Transcript of Joe Goffman and Kathy Fallon Lambert from our CleanLaw Podcast, March 7, 2019

Joe: Hi, Kathy. Thank you very much for coming to talk to us for our Clean Law Podcast. You and I have had the pleasure of talking over the phone and exchanging emails for the last year or so, so it's great to finally, finally meet you in person.

Kathy: Thanks, Joe. Great to be here.

Joe: It's really amazing how in the last year, you've been part of not one but two different efforts to provide the public and your colleagues in the science community with up-to-date information about the air quality, public health, and environmental impacts of not one but two different regulatory developments being created by the EPA under its current political leadership.

The first involves a proposal that was issued at the very end of 2018 to roll back a key component of the Mercury and Air Toxics Standards, and the other, of course, is the proposal last summer to replace the Clean Power Plan with what the EPA is calling the Affordable Clean Energy rule, and what would be great is if we could actually talk about the two pieces, one on mercury and the other on the impact of the ACE proposal on air quality and public health.

Let's start with the piece you and your colleagues did on mercury, first. As you know in December of 2011, Lisa Jackson, then the administrator of the EPA signed the Mercury and Air Toxics Standards, and as part of the package of that rulemaking, the agency as it always does put together a regulatory impact analysis, which among many other things described the state of the science in terms of the impact of mercury on the environment and public health and calculated in terms of dollars, the benefits of mercury and other reductions in hazardous air pollutants.

I think for most people, for people like me who worked on that rule at the time and I think most of the public that was following the Mercury and Air Toxics Standards, the assumption was that the scientific community knew a heck of a lot about the impact of mercury and probably, correctly assumed that what the agency put out in 2011 about mercury reflected the state of scientific understanding represented state-of-the-art understanding at the time. I think they would be surprised to know that in the eight years since the Mercury and Air Toxics Standards were issued, we've generated or accumulated even more learning about the impact of mercury, and in your paper, you and your colleagues' paper really reflects how much progress has been made in the last seven or eight years, and that's what we'd love to hear about.

Let me turn it over to you to walk us through the most recent work that you were part of putting together and if it makes sense to describe some of the underlying studies.

Kathy: Sure. Well, thanks, Joe, and it's great to have a chance to talk about this recent work. The context for all of this is that we think that the most important thing is to have the best available science inform policy. Sometimes that means looking at the policy to see if it includes the most recent research and sometimes it means looking at the science to see if we are adequately addressing policy-relevant questions.

In the context of MATS and this most recent action by EPA it was clear to us and looking at that proposal that it was based on 2011 science and that a lot has been learned since then that has not been integrated into EPA's proposal. Importantly, the impacts of mercury are even greater than what was understood at the time, and then, therefore, the benefits of reducing mercury from power plants is even higher than was estimated in 2011 and as being applied today.

Joe: I'm going to interrupt just to highlight why what you just said is so poignant because what the agency did in December was propose something that is specifically focused on the question of how much benefit accrues to the public from reducing mercury emissions from power plants. One of the tasks the EPA was given by Congress under the Clean Air Act was to make an explicit finding as to whether or not it was "appropriate and necessary" to reduce mercury and other hazardous air pollutant emissions from power plants, and going all the way back to I think 2000, the agency had, after undertaking studies of the subject, determined that it was appropriate and necessary to regulate mercury and other air toxics from power plants.

There was a lot of history since 2000, and in 2015, the Supreme Court ruled that part of the agency's task in making this appropriate necessary finding was expressly to compare costs and benefits. It really matters how well we understand what those benefits are in public health terms, environmental terms, and in the translation of those terms into dollars and cents. What you've described as the intersection between science and policy is exactly what the agency's proposal in December was focused on.

Kathy: Right. It would seem that if EPA is going to meet their obligation under the court's decision in 2015, this most recent science needs to be taken into account because it does have a significant effect on the dollars attributed to the benefits from reducing, in this case, just mercury alone but obviously there are other pollutants involved as well. Going just to the point of mercury, since 2010-2011 quite a lot has been learned that was not reflected in that RIA.

One of the biggest items is how people are exposed to mercury, and in the RIA of 2011 it assumes that recreationally caught freshwater fish is the exposure pathway that's relevant for this cost-benefit analysis. Well, it turns out that about 80% of the mercury intake of US consumers comes from marine fish, not freshwater fish, so by not including

that exposure pathway, that cost-benefit analysis leaves out a very large portion of the American public when considering what the benefits would be of reducing mercury. That alone is a very, very substantial gap in the 2011 RIA that's being used in this current proposal by the EPA.

Joe: That's both interesting and obviously quite troubling. What happened not in terms of from the perspective of the EPA or lawyers but from the perspective of scientists, what happened between 2011 and 2018 that led to this conclusion or even discovery of the pathways of human exposure to mercury and how did the focus move from freshwater fish to marine fish?

Kathy: Sure. Some of it was just based on fundamental understanding of mercury and ecosystems, and the fact that it bioaccumulates not just in lakes and rivers but also in marine systems, and to a very large extent, and then, also surveying people about their fish consumption habits and patterns to better understand where people are getting their fish, what kind of fish people are eating and how much mercury is in those fish.

That just takes time to develop that body of research. It was certainly underway in the early 2000s but really found its way into the literature after that 2010-2011 timeframe, so generating that data, reporting that data, publishing that information took time and really came about in response to the question of, where are people getting their fish and how are people being exposed to mercury? An understanding that that's important to the policy conversation so some of it's just understanding the biogeochemistry of mercury and where people get their fish.

Joe: What I'm hearing is that if the EPA were starting from scratch in weighing the costs and the benefits, and particularly, in characterizing and calculating the benefits of mercury reduction now, the world would look very different from the way it looked 8 or 10 years ago. Having worked on the Mercury and Air Toxics Standards, having been in the agency when the rule was being developed, I can remember two or three briefings from working scientists presenting what they characterized at the time as up-to-date research, and the focus was very much on freshwater, if you will, ecosystems and various impacts there and hearing a lot of very compelling elaboration on that.

It sounds like it took some real vision on the part of researchers in this area to expand the frame and look at marine fish as well. But what I'm also hearing is that the stakes in terms of public health are much higher now, even higher now than they were when the agency first analyzed this.

Kathy: Right, and another piece of this is that it turns out a lot has been learned about the source of that mercury. The initial focus on freshwater systems came in part from the belief at the time that mercury from US power plants, if it was to have an effect it would be probably in lakes and rivers. But that understanding has evolved. It was originally thought that most of the emissions from power plants would be globally distributed and

that a small amount would deposit in the US and make its way into fresh waters and [freshwater] fish.

The belief that mercury is a global pollutant would mean that most of the emissions are just dispersed globally and the local effects are probably relatively small. Well, that understanding has changed quite substantially so that the portion of the mercury that ends up in fish in freshwaters and marine waters that comes from US sources is actually much higher than was understood maybe 10 years ago when that first RIA was coming together, and that stems from this estimate at the time that much of the mercury being emitted from power plants was in this form called elemental mercury.

Elemental mercury would have a very long residence time and would travel far from the source. Mercury comes in many species, another form of mercury is known as oxidized mercury, and that tends to deposit much closer to the source and if you can stick with me on all the science details here, the reason that's important is that if a lot more of the mercury coming out from smokestacks is in this form that deposits locally, then the contribution of US power plants to mercury in the fish we eat is higher than was thought maybe 10 years ago.

New research confirms the fact that that is, it is the case, that more mercury is in the form that deposits locally, and so, the estimates of the contribution of US sources to mercury in the fish we eat were low. If we were to use current science, we would see that the power plants have much stronger contribution to the mercury in the fish we eat than was estimated at the time, therefore, the benefits of reducing those emissions is much higher than estimated.

Joe: If you were to read, if a person were to read the December 2018 proposal, in which the agency purported to a report the benefits of reducing mercury from power plants, and then, compare those benefits with the costs, would a reader of the proposal be made aware of any of what you just said?

Kathy: No, you wouldn't find there's more current science referenced in the recent EPA decision or proposal.

Joe: Despite the fact that the purpose of the December package was to propose an analysis, provide the public with relevant information so that the public could submit comments, what I'm hearing you say is that none of this information about oxidized mercury, the local impacts or what we talked about before, the marine fish pathways would be presented to the public, would be made available to the public in any way by the EPA's proposal?

Kathy: Not in that proposal. That's correct.

Joe: Right. It sort of feels like if you contrast what was in the proposal and what you just described as what the scientific community is seeing and understanding about the

impact of mercury emissions, it's almost as if what the agency did is put out sort of a stage set for a public discussion, public examination of these issues but there's nothing behind it because the state-of-the-art science of the last seven or eight years is completely missing.

Kathy: Right. To the extent that EPA relied on that 2011 impact assessment, it's quite out of date, and there's even more to that, which is that it also, that 2011 RIA, focuses on neurocognitive deficits alone. Mercury is a neurotoxin, it passes the blood-brain barrier, so we know that it has neurological effects at certain concentrations but those are not the only effects. The RIA looks at IQ detriment, so reduction in IQ in children who are highly exposed from maternal consumption of fish, presumably is the biggest input.

But since then, the cardiovascular effects of mercury have become quite well understood. The risk of non-fatal heart attacks and fatal heart attacks is well described in the scientific literature now that most scientists would say those should be included in a cost-benefit analysis. In addition, when looking at IQ, they (EPA) focused only on lost earnings and the economics of reduced IQ go well beyond that. If you were to look at just IQ, even that number would probably be higher today than in 2011 considering effects on the healthcare industry, effects on lost earnings for sure, but also effects in the insurance agency.

There's a whole cascade of health effects of mercury that are also missing from EPA's current proposal.

Joe: If I understand correctly, it's probably worth doing at least at this moment either an interim or maybe a final recap of what's missing? What basically we didn't know, we didn't know well enough in 2011 to include in that year's calculation of the benefits of reducing mercury and what's continues to be completely opaque in the December 2018 proposal by my count there are four buckets. One is the importance of marine fish as a pathway to exposure. Two is the importance of looking at oxidized mercury, not just the elemental mercury and as a result its local impacts.

The third it sounds like is the cardiovascular impact of mercury exposure that was, let's say invisible in the 2011 impact analysis, and remains invisible in the 2018 analysis, and then, it sounds like there was a pretty significant not to say gross under characterization or under-representation of the economic, not to mention human impacts of the IQ damage that's done by mercury exposure. These are four major, if you will, missing pillars of what would be a truly up-to-date informative of the public impact analysis, and yet the agency is proposing or purporting to be able to perform a comparison of costs and benefits but doing so without these four major pillars of information. We've got four, do you have other missing links to add to that list?

Kathy: Well, those are the major missing links. There's definitely emerging research on endocrine disrupting effects of mercury, links to diabetes, other health effects that a

more up-to-date analysis might also look at, but you hit the four buckets for sure, Joe, and when considering what this might all add up to, I think a true analysis needs to be done to nail that number down, but in our paper, we looked at the literature and we see that a full accounting of the IQ effects in the US has a monetized value of about $4.8 billion.

That's mercury exposure from all sources with, that would have IQ effects.

Joe: IQ specifically, IQ effects?

Kathy: IQ effects alone, and when we compare that one impact and that dollar amount of 4.8 billion to the value of reducing mercury via MATS of 4 to 6 million perhaps up to 10 million depending on how you read the RIA, you see that, we had this enormous gap between what the research would suggest is the benefit of reducing mercury in monetized terms and what is in 2011 RIA upon which EPA appears to be depending.

Joe: Essentially, if what I heard correctly, is the RIA calculates in millions with an M, in single-digit millions, whereas looking at the IQ impacts alone and translating them into a monetary value is dealing with billions with a B, and we're just talking about IQ impacts. That's just one of the buckets. I do have to commend both of us on how calm we're remaining when contrasting the information you're sharing with what the EPA deigned to share with the public in a proposal that claimed to be comparing the benefits and the costs of reducing mercury emissions from power plants.

I'm aware and I'm sure you are as well that the agency provided what it thought was a compelling or decisive legal justification for performing the cost and benefit comparison using 2011 information, but if you remember that the proposal, all proposals are intended to be a pathway for informing the public, you, essentially what the agency is doing is fashioning a legal justification for hiding a lot of information that the public needs to, the public would certainly benefit from having.

Kathy: We see our job as making that research as available to as many people as possible and that's why we produced the brief that we did -- to compile that information, make sure it's in people's hands and our hope, of course, is that it makes its way into the final decision-making process.

And in terms of the cost-benefit analysis itself. Another issue that we have to contend with is that it has long been a pretty imperfect tool when it comes to dealing with a whole host of benefits of reducing emissions that are unquantified still, so we are often very good at estimating costs and complete costs and usually, they tend to be overestimated but we almost always underestimate benefits, and if you look at the regulatory impact assessments that EPA has done over the years across all administrations, there's usually at the very back a large list of unquantified benefits.

In this case, for mercury, those are quite large. They're all of the wildlife effects, for example, which are completely unquantified and for wildlife, there are many - there are obligate fish eaters, they have no choice other than to eat fish. There's no option to change your diet, and the effects on loons, that's just one example or bald eagles or osprey, fish-eating birds who produce fewer young as a result of elevated mercury in their blood.

That is just one of many unquantified benefits of reducing mercury, and so, the ledger is often incomplete, to begin with on the benefit side, when cost-benefit analyses are done and that's understood. The knowledge is evolving. It's a bit of an imperfect tool.

Joe: But it's a fifth major category of damage that mercury in the environment does, and that's barely acknowledged let alone counted in what the agency proposed as a comparison of cost, benefits.

Kathy: It's an area in need of additional research, and I think when we do the, when that research is done, the numbers will only go up, right? We wouldn't expect that as you add more of these the number would go down. You can see that updating the science periodically at each decision point is so important to generating a rational, logical outcome that should be based on costs and benefits, and on the benefits side, it's almost always incomplete, so we should, at least, be accounting for what we do know.

Joe: Well, it's probably time to go to the other major piece of work that you were part of creating in the last year at the interface between public policy, environmental policy, and science, and that's a paper that you co-authored looking at what would or will happen if the Affordable Clean Energy proposal is finalized, the requirements in that proposal that coal-fired power plants invest in operational upgrades, and how that would affect air pollution in various parts of the country as compared to or contrasted to what would happen if the ACE rule were not put in place at all. Let's hear about that.

Kathy: Sure. So, this work starts actually back in 2015 when we published a paper in the journal Nature Climate Change that looked at three different types of carbon standards. This was before any actual policies had been introduced. But we were curious, what would be the air quality changes if a carbon standard were constructed as a flexible standard that allowed a systems approach with trading and renewables and energy efficiency included in the mix of how a standard might be compared with a more source-specific approach that's just focused on individual power plants and improving the heat rate or efficiency, operating efficiency, of the plant, compared to a third approach which would be a carbon tax approach, which would implement any carbon reduction measures that cost up to 50 dollars per metric ton. We were purely interested in the question of what does that mean for air quality, apart from carbon dioxide emissions, and what would be the health implications of any changes in air quality, improvements or degradation.

Joe: It sounds like you know Dallas Burtraw.

Kathy: All of this work that we've described has been a team effort. And that's another hallmark of the work that we do. In order to ask and answer these sorts of questions requires having air quality experts, energy sector modelers, epidemiologists, economists all working together. You're right, Dallas was a member of the team that produced that paper, along with Charlie Driscoll, John Levy, and Jonathon Buonocore.

So fast forward to the present, as it turned out, when the Affordable Clean Energy rule was proposed, it represented just that kind of shift from a systems approach where the full power sector and different opportunities for reducing CO2 were taken into account with the Clean Power Plan to a more source-specific approach that would focus on improving the heat rate of power plants. When that rule was proposed, EPA produced an RIA that included in it, information on emissions for the Affordable Clean Energy rule compared to taking no action, no policy, and compared to the Clean Power Plan.

Our most recent analysis, which was published in Environmental Research Letters, simply takes EPA's own emissions results from its modeling and disaggregates it to look at the consequences state by state.

Joe: It sounds like the significant revelatory here was the state by state breakdown of the air quality impact of implementing ACE, as compared to no policy or no rule at all. Is that right?

Kathy: That's correct. It turns out that the information we used to do that did come directly from EPA's modeling, but had not been summarized in that way. Our contribution was to break it down further than what had been reported in the RIA, and to then evaluate what was responsible for causing the increase in emissions where and when it occurred. Would it be helpful to get the top-level sort of findings from that?

Joe: Sure, absolutely. Yeah.

Kathy: The basic finding from that work that built on our previous work is that when you take a heat rate approach and just look at the individual power plants, and improve the heat rate of an individual power plant, it's possible that it will operate more. Money has been invested to improve the operating efficiency of the plant, and now it moves up in the dispatch order and it runs either more frequently or for longer periods of time because it's more economical to do so.

Joe: By the way, what you just described is sort of the hidden in plain sight policy purpose of ACE. Which doesn't seem to be to make significant reductions in pollution, whether we're talking about CO2 or other pollutants. But to instigate or prompt additional investment in the existing coal fleet. Or at least it sounds like, not to put words in your mouth, it sounds like that's an implication or an assumption.

Kathy: Right.

Joe: In the analysis you did.

Kathy: We just took EPA's numbers and just took them at face value without reading into why they are what they are. But rather -

Joe: If you were explicitly doing a reinvestment in the existing coal fleet policy, it sounds like you would see numbers like the numbers you saw.

Kathy: Right. That's certainly what comes out of EPA's analysis. Just to drill down a little bit further on that, this emissions rebound, basically what it does is shift the burden to the states to take action to prevent that from occurring. Because it would occur not only for CO2 in some instances, but also other criteria pollutants like sulfur dioxide and NOx.

Joe: You snuck a little term about, snuck a little term of art in there, "Emissions rebound". That's really the term that is used for what you described as, you add investment to these plants. You increase their efficiency. You increase their, if you will, operating value in terms of what the dispatch protocol sees, and they run more.

Kathy: Correct.

Joe: Therefore emit more.

Kathy: Correct. That emissions rebound occurs once you've improved the operating efficiency of the plants, and it makes sense for them to then run more often. You can get increased emissions of CO2, as well as these pollutants that come along with it, SO2 and NOx. Those are the pollutants that can directly affect local air quality.

In addition to undermining the purpose of addressing greenhouse gas emissions, the end result could also be to reduce local air quality in the near term. In some cases, that leaves it up to states then. States have the burden of figuring out how to deal with that, and perhaps proposing their own standards. However that happens, there is a patchwork approach as a result, with a pretty uncertain outcome.

For some states where we saw the potential for emissions rebound, they have state goals that they're trying to meet. For six states, where emissions rebound occurs, they're also trying to meet reduction targets for greenhouse gas emissions. It's made meeting those targets possibly even harder.

Maybe just to step back a little bit and to unpack the study, it's useful to know that you can look at changes in emissions at the national scale, at the state scale, and at the individual plant level. You can consider them in comparison to what would happen under no policy at all, or what would happen under the Clean Power Plan. When we looked at comparing emissions to no policy at all, that's where we found that by 2030, about 18 states would have an increase in carbon dioxide emissions compared to no policy. That's the target pollutant.

In addition, 20 states would potentially see an increase in either sulfur dioxide or NOx because of this emissions rebound, compared to no policy.

Joe: You looked at states and the effect on individual states. Did you either look at, or could you give us now a kind of estimate of, what's the population that's affected here?

Kathy: The question of, "Which states see this emission rebound?", is an interesting one. Texas is one that stands out, for example. Because there's a lot of production there to begin with, you might expect to see this rebound effect. In fact, for carbon dioxide, sulfur dioxide, the emissions increase quite substantially.

Joe: We're talking about a large state. We're talking about a state that in and of itself is quite populous. We know from other work that the EPA has done going back at least a decade, emissions from Texas coal fired power plants have a significant impact on transport. That emissions in Texas don't just affect the health of people living in Texas, but they affect air quality at least across the southeast quadrant, if not beyond.

Kathy: For sure. We see these increases in the southeast and in the mid-Atlantic region, where there is higher coal production in fairly populous regions. In part, that's why you see in EPA's own RIA a projected increase in premature deaths, of approximately 1000 additional premature deaths. That reflects this emissions rebound in SO2, leading to degradation of air quality.

Joe: Right. I think that's, I want to dwell on this a little bit because EPA, as your answer just indicated, has long since understood the fact that the air quality policy community, from both a policy side and a technical side, has long since understood that power plants in particular, not alone but in particular, contribute significantly to the long-range transport over multi state areas of air pollution or air pollution precursors.

Let's be clear that even though your analysis broke the impacts down on a state by state basis, we're talking about states like Texas that also have a very big footprint or a very big fingerprint on multi-state air quality. Not just local air quality.

Kathy: Right. I think it's fair to say that when it comes to air pollution, what happens in Texas doesn't stay in Texas. That's true probably for any state. That's why we have things like the Clean Air Act that looks at these as cross state, cross boundary issues.

I think in the case of air quality, we need to be concerned with what's happening at a state basis, for that state and for downwind states as well.

Joe: It's not just rhetoric to say that there's real perversity, if you will, in ACE. In the Affordable Clean Energy proposal. In terms of something that's being proposed under the Clean Air Act, it seems that it will have little if any impact on CO2 emissions, and will really create not only air quality problems, but additional burdens on states, who are at the front lines of protecting their citizens from air quality degradation.

Kathy: I think that's fair to say. It's important, as you point out, to remember that the benefits for CO2 emissions nationally are quite modest. This is an approach that would really have very minimal benefits for climate, and then also potential negative impacts for air quality.

Joe: This is ... I think one of the things that has haunted a lot of environmental policy, and I'm taking a very broad sweep here, is trade-offs. What you're saying is that this is a classic, and at the same time almost elementary case, where the proposal is setting up a trade-off between reductions in one air pollutant, CO2, versus increases in other air pollutants. What I'm also hearing you say is that there are a number of ways to achieve the benefit, modest or not, of CO2, without imposing those trade-offs. Yet this proposal chooses kind of a close to worst case scenario. Very very small benefits traded off against non- trivial air quality degradation.

Kathy: Very well said. It points to the value of a multi-pollutant approach. I think that's why it's so important in both this policy context and another context to look not only at what's happening with the target pollutant, but what are the potential unintended consequences for other air pollutants? In this case, that jumps right out. The fact that CO2 can be reduced in other ways without having this rebound of co-pollutants really is important to understand when making the determination about how to meet the endangerment finding.

Joe: Right. That comment really I think is important, and it may be something that hasn't been focused on. In the last year or so, let's go back to October of 2017 when the EPA first proposed to repeal the Clean Power Plan. Then the August proposal was the follow-up to that, because that is, paired with the repeal now is a replacement. A lot of the discussion has been about evaluating ACE in contrast with the CPP.

But let's widen the frame a bit, because what you said just now about maintaining a multi-pollutant perspective on rule making and policy making may be the even more important context even beyond the CO2 question of evaluating ACE. Because going back to the Bush administration with its ill-fated Clean Air Mercury Rule, which tried to set up a kind of, if you will, a trading system for mercury, which was found to be illegal under the Clean Air Act, but for other reasons. Which also issued the Clean Air Interstate Rule, which evolved into the Obama era's Cross State Air Pollution rule.

The EPA has long since committed itself to a multi-pollutant trade off-eliminating approach that involved flexibility by and large in the way of setting up multi state emissions trading programs. The idea being that if you gave power plant operators a lot of options for how to reduce emissions, they and the states in which they operated would find ways. They'd have the latitude to find ways to minimize or eliminate these trade-offs.

What you're describing is an ACE proposal that not only comes into conflict, if you will, or defies the logic of the Clean Power Plan, but you're talking about it, a Clean Air Act proposal that this EPA has put forward that defies 10 or 15 years of what had been some of the most enlightened approaches that the agency had taken through a series of previous rules. Again, authored first by the Bush administration, and then by the Obama administration.

As I listen to you, the agency is ... The sin here isn't just measured against the CO2 problem that they're not solving. But it's really, it needs to be understood in terms of how backward this approach is to dealing with air pollution from power plants. I think I just put a lot of words into your mouth. But certainly that's the lesson I draw from taking the results you and your colleagues developed and reported here, and putting them against that much broader, at this point historical backdrop.

Kathy: Sure. If you're thinking about those same questions from a research perspective, from a science perspective, you're thinking about it as a system, right? If the goal is to be protective of human health and ecosystem health, you must consider the fact that we breathe air that integrates all of these pollutants. We don't get to breathe air that just responds to one policy at a time, or reflects one pollutant at a time. Air integrates all of these. That's what we breathe, and that's what the environment receives.

When we consider how to analyze a particular policy path or trajectory or outcome, it's logical from our perspective to consider the full range of pollutants as best we're able. When I think about it from a policy perspective, what seems important to me about that is, that speaks to the importance of considering the full range of benefits, so that if you don't look at the full range of pollutants, not only are you missing out on estimates of co-benefits, but potential dis-benefits. It would be very disconcerting if EPA or anyone started analyzing rules strictly on the basis of one pollutant. Because we could completely fail to see the unintentional effects that could have detrimental health or environmental health consequences because of changes in other pollutants that come along with the primary pollutant.

Joe: I hear, as I read your study and as I hear you describe it, I really see kind of two bottom lines in terms of what the public stake is in the ACE rule. One that, if finalized in its current form, the citizens of 18 to 20 states will be at risk of immediate degradation in their air quality. To the extent that at least a handful of those states, Texas being a prime example, generate emissions that have significant downwind impacts over a much broader geographic and population region, citizens or the public on a regional basis will be at risk of being exposed to air quality degradation by direct operation of the ACE proposal.

The other bottom line is that EPA had already figured out how to design programs and put in place policy tools that mirrored what you described in terms of what research should be looking at, and in terms of the fundamental foundational insight that public

health is determined, not by discrete pollutant by pollutant exposures, but by the total loading, if you will. By using regional programs, emissions trading based programs, programs that allowed grid-wide flexibility as reflected by Bush's Clean Air Mercury Rule, Bush's Clean Air Interstate Rule, Obama's Cross State Air Pollution Rule, and the Clean Power Plan, the policy designers had already solved that problem. If you will, the authors of ACE have “unsolved” the problem.

Kathy: When looking at EPA's own emissions data, that would seem to be the case. When comparing ACE to the Clean Power Plan, which they did do in the RIA, CO2 emissions of course would be higher. Sulfur dioxide emissions would be higher. Nitrogen oxide emissions would be higher. From three to six percent nationwide by 2030. Just on the basis of those numbers alone, we see emissions going up compared to the Clean Power Plan, and also going up compared to no policy when it comes to SO2 and NOx for a number of states. This potential for a rebound effect I think is a fundamental aspect of understanding how different policy levers affect air quality and people, and people's health.