.

And there is also potential manufacturing jobs at the critical mass of projects is in the queue. When we speak with some of the larger companies and some of the turbine suppliers, they would like to see orders in the magnitude of 2,000 to 3,000 megawatts before locating a facility in an area.

This of course then really sparks the supply chain and that's what we're focused on now is really trying to grow those markets so that we can bring some of the European turbine manufacturers here to the U.S.

We also want to remember that this is an environmental protection initiative as well. We'll be responsible for reducing carbon dioxide emissions annually in the range of 1.3 to 2.2 billion pounds.

When we look at offshore wind, we like to see the trends in land-based wind and these data are from AWEA. Think about this. Over the last five years, $15 billion annually has been invested in land-based wind here in the United States. There now are nearly 500 manufacturing facilities employing 30,000 people and industry-wide we've got 75,000 folks.

The next fold is the most important one for our industry. We're seeing domestic content for land-based wind projects go from 25% really approaching 70% now. I believe that this is key for the offshore wind industry

because of our costs and the structure of our projects and the size of our projects.

I think we're going to have to start higher than 25% and I think we're going to have to get higher than 70% to be a sustainable economic industry energy supplier here in the United States.

We're also encouraged by what's happening in Europe. The European Wind Energy Association projects that by 2030 there will be more workers in the offshore space than on the onshore space. You can see those numbers, 215,000 versus 160,000.

That's really impressive and the United States really has the need for that much offshore wind energy and certainly has the capacity for it along our coasts, our four coasts, which are ocean coasts, the Great Lakes and the Gulf of Mexico.

We're 20 years behind Europe. Fifty-five wind farms are already operating in 10 countries. Almost 1,700 turbines are in the water. We're probably beyond 5,000 megawatts in nameplate right now and that's just going to keep growing and growing.

I just wanted to mention at this point we're not going to go over these regulatory and legislative requirements but for those of you who develop land-based wind on private property, you don't deal with a lot of these issues and it does make it challenging for the offshore wind industry to get through all of these different legislative and regulatory challenges.

One of the key issues that is a high concern for us right now has to do with the United States Coast Guard which is part of the Department of Homeland

Security and their interest in developing what's called the Atlantic Coast Port Access Route study whereas in the past the Coast Guard was primarily focused on access to ports.

They're now looking at transportation shipping routes, shipping lanes between ports up and down the coast and some of their initial routes would go through already adopted U.S. Department of Interior wind energy areas in a number of our states so we don't have an antagonistic relationship with the Coast Guard.

We're working with them but it's something that we're going to have to be successful on or else the wind energy areas are going to go away and a lot of the development footprints won't be valid anymore. Of course we continue to work with DOD and any of the other agencies that you see up here on this slide.

Now for those of you unfamiliar with this, federal jurisdiction of offshore wind farms is triggered on the Atlantic coast and the Pacific coast beyond three miles off the coast so the first three miles are state lands, submerged lands and the state had the jurisdiction there.

The Army Corps of Engineers would have oversight role since they maintain navigable waters out to three miles. After three miles it's the Department of Interior's Bureau of Ocean Energy Management. In the Great Lakes it's just states again with the Army Corps playing a role as well.

Because the states of the Great Lakes own their submerged land, there won't be any federal leases there and then the Gulf of Mexico off the coast of Texas where there's a project being developed right now, the state owns the land for the first nine miles.

That was something that was negotiated when Texas joined the union and the federal government would then issue leases for submerged lands beyond nine miles off the Texas coast or beyond three miles off the Pacific or the Atlantic coasts.

This is not meant to be real clear on your screen because it's not real clear to us yet but the permitting timeline started out at seven to nine years. Through a lot of hard work with some of our members and the leadership by Secretary Salazar and David Hays and folks at the Bureau of Ocean Energy Management, we've been able to reduce that timeline by more than two years.

And we're going to continue to work to reduce it and we're really shooting for a three to five-year timeline which would give us an opportunity to do a lot of work concurrently while we're getting federal approvals and getting the leases so a quick status for the federal government.

Let me mention this. In our industry, we look at the process as a three-legged stool. The first is federal legislative initiatives. They're concerned about tax policy and energy policy and that's what we focus on before the United States Congress.

The second leg of the stool is federal regulatory issues that's mostly permitting and leasing and we deal with the Bureau of Ocean Energy Management primarily and all of their resource agencies on those issues and the third leg has to do with state governments.

It's the state government and the utility commissions will manage how the electricity generated by our developers is put into the grid and sold into the market. They are the market-makers and very, very key component to make

sure that offshore wind can thrive here in the United States. The first bullet I would like to point out to you is the top one, the federal investment tax credit.

It was extended in the fiscal cliff legislation the early parts of January of this year and on Monday the Internal Revenue Service and the Department of the Treasury issued guidance on how that investment tax credit eligibility would work for offshore wind developers. I will tell you that a lot of developers are reviewing this. It's a very complex document. It's not very long but the language is very complex.

Many of the points that we sought in working with the IRS are included in the guidance but there's some that are either vague or are not reflected in the guidance that gives us some pause and a tax council for several of the developers are doing very intense research to understand whether we need clarifications, whether we need changes or whether we're understanding this correctly.

So we're feeling okay about it. We'd like to feel better and we're coming at this still with some concerns. On the second issue on this federal level, you're going to hear from Greg Matzat soon about the DOE's awards. Congratulations to DOE and to the winners.

We were really delighted that DOE is such a great partner with the offshore wind development initiatives for the U.S. and appreciate the work that DOE is doing on this.

We've gotten these wind energy areas adopted in the mid-Atlantic region for four mid-Atlantic states. There's other wind energy areas being assessed right now and in pretty far along progress with the area of mutual interest in

Massachusetts and Rhode Island and also in Virginia and I'll get to some of these other states when I get to the state slides which is right now.

So on the first state-by-state slide, I'm going to go through a few of these states and just put out a couple of highlights that are interesting to us. The first with Maine, Statoil has a 12-megawatt pilot plant on floating foundations 400 feet deep is in the area where they want to propose. I think it's 416 feet.

They've got a power purchase agreement already that's been approved by the Maine Utility Commission. A very interesting component of that PPA has to do with domestic content. If the developer doesn't reach 30% domestic content in this project, the Utility Commission has the authority to void the power purchase agreement so both sides are taking a risk here.

The Utility Commission said you give us 30% domestic content—jobs, labor, economic development—we're going to give you a PPA. The developer's taking the risk that they don't get those benefits to these state, they might lose the benefit of the Power Purchase Agreement and I think we're going to see a trend in this regard going forward because it sort of is a risk-sharing.

And it also ends in incentivizing the initiatives to make sure that when we ask rate payers to contribute to the cost of renewable energy, they're also seeing the benefit of jobs and economic development and other states have taken this approach particularly New Jersey and Maryland recently.

Under Massachusetts I just want to mention that in addition to what you see on the slides and these slides are all going to be public so Ian can tell you about how to access these at the end of the program so we're not going to go through every bullet here.

But I did want to point out that in addition to what's going on with the port facilities, Bedford is really taking a very aggressive role in making sure that they've got a port that can serve the offshore wind industry beyond just Cape Winds Initiatives but serving the New England area.

They're investing perhaps as much as $100 million to prepare that court with very robust weight capacity so that they can handle multiple turbines and nacelles and towers and the foundations and also having deepwater access for their vessels.

And I did want to mention one thing that's not on here about Cape Winds. They have identified their investment bank, the Bank of Tokyo which will help raise the $2 billion or so that will be needed for this and Cape Wind really is just waiting for some final federal lawsuits to be resolved.

They essentially went off just to, you know, the lawsuits that have been thrown at them by Bill Koch and his friends at the Alliance to Protect Nantucket Sound. I think we're going to see Cape Wind keep going forward.

Similarly Deepwater Wind's three-megawatt project could commence construction like Cape Winds by the end of 2013 but commence construction is really related to tax clients and not the actual steel in the water that I've seen referenced recently.

Commence construction means commitments to contracts for turbines, for vessels, for cable, some of these things that will be non-refundable deposits and under the IRS guidance of the investment tax credit, could be as much as 5% of the capital expenditures would have to be paid down.

New York is moving forward. New Jersey is expecting resales by Q3-Q4 of this year. They're looking at an initial revenue stream of up to 1,100 megawatts and their energy master plan has talked about up to 3,000 megawatts of offshore wind.

And Governor Christie notwithstanding the withdrawal of the state from the regional greenhouse gas initiative the day he pulled out of that city. He still wants New Jersey to be Number 1 in offshore wind because he sees it as an economic development driver and a jobs creator.

Delaware we've got a lease but no off-take mechanism. That can easily be corrected and we'll see how that goes. Maryland has done something that I think is very interesting. Governor O'Malley just on April 9th signed a 200-megawatt bill that provides a revenue stream like New Jersey's.

It's the Offshore Renewable Energy Credit and what Maryland has done that other states haven't done is in order for a developer to compete for the revenue stream in Maryland, they have to be able to demonstrate that they've got site control for a wind farm.

What that means is that they need to have a lease from the federal government through BOEM for an offshore wind farm which would come out of those wind energy areas.

And in Maryland's case what they did is they worked with the federal government to split the wind energy area off Maryland in half expecting that different developers would bid against one another for either Plot A or Plot B and at the end of that bidding competition there would be two winners; one for A and one for B.

Both of them would have the ability then to demonstrate site control and they would then compete for the Maryland revenue stream and they would be assessed on their environmental and health benefits, their job and economic development creation commitments that they would make in their bid and the price.

And the price is the key thing here and why we need this competition because with competition, there will be pressure to keep the price for offshore electricity as low as possible and that's what will drive the decision-makers at the Utility Commission there to approve a project or not.

In Virginia and the next three states—North Carolina, South Carolina, and Georgia in the next bullet—these are states that have not deregulated the electric market so the utilities there are what are known as vertically integrated. They own the generation as well as the distribution systems and since they own the generation, they decide whether to buy electricity from somebody or build generation capacity themselves.

So in Virginia when there's a lease auction, it's possible that nobody would bid against Virginia thinking that Dominion Resources would choose not to buy the electricity from another offshore wind developer.

Rather Dominion might say we'd like to build our own utility-scale project and sell power to ourselves and also rate-base that two or $3 billion asset which gives a nice healthy return and then let's then control their generation capacity without having to rely on somebody else to go forward.

So we'll have to see how that works. My credit to the folks in North Carolina, South Carolina, and Georgia who are working in a coalition down there, because of the different regime where you're working, you're going to be

much more focused on utility leadership than individual private developers since the utilities own the generation.

There's yes going to be a different approach to how you create the markets. The leasing on the federal outer continental shelf remains the same but the market-making will be considerably different.

Lastly we can see that DOE has given FOA awards that Greg's going to talk about in just a second with Texas, Ohio, and Oregon. What we like about this is if you look at these last three states, we're going to three different areas of the country for offshore wind; the Gulf of Mexico, the Great Lakes Lake Erie, and Oregon from the Pacific coast.

This is terrific because particularly related to the west coast, up until now it's been hard to imagine that we could build off the coast of the Pacific because it's so deep, the water gets so deep so quickly, we don't have the gentle sloping outer continental shelf as we do on the Atlantic Coast.

In the Pacific it gets deep very quickly and as Statoil and Principle Power have proved both in Portugal and in Norway and now as they're going to prove in the United States, floating foundations work and therefore we can see the offshore wind industry expanding into the deep waters of the Great Lakes and the Pacific Ocean.

My last slide just for a second gives you a sense of the scale of the size of these 440 or so foot turbines with the turbine blade. We in the offshore wind industry sometimes have been accused of looking down on the capital. I think that seems to be the general mode of most people in the country these days, waiting for the logjam to open up.

But we're still looking up to the Washington Monument and with that let me thank everybody and Ian, I'll turn that over to you or to Greg. Thanks very much.

Ian Baring-Gould: Great, thank you very much Jim. Our next speaker is Greg Matzat who is currently the Senior Advisor for offshore wind technologies at the U.S. Department of Energy in its Wind and Water Power Technologies Office and as I mentioned previously is the new lead for the Department's offshore wind and demonstration projects.

Greg is new to DOE and I think is a great example of how the offshore wind industry is—I don't want to say stealing—but is borrowing expertise from America's kind of great ocean energy or ocean—well ocean energy—with oil and natural gas but experience in ocean technologies.

And that's because Greg comes to us with a degree in naval architecture and marine engineering from the Webb Institute and then did graduate studies in ocean energy at Stephens Institute of Technology.

He's a licensed P.E. and before joining DOE Greg was the President and CEO of a naval architecture and engineering firm, Sparkman and Stephens. It was based in New York where he worked for 20 years and so the offshore wind industry is borrowing a lot from other offshore energy industries and Greg is a great example.

We're very happy to have him as part of the DOE team and Greg will give us an introduction to DOE's work now specifically related to these large demonstration projects. Greg?

Greg Matzat: Thanks, Ian, so I work in the Department of Energy's Wind and Water Power Technologies Office and the wind and water power program has about 50 people and in addition to offshore wind supports land-based wind, marine hydrokinetic technologies MHK, wave energy, tidal energy and also conventional hydropower.

But my focus is on the offshore wind technology and in particular the demonstration projects that Jim was referring to. Land-based wind has already made great strides in the U.S. and we have a robust land industry here with over 60 gigawatts of wind installed on land providing about 4% of the nation's electricity.

So why offshore wind? Why shouldn't we just build more land-based wind so this slide shows the U.S. land and offshore wind resources and as you can see, the purple colors that is where there's more wind and the yellow and green colors is less wind.

And as you can see, in the middle of the country we have a lot of wind and along the coasts—I'm trying to get a little dot here—but well, never mind, and on the two coasts there's also you can see a large amount of wind offshore.

If you consider the locations where the population is and the major electrical load centers, you can see that offshore wind has some advantages in being close to the major load centers.

The 28 coastal states in the United States use over 70% of the nation's electricity and in order to use more and more of the land-based wind in the middle of the country, we would need to increase our transmission grid. Offshore wind enables us to do that much shorter with short underwater cables right to the major load centers.

Finally the coastal electricity rates are typically more expensive than in the middle of the country so again, offshore wind being the near the coasts is advantageous there.

This just further looks at the offshore wind resource and shows also the depth so here you can see in the darker green colors is where the water is deeper, over 60 meters, 200 feet so you can see from this that for the west coast that we're in all deep water. For the east coast off the continental shelf, it starts shallow and gets much deeper faster.

Total though there's over 4,000 gigawatts of potential offshore wind resource here. That's over four times the size of the combined generating capacity of every electric plant in the United States.

Now while we can't develop 100% of this area, this area goes out 50 nautical miles from land due to competing uses and environmentally-sensitive areas, just due to its sheer size and the fact that it's four times the U.S., we still can generate a huge amount of power from here and we can always go beyond 50 nautical miles also.

Europe is currently developing projects over 60 miles offshore so but as we go further offshore in the U.S. though, you also have to consider that we're going into deeper water so the Department of Energy's offshore wind strategy was announced in 2011 by Secretaries Chu and Salazar.

There was a lot of analysis done in developing this strategy, economic models, transmission models, supply chain studies and from this the strategy calls for 54 gigawatts of offshore wind power by 2030 approximately 4% of the nation's total generating capacity.

To achieve this, the strategy has two critical objectives. One, reducing the cost of energy through technology development and two, reducing deployment timelines and uncertainties.

Now just to understand the scale of what 54 gigawatts is, that would be close to 10,000 wind turbines offshore with an average size greater than five megawatts each so that's much larger than land-based wind turbines.

Deployment of 54 gigawatts of offshore wind could support as many as 200,000 manufacturing, construction, operation and supply chain jobs and it would also revitalize U.S. ports and heavy industry so what is DOE doing to reach these goals?

So as I said the National Wind Strategy calls for 54 gigawatts by 2030 and does that two ways, reducing the costs and promoting the deployment and to achieve those two goals, we have three strategic focus areas: removing market barriers, developing innovative technologies, and demonstrating next-generation technology.

Now in the past couple of years we have done funding announcements and have done several projects with regards to the first two topics there, removing market barriers and developing innovative technologies and now we're moving into the third stage, demonstrating next-generation technologies.

So Europe already has a lot of offshore wind. As Jim said, they're coming up on 5,000 megawatts of offshore wind installed so why don't we just copy what they've been doing here in the United States?

The wind industry like many industries is somewhat averse to risk and therefore can be slow to change. The offshore wind today as seen in Europe is largely derived from land-based wind which is a very mature industry.

Offshore wind today looks very similar to land-based wind: three-bladed rotors, bottom fixed, model piles, look pretty much just like land. You could just switch that water out for grass and it would look pretty much the same.

So to use an analogy, land-based wind is like a modern, efficient, reliable automobile but when you try to put an automobile in water, it's not as efficient or as reliable as when it's on land.

The costs of offshore wind haven't come down as much or as fast as many had hoped and when we ask developers and experts from around the world what a sustainable offshore wind industry looks like, most agree that it was different probably from what it looks like today.

So what does the future of offshore wind look like? This is where the Department of Energy is investing so offshore wind should be purpose-designed in built systems. They should be optimized from the beginning for the offshore environment, optimized for deployment offshore, installation offshore and optimized for operating and maintaining offshore.

The ultimate solution may look similar to its land-based cousins and be more efficient and more cost-effective or maybe they'll be totally different. This is what our demonstration projects are looking at so as I said, my focus is on the third strategic area of DOE here which is demonstrating next-generation technology.

In 2012 DOE announced a funding opportunity for offshore wind demonstration projects and in February of this year we made awards to seven projects that demonstrate various technologies.

Each of the teams behind these projects include members from private industry, including developers, turbine manufacturers and offshore companies as well as universities and national labs. The Department is investing $168 million in this multi-year effort.

In addition the individual projects are putting in another 200 to $590 million in cost share on top of DOE's investments so these demonstration projects could result in up 3/4 of a billion dollars' worth of investment in offshore wind.

The goal is to demonstrate advanced technology currently not widely used in offshore wind but that has the potential to reduce the cost of energy and additionally we'll also be reducing uncertainty in permitting and environmental review and we should also create more public acceptance.

So this map shows the location of the seven awards. As you can see, the awards cover all regions of the U.S., the Atlantic, the Gulf of Mexico, the Pacific, and the Great Lakes. Three of the projects are in federal waters.

That is Dominion, Statoil, and Principle Power and the other four are in state waters. Four of the projects are demonstrating advanced bottom-fixed foundations and three of the projects are demonstrating floating foundations, floating platforms obviously for deeper water.

Each of the seven awards is receiving $4 million this year or for the next year to complete their initial engineering, design and permitting. They are also

required to provide a minimum of 20% cost-share for this first year and typically are providing more, some much more.

Then in February of 2014, DOE will review and select up to three of these seven projects to continue on to follow-on phases to complete their designs, permits, construct their projects and install them offshore and be operational between 2015 and 2017, the end of 2017.

Those three projects will receive up to $47 million more of the following four years pending Congressional appropriations. Each of the teams are required to put in at least 50% cost-share for this second stage and all the plan teams are planning on putting in actually substantially more than the minimum cost-share.

The projects range in size from 12 to 30 megawatts and all of the projects will be connected to the electric grid. Depending on which three projects make the down select, the total generating capacity of the demo projects will be between 36 and 82 megawatts which is enough to power between 13,000 and 29,000 homes.

So now I'm going to just run through the—tell you a little bit—about each of these seven projects so the first project is by Fishermen's Energy which Jim mentioned.

They are going to install five five-megawatt direct-drive turbines in state waters just shy of three miles off the coast of Atlantic City and they expect to be operational by the end of 2015, starting construction at the end of this year, beginning of next year 2014.

Fishermen's is looking at several innovative foundation types and also innovative installation techniques. The installation vessels that are used for installing offshore wind farms cost in the hundreds of thousands of dollars per day, you know, it's possible that they can be two, $300,000 per day.

So being able to build your project quickly is very important. Now currently developers in the U.S. can only work during the daytime when they can have lookouts to make sure there are no marine mammals or other species in the area that might be disturbed by the construction.

So Fishermen's is looking at several innovations with respect to installation to reduce construction noise and to allow for monitoring of marine mammals, birds and bats at night so that hopefully they could carry-on construction 24 hours a day which would greatly reduce the installation costs of the project which is a large part of the project.

Fishermen's has also done a lot already with regards to environmental monitoring and resource measurements and they plan to continue that. They have several wind-measuring systems including a scanning LIDAR which can sitting on top of a building along the beach in Atlantic City.

That's actually the box of the LIDAR that they're putting on that. That is capable of looking out up to about 15 miles offshore and measuring the wind speeds so they can look out to where they're planning to put their wind farm.

They also have a buoy that has a LIDAR here that shoots upwards and is capable of measuring the wind speed at hub height for the wind turbines also to get better data which is very necessary for getting financing for the wind farms. Additionally, they're doing a lot with regard to environmental monitoring and will continue to do that.

Next project going around the country in a clockwise direction is Dominion, Virginia Power. They are looking to put two direct-drive turbines six megawatts each, very big off the coast of Virginia approximately 20 nautical miles from shore in about 50 feet of water so these turbines will be totally out of sight from the beach even though they're over 500 feet tall each.

The project is also next to the Virginia wind energy area so it will help demonstrate how to reduce costs building there and will create a large knowledge base for the commercial build-out of the Virginia wind energy area.

They're looking at a couple different innovative foundation techniques. This one in the lower left is called a twisted-jacket foundation which they're looking at and then the second one here next to it is a somewhat standard four-legged jacket so they're doing studies right now looking at these to see what is the most cost-effective best foundation for their area.

In addition they're looking at several other foundations in just these two. They're going to down-select to two foundations from this, do a detailed economic comparison between the two and then get down to one foundation type by the time Department of Energy is ready for their down-select.

Dominion is also looking at high-voltage intraconnection cables, higher voltage than is typically used currently in Europe. This would allow for smaller-diameter, less-expensive electrical cables, saving costs there and they're also doing a lot of work with regard to installation techniques and vessels.

Next project is Baryonyx in the Gulf of Mexico. They're looking to install three six-megawatt direct-drive turbines in state waters about five nautical miles offshore. As Jim said in Texas, the state waters goes out a little further so hence they can be further than Fishermen's from the shoreline.

The Baryonyx has experience developing wind farms in Europe. They developed the Ormonde wind farm off the west coast of England which was commissioned in 2012. That wind farm has 35-megawatt turbines and on jacket foundations.

And for our project they're looking at taking what they learned from Ormonde and designing a better foundation that uses less steel and is easier to construct. They're also doing a lot of interesting things with regard to hurricanes which are prevalent in the Gulf of Mexico.

They're working with Texas A&M and other universities looking at new blade designs that will be more hurricane-resilient and they're also looking at some new resource assessment methods including a dirigible met tower which enables you to measure the wind speeds high up but without having to build a traditional tower.

So jumping to the next project is Principle Power so Principle Power is one of our three floating projects. They are looking to build five semi-submersible floating foundations outfitted with six-megawatt direct-drive turbines in deep water over a thousand feet deep about 15 miles off of Coos Bay, Oregon, far out of the view from the shore.

Floating offshore wind has a huge potential to be able to reduce the cost of energy. It's also the only way you can basically do offshore wind on the west coast which is a big resource of the United States.

One of the advantages of floating offshore wind is that it can be mass-produced and completely assembled onshore and then complete with installing the wind turbines with cranes and everything onshore and then simply towing as can be seen in this photo then just towing the completed unit out to the site, attaching it to some preinstalled anchors and to a preinstalled electrical cable and then you're good to go.

Greatly reducing the amount of time spent working offshore which is very expensive and also allowing you to use much smaller vessels for installing the wind turbine so all these things have a large potential to help reduce the cost.

Principle Power has already deployed a single two-megawatt turbine on the same type of foundation design off the coast of Portugal and this project will build upon that showing that they platform can work with six-megawatt turbines and also with five platforms it will show how the turbines interact—how floating turbines interact—with each other with respect to their wakes and how those wakes affect each other, each of the turbines.

It'll also make use of cable that aren't typically seen in wind farms currently because of with floating you need dynamic cables that are capable of being suspended from a moving platform and the cables between the turbines will actually float below the surface as opposed to going 1,000 feet down to the bottom before going over to the next project.

So those will be all-new things that have never been done before. Last, Principle's also doing some other interesting resource assessments. It's been very interesting, wind measure scheme based on the five turbines on each of the turbines that kind of looks back at each other turbine at the other turbines and should be an interesting way to look at getting some good data.

In the Great Lakes we have the Lake Erie Development Company also known as LEEDCo and their project is called Icebreaker and in the Great Lakes, ice is a definite issue and presents a unique set of challenges for doing offshore wind in the Great Lakes.

There's a second challenge in the Great Lakes is that there's also limitations on the vessels that are available in the Great Lakes and the size of the vessels that can get into the Great Lakes so this requires some interesting ways to think about our project in this area.

So starting with the foundation, LEEDCo's evaluating multiple foundation designs that are designed to resist ice loads and as you can imagine, ice loads can be very large, beyond what wave loads can do and it's a totally different type of design that's required to design a turbine that can go through the winter with ice around it.

So they are looking at a bunch of foundations and during this first year and they will settle on the optimal foundation design before our down-select next year. They're also looking at their project uses nine three-megawatt turbines.

One of the reasons for the three-megawatt turbine is just due to the vessels that you can get in currently into the Great Lakes or what's available in the Great Lakes so that is a limitation. With nine turbines they will also be able to do a lot of work with turbine-to-turbine interference and look at array controls and different things like that.

They're also looking at control systems on the turbines, changing the blades in order to stop ice from the blade speeds and also coating on the blades to prevent ice from building-up on the blades of the turbines similar to what

happens with an airplane which would degrade efficiency and can cause maintenance issues.

The University of Maine is another one of the floating projects. They are also building a semi-submersible, same basic foundation concept at Principle Power except that their foundation is being built out of concrete and that has the potential to allow for savings with mass production in that you can make a set of forms and just build these things fast.

They're currently testing or building I should say a 1/8 scale prototype which will be deployed at the end of May next month. This'll be I'd say 20 megawatt turbine—not megawatt, sorry, 20 kilowatt turbine—so it's small but it's totally scaled to 1/8 to full size and this'll be the first floating wind turbine in the U.S.

They're full-scale installation will be by 2017. It's going to be deployed off Monhegan Island about 2.5 miles from the island which is about 12 miles from the coast of Maine and in over 300 feet of water.

Besides the concrete foundation, they're also looking at using composite tower instead of a steel tower and the picture on the bottom kind of shows the areas of Monhegan Island and then this picture above here kind of hard to see but this is actually their 1/8 scale unit being built inside one of their labs at the University of Maine so this is an 80,000-pound concrete structure.

The last of the projects is Statoil North America. Their project is also in Maine and is also a floating project. They are proposing four floating turbines, three megawatts each. Statoil has already built a single floating turbine of 2.3 megawatts that was deployed off the coast of Norway in 2009.

This builds upon this project looking at putting multiple turbines together. Different from the University of Maine and Principle Power, this is a spar design and you can see that this design is just a single column that goes straight down underwater and floats. It doesn't actually connect to the sea bottom there.

The spars go approximately for this project will go approximately 250 feet below the water but they are being anchored in about 500 feet of water 15 miles offshore so there's the bottom of the spars is still 250 feet off the bottom.

Given the distance offshore, there won't be any view shed issues. They're very simple structures, simple mooring system, minimal impact environmentally on the sea floor.

One challenge with this though is that in order—these units have to be assembled—in deep water so these units will be assembled in a protected area in Maine that has 250-foot-deep water and which also that there's a way then to tow them from that site out to the actual installation site so first they get the major components are assembled on land.

Those are brought out into protected deep water site which they're then righted, put upright and then the turbines installed on top, then that has to get towed out so there's an extra step there and some of the things that Statoil is looking at is the ability to float them out horizontally and then flip them upright as well as they're looking at composite towers and other things.

This project they are shooting to have this project installed by 2016. Another difference from their previous projects in Norway is they will be using

synthetic mooring lines instead of steel cables so a lot of interesting things with this project also.

So in conclusion, to move forward with offshore wind in the United States, we have to bring down the costs and by focusing on innovation and technology and demonstration projects, DOE is working to reduce these costs and help create a sustainable offshore wind industry in the U.S.

And it is with this we hope that we can reach our goal of 54 gigawatts by 2030 and create a huge new industry in the United States. Thank you very much.

Ian Baring-Gould: Great, thank you very much Greg. We only have a couple of questions and I know we're running a little bit late but we'll stay on here and answer questions. If you have a question, remember to go up to the top menu bar of the window there. You'll see the little Q&A tab. Hit that and you'll be able to type-in your question.

I have a question from Suzanne Tegen primarily to you Jim about the domestic content and actually Greg if you're in a position to talk about this as well, what studies have been done that look at specifying the amount of domestic content we expect either in these power projects or in the industry more general?

Jim Lanard: Sure. Thanks, Ian. I'll start with that. First the domestic content will primarily be driven initially by the state policies that are going to look at whether the net economic benefits or the net benefits for a state if they were to go with offshore renewable energy.

And therefore the developers are incentivized that they want to get the revenue stream, a power purchase agreement for this offshore renewable

energy certificate from the state to show what they can develop in the state, what supply chain, what manufacturing, what economic development and what jobs will be available.

And they'll make commitments to that in these proposals to the state utility commissions that will evaluate them. Many states are going to be authorized to hire outside experts to look at these proposals—they're all new here in the United States—to determine what the likely outcome is as far as job creation and economic development.

So I don't think we're going to see any mandated domestic content initiatives but what we will see at the federal level—at the state level—it will be more an obligation of the developers to make the case for why domestic content is adequate to support the rates the rate payers are being asked to pay.

Ian Baring-Gould: Great, thank you. Greg, do you have any other follow-up on that?

Greg Matzat: No, I think Jim handled that.

Ian Baring-Gould: I do know that there are studies that DOE is conducting now that are looking at jobs and manufacturing based on different development scenarios so keep an eye out for those. A question for you Greg in regard to the shore wind project, has there been an estimated capacity factor for that project? It's really asking a lot.

Greg Matzat: So yes, with respect to offshore wind.

Ian Baring-Gould: Yes.

Greg Matzat: So with respect to offshore wind, typically you do see higher capacity factors than you do on land-based wind so if land-based wind, you know, you might see, you know, capacity factors, you know, in the 30s. Offshore wind depends on the project of course but in a lot of the areas it's in the 40s.

And for instance Statoil's demonstration project off of Norway their first high-wind project from 2009, that one has achieved capacity factors around 50% so that really helps bring down the cost of energy of these projects is being able to site them in locations with higher capacity factors.

And typically that's a reason also for looking further offshore where there's higher average wind speeds.

Jim Lanard: Ian, if I could just add one thing to what Greg said, there's another difference between land-based wind and offshore wind. Land-based wind often blows greater during the evening when demand is down for electricity.

Offshore wind is known as a load-following energy source in that the wind picks-up in the late afternoon just as peak power demands in the summertime with air conditioning and other electric uses is going up too.

So we actually have a nice energy profile with offshore wind that will help offset the wholesale electric market prices during these really peak periods because all of our wind will be bid into the grid at a zero marginal cost essentially which will lower all the wholesale prices to the rate payers in a region.

Ian Baring-Gould: Great, thank you. Another question for you Greg in regards to the DOE pilot projects. Do the grantees have stakeholder engagement plans developed and

then how are they dealing with any local opposition and this is from (Simon Mayhan).

Greg Matzat: Right, so yes, all the DOE projects have very active stakeholder engagement plans that they are working on and have been in place for awhile and DOE is working with them to help them in any way we can on those engagement plans.

So far with these particular projects, there is not a lot of I would say there's not opposition. There's more a lot of excitement about building these among stakeholders so so far, you know, the large majority for these seven projects, all of them have very positive stakeholder engagements to date.

But it's a very active part of the projects and will continue, you know, through the actual operation of the plans so it's important here not just for the stakeholder engagement to get these projects built but then so that people can see these projects in the water and see how positive they are and see what they look like and they're not something ugly on the waterfront.
And that in turn then will help shorten the—will make it easier—for future large projects to begin to be built around the country so stakeholder engagement's very important.

Ian Baring-Gould: Great, thank you Greg. Question for Jim from (Edward LeBlanc). How have European countries dealt with traditional port access routes in terms of any conflict of use issues with potential wind energy development areas?

Jim Lanard: Right, thanks (Ed) for joining the call and asking your question. The European ports are also highly used, highly trafficked and so far we've not seen any jurisdictional claims that have made it impossible for vessel traffic related to offshore wind to get out to their necessary sites.

There maybe some combinations that are necessary but there haven't been any significant traffic route claims that impinge on where the developers are putting their projects so I understand where you're coming from (Ed) and for folks who don't know (Ed), he's in the Coast Guard at a group and we're working with (Ed) and his team on this.

So I'd hope that there's some lessons learned from Europe that we can apply here in the U.S.

Ian Baring-Gould: Great, thank you Jim. That's all for the questions except one last one from (Lisa Abraham) that's pretty specific so I'm not sure if you guys will be able to answer it but she says that I believe Grand Valley State has a buoy in Lake Michigan that's recording wind data. Does anybody know whether that is the case and whether any results of that data collection have been undertaken or have been found?

Jim Lanard: Yes, so that is DOE-supported project and they have two seasons of data I believe and it's going out again this summer and I believe then at the end of that—by the end of this year then—there will be a report on the findings from that.

Ian Baring-Gould: And will that go out from Grand Valley State or is that going to be a formal DOE report?

Jim Lanard: It will be a Grand Valley State report I believe but it will also probably be able to be found on DOE.

Ian Baring-Gould: Great.

Jim Lanard: Ian, I've got a 30-second closing comment if I may to support some of the DOE comments. Is that—do we have time?

Ian Baring-Gould: Go for it.

Jim Lanard: Thanks. When I started in the offshore wind industry seven years ago, we were excited to talk about three and 3.6-megawatt turbines. As you heard from Greg today, we're looking at six-megawatt turbines with developers looking at even larger turbines down the road so we've doubled our capacity just in seven years before we even put the first steel in the water.

Similarly, we started out at $8 million fixed platform net masts to read wind speeds at hub height. We're now down to $2 million floating foundations with LIDAR reading wind speed at hub height so we've seen a really great reduction in cost just in seven years related to wind measurement and wind speeds.

And lastly when we started out, we used to joke that floating foundations for turbines was what we would call Generation 3. Here DOE is funding three different projects with floating foundations.

We're now calling them Generation 1.1 so just as the DOE has funded these seven projects, we should take their initiatives very, very seriously because already the industry by itself had driven down costs, improved efficiencies and economies.

And I think we're going to see a lot more of that and these seven projects are going to be part of the drivers to make this a very competitive industry and that's even before we get a carbon tax which I hope we all see in our lifetimes so thanks again for letting me participate today.

Ian Baring-Gould: Great, thank you Jim. One last comment from (Graham O'Hee), this is a response to the Grand Valley State. He does say that the data from those buoys are available. Grand Valley is going to have a poster at AWEA in Chicago and that either contacting (Graham Howe) or Grand Valley State, you can get that data if you need it so it is available and out there.

We've run a little late. I want to say thank you to our two speakers again Greg and Jim for joining us today and presenting the information that they did. We—upcoming events—that we have again the Webinar on May 15th, the standard Wednesday at 3:00 pm Eastern and that again is going to be Offshore Wind 101 so basic offshore wind development.

And then the Allstate summit Webcast will be held on May 9th. All of the Webinars will be posted at windpackamerica.gov and it takes us about seven days to do that so if you know of someone who would be interested in this webinar but wasn't able to attend, please point them there and they'll be able to see it.

Lastly as always special thanks to the U.S. Department of Energy Wind and Water Power Programs Office. Because of their support, we can hold this. Our three e-mail addresses there if you have any questions. I do want to say that we apologize for any problems that people were having with the audio.

I guess there is a number of people who are experiencing audio problems and we'll dive into that and see if we can figure out what the problem is and so hopefully it won't happen again. Again, thank you all for joining us today and then a special thanks to Jim and Greg for their time today. Thanks again and have a good month. We'll talk to you soon. Bye.