

WEBCAST ADDRESSING 2008 WIND TECHNOLOGIES MARKET REPORT

July 30, 2009

Coordinator: Good morning and thank you for standing by. All lines will be in a listen-only mode until the question and answer session. To ask a question please press star 1. Today's conference is being recorded. If anyone has any objections you may disconnect at this time.

Now I'll turn the meeting over to your host for today, Mr. Larry Flowers. Sir, you may begin.

Larry Flowers: Well thank you and welcome to the second annual Webinar on this very important topic of U.S. wind power market. As many of you know Lawrence Berkeley Laboratory does a lot of really good analysis in wind in particular.

And this particular report, I believe this is the third year that Ryan and Mark have done this. And it's just a wealth of great information on actual economics and market dynamics. And I use it often in my presentations around the country to depict what really is going on in the marketplace.

There's lots of speculation and there's lots of hand waving. But this is the document that we refer to and use as sort of the Bible of statistics when it comes to wind energy.

So with that let me introduce Ryan Wiser. And we're going to hold questions. I mean you can write them down, but we're going to hold questions until Ryan finishes his presentation and then we'll address them one by one. So with that, Ryan, how about it?

Ryan Wiser: Great. Thanks, Larry and hi all. It's a pleasure to be able to speak with you today. As Larry mentioned really the purpose of my talk this afternoon is to provide a reasonably quick overview of the third annual edition of the U.S. Department of Energy's Wind Technologies Market Report.

This is a report that came out finally a couple of weeks ago. And while the report was re-titled this year, otherwise it has a very similar structure and relatively similar content as in past years and still provides a pretty comprehensive summary as Larry mentioned as a key trend in the U.S. wind power sector.

So as noted on this next slide the topic here covers historical trends in the wind sector, but with a particular focus on the year 2008.

And our goal in producing this annual report is really to build on the very solid effort developed by the American Wind Energy Association and collecting and disseminating wind data to external stakeholders and then to extend that work in several new directions that AWEA does not otherwise cover.

And ultimately again to provide wind industry stakeholders with a pretty data-rich and reasonably comprehensive summary as some of the key trends in the wind industry with some particular focus on wind project cost and performance trends.

Now as you can all imagine producing a report of this nature does take a lot of time. So I would be remiss if I didn't acknowledge the very significant contributions of my colleagues, Mark Bolinger at LBL and many others at LBL as well.

And also my colleagues at the National Renewables Lab at the Department of Energy and the American Wind Energy Association and in addition Exeter Associates all of whom have provided critical input into this document.

So thanks to all of you who might be on the line that fit that category. I certainly appreciate it. So the contents and trends that are covered in the report and also those that I will be touching on today are pretty broad and they're summarized in this slide.

As I mentioned a moment ago building on AWEA's efforts we do present data on installation and industry-related trends. And we then focus quite a lot of attention on wind power price, project cost, urban transaction price and wind project performance trends and then we conclude with the discussion of policy and market drivers as well as the summary of the future outlook for the industry.

I'm going to be quickly covering virtually all of the topics identified here except that in the interest of time I'm going to skip over a number of important topics that but that - one's that again I will not cover today, but that are in the report.

And those are issues of transmission, integration and O&M costs, surely all important topics, but ones that I've opted to allow you to read the reports to absorb rather than hitting you over the head with even more slides than I already have.

So again my aim today is to quickly go through a large number of slides, 42 slides to be exact in order to highlight some of the key findings of the report

and also provide some of the context for three basic themes that emerged from the work.

And those themes are pretty simple and are listed on this slide. First that notwithstanding the rather difficult climate here in the year 2009, the wind industry is growing and maturing at a rapid pace. Secondly that that growth is largely the result of the fact that wind in recent years has been quite competitive with conventional sources of power.

But third recent increases in wind power prices as well as very significant corresponding drop in wholesale power prices may place at some risk continued growth in the industry.

Now for most of you that are on this call many of those basic themes are probably somewhat self-evident. If you're within the wind sector, none of those three themes will be particularly surprising.

But what's really interesting and I think useful about the report and the slides as I'll be going through today is that it tries to prove those points with actual data where possible. So that's really what this presentation and the report is all about.

So starting with the first of those basic themes and with installation-based trends, again, it doesn't take a whole lot of insight to realize that the wind industry in the U.S. is growing and maturing at a rapid pace.

In fact in the year 2008 - the year 2008 was the largest on record for wind capacity additions in the U.S. We shattered the previous record set in 2007, 8-1/2 gigawatts of new additions, \$16 billion roughly in new investments.

The American Wind Energy Association recently announced that roughly 4 gigawatts of additional wind capacity has already come online in 2009. So 2009 will surely exceed 2007 in total wind capacity additions, though it seems somewhat likely that we'll meet the 2008 rate of installations, a point to which I will return a little bit later in this presentation.

Now maybe more impressively than those aggregate capacity numbers, wind power did represent 42% of all the new electric capacity additions added in the U.S. in the year 2008. That 42% is up from 37 - 35% rather in 2007, 18% in 2006, 12% in 2005 and below 4% or 4% or below in previous years.

So in 2008 and for the fourth straight year wind was the second largest source of new electric capacity additions in the U.S., a bit behind natural gas, but well ahead of every other source including coal. So a significant contributor to the U.S. generation mix on an incremental going forward basis.

As a result of that phenomenal growth, U.S. has now led the world in annual wind capacity additions for four years running. And in 2008 the U.S. also surpassed Germany for the first time in many, many years to take the lead in cumulative wind capacity also.

As presented on this slide, the U.S. wind market represented about 30% of the worldwide wind capacity additions that came online in the year 2008 and about 21% of all of the wind capacity that's currently in existence worldwide as located here in the U.S.

So clearly the U.S. market is in the lead on a global basis and really only to be rivaled in the very near future it seems by China. China may well beat out the U.S. in terms of annual capacity additions here in the year 2009.

And by no means are we the limits of what's possible in terms of growth in the wind sector. This slide shows the proportion of electricity supply in these various countries that come from wind. We can see it in the U.S. The wind capacity that was installed at the end of the year 2008 can meet about 1.9% of the nation's electricity supply.

That proportion compares, you know, favorably to a number of countries, but is certainly well below the 20% being in Denmark, the around 12% seen in Spain and Portugal, 9% in Ireland and a bit over 7% in Germany. So the U.S. has long ways to go and a lot of market potential to exhaust to get to the market leaders in terms of wind as a proportion of electricity supply.

Focusing now on the location of wind projects in the U.S., we do see a pretty broad geographic spread in development activity with the exception really of the southeastern United States. We can see that in this particular slide.

And you can see on this next slide that, not surprisingly, Texas continues to lead the way and lead the way by a wide margin in terms of annual capacity additions, a trend that, you know, AWEA just reported has continued through the first half of the year 2009.

That said there are now 13 states with more than 500 megawatts of wind capacity or that have more than 500 megawatts at the end of 2008 rather. And rather impressively six of those states have in-state wind generation that exceeds 5% of in-state electricity generation in those individual states.

And the two leading states, that's Iowa and Minnesota, are now achieving wind power penetration percentages of 13% and 10% respectively. So we now have some states that are above 10% within relative to their total generation mix, a rather significant achievement in the year 2008.

Moreover if you look at as individual utility, as you move from states individual utility you can see that an increasing number of utilities are achieving even higher levels of wind penetration than on a state-wide basis as I just showed.

In a number of cases, six cases to be exact, utilities are achieving over 10% of their electricity supply from long-term contracted wind power. And in two instances utilities are exceeding 20%. So again on a utility by utility basis wind is now representing a significant proportion of some utilities electricity sales.

Moving from project installation trends to broader industry trends, we also see quite a lot of evidence of a changing and maturing wind sector. GE of course is shown on this slide maintained at the position as the leading wind turban supplier in the U.S. market in the year 2008.

But one of the really interesting trends that we see here is a growing number of suppliers competing in the U.S. market and gaining market share on the GEs and Vestis of the world.

So you can see in 2008 we have a much more diverse mix of wind turban suppliers than we have had in previous years. Moreover the growing demand for wind in the U.S. through 2008 and just in the last couple of years really has led to a sizable expansion of domestic manufacturing and assembly of wind turbans and components.

These are data that have been compiled collaboratively by the National Renewable Energy Lab and the American Wind Energy Association. And that shows on this map the number of facilities that exist in the U.S. to

manufacture wind turbine components and assemble turbines themselves as well as the new facilities that were opened in 2008.

And just as one indication of the growth in wind turbine manufacturing, in the year 2004 we only really had one well-known wind turbine vendor in GE that was assembling the cells in the U.S. market.

In the year 2008 we had eight such vendors, GE, Gamesa, Clipper, Acciona and CTC Dewind. So certainly a sizable growth in terms of domestic and international participation in the U.S. wind turbine market just over the last several years.

Let's see here. So turning to the next slide, perhaps not surprisingly wind turbines did continue their increase in average turbine level size in the year 2008, though I might note that that upward increase was rather modest, an increase just from 1.65 megawatts on average to a size of 1.67 megawatts on average.

So relatively little change over the last couple of years. But certainly if you look back in time to the timeframe of 1998 to 1999 we see more than a doubling in terms of the average size of a wind turbine installed in the U.S. market.

Similarly we've also seen an increasing trend among wind project size, a rather dramatic upscaling in the average size in wind projects from the 1998 to 1999 timeframe through to the present.

You can see that that trend reversed itself a little bit from 2007 to 2008. The average project size in 2008 was about 80 megawatts below the roughly 120

megawatts we saw in the year 2007. But still the long-term trend here is reasonably clear and towards larger project sizes over time.

Now the growth and maturity in the wind sector is not only demonstrated by capacity additions and by wind turbine manufacturing trends. It's also I think can be seen at some degree in trends in wind project ownership and power sales.

So in this slide we see that local electric utilities have gained increasing interest or have had an increasing interest over time in owning wind assets. The pie chart on the right-hand side of this slide for example shows that in the year 2008 roughly 20% of all of the new wind capacity added in the U.S. was owned by a local electric utility.

Most of those investor-owned utilities or IOUs, a smaller fraction being publicly-owned utilities or POUs, is about 20% of the capacity installed in the year 2008 was owned directly by a local electric utility, a percentage of increase somewhat over time as you can see in the area chart to the left-hand side of the figure.

Still independent, private ownership is the dominant mode of ownership in the U.S. market, but again an increasing trend towards utility ownership over the period of time that we looked at.

On this next slide meanwhile we see that in addition to now being major players in owning wind projects, electric utilities certainly have continued to play their historical role as being major purchasers of wind power from independent developers typically under long-term contract.

You can see that IOUs under long-term contract purchased roughly 33% of the new wind generation from capacity that came online in the year 2008. Another 17% of that wind capacity is selling to POUs, publicly owned utilities, under long-term contract. That represents the largest share in terms of power (off-take) arrangements.

That said though, 2008 was really interesting in that an incredible 43% of all of the wind capacity additions were at least initially selling on a quasi-merchant basis, that is not under long-term contract, but with some level of wholesale market risk by selling into shorter-term market.

So that's a trend as I'll mention later. It seems very likely to reverse itself here in the year 2009 due to the much lower natural gas prices that we're experiencing this year and the impact of those lower natural gas prices on wholesale market prices. I'll turn back to that a little later, but pretty amazing development in 2008 with that much merchant capacity being brought online.

So in addition to now having a wind industry that's very rapidly matured in both its scale and in its sophistication as I've just shown, it's also I think fair to say that public policy is now more favorable towards wind than really at time over the past decade or so.

I'm not going to go through the full list of policy activity that's occurred over the last year, year and a half and certainly there are still a large number of policy asks that are high on the priority list and high on the agenda of wind industry stakeholders.

But with the extension of the PTC through the year 2012 and with the various provisions in the economic stimulus package from earlier this year, combine those at the federal level with still growing movement towards state-level RPS

programs and again wind industry is seemingly rather well-positioned for continued growth in the years ahead.

And as a result of that an absolutely enormous amount of additional wind capacity is currently in the development pipeline in the U.S. In particular we reviewed 12 wind-relevant transmission interconnection queues around the nation, basically those transmission interconnection queues that cover geographic regions in which wind development is likely to occur.

And while I should be very clear that many, in fact probably most of the projects in those queues are rather speculative and therefore that a large number of those projects may never occur or may never be built by the current owners of those projects.

We nevertheless found nearly 300 gigawatts of wind had applied for interconnection in the U.S. as of the end of 2008. Now that 300 gigawatts is roughly twice as much as the second largest resource, natural gas, and that 300 gigawatts is just about spot on in terms of what would be required for the U.S. to achieve 20% of its electricity from wind by the year 2030.

So, again, not all of these projects will come online. Indeed a large majority of them may never come online, but still demonstration of very significant development activity in the U.S. market.

Despite all of those positive signals though let me not overstate the case, 2009 is expected by just about everyone in the industry to be a relatively slow year.

Now again with AWEA already reporting 4000 megawatts of wind already installed through the first half of 2009 surely some of the more dire

predictions presented on this slide, specifically those from the Energy Information Administration will not come through.

We will get beyond 4500 megawatts. I'm quite confident that we can get an additional 500 megawatts in the remaining six months of the year. But nonetheless we are looking at a potentially significant slowdown in the year 2009 compared to the year 2008 as shown on this particular slide and by a number of different market prognosticators.

And that slowdown is being caused by three reasonably strong headwinds that the wind sector is facing. First of course and perhaps most obviously the economic crisis has made project financing more difficult and more expensive.

And while the economic stimulus bill that passed earlier this year will certainly help in that regard, it won't help immediately. It's taking a while and will take a little bit longer to implement that bill completely.

And so there is going to be a lag in the ability of federal legislative action to solve the economic crisis-related effects that have been impacting the wind industry.

Second of course wind expansion is increasingly constrained by the need for new transmission investment. And though it's certainly true that state and federal efforts are on the right track, they're beginning to focus on this particular issue.

We still certainly have a long ways to go to build the infrastructure needed to bring a substantial amount of wind to market in the U.S. in the coming years.

Third and finally, the comparative economics of wind has recently become a bit more challenging and it's really to those trends that is trends about the cost and performance of wind and the comparative economics of wind that I'd like to now turn for the majority of the remaining time that I have with you this afternoon.

So I mentioned earlier that really perhaps the most important contribution of the annual DOE report, especially as it relates to the already very thorough data collection efforts by AWEA, comes in as collection and summary and information on project level wind power pricing, cost and performance trends.

That's really the heart of the document and it's the location of the document to go for information that is not otherwise being presented by others in different ways in the wind sector.

So in particular, using a pretty wide variety of sources, we've been able to piece together pretty good samples of data for wind project level power sales prices, project level performance as proxy by capacity factor, project level installed costs and finally turbine level capital costs.

Just as one example for the power sales prices, our sample consisted of 145 different wind projects built from 1998 through the year 2008 and totaling just about 10 gigawatts of capacity.

And specifically the prices that I'll be presenting here reflect the bundled price of both electricity and renewable energy certificates or RECs as sold by a project owner under a longer term power purchase agreement.

Our data set explicitly excludes prices received by merchant wind projects as well as projects that are selling their renewable certificates separately from power.

I won't go through the sample sizes for the other data sets that I'll be presenting, but suffice it to say that we have a very strong data on project level performance and pretty strong data for a wind power project cost and wind turbine cost as well that I'll be presenting in the slides that follow.

So what did we find when we look at those data. Well the first thing that we see is that at least on a cumulative averaged basis, wind power prices have fallen over the 1999 through 2008 timeframe.

Now this graphic's a little bit confusing but what it shows on the left-hand side of the graphic is that for projects built in the years 1998 and 1999, those projects sold their power for roughly 6-1/2 cents per kilowatt hour in the year 1999. So that is represented by this left most bar that you're seeing on your screen.

Projects built over the entire timeframe though, that is from 1998 through the year 2008 sold their power in the year 2008 for roughly \$40 per megawatt hour or 4 cents per kilowatt hour on average, that's the right most bar on this table.

So again, wind power pricing on this sort of cumulative and average basis at least has dropped, though you can see some increase over the last several years and I'll get back to that increase in a moment. But over this entire timeframe, the price of wind has declined on an average basis at least.

Moreover, those cumulative and average wind power prices and those prices are now presented here as red dots, so the red dots that you see on this slide are equivalent to the bars that you see on this slide. I'm trying to confuse you as much as possible, but that's what those red dots and then bands around the red dots represent.

But on this slide we're now comparing those prices for wind with wholesale power prices in the U.S. from the year 2003 through the year 2008. And the range in wholesale prices that we're showing here and that's the blue band, that range reflects different market hubs.

So you can imagine that on the top side of that band might be the New York market or the New England market whereas at the low end, you might be seeing prices in Indiana or some other location that is more coal based in their power generation mix.

And the prices reflect the cost of a flat block of power, a block of power that delivers consistently every day and every hour of the year on an equivalent basis.

Now this isn't a perfect comparison to wind, wind doesn't provide a flat block of power. Moreover, wind isn't the same as a coal generator or a natural gas generator in terms of fuel price risk, in terms of environmental impacts and things of this nature.

So this is not a fully fair economic social cost comparison that we're making here. But the bottom line is that the price of wind over this period has compared very favorably with the price of wholesale power and indeed the average of wind has been at or below the range of wholesale power prices in recent years as shown in this graphic.

Now some of you might be wondering well okay, that's all fine and good but you're averaging projects built in 1998 with those projects built more recently. We know that project costs have increased recently, let's focus on projects installed more recently.

Others of you might be saying well that's the national picture but my region's going to be different. I have particularly low wholesale prices or I have particularly high wind power prices. And so we've tried to address those issues as well, still the comparison between wholesale prices and wind power prices is not a perfect one.

But nonetheless if you do this on a regional basis and focus just on those wind projects installed from 2006 through 2008, so only the most recent vintage of projects are included in this next graphic.

And if you show the price of those projects delivered for in the year 2008 and then compared those wind power prices in 2008 to the range of wholesale prices in the year 2008, then you get this graphic.

And again we don't need to go through the details of this graphic, but the bottom line is that even if you focus just over the last three years for projects installed over the last three years and compared them with wholesale prices in the year 2008, in most regions of the country wind is competing reasonable effectively with wholesale power prices over this period of time.

And again, I don't want to overstate the case here. The comparison is not perfect but with the comparative economics that I'm showing here, I think it comes as a relatively little surprise that the wind industry has grown as much as it has over the last number of years.

Despite those positive economics though, even in pretty recent years, there are at least three trends I think that lead one to be a bit concerned and that I'd like to address here as I finish off the presentation over the next 20 minutes or so.

First, wind project performance improvements have leveled off in recent years. Secondly, project and turbine costs have risen until very recently, they've begun to decline but at least over the period that we've looked through 2008, those costs have increased. And finally and maybe most importantly, wholesale power prices have plummeted over this timeframe.

So let me now turn to each of these factors, all of which in comparison impact or in combination impact the relative economics of wind.

First while it's true that average project performance and for average project performance we're using capacity factors as our proxy, while it's true that average project performance has certainly improved over time, it has begun to level off since about the year 2004.

In this slide for example we're showing average project level capacity factors in the year 2008, so all of the data on this graphic show performance in the year 2008. But we're (binning) the project by - the projects by their commercial operation date.

And so what this slide shows for example is that those projects were built before 1998, this is the left most bar that you can see. I'm sliding a red dot over right now. Those projects in the year 2008 had a capacity factor of just over 20%, maybe that's about 22% there, if my eyes are serving me well.

That said, projects that were installed in the year 2007 going to the right-hand side of this graphic, delivered power in the year 2008 with an average capacity factor of roughly 35%. So a very significant increase in performance over that timeframe.

At the same time, you can see that over the last number of years from 2004 through 2007, performance has stayed largely flat or even declined a little bit on average. So we do see some very, very good projects with capacity factors at or even exceeding 50%.

The average has stayed pretty flat over those number of years. So while project performance has certainly improved over the longer timeframe, those improvements have not been in strong evidence just over the last couple of years.

Second, with respect to installed wind project costs, at LBL we have been able to collect a pretty good sample, a pretty sizeable fraction of wind projects installed in the U.S. since the 1980s we have installed cost data for.

And what we see in this slide where we're presenting this data is a rather dramatic reduction in installed costs for wind projects installed from the 1980s through roughly the year 2003 or so. And then stable costs in the early 2000 timeframe and then very rapidly trending upward costs just over the last four years.

In fact we find that projects in our sample that were built in the year 2008 had costs that just averaged a bit north of \$1900 per kilowatt. And that's about \$700 per kilowatt higher than the average installed project cost that we saw in the 2001 through 2005 timeframe, pretty significant increase in cost just over the last three, four years.

In addition, we anticipate at LBL that those costs may increase a little bit further for projects built in the year 2009 as developers continue to work their way through their earlier turbine orders, at what now we can see in retrospect were pretty high prices.

This next slide for example shows wind turbine transaction pricing over time. A variety of sources were used for this particular figure as well as the previous one. I wouldn't focus too much on individual transaction or any individual project, it's really just the overall trends that are perhaps the most salient here given the challenges in collecting accurate and consistent data in this respect.

But we certainly have seen a softening in wind turbine pricing over the last several months, since late 2008. There's evidence of price decreases of even as much as 25% in turbines that are being sold in the U.S. market and internationally now relative to their peak in mid 2008.

But again, the majority of the wind projects that are installed in the year 2009 are going to be installed based on turbine orders that were made in the year 2008 or even perhaps in the year 2007.

So though we are seeing lower turbine prices and certainly those lower turbine prices will eventually flow through to lower project prices, it seems unlikely that we're going to see that much moderation in project costs at least in the year 2009 due to the historical purchasing strategies of the developers.

So the result of those last two trends is somewhat predictable, wind power prices have been on the rise over the last number of years. This slide for example shows power sales prices in the year 2008 but for wind project that have been built in different years.

So again, a little bit confusing, we've tried to produce graphics that are as confusing as possible. No, that's not really true but it is hard to convey this information in an effective way. But what this graphic is showing as an example is that for projects that were built in the 2002 and 2003 timeframe, that's what the red marker is showing on your screen right now.

Those projects in the year 2008 sold their power at an average price of \$30 per megawatt hour, 3 cents per kilowatt hour. With a pretty sizable range, these dots represent the range based on specific projects. So again, the average about 3 cents per kilowatt hour, a darn good deal for utilities that's buying wind power from these individual projects.

In the year 2008 on the other hand, we have 25 projects for which we have pricing information, about 1800 megawatts of projects. And those projects in the year 2008 were selling for a bit more than \$50 per megawatt hour, about 5 cents per kilowatt hour.

So over that time frame, from 2002, 2003 to the present, we've seen price increases for wind again roughly 2 cents per kilowatt hour, from about 3 cents to about 5 cents per kilowatt hour on average.

Though you can also see there is a very healthy range of pricing that vary by region and by project size and by other factors that we do not explore fully in this particular report.

Now those increases that we saw in that previous graphic though, at least through about mid 2008 were also matched with very high and increasing wholesale power prices as well.

Natural gas prices were very high through mid 2008 and so even though wind prices as shown on this graphic increased over that timeframe, wholesale power prices as shown on this graphic were also pretty darn high.

You know, even up until April 2008, they were averaging, you know, somewhere in the \$60 to \$80 per megawatt hour range, 6 to 8 cents per kilowatt hour range. They increased even further through the summer until about July and then prices went off a cliff around July 2008.

So we - while we were seeing wholesale power prices that in many cases averaged more than 8 cents per kilowatt hour in mid 2008, today July 2009, we're seeing prices that are closer to 3 cents per kilowatt hour in a number of wholesale market hubs around the country.

So wholesale power prices mitigated the price increase of wind through about mid 2008 but just over the last year or so the plummeting wholesale prices have proven to be rather challenging. And that is shown in this next graphic. And the bottom line of course is that the near term economic position of wind has become more challenging as a result of these wholesale price reductions.

This slide we're showing the same wind power prices that I presented earlier. Namely if you looked at - go back, not forward, if you look at this graphic here, these data are exactly the same as the data presented on the left-hand side of this figure.

So this figure shows prices for wind and again this represents power and renewable certificates and prices in the year 2008 for projects built in different periods. Projects built in 2008 over here on the right, projects built in 1998 and 1999 over there on the left.

It then compares those 2008 prices with the range of 2008 wholesale prices that we saw among a variety of different market hubs. Again, the average wholesale price on the top end probably represents New England or New York.

The average wholesale price on the low end probably represents a place like Indiana or some other location with quite a lot of coal in their power generation mix. Still pretty good comparison if you look at 2008 wind power prices and 2008 wholesale power prices.

If you look at 2009 though, 2009 is a really different story. Wholesale price range, somewhere from about 3 to maybe 4-1/2 cents per kilowatt hour on average so far this year, again this only represents about half of the year so it doesn't represent a full year of data.

But nonetheless, it's pretty clear that the economic picture of wind has become somewhat more challenging, at least in the very near term. And perhaps that is one of the reasons that notwithstanding the fact that the wind industry currently sits in the position in which it has perhaps the most aggressive state and federal policy mechanisms that we've seen in the decade pushing it forward.

The wind industry is still pushing hard for additional federal policy intervention, whether that's through a national RPS, national carbon policy or through some other tool.

And one of the reasons that those policies are viewed as particularly important for the industry is because of this worsening economic position, at least in the very near term and concerns that it may continue for some period of time.

So I'm nearing the end of this 42-slide onslaught of information. But to conclude I would like to talk a little bit about what all of those trends mean for the remainder of 2009 and beyond, at least in the near term. I'm not going to be offering projections way out there but want to say a few words about the outlook over the next couple of years.

Well, you know, given the challenges that I described earlier including the economic crisis perhaps the most predominantly transmission barriers that are beginning to bind in some regions in the country.

And this comparative economic position of wind which may or may not improve in the very near future, we're not quite sure but does pose some challenges for purchases of wind right now. Because of the combination of those factors, as I noted earlier 2009 is expected to be a somewhat slower year for wind additions, that's what's shown in this particular table.

Again, similar data, probably the same data that I presented earlier in terms of 2009 predictions from a variety of different entities, that said given the policies that already exist at the state level, RPS programs perhaps most predominantly.

And at the federal level, PTC through the year 2012, ARRA, 30% investment grants in the next year or so.

Given those policies as well as given those that may be enacted or are expected to be enacted in the near future, the same market prognosticators that are guesstimating that 2009 will be a slow year pretty consistently believe that the years 2010 through the year 2012 will see a market resurgence with rather significant wind installations during that period in each year exceeding that of

the last, and also exceeding what we saw in terms of annual installations in the year 2008.

Now whether those predictions hold of course is anyone's guess and will ultimately be determined by a balance of trends, those trends that are pushing towards stronger growth and those trends that are pushing towards weaker growth.

Now arguing for weaker growth or trends that argue for weaker growth include the fact that the duration of the financial crisis of course remains uncertain and frankly the degree to which the economic stimulus bill ARRA will alleviate those impacts is a bit unclear.

Certainly the alleviation will be substantial whether it's sufficient to get us back to the installation rate that we saw in 2008 or even greater in future years remains to be seen.

Of course as I mentioned, natural gas and wholesale power prices have plummeted, as have price expectations. If that continues, wind also will face some increasing challenges in that respect. Inadequate transmission infrastructure, again beginning to constrain new build in some regions of the country.

And finally potentially increased competition from other renewable sources in some regions of the country. Solar in the desert southwest in particular and perhaps some other sources in other locations with wind costs on the rise and also with a greater basket of federal policies that are supporting not just wind but the other renewable technologies as well.

Wind is beginning in some regions of the country to face more competition than it has in the recent past with other renewable generation sources.

On the positive side though, we do now as I mentioned earlier, arguably have stronger federal and state policy support and really at any point in the past decade.

There are expectations by many in the wind industry for further federal policy support whether that's through a renewables portfolio standard, through climate policy or through transmission policy.

There are strong expectations that one or more of these kinds of programs will be enacted in the coming years during this administration. And finally we have dropping wind turbine prices. Prices have dropped perhaps as much as 25%, maybe a little less than that but on that order, over the last year or so.

And though those dropping turbine prices may not alleviate the price increase or the cost increase we'll see for installed projects built in 2009. Certainly those decreasing prices will flow through to project costs in 2010 and in future years.

The good news though, regardless of what you think about the near term trend, the good news is that even with this slower growth expected in 2009, even with some of the challenges that the industry faces, the sector does remain on a very early track to meet 20% the nation's electricity supply with wind power by the year 2030. That's what is shown on this graphic.

The blue bars represent the deployment path that was provided and presented in the U.S. Department of Energy's report performed in collaboration with the

wind industry to look at the economic and technical viability of achieving 20% wind penetration in the U.S.

The green bars represent the actual deployment that we've seen through the year 2008 and the sort of cross hatched bars or wavy bars let's say for the years 2009 through 2012 represent the projections from one consulting company, EBR for growth in wind from 2009 again through 2012.

And again, expectations are that not only have we been on track or above the track to meet 20% wind but that we will continue to maintain that pace even with the slowdown in 2009 where above those blue bars at least in expectation through the year through 2012.

That said though, to maintain that pace or to achieve that pace and then to hit the 16 gigawatts a year that would be necessary in terms of annual wind additions by the year 2017 and continuing for almost a decade is clearly an enormous challenge.

And will require not only alleviating the near term constraints that the wind industry will face but also will require a most certainly proactive federal and state policy, economic incentive policy, rather substantial expansions of the transmission infrastructure to deliver wind to our load centers.

Mitigating the variability of wind power outputs so that we can manage the uncertainty and variability of wind without imposing undue concerns towards electricity reliability and also easing the siting and permitting process so that we can legitimately add 16 gigawatts of wind a year, at least with reasonable expectation.

So with that, let me conclude, I think I provided a pretty - obviously a very quick but hopefully somewhat thorough presentation of the contents of the annual report. Of course the annual report contains a lot of additional information and supporting text about where the data that we've used comes from and things of that nature.

The document is available electronically. You should actually just go to that final slide. You can see the Web site, the Department of Energy Web site where the document is located.

You can also see here my phone number, use it sparingly if you would and email address both for me and my main co-author, Mark Bolinger. And then also contacts for our program sponsors and leaders at the U.S. Department of Energy's wind power program.

So thank you all for your attention and I will turn it back to the operator and to Larry to open the floor up to questions.

Coordinator: Thank you. At this time, if you would like to ask a question, please press star 1 and record your first and last name. You will be announced prior to asking your question. To withdraw your question, press star 2.

Once again if you do have a question, please press star 1 and record your first and last name. One moment please.

Our first question comes from (Peter Smith).

(Peter Smith): Yes, hi. I was wondering if you had any indicators or what any indicators might be for that performance improvement leveling that you saw in reference to the capacity factor?

Ryan Wiser: Sure I can - I will hypothesize a little bit on this question. We're actually currently in the middle stages of executing a project to try to understand both the performance improvements that we've seen historically as well as that leveling off that we've seen in the last couple of years.

So look out in the next six months or so, we may have - well we'll certainly have a much better answer than the one I'm about to give. The factors that we've identified as potentially influencing it and we haven't again, evaluated these factors to really know which of them are the most salient.

But certainly in the year 2008, especially for those projects built in 2007 or near the end of 2007, there may still be some teething problems for those projects. Projects often perform better their second year than their first year.

And so to some extent the drop off in the most recent year may simply be because we're capturing projects that were installed pretty late in the year and maybe still are going through some optimization procedures that the owners are dealing with.

Another factor to consider is curtailment. With limited transmission infrastructure in West Texas, in parts of New York and other places, wind projects are now sometimes being economically curtailed or physically curtailed because there just isn't sufficient transmission access to get that wind to market. So that may be another factor.

In addition to that, we have seen over the last bit of time some pretty well reported problems with (blade) and gear boxes among a number of different wind turbine manufacturers. And I can tell you that certainly some of the data

that I've presented for some of the more poorly performing projects are a result of some of those factors.

And then the final one, which I would note and I think I have some preliminary data that makes me believe that it's true, is that developers over the last couple of years because of the transmission constraints that exist, may simply be beginning to focus on projects that are in their development pipeline that don't necessarily have the highest capacity factor but that do have access to unconstrained transmission.

And we're beginning - in our project - again, it's only part of the way through so I shouldn't be saying very much about it. But we're seeing some evidence that projects that are installed more recently are actually being installed in wind resource areas that are somewhat less vigorous, less robust than those projects that were installed, you know, five years ago.

So a variety of factors there, can't really tell you which one is the most important. I'm sure that all of them play some role but hopefully we'll be able to disentangle some of that in the coming months.

(Peter Smith): Excellent. Is there any indication as to why the better performing capacity factors, those that were over 50%, are performing as well as they are?

Ryan Wiser: Well I think one of the things that we've seen also in the data that we're producing right now is that wind turbines over time have been designed differently. Generally speaking, rotors have gotten larger faster than nameplate capacity has gotten larger.

And that's a design point and that design point will automatically lead to higher capacity factors. And that's especially true if you put these larger rotors

on much taller towers. And so I think what's happening here is you just have - we have projects that are located in wind resource regimes that were otherwise not attainable.

Not at the ground, but at hub height and so I think the really high capacity factors that we're seeing and recognize that a couple of those are like Hawaii projects that don't necessarily have wind resource conditions that are regularly seen in other parts of the nation.

Nonetheless, I think it's a combination of design changes from the wind turbine manufacturers as well as much higher hub heights.

(Peter Smith): Excellent. Thank you very much.

Coordinator: Your next question comes from - once again, if you have a question, please press star 1. At this time, I'm not showing any further questions.

Larry Flowers: Ryan, this is Larry, can hear me?

Ryan Wiser: Yes.

Larry Flowers: Yes, a couple questions came in on email that dealt with the availability of these slides. Do you put this presentation on your Web site so that people can use the PDF version?

Ryan Wiser: Yes, we have a PDF version, not of these exact slides, but of a summary of the report that basically contains virtually all of the slides that I just presented and more. It's available on the LBL Web site.

And if folks email me, the LBL Web site unfortunately, you know, is not really necessarily designed by those who wish people to find it, it seems. But if you email me at my email address here, I'm happy to send you the link to the PowerPoint presentation in PDF form.

Coordinator: And once again if you have a question, it is star 1. (Nick Fernandez).

(Nick Fernandez): Hi Ryan. Can you hear me?

Ryan Wiser: Yes.

(Nick Fernandez): Hi, first of all, great presentation and I was wondering am I correct that the \$1900 plus dollar per kilowatt hour figure that you were presenting for 2008 for the installed cost, does that include the federal rebates and incentives.

Ryan Wiser: It does not.

(Nick Fernandez): It does not, okay. Thank you.

Ryan Wiser: Yes, it's the aggregate installed cost of projects prior to the receipt of any federal incentives certainly.

I should also note just on that topic, I meant to mention this earlier but failed to do so, that all of the wind power prices similarly that I was presenting are really the prices that are embedded within the power purchase agreements, the legal documents between wind owners and electric utilities.

And naturally those prices reflect the receipt of any available federal or state incentives. So that price of 5 cents per kilowatt hour of course is affected by the existence of the federal production tax credit and if the federal production

tax credit were not available, that 5 cents per kilowatt hour would be, you know, closer to the range of 7 cents per kilowatt hour.

(Nick Fernandez): Yes, I figured as much. Thanks.

Coordinator: Thank you. And once again it's star 1 for your questions. At this - one moment please for the next question. We have a question from someone from (Channel Star). You may ask your question.

Woman: Is there any policy on (foreign investments) on wind power?

Ryan Wiser: In the U.S. market, no. The U.S. market is fully open to foreign investors who wish to participate in the market. The only caveat that I would make towards that is that historically the wind sector has been very heavily motivated by federal tax incentives.

And those federal tax incentives to use completely of course require a certain amount of tax liability in the U.S. in order to use fully and completely. That will be resolved in the very near future through 2010 through the economic stimulus package and the ability to convert the production tax credit to an investment tax credit and then to a grant via the U.S. Treasury program.

But after that point in time assuming that we then revert back to the normal production tax credit, investors will require a sizable amount of U.S. tax liability to fully use the tax advantages. So there's nothing explicitly that precludes foreign investors.

Indeed there are a large number of European wind developers and players now in the U.S. market but there are some challenges that have to be overcome as well.

Woman: Thanks.

Coordinator: Thank you. At this time, I'm not showing any further questions.

Larry Flowers: Okay, I think we're up on the hour. And Ryan, I want to thank you and Mark for this excellent report and information. It's extremely valuable and as you said as we continue to track things in 2009 into 2010, it'll be very interesting to see how the dynamics of wind cost and economics compare to the marketplace and to see where this natural gas future is going. This will be a very interesting time period.

But as you have shown in the long run, the next couple of years, there's still great hope for increase in wind up to that 20% report that goes to 16 gigawatts per year. The growth from - you have 29,000 megawatts sold now to 150,000 by the end of the decade, next decade.

The ramp up period is really going to take a lot of effort as you well stated in the transmission area in siding, in some of the regulatory and policy areas. And so those areas still need to be focused on and worked on.

And we again thank you. The audience - we had about 100 attendees from around the country. Again, there's some good information on the Web sites they're showing there as well as windpoweringamerica.gov where I include much of Ryan's and Mark's work in my update presentation. And thank you, Ryan for this presentation. And thank you folks for tuning in.

Coordinator: This concludes today's...

Larry Flowers: That concludes the Webcast.

Coordinator: Thank you for your participation. You may now disconnect.

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