Good afternoon and thanks for joining us I am Judy Simpson. Hope the past several months we focused on various aspects of the smart grid upgrades to Vermont’s electric grid. We’ve learned about the new smart grid meters and looked at issues such as renewable energy reliability and safety. Our focus is afternoon is how the smart grid upgrades will benefit the environment. We are pleased to welcome two guests from the institute of energy and environment and Vermont law school in south Royalton. Joining me our Rebecca wake and Kevin Jones thanks so much for being with us. Before we jump into the future of the electric grid maybe Kevin you can tell us about the law school's institute for energy and the environment.

Kevin:: Our energy institute is part of the environmental law center at Vermont law school which has the top are ranked environmental law program in the country. And our director is Michael Dworkin who's the former chairman of Vermont public service board and well known across Vermont in the country on energy policy issues. That is to two serves as a center for research on energy issues and policy and in addition to staff like Rebecca and myself Michael we have about 15 research associates which are competitively selected from top energy and environmental law students at the law school. And we work on number of different issues including our smart grid project which will talk a little bit about today we also work on issues related to energy efficiency mobile energy with Energy Security and justice program and we also have a group that works on the energy extraction issues related to oil and gas and environmental issues of taking those from the earth.

Judy:: Let's start talking about the smart grid and let's start with the basics. What does it mean when we hear talk about turning the electric grid into a smart grid Rebecca.

Rebecca:: The electric grid as the entire system from power plants that generate electricity to the transmission lines to bring electricity to the substation and then the lines that bring electricity into our homes and businesses. The department of energy to find the smart grid has the whole system from point a generation to the point where we consume the energy integrated with communication and information technology. That provides enhanced grid operations that improve customer service and environmental benefits. You can see on the screen the really important aspect here is two way communications. The smart grade technology and facilitates two way communication both for the utility and the customer so that we can receive a real time information and respond accordingly.

Judy:: Kevin what are the upgrades and what makes the grid smart?
Kevin.: The part the gets most focus on and essential to our discussion today are the new smart meters and advanced metering into structure that goes along with them. An analogy of what the changes is kind of like going from a record player or tape deck to the iPod and different technologies that are available, or going from mechanical devices to digital devices. There's a lot of benefits that this new technology provides an addition two environmental benefits that will talk about today. First of all meters will now be able to be read remotely plus when people take on a new service or need to disconnect service they can all be done from central headquarters of the utility office rather than sending a truck.

Judy.: We see the meter readers going house to house.

Kevin.: Absolutely. Not only does it save on the labor cost their but the utility doesn't have to send a truck and the associated emissions and cost of doing that. And other area that's going to be very important is today the utility doesn't know when the power goes out until we pick up the phone and call them. When smart meters are in place and the utilities develop outage management systems utilities will be able to automatically know what customers are out of service, and no whenever electricity is back in service. That will help improve your liability. Beyond the smart meters there's a lot of other technology that's been going on there in terms of putting sensors and automatic controls and distribution systems that will help improve the reliability of the system like having to send a truck out two read the meters today also an outage online and issues the utilities have to send a truck to the substation to switch some power circuits with additional technologies in the future some of that will be automated too and will add to the reliability of Electric System.

Judy.: So when there are outages they can immediately pinpoint where they are and better fix them so the outages will be a shorter amount of time.

Kevin.: Yes I think one thing important is when people first get their meter I don't think they should stop calling if they get an outage because it will take a little time for the system to be in place but over time the utilities will have systems in place so they'll automatically know are when you power is out.

Judy.: The energy institute of Vermont law school has conducted research as you mentioned about the environmental benefits of this kind of technology Rebecca what did you find out?

Rebecca.: It's really an exciting opportunity this technology creates an opportunity for customers to make more informed energy choices well simply installing this technology as Kevin said does not guarantee that will see those benefits. The department of energy Pacific Northwest national lab estimates that we could see a 12% reduction in energy in carbon dioxide emissions by 2030 with this new technology. You can see a summary of that on the screen as these benefits come from a variety of places. First customers will be able to view their hourly electricity consumption either on the web for with a smart phone app. This immediate electric usage data can also be provided with the an home display so with this information we're encouraging people to make more informed energy choices to become more and energy efficient and to change their wasteful habits. You can see an example on the screen of what your web portal or you're smart phone at what look like when this technology becomes here in Vermont.

Judy.: So you can actually see when you're using electricity and what is costing and then change habits perhaps?

Rebecca.: Yes absolutely and that leads us into the second one which is smart meters allow the utility to expand their demand response programs. This means offering dynamic rates so on hot summer days electricity is really expensive so they can reflect that in the price that you see when you're paying your electricity on an hourly basis. For example if you decide to run a dishwasher or you're close dryer in the
middle of the evening instead of 4:00 when electricity rates are really high and peak demand is happening you can save energy and save money and that's a good thing for everyone.

Judy.: That's a great thing. So a third?

Rebecca.: The third thing is electric vehicles. Smart grade technology will facilitate this much needed transition from internal combustion engines which were driving around now two these electric vehicles. In Vermont as in many rural state's most were large percentage of our greenhouse gases comes from our transportation sector so shifting two electric vehicles which are much more efficient and have lower carbon emissions actually allows us to reduce our carbon emissions as a state.

Judy.: This is part of our way to give down the road tour debt as far as having more places to charge vehicles and maybe the cost of vehicles will come down a bit?

Rebecca.: Right and it's also the technology that enables us to bring a lot more electric vehicles into our existing electricity system. Smart grade allows us to put more a lector to your calls on that system without building new infrastructure.

Judy.: Well it will cost you to charge the vehicle it's still cheaper to run an electric vehicle vs. a traditional vehicle?

Rebecca.: Absolutely you will see an increase in your electricity bill but a significant decrease and the amount you're spending on gasoline.

Judy.: Okay.

Rebecca.: The last thing is smart grade technology allows us to integrate more clean distributed generation. And you'll see this ground mounted solar voltaic system on the screen. That's a mouthful. The systems continue to decrease in price overall in Vermont has meter incentives that make it even more affordable two consumers here in Vermont. On a sunny day a modest residential system provides enough electricity to power of both a Chevy volt one of these electric vehicles we're talking about as well as provide enough energy for energy efficient home in Vermont. As we put more of the systems on the grid smart grid technology will be very important two ensuring that the grid operations are optimized and we're getting the most out of this technology.

Judy.: That's a lot to digest we've covered a lot of ground. Let's go through some of the information point by point. Kevin maybe you first. How do smart meters help improve energy efficiency?

Kevin.: The way we talk we say smart meters will supercharge energy efficiency and what we mean by that is it's kind of a lot. If you've ever driven a Prius or ridden in one what we call a Prius effect or traditionalist call the conservation effect. You get a lot of media feedback and information about your energy use and a Prius. You see what your mile per gallon usage is so by having that information you can react to it and drive more efficiently. Similarly with smart meters you'll get information feedback through in home displays and what utilities call web presentment providing your early usage. From the previous day on the web. You can go to website and see where your usage as. Historically what you see on your bills all of customer got was your total monthly usage and now you'll have much more granular information that will allow you to better manage your energies.

Like this chart that is up there the bar chart you can see that reflects monthly usage over time it does not tell you a whole lot but when you look at the turn next to it where you can see on an hourly basis where you turn on a specific appliance. You may not know that it used as much electricity annual now have a lot more
information about your energy usage and can respond to that and try to be more cost effective. Studies have shown that just providing information feedback to customers that that alone can help customers save 3 to 4% of their electric usage and if you combine that with a special rate program and other technology we have seen studies that show and people can reduce 10% or more of their electric usage just by having additional information and how to better manage their electric use.

Judy.: I think information is really important because people probably don't think about the electricity either using unless there's a power outage or something breaks and it doesn't occur to most people that one thing might use more electricity

Kevin.: Absolutely and like I said traditionally now when you get your bill that over a month later your total usage and you don't know what your cost usage. Now you will have much better information much more up to date that will help you manage your energy use more efficiently.

Judy.: Rebecca let's talk a little bit about the demand response program and have it benefit the environment?

Rebecca.: Sure as demand increases on a hot summer day for example the cost of electricity increases this is because as a region here in New England we run the cheapest most cost effective most efficient generating plants first. As we need more more electricity we start running the more costly less efficient the power plants that are producing a lot more pollution. With smart meters we can offer these demand response programs that I mentioned and those basically reward June for shifting your electricity usage from those peak times when the power plants are really expensive and generating more pollution to off peak times when the power plants are more efficient and generating less pollution usually. That's good for the utility that's good for the environment and with these dynamic rates it's good for your pocketbook because you're saving money. This can be automated with smart appliances. And program their dishwasher and say I want dishes clean by tomorrow morning when I get up to the work and your new smart dishwasher will say OK utility rates are going to drop after 8 o'clock will run the dishwasher after 8:00 or it can be you taking initiative yourself if you don't have smart appliances. I'm conscious about it I do my washing dishes and laundry and things like that in the evening when I know the power plants are not running as hard.

Judy.: Excellent. How about electric vehicles Kevin?

Kevin.: That's one of the interesting new technologies that smart grid can help integrate. As Rebecca said Vermont’s largest source of greenhouse gas emissions are from the transportation sector so electrifying the transportation sector is an area where were going to be able to do a lot for the environment. Electric vehicles are generally more efficient than the internal combustion engine. It's much more efficient to run Electric Motor in a car and it is to burn gasoline in an engine. Specially in Vermont where our electric generating resources are relatively clean compared to the national average. As we integrate more renewable energy electric vehicle will have additional benefits. As an example here as a dash for greed out from a Chevy Volt. This is actually my Chevy volt I bought a few months ago. You can look at this and this represents a trip from my house in Chittenden to the law school it's about an 80 mile roundtrip. I have a long commute into work. Even though I don't have a place to charge here at the law school the increased efficiency of the vault allowed me to get 103 MPG even though half the trip was on gasoline engine. The Chevy vault and other electric vehicles are much more energy efficient much better for the environment and what the smart grid is going to contribute is if we use smart rates that give people incentives to charge off peak studies have shown you can essentially convert 70% of our car fleet to electric vehicles without building new infrastructures to support that.

Judy.: Amazing. One last thing we should point out if you do have questions about smart grid technology you should contact your electric provider there's all kinds of information out there. Thanks so much for
joining us today. That's our program for today I'm Judy Simpson we will see you again next time on Across the Fence.

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