U.S. EPA
State Climate and Energy Technical Forum
Approaches for Quantifying Emission Reductions from Clean Energy

Transcript

Moderator: Julia Miller
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Operator: Good afternoon. My name is Chris, and I will be your conference operator today. At this time, I would like to welcome everyone to the U.S. EPA State Climate and Energy Technical Forum.

All lines have been placed on mute to prevent any background noise. If you should need assistance during the call, please press star then zero on your telephone keypad and an operator will come back online to assist you. Thank you.

Ms. Miller, you may begin your conference.

Julia Miller: Thanks, Chris.

This is Julia Miller from EPA's State Climate and Energy Program. I want to thank everyone for joining us for today's Technical Forum webinar on deciding what approach to use when quantifying the emission impacts for energy efficiency and renewable energy programs and initiatives.

We did several Webinars last year on related, more specific topics, including EPA's eGRID tool, how Energy Efficiency and Renewable Energy can impact the electric system, and quantifying the job impacts of EE/RE.

We received feedback from many of you that you wanted more general information on the range of approaches that you could take to quantify emission reductions from EE/RE, so we're hoping to provide that for you today.

We have Robyn DeYoung from EPA. She's going to give a broad overview of approaches. And then we'll have Sharon Weber from Massachusetts and Carol Stemrich from Wisconsin, along with David Sumi of the Cadmus Group, talk about their experiences at the state level. And I'd like to take this opportunity to thank them for taking the time to be with us today.

Listed at the bottom of your agenda is a web link that you can use to find all the presentations for today's Webinar as well as other background materials. Also, a recording and a transcript of this webinar will be posted at that site in the next week or so.

We're going to do our next webinar sometime in late February on EPA's Greenhouse Gas Data Reporting Tool. We haven't set the date for it yet, but we should have that information out to everyone in the next week.

And we're also planning to do a Webinar in March on some of the new work we've done at EPA to help account for Energy Efficiency and Renewable Energy programs in state implementation plans.

As always, if you have any topics that you'd like to suggest for future webinars related to energy, air quality and climate change, you can e-mail me at miller.julia@epa.gov.

So now I'm going to hand it over to our facilitator, Catherine Morris, from the Keystone Center. She'll cover some of the logistics and get us started.

(Catherine Morris): Thanks, Julia.

This is Catherine Morris, and welcome, everybody. We do have a very large audience today. Over 200 people are already on the webinar. Some of you may have noticed there was a little bit of delay in getting into the audio, and I

think we probably have some other people still entering. So we waited a little bit so everybody could get on.

You are muted, as you obviously found out. We'd like to encourage your interaction with our speakers by asking them questions through the Q&A on the Go-To Webinar screen.

You have a control bar which you can de-minimize if you'd like during the presentation, but open it up so that you can type your questions into the question bar. They'll come to the host and the presenters and we will be verbally asking as many questions as we can get to.

We have some time after each speaker to ask some clarifying questions. We'll take about five minutes after each of them have finished their presentation. And then we try to reserve as much time as possible at the end for additional questions that we weren't able to get to.

So with that, I would like to introduce our first speaker, Robyn DeYoung. She had been working at the U.S. EPA since 2010, but before that she was working at Ohio EPA in the Air Pollution division. And there she was responsible for managing the statewide emissions reduction trade credit banking program to the new source review program.

And she also developed Ohio's state greenhouse gas inventory. And importantly, she was a liaison between the Air Pollution division and the Ohio Department of Development, and also the Public Utility Commission staff.

So Robyn, we'll hand it over to you and open up your slides.

Robyn DeYoung: OK. Thank you, Catherine.

Today I'm going to talk about how you can decide which approach to use when quantifying the emission impacts of clean energy programs. And on the next slide, it gives an overview of the presentation.

First, I'll talk about some important terms that I'll be using throughout the presentation, and discuss which electric-generating units would generally be displaced when you implement clean energy policies and programs.

Then I'll transition into the decision-making process where we'll talk about some important factors to consider when you're deciding which emission quantification approach to use. And then I'll give you a little bit more detail on four different approaches.

I should mention that these four approaches are a sample representation of all of the different quantification approaches that are out there. They represent basic approaches.

On the next slide are some common terms and abbreviations. First is clean energy. Clean energy is a zero or a low-emitting option to meet energy demand, including energy efficiency, combined heat and power, and renewable energy.

Electric Generating Unit or EGU – you'll see that abbreviation throughout – is a power plant or a generator that produces electricity and attaches to the grid. A baseload EGU is one that operates near maximum capacity most hours of the day. Examples of that would be a nuclear power plant. In most cases, coal or hydro plants are baseload EGUs; depending on the region, they could also be a non-baseload EGU which brings us to the next definition.

A non-baseload EGU is one that fluctuates their generation based on changes in demand. And then the next set of EGUs are peaking EGUs. These EGUs only operate during the highest demand period.

So, for example, if you're experiencing a high electric demand day, it's a hot day, and everyone's turning on their air conditioning, these peaking EGUs are the ones that will come on when you got additional demand that you wouldn't normally see on the system.

Finally, there is the marginal unit. A marginal unit is the last or next EGU that comes online to meet demand. So a non-baseload EGU or a peaking

EGU could be that marginal unit as soon as that next EGU needs to come online to meet demand. These are some basic concepts.

The next slide is where I'll talk about when and how clean energy policy has reduced emissions. I have two illustrations here to explain this concept. On the right-hand side is a typical daily demand profile.

The baseload EGUs are the ones that are below this horizontal dotted line. So just imagine if you wake up on a Monday morning, you turn on your appliances, your lights, you go to work, you're turning on your computer. And as the day keeps going, we are increasing our demand.

As this demand starts to increase, the non-baseload EGUs are the ones that come online to meet this additional demand. And so the opportunity to reduce emissions is in the stage above the horizontal dotted line on that right-hand side.

Another example on the left-hand side is a hypothetical EGU dispatch curve. So what you have is a full week. The plants that are operating the whole entire week consistently tend to be your nuclear and newer coal plants.

And if you climb up that dispatch curve all the way to the top left-hand side, you can see that these are the most expensive units and they are the ones that are dispatched last. So if you're adopting the state energy efficiency program, the opportunity to reduce emissions are at these EGUs that are the most expensive and dispatch last.

In the next slide I've given a couple of examples of some common energy efficiency or renewable energy policies. The way you estimate the energy impact of these policies is to use a metric, megawatt hours. If you want to estimate the amount of electricity that you're consuming or the amount of electricity that you're saving, you would use the megawatt hours metric.

An important point we want to make is that capturing the energy impact of the clean energy policies at this higher level will provide the most emission benefit. So, for example, a lot of times we see people are measuring the

emission impacts at the program level. But if you start top down, you will actually see that the most emission benefit is to use that strategy.

The next slide starts getting into the emission quantification approaches. So let's talk about that. I've characterized the two approaches in different ways: the basic approach and the sophisticated approach.

A basic approach can meet your needs if resources are limited or you need a preliminary analysis. A sophisticated approach might be the way to go if you have policy options that are very well defined, you need a high degree of precision or analytical rigor and you have enough time, data and financial resources.

Our next slide gives you a little bit more detail. I've created a matrix to help you choose which method is best for you. On the left hand side of the matrix are the key considerations you should think about when selecting an approach. On the top left to right are the different approaches. The first two approaches here will be considered the basic approaches.

The last two approaches would be the sophisticated approaches. So what you can do is ask yourself several questions that will help you narrow down your options.

For example, what is the purpose of your analysis? What types of emissions are you interested in? What geographical and temporal scales are needed, and how much time and resources do you have? Depending upon how you answer your questions, you can find one of the approaches that can meet your needs.

What we want to do is now launch a poll question for you to answer to make this a little bit more interactive. We want to find out what objectives you want to meet with your energy efficiency or renewable energy emission quantification effort. So we'll give you about 30 seconds to make your choice.

Are you conducting a preliminary analysis? Are you estimating voluntary program results? Maybe you're providing general benefit information to the public, or you need to meet regulatory and statutory requirements with these emission quantification approaches.

So let's see what you guys have to say. It looks like most of you are looking to provide general benefit information and to estimate voluntary program results. Great. And then the runner up is the regulatory and statutory requirements. Excellent. Well, thank you for your vote.

Moving on – the next slide talks about some of the available data sources. And the reason why I have this here is, let's go back to the available data sources for a second.

You know, this is going to be an iterative process. You're looking at your approaches and you also want to find out the data sources that are underlying each approach. So, here we have the eGRID database, which is an EPA Clean Air Markets Division database.

If EPA's emissions and generation information isn't what you need, you can turn to your state emission inventories. For example, Massachusetts actually changed their data collection systems so that they can meet their emissions quantification approach needs.

On the next slide is a list of the four quantification approaches that I'll discuss. Before we jump into the more detailed information, I just want everyone to know that the next couple of slides have a lot of information on them. I'm only going to touch on a couple of things, the advantages and disadvantages, so that we can just focus on how to choose your approach.

But please use this other resource. There are plenty of links for you to check out more information, and you can always give me a call if you have a question.

Next slide, please. OK, the eGRID subregion emission approach. The advantage of this approach is it requires very little resources. We already have calculations set up that you can apply. It's great for annual emission reductions, regional and national estimates.

One of the limitations of this approach, though, is the most recent year of data is 2007. So if your EGU has turned over in the last four to five years then this

approach might not be the best. However, we are updating our eGRID numbers and they should be coming out hopefully very soon.

On the next two slides, we have informational resources and then we have the EGU capacity factor approach, which is another basic approach. And if we could move to the next slide here for the EGU capacity factor approach, we can talk about some of the advantages and limitations.

One advantage to this approach is that you can get the emissions at the EGU or plant level. This is great if you want to know exactly what area, what county, what small geographical area, can see emission reduction potential.

One of the limitations of this approach is that the capacity factors are approximate and they don't always account for maintenance and outages, et cetera. So it's useful but it is heavily caveated.

OK, next slide. The hourly emissions rate approach – this approach we'll hear a little more about from our Wisconsin speaker today. One of the great things about this approach is that you can look at emission reductions during high electric demand days.

If you could go to the next slide, so you can get continuously, quarterly reported data from EPA at the emission unit level. You get very refined data. One of the limitations, though, now that we're getting up into the sophisticated approaches is that this can be data intensive if you don't have the infrastructure set up. And you do need hourly load data to manage the program to make this work.

Next slide, please. And then finally, we have the energy modeling approach which is the most sophisticated approach. This is very useful for regulatory analysis. As you can see here, it uses many different parameters and user defined constraints. It also looks at the interactions on the electric grid.

If you could go to the next slide, please, here's an example for this approach, and where you can find more information. And then one more slide. Here are some of the advantages and disadvantages of energy modeling. One of the advantages is that there are EGUs that are required to comply with the cap and

trade program for (inaudible) the models are able to adjust their behavior based on these environmental constraints.

But one of the disadvantages is that it does require high intensity data. And the use of models is proprietary so you would need to have a contractor or consultant help you use these or you might have to buy some software.

And then the last slide is my contact information. If you have questions, feel free to contact me. This presentation is really to give you just a brief understanding of what things you need to think about when you're looking to quantify emissions, and what approaches are out there.

Remember, it's an iterative process depending on the data availability and your analysis needs. And our speakers from Massachusetts and Wisconsin will be able to give you some examples of work that they've done in the recent past that will also help you for your emissions quantification analysis.

Catherine Morris: Thanks a lot, Robyn.

I should have said this at the beginning when I was giving you some of the background. We have posted the web site where you can get Robyn's presentation, the other presentations, as well as background information for this webinar. It's www.epatechforum.org. You should see it on your screen. We've gotten a couple of questions about that. So, please feel free to download those either during the webinar or afterwards.

Robyn, a couple of questions came in during your presentation, one while you were talking about the marginal unit approach and the question was, are there circumstances when an energy efficiency program or measures might actually go beyond the marginal unit and affect base unit, so base load? And if so, how would you handle that?

Robyn DeYoung: Thank you, Catherine. There are – yes, there are instances where, let's say, you're looking at a certain renewable energy technology, that might be an example where it could affect base load emissions.

And so, what you would want to do is you want to be able to understand how the policy reduces emissions, maybe it reduces emissions during night time hours. And that's one of the reasons why it's affecting base load.

So you want to pick the appropriate emission factor that represents the EGUs that are reducing emissions. And so, that's really a good point there. You do want to have a detailed understanding of your energy efficiency program so that you do pick the correct emission factor for your analysis.

Catherine Morris: OK. And another question was regarding the matrix you had on slide seven. I don't know that we need to go back but it's easy to do that – on slide seven, you were showing the various approaches and one of the questions was how would you also rank those approaches in terms of the dollars, cost and resources needed to actually implement them?

Robin DeYoung: Well I do have on the bottom part of the matrix where we have time, money, and maybe the one part that got cut off was staff expertise. I would rank from least expensive to most expensive, left to right. So the base load approach would be the lowest amount of money needed because they already have the resources all ready to go, all the way up to the energy modeling where it would be the most expensive.

Catherine Morris: Thanks. Let me see if I can get one more question in here. There are a couple of questions that will probably take a little bit more discussion and we'll hold those until the end.

Another question about slides 14 and 15, are there price versus time data that would support the use of solar and wind distributed generation with respect to time?

Robin DeYoung: Can you repeat that?

Catherine Morris: Sure. Under slides 14 and 15, are there price versus time data that would support the use of solar and wind distributed generation with respect to time? Does that make sense?

If not, we can ask for whoever has submitted that question if you could – Dorothy Allen, if you could just provide maybe some clarification we can get back to you.

Robin DeYoung: That would be helpful, thank you.

Catherine Morris: OK. All right, well, let me go ahead and introduce our next speaker, Sharon Weber.

Sharon, I know you were pressed for time in joining us and thank you very much. Sharon's been working at Massachusetts Department of Environmental Protection since 1997 and in that time she has worked on quantifying the aspect of energy emissions since the adoption of the NOx emission training program back at the end of the 1990s.

She has an M.S. in Environmental Engineering and Policy from Tufts University and a B.S. in Material Science and Engineering from MIT. And I believe you're going to handle the slides yourself, Sharon, and so, we'll the controls over to you for that.

Sharon Weber: OK, do you see my slides yet?

Catherine Morris: We do. Thank you.

Sharon Weber: All right.

Catherine Morris: Good going.

Sharon Weber: Thanks so much. So, I want to cover three items today. One, I want to talk about a way in which Massachusetts has actually estimated the emissions benefits of some clean energy impact programs. And then I'm going to talk a bit about the NEEP regional Evaluation, Measurement and Verification forum and then very briefly I'm going to mention a DOE project that's ongoing in the same efforts.

In Massachusetts we have a large effort underway. In 2008, our legislature passed a law that placed a lot of effort in energy efficiency, and the result of

that has been energy efficiency plans that each of the utilities in the state have to develop. Each of them go over the course of a three-year time period.

We are spending $2 billion in the 2010-2012 time period to get benefits that we estimate will be worth $6 billion in avoided costs. And so, this is a big commitment by us. We think it's going to have big impacts for rate payers, saving them money over the long haul. And as part of that people have asked, well, what kind of emission benefits have you seen from such a program? The natural question.

And last summer, we published our first report for the 2010 calendar year. It's at the link on your screen if you want to read up on it. The initial report estimated reductions for three groups of pollutants, greenhouse gases, nitrogen oxides and sulfur dioxide.

And the simplistic way we did this was multiplying an emission factor by the megawatt hours of electricity that were saved by the energy efficiency plan. For natural gas we multiplied an emission factor by therms and for oil we did it in terms of MMBTUs, which is a measure of how much energy is in the fuel that is burned.

So getting to the point of being able to have an emission factor to multiply, though, took a lot of work and actually is the result of years of efforts.

For NOx and SO2, Massachusetts had been working with ISO-New England on a report that they put out every year that estimates the emissions associated with the power plants that are putting electricity on the grid. And I have the link there for the most recent emission rate report that they put together. So, for those pollutants we used those regional emission factors for (NOx) and for SO2.

For greenhouse gases we were in a different place. The legislature in Massachusetts requires retail sellers of electricity to report their emissions to the Mass DEP. And they require that we consider the power that gets imported into Massachusetts. Massachusetts imports a quarter of the power we use, so when I looked around for sources of emission rate data to use, you're not going to find much out there that has to do with rates that account

for the reality that some states are importing power and some states are exporting power.

So, we had to develop that ourselves and we have done that now for three years, 2006, 2007 and 2008 in a spreadsheet type approach which is posted on our Web site. We've used three-year averages in estimating the greenhouse gas benefits for our first year of our three-year energy efficiency plan. And the reason we use a three-year average is that we don't yet have 2010 emission data that we might want to marry to 2010 energy savings in an ideal world.

Since we don't have them, I hate to just grab a single other year to try to use an emission factor. It tends to distort things depending on the conditions of some particular year that you had certain power plants online or offline, so I generally like to use at least some average of a few years and three years as sort of the default. And so, we use a three-year average so that we wouldn't just be focusing on a single other past year that wasn't representative perhaps of 2010.

You have to think about why we were doing this. We were just trying to make an estimate of emissions and the energy that's saved, that is the megawatt hours and the therms and the millions of (BTUs), those numbers weren't even final when we did the emissions estimates, so this wasn't an exercise in trying to get a precise inventory or to get the credit for this, at least not to start with.

Someday maybe we'll go there, but for right now an estimate is what we needed. And you'll note on the slide that a couple of places I used the word average emissions, not marginal.

Robyn did a nice discussion about the differences between average emission rates and marginal emission rates and I guess from our perspective, in Massachusetts, if marginal emission rates that were valid were available we might be interested in using them, but we haven't been able to find a source yet that's publicly available. I have been working with our ISO in New England to see about doing some different kinds of marginal emission rate calculations and analysis to find out what the rates might be.

In the future we might move to using marginal rates but we're started out using average.

All right, I mentioned the greenhouse gas emission rates and the lingo we use to communicate the fact that we're using rates that account for imported power and that they're based on consumption as opposed to generation, and so, it's the consumption of electricity in Massachusetts, not solely the generation.

We initially did this and, as I've said, the legislature required reporters of retail sellers of electricity to report their greenhouse emissions to us and they also required the Mass DEP to establish an emissions inventory, but if you want more background there's much to read in the couple of links I've got listed there on the slide.

We didn't want to look solely at our in-state generation because it would have underestimated the emissions associated with the electricity we used, and because of legislature required that as part of the process under something we call the Global Warming Solutions Act here in Massachusetts we had a lot of public meetings and feedback from the public on how we might think about these kind of emissions.

So we actually post our greenhouse gas emission factors each year for public comment, and then the folks that have to actually do the reporting to us, they're always the best source of feedback, frankly, because they have to deal with the realities of submitting information back to us.

The one exception to what I said earlier, that folks use the average emission rate, we do allow our retail sellers of electricity to take credit for power they use that is non-emitting. For example, some of them have contracts for solar power or for hydro-power or for wind power and have a lot of interest in being able to try to get credit for that. So we have set up a way for them to each individually take credit, if they wish, for the clean power that they use which is a way that we hope encourages folks to do more of that, because if you can get credited for your good actions then perhaps you'll do more.

Challenges – folks wanted to hear how this has worked for us or been difficult for us as the case may be. A big problem on this is probably timeliness. I

think Robyn alluded to the fact that eGRID's most recent year available is 2007 data, but in our calculations for our emission factors we've gone back to some of the reporting that's done to the federal Department of Energy and to the Environmental Protection Agency, and the data that is available at – because Massachusetts imports power from or at least the New England area imports power from Canada, we've also had to think about data availability from Canada.

So, it's a quite a few different data sources and it takes quite a while for them to all be issued so that we can calculate our emission factors. We're environmental people. But we've ended up having to learn energy lingo, which has been fascinating, but time consuming.

You just have to get used to new terms and acronyms that you haven't used in the past. Similarly, because some of our power is coming from Canada, we've had to learn some of the lingo for other countries, specifically Canada, on the environmental side.

Department of Energy databases we've had to get familiar with. We had to figure out how to allow credit for clean power purchases, but while trying to remain true to the system, that is, not allow double counting. You don't want to allow some folks to count clean power and at the same time allow other folks credit for it. We have our existing renewable energy credit tracking system in New England, so we do that tracking through a system that allows us to ensure that we're not allowing double counting.

And lastly, the regulation – we thought we were being kind of broad in what we wrote in the regulation and purposely put some of the detailed methodologies out for public comment separately each year, so we wouldn't have to go back into the regulation itself and revise it. But even trying to do that, we found that some things that are in the regulation itself have needed to be revised over time, so a lot of learning.

I want to speak briefly about the Northeast Energy Efficiency Partnership. This is a regional group here in the northeast and they have been getting funding from public utility commissions and energy offices to work on an

Evaluation, Measurement and Verification forum supporting the development of consistent protocols to evaluate energy efficiency.

Overall, we think we'll get reduced emissions if we use more energy efficiency. This is really high level. That leads to improved air quality for the residents in the state, so it's probably the biggest picture reason why we would want to be pushing energy efficiency.

But we also have a big interest in assuring that air quality is considered as part of the Evaluation and Measurement process. Folks for years have been trying to get the measurements correct as far as quantifying the megawatt hours that you saved, or the therms that you saved, or the millions of BTUs that you've saved.

But now we're trying to marry that to the air quality data. We'd like some consistency if we could get it, regionally or nationally, if that's ever possible. We want to make sure that the air quality benefits are documented so that people realize that energy efficiency has multiple benefits, and it's even more reason for why energy efficiency should be part of people's thinking.

One of the questions that Julia had us focus on for these presentations was how we decided on the methodology that we used, and the EM&V forum hasn't come down on a final methodology for quantifying emissions.

But things that we've considered are things like this question of marginal rates versus average rates, where can you get that kind of data and get it in a replicable, reputable, accurate level of detail.

And doing this EM&V forum work, because it's in New England, there's already a group of air regulatory agencies that meets under that guise of NESCAUM, which is the Northeast States for Coordinated Air Use Management here in the northeast. Different states have different perspectives, so it's always helpful to go back and talk to your colleagues about the different approaches.

Challenges – terminology. Oh, just trying to keep straight the energy lingo for environmental folks and then vice versa, I often find myself having to have folks define acronyms for me.

How this has been evolving? You know, you really do need measurement and verification methodologies first to be able to get the megawatt hours and the therms and the millions of BTUs quantified accurately before being able to marry those kinds of energy numbers to emissions factors.

To a certain extent, if your energy reduction values aren't accurate enough, it doesn't really matter how you're going to marry them to emission factors. So the evolution here has been somewhat a matter of waiting for the energy efficiency reduction value methodologies to be robust enough to then bother to justify hooking them up with the emissions factors.

And then just one quick plug for a project that the Department of Energy is in the midst of right now. The Department of Energy is working with the National Renewable Energy Laboratory trying to set up protocols for measuring and verifying the savings from various energy efficiency programs, for different sectors as stated on the slide.

We couldn't support this work more. It is really, as I said on that previous slide, it's fundamental. You've got to have energy efficiency numbers right in order to then justify marrying the emissions factors to those energy reductions and coming up with estimates of your emissions benefit.

I think, there. Yes, I've got through most of what I wanted to touch on.

Catherine Morris: Great. I know your last slide has your contact information as well, which might be helpful for people who want to follow up. We got a lot of questions while you were talking, Sharon.

Going back to one of your earlier comments about how you've made the decision to rely on average rather on marginal emission rates, one of the questions was will that result in, in fact, lower emissions values for energy efficiency, since the average tends to be lower than marginal emissions?

Sharon Weber: It could. It's kind of funny here in New England, although this may be happening in other parts of the country now. Our average and our marginal rates are getting closer and closer together because we use so much natural gas, if you consider the natural gas unit to be marginal unit. Our average emission rate is starting to get close to that of a natural gas unit.

But you're right. Yes, there could be some underestimation by choosing to use average values.

Catherine Morris: And this may be a question that Sharon might want to follow up on later, but one of the audience members noted that it seems like there's one potential downfall or pitfall in all of these approaches, being that because the electricity system is very interconnected, all of your emissions may not be in state, in fact, may be regional and a lot of imported.

And so, the question was, given the geographic location of where the efficiency measures are actually implemented, you may be getting a false reading on what the emission benefits are. Do you have any advice about avoiding that type of pitfall?

Sharon Weber: It sounds like a question about the accurate measurement of the energy side of the house, energy reduction. I know in New England, we do a review every two years, on-the-ground costs and benefits from energy efficiency programs.

Actually, more frequently than that, I should say there is quality assurance done on the estimates for energy efficiency programs. So those analyses and quality assurance activities in Massachusetts' case are specific to our three-year energy specific plans.

So, I would argue that they're very localized to our state, but I don't know the situation across the country.

Robyn DeYoung: Yes, and this is Robyn, Sharon.

Catherine Morris: OK.

Robyn DeYoung: Oh, did you want me to answer it now or later?

Sharon Weber: Hi, Robyn.

Catherine Morris: No, go ahead, Robyn.

Robyn DeYoung: I guess, what I would say is that the person who asked the question has a really good point, that you do need to consider the geographical scale of your analysis. So the electricity does go across state boundaries and a lot of times, what you need to do is you need to look at either the NERC regions, the sub-NERC regions, looking at imports and exports, such as Massachusetts did, to get the right geographical boundaries for your analysis.

So those things should be flexible and you should do a little bit of investigation on what that boundary should be. When you're looking at eGRID, it has its own boundaries and there are imports and exports factored into the boundaries that are listed there.

The other thing to think about is, even if the emissions aren't happening in your area, if you're looking at criteria air pollutants, if you're downwind from an area where you see benefits from emission reductions, then that downwind area could still reap some benefits from the emissions being reduced upwind.

Catherine Morris: Thanks, Robyn, that's helpful elaboration. There were a number of questions, Sharon, also about challenges that you face with your approach. You talk specifically about allowing credit for clean power purchases and trying to prevent double counting.

Could you just elaborate on that a little bit more about how you did prevent that, or what measures or steps you need to take to prevent double counting.

Sharon Weber: We have existing tracking system called the GIS, which is not the same GIS that people typically use that acronym for – Generation Information System in this case. And each power plant that generates a megawatt hour of electricity gets something called a certificate and then somebody may purchase that certificate so you can tell at the end of the day what accounts that certificate (inaudible) in.

So when our retail sellers of electricity report to us, they can tell us, "Ah, I actually did get that particular megawatt hour of power from that particular clean power plant and nobody else got it. And I can prove that because there's this tracking system and only one person can end up with a certificate in their account." So we have the luxury of having a good tracking system already here.

Catherine Morris: Thanks. One more – let me just slip this question in because it goes back to some comments Robyn made about eGRID. Does eGRID allow you to take into the account the imported power in your region?

Sharon Weber: This is Sharon, but I'm sure Robyn might have an answer here, too. eGRID did look at imports many years ago when it was first created. But in recent years, I haven't seen it attempt to account for imports and exports between particular states.

Robyn, is that your understanding?

Robyn DeYoung: Well, that's right. I guess I ought to caveat that where the eGRID regions go across the boundaries. So within that eGRID region it is able to capture the generation for multiple states.

The imports and exports across eGRID regions, which could be larger than a state, is not currently accounted for. But you are able to get an average of (either) a non-baseload average for a particular region.

Catherine Morris: Thanks, Robyn.

There are quite a few other questions, but I'd like to move on to our next presenters. And we have kind of a tag team here. I'm going to introduce them both. Our first speaker from Wisconsin is Carol Stemrich, and she's the assistant administrator of the Gas Electric Division in the Wisconsin Public Service Commission.

She's brought her engineering experience to bear for the last 25 years on the energy efficiency field and more specifically in Wisconsin. She has been working on the oversight of the Focus on Energy program and all of

Wisconsin's other statewide energy efficiency and renewable resource programs.

She's joined today by Dr. David Sumi, who is the Executive Director of the Cadmus Group. They've been working closely together on the Wisconsin Focus on Energy program. And David, in fact, has some history that he's able to share with us about how the program started and what some of the original rationales were for selecting the approach they used in Wisconsin.

Just as background, he has over 25 years of experience in evaluation of performance measurement research. His work is to look at energy efficiency, demand side management, and quantifying not only the displaced power plant emissions from these types of programs, but also the statewide economic impact benefits and other non-energy benefits.

So I'm going to turn it over to you, Carol. And we'll get your slides up and running for you or are you going to do that yourself and then we'll move into your presentation?

Carol Stemrich: A slide is not up?

Catherine Morris: No. I'm not seeing it.

Julia Miller: We can see it here at EPA.

Catherine Morris: I do. OK, I may have lost connection. Go ahead.

Carol Stemrich: All right. Again, my name is Carol Stemrich and I work for the Public Service Commission of Wisconsin. Like Massachusetts, Wisconsin has a long history with energy efficiency. And I'm going to start out with a little bit of background on energy efficiency mainly because where we've been and where we've gone definitely influences how emissions are currently addressed.

Until about 2000, Wisconsin investor owned utilities were required to deliver cost-effective energy efficiency and renewable resource program as a result of our advanced plan, which was Wisconsin's integrated resource planning process.

This served us quite well until the mid-1990s when Wisconsin began discussing restructuring in the state. As you can imagine, some of the utilities began to propose fewer, lesser goals for energy efficiency at the time, in anticipation of a restructured industry.

We had one utility in particular that wanted to greatly reduce their goals. As a result of that, and because we wanted to have a test of a third-party delivery of energy efficiency in Wisconsin, we implemented what's called the Focus on Energy Pilot. This occurred in, I believe, 1997 through 1999, in that timeframe.

Shortly after the pilot ended, in 1999, Wisconsin Act 9 came into effect. That resulted in full third-party delivery of energy efficiency programs in Wisconsin. So the utilities were no longer directly responsible for delivering those energy efficiency and renewable resource programs. Under Act 9, our Department of Administration had oversight of those statewide programs.

In 2005, Wisconsin Act 141 made some changes to the statewide energy efficiency and renewable programs. One thing they changed was the funding source, and this was basically because some of the funds under the previous structure were diverted to help balance the budget.

They also increased funding for the energy efficiency and renewable resource program and oversight of the program transferred from the Department Administration over to the Public Service Commission.

The environmental value of energy efficiency has long been recognized in the State of Wisconsin. Under our advanced plan process, the utilities were required to monetize greenhouse gasses. And those monetized dollars were used to compare the demand side resources, energy efficiency and renewable energy resources, to supply side resources.

Under Act 9, environmental protection still was an important objective of those statewide energy efficiency programs. And that continued under Act 141 which stated that the purpose of the program should be to achieve environmentally sound and adequate energy supplies at reasonable cost.

So this leads us to why we determine emission benefits form energy efficiency and renewable resource programs. Again, as you saw, one of the major objectives of our statewide energy efficiency programs is environmental protection.

One of the objectives is to document that the statute is met. However, equally important is to appropriately reflect the environmental benefit in the evaluation of energy efficiency and renewable resource programs.

Reflecting those environmental benefits is one tangible way for emissions effects to be appropriately credited to the program. How we do this is we use a total resource cost test which began under the oversight of our Department of Administration. This was continued as the program transferred to the Public Service Commission.

And also under Act 141, the Commission was required to go through a four-year energy efficiency and renewable resource planning process called the quadrennial plan. And the Commission's decision in the planning process confirmed the use of the total resource cost test.

So how did we actually develop the method that we used to value those emissions? Under the Focus pilot, which again began in the late '90s, the Department of Administration actually requested the Lawrence Berkeley National Lab to build a method for the Focus pilot.

Unfortunately, I don't have much information on this because anyone who was around at that time is no longer around and it wasn't documented very well. However, we do know that there were several enhancements made to that method under Act 9.

Those enhancements include development of multiple load-duration curves, identification of the marginal generators during different times of the year – these include peak and off-peak for each season. We also began using additional plan specific data for heat rates in emissions and began using a subset of power plants that more closely reflect Wisconsin generation sources.

We continued to enhance the method for gathering emissions under Act 141. Under Act 141, we began to apportion the savings over each hour of the year. And we also began to base the data specific to plants estimated to be operating on the margin.

So as you can see, there was quite a progression over the years from the beginning of the DOE pilot, which began in the 1990s, all the way through Act 141, which started in 2005.

There were several key considerations in determining what method to use. As I mentioned, at first it was a fairly simple method and became more complex as the program progressed. The key considerations were data availability, the cost of obtaining and developing the data, realism and accuracy in the estimation of the avoided cost.

And we were also very interested in making sure the method we used was in alignment with the greenhouse gas protocol initiative because this was broadly accepted, and is thought to lend credibility to the result. And there has been a lot of change in the methods that we have used over the years.

Our next speaker is David Sumi, who currently works with the program evaluator that the Commission has hired, who includes the estimation of greenhouse gases in our benefit-cost analysis for energy efficiency and renewable resource programs. And as mentioned earlier, he was also involved in the early work for Focus on Energy in evaluating emissions for our program.

And again, that contact information if you have questions in the future.

Catherine Morris: So, David, we'll hand over the presenter controls to you.

David Sumi: OK, should I use my version here?

Catherine Morris: Yes, great.

David Sumi: OK. Some of the early slides here, the pace will have to be brisk through this, but some of the early overview Carol has covered quite well relating the

background and goals of Wisconsin's energy efficiency programs and the evaluation to the state's objectives.

Focus on Energy is the portfolio of programs delivered pretty much statewide and we calculate emission factors to provide estimates of the non-energy benefits that are environmental in nature but are based on the effects on generation serving the grid, that in turn serves the customers who have the Focus on Energy programs available to them.

The smaller bullet on that slide gives a summary through 2010 of the program- attributable impacts in terms of emissions and quantified emissions. A report is cited and I should mention right now that you can go to focusonenergy.com, and go to evaluation reports and there are a number of different categories. Under the general category you will find reports over the past few years relating to the quantification of emission benefit.

We can move on from this. Recently in the quadrennial planning process there was input affirming that the use of carbon values to assess DSM savings through application of time-differentiated periods reflecting the carbon intensity of electric generating units operating at the margin at that time, and then as you'll see in some slides coming pretty quickly combining that with hourly energy savings projections. So we're operating here 8760, each hour of the year.

The timing dimension, a slide or two on this, the default emission rates can be adequate for some and perhaps many purposes but it's become our view in Wisconsin that because we know that the program savings are not distributed equally across the year, and we also know from analysis of the emission data that the emission rates fluctuate in important ways, also, over each day and year or hour of the year, that we needed to focus on the movement of these two relationships to try to do our best to capture an emission factor.

And another key principle identifying marginal generation, and we've spent a fair amount of effort over the past years doing that and we got from Robyn DeYoung a good definition of margin, (inaudible) margin and it's pretty critical to getting an accurate estimation of the emission rates.

So that combined with the energy savings at different times of the day gives us the ability to estimate the hourly emissions factor and apply it to the program energy impacts. And so, here are the data sources and guidelines that we used.

As Carol mentioned, the greenhouse gas protocol gives some important guidance. We used EPA data, the hourly emissions data labeled here as (asset grade) and hourly emissions data but I'm quite sure it's what Robyn referred to as the Clean Air Markets Division database.

And so, using the approach of combining hourly emission factors with hourly savings, we get a time of savings result and we bring this principal information to bear and it gives a more precise emission factor estimation.

This is a slide you may want to go back to at the Tech Forum site with some results for using different estimation approaches for the emission factors. And basically what happens if you use default emission factors using all generation on an average in Wisconsin, you end up over-estimating the emission impacts because a lot of baseload is included in those emission factors rather than focusing on the marginal load.

Bringing this all into benefit cost analysis, as Carol mentioned, this is where in Wisconsin this particular non-energy benefit gets quantified and monetized but with the methods that were used we're able to provide hourly emission rates at the level of these four locational, marginal price period which is an important dimension in the benefit cost analysis.

And finally the advantages, and this really echoes the slide that Carol showed as well using EPA data, we think our realistic estimate of the operating margin and hourly analysis and for evaluators a favorite quote from John Kenneth Galbraith.

And so, that's it.

Catherine Morris: Thanks very much, David. A couple of questions for either you or Carol.

One of them goes back to all of the approaches that we've been about talking today, which mentions the fact that their focus tends to be more on the short-term or annual emission benefits from these types of programs, but as we all know energy efficiency programs have very long-term benefits.

And so the participant is asking, "How do you take into – how would it be different from along – what would you do differently? Do you want to capture more of the longer term emissions benefits?"

I'll let our Wisconsin speakers take this one on first.

David Sumi: All right I'll give one perspective on that. One of the other things we've done in Wisconsin over the past eight to ten years or so is to look at the trend in emission factors over time and there have been some important changes and basically it's attributable to the amount of gas fire generation that is at the margin.

And so, emission factors have been getting somewhat lower accordingly. Now to go forward in time and project is probably a reasonable objective. It's just that you will not be able to know the change in the emission factor pattern from the electric generating unit serving your NERC region. We looked at a combination of two NERC regions for Wisconsin.

With that caveat that you won't know how things are changing in the future you might, and depending on the generation portfolio in your jurisdiction and how much change you might expect, that would be one caveat.

Catherine Morris: Do you want to add anything?

Carol Stemrich: I was just going to add to that quickly. For the first time this year the Commission determined that our energy efficiency and renewable resource goals will be life cycle goals. And so, we are beginning to look at things more long term and it's likely that we'll take a look at when we do benefit cost analysis how we can bring that long-term view of emission value into that analysis.

Catherine Morris: Thank you very much, Carol.

Another question specific to Wisconsin was whether or not you have co-generation in your state and, if so, how do you handle that in this emission quantification?

David Sumi: Oil, it would, first of all, depend on if it's grid connected or not, and I'm tempted to suggest that this might fall into the category of how to handle renewable energy. And two Focus on Energy programs have sponsored and delivered supportive energy, renewable energy program and we on the emission quantification have not factored into current emission rate estimates, renewable energy because we've been assuming it's not affecting the operating margin, also it's not under dispatch control.

Catherine Morris: This is a pretty specific question and I noticed this is from one of our prior speakers, Colin High. So, David, on your slide number 12, you're talking about the time of savings approaching and Colin's question is whether or not, his suggestion is that seems to underestimate the emission rates as compared to an average emissions rate, which is usually the case considering that nuclear, hydro, et cetera is in the base load.

Can you talk briefly about the approach being used to – when matching 8,760 hour savings against emissions?

David Sumi: Well, first of all, we do not bring into the emission factor estimation nuclear or hydro and there is – there is nuclear – not much hydro in Wisconsin or the NERC region serving here but there is nuclear.

So that's not there because it's non-emitting. As I indicated in one of the slides, we do hold a role as we look at trends and emission factors overtime and we look at using different emissions factor estimation approaches and what results we get, we do believe that using an average emission factor that incorporates base load, which in Wisconsin would be primarily coal, tends to overestimate the emission effects of the programs. And that we're better looking at that margin as closely as we can so that we get the emissions for the units actually likely to be on the margin, which is going to be lower emission factor.

Catherine Morris: Thanks. I've had this question come up for a couple of our speakers so let me open it up to all speakers and I'll let Wisconsin respond first. Have any of the states looked at the embedded emissions impact from different types of renewable technologies, for instance, they provide the example of PV panels which might be produced, manufactured in an area where they're actually using coal generation for their energy resource for that manufacturing.

Have any of you looked at that type of emissions impact and taken that into account?

Carol Stemrich: We have not in Wisconsin.

Sharon Weber: In Massachusetts, our Greenhouse Gas Emissions Inventory would take into account emissions associated with manufacturing anything in Massachusetts. So if the solar panels happen to being made in Massachusetts those emissions would be accounted for in our inventory, but that's kind of a different question than, whether the power to make the emissions associated with making windmills, the solar panel or even cement for the nuclear power plant are accounted for in this process, which – in just the grid emission factors they are – definitely, not in Massachusetts.

Robyn DeYoung: This is Robyn. The processes I laid out today do not take into account the embedded energy needed to produce renewable energy technologies, for example.

Catherine Morris: Thank you. Another question has come up during several presentations is whether or not there is a distinction or some qualifications that should be made, if you're a restructured state versus a state that still has an integrated electricity system and regulations.

So, specifically, I wondered if each of our state speakers could explain what your state represents in terms of a restructured state versus a traditional regulated state and how that affects your calculations.

Carol Stemrich: Wisconsin is still a traditionally regulated state. Again, because we have a statute that requires that the energy efficiency and renewable resource

program take into account environmental impact, that is the basis for how we determine how emissions are included.

Sharon Weber: In Massachusetts, we have a deregulated electricity sector. And (inaudible) from the (EP) side of the house – the environmental side, I'm not sure that it matters one way or the other because your emissions are what they are.

If you're choosing to incorporate imported power or exports of power, that doesn't seem to me that that's linked critically to whether you're a regulated or deregulated state, but on the PUC side of the house and what one has to account for in benefits from energy efficiency, we have a court case here that says that the utilities are supposed incorporate the costs of reasonably anticipated environmental compliance programs that are coming.

So, I think that probably is more a driver for what needs to be included in the thought process of deciding how much energy efficiency to invest in, more so, than whether we were regulated or deregulated.

Catherine Morris: Thanks. Another question to both the speakers, state speakers, do either of you account for line losses when you're looking at the emissions backed out from the various sources of generation?

Sharon Weber: In Massachusetts, we do because the legislature required us to include that, so we look at wholesale level, not the retail meter level numbers, but rather the larger wholesale amount that needs to be supplied, which will shrink a little bit from line losses on it's way to the customer.

Carol Stemrich: (Inaudible) correct me if I'm wrong, but in Wisconsin, we do include line losses when we determine the savings from energy efficiency program, so they would be included in the analysis.

Catherine Morris: Good.

Robyn DeYoung: And this is Robyn at EPA, we also recommended including line losses when you're doing your emission classification analysis for clean energy policies and programs.

Catherine Morris: I'm going to go back now to a question that came up about the NEEP approach and the question is does it – is the EM&V that's developed by NEEP only for electric generating plants?

Sharon Weber: It's not for plants so much, it's for measures that one would implement, you know, a light bulb, fans, motors, so it's not about the generation of the power, more, it's more about the use of the power.

Catherine Morris: OK. Thanks for that clarification. One of our participants wants to know – having listened to all these various approaches, can you give our audience a rule of thumb about how much emissions are saved from a specific type of technology, say, wind in terms of how much fossil fuel generation is likely to be offset?

Sharon Weber: This is Sharon in Massachusetts, I'd say no.

Catherine Morris: It seems like this whole presentation has been the best rule of thumbs that you can get. You really do have to take the time to go through these various approaches.

Sharon Weber: And part of it is that each grid has its different types of power plants that supply that grid, so the benefits from a windmill, in this example, would be different in different parts of the country.

Catherine Morris: Another question for both the state speakers. Has Wisconsin or Massachusetts given consideration to an emissions performance standard for long term generation of resources in terms of say, amount of carbon per megawatt hour. It's a little bit off our direct topic, but if you'd like to respond?

Carol Stemrich: To my knowledge, it's not been considered in Wisconsin.

Sharon Weber: In Massachusetts, when we went through our deregulation, there was concern that maybe the act of deregulation would lead to greater emissions. So there actually was a thought put into doing an emission performance standard.

But what happened when we had deregulation was that many new clean combined cycle power plants came into New England. And so, actually, our

emissions have dropped due to deregulation, not increased. So that was the original concern about it. So it definitely hasn't been thought about here.

Catherine Morris: Thanks, Sharon. And I'll take one more question that went specifically, David, to your presentation. And the question was why are the marginal emissions so much larger than the time of savings emissions?

David Sumi: Our approach now is a time of savings and it is based on this combination of hourly emission factor and hourly savings. So that is where we have the analysis, that's the level it's at right now and we'll be over time, re-estimating the hourly emissions factors in part, because as I mentioned the plants at the margin do change and we'll be trying to bring even better data for hourly savings as the programs evolve. Not sure if that answered the question.

Catherine Morris: Thanks. Well, I think we'll take that as an answer and we are at the bottom of our hour here. So we wanted to just remind you because there were a lot of questions, some of them very, very specific, so I didn't take those first and we ran out of time here.

But you have the contact information on their slides. You also have the contact information that speakers shared with you that we've posted to the Web site, www.epatechforum.org.

So, if you'd like to follow up with them, individually, they've agreed to do that and with that I'll turn it back to Julia and Robyn. I know we have some polling questions to alert our speakers or our audience to.

Julia Miller: Yes. Thanks, Catherine. This is Julia. We do have a few poll questions for those of you who have stuck around to the end. So Eileen, if you could put those up, I'd appreciate it, and then you all will have, I think about a minute to complete these questions. And there should only be, I think three or four questions.

I want to thank the speakers again, I really appreciated them spending their time with us and sharing their expertise. As I mentioned early on the call, we will be sending out information on the next Tech Forum webinar, which will

held late in February on EPA's new Greenhouse Gas Data Tool. We will send out registration information in the coming weeks.

So thank you all very much for joining us.

Catherine Morris: And do fill out the poll. Are there more – a couple of questions here?

And we'll leave the poll open after we shut this down, but thanks very much for joining us today.

Operator: Ladies and gentlemen, this concludes today's conference call. You may now disconnect.

END