HARVARD ELECTRICITY POLICY GROUP

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Rapporteur's Summary*

The EPA Mercury Rule—State of the Cost-Benefit Debate: Are Generators Collateral Damage?

The Environmental Protection Agency recently "completed a reconsideration of the appropriate and necessary finding for the Mercury and Air Toxics Standards." The main elements of the finding address the appropriate metrics for the underlying cost-benefit analysis. The focus was on whether to include co-benefits in determining what is required to meet the "appropriate and necessary" standard to be applied to its rules under the Clean Air Act. In doing so, EPA left the pre-existing mercury rule in place but removed its factual and analytical underpinning. The decision raises policy, legal, and practical issues. On the policy front, what role, if any, should co-benefits play in determining what is "appropriate and necessary"? This is related to other issues such as the definition of the relevant beneficiaries, as in the case of carbon emissions that affect the whole world, or the data and analytical underpinnings of constructs such as the value of statistical life. Should cost-benefit analysis be limited to the specific emissions for which the rule is intended, or should co-benefits be considered, and if so, just how broad a sweep of co-benefits should be included in the analysis? This matter will go to the Courts. How do the legal issues play out? On a short-term term and more practical level, how should generators manage in a regime where the rule, itself, remains intact, but its foundation has been removed? For competitive generators, how will this influence market strategy and impact the markets themselves? For regulated generators, what risks, if any, exist for disallowances or recovery of ongoing costs? Does the change in the analytical framework create risks for stranded assets for all generators?

Moderator.
The topic this morning is particularly topical for other events having nothing to do with with mercury, but in raising similar issues, which is, in the midst of the COVID-19 crisis and pandemic, we have a lot of cobenefits issues that are associated with that. We have record reduction in the emission of carbon. The emission of particularites are way down. So there are cobenefits.

Of course, there are enormous cost to get those cobenefits. And, so, the course of this discussion, although it's not quite as life and death as it is with COVID. The discussion has a lot of applications for a lot of other issues in our society. So it's a particularly timely discussion and, obviously, we're going to be looking at the cobenefits from particularites from rules, in this case, for mercury and other toxics rule, but also presumably some discussion about the co-costs that are associated.

So the first speaker will lay out what the issue is and his perspective on it. The next speaker will look towards the legal issues. And then having had two academics/governmental kinds of perspectives, we're going to have two people that have to live with these rules and what to do with them, one on the regulated side of generation, and one on the unregulated side of generation. So look forward to everybody's discussion and we'll go ahead and start with Speaker 1.

Speaker 1.
Right, thank you, and thanks, everybody, for joining us here today. It's a real pleasure to be with you at least online for today's meeting.

I'll be sharing the results of some work that I've been doing with the a team of scholars working with Matt Kotchen of Yale Meredith Fowlie from UC Berkeley, Mary F. Evans from Claremont McKenna, Arik Levinson from Georgetown and Karen Palmer, who may be joining us here today, of Resources for the Future. This work first began with an assessment we did for the External Environmental Economics Advisory Committee. This is a new independent group of scholars who are analyzing important questions for EPA, effectively founded after EPA decided to dissolve its own Environmental Economics Advisory Committee.

So, with the support of a couple of universities and the Sloan Foundation, this group was launched last year and our report evaluating the MATS regulation is the first report from that group. We had provided as pre-reads our full report, as well as a shorter synthesis of that report, which we published in the journal *Science* earlier this year.

I'll be drawing from that work, also be drawing from some more recent work that the same group of six scholars have been undertaking, thinking more generally about the question of cobenefits under the Clean Air Act. First, I'm going to provide a very brief summary of the MATS Rule. I will defer to my colleagues, you know more about this on the legal standpoints and the implementation standpoints later in our discussion. But just a few key details, and then go into more in depth about the benefits and costs under MATS. I will discuss some about the role of cobenefits in the MATS Rule, but also talk some about what has changed in our understanding about the power sector and how the MATS Rule played out as it began being implemented in 2016, relative to what's been assumed in the EPA analysis underlying its recent rulemaking.

I do want to put that into sort of a broader context policy context of the Clean Air Act and look at historically the role of cobenefits in Clean Air Act regulations, where we've been evaluating all major regulations promulgated since late 1997. Then I'll conclude with a couple of comments synthesizing the key insights and talking a little bit about the political economy of this at the end.

Next, we'll go and discuss a little bit about the summary of the recent MATS rule. So in that rule, the key thing to recognize is that EPA did not withdraw the actual standards that apply to Mercury and Air Toxics, as previously promulgated. What they did is they revoked the appropriate and necessary determination under the Clean Air Act. Under the Clean Air Act, EPA must determine that it is appropriate and necessary to actually go forward with regulations on the emissions of mercury and other air toxics from power plants.

This appropriate and necessary determination was first made as a part of the final rulemaking that established MATS in 2012. It's been subject to significant and heated legal challenges that culminated with a Supreme Court ruling in *Michigan v. EPA* that kept the MATS Rule in place.

EPA, at that point in time, had already given regulated entities an extra year through 2016 to begin complying with regulations, so *Michigan v. EPA* kept the rule in place, but remanded EPA that they had to consider costs in this appropriate and necessary determination. In April 2016, EPA issued a

new appropriate and necessary determination, and at that time, electricity generating units also began complying with the MATS.

I should note that in that 2016 determination, one of the justifications, not the sole one, but one of them was actually an accounting of the benefits and the costs as a way to justify why it is appropriate and necessary to regulate these pollutants. Then, just last month, EPA reinterpreted the evidence from 2011. They're not using any new evidence, a point that I will spend some time on, and they decided, based on this reinterpretation of the evidence, that it's no longer appropriate and necessary to regulate mercury.

So let's drill down and look at how EPA considered and analyzed the benefits and costs of the MATS Rule. The 2012 regulation was based off of a regulatory impact analysis, an RIA, conducted by EPA in 2011. This is the very first table from what is, if you're not familiar with RIAs, a very long, very technically detailed document. But it's just summarizing, in simple terms here, what are the aggregate cost expected on an annual basis? And what are the aggregate benefits expected on an annual basis?

What we find here is that, if we think about either the magnitude of cost, monetized costs, the magnitude of monetized benefits , is one of the biggest rules EPA has ever promulgated. Looking at costs on an annual basis on the order of about $9.5 billion and benefits that are on the order ranging, depending on the choice of discount rate, between about $33-$90 billion.

So it's very large benefits in play, very large costs in play. I should note that is as you look at this table, there's this capital B. That's representing the non-monetized benefits. And I think this is important that, as one thing that we will comment on over the course of our work and, as I'll note at the end of this presentation, I think there are times when EPA is complying with the Clean Air Act statutory obligations, but in this case the executive order governing the use and application of benefit-cost analysis in economically significant or major regulations. Once EPA has been able to demonstrate we have benefits here that justify the cost, there's a kind of incentive to sort of stop counting.

So they haven't gone forward and actually quantify to monetize all the potential benefits, and instead they list them qualitatively, because they've done sufficient analysis here to show that the benefits significantly exceed the cost and thus justify this. Now, an idea of the changes that were undertaken in the 2020 analysis. EPA put out a benefit-cost memo at the very end of 2018 when they issued the proposal to revoke the appropriate and necessary determination, and then a modified version of that memo that accompanied the final rule as it came out last month.

The first table from that memo here looks very similar, except we just took out all of the fine particulate matter cobenefits. So we have the exact same cost as what was estimated by EPA in 2011 for the rule. And then we have just the benefits that are monetized associate with hazardous air pollutants, which is on the order of $4-6 million, plus again, this unquantified run monetized benefits, represented by a capital B.

I think it's important to note here that they then, although this wasn't in the proposal, I think it reflects some of the pushback they got from OMB, in table three they now include a characterization of targeted benefits, as well as the ancillary cobenefits. So, in the end, we still see what is the sum of the benefits and

costs and regulation, but distinguishing in ways that, as I will make clear in this talk, don't make sense from an economic standpoint, as part of what I think is their legal argument, that I think Speaker 2 is addressing in her remarks.

We're trying to distinguish here, what are the benefits associated with the reg with a pollutant that is the, if you will, target or intended focus of the regulation under the statutory authority? And what are then the cobenefits associated, the ancillary reductions of fine particulate matter? These are so large in part because fine PM does contribute substantially to premature mortality, and it's probably the worst among major air pollutants in doing this.

Now the question is, do the benefits of the rule justify the cost? That is the test that has governed the evaluation of regulatory policy since 1993, when we think about the application of Executive Order 12866 that coordinates the review of regulations and provides the basis for why we undertake the assessment of benefits and costs of major regulations. When we're doing that, we basically just want to do an analysis of the state of the world with the regulation and compare that to the state of the world without the regulation.

We just want to look at all the differences. We want to look at all the positive differences and all the negative differences. We might call those benefits and costs. And we're going to sum up all those differences, and if the sum, when we look at all the positive impacts and all the negative impacts and monetize, if the sum is positive, then we would say the monetize benefits exceed the monetized cost, which could be one basis by which one would say the benefits of the rule justify their costs.

It's standard practice that when we do this, we look at cobenefits and count them on par with benefits. This is a standard finding that you will find in textbooks on benefit-cost analysis and it's something that, to be honest, at times, if you were to talk to a group of academic economists at a conference or workshop, we would find to be a trivial question. We don't really make distinctions about what's a cobenefit versus a benefit. These are all things that reflect how society is better off if we do the rule, and we should account for.

Now this isn't something that's new or novel or alien to how the government operates. For a long time, the government has had guidelines, whether it's at the Office of Management and Budget in Circular A-4**,** which is their guidance on how to implement Executive Order 12866, how to conduct benefit-cost analysis or regulatory impact analysis of regulations. As well as in EPA's guidelines for preparing economic analysis. So in Circular A-4 OMB states in their guidance to regular agencies, they should identify the expected undesirable side effects and ancillary benefits of the proposed regulatory action in the alternatives. And these should be added to the direct benefits and costs as appropriate.

In EPA they note that in an economic analysis of regulatory or policy options to present all identifiable costs and benefits that are incremental to the regulation or policy under consideration. These should include directly intended effects and associated costs as well as ancillary or cobenefits and costs.

Now, I also want to emphasize the things that I think are important when we look at this analysis that EPA has presented in 2020. They are simply copying and pasting in a selective manner the information from a 2011 regulatory impact analysis. It's important to

recognize in the broad sense of things that it's not 2011 anymore. We know a lot more about what the world looks like with this regulation in place than what we knew years before it actually was implemented.

First, in the context of the health benefits associated with mercury. The 2011 monetized mercury benefits from a very narrow way of looking at mercury. It's a single-outcome, reduced IQ for children, through a single pathway, which is through recreationally caught freshwater fish. Now I'm a lousy fishermen. I would actually have zero way to end this kind of monetized analysis because of my exposure to mercury doesn't occur through recreational caught freshwater fish because I can't catch fish.

I do eat a lot of fish, though. I just eat it in a way that I enjoy it, commercially consumed, whether it's at restaurants or seafood that we buy at the grocery and prepare at home. So, actually, when we sort of think in a broader way about all the potential ways and mechanisms by which one might be exposed to mercury, then we would actually think about more health outcomes beyond just IQ impacts. You can actually recognize that the direct health benefits are not $4-6 million but potentially much larger.

In our review, we found that the literature had moved forward since 2011 and that if we started to account for the cardiovascular risk associated with mercury exposure, we're now talking about mercury benefits that are not measuring millions of dollars per year but billions of dollars per year. There's a paper by Giang and Selin, in the Proceedings of the National Academy of Sciences from 2016, that estimated more than $150 billion of public health benefits from the mercury standard through the year 2050.

We all know—and I'm not gonna spend much time on this, given the audience—how much the power sector has changed since 2011, and how much has changed relative to what we thought it would be. That we've seen such a dramatic reduction in the generation of power from coal-fired power plants, both from the retirement of coal-fired power and from reduced capacity utilization from the units that are still operating, that we end up with a lot of differences that matter for both the costs and benefits of the mercury rule.

This table that's drawn from our report, that we issued to the external Environment Economics Advisory Committee, is showing the difference between the policy case and the base case. So this is sort of what EPA expected would occur under the regulation versus what they forecast without the regulation. That's going to be the first sort of darker row under both the A panel on mercury and the B panel on sulfur dioxide emissions.

Then that second row is going to compare what we see in practice in 2017 versus what was forecast under the no-policy base case estimated by EPA in 2011. Now the samples between mercury and sulfur dioxide, a little bit different. We have more observations of electricity generating units for sulfur dioxide and mercury. But even on the mercury side we're covering more than 90% of our all power generation from coal fired power plants in 2017. But the thing that you first notice, of course, is that we have a dramatic difference in capacity.

EPA had projected in 2011 that we'd see about a 2% reduction in installed capacity of coal-fired power plants. We see in practice for the year 2017 about a 20% reduction from that level. As a result, we see much less generation. EPA had projected, a small increase in generation from coal fired power,

even if it's coming from a smaller amount of capacity in their policy case.

In practice , we've seen even with units that are still generating and still operating, they're still producing less power, at lower capacity utilization rates than what had been assumed in the EPA analysis. So we see generation is down significantly in our sample. The emissions intensity falls significantly from mercury is reflecting a lot. The installation of mercury control measures and the difference here between the 2017 realized and what what had been projected is virtually nil, virtually the exact same. You end up with a little bit more emission reductions in 2017 because of the reduction in the amount of coal-fired power plants

But the emission intensity here that's reflecting the installation of a pollution control equipment is very similar. We do see some differences here in the case of SO_2. Part of it is that we end up in a world where there ends up being much less pollution control equipment installed for compliance, just because we have fewer units. In fact, EIA estimates probably installed, about half as much capacity of pollution control equipment as what had been projected by EPA.

But because we have other factors going on that are driving down the use of coal-fired power electricity sector, some of the fine PM benefits are accruing not because of the mercury standard, but because of this shift towards natural gas and renewables that we see in the power sector.

Now, the thing that I think is important is that there's been increasing interest across administrations, the Obama administration and the Trump administration, for doing retrospective analysis of regulations. This would have been a prime example for doing one. By the time EPA had proposed their change and the appropriate and necessary finding, electricity generating units had already been implementing the rule for three years. It's a great opportunity to actually look at the data and assess what are the benefits and cost of the rule.

We actually have a couple of papers that have gone through the referee process and have actually been published and available in good economic journals, both the *Energy Journal*—John Coglianese, my colleague Jim Stock and Todd Gerarden. John and Todd are both graduate students of ours here at Harvard. As well as a paper in the *RAND Journal* from Josh Linn at Maryland and Resources for the Future, Kristen McCormick, formerly of RFF and now a graduates student at Harvard.

They've both done analyses to show what impact MATS has had on coal-fired power relative to other key factors, such as low natural gas prices, significant deployment of wind, lower electricity demand coming out of the Great Recession etc., and find that MATS had a every small impact on retirement.

So the big change that we're seeing because of retirement is clearly not being driven by environmental regulations. This is all something that could have fed into an analysis, as opposed to simply doing a copy and paste from the 2011 document and putting it into a 2020 economic analysis.

I think this is important because when we think about the role of economic analysis, we want to understand, is society better off when EPA implements new air quality regulations? And this thing that we call cobenefits ends up being important as a way of illustrating how much better off we are as a society in a number of EPA Clean Air Act regulations.

As I noted, benefit-cost analysis has been a key part of regulatory policy and regulatory policy evaluation for a long time, and actually goes all the way back to 1981. Some would argue even there's some executive orders under Carter. But the really sort of beginning point of why we need to evaluate benefits and costs goes with the executive order implemented early in the Reagan administration calling for this analysis for major rules. When we go back and look at the last decade's rules, 2007 to 2016, so the last full decade that's been reviewed by OMB, we find that the monetized benefits of EPA rules or at least 80% of the total federal regulatory programs' benefits. We find that the cost of EPA rules are at least 63% of the total federal regulatory programs costs across all regulatory agencies.

So it's obvious why it's important to look at benefit cost analysis in EPA rules. They are a very large fraction of both the social benefits we enjoy and the social costs we bear associated with federal regulatory actions. I think it's important to recognize, though, that the EPA under the Clean Air Act doesn't design rules subject to a benefit cost analysis. It's not part of their authorities and, in fact, in some interpretations of some elements of the Clean Air Act, you can't even take into full account the benefits and costs of the regulation when promulgating the standard.

So it's also important recognize that this idea that we might use benefit-cost analysis to find what is a socially optimal level is something that economists may dream about and aspire to. But it's not consistent with the authorities. Now there are a number of, I think, recent EPA actions that raised questions about the accounting for cobenefits and cocosts.

There's the Science Transparency Proposed Rule from EPA, which raises questions about whether or not, in the spirit of transparency, EPA would actually disregard some of the important epidemiological research that shows how fine particulate matter contributes to premature mortality.

They have another rule where they raised the question whether or not they should count cobenefits in the context of the consistency and transparency and benefit-cost analysis proposals. We have, in the context of the Affordable Clean Energy Rule that was the replacement for the Clean Power Plan, in which they actually distinguished the illustration and the communication of so-called targeted benefits for CO_2 from the cobenefits of reducing fine PM.

Interestingly, with the proposal for the Oil and Gas Sector New Source Performance Standards, EPA said that they did not need to do a new standard for methane emissions, because you're already going to get methane emission reductions and the benefits of that, when you are targeting volatile organic compounds under that standard. And so here's a case where the cobenefits actually matter in what they're doing in designing the rule.

Likewise, when they weakened the fuel economy standards just recently for the joint EPA/DOT tailpipe fuel economy rule, there the justification was in part because of the cobenefits or cocosts—in this case, because they were negative—of accidents and related congestion associated with improving fuel economy.

In our review of regulations, where we looked over 20 years, we find that it's quite common for EPA to implement multiple economically significant or major Clean Air Act regulations in a given year. Every single year over 1997-2016 EPA did this, the last couple of years, until just recently, it has been

less intense in terms of regulatory activity, not surprisingly.

But just to illustrate that, at the end we identified about 50 rules that EPA implemented on the Clean Air Act that were major or economically significant, and 40 of those they monetized both benefits and costs. I'll talk a little bit about those.

So first is to get a sense of the net social benefits of these rules. We look at the monetize benefits, and comparing them to the monetized cost. These are on an annual basis for most of the rules, looking at your snapshot full implementation year in the future when the rule is expected to have its full effect on both benefits and costs.

What we find is that some of the rules have huge net social benefits, measured in the tens of billions of dollars per year. The median rule delivers about $4 billion in net social benefits on an annual basis. And we only found two rules in our analysis that had negative net social benefits. One was the National Indian Air Quality Standard for lead, and that is depending on whether you're looking at the 3% discount rate scenario or the 7% discount rate scenario. In all of our analysis, we're focusing, to ensure consistency, at a 7% rate. But in that case lead, if you look at the 3% discount rates, it would actually have had positive net social benefits.

Interesting in the context of our discussion here today on mercury, the other regulation that had negative net social benefits was the 2005 mercury rule that had about almost $-1 billion in net social benefits. Everything else, as shown, positive net social benefits in the monetization in the RIAs produced by EPA.

Now to give you a sense about the relative share of the targeted benefits versus the cobenefits, we went through each one of these rules. I apologize that the type here is small, but I've got a link to the underlying paper that provides a full documentation associated with this and the related figures here in this part. The type on the side, there showing you the regulatory identify or numbers or the RINs, if you will, to help you identify the regulation. In that dark shading. they're showing what percentage of the monetized benefits are associated with the polluted that we think is targeted by the regulation. The gray bars are showing how much of that is accruing to so-called cobenefits or the benefits associated ancillary emission reductions.

Over the course of these 40 regulations, about 45% of the monetized benefits are so-called cobenefits. So it's clear that a major fraction here of the social welfare from EPA air quality regulations are because of these reductions in non-targeted or unintended focus of the regulations. Most of this ends up being reductions in premature mortality. A lot of that is for fine PM.

Another way to sort of think about this and say, well, in how many of the rules which pass a benefit-cost test, where we have monetized benefits exceeding monetize cost, if we only focused on the top, the benefits that are monetized for the targeted pollutant? In this case, what we find is a little bit more than 50% of the rules have targeted benefits that are less than their monetized cost.

So it's clear here that a lot of these rules are able to demonstrate that their benefits justify their costs if we interpret that standard in terms of the monetized benefits versus monetized costs through an accounting fully of the monetized cobenefits.

To conclude here, let me talk a little bit about where we sort of synthesize these results,

both how we think about this in the context of MATS and how it plays out in the broader debate about Clean Air Act regulations and cobenefits, and then close with a couple comments on political economy.

The first one, we think about some of the patterns and trends that we've seen in the Clean Air Act, the cobenefits do make up a significant share of the monetized benefits in the EPA regulatory impact analyses. Clearly, MATS is a prime example, where more than 99% of the monetized benefits are cobenefits associated with reduction to fine particulate matter concentrations. Fine PM is definitely the biggest category across all these regulations. We found, when summing across those 40 regulations, that more than 94% of the monetized cobenefits are associated with fine PM.

We find those monetized cobenefits are necessary for the monetized benefits to exceed the cost of the majority of RIAs, and that's also true in the MATS rule. So it has important implications when we think about cobenefits for the analysis of social welfare from these rules.

Now it's been posed as if there's something wrong to include cobenefits and is there something that would give us concern about the fact that there's a large role for cobenefits in practice. From the standpoint of economics, from the standpoint of are we better off as a society, the answer is clearly no. We would say that cobenefits are simply just as a semantic category of benefits that should be included in benefit-cost analysis. And this isn't a novel finding. It's covered in academic textbooks and, as I noted earlier, it's standard practice for benefit-cost analysis consistent with the guidelines from both OMB and EPA.

I think there's two things that are worth thinking about in terms of the political economy of cobenefits. First is how we might think about the value of information, as well as the incentives that the agency or the way they undertake this analysis. If you read an RIA, every single one of them is going to have a long list of non-monetized benefits. And so there's a question about why doesn't EPA go forward and monetize some of those some of those outcomes. I think it reflects the sort of time constraints and the resource constraints that the agency faces that they don't really think that it's critical for them to go and monetize every single potential outcome associated with the rule.

From the standpoint of the agency, especially an agency that's implementing the Clean Air Act, where the standard is not benefits must exceed cost**.** But because they have to satisfy the guidance from an executive order saying that the benefits should justify the cost, if they can go through and do their analysis and they can look at a subset of the categories of benefits and monetize those and say these now and see the cost, they probably feel like they've satisfied the guidance that comes from that executive order.

In that context, the value of additional information of monetizing the full gamut of outcomes associated with the rule are probably fairly low, especially in the sort of political context of needing to satisfy the executive board. I think it's also something to when we think about why we're getting more and more discussion about this in this administration, it's reflecting a fundamental tension between having a large set of regulations in which the net social benefits are greater than zero, much greater than zero. As I noted, the median Clean Air Act rule over the last few decades has about $4 billion of annual net social benefits. There's a fundamental tension between having very

large positive social welfare impacts with these rules and a deregulatory agenda where you have guidance, where you're trying to get rid of some of these regulations, where you're trying to focus almost entirely on the cost side of the ledger.

We can see that when we look at say executive order 13771, which was the first record executive order issued in the Trump administration in very early 2017. The focus there was on deregulation of reducing costs. We can look at CEA's 2019 report that reviews the directory agenda and its impact in this administration. There's clearly an appetite for getting rid of these regulations, but if you were to get rid of a regulation that has large net social benefits that means that the deregulatory action has large negative social cost.

So I think that creates this fundamental tension that EPA doesn't want to be doing things to satisfy deregulatory agenda that looks like on its face would have billions of dollars of adverse consequences to social welfare on an annual basis. That's why we're starting to see these kinds of games about how we think about the the accounting consideration of cobenefits.

So, if you're interested, I'm happy for these slides to be shared.This shows the papers that I drew from for today's analysis, two of those were shared previously. One is the working paper on the broader Clean Air Act analysis. We are continuing to work on that. I'm also happy to share the final version of that here in the next month or two, once we've completed that revision, but it gives you a sort of a sense of where I've drawn the information from for this. But I think you know that it's very simple, the bottom line that comes from the economic assessment of this, is that cobenefits are things that reflect how people are better off with air quality regulations.

And whether we're calling it a cobenefit or a benefit, it should be counted when we're thinking about what are the implications of air quality regulations on our society. So I thank you for your attention. I look forward to the discussion after the rest of the panelists' presentations.

Speaker 2.
Thank you so much for inviting me. This is an interesting topic that never seems to go away. It has certainly haunted me for my entire Clean Air Act career, so it's fun to dive in.

Speaker 1 just gave us a really great overview of the central issue, teed up by this rulemaking, which is the role of cobenefits in a cost-benefit analysis. What I want to do now is provide a legal wraparound because this is a really complicated set of circumstances. Speaker 1 talked about how CBAs should be done, and certainly from the economist's perspective, it's clear that cobenefits should be considered from a legal perspective. EPA has considered cobenefits, throughout its time regulating under the Clean Air Act.

And yet we do have to contend with the structure of the Clean Air Act, and its pollutant-specific regulation, so reasonable minds can differ about the relative weight that cobenefits should carry in a cost-benefit analysis for a particular rule. It's somewhere between zero and 100%, and so we can definitely have that conversation.

But what I want to do is bring in a couple of additional questions that add a little texture to this. One is when a cost-benefit analysis is required to be done under the Clean Air Act. In this particular instance, whether you need

a cost-benefit analysis, both for an initial stage of should we regulate, and then for the second stage of how should we regulate. And then, finally, what role this 112 end determination of whether it's appropriate and necessary to regulate power plants for their HAPs under 112**,** what role does that play in underpinning any subsequent rulemaking targeting electric utilities under 112? And all of those will play a role here.

I took a long time thinking about this slide because there's so many ways we could approach this. I decided to go with the most neutral and just remark that we've been working at this for 30 years and still don't have answers to fundamental questions about 112(n)(1)(a). My other two finalists for this slide were the trailer to *Groundhog Day*. So I thought that could be relevant. The other was the Talking Heads song with the lyrics, "My God, how did I get here?"

So we've all been on this trail, or many of us on this, as I'm seeing who the participants are, many of us have been on this trail for decades. And we sort of cycle through determinations and head in different directions. What's really interesting to me is just the shift over time of where people are falling out on this, on the ultimate regulation of mercury and other air toxics from power plants. Ultimately, which I think gets back to what Speaker 1 talking about how we know a lot more today than we do in 2011, that this is becoming as much a practical consideration as legal consideration. Because we've implemented the Mercury and Air Toxics Rule, coal-fired electric generating units are no longer operating because of imposition of the rule. And so we'll think about some of those implications, as well. So, starting with the statutory text. Always good to start here as sort of our North Star. How did we get here?

1990 Clean Air Act amendments. The Congress was incredibly active in this legislative session and had also been doing other work in other media. But the Clean Air Act was very aggressive in bolstering existing Clean Air Act statutory programs and creating new programs. Notably, in particular, one of the new programs was a title for Acid Rain Program targeting the electric generating units. In part, because of that, there were also new tools added to the toolkit in 1990, including market based and contemplation of trading under 110, which again really had the power plants in mind.

So, given that Congress was clearly either explicitly targeting the electric power sector for regulation or giving EPA new tools to expand regulation of that sector, when they got to 112, which they also overhauled and clearly sent a signal to EPA that they intended regulation to pick up pace against air toxics, they decided to have a carve-out for the electric-generating units. So, otherwise, any major source of EPA-found emitted, hazardous air pollutants that were on a list that Congress provided them, they would have to, on a rather orderly schedule also spelled out by Congress, regulate those sources for their hazardous air pollutants.

Electric utilities are treated a little bit differently here, and the sort of key language that I've highlighted, that before the EPA would list all electric-generating units and begin any sort of regulation, they had to make a special determination. They had to find that the regulation was appropriate and necessary. Congress did not define appropriate and necessary.

That is not language that is found throughout the act and already had sort of a rich regulatory history and understanding. So we're often just left with the dictionary definition. And that's what you see through

case law, that that's sort of where people turn. Ten years passed, there was that 112(n)(1)(a) as the previous slide indicated had hoped that the determination of whether it was appropriate and necessary to regulate power plants directly for their HAPs under 112. They were intending that was to be done within three years.

It happened 10 years later, notably one week after *Bush v. Gore*. So it is true that there was a flurry of activity, particularly with Clean Air Act rulemaking in late December 2000. A lot of fun projects teed up and left for the incoming administration of a different party to handle. This determination had been in the works for some time, though. For about two years previous, the Clinton EPA had asked the National Academy of Sciences to do a literature review of the medical literature related to methyl mercury and its health hazards.

They had been doing a technology review to see what kinds of control technologies were available to address mercury and other hazardous air pollutants from the power sector. So this had been in the works for some time, and yet was teed up in this initial stage of saying, "Yes, we think that it is appropriate and necessary."

It was quite a cursory determination in the Federal Register, and only spent 12 or 13 pages. It talked at some length about what the National Academy of Sciences had found and what their studies that Congress had asked them to do had concluded. But, ultimately, there isn't that much more in this determination than the bullets I have on this slide. What they then said was, "We are going to have to consider cost at some stage. We are not doing that now. We think it is much more appropriate for us to consider costs of controls at the point of regulation—when we figure out what standard we're going to be setting, what source subcategories we might create and what actual controls we contemplate regulated entities applying."

Fast forward. The Bush administration did not take up the invitation. Oh, and I should mention, because this is relevant for later, that that 2000 determination was challenged and the DC circuit took sides with EPA and agreed with EPA's characterization of a determination that it's appropriate and necessary to regulate power plants as a non-final agency action. So, in that it was a procedural decision, but in that implicit is some understanding that this is a first stage of a two-step process that you have to make the determination of "yes, should we regulate" and then you regulate and that becomes key later, when we're trying to figure out when a cost-benefit analysis should be done or whether it needs to be done in both stages.

The Bush administration did not take the Clinton administration's invitation to regulate HAPs from EGUs under 112. Instead, they issued their own determination, backing off of the 2000 determination. They now decided it was not appropriate or necessary to regulate HAPs directly under 112**.** They've been removed power plants from the list of sources that had to be regulated under 112. In a related action, Speaker 1 mentioned the Clean Air and mercury rule, they created a mercury trading program for power plants under Section 111.

That, too, was challenged, culminating in the DC Circuit case in 2005, *New Jersey v. The EPA*. Now here is another sort of missed opportunity. I think we had a missed opportunity with that initial case, *UARG v. EPA*, not answering questions about what does appropriate and necessary mean. Was EPA's interpretation of that reasonable in 2000? We're calling that case that was just sort of a procedural, you got the hand, it's not

right, we don't want to opine on that. So in 2005, the Bush administration wants to reach a different conclusion. It doesn't have any more guideposts about appropriate and necessary than the Clinton administration did. We haven't heard from a court say whether the Clinton administration's interpretation was reasonable or not.

So here we've got the Bush administration, creating its own sort of understanding of what appropriate and necessary is. That was teed up in this challenge, whether, one, could EPA go back and decide, "Wait a minute, nevermind, five years later, we don't think it's appropriate and necessary"? Two, was their new interpretation of appropriate and necessary reasonable? And, three, could they then take power plants off the 112 list?

The DC Circuit just jumped to the third issue and said they cannot delist power plants from the list of sources that must be regulated under 112. And the rationale was that EPA had not gone through the generally applicable delisting process in 112, which is (c)(9) and this is how the court characterized or quoted it. This is paraphrased from the statute.

Implicit in this holding is that the 2000 determination was a one-way determination, that once EPA determined it was appropriate and necessary to regulate power plants, they were put on the 112 list, and from there on out, treated like any other source under 112.

But the holding did not say that. And so it left this an open question of whether EPA could go back and forth on this decision and what role ultimately that determination plays. Here, it was determined, because they couldn't delist power plants from 112, the camera rule under 111 could not survive. But it, again, did not get to this question of, what role is the appropriate and necessary determination at play in ultimately regulating power plants under 112? So more drama, not any more clarity.

So we move forward to 2012; and you'll notice, from an economist's perspective, Speaker 1 is saying that this is one of the most significant rules, ultimately, this rule that is finalized on February 16, 2012, of any of EPA rules in terms of total social benefits and in terms of costs. You'll note that all of these final determinations or rulemakings is happening around the regulation of HAPs from power plants under 112 happened in presidential years. 2000, 2004, 2012. You'll see 2016, 2020. This is a very high profile regulatory decision, no matter which way you go on it.

And it suggests—sometimes it's just you're running out of time, you're at the end of your term and you finally gone through this rulemaking process—but it suggests that there is also a campaign element to the positions taken on this, particularly on 112 and the regulation of HAPs from power plants. So February 16, 2012, we once again go back to the 2000 finding. Now, EPA tries to play this both ways, I would say here. On the one hand, they are confirming the 2000 finding. So they're somewhat playing into what we think we learned from *New Jersey v. EPA*, that EPA that made this decision, this determination, once and for all, in 2000. There's no going back. Now the question is, how do you regulate power plants from 112?

But EPA supplements the record and EPA goes back and forth with commenters about whether they should be considering cost in this determination that they are confirming or reaffirming. That kind of language is being used. They talk about why they are able to deviate from the 2005 finding, which suggests they saw that as something that they needed to back away from.

So, on the one hand, it seems like they're just trying to resurrect the initial determination from 2000. On the other hand, they're creating their own new record to say that this is appropriate and necessary. And, again, as in 2000, they do not consider costs.

Michigan v. EPA. This is not the only case to have been brought to challenge the Mercury and Air Toxics Rule. Notably, through all the challenges of the Mercury and Air Toxics Rule, the rule still stands today and even through this latest rulemaking, which we'll get to in a moment.

So we've had a lot of battles about the underlying initial determination about whether it's appropriate and necessary to regulate power plants under 112, and yet we're allowing the regulation of HAPs from power plants under 112 to continue, which I think creates a very odd set of circumstances if we're cutting out the foundation of the house, but then saying, the house is free to stand without that foundation.

The main issue here was, all right, EPA now in 2012 says it doesn't have to consider cost when determining whether it's appropriate and necessary to regulate power plants under 112. And the majority and dissent, and 5-4, plus Thomas has a concurrence to explain why he doesn't think the agency should ever be given deference. It really falls out on yes or no: Do you think that the appropriate and necessary determination should include costs?

Implicit in the majority saying that you have to consider cost for that initial determination is that that is a separate sort of decision and a separate stage from the ultimate regulation of power plants under this rule. And, yet, in justifying why they felt it was important the rule be remanded so that EPA could think about the cost, they took the cost-benefit analysis for the rule and sort of imported it and said, "Hey, prospectively, if you knew that only 1% of the benefits were going to be tied to and monetized benefits from HAP production, that seems really out of whack. So maybe you shouldn't have found that this was appropriate and necessary." So a little bit of inconsistency there.

These are either distinct stages with their own set of cost-benefit analyses, or they are conflated and the only way to regulate is the way the EPA chose to regulate in 2012, which is the one with the price tag that we thought at that point would be $9 billion a year. The dissent here says, "Oh, no, we actually think EPA was right not to consider costs, because they were considering costs in the next stage, in the regulation stage. And that's where it is appropriate and that's where you can actually figure out what controls are they going to be applying, what subcategories are they using. And you can see then at that point whether this particular way of regulating makes sense."

I find this opinion really confusing because it doesn't get to some of the very basic questions that I laid out at the beginning. Is the appropriate and necessary finding its own standalone reviewable decision or not? DC Circuit suggested it was not when the 2000 determination was challenged, that case was not overruled by this decision or even mentioned, if I am correctly remembering that. It's not clear, the underpinning, the role of that initial determination, if it is tied to the regulation, why it can go away but the regulation remains.

Because ultimately here what even the majority says is, "You need to consider costs. We are remanding that, so you can think again about whether it's appropriate and necessary to regulate. But in the meantime,

we're going to let you regulate and we're gonna let this rule go forward."

That was a very big deal to say in 2015, which was the compliance year of MATS. Power plants and utilities were making decisions to shut down or install scrubbers right at that time. So this had very real impacts. And, yet, despite the fact that the underpinning for this, the foundation for this, is being kicked out the rule remains.

So EPA says, "All right, you've remanded this determination to us, you've asked us to consider cost, we'll consider cost." EPA also takes the cost-benefit analysis that it did for the ultimate rulemaking and sort of brings that back into the determination and looks at it in two ways. It takes for granted the 2011 regulatory analysis, the costs of $9 billion a year, and compares those against other sort of metrics in the power sector, cap expenditures per year, generally, for the power sector, electricity prices and sort of impact on electricity prices—and so puts it in that context and feels it's reasonable, because even though $9 billion is a big price tag they posit that in the context of these other large expenditures, large-volume sales of electricity, it's not unreasonable.

The second thing they do is a cost-benefit analysis, and they just double down basically on their 2011 rulemaking and say, "We believe the benefits outweigh the costs for many of the reasons that Speaker 1 described today, leaning heavily on the cobenefits in particular of particulate matter. Particulate matter is a proxy for some of that hazardous air pollutants. It's also a big driver of heart disease and other sorts of health problems. It's also been the subject of very extensive study, which is why we've got the most information about the monetized benefits there.

That brings us forward to today, and Speaker 1 talked about this a little bit, but just in terms of these legal questions that I think are still left unanswered and kind of looming out here, that might be helpful context as we think through the cost-benefit and the cobenefits issue here. EPA decides, once again, this is the fourth turn in the last 20 years, that it is not appropriate and necessary to regulate electric generating units, and they seem to rest on the fact that nearly 99.9% of the benefits, they say, are not based on HAPs. What they mean is, and Speaker 1 said this more precisely, they're not based on monetized benefits of HAPs.

So a couple of things here, not going to go over things that Speaker 1 said, but the fact that this was based on the 2011 rulemaking or regulatory impact assessment, we know a whole lot more now. EPA itself had talked about three studies that have come out, including by EIA, MJ Bradley, all finding that the costs were at least 50% lower and in some cases more. They mentioned, they gave short shrift to, yes, there are these non-monetized benefits. Yes, some new studies have come out.Yes, we're sort of considering cobenefits here. We just would put a heavy discount rate on them, no, we're not going to tell you what the discount rate is.

I know an environmental advocate friend who's been joking that with all the rulemaking happening in the last couple of months, that it seems like someone just left Administrator Wheeler alone in the building, and he's just clearing his desk and finalizing a bunch of rules. If so, based on this it seems like the last person out, except for him, took the calculator. Because in some cases there were some pretty basic number crunching that could be done to bolster EPA's arguments here that, even considering all of these other aspects, that you still, in their view, way out of whack, in terms of the

percentage that the non-HAPs benefits are driving the outcome of the cost-benefit analysis.

So EPA goes through this whole thing, not appropriate and necessary to regulate, but we're not going to delist power plants from the 112 list. Clearly, trying to steer clear of the *New Jersey v. EPA* decision and yet unclear why you would keep it on the list, which would require regulation, if you think it's not appropriate to regulate. And, two, they're going to leave the rule in place. Again, begging the question how the rule can go forward if you've taken out that foundation that said it was appropriate and necessary to regulate in the first place.

Speaker 1 alluded to this. One of the sort of big subplots here is that EPA is a lot more concerned at this stage of the game, given that there's already sunk costs and compliance for the Mercury and Air Toxics Rule—power plants have been retired, scrubbers have been installed. There's certainly the continuing ongoing operating costs of running the scrubbers and electricity costs of running the scrubbers. But a lot of the compliance costs have already been spent.

So it's much more about laying a trail for this argument that we should not be using cobenefits to drive cost-benefit analyses and that we should be looking askance at the existing literature about particulate matter. They know particulate matter drives the benefits in a lot of Clean Air Act rulemaking, they know that PM studies are longitudinal studies that have been relied on extensively, that we don't have that kind of research for a lot of other types of benefits of different air pollutants reduction. And so you cannot have this conversation about the Mercury and Toxics Rule without also directing squarely the concern about the role that particular matter has been playing and driving Clean Air Act rulemaking, and that if you are in a deregulatory posture, this is a pollutant and studies that you want to take under consideration.

This is my final slide. So I've been taking you through this tortured history. We've been on-again, off-again about whether it's appropriate and necessary to regulate. We've nonetheless regulated utilities, and I'm really looking forward to hearing the two utilities that are with us today. They've sunk the cost. They've made the investments. They've made the big decisions based on this rule.

But now that I think we're left with a lot of really interesting legal questions and some could say it's angels dancing on the head of a pin, but I think there are a lot of really interesting questions here that have great implications for rulemaking moving forward, not only rulemaking that might consider the cobenefits of PM and other cobenefits.

This could have implications for a 115 rulemaking, because that part which is international air pollutant reduction, where we might take reductions, commensurate with a commitment from another country. That, too, has a sort of threshold. Should we do this before it gets into how do we do this? Maybe there's some lessons to be learned or warnings to be averted because of this conversation, but just a couple of very quick questions. I think *Michigan v. EPA* implicitly got rid of this, but there still is this odd question of, maybe once EPA said that it was appropriate and necessary and power plants ended up on the list, we're stuck with power plants on the list. Well, this time EPA said they didn't want to ratchet down the mercury and air toxics standards because it was doing a good job and there weren't new technologies. Can a future EPA build on that? Or do we have to go back through this appropriate and necessary finding battle?

Thinking about, is it fair to use the cost-benefit analysis from the rulemaking and back into the appropriate and necessary, or does there need to be a separate costs assessment at that initial stage? The last couple of points I have here, it's just more practically speaking. The EPA now says that EGU HAPs been reduced to acceptable levels, but they're looking at current emissions. So are they assuming continued operation of the scrubbers? And if there is not enforcement of this rule going forward, will all companies continue to run their scrubbers? And will EPA enforce this is another question.

And then, finally, if you start getting into that situation where it's not being enforced or scrubbers are not being operated, do you end up in a situation where some state regulators say this is no longer a prudent cost, you're not required to be operating these scrubbers and, therefore, you can't see cost recovery for your operations going forward, but maybe even for some of the asset that has not been depreciated? So I will stop there and I look forward to the conversation.

Moderator: We have been talking about what the implications are, and now we will turn to two people who have had to live wh=ith what the consequences are. Next is Speaker 3 from Exelon, whose generating fleet is almost entirely in the unregulated sector, and then from Speaker 4 with Southern Company, whose generation is either almost entirely or entirely in the regulated sector. So, Speaker 3, if you'd pick up from here, I'd appreciate it.

Speaker 3.
Yeah. And just to be clear, I'm not answering that list of important questions that Speaker 2 laid out. I do like the draft. I'll just also note, on terminology, at the risk of arguing with my hosts, I do like to use the phrase "competitive markets" in some of these presentations. Just because talking about unregulated nuclear plants does tend to scare the crap out of my audience.

I'm going to just zoom through a little bit of context on Exelon and how this rule affects us. I just need to note again how delightful it is to have this discussion with people who understand wholesale markets and I can just take that for granted. I think you guys are all pretty familiar with Exelon but, as the Moderator intimated, we are largely in these competitive or unregulated markets, where it's based on least-cost dispatch by the RTO. I think the key point is that one.

We, for this discussion, will go ahead and play the role of speaking for nuclear. We also have a pretty large renewable oil and natural gas fleet, which are of course not covered by MATS. EPA does use power plants or EGUs to mean this small and shrinking subset of what we consider are the power generation sector, not just based on their traditional regulatory purview. But I think it is important that every time Speakers 1 and 2 said power plant or EGU that we're thinking coal and oil, and how the dynamic there has changed even just since the rule was finalized in 2011, much less when some of these risk determinations were made in 1998. I think that we would make different decisions, if we had to go back and revisit the finding of this role, particularly the role that natural gas plays in this question,

I think going on Speaker 2's musical theme, how did we find ourselves here? Why are you out talking to us about this rule when we have zero goal? I will obviously not lecture to this group about the just generally how PJM in particular and other RTOs procure electricity. But I think the key point here is that PJM and others least-cost, dispatched-based decisions, they select the generators on the least-cost

basis, without distinguishing between emissions-free or polluting power plants. They take as an input the costs of the generators give them. That implicitly includes what is hopefully no longer an externality like, here, it would be MATs is being treated as internalizing that externality that used to be foisted on the public.

And then PJM takes those costs as given, each generator presents their cost for having met the standards put forth in MATS, whether it's running a control, whether it's being a gas plant, whether it's being otherwise not compliant, whether it's covered or not. One thing that I think should just be said boldly, and I've got a couple slides that will touch on this is, most of the discussion, particularly outside of this room and kind of the less deep discussions assume that revoking the MATS stasndards would have no effect, because there have been so many coal retirements since the study timeframe, since 2011. But I think that it's important to understand that it's just not true.

Lots of coal plans have have complied with MATS by adding controls, and that's got some information on that in a sec, and those have ongoing operations and maintenance costs that have implications for how they fall in the dispatch. So, essentially, what their costs are bid in at on. This is a hypothetical dispatch curve stolen from an NREL report because I thought it worked really well.

So, just hypothetically, those two black dots would be coal without and with running MATS controls, respectively, left to right. So if that dotted line is what you're procuring at that particular moment, the difference between running and not running the control will determine whether or not that plant runs at all. So we do have a strong concern about the idea that without MATS, there are a number of states where units could turn off controls.

Just as a kind of breakdown of what coal plants did install to meet these standards, because I think this is a really good example of another thing that Speaker 1 mentioned of just how much has changed since 2011. And I won't even say fracking when I say this, of EPA based all of those cost projections on assuming that far more units would, (a) not retire because we didn't have fracking, or, (b), would build scrubbers, because that was the best-known technology at the time.

However, yea markets, ACI really took off, activated carbon injection. This became a favorite due to the lower capital costs, but they do have an ongoing operations and maintenance cost of buying the activated carbon, for example, and that goes into units' bid prices which would push them further up that curve.

This is from EIA and I just enjoy it because it does highlight that you only use ACI to meet MATS. Those two lines are the first and the extended compliance deadline of MATS. You can see there's a run up and then a giant push to install and run ACI right before both of those compliance deadlines. And, again, that was essentially a market-driven innovation as part of MATS. It was a much lower capital cost, much more flexible way to to meet these standards, but does have this ongoing compliance cost.

A part of this is cut off by the pictures, depending on how your Zoom is laid out. But I think that this is a really nice picture that *Power* magazine put together of how control measures worked. The reduction in mercury released to the air from power plants has outpaced the reduction in coal generation. So you're seeing that there's an effect there of actually turning on controls. So a non-trivial

percent of mercury reductions are from running controls that may or may not be required if MATS is taken away.

Back to our friend the dispatch curve and why Exelon cares. So if you don't have federal rules, MATS, this will end up being a state-by-state essentially differential. A number of states do have their own backstop mercury roles that took effect before MATS. I think Speaker 2's timeline was wonderful in highlighting why, considering the back and forth, at some point a number of states just put in their own mercury standards to essentially pre-empt the [UNINTELLIGIBLE].

So you'll have essentially both of those dots if MATS goes away. In some states, you'll have the dot without controls and then you'll have some dots that are required to run controls, and then you'll kind of extend this competitive disadvantage of foisting your externality out on others, not just between coal and clean, but within coal as well. And then, of course, depending on the change in which unit is matginal and who's setting the cost, you could see a lowering of power prices as a result of this dynamic.

So this is where I think a few people on the phone are going to want to fight about it, but I will consider this largely illustrative of the challenge to basically everyone that's competing with coal that has the opportunity to turn off control costs right now. What this means is that clean or at least non-coal is less likely to recover their costs if our ability to turn off MATS controls results in lowering our wholesale power prices. I will point out that this is one of the few times where gas and nuclear do play well together. We, along with Calpine, have been defending this rule, since the day it went out the door in 2012.We've taken it to the Supreme Court at least once. We'll see what happens over the next year or two.

It means that basically everyone not coal is less likely to recover their costs in the market. So in some ways it's an environmental double whammy of you have more uncontrolled coal able to run, plus in the medium term, you have a reduction in generation, including clean generation like nuclear, which is less likely to be able to recover costs as that power price. So, the sum of the green and yellow on the right content continues to not meet the bid costs.

I will note, of course, for everyone paying attention to the numbers on those are obviously pre-COVID wholesale prices. And then just for context, I think this is a very closely held number for a lot of generators, but Ventyx in particular estimates that the difference between running controls and not running controls, they use for modeling about $4 a megawatt hour. Obviously, that doesn't all impact wholesale prices because coal is almost never on the margin anymore, at least on any kind of regularity. But that is a large shift up and down the LMP curve when you're talking about a unit moving by $4.

So I will stop there. That's essentially largely the question of why Exelon has been so invested in this rule, since the beginning, in addition to our 25 million customers that live downwind of the Ohio Valley. We'll just leave it on my last slide. I think that's actually a good pivot to Speaker 4's presentation, just to put this back to continuous back and forth on mercury in the context of state goals.

So as state policies are getting more ambitious and trying to target and promote clean energy and essentially set very ambitious goals, this federal policy back and forth just tends to undercut this broad transition to clean electricity that our states,

in particular, and as you can see nationwide, have set as their policy goal. I will stop there and turn to Speaker 4 for the regulated perspective.

Moderator: Thank you. Feel free, Speaker 4.

Speaker 4.
Well, good afternoon. And thank you so much for having me with you guys today. I think this has been for some of us a great stroll down memory lane. Love that we've gone through kind of the history of mercury. I was telling someone I remember when this was mercury MAC.

Just for a little bit of my history. I work in the Southern's environmental policy group. I've been with Southern for about 24 years now, been in the industry for 26, and it's just been really interesting to kind of see the evolution of this. I've worked across some different areas, so my whole career has not been spent in environmental but I've had two different stays here. So I was like, when I, this was mercury MAC. Wait, what happened, since now it's MATS? So all of that is very interesting as you think about this.

I'm going to talk to you a little bit about Southern Company and who we are and kind of where we've come from and what we look like today. Because just like we've all talked about things have changed a lot over the last few years, and I really feel like the changes in this industry and the changes in our company seem to have really accelerated every year. And so we'll talk about that talk about kind of our position, specifically around the MATS rule, what we want to advocate for and then kind of touch on this practical implications piece that we were asked to talk about by the Harvard Electricity Policy Group. So thank you guys so much for having me, and look forward to the discussion.

I'm sure many of you are very familiar with who Southern Company is, but might typically think about us as an electric utility in the southeast United States, which we very much are, still, through our Alabama Power, Georgia Power and Mississippi Power subsidiaries. We've got about 4.5 million of our customers are electric customers in the southeast.

But we are not just in the southeast and we are not just electricity. We also have our Southern Gas, which is our natural gas local distribution companies that are in four states. We've got Southern Power, which is our wholesale branch that really stretches from coast to coast, and they've really expanded into the renewables, both solar and wind, that has been added at remarkable pace. A couple of their recent announcements, just to give you kind of the coast-to-coast perspective. Wind in Washington State, wind in West Virginia. There's not a geographic preference here. We'll go either coast, either place.

I just really am fascinated by that change and how quickly, when I think about our first solar plant in New Mexico, I think, was in the 2010 timeframe. So we're talking about a decade and how fast that has continued to go. And we also have Power Secure, which is a nationally distributed energy resources company, energy efficiency and infrastructure as well as fiber optics networks and telecommunications. So that's really Southern Company. But one thing that remains across all of our businesses is providing clean, safe, reliable and affordable energy.

And that is something that I want to talk about, as we go through this. Our CEO will often talk about this is not an or, it's an and, and I think it's very pertinent to this discussion as we talked about cost benefits

and keeping clean and affordable. So that kind of is the lens I'm coming from.

Recently, much of the environmental discussion has been around greenhouse gas emissions. Southern has put out their greenhouse gas goals, and in 2018 we announced that we'd be low to no by 2050 and 50% reduction by 2030. We have more recently updated our 2015 goals to net zero and we have been able to make progress towards that goal. Actually, for the end of '19 we're about 44% reduction. So we expect to meet that 2030 goal ahead of our original target of 2030. But we've really seen this rapid transition as a function of a number of things. Some of it is the low gas prices that have already been referenced, the falling renewable costs, the support of our regulators as we look at the totality of the pressures on our fleet and making those decisions for our customers. So we've obviously done a lot to transition our fleet. Our gas company has done a lot to reduce their methane emissions.

So, talking through that, that's how we're going to get through these goals. But to talk a little bit more about the fleet transition, this will just give you a kind of a sense of where we were and where we are, where we are today and where we're headed. And so two pieces of this, the type of capacity that we have in our fleet has changed and how we're using that capacity has changed as well.

And the type of capacity has changed. You'll see renewables has grown significantly. Used to be, when I started with the company, hydro was our rolling renewable resource. Now renewables continue to grow and increase the amount of megawatts we have and also the amount of generation we get from those. We have also significantly decreased our full capacity. Southern was always thought of as a coal company. But I think that was really based on our generation of coal. If you look at the way we used our coal, it was when gas prices were high coal ran a lot. And so we were nearly 70% coal generation and now into after 2019 are 22% and we expect that to continue to fall.

That's a function of both retirements, conversions and also low natural gas prices, allowing our economic dispatch to be able to run cleaner energy sources, as well as the energy brought to us by the renewables. So just a really big transition in our fleet, but you know that transition gets us more than just greenhouse gas emissions. So I want to talk a little bit, I don't think everybody's hit on it that we'll talk about ours, because we're one of the companies that has been putting in controls and we actually go back, Speaker 2, to your Clean Air Act amendments of 1990 because of the significance of what was going on. It's particularly in Title IV for the Clean Air Act amendments, it's interesting. As a chemical engineer in a power company back in the early '90s, they said, "Oh, yeah, you can look at this and threw it on my desk and I was like, 'What in the world?'" So it's interesting to think about coming back to it now, all these years later.

But with this transition of the fleet, we have had significant reduction in our emissions beyond just greenhouse gases. So you'll see, SO_2 and N_2O down over 98% and 90% since 1990. Mercury's down over 96% since 2005. This is kind of where we are today and how we think about this. As we go into this MATS discussion, this is kind of setting the stage for you guys.

Let's talk about Southern's position. We did file comments on behalf of Alabama Power, Georgia Power, Mississippi Power because it's our electric utilities that do have coal resources that are impacted by the MATS rule. In those comments, we do support keeping MATS in place and oppose any

effort to rescind the rule. As a regulated utility, it is always the desire that we have certainty and I think certainty is desired by the company, not only by my company, but by the industry as a whole.

So we have already been complying with this rule for years, and we've been anticipating a rule for decades. Going back to Speaker 2's timeline of all the different mercury MAC camera. So we've been anticipating for decades. And we've got the rule, we've complied with it, we support keeping it in place. In our comments we did encourage the finalization of the RTR, just might bring that up because that is a statutory requirement that they did eight years after the initial rule. And so that time is now. And also in our comments, and I think this really gets to the heart of what we're talking about today, is to encourage a broader, more comprehensive rulemaking to address cost and benefit, to inform all Clean Air Act rules.

Really, this is because, hopefully, if we have that kind of rulemaking that addresses this cost benefit we can maybe reduce or get rid of some of this uncertainty that's already been discussed this afternoon. I think this last bullet is probably one of the most important ones to take away on this slide. And the reason this is so important to us is we really hope to avoid this current place where in, where we fully complied with a rule and our customers have fully complied with this rule, and we have uncertain justification or foundation.

So, it makes a difference to us that the cost benefit be protective of the environment, but also be able to make people's electricity affordable. That's important to our customers. And if you've ever heard a Southern investor speech they'll hear about the circle of life and the customers in the middle. It is a real thing and we live it. And it's how we do our business. Keeping those costs reasonable is important to us, especially when you look at the demographic of our customers, especially our lower-income customers, this becomes a real issue to them. So from a practical matter, and we've talked about this, the standard remains in place. Whether that's right or wrong, or how strange that is, and all the questions Speaker 2 brought up, which, Speaker 3, I'm also not going to answer all the those questions.

But the other standard remains in place. And so our controls continue to operate. Southern Company has made a big investment in our environmental control technology. These investments, they're not exclusively MATS-related, but they include MATS-related scrubbers and bag houses. Beyond that there were conversions to natural gas and retirements. Those decisions have been made.

We really look at those rules in a holistic kind of view, and really look at all the environmental requirements, along with the fuel reliability load considerations in our planning processes to make the best decisions for our customers related to control conversion and retirement. And we've worked with our commissions and when we make those recommendations, that they understand what the drivers are. We do scenario analysis when we look at those particular things over a variety of futures.

From that perspective, we feel like we've made the best decision, given the information we had at the time. Where these rules end up long term may still yet be determined. But in the near term and in the short term, the standards remain, the controls remain, we will continue to operate them and comply with the laws that are in place. And we made the decisions, the best decisions for our customers, given everything we knew. And

so that's our kind of practical point from that perspective.

Then on the last slide because I talked a little bit about where we were heading, I have to give you guys our standard cautionary note on forward-looking statements. But that's all I prepared to talk, I look forward to hearing some of the discussion.

Moderator: Thanks very much. We could take a break and reconvene.

Discussion.

Moderator: Alright, we have a hand up.

Question #1: I'm the only one who does have a hand up according to me. I have two questions. And I'll raise the one that is practical for our two representatives of the generation community, and that is, does anybody, at this stage, really fear that there'll be owners of coal who decide to not comply with MATS, to rip out there scrubbers or disengage their environmental controls?

Respondent 1: I think that there's a couple things baked into that question and I can take it and then Speaker 4, who actually still owns coal plants, can have a shot. I think speaking, particularly in the markets in which we operate, some of these companies actually have a fiduciary duty to do what you're talking about if MATS goes away, which I was called Chicken Little for years on this question.

But the legal challenges that just got landed Friday explicitly asked for the revocation of the MATS standards so I think that's no longer a hypothetical concern. If those standards were revoked, I think particularly corporations in competitive market RTOs would essentially have a fiduciary duty to turn off their controls, because at that point they would be running their power and bidding at a higher price than they needed to, frankly.

Questioner: With gas, I haven't looked at in the last couple days, under two, and solar and wind with essentially a zero or even a negative marginal cost, because the production tax credit at least with respect to wind, isn't coal still on top of the stack?

Respondent 1: Even if you just think of this as toggling between gas and coal, right now the practical impact could probably be mooted somewhat by just, to your point, gas is nearly negative at this point, depending on your node. But from a longer term, is that the best plan, is to really count on those commodity prices never flipping again?

Respondent 2: I think it's an interesting question, for sure. And it probably depends on a lot of things, and the piece I'll say first is just to remember that the standard remains in place. And so the controls, I believe, will continue to operate and, this question, I think it will be a legal question. I'll let maybe Speaker 2 and some people more versed in all the legal back and forth, this is not something that I believe is going to get settled quickly. I think this is something that has the potential to be, it would have to be settled, I'm assuming, through litigation and through proceedings and then through more rulemaking of delisting and in getting rid of the rules.

So I think there's a lot that needs to go on. As long as the standards remain we'll continue to operate those controls. Now if you want to speculate that, sometime in the future, the standards aren't in place. In that case, if we assume the standards go out, and this is kind of speculation, then I think there are still

some things that need to be considered, that you'll still have to work with your states on the controls, since they are already are in place and already operating.

I'm speaking for us. But, we have unit level permit requirements and limits on these units. And they are highly controlled and so those permits would still be in effect. Then you've got National Ambient Air Quality Standards. The states have been including these units and things in their analysis of those ambient air quality standards and in their state plans and allowance for requirements. Then you do have states that we talked about, that have state laws that have driven the controls. So there's just a lot that would go into that decision to take a control offline, at least for the controls I'm familiar with and then the jurisdictions that we're in.

Moderator: Before your second question, let's just go to Speaker 2 for a second, because I'm curious. Let's assume some utility decided to simply to abandon the controls. I mean, how is EPA going to seek an enforcement action when they've knocked the underpinnings out? What would that look like, would they just simply ignore it?

Respondent 3: That's a great question, even if you didn't have that sort of special fact pattern. We're seeing civil penalties getting knocked down by this administration, there was just another wave of that in the last couple of weeks. We've seen rule makings where different penalties are categorically lowered, like for failing to meet CAFE standards. So I think there's a general question of enforcement, what would be taken or not. I take the point of the utilities and at least one regulator in the chat box, that until a court says that MATS is no longer effective because the underpinning has been knocked out. Legally speaking, everyone would be considering it still in place.

The question is, practically speaking, sort of, does it signal some sort of less aggressive posture for enforcement by EPA, that maybe if there is some, and again, obviously, it seems like a lot of the marginal plants at this point are gas in most of the competitive markets, but you know if there is some situation where a company is worried it doesn't clear it with its additional operating costs, is this just another calculus, risk calculus there of likelihood of enforcement?

I don't think there's a clear answer here. It does feel like, on paper, people are going to be treating the MATS standard as in place unless and until the litigation says otherwise. But I think there's just practical implications for how readily state and federal regulators would be enforcing it. And I just don't know.

Respondent 1: I think you touched on a really good point there that I think Speaker 4 and I are probably remiss not to do at the beginning, but it doesn't have to be a utility or a power plant operator that makes that decision.

Let's be clear, the MATS rule has not been about the electric sector in a very long time. We weren't the ones that suited on Friday, we didn't ask for this finding to be revoked. As an entirely wide, wide sector, we have signed several letters to this administration basically saying, "Don't do this." This is not the place to have the cobenefits fight. We've complied, whether it's Speaker 4 building an operating a scrubber, us upgrading a nuclear plant to take up some of the slack from retiring coal.

We have all made these investments and we would like to keep these rules for the regulatory certainty that we're all chasing. But it hasn't been about us in a long time. And I actually think probably the most practical path to get to facing this question is not, I decide to turn off my controls at some point.

It's going to be a state customer protection official who sees money going out the door that doesn't have to or a coal interest or there's a lot of other people, that "we are the football in this fight." So it doesn't really have to be us. I know Sierra Club has been making some noise about, if the rules go away challenging the used and usefulness in regulated states.

I think it's not out of the realm of possibility that public advocates do it too, in some states that would like to kind of pull out everything they can for either coal or lower LMPs. I think it's just important to remember, it's not just that I decide to go turn off a scrubber. There's a lot of other people with their hands in this issue.

Moderator: Actually, we didn't allude to the politics of this, but the coalition of people that have posed changing the rule was as about as broad—if you ever again see Greenpeace and all the utilities on the same side, that'll wake you up. But they lost.

Respondent 1: If you had been able to tell pre-2017 me that we would have been able to put together a coalition that was Center for Biological Diversity to the Chamber of Commerce. I really thought we won Regulatory Bingo on that one.

Moderator: I interrupted your second question.

Question #2: This is actually I think for Speakers 1 and 2. I'll preface that by saying I agree completely on the economics with respect to the cobenefits, but the concern that some folks have is the use of that rationale to take the regulatory authority way beyond what was originally intended by Congress. It's part of this whole question of regulatory legitimacy, if you will, in some agencies, because mercury would be like defending mass murder in criminal court.

Here's another example. FERC right now, and it's it's controversial, but they're proposing that net metering, which is just a code word for distributed generation, that because it's generation in organized markets, they have exclusive jurisdiction, notwithstanding what the Federal Power Act actually says about the line between between folks authority and state authority. As an aside, I noticed in I think it was the *New York Times* today, that there were 24 Democrats from the House who sent a letter to FERC, saying that this rule is an abridgement of states rights. I don't think I've ever seen them defend states' rights so vehemently.

But to get back to the point that until or unless *Chevron* is overturned by the Supreme Court, I get nervous when regulatory agencies begin to move outside of their sphere. I'm not saying EPA is, but, broadly broadly used, I think it has some concerns about making law or enforcing law.

Respondent 1: I'm happy to jump in. I suspect, given the nature of the question Speaker 2 probably has to join in here, as well, because some of this is as much legal as it is economic. One of the reasons why, in my remarks, I wanted to emphasize not just here's what we know about cobenefits with MATS, but here's what we've learned about the direct health impacts of mercury since 2011, is that it would appear that we're talking about health benefits from mercury that probably aren't measured in millions of dollars but billions of dollars. And it's simply the fact that EPA has not done any consideration of the research literature since 2011 in their most recent rulemaking process. And I think it's important because when we look at the political economy of this, the benefits and cost analysis actually has no bearing, typically. in a lot of these Clean Air Act regulations.

There's this sort of a potentially apocryphal story about Ruckelshaus, where someone brought him an NAAQS proposal. And he said, "The Reagan executive order requires a benefit-cost analysis. Where's the benefit-cost analysis?" And the staffer said, "Oh, we don't have it. Let's go back and do it." So they go back and they bring it to them, and they say, "Here's a benefit-cost analysis." And he says, "Well, for God's sake, don't show it to me. I can't consider it."

And that's part of the interesting nature in which the Nationally Ambient Air Quality Standards or NAAQS are set under the Clean Air Act, where you're not supposed to be taking into account the cost of the standard but setting it to protect public health within an adequate margin of safety. And we have that throughout the act. And in fact, if anything, it was only in response to *Michigan v. EPA* that you had EPA say and justify that it's appropriate and necessary to regulate mercury in 2016 where they actually relied on the benefit-cost analysis.

But, in general, it seems like, in our assessment throughout the act, and it seems consistent with the evidence you find with MATS, EPA is doing one thing to satisfy their obligations on the executive order. They want to show that benefits exceed costs. They felt like they did that huge difference between the monetized benefits and the monetized costs. In a sense, it creates a kind of "I've done enough to justify what I need to" for the sort of incentivesI have on the institutions for the executive order, and I sort of stop and I don't go that next step and say, **"**What really are the direct impacts from Mercury? What are the direct effects of any of the other acid guesses that are regulated here that aren't monetized at all in the RIA?"

So I think we have these two different kinds of incentives going on. There's what you need to do to justify your regulation under the Clean Air Act authority and under that provision, and there is some variation across those. But there's nothing in my understanding of the Clean Air Act that says, design the standard consistent with a benefit-cost test.

And then you have the executive order that says, we have a kind of benefit-cost test we'd like for you to pass when we're evaluating the rule. So I think that that's created these dual incentives, something that matters when we think about the political debate. And maybe at the end of the day, we say, "Look, there's huge fine PM cobenefits that separately go after fine PM and maybe by directly targeting fine PM with regulation, we might actually be more cost effective." I've heard that argument.

I think that, if anything that I've learned over the past month from this EPA, when they decided not to propose a more stringent fine PM standard, that they are not going that route. But from the standpoint of, are we better off a society, we are certainly better off as a society when we actually take policies that improve air quality, whether it's for mercury or other air toxics, or we get these ancillary benefits that are largely a function of the control technologies that we're doing to deliver on those other emission reductions that we get for fine PM.

Moderator: Okay, did you want to—

Respondent 2: Yeah, great answer, but I can add a couple of pieces to it. I do think there is the threshold question of whether you need to do a cost-benefit analysis. And then what do you consider in the cost-benefit analysis.I mean, *Michigan v. EPA* I find confusing. I also find it really interesting. One of the really interesting things about it is that Scalia wrote it, and the reason Scalia wrote it is

because he wrote *American Trucking*, which endorsed what was just said, that EPA is not allowed to consider cost when setting air quality standards. And so that was critically a strategic move there to have him wield the pen on this.

It's also interesting that, even though he said you needed to consider costs, he went quite light on how EPA should consider cost and was quite deferential in saying there's lots of different ways this could work. He also didn't strike the rule, the MATS Rule, and just said, go back and do some housekeeping on the cost side. Scalia, as we know, could be biting, could be sarcastic, could really take umbrage at some of EPA's actions. And the fact that he didn't, in this case, I thought was really interesting.

So that's one thing. Second of all, when you start thinking about how to calculate benefits and to what extent you should rely on cobenefits, I think this gets at the question. We can agree as a society that these benefits are legitimate and real, the question is, who should pay for them, right? So, Speaker 3, for instance, made I think an excellent point at the beginning of her presentation that might have gotten lost, the fact that this really focused on coal- and oil-fired power plants.

And the fact that the overwhelming monetized benefits are reductions in particulate matter and N_20. Natural gas plants are huge sources of those two things, and yet they're not being asked to pay the cost of the Mercury and Air Toxics Rule. They don't emit mercury, so there was a real threshold reason for that. But the more you start bringing in cost benefits, particularly in a statute that is structured by pollutant, there is going to be, I think, rational disagreement among actors of how much the targeted regulated entities in this particular rulemaking should be carrying the costs of what are clearly benefits to society.

I think what you have here, as complicating facts, which Speaker 1 went into great detail on, the fact that we don't have a lot of the HAPs benefits monetized here, just for lack of research, not for lack of likely links between mercury and more than things than IQ of kids whose parents subsistence fish in freshwater. That's a very narrow monetized category of benefits. Not to mention the other HAPs.

So, and some part of the PM benefits that we have monetized are actually a proxy for some of those non-mercury HAPs. EPA makes no distinction there. There's some percentage that clearly actually falls right in the direct benefits here. And so part of this is just, we don't have full clarity on the benefits, and EPA has made PM do a lot of work for a lot of its rules. It's because that's where we have the research, and it's good research. PM drives a lot of health issues. I think we should be doing more research on other pollutants, so that we've got better research to bring to bear that is more relevant to the targeted pollutants of each rulemaking.

I think there's absolutely, legally speaking, precedent for considering cobenefits. OMB has considered cobenefits. Lots of rulemaking has been affirmed by courts that considered cobenefits, too. So to me it's not the nature of the cobenefits. It's the degree to which you rely on them. And I think that's a legitimate question.

Respondent 3: Those on the phone didn't get a chance to see me applaud that incredibly important point that not all PM is essentially cobenefit. Mercury is the star, but it is the Mercury and Air Toxic Standards. It's been a long time since I had to deal with MATS, someone might remember at 12 or 14 covered

metals that we as an industry at the time said, "Please don't make us stack test for 14 individual toxic metals. Can we just have a PM surrogate option?" We didn't know this debate is what we were kicking off.

But I think what was just said is such an important point in this conversation, that when you simplify PM into a cobenefit you're actually rounding off a lot of the pollutants covered by these standards and targeted by these standards.

Moderator: Next question.

Question #3: Thanks. I think this has been really fascinating so far. And I know before I get into my my two questions, I do want to commend Speaker 1 for a lot of the work he's done in multiple papers I've found quite compelling.

I wanted to maybe take the concept that the earlier questioner was going into for my first question, and put it in a little bit of academic terms and how it's used to cost-benefit analysis in regulatory decisionmaking. Because, a decade ago, when MATS was really in the developmental process, I was down there in Durham and we were working with the EPA cost-benefit team on the air regs and, right out of the gate, this was never motivated to reduce toxics. It was always about copollutants.

So maybe you could argue some other elements of it, too. And so even to Speaker 1's point that, yes, updating the literature and a current CBA absolutely makes sense in a rulemaking process, and whether it's a target or a cobenefit. Absolutely. It all counts. However, cost-benefit analysis as a staple is also about looking at the metrics across different alternatives and to the point, this was a provision of the Clean Air Act that Congress primarily intended to address toxics. Going back to the decisional point a decade ago to even go down this path, this wasn't the vehicle that was selected. So I'd be curious to know, to the question of what the role is of cost-benefit analysis in weighing multiple alternatives, even if you have a regulatory option that maybe has favorable cost-benefit metrics and isolation, how should RIA's be contemplating alternative vehicles and making sure that, from a matter of instrument choice, we're using CBA in this regulatory context as useful as possible?

Respondent 1: I think that's a great question. It's also fantastic because what I will be working on later today and tomorrow are comments to EPA on how to update their guidelines for economic analysis. So I cited them in my presentation, EPA's in the process of updating that and I'm on the science advisory board panel thinking about this. This question about how to characterize alternatives is one that we in our panel have talked about several times.

I think there is a sense in which, for one, we would like to see EPA be much more open-minded about the set of policies you might consider in an alternatives analysis. I would say the norm, when you look across Clean Air Act RIAs, is here is one stringency of the standard, perhaps that's more stringent than what we accepted or what we're proposing or what we're actually going to promulgate. Here's another alternative that's less stringent. And here's the sweet spot that we found and what is the going to be the rule.

We think there's a lot of value in thinking through perhaps something that's not consistent with EPA statutory authority as it stands, but could be a signal to Congress, we could do this better. Here's what we're doing with our good in authorities right now. There's a smarter way to do this. Here's an alternative instrument we might use that

would enable us to do this in a way that might either have higher net social benefits or perhaps to have that same benefits but at lower cost.

So I think there is a lot of value to that. I think there could be some value for us to think also more holistically about what is the Clean Air Act program. We do benefit-cost analysis for the most part rule by rule. There have been a few exceptions, there is under the Clean Air Act, the section 812 process that involved a sort of Clean Air Act as a whole retrospective analysis of the benefits and costs. There've been a few prospective studies as well done for that.

But, in general, what we tend to get is this as a function of where we are in what's prompting the motion in the rulemaking process. We're going to look at this rule in isolation and evaluate the benefits across, that we may be taking into account, what we should be taking into account how the baseline is updated, given what else has been done previously leading up to that given rule. I think there is some value to actually step back and say, "What makes sense if the objective under the Clean Air Act is to improve the public health? What makes sense in terms of our next steps going forward? And where might there be positive synergies, where might there be substitutions across different actions? How can we do this in a way that makes the most sense?"

It would be one of those things which I think what I've just described would have been reflected in a reauthorization we might have seen sometime over the past 30 years. Because I think since 1990 we've learned a lot. But it feels academic for me to say, "It'd be nice of EPA to highlight what might make sense in a new reauthorization bill of the Clean Air Act." When that hasn't happened since, well, since I graduated high school and and that was a while ago.

I think it is important, though, as I said, to inform our analysis and inform our understanding about what is the policy approach that can best increase social welfare and deliver on the objectives on the statute. But it's not clear to me we're going to see that all that often in practice at EPA, unless they think Congress is seriously open to the idea of new, smarter ways of implementing the law by giving them new authorities through a reauthorization.

Respondent 2: And I would just add, really quick, I agree with everything just said. When you were describing it, it was sounding to me, almost like a NEPA analysis of the various alternative paths. And so I just wanted to caution, and maybe it is just a matter of we'd have to go back to Congress and figure out through more of a grand bargain here, but just that the posture would be different in a NEPA sort of looking at alternatives analysis and Clean Air Act, because in NEPA the original federal action is not usually being done to protect public health and welfare, and so no action is a viable option or various levels of protections. Whereas, here that since the posture would be we are acting to protect public health and welfare, and since there are specific parts of the Clean Air Act, you're not allowed to consider costs.

There'd be a little bit of a thumb on a scale, even if you did lay out a few alternatives, but I agree, something like that could be nice and be more transparent about the different options.

Moderator: A second question.

Question #4: That was a great response. And I wondered if that could set up maybe a point

that Speaker 4 had raised about some approach to a more comprehensive cost-benefit approach. And I don't know if there's a way to do this within the existing statutory framework. Or if Southern Company and friends have some broader idea of, maybe alluding to the reauthorization vehicle. But I'd be curious to get everyone's thoughts on that and maybe if anyone wants to elaborate on what they were thinking.

Respondent 1: I'll kick it off. I'm definitely not into the same level of details about what's legally viable, but I'll talk more from a business implications. But this Monday morning quarterbacking, it's bothersome when you're thinking about spending billions of dollars on controls and you have to comply with the rules that are in place and then we have a decade and we're not done yet. And, I think that if there's one thing all of us can agree on is that that just none of us would want to operate our personal lives under that situation, and yet we're having to operate all of our customers' lives in that situation.

So that's what really drives us to, instead of doing this rule by rule and it being done differently and there not being clear requirements. I will say a personal problem is when I think about there's laws that there's legislators who pass the laws, regulators who are supposed to enforce the laws, litigators that keep us in check to make sure we're doing those things. And when the regulators can change the direction of the policies so much and I think mercury MAC to camera to MATS is a great example of it.

But back to the Southern Company piece of it, being able to assess costs and benefits as part of the process, it's where it makes sense. There was a great point that cost in some cases is not a consideration, and that's spelled out when it's not. But we don't like finding ourselves in this this back-ended Monday morning quarterbacking of what you do, and I agree. I think cobenefits are important parts of that analysis, I agree with how heavily you rely on the cobenefits plays into it.

One of the challenges we've talked about in this discussion is updating the analysis. Well, yeah, things have changed, but I still like all that to happened first. So that we don't all find ourselves in this case, so it's what's in the best interest of our customers for them to know what they've got to do, and we can make the best decisions for them because if it just makes us two different things and so that's what's driving us to want to do that on a broader scale.

Moderator: Anybody else want to weigh in?

Questioner: Well, I think that that was really helpful. Also, to add one other thing, I think you'll have a fan with a lot of consumer groups. The whole reason that we filed at ELCON last year, even in the cost reconsideration front on the MATS rule, was really to talk about the use of cost-benefit analysis going forward and regulatory decisionmaking. It wasn't about trying to rescind the rule or clawback those last little bits or have states challenge use and useful or anything.

The heavy industry was really interested in getting more clarity on the use of cost-benefit analysis, and to your earlier point on certainty, that just seems to be big. So going forward, I think there'll be a probably be a broad coalition of stakeholder interest in that.

Question #5: Maybe this would be a good place for me to jump in on this, to try to take a slightly different but I think reinforcing perspective from comments about this. One, and Speaker 1 pay attention, because we've exchanged notes on this a little bit.

The statement early on about cost-benefit analysis and looking across all the cobenefits is standard advice that comes out of cost-benefit manuals and guidance. Maybe I would take a devil's advocate position and say that that's not exactly quite right. And that the argument is that if you do the social welfare analysis and you look across all of the strategies, then you should include everything, and then you should balance everything. That's not controversial.

It's when you get into the actual applications and a partial equilibrium kind of framework, where you say, "We're going to look at the sector, that this is the whole point of direct and then co is the other sector, cobenefits or some some other thing." And the examples that are in the papers that are cited with these sort of abstract partial equilibrium models are making assumptions about what's happening in the rest of the other sectors of the other economy.

And, there, I think it's not true that you should always come with the cobenefits or, at least, or maybe it's a question about how you do the calculation. So let me suggest two alternatives where I think you would get the opposite answer. One is, which is how I interpreted the last question, is, there's a lot of other strategies that you could consider and if one of those strategies was a cheaper way to reduce particulates and it has no effect on mercury, then that would be the strategy to follow, given the estimates that we're talking about here. I don't know, technologically whether that's possible. But that's an example, conceptually. And then the other general equilibrium as opposed to partial equilibrium argument is, what's happening in the other sectors?

So if you had a cap-and-trade system for controlling particulates, and what you're doing is reducing particularites because we're doing the mercury protection, all that does is give other people opportunities to emit the same quantities. So, in a cap-and-trade framework, there are no cobenefits. That's actually wrong, because of the partial equilibrium assumptions that apply there. So I think it's a much more complicated story than simply cobenefits should be included.

And I'm still not clear, I think I just intuitively find it troubling, when you look at those graphics showing 99% of the benefits are cobenefits. One way out of that is to argue, "Well, you ignored a lot of stuff." Okay, I agree with that. We should do the arithmetic correctly, but even if you did the arithmetic correctly, you ended up in a similar position, then you have to address these other characteristics. It's not so obvious to me that we either have the conceptual or the legal or the evidentiary experience here in order to do the calculation the way the handbooks tell you that you should do it. So I think that this is actually not so easy, even from an economic perspective.

And I'm wondering if there's something wrong in my argument, or is this going to show up in the new guidelines for EPA in a couple of days?

Respondent 1: I think those are two great points, because you're spot-on that they are important and because I'm happy to say that Karen Palmer, and my other colleagues on this project and I have actually been thinking about each of those topics. They have been raised before in the literature, about how we actually do the accounting correct. So you're right. There's a sense in which conceptually, yes, count cobenefits. But there's a question about, if you will, the devil in the details.

And I think these are two empirical questions at the end of the day. We're not going to be able to have a cut-and-dry, black-and-white

rule—include or don't include cobenefits—when we think about these things. We need to actually drill down and do the work. On your first point, on it might be more cost effective to go after a PM directly with a regulation that's really focusing on the fine PM, either their emissions or the precursors, then to do it, say, through a Mercury and Air Toxic Standard. I think that it does make sense that there should be a lower-cost way to get fine PM.

But there is going to be a question about what we go give up when we target fine PM. Now if you think that mercury and air toxics are only getting you $4-6 million of benefits, then taking an approach that ends up explicitly targeting fine PM and getting you less in the air toxics and mercury, you may not really worry about that. But it could be that way your opportunity cost could be more substantial than that. In fact, we would argue, and looking at some of the more recent mercury health benefits literature, that it may be quite substantially. So I think it is possible that you can get those fine PM benefits at lower cost. You should think about what you would be giving up. You've now made what is the targeted benefit and that's now a cobenefit, what are we giving up when we now decide not to go forward with MATS and instead target directly fine PM?

But I think that's an empirical question, one that we should sort of think about from an economic standpoint. But then we have to go through the next step, which is to talk to Speaker 2 and her colleagues and say, "Legally, could we do this, can we decide not to do MATS at all and just do something that targets fine PM directly?"

The second point, on what's happening in other sectors, what we in our work described as the regulatory rebound, I think is very important. And I think it's even broader than what you described. You described one example, which is suppose I had a cap and trade program? And now what you've effectively done is relaxed, for some of the sources covered by that you-have-to-trade program, their obligations. Because you now have this overlapping policy that requires certain emission reductions. What we're going to do is just cause a reshuffling within the cap-and-trade program in emissions, and not really reduce on net emissions.

So we're not really doing justice to what's the baseline for analysis, because there's this prospect for a rebound as a result of the design instead of the regulation. I think it's possible to think about this in the context, more generally, that here are a lot of states that had their state implementation plans. They talk about the different ways they're going to do things to reduce their emissions, consistent with sort of demonstrating either progress towards attaining a NAAQS or demonstrating how they will continue to comply with the NAAQS. And what we do when we impose a national standard like this is, we may relax the constraints within the states on what they have to do to demonstrate progress, through what they have included as policies and programs within their state implementation plan.

I think this is also something that's quite important that we need to think about. It may reduce then the estimated magnitude of the ancillary emissions. What is the true measure, the incremental impact on, say, fine PM in this context when we account for this regulatory rebound?

But I think in both these cases, what we have here are going from this sort of abstract general rule, count all the cobenefits to making sure that, in the first case, let's think about the most cost-effective way to get to these public health benefits. And, in the

second case, make sure we're fully accounting for how these policies interact so that we're really understanding the incremental impact of the regulation and consideration on fine PM, or the other sources of the ancillary impacts of cobenefits.

Moderator: Anybody else want to weigh in on the panel? No?

Question #6: Good afternoon, everybody. This has been a fascinating panel. I actually want to piggyback on the last question a little bit, but there's also a broader question. I'll ask the broader question first, and the broader one is, given the now 2020 MATS Rule, what's actually going to be more impactful, more worry? Is it the cost-benefit analysis issue and the cobenefits? Or is it the prospect of resources actually turning off their controls and emitting more mercury and toxic metals?

So that's, I think, a threshold question at least immediately. But coming back to the point which I think is interesting, and I hadn't thought too much about that, there's also cobenefits, if you will, or cocosts inmeeting all of these different programs, whether it's sulfur dioxide, nitrogen oxides, particulates. A lot of units that are more controlled for MATS or already could meet the standard met the standard because of the sulfur dioxide trading program, the N_2O trading program where they had to, effectively, install scrubbers or select a catalytic reduction.

Those combined help reduce the amount of particulates and the mercury and acid gases and other air toxics being released. But then there's also the issue of, if we attack the particulates directly with all of that and you still have units out there who didn't have anything, many of them decided to go with things like trona or Activated Carbon Injection or both, in which case they would also have to install a bag house or fabric filter on on the back end that attacks both the particulates and mercury.

So the question is, if we just reframe this as particularites, a lot of those things would have happened anyway, a bag house certainly would have happened. Maybe some other controls would have happened because when you think about the costs and benefits, well, I'm facing all these different regulations. I haven't installed the controls, let me go all the way.

How do you parse that out in looking at costs, because are the costs that are being quoted by EPA, are those the true direct costs for the rule? Or are there other costs that shouldn't be included, because they're being used to comply with other rules that happen to already be in place? So it's turning it on its head, and looking at the other direction. I'd like to get some reactions from the panel on that. Thanks.

Respondent 1: I'll offer three comments on the cost side, of their analysis. First, the capital costs incurred for some of the equipment that's already been installed that was clearly in response to the MATS rule. To go back to the figure we saw earlier, and I apologize, I can't recall whose presentation, you could see right when we got to the date in 2015 when we initially have to have compliance, you see a big spike in investment. And then EPA gives the one-year extension and there's not much activity. And then we get close to April 2016 and we see a big spike in investment as well.

From an economist's standpoint, we wouldn't put that into a benefit-cost analysis today. Those costs are sunk. They've already been incurred. As far as I know, there is not a really robust liquid market for used ACI equipment.

It's not like you could go sell this stuff somewhere else.

So if you're a utility and you've already incurred those costs, they're incurred, they're sunk from the standpoint of how we think about today, going forward, the benefits and costs of this stand. I recognize that's different than how you think about the finances of the utility and how you think about how you engage with your public utility commission on rate setting, if that's relevant in your context, but from the standpoint of, how do we think about the benefits and cost of this regulation going forward? Those costs are incurred and they are the past.

The second thing I want to say about the cost years, as we've noted in several of our presentations and practice, we saw a lot less pollution control equipment than what EPA had projected in 2011. Some of that is because of retirement coal-fired power plants. Some of that is I think, as we discussed earlier, that ACI just wind up being a sort of cheaper alternative, certainly lower capital intensive alternative than scrubbers.

But even when we look across all the control technologies, there's just a lot less investment of controlling technology. So, even if I wasn't thinking about these as being sunk, the total capital that's been installed is much less than what EPA projected.

The third thing I want to say is when we think about the EPA cost, of this 9½ billion estimate, about a quarter of that was the fact that they thought we were going to be bidding up the price of natural gas as an input in the power sector. That was going to be increasing the cost in the power sector. So it's actually looking outside of the regulated units, but looking at the cost being born within the power sector.

And I think what we've experienced in practice is that, because of very low natural gas prices, not just that natural gas prices are low, it's that the supply of natural gas tends to be much more elastic, as a result that increasing demand isn't really bidding up. If we have a little bit of demand that's caused by this regulation for gas, we're not really bidding up the gas price that much. So, as a result, we're not really bearing as much of a higher cost of electricity than we would have otherwise, if we had not implemented this rule.

So I think there's a number of things that, when I look at some of the cost side of the ledger here, that the costs, given what we know now, are a lot less than what had been projected in the 2011 analysis.

Moderator: Any other comments on that?

Respondent 2: Yeah, I think that's all true. And at the risk of dinging everyone's really good work on some of this cost-benefit analysis, I think one question or point implicit in what was asked was, a lot of these regulatory analyses, obligations, let's say, do go pollutant by pollutant, because that's how the Clean Air Act is structured. I think I'm with the vast majority of us that think we're not reauthorizing that anytime soon.

But that's not how we as a business will react. I think Southern Company is a great example of, there was the MATS rule, and there was CASPER and all of their various predecessors. But they didn't look at specifically, what could they do to, I think I saw the the reference to the goal line being moved in the chat. So at the risk of arguing football with people from Georgia, we don't look at each of those rules as a goal line themselves, they're more like down markers.

Southern Company just looks at all these. You would make a different decision if you only had to go and meet CASPER, and you're done. Or just meet MATS, and you're done. They looked at the totality of it and funded Vogtle, because they said, "We can see where this is going. We're going to make a long-term investment."

And some of that was because their regulatory structure and regulators allowed it. But I think it's just the dynamic between what the regulations themselves say versus how we, as a business, will react to them.

Respondent 3: Those are great points. Just to add to that, I do feel like, in some ways, I'm taking my legal hat off here, all of these rules have sort of been a march towards, at some point, we should have scrubbers and bag houses on all operating coal-fired power plants.

So in 1977 you grandfather the old power plants. You assume that everyone's going to come in when they modify their plants and then be brought up to current controls. That doesn't happen. You have 1990, assuming you're going to get scrubbers put on for the Acid Rain Program. It turns out Powder River Basin call helps you meet the standard. So, I feel like a lot of these have been like another nudge towards FTDs. And at some point, companies see the writing on the wall and installed those, because it meets a number of these requirements. That also probably goes to the point of some of the animating forces behind the MATS Rule, and why having FTDs there was so important to EPA.

Respondent 4: Well, one piece I'll add, a little bit like a broken record, is that I still believe all this needs to be done ahead of time because, Speaker 1 I completely agree, a cost-benefit analysis, the sunk cost is sunk. But I would not ever want to get us in a regulatory world where we can promulgate a rule and then come back later and say the costs were low because we already made you do it. And that's where I agree with that. I want it done ahead of time, when it's viable and done in a consistent manner.

So that's the slippery slope I see with the discussion about, do you use the 2011 data to use new data? Back to the football, the goal line keeps moving. But you're absolutely right. When we're making decisions for our customers, it's what's the cost to continue to operate versus what's the replacement options?

And those replacement options can be things we can do, they can be things in the market. Southeast has a very healthy bilateral market with lots of players. So those options are always there, and that cost to continue to operate, it isn't just, "Oh, we get through this one rule, and it's all done. We're done. Whoo!" It's, "What else is coming?"

But the drivers, and some of the "what else is coming" are bigger drivers and more impactful just because of their timing and because of the amount that they require. But to the point on the transition of the fleet, that transition that I talked about for us is just the cumulative impact of a lot of things, greenhouse gas being one of them, water, land, air, take your pick.

Moderator: Next.

Question #7: I'm with the Edison Electric Institute. Thank you very much for letting me participate. I basically begged Phil Moeller, who is the regular participant, to let me play today because this is my favorite topic, and he nicely let me. But I wanted to go back to maybe some of the legal discussion, and in particular, I guess I'm going to start with an

anecdote. I hope no one's mad, but I have this very vivid memory of sitting in a conference room in the offic. I haven't been to now in months, when the first MATS proposal came out in 2011. Someone was ranting at me about the cost-benefit analysis and something they didn't like about it, and I responded, "I really don't care."

It wasn't relevant to me with respect to how the standards were set and what the compliance obligations were. Because I lived in a world at the time, where I didn't think anyone would challenge the appropriate unnecessary determination, which maybe was naïve. But 112(n)(1)(a) is this very weird thing that requires an appropriate and necessary determination only for setting standards for the power sector. It doesn't exist anywhere else, it doesn't exist for any other MATS standard.

I don't think the Supreme Court said in *Michigan v. EPA***,** when they said that cost had to be considered, that it had to be done through a cost-benefit analysis. So why are we even torturing ourselves with this? For starters, it's toxics**,** it's bad for people. I feel like we're turning ourselves in knots to make EPA's assessment of cost-benefit analysis make sense. It doesn't make sense. But I don't think the Supreme Court required it, and I'd love someone else's perspective on that.

Respondent 1: I'll take the first shot and just say, "Thank you." You boil down what I was trying to say in a much more indirect way in about 30 seconds. So I appreciate that. I think there was a lot of conflation that happened through the subsequent rulemaking. By EPA, by the Supreme Court, by EPA now. I feel like in *Michigan v. EPA* pretty clearly, like I said, it was very strategic that Scalia was the one who wrote that, and it was not prescriptive and it did not say cost-benefit analysis, it said consider costs.

And it said, "There are lots of different ways to consider costs." And the fact that they said that, and the rule that has this as its foundation can go forth right in the middle of critical compliance time. That's like 2015, right when we hear whether there's going to be a year extension. I think all that together, a very reasonable reading of *Michigan v. EPA* is that there was not a cost-benefit analysis required.

What EPA did in its supplemental rulemaking, and it was probably doing a belt-and-suspenders thing—and you know we've got Joe Goffman and others here if they want to talk out of school here. But, I think, to sort of bolster, they went ahead and as one of their options for how you could think about costs—because they did this sort of back of the envelope "Is it reasonable?" But then they did just basically take their cost-benefit analysis from 2011 and shoehorn it into the appropriate and necessary determination.

Then I think a lot of mischief has followed since then, because I think we maybe have made too much of what needed to be considered for that initial determination. Now we are in the mess that we're in, and you know the litigation is going to be really interesting to see how you tease this apart. Or to what extent you don't. Because there's been a lot of conflation here, I think, which creates more uncertainty, which, as we've heard, is unwelcome—

Questioner: It's not my favorite part of this experience. Well, I appreciate that. I guess one of the things we said in response to the most recent go around with this EPA about MATS was, we can't undo where we are. And it seems very strange to try and do a cost-benefit analysis pretending that it's 2011 when, at least at the time, it was 2019.

I totally understand Speaker 4's perspective, mostly because we've talked about it at length, saying that sunk costs don't matter and therefore saying it's okay that we spent them. But it is very strange to have them actually not return to a cost-benefit analysis conversation. It's very strange to have them pretend that we hadn't spent those costs and that it didn't matter at all.

Respondent 1: My final point on this. And we've been talking about proxy and PM playing proxy for non-mercury HAPs. In many ways, the appropriate and necessary determination, I think, is a proxy here for a fight over the rule. But the direct fight over the rule, the challenge was lost. So this was sort of a collateral attack four or five years later on the underpinnings of the rule because the Supreme Court had already largely upheld MATS itself. So I think *Michigan v. EPA* conflated things a little bit and complicated things.

Respondent 2: Yeah, I think some of that has certainly been intentional after the fact. I mean, I think just to highlight what you're saying, *Michigan* didn't say that EPA had to do a specific type of cost-benefit analysis or one at all. They didn't even say benefits had to exceed costs. For those of us who have been doing this for entirely too long, one of the key things was once this incredibly unlikely challenge to the A & N finding actually found itself at the Supreme Court, EPA in some ways seemed to go for the Grand Slam, just to mix our sports metaphors here, and get the ruling that they did not have to look at one iota element of cost in a 112 rule.

Instead of, I think, arguing possibly this far more successful, "Well, we didn't have to. But if we had, it still would have made sense." It seems that "But if we had, it would have made sense" might have picked off that fifth vote. And bear in mind. I'm not a lawyer, nor an economist. So don't listen to any of that.

Comment: I think the shortcut answer is, go read Justice Kagan's dissent in the *Michigan* case. The agency in 2001 it issued the first appropriate and necessary finding, and in 2012 when it reaffirmed it and then when it argued to the court, was that 112(n)(1)(a) had to be read as a whole. And that's the only question the agency had to answer—and again, I think, Kagan explains this quite well—is at the threshold, have the other provisions of the Act, as a matter of collateral effect, reduce mercury from the power sector to a level that no longer threatened human health and the environment. So the problem with the *Michigan* majority was that it erased the two sentences that preceded the appropriate and necessary sentence, and treated it as if it were isolated.

In the 2016 supplemental, the agency tried to take advantage of the fact that Scalia said that he wasn't prescribing how we considered cost, in order to restore the entire paragraph and then to, if you will, resuscitate reading of all of (n)(1)(a) as a qualitative threshold decision where the inquiry was not primarily cost, but whether or not the residual mercury emissions after, say, Title IV in the Act, was implemented still indicated agency action by way of regulation. And, you know, I hate to do this to you, but I was actually a Senate staffer in 1990, and participated in the negotiation and review of the drafting of Section 112(n)(1)(a). My memory, now 30 years old, corresponds with the Kagan dissent. I think she described in (n)(1)(a) the same way I remember Congress intending it. So the cost-benefit analysis is the result of a sort of injection of an alien element very late, decades late in the game.

The one thing I will say is that my sense is that what the current EPA leadership is after is the rule that's over at OMB now, which I gather is going to be a more comprehensive rule as to how a cost-benefit analysis is done throughout Clean Air Act rulemaking, and this is a sort of prequel laying a consistency foundation for what's coming.

Question #8: Let me ask a couple questions. Is there a natural limit to how far I could go looking at cobenefits? I mean, at what point are they so removed from what actually is going on that they stop being important as part of the consideration?

Respondent 1: I think there's a couple different ways people have approached this. One is to say, "I'm going to focus, just focus on the pollution from the regulated entities".

But sometimes EPA doesn't do that. And it kind of makes sense. You know there's there's a hazards air pollutant rule for the Portland Cement industry. Part of the compliance strategy requires the Portland Cement facilities to actually consume more electricity, and as a disbenefit in that analysis. So it's a negative cobenefit or you can call the cocost.

EPA accounts for the fact that there's going to be an increase in emissions of CO_2 from the fact that more power needs to be consumed as a part of the compliance strategy by these facilities. So you sort of went outside the regulated industry there, and it's a case where the social cost of carbon is being used to demonstrate that there is an offsetting or ancillary cost associated, that's an environmental cost, associated with the regulation.

Some people said you should just think about this as "What's the value of doing the additional analysis" Some of this animates from the general approach we take to RIAs that come out of the executive order and OMB guidance. So we start with the fact that you've got to be a big enough regulation, we use this $100 million threshold of annual economic impacts as the basis, typically, for why you need to do a full-blown regulatory impact analysis.

So if it's a small rule, we think that the value of the information and really drilling down and fully understanding the benefits and costs of something where the benefits and costs may be really small, you don't want to do all that analysis for something where the benefits and costs combined are measured in millions of dollars as opposed to hundreds of millions or billions of dollars.

So it could be, you say, "Well, I'm doing analysis and, at some point, what's the value of doing additional analysis to make sure that I've got a full understanding of all the monetization of all the ancillary impacts benefits cobenefits and cocost?" And you may say, at some point, "Wait, I've counted all the big stuff. Do I think that this sort of incremental analysis is actually going to change the bottom line?"

So there's a bit of art going on here. In some cases, we're making determinations and reflecting, in part, ignorance. We actually don't know what the monetization may be. But we think it's not really changing what we think will be the sort of bottom line conclusion about that analysis.

There has been more work recently at EPA to think about the full economy-wide impacts. I think there's growing interest in that. I think there's growing interest in understanding what may be labor market impacts from a regulation outside the regulated industry. So if you think there's something that, say, raises the price of electricity under a Clean Air Act

regulation, there may be more important labor market impacts, say, in the manufacturing sector as a consumer of that electricity then there is, for example, within the power sector.

But there may also be a view that if we're raising energy prices throughout the economy through some of our regulations, we want to have a full understanding the general equilibrium impacts. And there has been, I think, some improvements in an understanding of the application of those modeling tools. Some of this, as we develop and improve the tools, we lower the cost of doing that analysis, and maybe we can look more broadly to fully assess.

But I think the rule of thumb is, do you think that doing the additional analysis beyond, here's what we think are the compliance costs to the regulated industry? Here's what we think are the direct health benefits. Here's what we might think might be the easy to monetize cobenefits which were fine PM typically comes into play. And the question is just, beyond that, we think there's a value to providing additional information.

Respondent 2: And especially if there's a way that you, I don't know what you call the right word here is, but when you talk about the cost and benefit to the regulated industry, and then just thinking of where does that square peg in the round hole. I think that the electric sector is not synonymous with the fossil fuel generating sector, and that's a battle we fought for 10 years. I'm glad to hear that the tools are starting to encompass that. It's like the metaphor of you squeeze the balloon and it pops out the other side. Like, you can't do something to just the fossil fuel electric sector and think there's not costs and benefits to the rest of the sector.

So I don't know if there's a way to, kind of think of it as sector or like directly related or the things that physics won't let you treat separately.

Comment: I'm trying to think through the Portland Cement story here on the fly, but I think it's a perfect example of why this problem is harder than we think. If you had an appropriate carbon tax on the emissions in the electricity sector then the price of electricity would account for everything and the cost-benefit analysis wouldn't have to go any further.

If you had a cap-and-trade system in the electricity sector, with a fixed limit on emissions, you get the opposite argument, for the opposite reason, but you get also the same story, which is there's no cobenefits in that case because of the cap-and-trade story. So I think the general wisdom about general equilibrium welfare analysis being uncontroversial does not translate into these partial equilibrium sector-by-sector stories, without being very careful about all the side effects of everything else that's going on. That's the big message that I'm getting out of this.

Respondent 3: There's one other thing I want to bring up, said a while back, that as we talk about cost benefit and as we talked about how that's done, that I think is important. I don't want to lose sight of who gets the benefit and who bears the cost, and I thought Speaker 2 did a good job of kind of explaining that. And I think that's part of the challenge of, maybe in the cobenefits world, if it's cobenefits and it's all the cost is on some subset, because it is cobenefits. They're real benefits, but are the right people bearing the cost? Or is the breadth of the people bearing the cost the right level? And so I guess that's one thing, trying to think through, too, is just the costs and benefits are there. But how did you try to

get them assigned better, or more accurately? And maybe that's some people's reason for gravitating towards the pollutant-by-pollutant, because everybody who contributes to PM, you need to pay for it.

Respondent 1: I think it's a really important point. It's one where there is OMB guidance, especially for really large regulations, like regulations with economic impacts of a billion dollars or more, that the agency should undertake a distributional analysis.

I think when we think about why are we doing this kind of analysis, why do we require benefit cost analysis? And I think there's a sense in which we make, as a society, better decisions. And we can communicate our decisions when we have that kind of understanding about the benefits and costs. But it's not just the tally that matters, but it does matter when we consider the way our democracy functions and think about the political economy to think about the distribution of those impacts.

So while there has been this guidance of agencies to do a richer characterization of the distribution of the benefits and the cost, in practice we've seen very little of that. And I think that is something that has been a frustration for some stakeholders, where they would like to better understand that distribution. It's something that is an issue that we're tackling as we advise EPA on economic guidelines, for the guidelines for preparing economic analysis to think about how to better characterize the distribution of the benefits and costs.

Because I think if anything, the line, I give it to my class where I teach benefit-cost analysis, is I say that I do want to acknowledge, though, that when I worked in government, there's a difference between what an economist in the Ivory Tower says—which is let's let's try to minimize our dead weight loss triangle, we're really worried about those triangles that reflect a loss and social welfare. Because what really matters in policymaking are not the triangles. But it's the rectangles, and for those of you who haven't had enough graphical analysis in economics, I'll spare you by trying to pull up the whiteboard on Zoom right now. But those rectangles are the economic value associated with the regulation and that's where we see a lot of the fight in the policy process, is fighting over who's bearing the cost and who's going to enjoy those benefits.

So I think if we're going to really have a well-informed policy debate about these important issues, we need to understand both, in aggregate, social welfare impacts. What are the net social benefits? But, also, how those benefits and costs are distributed across society.

Comment: I think you misspoke. You said the rectangles are the economic value of regulation. I think that you're saying is there, the economic transfer—

Respondent 1: Yeah, those are rents that we're fighting over, that are transfers from different players. Yes, to be very clear. Yes.

Question #9: I had one more. We heard the example of somebody filing, particularly for regulated companies that have these assets and rate base, that they have to remove if the rule is changed, or the requirements are changed. And Speaker 2 suggested that consumer advocates are among the possibilities of challenge, that would be the Sierra Club. But I was trying to figure out why an environmental group would want to do that. What would be their motivation to do that?

Respondent 1: I actually think that was someone else who threw Sierra Club into the mix. I was much more focused on thinking about consumer advocates. And certainly Sierra Club has entered into coalitions though with consumer advocates and industrial customers in wanting to keep costs down. I agree with you. Maybe there's some sort of endgame of an unscrubbed coal plant is easier then to fight that it should be retired, but I—

Comment: Can I jump in, as they've told us they will do that?

Respondent 1: Hmm. Wow. Okay, well then. yeah, I'd love to hear from someone on that, because that was someone else's theory, but I'm intrigued.

Commenter: I've had very candid conversations with Sierra Club, in which they basically said, "Strange bedfellows." Where we all said, "Please don't do this to this rule. We've already done it." And it was this very large coalition of people who usually don't hang out together.

And in the process of those conversations, they were like, "Yeah, don't take this too personally, but if this rule falls, we're going after all of your controls." Because that would be the most expedient way to get those units to potentially close down because, without the standards, they're concerned about the health impacts and the best way to address that is to get the at the economics of the plants. And, for some of those plants, if you are no longer able to recover the cost of controls, it would no longer make economic sense to run them. And there actually are two instances of Sierra Club intervening in state rate cases, taking positions that seemed very odd for Sierra Club with respect to the recovery of control costs, one in Oklahoma and one in Oregon. So I take them at their word when I say that.

Respondent 1: Interesting. Is that maybe because, this is now ringing a bell again—Chatham House rules—but some conversations with Sierra Club folks about really tracking when the controls for MATS would be fully depreciated, in assuming that coal plants wouldn't retire until after that. So somewhere like 2024-2025, and how to move that data. That sounds consistent with what you're suggesting.

Commenter: Yeah, I mean, practically speaking, there are state regulators out there, I won't speak for them. But I think they would probably be more successful going after the O&M costs than the capital costs, because most regulators tend to understand that if you made those investments in good faith to comply with rules that were on the books at the time, they're not usually going to ding you on that. But either capital costs or existing O&M.

Moderator: We have about two minutes left, if anybody has any more questions. Okay, if not, first up we will be announcing the next session sometime shortly. Please join me in thanking the panelists.