

Below is the text version of the webinar titled U.S. EPA Regulations and CHP originally presented on January 17, 2012.

Katrina Pielli:

Well then let's go ahead and get started. So again, welcome, folks. This is the State and Local Energy Efficiency Action Network, or SEE Action, Industrial Energy Efficiency and Combined Heat and Power Working Group Webinar. Today's webinar is focused on U.S. Environmental Protection Agency (EPA) regulations and combined heat and power or CHP. We're slated to go for one hour today, and due to the large volume of registrants for the webinar we have went ahead and put all participants in mute. We encourage you to type in your question through the chat feature of the webinar. Hopefully that will be clear to you on the right nav bar of your webinar screen. We will build in time for discussion at the end of today's presentation, but feel free to type in questions as we go.

Before we jump into the focus of today, just a quick synopsis of SEE Action. SEE Action is a state- and local- led effort that is facilitated by the Department of Energy (DOE) and the Environmental Protection Agency focused on taking energy efficiency to scale. SEE Action is composed of more than 200 leaders from state and local government, associations, businesses, NGO's, and others all working toward achieving all cost-effective efficiency by 2020. The network is composed of eight different working groups, and we encourage you to learn more about SEE Action at seeaction.energy.gov.

Today's webinar is comprised of the Industrial Energy Efficiency and Combined Heat and Power Working Group. My name is Katrina Pielli from DOE, I'm one of the staff leads, and we welcome you. For today's webinar we have three speakers. I'll go ahead and introduce them right now, and then we'll just flow straight through the discussion. Our first speaker is Joe Bryson from the U.S. EPA. Joe is a senior policy analyst in EPA's Air Office, Climate Projection Partnership Division. This division is responsible for developing and implementing a portfolio of voluntary clean energy programs including ENERGY STAR® and the CHP and Green Power Partnerships. Joe works closely with his regulatory colleagues and programs with the EPA's Air Office to ensure their programs are designed to recognize the air emissions benefit of energy efficiency, renewable energy, and combined heat and power. Joe has been with EPA for 15 years and holds a BS in mechanical engineering and an MBA.

Our second speaker is John Cuttica. John is currently the director of the Energy Resources Center (ERC) at the University of Illinois at Chicago. The ERC is heavily engaged in energy efficiency, distributed generation, and bio energy products. Mr. Cuttica also manages the U.S. DOE Midwest Clean Energy Application Center, which provides educational and technical support for CHP, waste heat recovery, and district energy in the 12-state Midwest region. John has been in the energy field for 30 years and has held previous positions at the Gas Research Institute. Mr. Cuttica holds an undergraduate degree in electrical engineering and a Masters in Engineering from George Washington University.

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With that I'll go ahead and turn the webinar over to Joe Bryson. Again type in questions as we go. We will take questions at the end of the webinar.

Joe Bryson:

Thank you, Katrina. This is Joe Bryson as Katrina said. I'm with U.S. EPA. For the next two minutes or so I'm going to cover EPA's air regulations and CHP. There's a lot of information in here. Several of the slides I will just skip directly through but wanted to include them so that you had them as a resource. The slides will be available after the webinar and I'll be providing some website contacts for information at the end and contact information for Katrina will also be provided. The topic of my presentation is an overview of recent EPA regulations.

These regulations have been finalized or proposed in the last year. Several affect the power sector. One affects the industrial sector. In addition to going over the regulations in general terms I will be highlighting the implications for development of new CHP projects as well as for existing CHP systems. After I'm done John Cuttica will go into more detail on one of the rules, the last rule I go into, and talk about the impacts of that rule and the economics of compliance with it including strategies that use repowering of industrial boilers with CHP.

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Here's an overview of the topics I'll touch on. I'm going to start by giving the key takeaways. Then I will address briefly the EPA/CHP Partnership and the role that the partnership has in this context. The bulk of my time I'll go over the basics of the rules, focusing in particular on the two power plant rules that affect the air emissions.

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At the end there will be links for additional information. So the key takeaways from what I'm going to present are what are addressed on this slide. The rules I'll be speaking of in the power sector, four rules, require the retrofit of existing power plants with emissions controls that will level the playing field for fossil-powered power plants, in effect bringing fossil-powered power plants up to a common level of emissions performance. Most of the impacted facilities are coal and oil units, coal units and oil, gas, steam units. The majority of these have been in operation for 40 or 50 years or longer and tend to be smaller on the order of 100 or 200 megawatts and tend to be less efficient. For various reasons these units have avoided putting on modern controls and these new regulations will require they put on those controls.

Specifically in terms of CHP the impact of these power sector regulations is that the electric sector will see modest increases in electricity and natural gas prices on the order of 2% or 3% increase in electricity prices nationally, on the order of ½% increase in natural gas prices nationally. In addition, some power plants will choose to retire instead of updating their controls, and this will lead to the need for new generation. These impacts will be regional in nature; some regions of the country with greater amounts of coal units for instance will have need for new capacity sooner than they would otherwise be required. In addition, because of the retirement of some units there will be very specific targeted localized needs for new

capacity as well, and that can be seen as an opportunity for CHP or any new generation to meet those needs.

The implication that the industrial sector rule will be addressing, which affects boilers, is that these units will be required to put on again kind of bring their controls up to state-of-the-art modern controls, which will require them to either retrofit with those controls, or alternatively they could choose to fuel switch to natural gas, which would avoid the need to put on the retrofits on to the boiler gas or coal units, and our industrial boilers. The relative economics of conversion to gas CHP will be significantly improved over what it would be absent these rules. What I'm going to be addressing here –

Katrina Pielli:

Sorry, this is Katrina. We've received a number of e-mails from folks saying that they're having a hard time actually joining the webinar. Please continue to notify us. We are trying to reconcile that issue and we'll get you involved in viewing the slides as soon as we can. Sorry for the interruption.

Joe Bryson:

Lastly, I just wanted to highlight that I'll be giving an overview of the regulations, but they are much more complicated than the overview I'm going to provide. You should see EPA's website for the details.

[New Slide]

EPA has a CHP partnership I'm going to talk about for just a minute. It's a voluntary partnership that's been supporting development of new CHP and existing CHPs for about 10 years and the key objective of the partnership is to recognize CHP as a clean energy resource for its greater efficiency benefits and the associated air emission reductions that come from greater implementation of CHP.

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The partnership has supported, has over 400 partners and supported the development of over 5,000 megawatts of new capacity since 2001, offers direct assistance and resources on the web, and we work closely with our colleagues at the Department of Energy who work on combined heat and power in the industrial sector.

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Importantly for this phone call, EPA CHP Partnership works closely with air regulators at EPA so that they understand the benefits of CHP projects and work to include regulatory approaches that recognize the benefits of CHP specifically the greater efficiency and the pollution prevention that comes about from that. A good example of that is the inclusion of output-based approaches in many of our regulatory programs with an appropriate accounting for CHP outputs.

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So now on to the regulations. I'm going to touch on five regulations. I'm going to spend most of the time on the first two, which are regulations that affect power plants, air emissions from power plants.

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Before I get into those I'm going to provide just a little bit of context about the power sector in EPA's work on these new air regulations. The two regulations I'll be talking about have been in the works for more than a decade and have been advanced previously and the courts have required us to come back to them. So this slide shows you a little bit about the history of each rule and how it has been a decade since we first started working on them. For both rules the benefits greatly outweigh the cost. EPA's estimate of the benefits is much greater than 10 times the cost associated with these rules, and I'll have details on this later.

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As you all likely know power plants are one of the largest sources of air pollution in the country. Coal plants are the leading source of most of those emissions, and approximately 40% of all coal plants do not have proven state-of-the-art cost-effective controls for reducing those emissions.

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Forty percent of coal-fired power plants for instance do not use SO₂ scrubbers, which have been around for about 20 years or longer now. This slide just shows you where coal plants and oil plants are located in the country. Primarily in the eastern U.S., coal plants particularly throughout the Ohio Valley, oil plants particularly in Texas, Florida, and northeastern U.S.

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So I'm now going to talk about two different air rules in the power sector. The first one is called the cross-state air pollution rule. Our shorthand for it is CSAPR, so I will just refer to it as CSAPR instead of all those words, cross-state air pollution rule. This rule was finalized last summer by EPA and the basic objective of the rule is to keep one state from significantly hindering another state from cleaning up its air. There's a provision within the Clean Air Act that allows the EPA to step in and ensure that one state's air can be cleaned up within, by their own efforts, and not impacted by other state emissions. The CSAPR rule again finalized last summer will reduce emissions of SO₂ and NO_x from power plants in the eastern U.S.

As mentioned previously the costs are much less than the benefits. Costs on the order of \$1 billion per year, benefits, greater than \$100 billion annually. Those are primarily health benefits that accrue from reducing the emissions. This rule is designed to go into effect the first of 2012, which was two weeks ago. On December 30th of last year the court of appeals stayed the CSAPR rule, which meant it was put aside temporarily until the court hears the case, which they set a date of April 2012 for. In the absence of the rule going into effect the predecessor rule known as CAIR, Clean Air Interstate Rule, which was put into effect in 2005, remains in effect until the court reviews CSAPR. So that is where that rule stands. That is the basics of the rule.

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As I mentioned, CAIR was already in effect. It led to similar results as CSAPR, slightly less strict, but started several years ago. The courts required EPA to revisit the rules of CAIR and replace it with the new rule, which is what CSAPR is seeking to do. Not going into the details of what the court required when they asked EPA to redo the CAIR rule.

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In order to comply with CSAPR, states, CSAPR is structured as multiple cap and trade programs.

I'll give you a little more detail in a minute. There are four different cap and trade programs established by the rule. Through the rule, EPA will see compliance by power plants by doing a number of different strategies. They can improve the efficiency of their power plants, they can put on SO₂ or NO_x control equipment, they can accelerate or develop a new clean energy sources, they can shift to lower emitting units, they can switch fuels, and then lastly they can do nothing on their unit and simply buy allowances from other sources that over-control. So because it is a cap and trade program CSAPR does not require every power plant to make investments and controls on the power plants. Some will. Some will do more than they need to do in effect, and the ones that don't see fit to put on controls can buy allowances from the marketplace.

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Slide 16. This shows that parts of the country affected by CSAPR and which states are controlled for which, for SO₂ annually, NO_x annually, or ozone season NO_x. I wanted to briefly touch on the economic impacts of the rule that in an indirect way would affect CHP project development. EPA's projections of the economics of the rule are that CSAPR will lead to national electricity price increases on the order of 2%. It will vary regionally. Some regions prices will not go up at all. Some regions the prices would go up as much as 4%. Natural gas prices on average nationally would go up less than 1%. EPA projects that approximate 5 gigawatts of older coal units and oil steam gas units would retire instead of investing in controls or otherwise complying.

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I'm going to go quickly through a next series of slides. These are in here mostly as background about CSAPR. This slide shows the impact that CSAPR is seeking to address. This shows which states affect the clean air in other states.

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Just to give you a sense of the interconnectedness of the eastern states air quality. This shows the cities and counties in the country that in 2003 through 2007 did not meet clean air standards as set by EPA. These places have unhealthy air.

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Once CSAPR is in effect the impact is shown on the following slide.

[New Slide]

Whoops, sorry about that. And as you can see we go from many dozens of dirty cities to just a few left.

[New Slide]

And that is the impact of the training program. The next two slides go over the benefits, and show that primarily the benefits accrue in the places where the investments are made in the eastern U.S.

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And the next few slides show the specific reductions in SO₂, annual NO_x and summer NO_x that accrue across the region and in the individual states.

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Last I wanted to highlight the treatment of CHP under CSAPR. The units that are affected are

greater, are fossil-fired boilers and combustion turbines that serve generators greater than 25 megawatts and produce power for sale. This definition includes CHP facilities that sell greater than or equal to one-third of their electrical output and are greater than 25 megawatts.

Allowance allocations under the rule are given out within the state to sources on the basis of historic heat input. Beginning in 2014 states can replace the federal allocation with their own approach through something called state implementation plans and would have the flexibility to do allocations on a different basis including allocating on an output basis or using set-asides to reward energy efficiency, CHP, or renewable energy.

[New Slide]

The next rule I'm gonna talk about is mercury and air toxic standards. This was finalized just last month in December and controls hazardous air pollutants from power plants. Unlike CSAPR this is a standard that applies to all affected power plants, so either you meet the emissions standards or you don't, and if you don't you would need to retire the unit. It does not have the flexibility of a trading program where you can buy allowances to keep operating.

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The compliance with MATS, Mercury and Air Toxic Standards. Shorthand is MATS, the Clean Air Act gives three years and a fourth year if needed to comply.

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EPA is also making clear that a pathway exists for any reliable, reliability critical units to obtain an additional year as allowed for under the law. I'm not going to go into the details of the impacts of hazardous air pollutants that are controlled under this, but they are included here.

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And as highlighted before, again in terms of toxic pollution power plants are key opportunity for reductions. Other sectors of the economy have already gotten dramatic reductions including municipal waste combustors and medical waste incinerators.

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Mercury and Air Toxic Standards will affect about 1,400 coal- and oil-fired units and about 600 power plants. The standards are set at a level of the average performance of the 12 best performing sources in the category, which just points to the fact that these are proven existing technologies for emissions controls that the remaining power plants are being required to install.

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I have several slides here on the benefits of MATS that I'm not going to go into except to say that again for every dollar spent complying with this rule, there are \$3.00 to \$9.00 in benefits that accrue.

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Lastly I wanted to address the treatment of CHP under MATS. It's similar to CSAPR in that it is applicable to coal, in this case coal- and oil-fired facilities that sell greater than or equal to a third of electric output and greater than 25 megawatts. CSAPR also applies to all fossil units. MATS just applies to coal- and oil-fired units. The form of the standard is output based for new sources and can be either output or input at the discretion of the source or existing sources, and CHP is credited for its thermal output.

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There are two other power sector rules, neither of which have been finalized. One addresses cooling water, one addresses coal combustion residuals. The cooling water rule was proposed last year and will be finalized this summer. Its effects will be determined by state implementation of the specific rules that have to do with the cooling water facility at the plants. Coal combustion residuals was proposed in 2010 and will be finalized as expeditiously as possible, but, no specific date has been set for its final implementation.

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Lastly I'm going to talk about the industrial/commercial/institutional boiler rule. The shorthand for it is Boiler MACT. This rule was proposed in June 2010 and then finalized in March of last year. EPA went through a process called reconsideration and issued a reconsideration proposal just last month and schedule, and is scheduled to release a final rule in April 2012, so this in effect has been proposed last month or re-proposed in effect and will be finalized in a few months.

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Like the MATS rule this effect has reduced the air pollutants from, in this case, industrial boilers. John Cuttica is going to go into more detail on the impact of this rule. In short, facilities are affected if they emit more than 10 tons of a single hazardous air pollutant or 25 tons per year in total of hazardous air pollutants. There are over 750 affected facilities that have units that burn coal, liquid fuels, and biomass.

Dallas Elgin:

John Cuttica should now have control of the slides.

John Cuttica:

Joe isn't finished though, is he? Or do you want me to start, Joe?

Joe Bryson:

Yeah, I had a couple more slides to do.

John Cuttica:

I don't have control of them either, Dallas.

Dallas Elgin:

I'm giving them back to Joe.

John Cuttica:

All right.

Katrina Pielli:

While we're waiting, folks, we understand that the connectivity issues of logging into the webinar have been resolved. If you're still having issues you can email Garrett Shields at BCS, and we do apologize for all of today's technical difficulties. The webinar recording will be posted as well as the slides so you will be able to access them after the webinar and we will send out an email when those are available to you.

Joe Bryson:

Finishing up on what we're calling Boiler MACT, the rule affects fossil units, but in particular sets standards for coal, oil, biomass, and processed gas units. Natural gas and refinery gas units only require...or simple annual tune-ups. The coal, oil, biomass and processed gas units

depending upon their size require them for tune-ups, one-time energy assessments, and specific emissions limits for the larger units, addressing four or five different hazardous air pollutants or proxies for them.

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There is also a rule that affects smaller sources, the area source rule. This too is split up between smaller units, larger units, natural gas and refinery gas units as well as coal, oil, biomass, and processed gas units, and only for the larger units and the oil and coal fuels are standards that require emissions reductions.

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And lastly, here is where you can go for additional information on each of these five rules. Now I'll turn it over to John to talk about Boiler MACT, the characteristics of the affected units, and the different compliance strategies possible.

John Cuttica:

Okay, Joe. While we're waiting for the control to be sent over to me, which I don't have right now, I hope everyone was able to get on and now has access to the slides. And here we go. Let's see if it works.

[New Slide]

There we go. Okay. Thank you, Joe, and I'll be focusing on the Boiler MACT proposed standard as Joe said and how combined heat and power, what we refer to as CHP, might be considered both a technical as well as an economic strategy for companies to consider when complying with the standards requirements. What I'd like to do before I go on is I'd like to point out that Bruce Hedman of ICF International and his very capable staff developed the analysis that I'll be reporting on today.

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The Boiler MACT proposed standard addresses hazardous air pollutants from facilities with boilers and processed heaters both that are deemed major sources of industrial, commercial, and institutional, or as the slide says, ICI market areas.

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The emission limits pertain to mercury, particulate matter, hydrogen chloride, and carbon monoxide. Joe already addressed some of these requirements and impacts in his presentation, so I will very quickly reiterate that the significantly impacted boilers and processed heaters are those that are fueled by oil, coal, and biomass. Natural gas-fueled units can comply with the regulations by ensuring that they receive proper tune-ups. The emissions limits for the affected categories must be met at all times except during start-up and shutdown of the units, and there are monitoring and reporting requirements in the proposed standard, and meeting the emissions limits required in this standard for oil and coal units especially can be economically challenging, and that is what we're going to be talking about today.

In terms of compliance options, obviously they will vary for specific units depending on the original design of the unit, its present configuration in terms of installed controlled technology, its age, its use, and many other factors. However, for the analysis that I'm presenting on how CHP can be considered as a viable option for compliance, we assume the use of the control

technologies that are listed here to establish the baseline compliance costs, and they are, as you can read, fabric filters, an activated carbon injection as primary control devices for mercury, electrostatic precipitators for control of particulate matter, wet scrubbers or fabric filters with dry injection as primary control for hydrogen chloride or acid gasses, and tune-ups, catalysts, the standard combustion controls for CO and the organic hats.

[New Slide]

At the beginning of the previous slide I mentioned that the choice of compliance options will depend on a lot of factors regarding type of boiler, its present configuration, and its age. Along with the choice of options comes the cost of compliance that in many cases will be quite expensive. Depending on the cost of compliance many facilities are and will continue to consider switching or moving to natural gas as their fuel of choice versus installing the control technologies on their existing oil or coal fired units. When this is considered we are strongly recommending that one of the natural gas options that you consider is to move to natural gas combined heat and power.

The addition of CHP becomes a tradeoff of the additional benefits of CHP versus the additional investment, and I want to point out that the additional investment is actually the incremental cost over the alternative compliance costs and not really the total cost of the CHP system. That is the analysis that I'll be providing in the rest of this presentation. The number of affected units and the total cost of compliance of those units per EPA estimates are shown at the bottom of the slide, and you can see these are big numbers.

[New Slide]

If you simply divide the numbers, the average cost, for example, of compliance of coal units as an example is about \$4.4 million per affected unit. So we're talking about some pretty big numbers. What we've done on this slide is start to pare down the population of affected boilers for our analysis. These numbers reflect the industrial, commercial, and institutional boilers qualifying as major sources according to the EPA database operating on coal, oil, biomass, and processed gasses. The 1,500 or so units, that is boilers and processed heaters, reside in about 652 sites around the country with a total nameplate capacity of about 307,949 million BTUs per hour.

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This slide breaks down the data on the previous slide by region of the country, and you can see that the majority of the sites and affected units reside in two regions, the Midwest and the Southeast, and I've got them highlighted in red. This slide provides the breakout by industry sector, and you might notice that the number of affected facilities, 410, is less than the previous slide of 652, and if you total the number of units on the previous slide you would also see that the number of affected units, a little over 1,000, is also reduced. This is because on this slide we dropped out the biomass-fueled units. We believe the affected biomass units are less likely to switch to natural gas or natural gas CHP, and we did not want to overstate the opportunity of switching to natural gas or adding the incremental benefit of natural gas CHP.

[New Slide]

Now we pare down to the Midwest region, one of the two regions with the highest concentration of affected units. Here we can see that of the 409 affected coal, oil, and processed gas boilers, that over 59% are coal fired, and if you look at the age of these units many are very old, vintage 1970s and earlier. These older units are more likely to be more economical to switch from coal to natural gas versus trying to come into compliance with standard control technologies using the existing coal boilers.

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This provides a breakout of the affected Midwest units by industrial sector. Please note that food processing, paper products, chemicals, primary metals, and transportation equipment are all large industries in the Midwest that will be affected, and again we highlight them in red.

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Also there are several affected facilities that – oh I'm sorry, let me go back a minute here. I also wanted to point out that there are facilities that today are familiar with CHP and that they have CHP systems installed. These systems are for the most part not natural gas-fired CHP systems. They are mostly steam turbine driven systems, with the steam generated with the coal- or oil-fired boilers that are under emission level compliance review. On the positive side these companies are familiar with the benefits of CHP and if they elect to switch to natural gas replacing the oil- or coal-fired units, they will better understand what the incremental investment of CHP buys them, and you can see in the last columns there that 61 sites already have CHP, are generating about 2.4 gigawatts of electric power at their facilities, and experiencing already the benefits of CHP.

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This and the next slide show the same information for the Southeast region, the second region most affected by the standard. What is interesting in the Southeast is that there are a very large number of biomass units. There are actually about 248 biomass units that can be affected, versus 55 in the Midwest, 55 in the Northwest, and 46 in the Gulf Coast regions. Remember though we are leaving the biomass units out of this analysis of utilizing natural gas CHP as the control technology.

[New Slide]

Broken out by industry, we see the industries most affected in the Southeast tend to be paper products and chemicals, and to a much lesser extent in the Midwest, food processing and transportation equipment. Also we see more plastic and rubber products affected in the Southeast.

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Before we get into the actual example that we analyze, let's summarize where we are at this point. Compliance costs for many coal and oil units, especially the older units will be fairly expensive. Many will consider switching fuels from oil and/or coal to natural gas. If they do, for some oil-fired boilers they may be able to simply convert the existing units to natural gas. For coal boilers this is much more difficult to do. In those cases the choices will most likely be either to replace the boiler with a natural gas-fueled boiler or to replace the boiler with the natural gas CHP system, and in that case it would most probably be a gas turbine with a heat

recovery steam generator providing the thermal process requirements. What we want as CHP advocates is for those sites to consider this option. The CHP strategy has to make economic sense, obviously, and we believe that it can. It has the potential for lower steam costs, higher efficiencies, lower emissions, and although higher capital costs it provides an opportunity for a return on the investment rather than simply a cost to come into compliance, and I think that is a point that we want to stress as we go on.

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So now let's look at the example. The example site we used for the analysis is a site with four coal boilers located in Pennsylvania. Three of the boilers operate about 8,000 hours per year satisfying an average thermal steam load of about 40 million BTUs per hour. The fourth boiler is used as a swing boiler or a backup boiler. The cost of electricity at this site is \$0.08 per kilowatt hour, \$7.00 per million BTU natural gas, and \$3.10 per million BTU for delivered coal. These are all indicative of costs in Pennsylvania. The projected capital costs for coming into compliance with the standard control technologies for all four boilers is about \$4.1 million with an additional \$723,000 increase in annual operating and maintenance costs due to the addition of the control option.

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This slide shows the results of the analysis in regards to the annual steam operating costs associated with the three compliance options. Column one shows the existing coal boilers modified with the required standard control technologies, the costs involved, and the resulting annual steam operating cost of about \$3.3 million. Column two shows the switching to natural gas and simply replacing the coal boilers with equivalent natural gas-fired boilers. This results in a very similar annual steam operating cost of about \$3.3 million.

Finally column three is replacing the coal boilers with a natural gas turbine and heat recovery system that provides eight megawatts of electricity and a waste heat recovery steam generator that can provide the 40 million BTUs of required steam. Since this case results in a sizable annual savings in the electric costs of the facility, you can see that the annual steam operating costs are more than cut in half at about \$1.4 million. The important point is that since the annual steam operating costs for the CHP option is so much lower than the other two options, the CHP option can be looked at as an investment and not simply a cost of compliance. There is an annual savings that can be applied against the investment cost of the CHP system and once the investment is paid off there is a revenue or annual profit on the investment.

[New Slide]

This slide shows the simple payback on the incremental investment if you install the CHP option. Now how do we calculate the payback? Well first of all if you look at row two it shows the annual steam operating savings from the CHP option over the total compliance option, and row three shows the annual steam operating savings over the natural gas boiler option. Row four shows the capital costs of all three options. Since we are evaluating the investment cost of the CHP system versus the cost of the other two options, we can back out of the CHP capital cost, each of the other options in the comparison. So we're looking at the incremental cost of

the CHP system first against the coal option, which is row six, and then the natural gas option, which is row nine, and you can see the investment is fairly steep, but finally we can calculate the payback period. We can calculate it at about 6.3 years for the CHP system, that is an investment against the coal option, and about 7 years against the natural gas option. Whoops, let me go back.

The bottom of the slide shows some of the potential benefits of selecting this option and you can see them. You not only meet the compliance requirements of the proposed standard through an investment rather than an operating cost. The payback investment is about six to seven years. You increase the reliability of electric service since the CHP system is interconnected in parallel with the grid. You enhance your business competitiveness, you increase the energy efficiency as well as manage your operating costs with the CHP system, and you can reduce the carbon emissions, higher efficiency and displacing electricity generated at the central station power plant.

[New Slide]

Now this slide simply shows the market potential the boiler MACT standard offers if all units were converted to the natural gas CHP option. The last column shows that it could be as much as 21 gigawatts of CHP power. This is the technical potential, not the economic potential. Each facility really has to evaluate the economics of the various options; however the opportunity for CHP in this market sector is fairly substantial.

[New Slide]

I'll end with this slide that provides sources for you to consider as you go forward to evaluate your options regarding compliance with the boiler MACT rule. I'd like to draw your attention to bullet three and the availability of the DOE Regional Clean Energy Application Centers that are available to assist in evaluating CHP as an option open to you. There are eight of these regional centers. I represent the one in the Midwest, but I have counterparts in the other seven regions. We are available to assist you to look at CHP as the option or a strategy. And with that I thank you for your indulgence, and I'll turn it back to Katrina for questions.

[New Slide]

Katrina Pielli:

Great. Thanks, John. So again folks, go ahead and type in the question using the chat feature that you have. We have had some that have come in. So the first one is for Joe. The question is, would a facility with waste heat recovery approximately 100 megawatts be subject to CSAPR, the waste heat being recovered from a gas to a liquid process?

Joe Bryson:

I'm not completely sure, but I would be happy to get you an answer and we'll follow up with you. In general, if there are fossil-fired boilers or combustion turbines that serve generators greater than 25 megawatts for sale then, then they would be included. I'm not familiar with gas to liquid process and whether that includes boilers or turbines. So sorry, I'm not sure I know the answer, but I'm happy to get it for you later.

Katrina Pielli:

Great. Thanks. The next question that came in is referring to I think Boiler MACT. If not, go ahead and type the question in again, but the question is, how are the numbers developed for cost? CIBO got \$14.4 billion.

Joe Bryson:

Yeah. I assume that has to do with Boiler MACT. The cost numbers that we show in both my presentation and also from John Cuttica's are all drawn from the RIA, which is the Regulatory Impact Analysis. Why our numbers don't add up to your number, I couldn't say, but again would be happy to try to sort out why our numbers are not the same, but the source is EPAs Regulatory Impact Analysis.

Katrina Pielli:

And the next one I think also is for Joe is regarding CSAPR. The recent court decision pushing back implementation until at least April 2012, how does that affect the SIP reallocation deadline? Should we assume that it will likewise slip by at least three months?

Joe Bryson:

We are not assuming anything. We have no idea what the court will decide when they re-hear the case and your guess is as good as ours and we don't really have one. Sorry.

Katrina Pielli:

Thanks. One more question also I think to you. Do the reported benefits associated with these rules include tangible benefits or do they also include intangible benefits? If the latter, how realistic are they?

Joe Bryson:

The quantified economic benefits that are referenced in the slides, the vast majority of them are, are derived from health impacts, so reductions in lifespans, trips to the emergency room for asthma attacks, things like that. Those are all quantified economically and that makes up well over 90%, 95% of the benefits. The only other benefits quantified are environmental impacts such as impacts of acid rain on lakes and estuaries. There is also quantification of visibility impacts on national parks, but again that is a pretty small number compared to the health benefits. No other secondary or intangible benefits are quantified other than those.

Katrina Pielli:

Great. Thanks. The next question I think is for John. What technologies do you see as most applicable for the natural gas CHP, gas-fired combustion turbine with exhaust to a HRSG, gas-fired boiler with steam to a back pressure turbine, existing technology process loads, or other technologies?

John Cuttica:

Thanks, Katrina. I'd say it really depends on particular site, which again we'd have to look at and we stand ready to help people to do that, but it would seem to me probably most of them would be putting in a natural gas-fired turbine with a HRSG as you said, a Heat Recovery Steam Generator. I would think that that in most applications would probably be the way. The other approach using a back pressure steam turbine would certainly be applicable, but again I think it would probably be possibly in a lower number of applications.

Katrina Pielli:

Great. Thanks.

John Cuttica:

And again I think you have to look at it and, and again there's difference in cost so I mean if you can go with a back pressure steam turbine it would probably be less expensive on capital cost. So again I hate to beg the question but you really have to look at it on a case-by-case basis.

Katrina Pielli:

Thanks, John. The next question also is for you. You estimated full CHP technical potential. Please share what assumptions went into this. If this is national, what are the regional breakdowns? I assume this is without biomass and natural gas units.

John Cuttica:

Right. This is if you're talking about the potential looking at the 410 sites. So yes, it is taking away the biomass because again as I said, we believe that it is less likely that the biomass units would be converting, but it was assuming that all of them converted. So I hope I mentioned that it is a technical potential and it is probably nowhere near what would actually happen, but we're just trying to kind of show what the maximum potential was. So it is looking at the coal and oil units, not the biomass units.

As far as it broken down regionally, I don't have it in front of me, but, but we can certainly get that. The other thing is, again the application centers are ready to assist on any particular sites. If people would like to contact us I'm sure we can provide some help on what kind of configuration would look or might look best at that facility with at least a first cut of what the economics might look like. Again it would be a first cut, but we stand ready to help do that.

Katrina Pielli:

Great. Thanks, John. The next question is for Joe. I think it is referencing Boiler MACT. Is the 10 MMBT per hour cutoff for individual boilers or entire facilities?

Joe Bryson:

I like that one. It is easy. It is for individual boilers. The facilities are determined to be impacted by MACTs by their total hazardous air pollutant emissions from the facility, but the standards apply. Their application is determined by the size of the individual boiler.

Katrina Pielli:

Great. Thanks. I think the next question is also for you as well. Which emissions standards are currently in effect and not in revision that coal plants will have to comply with today?

Joe Bryson:

The MATS, the Mercury and Air Toxic Standards are in effect. They have been finalized. They affect both coal and oil plants. CSAPR is not in effect because it has been stayed, but its predecessor CAIR is and does also apply to coal and oil fired plants.

Katrina Pielli:

Great. Next question I believe is for John. When is CHP payback affected by electric standby rates to back up CHP to the energy system? And linked to that we did get a related question,

when calculating the cost for CHP did you take into account the standby service fees that most utilities charge?

John Cuttica:

We looked in Pennsylvania and, and yes we did take into account, although Bruce did it and I did not do it, but knowing Bruce he would take into account the cost including any standby costs for the particular, uh, example that he used. The answer to the first one is definitely yes. I mean you need to take a look at what is the cost of the fuel you are going to be using, natural gas versus the cost of electricity, and when you take a look at the cost of electricity it is not just the energy cost, it is also the demand charges and what have you, and again that varies from state to state and it also varies from utility to utility. That is why in all of these things that you really have to do an evaluation of that site and what we are really looking for here is that these industrial sites may not be thinking about CHP as a possible strategy, and that is the whole point of this is to get them to think about it, not that it is the silver bullet, but if they think about it then an evaluation can be done and then you can see whether it really does make sense at your facility. I hope I answered your question.

Katrina Pielli:

No, you did, and unfortunately we are out of time. There were a few additional questions that came in that we unfortunately do not have time for today, so we will go ahead and follow up with folks, with John and Joe to make sure that we get answers to those questions. And again both the recording of the webinar as well as the slides will be posted on the SEE Action website, which is www.seeaction.energy.gov. Also just a reminder we do have two additional webinars coming up, one on February 7th on showcasing model utility industrial efficiency programs and another on March 6th, elevating industrial efficiency regulatory issues for commissioners. You can register for those also on the SEE Action website. Thank you again for joining us. We do apologize one final time for the technical difficulties that we encountered at the beginning of the webinar, but again we will follow up and answer any questions that have come in so far and we hope to see you on our next webinar on February 7th. Thanks, folks.

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