JOBS AND ECONOMIC DEVELOPMENT IMPACTS WEBINAR

August 17, 2011

Coordinator: Welcome and thank you all for standing by. At this time, all participants are in a listen-only mode. After the presentation, there will be a question and answer session. To ask a question at that time, you may press star 1 on your touchtone phone and record your name at the prompt.

This conference is being recorded. If you have any objections you may disconnect at this time. I would now like to turn the meeting over to Mr. Ian Baring-Gould. Go ahead sir, you may begin.

Ian Baring-Gould: Thank you all for joining us today and apologies for our little delay here. We were having some technical difficulties, but it looks like we'll be all set to go forward. I want to welcome you all again to the next session of the Wind Powering America monthly webinar series and this series.

In today's session we're going to be talking about jobs and economic development, which clearly is one of the key drivers not only nationally but in the wind space. And so I'm very excited about the speakers and the topics that we're going to have for today.

So the first two, Suzanne and Eric - well actually all three of the presenters are very well known. Suzanne with the JEDI model and she is going to talk a little bit about the JEDI model and kind of current updates. And then both Eric and Peggy are going to talk about specific examples of applying the JEDI model and how we can use it to get a better understanding of the economic development impact of wind technology, clearly a key issue.

As (Sharon) our operator has said, we're trying something different this session and we're going to be doing live Q&A at the end. So instead of doing it just typing in your questions as we've done in the past, you'll hit the star 0, record your name and then (Sharon) will introduce you into the conference and you can ask your question live and then we'll go to the panel to respond to that question.

Just a quick update on the upcoming webinars and then we'll address this again at the end. But in September we're doing one in offshore wind and then following that wildlife - wind and wildlife interaction, so please mark those on your calendar. Again it's always the third Wednesday of the month at 3 o'clock eastern.

So without further ado we'll get into the actual topic. Suzanne Tegen who's leading office activity, very fitting because Suzanne has been at NREL and through her doctoral work and then her time at NREL has really pushed forward the whole idea of economic assessments for wind.

And in her development of the JEDI tool has allowed not only us at NREL but across the nation -- people -- to really look at what the true economic impacts of wind deployment are in their communities and in their state, which is critically important.

It's important to note that the JEDI model has gone forward now and now everybody has developed a new module for solar -- everything of that nature - for JEDI. So we're very happy to have the person who has developed the software to actually give us an overview. So, without further adieu Suzanne.

Suzanne Tegen: Thanks Ian. Okay (Corrie), if you want to just flip to the next slide there. And we at NREL have developed the JEDI model in about 2004. It was developed by Marshall Goldberg who's our modeler.

And it was because there were so many decision makers coming to us and asking, you know, "How many jobs will be supported by wind if a new wind farm goes in in my community? What kinds of jobs would these be? What other economic impacts will occur if we have a new wind farm in in our county? What kind of revenue will it bring in? What kind of property taxes will the developers have to pay? What will the increase and local business look like at our hotels," and that kind of thing?

So today I'm just going to go through kind of an overview of the model and some of our results, and then Eric is going to talk more about an in depth study that we did. And then our first speaker, Peggy, is going to talk about working with NREL and also using the JEDI model from some of the sort of upside of JEDI. Okay next slide.

So you are all hearing about jobs, jobs, jobs in the news everywhere and that certainly is not going to go away before the next election. I think everybody is - this is kind of the hot topic, but we have to remember that it's not the only thing that's important.

Somebody asked me once, you know, "If a natural gas plant wasn't bringing in as many jobs as a wind plant, why wouldn't you just put a wind plant in?" And then I thought well you know, it depends on the wind resource and it depends on a lot of different things. So you don't just of course, want to put something in because it brings you a lot of jobs but you know there are a lot of factors.

Another important thing to mention is, the JEDI models are user friendly and they're free to download from the web, and they estimate gross economic impacts and that is gross versus net. So that means they tell you how many jobs from a specific project are going to be supported by that specific project.

They're not going to say you know, "If you develop a wind project in one county, does that mean that there are going to be jobs drawn from another county," or something like that. It's not a net jobs analysis. It's just a gross job analysis.

And we'll talk a little bit more about how individual projects vary and how that affects economic development in different states and local manufacturing, and that kind of thing. And as with any input/output model, acquiring as much specific project information as possible in the beginning is critical and I'll talk more about that a little bit too. So if you can flip to the next slide.

Who uses the JEDI model? People like you, so state energy offices. There's a list here but there are a lot of people who use the JEDI model. We have - we ask people to - when you download the model you have to give us your email and we never give our information away. That's just so if there's an update we know that we can send you an update that way of the model. Next slide.

So here is the screen shot of downloading the free JEDI model. You can just go to NREL at nrel.gov and search for JEDI, or you can go to the Web site there on the bottom.

And if you go the next slide Ian talked about how with the wind was the first JEDI model and now we have several number of JEDI models and that's growing. We're trying to get - our (unintelligible) model is actually almost

done. The hydro power and offshore wind have started and Eric will talk a little bit about the transmission model.

So we're excited that there are more and more JEDI models. And all of these models are free to download and they will estimate the number of jobs supported by whichever projects you're interested in here. Okay next slide.

So this shows the - what we call the ripple effect and you've probably heard direct, indirect and induced impact before. That's pretty typical from an input/output model. So when you're looking at jobs or economic impacts, those are pretty typical categories.

And we don't exactly do that with JEDI. What we do is our first category is just labor. It's just the onsite labor impact. And that means that we're looking at construction workers and management, and there are things listed there in that sort of first ripple.

The second ripple is our largest ripple, so dollar wise and job wise this is going to be the biggest impact where we have jobs and all the parts -- all the parts of the turbine. And you've got the blades and the towers and you've got the gasoline that the truck, you know, uses and that kind of thing. And that's all counted in that second turbine and supply chain impact.

And then the third category is induced, so now I'll just have you look at these in more of a visual way. The next slide.

So this is the project development and onsite labor, and this is what you would think of when you think of you know what happens at a wind farm. These are the people who come and do the sighting and the people who actually install those parts.

Next slide. So this is going to be that second category here. Next slide.

And this is the supply chain. And it's also what you would think of as a supply chain and some things you might not think of, so financing and banking and accounting. Your property taxes are included in this one. Next slide.

So this is just to show induced impacts and induced impacts are very important. They're very real and next slide. So this is what I call my shiny, happy people slide. And your induced impact might not look just like this but this is money that - this is money and jobs that are spent on local area goods and services.

So if you have construction workers coming to your town for six months to put up a wind farm, they are going to go to your local sandwich shops and they are going to use your local grocery stores and that kind of thing -- your coffee shops or whatever it is.

And some projects take longer than six months. You know, some take a year. And so these are very real impacts that happen in the economy and we trace those linkages -- those dollar linkages -- in the economy and get that last ripple called induced impact. Next slide.

So when you download the JEDI model, you will get a screen like this. It's in Excel and the model is in Excel -- Microsoft Excel and it's very user friendly, and so this is the first screen that you'll see. And then (Corrie) if you'll just get past that little yellow box and go to the next slide.

Really all you need is for these basic user inputs. So if you need to put the state where the wind project is going to be, the year of construction, the

project size, and then a couple of these other little things. Installed project cost is very important.

So we do have defaults for these if you don't know the answer to these. But it's much better to talk to developers in your state or talk to the people who are thinking about putting a project in and get their information, because that's going to make the answers specific to you know your state or your county.

And that little Y in the middle of the screen here is something that you can click on. And this is just if you want to use default and you should click No, and then putting your own data there. And so these are the basic user input. And then (Corrie) if you'll just click through those yellow boxes to the detailed user input.

So here you can see over on the right, there's a category called, "Local share," and if you look up in like Row 33 or 34 you see turbines and blades, you see towers up there. The JEDI model will assume that none of your blades and towers is made in your state and that's because usually they aren't.

But there are some states like Colorado or Iowa where there are blades made in state, and so then if your project is using your instate blades, you want to put 100% in that local share because that's really going to increase the economic impact to your state.

And then you can flip through, (Corrie), those yellow boxes and we'll go to the JEDI caveat. So these are just some things I have to say so you guys don't - you don't, you know, base your financial transactions or something on the JEDI model, which you wouldn't anyway. But it's not intended to provide us precise forecast. It's just kind of an overall estimate of economic impacts and it is very - it is based on real projects.

So the way that we get the default for the JEDI model is we interviewed developers. Every year we go out and we interview developers and we talk to county commissioners. We're getting the real data from on the ground and then that's what we put into the JEDI model. So your default are going to be pretty good for your state, but you can improve them by being sure and talking to those developers.

So let's see. The - I talked about the gross versus net jobs and I talked about a few of those other things. The local sourcing levels have a significant impact and I just mentioned that in the last slide, so that's just if you have local manufacturing that's a really big deal.

And you know you can increase your economic impact up to five times if you have things that are made in your state and local workers instead of using out of state workers, that kind of thing.

JEDI reports full time equivalent jobs, so that just means that there are two people working for six months. That's in fact counted as one job. And then there's the simplicity complexity tradeoff, so the JEDI model is a fairly simple model and again it doesn't have the net jobs and that kind of thing.

So it's much - it's better than the back of the envelope calculation, but it is a simple model. So if you're a developer or something you might want to use your own model or something that's more complicated if you really need to know exactly the number of jobs in the economy. Okay next slide.

So this just shows the typical results from a 100 megawatt wind project. Usually there are around 70 to 100 construction jobs and these are the jobs in that first category, and 6 to 8 operations and maintenance jobs. And then for

land lease payments this changes. It depends really on your county and on your state, but it's around 3 to 6% of your gross project revenue.

And then local property taxes really - this really varies from state to state as well. But anywhere from $½ million to $1 million per year for a 100 megawatt wind project, and like I said it really varies. I mean, sometimes they make other payments in lieu of taxes and those are negotiated between the developer and the county or however that state works it. Next slide.

So I'm just going to show you now a couple of examples of what we do at NREL with our JEDI model. This is the project that a college of ours did, Sandra Reategui, a couple of years ago.

She looked at different counties in Colorado and there are four of the counties, and she took the median household income and then she looked at the lowest salary and the highest salary in the orange bar to the right of - from wind projects. And so as you can see, wind projects do offer competitive salaries. Okay next slide.

I would encourage you if you're interested in this topic, you can go to windpoweringamerica.gov and there are lots of reports and fact sheets. There are different maps on wind resource, that kind of thing.

You can also contact me, but if you're interested we do already have a lot of information, and windpoweringamerica allows you to click on your state and then you can see information that’s already there.

And I think with that (Corrie), if you just want to go the next tape, there's my email and I'll wait for questions at the end. But I appreciate your patience at the beginning of this call and look forward to the other presenters.

Ian Baring-Gould: Thank you Suzanne. Again hold the questions till the end. Next I'd like to introduce Eric Lantz. Eric is also an analyst at NREL who has been doing a lot of work in economic assessments and assessments to the wind project. He also leads a lot of our social acceptance activities including work with the IEA.

Most recently he's been working on a new module in JEDI looking at the economic impacts of transmission. Again we all know that if we really want to see extended wind usage in the United States, transmission is something that needs to be looked at.

And the - understanding what - the economic and impacts of that extended transmission is critical for state decision making. So I'm very excited to hear a summary of Eric's work specifically looking at his Wyoming project, so Eric.

Eric Lantz: Thanks Ian. So we'll get things rolling here. Given the time constraints that we have today, I'm really just going to focus on three things. I'll give you a little bit of background to the Wyoming study we did.

As Ian mentioned it includes the wind transmission and actually some natural gas generation also. We'll go through the basic approach that we took and our results and then follow with some conclusions.

So just to begin we'll kick off the background here. For those of you that don't know -- many of you probably do -- but Wyoming has a really great resource but it has very low actual load consumption within the state borders. There's only about a half a million people that live in Wyoming and they just don't consume that much power.

So much of the wind resource in the state of Wyoming is going to have to be shipped around the West in order to be successfully utilized. And there's a number of transmission lines that have been proposed to move wind power from Wyoming to parts of the Southwest, to California and even to the Northwest.

But building these projects is a little bit controversial. Obviously they require long right-of-ways. They require passage through private land and public land, and on either end they have to be able to tie in to the existing system or a large wind energy facility.

And in order to kind of encourage a healthy debate about the tradeoff associated with these projects, the Wyoming Infrastructure Authority, which is the state entity in Wyoming asked NREL to analyze the jobs and economic development activity that would result from a portfolio of projects that would involve large deployments of wind transmission, and as I mentioned before a little bit of natural gas.

I should mention that this was very much a, “What if scenario.” We did look at actual proposed projects, both on the transmission side and also the wind side. But whether these projects actually become a reality or not remains to be seen.

There's a lot of variables that will determine actually which and how many of these projects are realized, but this was intended to give somewhat of a representative - communicate the representative nature of the economic development activity that could result.

So this was actually the portfolio that we looked at. You can see here that the bulk of the investment is actually in new wind generation. About $18 billion

out of a total of about $25 billion goes towards 9 gigawatts of new wind generation.

On the natural gas side we had about almost 2 gigawatts, actually 1.8 gigawatts. That was essentially in place there to utilize the available transmission capacity when the wind did not flow in at its highest speed.

As well there were two high voltage DC transmission lines, two high voltage AC transmission lines and a number of high voltage 230 KV lines that would be used to collect the power from the individual wind farm and bring them to a centralized - to your converter station or substation to then be shipped throughout the rest of the West.

As I mentioned before it's about a $25 billion total project investment to construct this infrastructure, and then it's about $350 million per year during the operation's period.

This is what things look like overtime. In Wyoming right now there's very little - in fact you could probably say there's no excess transmission capacity. The only way that they can build new wind projects in Wyoming is if they back down existing generations, primarily in the form of coal. So basically you - we don't see large deployments of wind until our high voltage transmission lines start to come into play.

The first one which is a high voltage deep AC line comes on in this specific scenario, which again is a hypothetical scenario. At the earliest probably in about 2015, you can probably bring a high voltage DC line on shortly after that, and then that could be followed up by some additional lines later in this decade.

The wind climate happens actually relatively rapidly as these new lines come - are placed in service. We're installing about 1500 megawatts of wind per year in order to fill the capacity of those lines as quickly as possible.

You can see where the natural gas comes into play as well there in 2015 and 2016, and again in 2018 and 2019. We're adding collector systems throughout the process simply as new generation is placed in service to connect with the larger interstate transmission lines.

Now before we jump to the results, Suzanne was showing you in her presentation all the different variables you can input into the JEDI models. And when we do a study, we actually go through and research the percentage of total installed cost, so you can see that's the middle column in this table as well as the local share value or local purchase co-efficient.

We like to research those for each study just to determine you know if our data is representative for every context, and in some cases we'll actually use a variety of scenarios. And in this case we use scenario analyses around the local purchase co-efficient or the local share value.
And just to demonstrate that there is some uncertainty in the amount of local labor and equipment that will be used on these projects and this range of scenario is intended to capture that uncertainty to some extent.

So this is our wind data. Actually in our pool report you can see both the percentage cost breakdown and the local share values that were used for natural gas and each of the different types of transmission lines as well.

So here was our results. What you're looking in the top section is the construction period results or the results resulting just from building these

projects. It's averaged over ten years. You could see from my slide that shows the deployment that there is actually a ten year construction period.

Now you may also recall that much of the construction activity actually happens in that 2015 to 2020 time period, so that's something to take into account and we'll get to that in just one moment. But these are the average annual impact over the ten year construction period, and then you also have the average annual impact from operations and maintenance.

And you can see in total we're looking at about 4700 jobs on average representing about $260 million in wages, in income and $510 million in economic output.

Now these are the results I mentioned on the previous slide. We did some scenarios. This was our base case results or what we determined to be the most likely scenario. Again you can see the other numbers in the full report.

On the operation side we're going to employ about 2500 people for the full life - full operating life of these projects earning a little over $100 million per year and about $380 million in the economic output per year. So you can see that actually the operation's period impacts are relatively large even when compared to the construction period.

In fact often we think about the construction being you know the kind of short, brief really big boom in the economic activity. But when we look at the whole portfolio of projects and look at that over the time period of a decade, then the construction and the operations period impact starts to approach one another.

So this is what the actual results look like in conjunction with when the deployment happened. You can see again in the next couple of years there's really very little activity occurring. But once we hit that 2015 point when new projects - when new transmission lines are placed in service and the new generation is allowed to be built, there's a very large economic impact.

In the peak years we're looking at 10,000 to 12,000 employees in the State of Wyoming -- these are Wyoming residents. Certainly there will be others that are employed as a result of these projects outside the state, and some that will probably come into the state to work on these projects that are not counted here. This is just looking at the Wyoming results.

You can see there is actually when we just look at it on a project by project basis the results are quite large during construction and somewhat less during operations. But again as I mentioned before if we average the construction period results out over the full period of construction, then they start to look a little bit closer together.

So I wanted to put some dollar amount to this. Here is where you can see the individual contribution in terms of economic output and jobs -- the full time equivalent jobs for the different types of infrastructure. To some extent this is a function of the amount of investment.

So we're not necessarily saying anything in this case about natural gas and whether it has a large amount of jobs and economic output associated with it relative to the other technologies. It's just in this case it was simply building much less natural gas or spending far less on natural gas than we are on transmission and wind.

You can see that actually transmission is quite a large contributor to both jobs and the economic output during construction, but much less so during the operations period. During the operations wind is by far the largest contributor to local jobs and economic development.

Something else that you may be interested that we often highlight in our analyses as well, is the direct payment to government and land owners. In this case this is the wind result. Wind is again also by far the largest contributor to the local government and land owners in this specific scenario or in this set of projects.

You can see sales taxes assessed on these equipments is quite large during the construction period. It dwindles dramatically during operations but it's still certainly not trivial -- a few million dollars per year in sales tax. But then the landowner lease and property tax payment become a bigger proportion of the direct payment during that operations period.

Wyoming actually also has a wind generation tax. Currently it's $1 per megawatt hour. It kicks in after the project has been in operation for three years, and you can see that’s the reddish color there that ramps up over time to about $28 million per year.

So the final conclusions from this study. Essentially - and actually these conclusions capture the full range of impact we estimated with our different scenarios. We're looking at about 4000 to 6000 workers per year employed during construction, $200 million to $330 million in wages and wind is about 45% of that.

Transmission as you might have guessed was about - also about 45% as a construction period employment. So that’s one of the things that’s interesting

about transmission is that even though it's only about 20% of the initial capital investment, it's a very large - a much larger proportion of the actual jobs resulting during that construction period.

And that's primarily a function of the fact that building transmission lines is somewhat labor intensive, especially relative to wind projects. Wind projects although they do generate a significant amount of jobs and economic development, much of that is in the manufacturing sector.

And so if you're not manufacturing the equipment for your wind project in the state where the project is located, you're not going to have the opportunity to benefit from that and - or those types of project expenditures on the wind side.

Transmission is a little bit less capital intensive in that regard and a little more labor intensive, though it has a proportionally larger job impact relative to the initial investment.

During that operations period, again about 2300 to 2600 workers for a minimum of 20 years. The transmission and natural gas facilities in our scenario will likely operate you know much longer than 20 years, probably 30 or 40 years and wind projects might operate longer than 20 years as well. They are typically financed on a 20 year basis but operations from 20 to maybe even 30 years are not inconceivable.

As I mentioned, wind is the primary contributor of jobs and economic development during operations. It's about 70% of employment, and then you can see those numbers for land lease and then property taxes that were highlighted on the previous slides. You can see those again.

In terms of economic output, our peak years are $1.2 billion and $1.4 billion and we're about $380 million per year during operations period only. You can see some additional detail on the numbers there for wind and transmission.

And you can see that during operations transmission there's only about 14%, so it's actually a little bit less or it's relatively proportional to the annual operations period investment for transmission unlike during the construction period.

So in total, the state of Wyoming is looking at the potential for $12 billion to $15 billion of economic activity from these set of projects should they come to fruition. That's during construction and a 20-year operations period.

But this is only about 30% of the total available economic activity that could potentially accrue to Wyoming. That's because much of the equipment that's going into these projects is unlikely to come from Wyoming. That's starting to change.

The state is targeting some manufacturers and they have at least one power manufacturer announced to be located in the state. We do in our high scenario and assume some instate tower manufacturing and blade manufacturing. And it looks like ours results - should the current trend continue, the manufacturing may be - may result in actual impact to Wyoming being towards the higher end of our results or possibly even exceeding those.

And total wind is again a good portion of the economic output, about $8 billion to $10 billion worth. So that's all I have for right now and I look forward to your questions.

Ian Baring-Gould: Great thank you Eric. Our last but certainly not least presenter is Peggy Beltrone. Peggy was a county commissioner for Cascade County up in Montana for quite a few years and worked very closely with Wind Powering America to look at the kind of county effects of wind development, and then after that has moved to Exergy Integrated Systems where she works on development primarily of community scale projects.

So Peggy comes to us with a great experience from a public official point of view, looking at the impacts for their community but also as a developer, and how developers can use the tools to be able to understand what the impacts of their projects are. So Peggy, please.

Peggy Beltrone: Well thank you Ian, and I sure appreciate being able to be on this webinar at this point because I am so appreciative of what Wind Powering America has done.

And with that I think I'll go to my second slide which is a little photo that we took about oh, probably eight years ago when Cascade County started its wind promotion efforts. And we were sort of just trying to get the word out that we had a great resource, but we really weren't able to quantify the economics of what bringing this resource into the county would mean.

And as you can see the wind (unintelligible) shows we have quite a resource and we do have Class 4 and 5 wind throughout the county and wanted to see the economic benefits.

Another reason on the third slide you'll see that we are heavily impacted in the great plains by property, and in fact counties - a neighboring county had received the distinction of being the lowest wage county in the country. So we

were focused on jobs probably before the rest of the country got so focused on it with our recent economic downturn.

And I was so grateful to have the resources of Wind Powering America, and especially when Suzanne started working on her JEDI model. And I was very encouraged that we would get tools as elected officials explained to the public what kind of impact it was.

On the first project that was done in Cascade County, we didn't have access to that information. We had a sense that there would be a great economic impact from the property taxes we would be able to collect but didn't really have an idea of some of the other benefits.

So it was later -- and I'll go to my next slide now -- when we had a chance to see a transmission project open up the wind country in our area that we went to NREL and Suzanne and had some numbers run not by the transmission investment itself.

And I'm glad to hear Eric is looking on the transmission JEDI model, but we just said, “What would it be if we had 600 megawatts of wind power associated with this in Montana under its pipeline in North Central Montana; what would that do for us?”

And so on the next slide you'll see the slide that we had developed and took around to the various public meetings, where we tried to put on the table what the actual economic benefits to the community as the discussion was unfolding about the benefits of this transmission line.

And it was very helpful. We were able to speak in real terms to people and I would say that this information was quite effective. We did have legitimate

concerns from landowners about the routing of the transmission line and those were and are still being addressed.

But I think that what I heard from most landowners was sort of an absolute acknowledgement that the communities and the state would benefit economically. And they didn't want to stand in the way of what this transmission line and its 600 megawatts of wind would bring to its community, but they had other concerns.

And I - that told me time and time again when we had opponents who got up to speak, that they recognize the economics, that this model had been very effective for us.

And I think that you know it's been very well explained what these impacts are, so this definition slide I think we can just pass right through. I just wanted to give one slide of Anaconda, Montana, because today as a wind developer we are working in Anaconda, Montana, which is a super fun, impacted community.

And as you can see, the vegetation around the community has been impacted by a (unintelligible) operation, and that is the desire of the government in the city county of Anaconda to have wind on those hills. And so there's not a lot of other use for that -- the areas around the community.

We were able to quantify the impacts of the project that we proposed to the local officials in Anaconda by using the JEDI model. And its just an example to me of how I have been able to be involved on both sides -- the local government and the development side -- in using these tools.

And I appreciate they are evolving, that Wind Powering America has a good sense of what's needed for the continued promotion of the renewable energies that we so desperately need to have going forward in this country. And for this - and on that and we look forward to questions that anyone has. Thank you Ian.

Ian Baring-Gould: Great, thank you Peggy. Nice examples of projects that are out there, that we've used the JEDI tool or that - no, we've used the JEDI tools but people have used the JEDI tool.

And just to point out that the tool is available online as Suzanne says for communities to be able to take the tool and either look at it on a state basis, on a county basis, on a community basis to determine what the impacts are going to be.

So as we talked about it at the beginning we're going to head into questions, and I would like (Sharon) to come back on the line and explain again how people should raise their hands in this electronic universe.

Coordinator: Thank you. At this time we'll begin the question and answer session. If you do have a question please press star 1 on your touchtone phone. Please unmute your phone and record your name at the prompt.

That's star 1 if you have a question, star 2 to withdraw your request. One moment please while we wait for the first question. Our first question comes from Simon Mayhem. Go ahead your line is open.

Simon Mahan: Hi this is Simon Mahan with the Southern Alliance for Clean Energy. Great presentation guys. I'm a big fan of the JEDI model. I'm wondering if the model has been used or if you guys have thought about developing a little bit

further to kind of quantify the environmental benefits of a proposed wind farm, particularly like water consumption.

Suzanne Tegen: So this is Suzanne...

Man: Suzanne.

Suzanne Tegen: Yes. We have not - we're not considering adding an environmental impact right now because other - are other people at NREL and other national laboratories who are already doing environmental impact work.

So I understand what you're saying, that it would be nice to have this - just kind of do all of it. But right now we're not funded to do that and it's not in the plans unfortunately.

Ian Baring-Gould: Suzanne this is Ian, just kind of as a follow up. Can you give recommendations to Simon or anybody else out there on some tools that they might be able to use to look at the environmental impacts of projects, if they know how many megawatt hours of projects it's going to produce?

Suzanne Tegen: So NREL does have some of that. And you can email me and I can put you in touch with the right people. It's going to be different whether you're looking at sort of you know carbon or if you're looking at water use. I don't know if there's a tool that can calculate water use for you. We do know there's probably a formula, so email if you're - if that's what you're interested in.

And then there are other organizations like Union of Concerned Scientists and others who do kind of environmental work on a per project. You know, they'll look at a project and say, "You know, this is what we think the environmental impact will be."

But it depends kind of what you're looking for, but people can definitely email me and I can point you in the right direction if you tell me specifically what you're looking for.

I know that there are other national laboratories that also work on this. Pacific Northwest National labs work on this too as well, so it really depends how specific people want to get.

Ian Baring-Gould: This is Ian. I'd also point out. The Western Resource Advocates have just released two documents -- white papers -- that I believe are on their Web site that address water issues and in the power sector. It's mainly focused on the West, so I'm not sure how applicable it will be for you Simon, but people can also look at Western Resource Advocates.

Simon Mahan: Great thank you.

Coordinator: Our next question comes from (Kathy Jensen). Go ahead Ma'am your line is open.

(Kathy Jensen): Hi I was just wondering if you know if this JEDI model has been used before on any projects for environmental impact statements for the economic portion in the past. Are there any examples of that?

Suzanne Tegen: I don't know about economic impact statements. I do know that we - there are States Energy Offices and Public Utility Commissions that have used the JEDI model for if - you know, if the questionnaire that they're filling out asked for jobs information.

They have used the JEDI model and actually developers have done that too. So yes, they are using that and I'm not sure about environmental impact statements, but I know like PUCs are - in some states have done this.

(Kathy Jensen): Okay thank you.

Coordinator: Once again, if you have a question it's star 1 on your touchtone phone. Unmute your phone and record your name at the prompt. Your name is required to introduce your question.

Our next question comes from (Ben Chowkovski). Go ahead your line is open.

(Ben Chowkovski): All right thanks. Yes I support the offshore wind program at Department Of Energy. And I'm just wondering if variant of the model has been developed for offshore wind and if so, how is that done considering that there are no projects in the U.S.?

If I can ask this late follow-up question, I'm wondering if there are competing models that accomplish similar things as the JEDI model and whether or not you can compare the JEDI with those variants. Thanks.

Suzanne Tegen: Okay. If I missed part of your question maybe - okay. So I'll answer those last ones first. There are other models that look at economic impacts. There are no other models that look at gross economic impacts specific to projects like the JEDI model does, but there are more complicated models. There are kind of metric models and there are other input/output models that kind of use the same backbone that JEDI does.

They're - we get our data from the Bureau of Labor Statistics and the Bureau of Economic Analysis as well as the U.S. Census, and the kind of the model that JEDI uses for the background model is called IMPLAN.

And so IMPLAN is something that people could go out and use instead of just using JEDI. It's much simpler to use JEDI if you're not a modeler and if you don't know a lot about the technology and that kind of thing. But IMPLAN is one of those.

And also there's a - there are other models -- RIMS and REMI -- and there are a number of other models. I guess I should say a handful of other models that do the type of economic filing and look at jobs and most of them can also look at net jobs.

Those ones will cost upwards of $30,000 to run because you have to purchase all this economic data and you're looking at the multipliers and that kind of thing. So that's one comparison, is that JEDI is free and JEDI is already organized into the categories that you need for whichever technology you're looking at like wind. And so there's nothing else quite like JEDI but there are other - you know other tools that you can use if you have funding.

And there is a good report on this by the environmental protection agency comparing different models like this and maybe you can send me an email and I can send you that report. I believe Denise Mulholland is one of the authors of that report from EPA, so you can try Googling that otherwise I can send you the report.

And then there has been a little bit of work done on the offshore JEDI model. We don't currently have funding from the Department of Energy. So since you are from the Department of Energy, you can nudge your colleague and

ask them if they're interested in funding the offshore JEDI model a little bit more.

So we really are interested in this. We know developers; we know industries and particularly state energy officials are interested. We know people in the supply chain are interested in offshore wind jobs and we'd really love to get going on it. So we're very excited to do the offshore wind model and we're optimistic that we're going to get funding for that and be able to come up with a model within the next year.

Eric Lantz: Just a couple of comments to add to that. This is Eric. The - I would say, one of the big things that the JEDI model offers that the other models don't is that it has the project cost allocation or essentially the category for each expenditure, whether that's for blades or installation labor or foundations -- all that's already broken out for you.

If you want to use one of these other tools that Suzanne is talking about, you would have to develop your own breakouts for that and that's based on our data collection with industry and others as well as the local share values. They are already provided for you.

And if you were to use one of the other models you would have to develop your own set of local share values. Otherwise you know our model essentially uses the IMPLAN data, and so if you did everything on the front end the same and used IMPLAN, you would probably come up with very similar if not precisely the same results.

To the offshore piece I think you also asked, you know, how would you do that if no projects have been built? Well just because no projects have been built doesn't mean there aren't people out there costing different parts of an

offshore project, whether that's the vessels and the foundations and the turbines and things like that.

And so to some extent those data do exist such that we can develop you know a general and a rough outline of where the expenditures for projects are going in the economy and then use that to estimate jobs from those projects.

So essentially we would have to query project developers and collect that data that - or those data that do exist from preliminary estimates and from you know contract bids and things like that.

Coordinator: Our next question comes from (Anna Burroughs). Go ahead your line is open.

(Anna Burroughs): Hi, this is (Anna Burroughs) from the Union of Concerned Scientists. And I was just curious if Suzanne or Eric or both, if you could speak a little bit more about - you mentioned the difference between wind jobs and gas jobs and that typically wind has more per megawatt installed but maybe not more per megawatt produced.

So I was just wondering if you could talk about the factors that influence whether wind or natural gas would have or other technologies as well.

Eric Lantz: So...

Suzanne Tegen: Go ahead.

Eric Lantz: I'll take a stab at that. So there's a variety of variables for which of these types of analyses are pretty sensitive, and you know first off, it's the local share value.

So if you're doing the analysis at the state level, it's really - the biggest driver that determines you know which technology is going to produce more jobs per unit of energy or potentially even per megawatt of installed capacity, it's going to be you know where their labor, where their equipment and where their material is coming from.

In addition on the fossil side if you include the mining or the drilling economic development activity that might be associated with the project, and you attribute that to a specific project, and that mining or drilling occurs in the state where the project is built, then those technologies often see higher levels of job creation than wind.

With that said, if we want to take a step back and look at it on a little bit more of a national level, then it depends a little bit more on where your equipment is coming from. And I think with the increasing U.S. domestic manufacturing of wind turbine components and things like that, I think at the national level wind is certainly starting to compete in terms of both jobs per unit of energy and jobs per unit of installed capacity.

And particularly if we look at whether the manufacturers that are located in the U.S. could export to other parts of North or South America, then the wind related jobs start to look even better.

So I guess the short answer is that you know it really depends on a lot of kind of project or the broader level industry specific variables -- where that equipment is coming from, where the labor is coming from and so on. Did you want to add anything to that Suzanne?

Suzanne Tegen: I guess I just wanted to say that if you do those comparisons, you can run different JEDI models and do some comparisons. But yes, it really depends on the project per project basis and it really depends on the state.

The workforce also and it also depends - I mean, I also just wanted to caution that you shouldn't compare per megawatt. You want to compare per megawatt hour because what you're looking at is the amount of electricity produced and that's what you want to compare.

Because for - you know for a wind project you have to kind of factor the capacity factors in there, and so you know wind - because the wind doesn't blow all the time and that kind of thing, so you want to compare on an electricity basis or megawatt hour basis and not megawatt basis. So I would just say that.

And at least a few years ago when I was running a lot of these analyses, for some reason the wind developers were hiring more instate workers. They were hiring more local people. And coal and national gas power plants that were being installed were kind of being installed by crews that would go around the country, and so they weren't necessarily using the instate laborers as much.

But as wind you know becomes more and more popular in the U.S. and we install more and more that might happen as well, specifically in the industry. We don't know it. I mean, some developers are great about using local workers and some don't care as much. You know that's not their thing. So it just depends you know what the developer cares about and what the deal is that they've worked out with their state or their county.

I mean, you know your local area can specify and say, “You know if you develop here, you need to use X percentage of local workers,” and that kind of thing, so it's really site dependent.

Coordinator: I am showing no further questions at this time.

Ian Baring-Gould: Great. Well we're two minutes over. So again I would like to formally thank our three speakers -- Suzanne, Eric and Peggy -- for taking the time to - from in some cases their vacation to come and talk to us. Again I want to say that the next webinar is kind of an update on offshore wind technologies.

That’s ahead of the Offshore Wind Conference that’s coming up, so we're still in the planning stages but hope to have representation from the industry DOE and then the Department of Interior to talk about the current status of offshore wind development. And then looking into October wind and wildlife will be the focus of our webinar, so again the third Wednesday at 3 o'clock eastern.

Thank you all for taking a little bit of your end of the summer to spend with us and learn a little bit about economic development, and clearly if you have any questions, comments or concerns please don’t hesitate to contact any of us. Thank you all and have a wonderful day.

Coordinator: This concludes today’s conference call. Thank you for your participation. You may now disconnect.

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