

**EXPLORING TOWER HEIGHTS, FINANCING, AND OTHER OPTIONS: LIVE DEMO
OF DISTRIBUTED WIND POLICY TOOL V2**

November 1, 2012

Coordinator: Welcome and thank you for standing by. This conference is being recorded today. If you have any objections you may disconnect at this time.

All lines will be open for the duration of today's conference. When not speaking if you could please utilize your mute button.

If you do not have a mute button it is Star 6 to mute and Star 6 to un-mute. I would now like to turn your conference over to Ms. Karin Sinclair. Ma'am you may begin.

Karin Sinclair: Okay hi. This is Karin Sinclair from NREL, chair of the Wind Division of ASES and want to welcome everybody to the last scheduled webinar for 2012.

Today we have a very exciting webinar looking at tower heights, financing, and other options using a tool called The Distributed Wind Policy tool.

And we'll have three speakers, Heather Rhoads-Weaver Matt Gagne and Alice Orrell.

And what I'd like to do is refer people to our notice of this webinar so that you can get a good idea the background of these three folks. But they're very instrumental in the effort that's been put into developing this tool. And so I'd like to let us spend the majority of the time looking at this tool.

So I'm going to turn the presentation tool over to Heather.

Heather Rhoads-Weaver: Thank you Karin. And welcome everyone. I did want to acknowledge we had several other team members helping us with this project.

Trudy Forsyth who's involved in this ASES Small Wind Division as well as Tony Mendez from NREL and several folks from the North Carolina Solar Center, Amanda Vanega, (Chelsea Burns), Jen Banks and a few other folks that helped to start this project a few years ago.

(Laurel Vinardo) is now separate from the Solar Center but still working on the project. And then we've had some help from (Kurt) and (Peter) with (e-formative).

And I will say we've got a fairly small group today. So we're going to take questions kind of throughout this session.

I think we have all lines open so if you don't want to have us hear you typing or talking on the background go ahead and mute your line.

But we'll let you know when we're opening the questions. And then during the demo itself we're going to try to have it just be kind of open an interactive.

So I'm going to quickly run through a little bit of background and talk about the assumptions that we made when we developed the tool.

And then Matt is going to do a user driven demo of the tower heights and then on financing Alice is going to go through a couple of exercises with that and then we'll do a little wrap-up.

And I'm especially interested in hearing what you all want to see with this and what - how you're using the tool to help us in the future.

So we've had quite a big upswing of uses on it in the past week or two here that we got some coverage in Forbes Magazine.

And now we're starting to see how the tool holds up under more widespread use. So that's great.

Just quickly here we do get a grant from the US Department of Energy to start this project under the 20% by 2030 program.

And we actually developed a full guidebook about a year ago. We've released this fall an update to it called A User's Guide.

But the guidebook has a lot of case studies that we went into quite a bit of detail. And the main thing we want to emphasize here with our tool, what makes it different from other tools is that you only have to select two initial inputs to get your results, the state that you're interested in and which sector -- residential commercial or nontaxed.

So with those two selections then you get your results and you can adjust a lot of different things. But it's all pre-populated with the policy information specific to each state. Wind resource classes are already assigned based on ranking of wind maps.

And we've assigned specific turbine models and tower heights for each of the sectors as sort of a place to start from.

And you can change all of these things in the dashboard. But having the policy feed coming right in from desire we think gives it a lot of value

because then you can see how different incentives actually apply to a specific example.

So we originally designed this for policymakers to be able to analyze different possible changes to their incentives for utilities to look at different rates and feed in, tariffs -- that kind of thing -- a lot of what if scenarios.

And we originally did not intend for it to be a project specific analysis tool. We have added a feature that you can adjust the annual energy production. So you could try to model a specific project and look at a few different scenarios like we're doing with the tower heights.

But still we are wanting to warn people this is not a citing tool. So if you want to micro sight your project there's other tools for that. This is really just to look at how the policies interplay with your project assumptions.

So just a little bit of landscape here looking at sort of the patchwork quilt of various incentives available. This was during 2011.

Since then you see in the lower left-hand corner here if I can get my little cursor to come up, a lot of these programs have either been scaled back or have run out of money that have the horizontal line.

And then the vertical lines even though these programs run the books they didn't actually give out any money for small wind in those states.

So that's something to think about too that even though a program may be available whether it's actually being used is another question.

So just real quickly on the assumptions that we made to develop the tool, we picked a set of winter events. And this latest update we actually changed a few out based on their progress toward certification and their market share.

So we really wanted to use power curves that had completed certification or at least NREL verification.

I believe there's still one in there, the northern power that was provided by a manufacturer but that it has gone through IEC testing at least so all these turbines are pretty well verified with their power curves.

So we have four major metrics that the tool gives you -- cost of energy, net present value, internal rate of return and the payback in years.

So there's four different ways of looking at it. And Alice can explain more about the differences between each one and why you might want to consider one over another.

But we did have a series of tower heights so that you could look at different tower heights and tower types with the pricing.

And it - right now there's a total of 14 different options that are preprogrammed. And like I mentioned you can adjust the annual energy output so that you can actually model other scenarios as well.

So this is just a snapshot of what the tool looks like when you come into it. And I wanted to point out a couple of things before we go into the demo that right here you can [click here](#) and download a PDF which gives you some user tips.

There's a little bit longer version of the user guide in the help section along with a glossary of a lot of terms. And everywhere you see a little I here you can click on that and pull up a little pop up box to define what you're looking at.

So that gives you a little bit of orientation to what you're looking at here. There's a menu across the bottom with various things that you can do. And then these are your main pages across the top here.

Let's see okay, just a little bit more about assumptions. Oh great that's coming up.

I mentioned that we did pick different turbines and we collected the estimated costs from the manufacturers. So, you know, they may not be representative for every state that we just have to use national averages.

Of course states like Alaska and Hawaii you might have to pay more for transportation cost so you might want to bump those up a little bit.

Same with O&M costs. It's one default assumption for the whole country. On the wind resource classes we picked a few states that we set as low class III, states like Kansas, Montana and Nebraska, North Dakota, South Dakota, Texas. Those all have, you know, more broad higher wind resources available for distributed wind.

And then we had another set of states where we picked Mid-class II as the assumption. And that is Colorado, Iowa, Oklahoma, Minnesota, and New Mexico and Wyoming.

And then we set all of the other states to the default of Low Class II. And we wanted to show that these were the sort of typical wind regimes where distributed wind turbines might be installed.

And I already kind of talked about the tower heights and power curves a bit. We can get into that more if anybody has questions.

We did enter quite a few different types of incentives. As far as grants we only included them if they were available to everyone that applied.

If they were a competitive solicitation you would have to enter that manually. So we didn't want that to be like the US (Reaps) program is not in there as a default. But you can model that and see how that would have impacted a particular project.

So we looked at tax implications of all of these different types of incentives as well, looked at a lot of policies around net metering and interconnection.

So we have a - we have a statewide net metering policy. And in a lot of cases there may be a net metering policy available to just the private utilities.

But if that was the case we assume that it was not available to the rural areas which would have the most likelihood for wind installations.

So if you see a state where we say that it doesn't have net metering and you know that it does in some portions you can use a toggle feature to turn it on.

And then we had to make some just basic assumptions on inflation, what an investor would look at for a discount rate and in some cases there were state specific issues that we had to decide how to handle.

So again we had four defaults on the home page there, two in the residential category, the Skystream and the Bergey and then a non-taxed sector so, you know, be like public schools or government agencies and then a commercial sector with the 100 kilowatt turbine.

And I should say we're using the 11 meter per ratings. So even though say the northern is - has a nameplate rating of 100 kilowatts, for the purposes of our tool we're looking at standardizing everything at 11 meters per second. So we call that one of 84 kilowatt turbine.

And that talks about our wind classes again. Again you can always look at what a lower wind speed might turn or a higher wind speed. But we wanted to keep this to the wind regimes that are most likely to have distributive wind.

So with that I would like to go ahead and open up for questions on just this intro portion if anybody wants to ask anything about our project background and our assumptions.

Karin Sinclair: Well this is Karin. I have one question. Are - is there a document or a place where the tool where one can find more information on all these assumptions?

Heather Rhoads-Weaver: Very good. Yes so as I mentioned we had originally published the user - I'm sorry the full guidebook which when you go to the main website windpolicytool.org you can pull up the full guidebook.

But that is about a year old at this point. So the document called the User's Guide does I think Alice and covers all of the assumptions doesn't it in pretty good detail?

Alice Orrell: So the longer document yes.

Heather Rhoads-Weaver: So users...

Man: Heather hopefully you will have 15 new people who were on another line waiting for you.

Heather Rhoads-Weaver: Oh no.

Man: Yes but so we've all jumped.

Heather Rhoads-Weaver: Oh no.

Man: But all we see is a blue screen. So if you haven't start of the presentation then hopefully we'll all show up and we'll be on the same page.

Heather Rhoads-Weaver: We have been going for about 20 minutes. Hi (Tim). So I'm sorry there must have been a separate dial-in sent out?

Man: And I think we need a different link for the presentation.

Heather Rhoads-Weaver: Darn.

(Trudy): Yes. So this is (Trudy). I was wondering who was on the other line. And yes we are on a totally different line. Myself I don't tend to look at my meetings just because my Internet speed is so slow.

I don't know Karin may be the easiest thing would be to just take the latest information that you already sent and resend it to everyone so they can get the webinar link. We had a pretty nice group of folks on the other phone.

Heather Rhoads-Weaver: Having a nice chat over there?

(Trudy): Well yes. And I was like doesn't anybody know a joke. And they - somebody said well where's (Larry Flowers) when you need him? I said well there you go, that's a joke right there.

Heather Rhoads-Weaver: Oh my goodness.

((Crosstalk))

Heather Rhoads-Weaver: So we need to figure out how to let you login and look at what we're looking at. Is that the situation?

(Trudy): Yes.

Karin Sinclair: Just hold on for a second here. (Arielle) can you clarify which number it is and send out an email?

(Arielle): Yes I can.

Karin Sinclair: Because I'm confused now myself.

(Arielle): Okay.

Man: So we all got on to the 888-970-4170 but we went to the wrong go to meeting. So I've closed so that's what we really need. But there still looks like there's nine people still on the other one when I closed it.

Karin Sinclair: Okay. I will do that right now.

Heather Rhoads-Weaver: I don't know how that happens.

(Kurt): This is (Kurt). I called that number and I'm talking to you on that number.

Man: Now that is weird. On the 877-491 number?

Woman: Did you call...

(Kurt): No the..

Woman: ...877 or 888?

(Kurt): 888-970...

Man: Okay.

(Kurt): ...4170.

Man: Yes that's...

Heather Rhoads-Weaver: Okay.

Man: ...the good number. It's the 877 number that wasn't as good.

(Kurt): Oh okay. Well my problem is I can't get a Web browser to work so...

Man: Yes.

Heather Rhoads-Weaver: Wow. Well this is...

Man: Were you completely...

((Crosstalk))

Man: ...were you completely through?

Karin Sinclair: Okay let's take a breather for a minute here because we were really doing a nice job of getting a summary of the background of the tool.

We haven't gone into the actual interaction of using the tool. So let's (unintelligible) a moment so more people can get on. And I think that's going to be very valuable.

Heather Rhoads-Weaver: Okay. I had a calendar item that maybe some of you had used that does look like it had the wrong link so sorry about that.

Karin Sinclair: The link changes with every webinar.

Heather Rhoads-Weaver: Yes I thought I...

Karin Sinclair: Which...

Heather Rhoads-Weaver: ...thought I pulled it out of the newsletter though.

Karin Sinclair: Oh maybe. I'm sorry.

Heather Rhoads-Weaver: Maybe the newsletter was wrong.

Karin Sinclair: May have been.

Heather Rhoads-Weaver: Too bad. Okay well here we are. We were just about to go into the demo which actually for those of you that aren't on the Live Meeting yet you could just go on to the website and follow along with us verbally.

So the Web link to open the tool is windpolicytool.org. And you do need to click through the initial kind of disclaimer and user tracking.

I think there's only one or two things that you actually have to enter on that sheet the - your user category and...

Man: Whether or not it's the first time you're using the tool?

Heather Rhoads-Weaver: If that's - yes whether it's the first time right correct. So I'm going to go ahead and turn this over to Matt.

He's going to walk through our first example here of how you actually evaluate a tower height option. And with that Matt if you'd like to walk us through.

Matt Gagne: Okay so I'm going to give everybody a minute or two to either go to windpolicytool.org and login or just for the current screen to load.

What you'll see is the actual policy tool. And you should have interact - be able to interact with it if you're on the webinar.

So what I'm going to do here is verbally walk you through a comparison of - to show you what different tower heights would do and how it would the result as they use the tool and some adjustments that you can make.

So what I want you to do is to - actually I can verbally talk you through it and you do it, you can follow along with me. You will not be able to see what I'm doing and you won't be able to see what you're doing.

So what you'll see here is the very first page. And I want Oregon is selected. We're going to look at Oregon. Down below I'll select a scenario. I want you to select commercial.

And you should see the results change over on the right-hand side along with the current scenario it should change to commercial and low class to and the MPS to 124 with 160 foot freestanding lattice tower.

But we want to change that to another turbine so we can see what the different tower heights will change the outcome.

So up on the top select Technical. And the - it's not bringing it up Heather.

Heather Rhoads-Weaver: Oh that worked for me.

Matt Gagne: Okay if it's not working for me so if it's not working for you go to the website and it should work there.

Heather Rhoads-Weaver: So did everybody see the change of results when you just picked the commercial sector?

Man: Yes.

Heather Rhoads-Weaver: Okay, super.

Matt Gagne: Give me one second. All right so click on the Technical tab. And the first thing we're going to change is the turbine. So select the little drop down arrow and scroll down until you see the 55 kilowatt E3120 100 foot freestanding monopole.

And you'll see the results change again. And then what we're going to do is change the sector to commercial if it's not already.

So if you look at there you'll see the results. We get an IRR of 10%, a payback of six years and MPV of 31,975 and a cost of energy of 8 cents per kilowatt hour.

Man: It's beautiful the link worked.

Woman: All right.

Matt Gagne: Yeah, good. You can go through the different tabs but you can select the State tab. And the rebate incentive we're actually looking at here is if you select State tab and you select the third sub tab over, its rebates and incentives, it's the capital cost rebates incremental production based rate.

So that's the main rebate here. With this turbine it's not going to change from 200,000. But we could go into - it could go into like the eight, nine for these. And it will change based on the tower height.

So let's go back to the Technical Tab. And you all can say slow down or if you have questions please interrupt. You should all have audio.

And then go back to the turbine and select the taller, E3120 the 140 foot or freestanding lattice tower. And you'll see that the MPV goes up to 60, almost 65,000 and the cost of energy goes down to 6 cents per kilowatt hour.

Man: Thank you.

So let's say we wanted to change, we wanted to estimate what a 160 foot, let's say you can get 160 foot tower for this turbine but that's not in the tool.

So what you would do is you could estimate the annual energy production. So go down to the bottom on the Technical tab and you could put in like we estimated 144,000 kilowatt hours per year.

And then you also would want to adjust the cost of the turbine. So you would go to the Capital Cost tab and then the initial capital investment in the custom input area and put a custom value. Heather did you have that value?

Heather Rhoads-Weaver: You put in something like 376,000. Just they don't actually offer that tower height but if you were able to purchase it, it would obviously be more expensive than 140 foot tower.

Matt Gagne: Right. So you could put in the custom value there based on either what you know or just estimate you could just like say well this will reasonably be more expensive because it's a taller tower.

And then you could get - you could adjust and see what the value is based on that...

Heather Rhoads-Weaver: Yes and if you think that maybe the permit is going to cost more you can put a little bit more money into that.

Matt Gagne: Right. Just because if it's a, you know, it's a taller tower you might need different permits for different jurisdictions. I mean its municipalities or FAA or whatever.

So that gives you kind of an idea of what can be adjusted. And you can obviously go through each tab and adjust each individual value based on your different scenario and different turbines that you might be hypothetically looking at if you're trying to go outside something that is currently in the tool.

So if you have any questions please let me know. You're welcome to obviously play around with the tool and try different scenarios and different states but that's the end.

If you look at the next slide...

Heather Rhoads-Weaver: Let's see, so we're going to go back to the PowerPoint now.

Matt Gagne: Yes.

Heather Rhoads-Weaver: And we do have one more demo that Alice is going to do. She will actually walk through it. But so this actually gives a summary if you want to talk through this Matt?

Matt Gagne: So this is what we just looked at, the three - well the two turbines that are in the tool, the 55 kilowatt. They're both 55 kilowatt E3120s but at different tower heights and different tower types.

So you can see the NREL energy production here of each one based - you can see what the power raises based on the tower height, the cost of energy and how it goes down and the MPV how it goes up.

And then our estimation if it was 160 foot freestanding lattice tower we output - annual energy production to 144,000 kilowatt hours per year and you can see the results the cost of energy stayed about the same and but the MPP went up a little bit.

We also adjusted the capital cost on that one just an estimate of what it would've actually cost. But you can see like if you wouldn't get much more for going, you know, another 16 feet higher tower.

Heather Rhoads-Weaver: In that particular scenario.

Matt Gagne: In that particular scenario. There may be other scenarios where you would get better results, different states or different say for like New York or I don't know where else, but maybe California. Any questions?

Heather Rhoads-Weaver: So do you want to talk through this one a little bit? I threw this together this morning so...

Matt Gagne: Yes actually you...

Heather Rhoads-Weaver: Want me to...

Matt Gagne: Why don't you do it...

Heather Rhoads-Weaver: ...yes...

Matt Gagne: ...Heather.

Heather Rhoads-Weaver: I thought we could look at another turbine as well in addition to the Endurance. The sky stream is way more dramatic if you're comparing the 60 foot tower to their 70 foot tower in terms of how it helps the economics and especially if you're in a pretty low wind regime.

So if you look at the two green bars, you know, they're - the lowest tower on the sky stream in low class two probably this wouldn't pencil out.

But if you had the Class III maybe you could use that height of tower but even better would be to use the 70 foot tower.

So I think that's the main message that we were trying to send with this is that, you know, sometimes it does make a big difference in terms of the tower height. And this tool helps you to quickly look at different scenarios.

So with that any questions on what we've done so far?

(Merrick): Yes Heather this is (Merrick). I - the policy tool is assuming the Class II or the Class III at hub height, correct?

Heather Rhoads-Weaver: Right.

(Merrick): So the big assumption in all of this is that - and this is where somebody needs to qualify the site and qualify the tower height ahead of time -- you're not going to have a low Class III at 55 feet, 70 feet, 100 feet and 144 feet. They're going to be different for all four of those heights.

So somebody needs to go in and qualify that, specify the tower height and what the wind resource is before you even plug anything into the policy tool.

Heather Rhoads-Weaver: Right and this goes back to - I'm not sure if you heard the background when we were talking about we originally developed this tool was not for a project specific evaluation. It was more...

(Merrick): Right.

Heather Rhoads-Weaver: ...for broad policy analysis to look at, you know, in general what is a best practice for my particular state.

But now we have added this feature with the, you know, you can adjust your annual energy production so you can actually use it to evaluate how your local policies impact a project.

But Alice do you want to chime in here on how we did the projection on wind speeds? I know that we did adjust the windshear from when we released this a year ago (Mick) and I think you're in the loop on some of that.

So it does make a big difference of what assumption you use for your windshear as well when you're looking at tower heights.

Alice Orrell: Yes this is Alice. We show you the wind speed in a tool as a class, low Class II, mid-Class II. But behind the scenes there's hub height specific calculations going on with relation to the power curves.

So for example the low Class II wind resource is defined as a 5.1 meters per second at a 30 meter reference height. And for the Sky scream - Skystream --

Halloween sorry -- 55 foot tower height that translates to a 4.28 meter per second speed at the hub height.

That's kind of detail that was not shown in this tool. It's calculated behind the scenes.

Heather Rhoads-Weaver: So yes (Mick) I think we're definitely agreeing with you that if you were looking at a particular site you would need to have measured the wind speed ahead of time to know what it is at any particular height. So does that help?

(Merrick): Yes or qualified it so that for example if you had 60 foot trees the 55 is not even an option.

Heather Rhoads-Weaver: Oh there you go, right exactly. But there could be a lot of site specific considerations that this tool isn't looking at. But that's a good point.

(Mason): Heather this is (Mason). And I was in the wrong group as well so I apologize that I missed some...

Heather Rhoads-Weaver: No problem.

(Mason): ...of the intro. But I was - one of the main questions I had was what you just said. I just want to make sure if there's any more that I missed on the - because I remember when I sat through one of your presentations a year ago or whatever it was very clear that this was more of a big picture tool versus a specific project guidance.

But you're saying now it can be used for more kind of practical experience as opposed to more policy?

Heather Rhoads-Weaver: Yes actually so the next exercise we're going to go through with Alice on financing I think will become more clear of how you can use it to look at a specific financing option for a particular project you have in mind.

And that may - you know, maybe that will lead to other ways you might use it but you do need to be pretty careful in all of your assumptions going into it.

Just like (Mick) is saying, we're not trying to qualify the wind resource for you with this tool.

(Mason): Right.

Heather Rhoads-Weaver: So you already have to have some basic knowledge about the project.

But, you know, if you are just trying to evaluate the difference of a loan rate or something you can use the tool for that.

(Mason): Great.

Heather Rhoads-Weaver: So we only have 20 minutes left so I do want to move on to Alice. And I again I'm sorry for those of you that had the wrong link. There was a little mix up there.

But so Alice is with the Pacific Northwest Lab. And I think I'm going to bring up the Web version of this, right? That's right.

And so you're going to see what she's doing. Unfortunately it's going to be pretty pixelated. And I know if you saw the previous slides it does look a lot better when you go into it directly yourself.

Let's see if this works. Okay can everybody see that?

Alice Orrell: It's just a black screen for me so far.

Heather Rhoads-Weaver: Oh.

Alice Orrell: Oh it's coming. There it is.

Heather Rhoads-Weaver: Okay. So I'm going to be driving the mouse here while Alice talks.

Alice Orrell: Okay. So here we go. Can everyone see what - the Policies Home Page Scenario tab?

Heather Rhoads-Weaver: Like I just clicked on Montana. Does everybody see that?

Man: Looks good. Yes.

Alice Orrell: Okay. So to demonstrate how to use the different financing features of the tool we're going to run through a few examples using the Montana commercial sector scenario.

We'll look at paying 100% of the cost up front, a loan scenario and a grant scenario. So to get started let's look at our base case.

On the Scenario Tab where we are right now we're going to select Montana and commercial. The default commercial sector turbine is the northern power 24 meter rotor diameter with 160 foot tower turbine yes, tower sorry.

And you can see that is displayed over on the right side under the current scenario box.

The default wind resource for Montana is the low Class III. So that allows the turbine to have a strong production of over 250,000 kilowatt hours a year.

The tool's default assumption is 100% equity paid up front. And that is reflected in these results. They cost of energy is - what are you doing?

Heather Rhoads-Weaver: You - I'm with you.

Alice Orrell: The cost of energy down in the results you can see is 6 cents. It's actually 5.9 if we take it out a decimal place.

So if we pop over to the state tab which Heather already did we can see that the average electric rate for the commercial sector in Montana's 9 cents. So if you're comparing cost of energy this system is doing well.

Right now let's look at a loan. State loan programs for renewal energy systems are designed to provide loans at lower than market interest rates for the purchase and installation of equipment.

Many of these programs are revolving loan funds meaning that the loan money is recycled back into the program as it is paid back.

For example Montana has an alternative energy revolving loan program open to individuals, small businesses, local government agencies and nonprofits.

The program is currently offering a 3.75% loan for ten years on a maximum of \$40,000.

So if you go back to the Capital Cost tab you see that the total capital cost is \$551,000. \$40,000 is about 7% of that total capital cost.

Let's go back to the Financial tab and change the equity contribution in the custom input window yes, to 93%.

So now you see the total loan amount is calculated for you. It's just under 40,000, 37,975. And you can see we have a flat annual loan payment because we haven't entered an interest rate yet.

But we do already have the ten year loan term in there as the default. So now let's go ahead and enter the 3.75% or 3.8%. I think it's going to round it yes, loan interest rate. So now our loan annual payments are recalculated. So let's go back real quick to the Capital Costs tab just to show you.

You'll see this line down here in total capital cost after rebates grants and loans. Now the - it's taking into account that loan of low interest total cost.

So now if you look over at the results the loan has lowered the capital cost to near zero which therefore increases the net present value.

Because the small annual loan payments are spread out over, you know, ten years that payback in IRR hasn't really - are unchanged.

And the loan interest payment tax savings are accounted for in the cost of energy calculation. They're also small amounts.

For the base case the cost of energy was actually 5.9 cents if you take it out one decimal. For the state loan scenario the tool is still rounding it up to 6 but the cost of energy is actually 5.6 so just a small improvement there.

Now let's look at a grants program.

Heather Rhoads-Weaver: Okay I was going to run the slider bars just so they would see that. If you were able to get down to like 80% with a bigger loan and of course maybe your interest rate would be a little bit higher you can see what it's doing over here in the results.

So that's just a way that you can kind of test out different possible options. But I'm going to zero this out so that we can...

Alice Orrell: Okay so yes so now we look at a grant program. We could hit the Reset button at the bottom of our screen and that would send us back to the Scenario tab and erase all these loan changes we made or as Heather just said just - we're just going to zero out the changes. And that'll take us back to our original base case. You can see the results of what we were out for.

So Northwestern Energy, a utility in Montana has a grants program. It offers \$2 a watt for wind energy systems up to \$10,000.

Loan applications are accepted through a request for proposal RFP process. So grants at the state and federal or utility levels are not automatically included in the model for this reason because most of them are awarded on a competitive basis.

So let's see what happened to our - happens to our scenario if we factor in this loan - or sorry this grant.

Assuming the \$2 per watt rate the northern power 100 kilowatt server would be way over that \$10,000 limit. So we'll just go ahead and assume that we can have the maximum \$10,000.

The tool does not have a specific variable for utility grants but we can enter this utility grant in the state Grants box on the state Sab.

So if you click over to the State tab -- headers ahead of me -- and enter in the \$10,000 I think you have to - yes there you go. Now you see that again we lowered the upfront cost and that increased our net present value.

Cost of energy, still roughly the same. It was - the base case was 5.9 cents and now it's 5.8 cents with this grant.

So in these loan and grant adjustments we made we took a positive scenario. The base case, you know, had positive results and made it even better.

So let's try the same scenario but with a different turbine and see if we can get some different results.

Heather's going to zero out everything, go back to the scenario tabs. Does anybody have any questions while she's cleaning it up?

Woman: (Unintelligible) anything.

Heather Rhoads-Weaver: Okay and I just hit the reset scenarios which is a little clicker. If you hit this Reset button in the right it's going to exit you out of the tool and reset everything so it just takes a little bit more time to get back into it.

Alice Orrell: You need to get it to yes. Get the results in the scenarios to show up. There you go. Commercial, there.

Heather Rhoads-Weaver: And then we're going to use what turbine was it?

Alice Orrell: Yes.

Heather Rhoads-Weaver: All right.

Alice Orrell: Okay so we're going to assume we're still Montana and a commercial sector. But let's say we don't need as much energy so we don't need that big 100 kilowatt turbine.

So over to the Technical tab. You can yes, click on it and then go to the turbine menu and we'll pick the Bergey 160 foot tower. There you go.

So now all of our results in the far right-hand corner have changed. I have a 5% IRR, It's not so bad but we do have a negative net present value and our payback is higher than ten years.

So let's go and add that same \$10,000 grant. So go back to the State tab and enter in \$10,000. And there you can see that an increased our IRR, lowered our payback, gave it - lowered our cost of energy and gave us a positive net present value.

So that really flipped the finance, the results that one grant for this turbine.

Now let's look at the loans. You get to zero out the grant amount and go over to the Financial tab. I'm sorry, let's go over - what did I do wrong?

Heather Rhoads-Weaver: Oh you want the Capital Cost tab?

Alice Orrell: Yes Capital Cost tab, let's look at that first sorry. So the total cost here is about \$73,000. So if we're going to get a \$40,000 loan that is a bigger chunk of this turbine's cost so it's going to have a bigger impact.

So \$40,000 is about 55% of that cost. So we'll go back over the financial tab and enter in 45% as our equity contribution.

(System), so we got just under 40. And if you wanted to place the sliders to get it a little bit closer, higher or lower you could. And there was entered in the loan interest rate of 3.8%.

So now I've got an IRR of 10%, a payback of nine years, a net present value of almost 3000. And the cost of energy is 5 cents or if you extend it out it's one more decimal it's 4.6 cents. So that's pretty good too.

What if the Montana consumer is eligible for both the loan and the grant? Let's go back and add the grant back in on the State tab and put in the \$10,000 again.

So now the results are even better. We've got a - even a lower payback, a higher net present value and our cost of energy has dropped a little bit more.

So this case without using the tool you might just assume that the grant would be the best deal is because, you know, it's almost free money assuming you can make it through the RFP process.

But using the tool to compare the loan scenario to the grant scenario allows us to see the loan is a good deal and may be preferable to certain customers. And if you can get both that's even better.

So we have on the next slide this shows all of these different options that we just compared just to summarize.

Heather Rhoads-Weaver: Trying to get to that, sorry.

Alice Orrell: That's okay.

Heather Rhoads-Weaver: Here we go.

Alice Orrell: There we go. So you can see how some of the base case we kept improving the situation with the loans and the grants. Does anybody have any questions?

Heather Rhoads-Weaver: Alice could you talk about the difference between these four different metrics, the rate of return and pay back, net present value and cost of energy, which ones you might be most interested in in looking at?

Alice Orrell: Yes we have all these different metrics depending on, you know, what the user is, you know, used to or more familiar with.

You know, cost of energy you can use to compare it back to what the rate you're already paying, what the retail rate you're already paying, you know, at the consumer level.

If you're looking for a project investment you might want to look at the net present value. Is it - does it have a positive net present value? That means you should make your investment.

Payback is simplified right because it doesn't take into account the time value of money. But that's a metric that a lot of people are familiar with. Yes, how much - how many years is it going to take me to earn back this investment?

So they just - they're not - one's not better than the other necessary. They're just trying to capture different information and give you a full spectrum of metrics to evaluate your project with.

Heather Rhoads-Weaver: So in a state like Hawaii you might have a pretty high cost of energy but because the retail rate is high there you might also have a pretty high rate of return for scenarios in my network and other states?

Alice Orrell: Right.

Heather Rhoads-Weaver: Okay any questions on either of these scenarios that we've gone through?

(Lisa Tradoki): Sure. This is (Lisa Tradoki). Do you have to incorporate maintenance costs?

Heather Rhoads-Weaver: Yes we do. Let's see if I can get back to that.

Alice Orrell: Yes we do have an O&M cost. The default assumption assumes 1-1/2 cents per kilowatt hour and that's adjustable too. It's on the Capital Cost Page tab.

Heather Rhoads-Weaver: Yes so if you go to this tab it a dollars per year, yes annual O&M. And there's an assumption that we've built-in behind the scenes for each turbine.

I believe does it scale based on the wind regime too Alice?

Alice Orrell: Yes.

Heather Rhoads-Weaver: Right.

Alice Orrell: It's based on energy production yes.

Heather Rhoads-Weaver: Right. So a windier site that's going to see more action on a turbine is going to have a higher maintenance cost.

(Lisa Tradoki): That's super helpful. Thank you.

Heather Rhoads-Weaver: So you can kind of see that by toggling through the different turbines here. I think yes, well anyway you can play with it and see.

I believe we might have a listing of all of those assumptions if you download the full user guide here. And this is where you can click on Tips to pull that PDF down.

There might be some more information about the O&M cost assumptions. Let's see right here in the definitions.

Okay so okay we used 1.5 cents per kilowatt hour as our default assumption. So it scales automatically.

Karin Sinclair: Create yes. I think I heard Alice mention that. But that's fantastic to see that all where you check the assumptions and for each of these. So this...

Heather Rhoads-Weaver: I think if you...

Karin Sinclair: ...was great.

Heather Rhoads-Weaver: ...when you're on this tab if you were to hit this button I, yes okay, so the definitions come up that way as well. If you're ever wondering about any of these assumptions you can do that like over here on zoning costs for example.

Well that's just a definition. So we have a table in that user's guide that those - all of the capital cost assumptions laid out per turbine.

So you can look at it on a grid as opposed to having to having to toggle through each one. Any other questions before we wrap up here? I think we have maybe one or two more slides.

So I mean obviously we've had a lot of good ideas of other things to do with this tool and ways to expand it and improve it. And, you know, we'd really love to be able to cover larger turbines as well.

That was not in the scope of our original grants. And we're exploring ways to try to get funding to do that.

It's just in terms of the policies and the incentives it takes a little bit of work to make sure that they're flowing through correctly.

So even though you technically could put an AEP in there for a larger turbine and adjust all of this, you know, pricing and everything the background of the policy feed may not work exactly right for the larger turbines.

So that's just something to be aware of that, you know, we would love to try to do that kind of work down the road.

We're definitely wanting to do the ongoing maintenance and updates as policies change.

Most of this is a feed that comes through a macro from desire. But it does take some manual troubleshooting with some of the calculations.

And, you know, as a policy it gets really complicated like what just happened in California that we have to go in there and fix things to make sure it's working right.

In fact just the other day we figured out there was a little mistake for Oregon that we're still working on fixing for the northern power turbine.

So we're going to hopefully be able to look more at the financing scenarios as well and leasing options and looking more at net metering.

Certainly there's maybe a limited number of sites that could use that, all of that power on-site for the scenario Alice went through in Montana.

But say you could use, you know, 60% of the power on-site from a larger turbine and sell the rest back at a lower rate, you know, how would that affect your project financing?

So those are things that we would love to do some more analysis on, some case studies. We did a ranking of states which is a very dynamic exercise. It, you know, changes weekly if not, you know, more often than that.

So one thing we could do to use the tool to compare against where are we seeing the actual installations happening?

And if the tool is showing for example that Oregon has really good economics, you know, why are there not more turbines being installed there?

And one reason is I know that our assumptions for the permitting costs are pretty low. So maybe we would do some state by state adjustments.

I mentioned Alaska and Hawaii. Obviously their capital costs are a lot higher so we could do some scaling factors if we know a particular state has higher costs for some reason.

And then with that we just wanted to thank everybody that helped with this.

And I realize I didn't get all the manufacturers names on here but for the last round of updates we did get a lot of help from the seven companies that gave us information. We really appreciate that.

We've had, you know, a lot of support for this project and we just - we hope that it's useful to you out there in the field. And if you can give us more feedback on how you'd like to see it improved we'd really appreciate it.

And here again is the link to get to the tool. And any other questions or feedback at this point?

Trevor Atkinson: I have a question.

Heather Rhoads-Weaver: Sure.

Trevor Atkinson: This is Trevor Atkinson: with Northern Power Systems.

Heather Rhoads-Weaver: Hi there.

Trevor Atkinson: Hi. How are you today?

Heather Rhoads-Weaver: Good.

Trevor Atkinson: I'm having some issues getting to see the PowerPoint and I actually missed the first part of it. Do you have a recorded version available or are you going to send out a copy of the PowerPoint so I can look at it after the fact?

Yes so they did record this today. And Karin does it normally take about a week or two for it to get posted?

Karin Sinclair: Yes. It just depends on people's availability but it could be a couple of days or a week or so but yes it will be posted, the whole thing.

Heather Rhoads-Weaver: And that will be on the NREL website?

Karin Sinclair: Yes with a link to a think it's going to be under the Wind Power in America.

Heather Rhoads-Weaver: We will also put a link to it from this site. If you can't see it it's windpolicytool.org. And I can go ahead and put the PowerPoint up there as well. So...

Trevor Atkinson: Excellent. Thank you much.

Heather Rhoads-Weaver: I'm sorry about the glitch there with the login. But, you know, Trevor we're happy to go through this one on one with you if you'd like a little more instruction on it so...

Trevor Atkinson: Wonderful.

Heather Rhoads-Weaver: ..yes and as I mentioned (James) from your company pointed out that the incentive wasn't flowing through correctly for Oregon and we're working on fixing that.

Trevor Atkinson: Excellent.

Heather Rhoads-Weaver: So if you see any...

Trevor Atkinson: Thank you.

Heather Rhoads-Weaver: ...other little glitches or bugs like that please let us know. There is at the bottom of the menu when you're in the tool a little feedback button. And we would love to hear any comments or questions that way.

Trevor Atkinson: Okay I'll definitely take a look at it once I get -resolve my technical issues here.

Heather Rhoads-Weaver: Great.

Trevor Atkinson: So are there any more questions? Well thanks everybody for your time. And, you know, moving forward we'll probably have another demo on this I would guess next spring sometime.

And we'll we're happy to look at other case studies if you have particular questions that you'd like to see us explore.

Karin Sinclair: Okay so this is Karin again. Just to wrap up I really want to thank our three speakers today -- Heather, Matt, and Alice. I think they did a great job.

And I'm sorry that, I apologize again for the difficulty in getting access to this webinar. But as we already discussed it is going to be - it is recorded and it will be posted so you can go back and look at it later.

And just to wrap up I'd like to say that we had a great 2012 webinar series. We're in the process of developing our topic discussions for 2013.

So if any of you out there have ideas or interest in a particular topic please let me know at your earliest convenience. We will be trying to set up our bimonthly webinar series within the next month or so, month or two.

So with that I think we'll conclude and we can stop the recording at this time.

Coordinator: One moment.

END