

## **AWEA'S SMALL WIND TURBINE MARKET REPORT**

**September 19, 2012**

Coordinator: Welcome and thank you for standing by. All participants will be in a listen-only mode for today's conference. Today's conference call is being recorded. If you have any objections you may disconnect at this time. I would like to turn the conference over to Mr. Ian Baring-Gould, Technical Director of Wind Powering America.

Ian Baring-Gould: Well, good afternoon everybody and thank you again for joining us for our monthly Wind Powering America webinar series. And this one we're focused on AWEA's 2011 Small Wind Market Report. So it should be a great presentation and catch all of us up on the activities in the small wind area.

We've got two speakers, Larry Flowers who needs no introduction but I'll give a quick one for him. He formerly - the Technical Director of Wind Powering America at NREL after long years here at NREL. He left our organization sadly and - but has been working for AWEA for the last two years I guess now, Larry, where he leads their small and distributed and community wind activities.

And then the second speaker is Heather Rhodes-Weaver who has also extensive experience in the small wind, primarily in the small wind area working primarily in wind policy and market analysis funding developments, stakeholder communications.

She is with eFormative Options which is a small company that she started not quite ten years ago that really looks at community and cooperative development for small wind working with a whole host of organizations,

Small Wind Certification Council, PNNL and Energy States Alliance. Heather also sits on a good number of Boards including DWEA.

She's a co-Chair of DWEA's state policy committee. And so is very active in the distributed wind space and has been for quite some time, even going back to her days as the sort of small wind person for AWEA.

She also has a number of awards including the Women of Wind Energies 2012 Mentor of the Year Award. And then we were happy to give her in 2006 the Small Wind Advocate of the Year Award.

So two people who have more experience combined in wind energy and most specifically in small wind than probably any other two people on the planet. So it's quite exciting to have both them giving us this overview of the small wind market.

The Q&A as we also do is going to be an online Q&A so to ask a question go up to the little Q&A bar up on the top of your screen, hit that. You can ask a question. You type in your question and then we'll address all of those at the end of the presentation that Larry and (Heather) are going to tag-team for us.

The webinars will be posted so if you want to come back and see any of this presentation or think it was very good and want to let a friend know, it takes us about a week to get them online but you'll be able to go to [WindPoweringAmerica.gov](http://WindPoweringAmerica.gov) and see the live presentation as you're about to see it now.

So without further adieu, I'm not sure exactly who is going to watch this. I think it's Larry first, but Larry and Heather.

Larry Flowers: Thanks, Ian. As far as the two most knowledgeable people on small wind on the planet, I hope Mike Bergey and (Dillan Clark) are on the phone. But thank you for that introduction and thank you folks for joining us today.

We're going to review a report that Heather and I and Ruth Baranowski put together in the early part of this year and published a one-page summary in March and then the full report in June. This report is available on AWEA.org, click on small wind and you'll see this report as well as a number of prior reports that my predecessor (unintelligible) had developed.

First of all, thanks to DOE for funding most of this work. They've been a supporter for a number of years and this goes toward their arsenal of important reports on the wind industry.

So my title is Progress Through Challenges in 2011. And that - and as you'll see from the presentation, there were a number of challenges that were both overcome and some remain. I just show this picture to show an illustration of the breadth of small wind.

These are pictures that all came out in the report, ranging anywhere from - on your far right, Skystream from southwest which 2.3 kilowatt wind turbine that is featured in Wind for Schools and a residential turbine that is also used on telecom applications.

And then in the center you see two 10-kilowatt Bergey turbines, one the capital of Oklahoma, the other one an African village on a telecom site. Then the turbines in the other areas - the north (unintelligible) 100s, up in the top left is a turbine up in New England. The bottom left is a turbine - are turbines (unintelligible) power application.

And so the idea of this collage is to show the range of applications, not the full range but it shows you the interesting range of applications and this report focuses on turbines of 100 kilowatts and below.

So here is sort of the summary slide of the presentation. Let me just walk you through these. We have 27 small wind turbine manufacturers that - from North America and Europe that actually responded to the survey. Worldwide sales of almost \$400 million, annual sales \$4 million, that's 41,000 units and about 64 megawatts.

Now let me just give you a caveat right up front, one of our challenges in trying to characterize and quantify the U.S. market is getting good information that is verifiable from our Asian importers and that's very difficult. So this is a subset of the U.S., does not include the Asian products that were imported last year because we just don't have a good system for capturing the quantity and location of those turbines.

So the second bullet point shows that from a U.S. standpoint, and U.S. manufacturers that participated, their total sales was 33 megawatts, both in the U.S. and exports, which is a 13% increase over 2010.

And as you'll see as we talk about this report, exports became a very important part of the U.S. manufacturing portfolio.

So total yields cumulative sales including imports were almost 200 megawatts this year and 151,000 units. And from an environmental standpoint, it displaces almost 180,000 metric tons of carbon dioxide.

However, going to the fourth bullet as a result of poor economy of 2011 and some inconsistent incentives with state level, national small wind market in

the U.S. declined almost 26% with about 19 megawatts of new sales representing a little bit over 7,000 turbines and \$115 million installed revenue.

So we can see that we had a decline in actual U.S. market. And as we'll see, that was more than overcome by the export strength.

Fifty-four percent of U.S. sales capacity went to overseas markets and this is (unintelligible) big increase almost more than doubling from 2010. So that was a very important part of the U.S. manufacturing portfolio last year.

(Unintelligible) national manufacturers including the foreign U.S. reported sales of exceeding 1 megawatt. So we have 11 manufacturers internationally that report to this project that have a megawatt of more - of sales of their products.

While we have a great story to tell in the U.S. for both large wind and small wind, small wind has always been dominated by U.S. manufacturers, accounting for about 80% of the U.S. share where as in the - if you look at that from a big wind standpoint, it's more in the 60% to 65%.

Sales in the U.S. were dominated by on-grid sales, 91% compared to off-grid sales. We had about 57 wind turbine models - and I'll show you how they break down in a moment, that were actually sold and installed in the U.S. last year. And the average install cost of small wind turbines actually rose a bit to about \$6,000 per kilowatt.

And those of you who are in the distributed generation market know that that's about - that's in the ballpark of what (unintelligible) is going for and so that's one of the big challenges going forward.

Okay, now I'm going to show you some of the graphics that back up the information I just told about as far as the summary. So the left-hand graphic are actually the units sold. And you can see from the last four years we actually had that declining numbers of units sold in the U.S.

But from the kilowatt standpoint it was the first year in the last seven that we actually had a drop in kilowatt sells in the U.S. to about 19,000, peaking last year at 25.6 kilowatts installed.

And as far as sales revenue is concerned - and sales revenue includes installation costs, drop of about 17% to about 11.5 - that's actually 115, watch out for those - times 10,000. (Unintelligible) did that so it's a left-hand axis so it all works out, so it's actually 115 million.

Okay, so that's the overall market picture. Let's look at the growth for the last decade and you can see we've had sort of continued growth and that - well, last year dropped down. We still have a growth. So very close to 200,000 megawatts of stored capacity around the U.S.

To break this down into the actual subsectors, we broke it into three sort of bins; less than a kilowatt, one to ten kilowatt, and the 11 to 100 kilowatt. The less than 1 kilowatt generally are off-grid turbines. And you can see the last two years sort of dropped down from a pretty leveled - the prior four years.

You can see however in the one to 10 kilowatt, that took a pretty significant hit last year. It had been growing previously for five years and then last year it dropped down.

And that's a result - and Heather will show you some of the data on states, some of the residential incentive programs around the country had fits and

starts. And that's where a lot of focus is in the residential and small wind turbine area, that one to 10 kilowatt range.

And you can see the dramatic growth in larger turbines that has occurred in the last four years was somewhat abated in 2011 and dropped pretty significantly. And again, that was somewhat caused by the state incentive programs that were influx.

If you look at that same data, remember the last one was in kilowatts, this was in units and you can see an interesting thing in the number of units. The off-grid and small turbines still sell a lot more units than the larger ones.

But - and they actually had a little bit of an increase last year whereas the number of units in both the one to 10 and the 11 to 100 kilowatt range actually decreased. And again, this is just the U.S. market.

Okay, now just take a deep breath on this one. There's a lot of information on this graphic but I wanted to put it all on the graphic because it sort of shows some trends.

Let's look at the bars first, forget the line curves, look at the bars first. The blue is the U.S. manufacturers in kilowatts. The light blue are the non-U.S. manufacturers in kilowatts.

So let's just follow that through the years. And you can see the dark blue across the years and see it drop down. Actually the dark blue which was U.S. manufacturers in kilowatts was actually below the 2009 level. And then you can see the relative portions by U.S. manufacturers and non-U.S. manufacturers.

You go to the green, the dark green are in units. Same again, dark green is U.S. manufacturers and light green are non-U.S. manufacturers. And you can see in units that the U.S. remains dominant. Now let's go to the line graphs. The blue line graph are the percentage. Go to the right axis now, the right vertical axis, that's the percentage in kilowatts that the U.S. manufacturers had.

So you can see that's declined a little bit over the last couple of years to about 80%. There was one point we were very close to 90%.

And the units, you can see, have a very steady but very slight decline. And I think we're finding here is that as the European feed in tariffs and market incentives get stronger, the European turbines are becoming more available and prevalent and higher quality. And so they're coming into the U.S. market.

Okay, so now that you've got that down as far as how to interpret these graphs, these are now the U.S. manufacturer's exports. Dark blue are - compared to domestic. Dark blue, U.S. domestic sales. And you can see as you follow that up along to 2011 how that dark blue and light blue really shift in 2011.

So that in 2011, 54% of the U.S. manufacturers output went overseas. And that - I mean (unintelligible) is units again. And you can see the units were not as significantly changed as the kilowatts.

And that's primarily because some of the larger turbines, the 50 kilowatt, the 100 kilowatt turbines had a very, very strong export percentage compared to their domestic percentage. And that's why you see the kilowatts being a greater percentage than the units.

And that's reflected in the blue line graph whereas you can see in 2011 that jumped way over the 50% mark whereas in the units it was a little bit over 40%. So that's the most complex graph we're going to see today.

We want to throw in something of the export situation because it became such a strong part of the 2011 market for U.S. manufacturers and continues as we - in 2011, it continues to show this. And we'll reveal that in next year's report.

But this is the UK small - (unintelligible) UK small wind graphic and they break theirs into a little bit different sections than we do. You see, they have 1:1 - 0:1.5. We have less than one. And then they have 1.5 to 15. We have one to ten. So you can't compare these straight out. But this shows you the tremendous growth in the UK market.

And last year, 2011, was the first year in history that UK actually had more kilowatts installed in this less than 100 kilowatt range than the U.S. And that's, you know, good news as far as the strength of the small wind international market. And it's good news for the U.S. because the incentives in the UK are strong and have been pretty consistent. And therefore, have really emboldened some of the U.S. manufacturers.

Now we can't quite say the same for - if you go to the Canadian market. While it's growing it's still quite small and that's primarily because of the lack of strong incentives in the Canadian market.

So look at the left graph first and that's in sales in tens of millions of dollars. Canadian exports to the U.S. in green you see a dropdown as well but Canadian - outside you can see that the U.S. market was a strong market.

But as we saw from the U.S. manufacturers, the export market became stronger for the Canadian manufacturers than the U.S. market did in 2011. So it's very consistent with the data that we see for the U.S. manufacturers.

If you look at the global sales of small wind products from Canadian manufacturers, you can see it is - actually grew like it did in the U.S. but by a pretty significant amount in 2011, more than we grew, both in kilowatts and in total sales. Although U.S. dropped down, and that also reflects a shift to larger turbines, that makes looking at the UK incentives.

Okay, now this is a - remember I mentioned the 57 offerings - not offerings but actually turbines that are installed in the U.S. from European, South African, Canadian, and U.S. U.S. is above that dark line and the international is below that dark line. And it's in kilowatts so you can see that the blue are off-grid, green are on-grid.

And what you've got to do is - where you see dots - like go down to New York where you see dots, blue and green dot right above each other, that'd be the same manufacturer offering a one kilowatt turbine, in both an off-grid and on-grid style.

So that shows you sort of the variety of turbine offerings, a number of - lots of turbines in the off-grid area down in that one kilowatt and below. Still a pretty good selection in the five to 10 kilowatt.

But as you get up above that you can see that there's less and less competition and we only really have one 100 kilowatt manufacturer in the U.S., that's being Northern Power, which is the leading - if you look at kilowatts sold, leading U.S. and U.S. - Europe supplier of kilowatts sold internationally.

So that's sort of the statistical part of the presentation. I want to now introduce Heather who has co-authored this report. And Heather has - as you heard Ian say, a long history looking at state incentives and state programs and so Heather, why don't you talk a little bit about the policy drivers and the growth?

Heather Rhodes-Weaver: Okay, thank you, Larry. So I'm going to start with a brand new set of maps that we just developed last week using the data from the report. And this is going to be used to help do an internal evaluation of the Wind Powering America program to look at which states have had additions over the last ten, 12 years here.

So I'm going to scroll through - you can see, obviously California was an early leader in turbines up to 100 kilowatts. Now a lot of these were put into large - sort of wind farm type applications. And the total capacity here shown doesn't reflect the entire amount of those wind farms using small turbines that since then have been - a lot of them have been removed.

If we keep going here you can see more states especially in the Upper Midwest filling in. Hawaii and Alaska also had some early small wind developments in the early part of the decade. You can see a few more states filling in here, Maine and Iowa's getting filled in darker.

Some states like Minnesota seeing a lot of development. And Washington State, my home State back in - see, that was 2003 and 2004, we started seeing more diversity of states getting some - Montana kicking in here with some extra market development. And especially the Upper Midwest, it stayed really strong with Minnesota and Michigan.

Here we see New York, some of their incentives coming into play. Kansas, interestingly, has gotten some good small turbines installed. Texas has become quite a big player even without direct rebate programs but is kind of the spillover effect from the renewable portfolio standard and people seeing those big wind farms and wanting to have some - you know, their own wind turbine in their own backyard.

And Wyoming is kicking in here. We're starting to see quite a few of those small turbines on ranches there. And you can see there's this back - I skipped over 2009, some notable developments there. Again, in Wisconsin and Massachusetts, some significant capacity.

And then in 2010 we started seeing several states with pretty substantial installations and this was some of the stimulus funding that was being given out, like, in Ohio and Wyoming especially. And then in Iowa, a lot of those were the Farmville funded installations.

And then here, last year, we see - again, California's still by far the largest market. Ohio, Alaska are coming in next. And Ohio, Wisconsin, Texas - and then another - if you look over here at Nevada, let's see if I can get my pointer, there we go. They had a huge growth in - that didn't work. What am I doing wrong here? I shouldn't have tried to use that fancy tool.

Okay, there we go. So they actually had almost 5 megawatts worth of small turbines put in in Nevada in 2011. Now several of those are refurbished turbines so my total is slightly higher than what Larry shows for the AWEA total tracking new sales. So that was kind of an exciting way to look through the history there.

Now this chart shows on a unit basis, so this helps to highlight some states where - like Arizona and Wyoming where they may not have as much capacity but they have a lower average kilowatt per unit, quite a lot of the Skystreams for example going in there.

So you can see there, Arizona's number two in terms of the total number of units. And these are - this is a subset of the total I just showed you. This is actually just turbines that have received either state, local, or federal funding assistance.

So this does not actually include - if people have taken just the federal tax credit, we don't have a way to track that. But if they've gotten a 1603 grant or USDA grant or any of the state programs we've been able to track them. And this represents a pretty high percentage of the megawatts but only about 10% of the actual units that have been installed.

So that in 2011, there was close to 700 small wind turbines that got incentives of these categories. And of that total, about 19 megawatts.

So looking a little bit closer at the federal programs, this shows the breakdown of states. And this totaled about 200 of the turbines of the 700 I just mentioned. And about 6 megawatts across 30 states. So you see Iowa, Ohio, Massachusetts, Wisconsin got - these selected states we pulled out here got over three-fourths of the \$12 million from these two programs.

Now this - especially the 1603 program was actually probably three-fourths of this money. The (REAP) program has been tapering off for small wind in particular. So it was sort of a bigger part of the picture in 2010 but in 2011 had less effect on the market. And of course the 1603 program ended last year.

So - however, this was only about 3% of the market, the 1603 program, compared to closer to 15% of the solar market. So I think we're going to see less of an impact of that program going away.

And this actually shows just the USDA installations going back to 2003 when that program started. You can see a concentration there, especially in Iowa and Minnesota. But a nice spread of several other states as well that have benefited from that program.

So I think that in 2012, as I mentioned, the small wind has decreased from a high of probably in about 2010. So in 2012, small wind only got 2% of the grants, only seven of the awards down from 81 of the awards in 2010.

There have been some extra environmental screening criteria put on these projects and so some of the state offices have been really sort of shying away from the projects. And a lot of the applications going in have not been selected for awards, whether it's a scoring issue or - you know, exactly what's going on that unfortunately this program is starting to see some scaling back.

This is also not great news. If you look at the hash marks in the lower left corner, everything left to right has been scaled back either curtailed or suspended in the past year or so. Including key markets like California and New Jersey that had previously a strong incentive program that was put on hold.

And then the hash marks going up and down are states that actually have incentive programs on the books like Montana and Oklahoma for example, but their programs did not actually fund any small wind turbines in 2011.

So either those rebates went to solar or some other technology or perhaps their funding was just all spent and they didn't have any allocations to give out.

But you - if you kind of compare this map to the earlier ones you can see that certainly the states that have yellow and purple, a combination of policies, tend to do the best.

And then, you know, obviously state rebates have been very helpful. We are seeing a lot of states moving into the performance based incentives, whether that's sort of a predicted payment scale to your wind resource or a payment for production.

And then the tax credits do help provide some support but usually that's not a key driver.

And I wanted to show, for example - one example in particular, so this is a preview of a new design that we're attaching to the policy tool that will help with some of the user interface issues.

If you haven't gone in there it's [WindPolicyTool.org](http://WindPolicyTool.org). You can use it to really examine some of the policies in more detail for each state. So here was Hawaii is a good example of the retail rate being the highest in the country.

So looking at their - just the default, having a fairly decent rate of return for a residential scale wind turbine.

So - one last - just a shift a bit - in the market report we did also look at the mid-sized market, which we defined as turbines up to 1 megawatt above 100 kilowatts. And this looks kind of like a busy patchwork quilt but what you can

see here is clearly Minnesota has had quite a few turbines in that size range due to some of their strong community wind policies.

California and Iowa as well, but each year you see kind of a surge in different states. So there's no clear trend for one year to the next of which state has seen the most growth but overall it's an exciting sector of the market that I think we'll want to keep a closer eye on in the future.

So with that I'll turn it back to Larry to cover the rest of the report.

Larry Flowers: Thanks, Heather. The next two slides are sort of a summary of - rather than having the quantitative, more of the qualitative aspects of the report and what were some of the key developments that occurred. And then we'll end with some of the challenges going forward.

So the key market developments in 2011, as we mentioned, the economy was sluggish, that certainly affected the residential market which was in that less than 10 kilowatt size range.

However, in the - in 2011 because of a strong ag economy in the U.S. and grain prices at an all time high, farmers had money in their pockets and that's when they go out and buy their (unintelligible) and goods. So that greater than 10 megawatt, the 50 - 20 and 50 kilowatts and some 100 kilowatt turbines, that part of the market remained strong. We're going to see that changing I believe in 2012.

As we mentioned, dramatic shift in the U.S. manufacturer's perspective to exports. Many of them opened offices in Europe to really service that market. As (Heather) indicated, these (unintelligible) the markets are very important. While we had the 30% ITC it's really important that the states have good

incentive markets and these particular states, California, Jersey, Wisconsin, Ohio, Nevada, which are strong incentive states historically.

We're in turmoil for a variety of reasons, some of them budget caused, some of them program caused, some of them product performance caused. And the small wind industry has had a stellar performance in working hard with the legislatures and regulators and in state advocates to get those state incentive programs back on track.

Of course, we compete with (unintelligible) in many cases for the residential market and there's many states that have very good solar incentives. We - either solar reqs or solar set asides that make it very difficult to compete when the state incentive programs for wind are being affected like they were in 2011.

We did see some state policies that we think are very promising or proving that way, the virtual net metering approach in some of the state in New England where you can actually move the turbine to a good wind resource away from the neighborhood. Sometimes enlarge it so several meters can be combined so you get the economies of scale of a larger turbine.

You also in states - either have installed (unintelligible) tariffs or (unintelligible) tariffs. Of course, the feed-in tariff is what is really pushing the UK market very strongly and it's one that is being discussed in a number of states.

So those are policies to keep your eye on and to support in the state that you're in.

One of the big steps forward is in the small wind certification council. We've had the first two turbine models certified in 2011 and there are a whole variety, 26 that were in some stage of testing and certification.

And this is something that my (unintelligible) colleague, (Trudy Foresight) was very active in and has been a real development that has - we believe is going to solve some of these product performance - or reliability issues that really cause some problems in California and New Jersey and some other states that put the incentives and then did - had some very serious reliability issues.

So as we go forward this is an important piece of a puzzle that if small wind turbine manufacturers want to take advantage of state funds they're going to need to get certified through (Inter Tech) or (unintelligible). Thanks to DOE and NREL there now are four regional testing facilities that feed into this certification process.

We have adequate facilities out there for turbines to be certified. The - as part of - sort of related to that, the interstate turbine advisory council was formed to look at incentive guidelines as well as some of the problems in turbine performance. And they now have a list of qualified turbines and are going to be - this is going to be expanded as SWCC and (Inter Tech) certification works through these 26 turbines and new ones coming in regularly.

As we mentioned the average installed cost of a small wind turbine went up to \$6,000 a kilowatt, an increase.

We're seeing increases over the last three or four years as PV has come down so that we're pretty much - we're pretty close to being at par from a kilowatt installed but you've got to take into consideration capacity factor, the wind

resource, solar resource when you're making the actual cost per kilowatt hour calculation, which is the - obviously the most important aspect. So in good windy regimes, wind is still the lower cost option.

Jobs are, of course, on everybody's mind. We estimated through our interviews with industry leaders and industry manufacturing groups that the small wind industry supports about 1600 full-time equivalent jobs.

Now Suzanne Tegen and her colleagues at NREL have - are in the process of developing a small wind module for the JEDI model to characterize the economic development impacts, jobs, income, taxes, and other indirect and induced impacts of installing wind turbines in the U.S.

And that will be a nice addition in 2012 of having a good quantitative tool to evaluate this important aspect of the wind industry.

And I mentioned earlier, that the U.S. maintains a dominant position as far as in the U.S. industry as far as manufacturing. So what are the challenges going forward? And these challenges came out of a series of interview I made with eight of the leading small wind manufacturers and developers in the U.S. And this was sort of their opinions, which you'll see reflected in some of my other comments.

We always hear, big and small industry, we really need to have consistent incentive and policy. Without that, it's a very erratic marketplace.

To the attribute of the small wind industry, they've been fairly flexible and be able advantage of the international market, which has kept them growing. But we really need to get these incentives at the state level in place for longer period of time so we have clear signals to the market.

The - I mentioned how important the SWCC certification process is. We still have turbine entrants that were non-certified and had some real performance problems. And, you know, a bad turbine can really sour a market.

I worked in Alaska for a number of years and there were turbines put in in Alaska back in the 80s, early 80s, that soured that market for almost 20 years. So it's really important that we really look at quality and performance and reliability in our turbines and be very cautious about new unproven turbines who don't have a third party testing and verification.

(Unintelligible) planning and zoning continues to be a challenge. You know, we put these turbines in people's backyards and it's really important to have quality ordinances. The small wind industry will tell you that the developers - and the manufactures will tell you that they would rather have a good planning and zoning ordinance than have no ordinance at all.

If you have no ordinance then you have no basic rules or guidance for the officials to make a decision yea or nay. And they just have to listen to the neighbors and the community argue about that - you know, how high it should be, how far it should be set back from roads and property lines, what the sound should be - sound level should be and how it should be measured and so forth.

So it's very important that we have good planning and zoning ordinances. DWEA's come out with a model ordinance with (unintelligible) and a lot of his installers have put together. It's on the DWEA's website.

AWEA put together - or at least went and looked a whole variety of municipal and county ordinances. It's on the AWEA website. You know, just to lay out what's out there.

And we saw a huge variation in these ordinances and it's going to be up to us in the industry to work with our local planning and zoning officials to make sure these ordinances are reasonable, both from the installer's standpoint as well as for the safety of the folks that are in proximity to the wind turbines.

Solar, next bullet, solar is a really tough competitor. Their economics have gotten down there. They have policies.

They've worked hard and (Stacy) (unintelligible) is their solar specific - and of course, our goal is to broaden those solar specific policies to make them distributed generation and allow the customer to choose which three generation renewable resource he wants to tap and not have the states picking and choosing winners and losers.

Financing, solar also - because it's a proven product and it doesn't vary - varies proportional to the solar radiation, not as a cube of the velocity as in the case of wind. Wind's much harder to predict what its performance is going to be without doing measurements and measurements are normally too expensive as far as anemometer for small wind turbines.

So you're going to use wind maps and the process has actually improved quite dramatically as exhibited in the Wisconsin conference this summer. We've really gotten down now with some good wind maps and some good tools, be able to predict the reasonable performance.

The PVs still kind of (unintelligible) there and the reliability record is such that they get third-party financing that we - that small industry hasn't been able to access at this point.

So there's also an advantage there for the (unintelligible) industry that small industry has to overcome.

Utility resistance, we continue to get concerns from utilities about putting turbines on their system and - now this is the - I don't want to whitewash this because there are utilities that have very aggressive policies and their connection, procedures and processes.

But there's a lot of utilities (unintelligible) America that we have a real challenge of having to interconnect to the distribution line even though there are standards that exist.

Next (unintelligible) performance prediction is a challenge for the installers to be able to come up with reasonable economics for the owner. We've - there's been some new tools introduced to the marketplace that look very promising and we recommend that folks look into some of those tools. There's some - also some thermoses that some companies provide to give you good, local site resource and performance predictions at a cost.

The REAP program, USDA REAP program that was part of the energy title of a farm bill, which was a very strong incentive for a number of years, was dramatically reduced last and while wind got a pretty significant percentage of the awards in the early days, has dropped dramatically.

And right now it's under severe attack in the House and there's been some great work done by ELPC and (Andy Olson) and leadership. So at least get

that restored to some reasonable level, that's a 25% grant as well as some low-cost loans.

Fish and Wildlife Service guidelines, this is something that's worked on for three years by a broad set of stakeholders and the guidelines came out this year. And we are looking for a categorical exclusion for single turbine applications, especially small wind. We didn't get that.

But we did get language in the guidelines saying the design for utility scale wind turbines and small scale turbines need to be evaluated but probably would only require a Tier 1 analysis, which would be sort of a low-cost risk analysis.

So we still have work to do there. There's a bunch of training going on now in the field for the fish and Wildlife Service that they know how to apply those guidelines because oftentimes in small wind we get lumped in with large wind even though we have a very different impact and has to be evaluated differently.

Then lastly, with the economy being so difficult and so - on everybody's mind, you know, the focus on energy environment that existed four years ago, some had been lost by the public and so this is not - has not been on our top priority.

So the small wind industry is facing a lot of challenges and it is to their credit that they're still growing. They are a committed group of folks who have good products as well as hard to make this something long term that is a very significant part of the future of wind industry in the U.S. and abroad.

So with that I'll end and there are two websites, Heather's at the (unintelligible) Options.com and do check out AWEA.org website. We have a new community wind section on it. Community wind, of course, is locally owned. Distributed wind and small wind is locally owned so as far as some of that - same umbrella.

So with that, Ian, why don't you facilitate the Q&A.

Ian Baring-Gould: Great, thank you, both of you for giving that overview. Just let folks know, again, the full report which runs about - I guess it's 55 pages, can be found on AWEA's website. There's a hard link available in the announcement for this webinar but you can also just go to AWEA's website and look at the whole document.

So thank you two again for the presentations. We've got a few questions and other people who have questions please don't hesitate. Again, go up to the Q&A at the top of your screen, right above the A in AWEA, and hit the Q&A - and you'll pull up a little window and you can type in your question there.

We'll start off with the first one we see and, Larry addressed this a little bit at the end of the conversation but (John Raycraft)'s question is, is there a recognized authority which compares small wind turbines? So Larry, do you want to tackle that one?

Larry Flowers: Yes, as I mentioned, the four test centers that are set up by DOE are doing a uniform set of testing, power curve, endurance, sound, and so forth. And then SWCC is going to set up to evaluate this data and then certify.

Now (Inter Tech) is a private company up in New York that actually does certify according to the AWEA standards. So this is a very important issue is

to get third-party test data and performance data before you select a turbine. And if a supplier doesn't have that I think you better look carefully at the data.

Ian Baring-Gould: And to sort of follow up a little bit, there really is not an authority which does comparisons of different wind turbines. You can go to the (ASWCC) and download the reports of the turbines that they have tested, but as Larry has indicated, only two have been tested thus far.

And so within a few years we expect that we'll have a whole bunch of turbines that have gone through that process in which case you can go and (ASWCC) won't compare the turbines but at least you can get information on the turbines from a basic baseline of systematic testing.

Heather Rhodes-Weaver: And actually...

Larry Flowers: Let me add to that, Ian, there's actually - as of 2011, as of 2012 there are additional turbines that have been tested now. And they're tested to a particular set of standards and therefore you can look across those tests to see how they perform.

In addition, Home Power magazine from time to time comes out with some comparative information on a lot of different turbines as far as, you know, size, cost, some of the non-testing aspects, power, heights, and so forth. And so if you're interested in comparing turbines, that's another source, Home Power Magazine has more of sort of the qualitative aspects of a number of small wind turbines.

I think Heather has a point too.

Heather Rhodes-Weaver: Thanks, actually - so there's five turbines now in the U.S. that have their power curve tests released, three on the SWCC website and two on the (Inter Tech) website. And then there's another five or six turbines that have been certified in the UK that their test reports are posted on the SWCC website with conditional certification.

So you can compare the test results through that website. Also Page 20 to 21 of the report that we've been talking about does go into a little more detail on the turbines at least that reported sales.

And on the WindPolicyTool.org website, you can look at the different tower heights for a selected batch of turbines that - and see how they perform in different states. So you can actually use that tool to compare turbines on the economic side to see their performance.

Ian Baring-Gould: Great, a quick follow on question from (Harris Rowan). Do you have a list available of small wind manufacturers? And I know at the end of the report you list all of the companies that took part in providing data and I know AWEA includes a list of small wind manufacturers. But is there a holistic list of small wind manufacturers anywhere?

Larry Flowers: I don't know about holistic, Ian. The 27 that are listed in the back of our report, both U.S. and domestic, are the ones that we - that through our interviews, including Heather's digging into the state data, are the ones that are actually showing - the ones that are actually being supplied in the U.S.

But you got to keep tuned to this. I mean this is something that's a moving target. There are - you know, turbine manufacturers, some of the new entrants have changed names and changed brands and dropped and added turbines. So you got to keep tuned in to these product offerings.

Ian Baring-Gould: Okay, Heather, do you have a comment on that?

Heather Rhodes-Weaver: Well, I didn't clear this with Larry but there is a website out there that has captured more than, you know, 600 different turbine models. It's called AllSmallWindTurbines.com. Sometimes I look at that just to - you know, make sure that I'm not missing anything.

You can click on their links to go to the manufacturer's sites. So that would include everything from - you know, ones that are maybe in the early R&D stages to kind of - quite a - you know, it's a very dynamic batch of companies that a number of - even the companies that we collected data from last year has changed hands or has closed their doors.

So I think - you know, that's something to keep in mind but - I would say if you look at the SWCC website, that gives you a pretty good handle on - between SWCC, (Inter Tech) and the Interstate Turbine Advisory Council, those would be the primary market players.

Ian Baring-Gould: Great, thank you. Question - got two more questions here that we'll go through quick. I know we've hit our hour mark. From (Jay) (unintelligible), we've seen a lot of vertical axis wind turbines in recent years and I think that's dropped off in the last year or so.

But could either one of you comment on the - any impact that we see in the small wind market driven by vertical axis wind turbines?

Larry Flowers: Yes, a couple of the 27 do provide small vertical axis wind turbines. It's not a very large portion of the market but there are certain offerings and they are included in this report.

I didn't break them out as vertical axis but, (Jay) if that's important to you and your work, just send me an email and I can - I'll break it out for you as to what - who the small wind turbine manufacturers were that provided vertical axis turbines and what the total vertical axis supply was in the U.S.

I looked at the data also in UK and it's actually a - pretty dramatically declining portion of the UK market.

Heather Rhodes-Weaver: So the impact I would see from a policy viewpoint is that because a lot of these turbines are installed at, you know, the rooftop level where there isn't very much wind, it's actually driving a lot of the policies away from upfront rebates to more performance-based programs which, you know, makes it more difficult for financing of small wind.

But I think some of the incentive programs are seeing that they really want to have a performance of the machines, not just having, you know, an architectural, you know, green marketing type of thing, but be really clear that they're trying to drive projects that are installed in good sites. So that's the impact I'm seeing from these turbines getting out there.

Larry Flowers: That's an excellent point, Heather. You know, you could have a wind turbine that's certified and reliable and it's been in the market for 20 years but you put it in a bad site it's not going to generate many kilowatt hours. And most of the incentive programs are about affecting the environment and that's in energy generated, not in installed capacity. So that's a very good point, Heather.

Ian Baring-Gould: Great, thank you both. One last question, from (Salvador Ramon), any reason why we're seeing price increases? And could you comment on what the main factors of those price increases are?

Larry Flowers: Yes, I think the main factors - you know, is cost of materials. The leading suppliers are generally using permanent magnets which have gone up some 600% and continue to be very high, that's a significant cost item for a number of the manufacturers. So cost of materials has certainly been, I think, the main driver.

We still don't have the volume we really need to get to a large - or the financing to get the really large volumes. So we still have some - sort of fundamentals that we need to improve to drive these costs down.

I might say this, that DOE just recently announced, just in the last couple weeks through NREL, an (RND) RFP to lower the cost of small wind turbines and improve the manufacturing processes as well as to add to the certification of these turbines.

So thanks to DOE to recognizing this issue of economics and helping small wind industry out improving its products.

Heather Rhodes-Weaver: I'll just add to that, I think also the soft costs have certainly not been going down. We're seeing, you know, increased permitting challenges in a lot of states.

I will mention that DWEA Distributed Wind Energy Association has a planning and zoning committee that Larry mentioned earlier is really tasked with working on trying to improve that situation. And there's an effort also to expand the model zoning ordinance to cover mid-sized turbines as well.

So I think that that kind of activity is really critical for helping to bring the costs down, both on permitting and interconnections.

And I wanted to make one more comment, if you don't mind, when I mentioned earlier the new maps that I showed with the state breakout, I wanted to point out.

So on Figure 15 - Figure 14 in the report, that data was only a subset of what I showed today so that only covered about 60 megawatts where I showed closer to 200 megawatts. And I did get some additional data to help prepare that - those maps through DWEA.

So I just want to correct when I said earlier that we use data from the report for those maps. We certainly built from it but we've added to it as well.

Ian Baring-Gould: Great, thank you. And that concludes the questions that we had. So once again, just love to thank Larry and Heather for agreeing to come and present the market report, very great information. Again, the report itself is available from AWEA's website and certainly worth checking out if you're interested in this.

The upcoming webinars that we have, the next month on the 17th is going to be on social acceptance of wind energy, updating a couple of recent studies that have had happened as well as some international work that we're doing.

And then as we have done over the last number of years in the fall, we're going to do another offshore wind energy update following the AWEA's offshore wind conference that's happening next month.

So in November it's going to be an offshore wind update. Again, the webinars are posted on [WindPoweringAmerica.gov](http://WindPoweringAmerica.gov)'s website and so please check in

there and let folks know if they did not make it to this webinar that those will be available.

Again, as always, thanks to the Department of Energy that funds Wind Powering America as well as funds these webinar series. And then we have a list of contact information here and one last little note, we are sorry to see Charles Newcomb leave NREL and go back to the private sector, again, into the small wind industry which is a fabulous step for him.

But (unintelligible) who's certainly a long-term friend of Wind Powering America and has been involved in our activities for the last ten years is taking over Charles' role in the organization. So if you have any questions or comments or ideas for future webinars, please do not hesitate to contact any one of us.

Thanks again for your time today and we'll look forward to seeing you next month. Thanks again and have a great day.

Heather Rhodes-Weaver: Thanks, Ian.

Larry Flowers: Thanks, Ian.

Woman: (Unintelligible), yes, sorry. How many personal days did you earn for every business - every biz day?

END