H.R. 806, OZONE STANDARDS IMPLEMENTATION ACT OF 2017

HEARING

BEFORE THE

SUBCOMMITTEE ON ENVIRONMENT

OF THE

COMMITTEE ON ENERGY AND COMMERCE

HOUSE OF REPRESENTATIVES

ONE HUNDRED FIFTEENTH CONGRESS

FIRST SESSION

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WEDNESDAY, MARCH 22, 2017

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON ENVIRONMENT,
COMMITTEE ON ENERGY AND COMMERCE
Washington, DC.

The subcommittee met, pursuant to call, at 10:00 a.m., in room 2123 Rayburn House Office Building, Hon. John Shimkus (chairman of the subcommittee) presiding.

Present: Representatives Shimkus, McKinley, Blackburn, Harper, Olson, Johnson, Flores, Hudson, Walberg, Carter, Tonko, Ruiz, Peters, Green, McNerney, Cardenas, and Matsui.

Staff present: Grace Appelbe, Legislative Clerk, Energy/Environment; Wyatt Ellertson, Research Associate, Energy/Environment; Blair Ellis, Digital Coordinator/Press Secretary; Tom Hassenboehler, Chief Counsel, Energy/Environment; A.T. Johnston, Senior Policy Advisor, Energy; Ben Lieberman, Senior Counsel, Energy; Katie McKeough, Press Assistant; Alex Miller, Video Production Aide and Press Assistant; Annelise Rickert, Counsel, Energy; Chris Sarley, Policy Coordinator, Environment; Dan Schneider, Press Secretary; Peter Spencer, Professional Staff Member, Energy; Jeff Carroll, Minority Staff Director; David Cwiertney, Minority Energy/Environment Fellow; Jean Fruci, Minority Energy and Environment Policy Advisor; Caitlin Haberman, Minority Professional Staff Member; Rick Kessler, Minority Senior Advisor and Staff Director, Energy and Environment; and Alexander Ratner, Minority Policy Analyst.

OPENING STATEMENT OF HON. JOHN SHIMKUS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ILLINOIS

Mr. SHIMKUS. The Subcommittee on the Environment will now come to order. The Chair now recognizes himself for 5 minutes for an opening statement.

During today's legislative hearing we will consider H.R. 806, the Ozone Standards and Implementation Act of 2017. Mr. Olson reintroduced this bipartisan bill this past February after its development through the committee process and passage in the House in the 114th Congress as H.R. 4775. We thank Mr. Olson, as well as Mr. Flores, Mr. Latta, and a guy named Mr. Scalise for the particular leadership and thoughtful contributions to the previous bill and what is now H.R. 806.

The Ozone Standards and Implementation Act makes practical reforms to the Clean Air Act to streamline implementation of national air quality standards by the state and local authorities. These reforms seek to improve the states' ability to meet the new ozone and other air quality standards without undermining efforts to ensure and promote the productive capacity of their citizens.

The bill reflects what we have learned from a record developed over a number of hearings and extending back to the committee's Clean Air Act reforms in 2012. An important lesson from this record is that timelines and procedures established almost 30 years ago can be counterproductive today. The result is unnecessary costs, duplicative efforts, regulatory delay, and economic uncertainty.

The 2015 ozone standards provide a case in point. In October 2015, EPA established a new ground-level ozone standard of 70 parts per billion, down from 75 parts per billion established 7 years earlier in 2008. The practical problem is that EPA had only issued implementation regulations for the 2008 standard 6 months earlier, in March 2015. So just as states were implementing measures for one standard they would now have to divert resources to implement measures for another standard for the same criteria pollutant. Yet EPA projected that the majority of areas that may be subject to the new standards would come into compliance with those standards under existing rules and programs.

It does not make sense why these areas should be subject to new, long-term compliance and reporting regimes that they would avoid if allowed to let existing measures work. But this cannot happen under the tight timelines that were established almost 30 years ago when air quality was much worse and emission controls were just beginning to take hold.

Add up the many other compliance deadlines for other EPA regulations, related litigation, the rapid pace of new rules, and you can see how this process hinders the ability of states to establish orderly plans and predictable permitting regimes.

As a result, state and local regulators expend resources and time keeping up with a never-ending succession of rules. This undermines their ability to focus on assessing the performance of existing public health measures. It also undermines their ability to ensure predictability so that people can build and expand their business and infrastructure.

H.R. 806 makes some reasonable changes to update the Clean Air Act requirements to address these problems. For example, the bill phases in implementation of the 2008 and 2015 ozone standards, extending the date for final designations for the latter standards to 2025 and aligns permitting requirements with this phased implementation schedule.

It also provides reasonable timing for mandatory reviews of air quality standards by extending the requirement to 10 years, while preserving the EPA Administrator's discretion to issue revised standards earlier, if necessary. This falls in line with the Clean Air Act's cornerstone "cooperative federalism" approach which mandates that EPA establish the NAAQS, but leaves the task of deciding how to achieve them largely to the states.

It requires timely issuance of implementation regulations by EPA to reduce the uncertainty that the states face when developing their implementation plans. The bill also authorizes the Administrator, under certain and appropriate circumstances, to take account of technical feasibility when determining where to set emission levels that scientists advise are fully protective of public health.

Other steps the bill takes help ensure states and localities are not penalized for emissions and air quality events they cannot control.

With that, let me welcome our witnesses, five of whom bring the state and local perspectives that we have focused upon throughout this process. They represent California, Maine, Wyoming, and Kentucky, regions that often confront different types of implementation challenges. We will also hear from the representative of the American Thoracic Society.

Let me note for the record that we invited EPA to the hearing. And while the agency was unable to provide a witness today, we expect to receive written comments on the bill in time.

I think all our witnesses will agree that our ultimate goal is to ensure air quality is protective of public health. Of course, the key to that objective is to ensure that we have laws that effectively facilitate standards for implementation. That is what this bill aims to do.

[The prepared statement of Mr. Shimkus follows:]

PREPARED STATEMENT OF HON. JOHN SHIMKUS

Today's legislative hearing will consider H.R. 806, the "Ozone Standards Implementation Act of 2017."

Mr. Olson reintroduced this bi-partisan bill this past February, after its development through the Committee process and passage in the House in the 114th Congress as H.R. 4775. Let me thank Mr. Olson as well as Mr. Flores, Mr. Latta, and Mr. Scalise for their particular leadership and thoughtful contributions to the previous bill and what is now H.R. 806.

The Ozone Standards Implementation Act makes practical reforms to the Clean Air Act to streamline implementation of national air quality standards by state and local authorities. These reforms seek to improve the states' ability to meet the new ozone and other air-quality standards without undermining efforts to ensure and promote the productive capacity of their citizens.

The bill reflects what we have learned from a record developed over a number of hearings and extending back to the Committee's Clean Air Act forums in 2012. An important lesson from this record is that timelines and procedures established almost 30 years ago can be counterproductive today. They result is unnecessary costs, duplicative efforts, regulatory delay, and economic uncertainty.

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The practical problem is that EPA had only issued implementation regulations for the 2008 standard 6 months earlier in March 2015. So just as states were implementing measures for one standard they would now have to divert resources to implement measures for another standard for the same criteria pollutant. Yet EPA projected that the majority of areas that may be subject to the new standards would come into compliance with those standards under existing rules and programs.

It does not make sense why these areas should be subject to new, long-term compliance and reporting regimes that they would avoid if allowed to let existing measures work. But this cannot happen under the tight timelines that were established almost 30 years ago, when air quality was much worse, and emissions controls were just beginning to take hold.

Add up the many other compliance deadlines for other EPA regulations, related litigation, the rapid pace of new rules, and you can see how this process hinders the ability of states to establish orderly plans and predictable permitting regimes.

As a result, state and local regulators expend resources and time keeping up with a never-ending succession of rules. This undermines their ability to focus on assessing the performance of existing public-health measures. It also undermines their ability to ensure predictability so that people can build and expand their businesses and infrastructure.

HR 806 makes some reasonable changes to update Clean Air Act requirements to address these problems. For example, the bill phases in implementation of the 2008 and 2015 ozone standards, extending the date for final designations for the latter standards to 2025 and aligns permitting requirements with this phased implementation schedule.

It also provides reasonable timing for mandatory reviews of air quality standards by extending the requirement to ten years, while preserving the EPA Administrator's discretion to issue revised standards earlier, if necessary. This falls in line with the Clean Air Act's cornerstone "cooperative federalism" approach-which mandates that EPA establish the NAAQS, but leaves the task of deciding how to achieve them largely to the states.

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With that, let me welcome our witnesses—five of whom bring the state and local perspectives that we have focused upon throughout this process. They represent California, Maine, Wyoming, and Kentucky—regions that often confront different types of implementation challenges. We will also hear from a representative of the American Thoracic Society.

Let me note for the record that we invited EPA to the hearing and while the agency was unable to provide a witness today, we expect to receive written comments on the bill in time.

I think all our witness will agree that our ultimate goal is to ensure our air quality is protective of public health. Of course, the key to that objective is to ensure we have laws that effectively facilitate standards implementation. That is what this bill is aims to do.

Mr. SHIMKUS. And with that, my time has expired. The Chair now recognizes the Ranking Member Mr. Tonko from New York.

OPENING STATEMENT OF HON. PAUL TONKO, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW YORK

Mr. TONKO. Thank you, Mr. Chair.

We have examined similar iterations of this legislation in the past. So it should not surprise any of my colleagues to hear me once again say that protecting public health and growing the economy are not mutually exclusive.

The history of the Clean Air Act and the National Ambient Air Quality Standards, or NAAQS, has clearly demonstrated that. Since its enactment, the Clean Air Act has reduced key air pollutants by roughly 70 percent while the economy has more than tripled. I have yet to see any evidence of that trend reversing.

I want to thank our witnesses for being here. I especially want to thank Dr. Boushey, certainly, who is testifying on behalf of the American Thoracic Society. It is important for us to remember why the Clean Air Act was passed in the first place: to protect public health.

According to a peer-reviewed 2011 EPA study, in 2010 alone the Clean Air Act prevented over 160,000 premature deaths, 130,000 cases of heart disease, 1.7 million asthma attacks, and millions of respiratory illnesses. Healthier people means fewer sick days, hospital visits, and premature deaths, all which lead to a more productive society. The science is clear: breathing air that contains ozone can cause serious health effects.

Cleaning our air is not always easy, but the benefits far outweigh the costs. And history has shown that meeting these health-protective standards is achievable.

This bill, as currently drafted, includes a number of provisions that would seriously undermine EPA's ability to create and implement health-protective standards, and not just for ozone but for all NAAQS. It would delay implementation of the 2015 ozone standard significantly, extend the review cycle for all NAAQS from 5 to 10 years, and add consideration of technological feasability into the standard-setting process.

We all want states and EPA to work cooperatively under a framework that gives states flexibility on meeting these targets. But we cannot deny the critical role that the Federal Government must play in reducing air pollution.

I am from a downwind state, and whether it is smog, particulate matter, or acid rain, we know air pollutants do not respect state lines. For years we have been asking EPA to do more with less. This bill continues that. I am not opposed to asking for studies and trying to better understand our nation's air quality challenges, but we cannot expect these studies to be done without additional funding.

I would be remiss not to mention the President's proposed budget which seeks to cut EPA by 31 percent, and includes even great percentage cuts to categorical grants. We must assume state and local air quality management grants and other programs that improve our air quality will not be immune from these cuts.

Solving our nation's long-term air quality issues is going to take innovation. I believe in America's ingenuity. It can be done. But it will be a lot easier if we support these efforts with federal investments. Investments in electric vehicles and cleaner trucks are just a few examples that would make a big difference.

I look forward to hearing from our witnesses today on how we can achieve our common goal of making our air cleaner for generations to come.

And with that, Mr. Chair, I will yield my remaining time to the gentleman from California, Representative McNerney.

Mr. MCNERNEY. Well, I thank the gentleman from New York for yielding.

It is a privilege to represent the northern part of the San Joaquin Valley, one of the most productive agricultural regions in the world, and home to manufacturing and renewable energy production. However, this region and its residents have suffered from some of the worst air quality in the nation. This means missed school and missed work. It means premature deaths, has a negative impact on the economy, and the long-term public health.

We are fortunate to have the dedicated folks in the San Joaquin Air Pollution Control District and the California Air Resources Board who have done a tremendous job in improving air quality in the last several years. The valley, however, still faces significant challenges as the Valley Air District has testified in previous years. The valley's geography will always make combating air pollution an uphill battle. But the Clean Air Act has been an effective tool to improve air quality.

Unfortunately, the bill before us today weakens the Clean Air Act. Improving our air, or even keeping the gains we have made, will be even more challenging if this bill were combined with the President's budget targeting the EPA's air shed grants and DERA grants that have been vital for our region. These are all steps backwards when we have made tremendous progress.

I appreciate the CARB and the Air Valley District with the work you do on a daily basis.

And I yield back the mountainous time that I still have remaining. Thank you, Mr. Chairman.

Mr. TONKO. And I yield back, Mr. Chair.

Mr. SHIMKUS. The gentleman yields back his time.

The Chair now recognizes the subcommittee chairman of the Telecommunications Subcommittee, Mrs. Blackburn, for 5 minutes.

Mrs. BLACKBURN. Thank you, Mr. Chairman.

I am from Tennessee.

OPENING STATEMENT OF HON. MARSHA BLACKBURN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF TENNESSEE

Mrs. BLACKBURN. This is an issue that affects us and affects a lot of our counties. And the NAAQS standards are something that has been of concern. I am appreciative to Mr. Olson for the bill and for going about looking at this.

I will tell you, and one of the things I want to talk with you all about, we know from the EPA that the technology that is necessary for some of these standards to be in place, you know, it doesn't even exist yet. And so this concerns us because it makes long-term planning and budgeting very difficult. So sometimes I look at what was pushed forward with the finalization of the NAAQS standards and the ozone standards and I just think, you know, we kind of got the cart before the horse.

And while, as I repeatedly say, we are all for clean air, we are all for clean water, what we want to do is make certain that there is the ability to plan for and to meet the standards that are on the books, and that we can do things in a technologically feasible and cost-effective manner.

So we thank you for being here and for your attention to the issue. And, Mr. Chairman, I yield back.

Mr. SHIMKUS. The gentlelady yields back the time.

Without objection, we will hold the Ranking Member's 5 minutes if he is able to attend. And with that, we will now turn to our panel. And I will recognize you are allowed to speak. Your full testimony is submitted in the record.

You will have 5 minutes. It is an mportant issue, you can go over a little it. If you go over a minute-and-a-half or two minutes, then we will probably try to get your attention. It is a big panel, so we want to get to questions.

So, first up is Mr. Sean Alteri, Director of the Division of Air Quality at the Kentucky Department of Environmental Protection. We are glad to have you, sir. You are recognized for 5 minutes.

STATEMENTS OF SEAN ALTERI, DIRECTOR, DIVISION OF AIR QUALITY, KENTUCKY DEPARTMENT OF ENVIRONMENTAL PROTECTION; MARK CONE, DIRECTOR, BUREAU OF AIR QUALITY, MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION; KURT KARPEROS, PE, DEPUTY EXECUTIVE OFFICER, CALIFORNIA AIR RESOURCES BOARD; NANCY VEHR, AIR QUALITY ADMINISTRATOR, WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY; HOMER A. BOUSHEY, M.D., PROFESSOR OF MEDICINE, DIVISION OF PULMONARY/CRITICAL CARE MEDICINE, UNIVERSITY OF CALIFORNIA, SAN FRANCISCO; SEYED SADREDIN, EXECUTIVE DIRECTOR/AIR POLLUTION CONTROL OFFICER, SAN JOAQUIN VALLEY AIR POLLUTION CONTROL DISTRICT

STATEMENT OF SEAN ALTERI

Mr. ALTERI. Thank you, Chairman.

Good morning, Chair Shimkus, Ranking Member Tonko, and members of the subcommittee. My name is Sean Alteri, and I currently serve as the Director for the Division of Air Quality in Kentucky. I am honored to testify today and I thank you for the opportunity to tell you about our commonwealth and share some good information about our commonwealth.

In addition to my work with the Kentucky Division for Air Quality, I am currently serving as the President of the Association of Air Pollution Control Agencies. Our association is a national nonpartisan, consensus-driven organization focused on improving air quality. The association represents more than 40 state and local air quality control agencies, and more than 20 environmental senior officials from state environmental agencies serve on its board of directors.

Regarding today's hearing, I appreciate the thoughtfulness and consideration that went into the drafting of H.R. 806. The bill's intent to facilitate efficient state implementation of ground-level ozone standards is a welcome opportunity for state and local air quality regulators. H.R. 806 is supported by leaders of air pollution control agencies. The strategic approach to modernizing the Clean Air Act is necessary and appropriate.

There are three elements of the bill that deserve emphasis. First, the proposed amendments establish a more reasonable time interval for area designations and revised NAAQS and provides EPA and state air pollution control officials with sufficient time to meet its statutory obligations.

Additionally, H.R. 806 requires the study and report of international pollution and its impacts on air quality.

And, finally, H.R. 806 will also obligate EPA and NOAA to conduct a study to determine regional background of naturally-occurring concentrations of volatile organic compounds and nitrogen oxides from vegetation.

These studies will provide the necessary information for state and local air pollution control officials to develop cost-effective air pollution control strategies.

With respect to the periodic review of criteria pollutants, H.R. 806 modernizes the statutory clock to reflect the significant improvements that have been made in air quality. Section 3 of H.R.

806 provides for a more practical and attainable 10-year interval for the review and potential revision of air quality standards. Moving forward, this time period will be essential to achieve the most difficult, the most expensive remaining increments of air quality improvement.

In fact, the time frames and processes detailed in H.R. 806 are consistent with those that EPA has most recently employed to designate areas with respect to the 2010 SO_2 standard. Although the sulfur dioxide standard was revised in 2010, the court order resulting from the consent decree negotiated between EPA and third party interest groups sets the schedule for EPA to complete all area designations by December 31, 2020, 10 years after the NAAQS requires. Given the court's decision, the 10-year interval for designation time frame expressed in H.R. 806 is consistent with EPA's approach to the 2010 SO_2 standard.

As a Director for the Division for Air Quality, I am responsible for carrying out the Clean Air Act congressional declaration of purpose, and that is, "To insure that economic growth will occur in a manner consistent with the preservation of clean air resources."

In Kentucky, we have a strong manufacturing economy that is robust and growing. Many of the products that are manufactured in Kentucky are essential to our national security and economy. For example, Kentucky produces military-grade aluminum and steel to protect our soldiers and to provide them with the resources to carry out their missions. We are a world leader in the aerospace industry and are currently the third largest automobile manufacturer in the United States. We are home to Toyota, Ford, and General Motors.

We melt, cast, and mold more than 50 percent of the aluminum produced in the United States and more than 35 percent of the nation's stainless steel. Currently, two of the four remaining primary aluminum facilities operate in the commonwealth. And, not to be forgotten, 95 percent of the world's bourbon is distilled in Kentucky. Simply put, Kentucky makes the things that enables other states in the nation to grow their economies and improve their quality of life.

In closing, state and local permitting authorities must be provided with regulatory certainty throughout the permitting process of new, modified, and reconstructed stationary sources. The regulatory certainty is necessary to carry out our statutory obligations, which includes providing for economic growth. The reasonable amendments proposed in H.R. 806 will further enable all of our states to continue to grow our economy, enhance our quality of life, and improve our air quality.

Again, thank you for the opportunity to comment on H.R. 806, and I look forward to any questions you may have regarding my testimony.

[The prepared statement of Mr. Alteri follows:]

MATTHEW G. BEVIN
GOVERNOR

CHARLES G. SNAVELY
SECRETARY

AARON B. KEATLEY
COMMISSIONER

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION

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FRANKFORT, KENTUCKY 40601

TESTIMONY OF SEAN ALTERI

ON "H.R. 806, OZONE STANDARDS IMPLEMENTATION ACT OF 2017"

BEFORE THE

UNITED STATES HOUSE OF REPRESENTATIVES

ENERGY AND COMMERCE SUBCOMMITTEE ON ENVIRONMENT

MARCH 22, 2016

Good morning, Chair Shimkus, Ranking Member Tonko, and members of the Subcommittee. My name is Sean Alteri and I currently serve as the Director of the Kentucky Division for Air Quality. I am honored to testify today and thank you for this opportunity to share information about the Commonwealth of Kentucky.

In addition to my work with the Kentucky Division for Air Quality, I also currently serve as the President for the Association of Air Pollution Control Agencies. Our association is a national, non-partisan, consensus-driven organization focused on improving air quality. The Association represents more than 40 state and local air agencies, and senior officials from 20 state environmental agencies currently sit on AAPCA's Board of Directors.

Regarding today's hearing, I appreciate the thoughtfulness and consideration that has went into the drafting of H.R. 806. The Bill's intent, "[T]o facilitate efficient State implementation of ground-level ozone standards…" is a welcome opportunity for state and local air quality regulators. H.R. 806 is supported by leaders of air pollution control agencies. The strategic approach to modernizing the Clean Air Act is necessary and appropriate. There are three elements of the bill that deserve emphasis:

- The proposed amendments establish a more reasonable time interval for area designations of revised NAAQS and provides EPA and state air pollution control officials with sufficient time to meet its respective statutory obligations.
- Additionally, H.R. 806 requires the study and report of international pollution and its impacts on our air quality.
- Finally, H.R. 806 will also obligate EPA and NOAA to conduct a study to determine regional background, naturally-occurring concentrations of volatile organic compounds and nitrogen oxides from vegetation. These studies will provide the necessary information for state and local air pollution control officials to develop cost-effective air pollution control strategies.

With respect to the periodic review of criteria pollutants, H.R. 806 modernizes the statutory clock to reflect the significant improvements that have been made in air quality. Section 3 of H.R. 806 provides for a more practical and attainable 10 year interval for the review and potential revision of air quality standards. Moving forward, this time period will be essential to achieve the most difficult and expensive remaining increments of air quality improvement.

In fact, the timeframes and process detailed in H.R. 806 are consistent with those that EPA has most recently employed to designate areas with respect to the 2010 sulfur dioxide national ambient air quality standard (NAAQS). Although the sulfur dioxide NAAQS was revised in 2010, the court order resulting from the consent decree negotiated between EPA and third party interest groups sets the schedule for EPA to complete all area designations by December 31, 2020. Given the court's decision, the 10 year interval for designation timeframe expressed in H.R. 806 is consistent with EPA's approach to the 2010 SO_2 NAAQS designation process.

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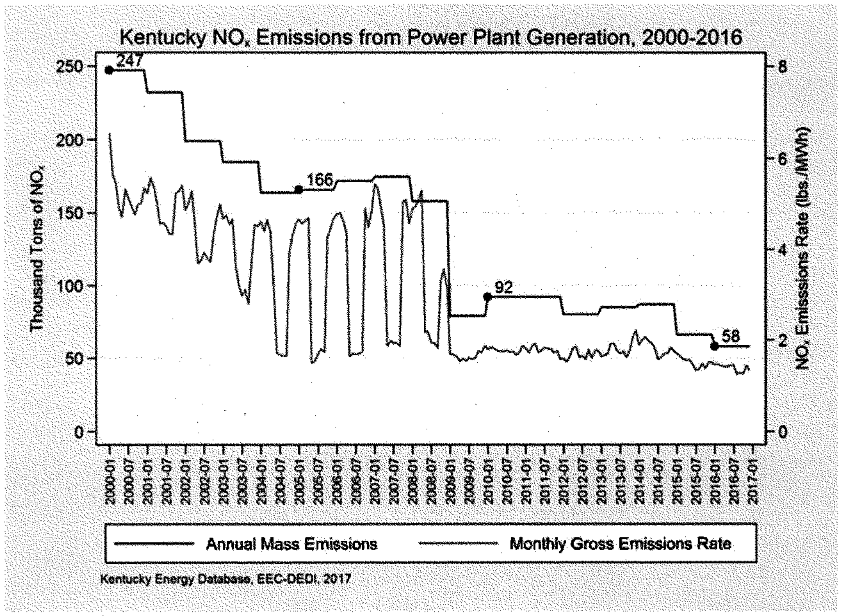
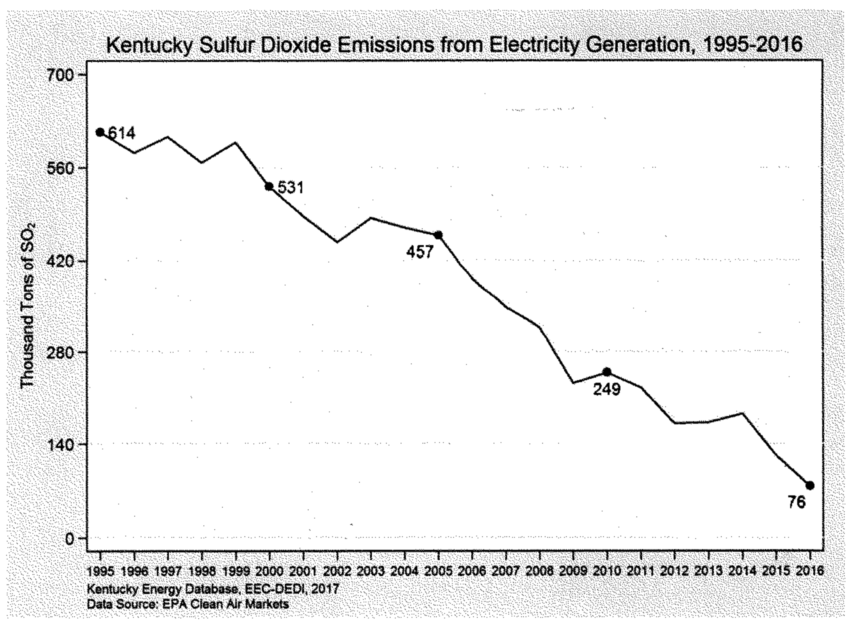
In Kentucky, we have a strong manufacturing economy that is robust and growing. Many of the products that are manufactured in Kentucky are essential to our national security and economy. For example, Kentucky produces military-grade aluminum and steel to protect our soldiers and to provide them with the resources to carry out their missions. We are a world leader in the aerospace industry and are currently the 3rd largest automobile manufacturer in the United States. We are home to Toyota, Ford, and General Motors.

We melt, cast, and mold more than 50% of the aluminum produced in the US and more than 35% of the nation's stainless steel. Currently, two of the four remaining primary aluminum facilities in the US operate in the Commonwealth of Kentucky. And, not to be forgotten, 95% of the world's bourbon is distilled in Kentucky. Simply put, Kentucky makes things that enables other states in the nation to grow their economies and improve their quality of life.

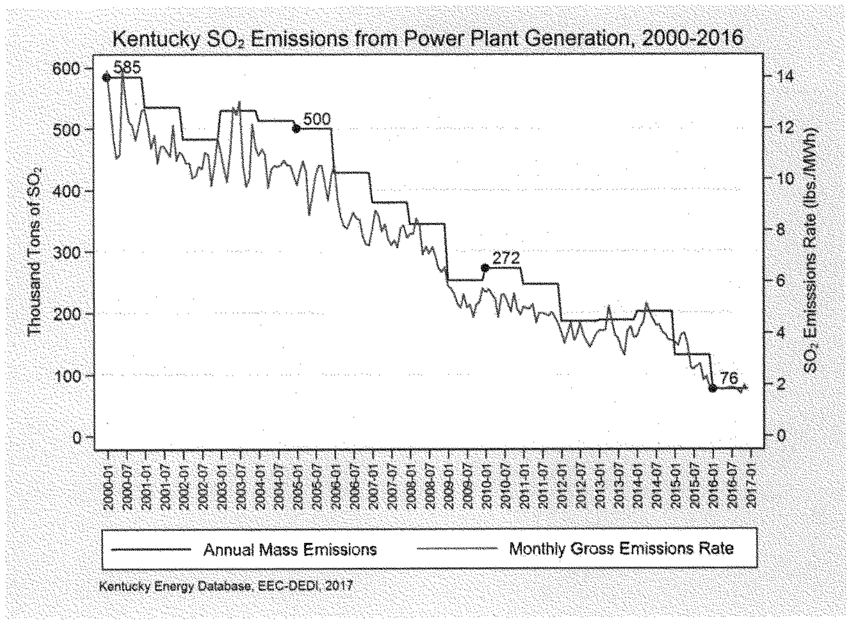
In closing, state and local permitting authorities must be provided with regulatory certainty throughout the permitting process of new, modified, and reconstructed stationary sources. The regulatory certainty is necessary to carry out our statutory obligations, which includes providing for economic growth. The reasonable amendments proposed in H.R. 806 will further enable all of our states to continue to grow our economy, enhance our quality of life, and improve our air quality. Again, thank you for the opportunity to comment on H.R. 806 and I look forward to any questions you may have regarding my testimony.

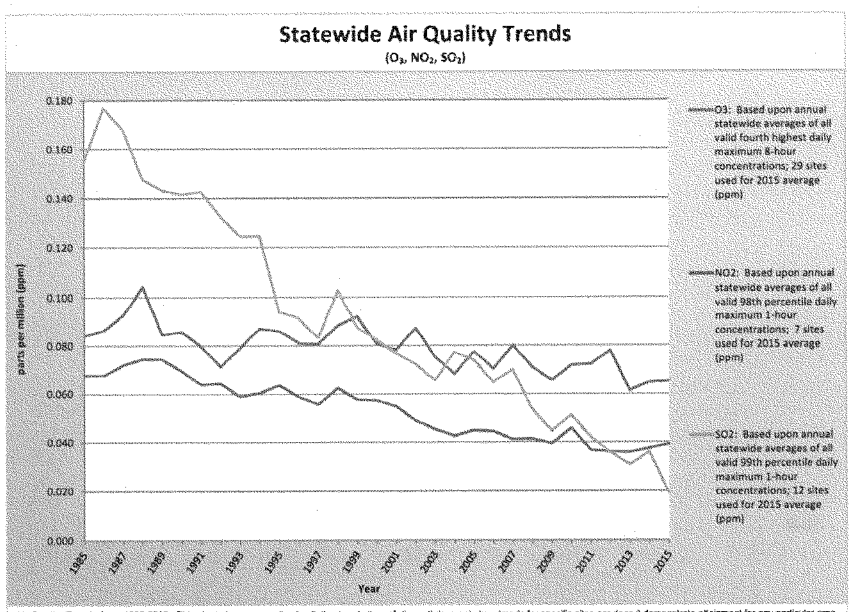


Kentucky NO_x Emissions from Power Plant Generation, 2000-2016
Thousand Tons of NO_x
NO_x Emisssions Rate (lbs./MWh)
247
166
92
58
Annual Mass Emissions
Monthly Gross Emissions Rate
Kentucky Energy Database, EEC-DEDI, 2017



Kentucky Sulfur Dioxide Emissions from Electricity Generation, 1995-2016
Thousand Tons of SO_2
614
531
457
249
76
Kentucky Energy Database, EEC-DEDI, 2017
Data Source: EPA Clean Air Markets





Air Quality Trends from 1985-2015: This chart shows generalized pollution trends through time. It does not show trends for specific sites nor does it demonstrate attainment for any particular area. While individual pollutants may spike in certain years, overall trends show declines in pollution levels.

Graph created on 11/21/2016. Data was obtained from the EPA's AQS Database. Data has been quality assured, but is subject to change.

Mr. SHIMKUS. Thank you very much.

Now I would like to turn to Mr. Marc Cone, Professional Engineer, Director of the Bureau of Air Quality at the Maine Department of Environmental Protection.

Sir, you are recognized for 5 minutes. Welcome.

STATEMENT OF MARC CONE

Mr. CONE. Thank you, Chairman Shimkus, Ranking Member Tonko, and members of the subcommittee. I am Marc Cone, Director of the Bureau of Air Quality with Maine Department of Environmental Protection. With over 30 years of experience working on Clean Air Act issues, I am here to speak in support of H.R. 806. Thank you for inviting me to speak.

Maine benefits from clean air and pristine waters and supports environmental protection. Strong national implementation of the Clean Air Act requirements benefits people of Maine more than most because much of the pollution of our air comes from areas downwind of us. Emissions data, ambient monitoring data, and meteorological data irrefutably show that short and long range transport of air pollutants to Maine from other states and nations all affect Maine's air quality.

The Clean Air Act has been successful in reducing significant amounts of air pollution, but today the Act is inefficient. Maine is supportive of the Environmental Protection Agency implementing the Clean Air Act in an efficient manner and as expeditiously as practical. When the Clean Air Act was in its infancy, the 5 years between reevaluations of standards may have made sense, but now it seems to be a pragmatic problem.

When the requirements to review ambient standards was new, the 5 years may have been effective due to less complicated and less costly controls, allowing timelier progress. Unfortunately, the reality today has been that EPA has failed to accomplish implementing new standards in a 5 year time frame. The current time frame has created uncertainty for facilities and for state and local regulating agencies.

It is both difficult and frustrating to fully understand regulatory requirements, explore options, plan, fund, contract work, implement, and measure the results of changes intended to maintain ambient air quality standards when the target is redefined on an erratic schedule and guidance for implementation of any new standard is not provided at the same time the standard is set.

It is complicated. A standard without an implementation strategy is like giving someone a destination without a map. You can probably get there, but it is going to take some time and effort. Currently, the system does not work and it is now an excellent time to consider changes.

Today, for a new standard EPA needs to propose, consider comments, finalize, defend legal challenges, develop implementation rules, and work with states on these plans. They must accomplish this all before evaluating the standard again. This is quite a challenge, which has been reflected in the latest standards.

EPA promulgated an ozone standard to replace the 1997 ozone standard 11 years later, in 2008. The EPA did not issue the implementation regulation for the 2008 standard until 2015, 7 years after the promulgation of the standard. Just months after the 2015 implementation regulation was issued for the 2008 standard, EPA promulgated a new ozone standard.

Even now, the latest data suggests that some areas in the ozone transport region are not attaining the 1997 standard, not to mention the 2008 and 2015 standard. The reality is that when a standard is set, EPA needs to issue an implementation strategy for that standard at the same time.

The latest sulfur dioxide standard was promulgated in 2010. The 2010 standard provides a new level of complexity to implement, as EPA had significant time to develop implementation requirements that came out in 2015. Depending on a state's plan, the final assessment of the 2010 sulfur dioxide standard will not occur until approximately 10 years after it was put in place. Again, the proposal in H.R. 806 seems a practical response to reality.

The PM2.5 standard has also been a complicated process. In 1997, EPA promulgated the first PM2.5 standard. The implementation has been very confusing and a technically challenging process.

In summary, the implementation of this standard to date continues to create regulatory uncertainty. A 10-year time frame for some standards may still not be enough for EPA to overcome the technical challenges of a standard.

In conclusion, a standard without an implementation strategy will not protect citizens. The challenges and uncertainty of the 1997 ozone and particulate matter standard continue 20 years after their promulgation. The changes, as proposed in H.R. 806, to delay final designations under the 2015 standard until 2025, and to extend the time frame for standards review from every 5 years to every 10 years, including concurrently-published, clearly-defined implementing regulations, would allow for due process to be followed and fulfilled. This would more effectively and efficiently utilize federal, state, and individual facility resources to establish a standard and work for the improvement of air quality and protection of the people of our nation.

Thank you for allowing me to speak today. And I welcome any questions you may have.

[The prepared statement of Mr. Cone follows:]

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PAUL R. LEPAGE
GOVERNOR

PAUL MERCER
COMMISSIONER

Written Testimony Submitted to the Subcommittee on Environment of the Energy and Commercc Committee

Comments on "H.R. 806, Ozone Standards Implementation Act of 2017"

This proposed regulation provides for improved fulfillment and facilitation of the regulatory process by EPA and therefore more effective use of regulations to protect air quality in the U.S. Historically, the EPA has neither promulgated updated ambient air quality standards within the five-year timeframe currently required by federal law, nor has the agency provided implementation regulations and guidance in a timely fashion so that states, tribes, and local agencies could implement the regulations and realize measured benefits in air quality. Components of H.R. 806 address and rectify both of these shortcomings within the current regulatory process.

The cycle of reviewing a standard every five years creates a perpetual status of uncertainty with States and the regulated community. The States and the regulated community deserve certainty to implement and then evaluate the effects of their efforts before the target standard for compliance is redefined. The existing sequence of requirements makes that unachievable. The changes included in this bill would allow the EPA more time for strategies to be more thoughtfully developed, would help provide greater certainty within a more realistic timeframe for implementation of a new standard, and would allow for assessment of the effectiveness of control measures that have been put in place.

Issues Regarding Implementation of the Ozone Standard

In 2008, EPA promulgated an ozone standard to replace the 1997 ozone standard. The EPA did not issue the implementation regulation for the 2008 standard until 2015, seven years after promulgation of the standard. Then, a few months later in 2015, the agency promulgated a new ozone standard to replace the standard for which implementation guidance had only recently been provided. Even then, EPA staff and states in the Ozone Transport Region recognized that the implementation regulation was not a plan that would achieve attainment of the standard in the Ozone Transport Region. The Ozone Transport Region is composed of northern Virginia, Washington, D.C., Maryland, Delaware, Pennsylvania, New Jersey, New York, Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire, and Maine. The reality is that when a standard is set, EPA needs to defend the standard and promptly develop an implementation strategy for the standard. H.R. 806 requires any newly promulgated NAAQS to be accompanied by concurrently promulgated implementation guidance.

Under existing process and timeframes, before EPA could defend and develop a strategy for implementation of the ozone standard promulgated in 2008, the Agency was already due to re-evaluate the standard according to the five-year NAAQS review frequency in current law. This situation is not ideal. EPA has yet to develop strategies that allow all states to reach the 1997 ozone standard. We have seen reductions of ozone levels in the country, but there are some areas, including some within the Ozone Transport Region, that are not yet monitoring below the 1997 standard, let alone the 2008 or 2015 standards. The continuing nonattainment with ozone standards and EPA's failure to facilitate discussions on pollution transport issues resulted in a number of states petitioning EPA to bring other states into the Ozone Transport Region. This adversarial situation could have been avoided if EPA had put resources into facilitating a science-based collaborative mechanism to achieve attainment instead of re-evaluating the existing ozone standard and then promulgating an updated standard.

The EPA has developed the Cross State Air Pollution Rule (CSAPR), which is a start for the development of an ozone transport solution, but the CSAPR has fallen short of the intended outcomes and needs to be more robust to solve nonattainment issues. EPA needs more time and needs to put resources into solving the pollution transport issue to achieve attainment of the ozone standard within the Ozone Transport Region.

Maine has experienced frustration with this latest ozone review cycle which created an atmosphere of uncertainty for our state. Maine is rural state and part of the Ozone Transport Region which requires the state be treated as a moderate non-attainment area for ozone even though the state has attained the ozone standard. Over the last 25 years, Maine has requested and been granted regulatory relief in the form of Section 182(f) waivers for nitrogen oxide (NO_x) requirements for each ozone standard. The state demonstrated that controlling NO_x further would not contribute to attaining the ozone standard in Maine and would not impact existing nonattainment areas in the OTR. In fact, Maine has monitored attainment with the ozone standard since 2004, which includes the 2008 and 2015 standards. In 2013, the state requested regulatory relief from the more stringent, nonattainment-level requirements for volatile organic compounds (VOC) emissions, which would make the VOC emissions requirements similar to those applicable to ozone attainment areas. This request was delayed, and then the EPA informed the state that this request would not be acted upon due to the next ozone standard being proposed. At the time, the state had already received construction permit applications for facility changes at forest products businesses that were relying on the regulatory relief being granted for economic and practical feasibility of the projects. Since that time, one facility has gone through bankruptcy, and the other has ceased operation. In a state where the manufacturing industry is still a significant part of our economy, every bit of regulatory certainty can be critical when competing in the global economy.

Issues Regarding the Latest Sulfur Dioxide Standard

The most recent sulfur dioxide (SO_2) standard was promulgated in 2010, and the previous standard was promulgated in 1996, for a span of 14 years between standards. The primary standard became a standard on a one-hour basis, where previously the standard had an annual and a 24-hour averaging period. The 2010 standard provided a new level of complexity to implement, and EPA's action was met witb legal challenges. Thus, EPA took significant time to develop implementation requirements, which became available in 2015. The implementation requirements obliged states to provide plans to demonstrate compliance with the standard around or near certain SO_2 sources by means of either atmospheric dispersion modeling or by setting up a monitoring network around sources which emit greater than 2,000 tons per year of SO_2 or other sources EPA identified to be included. The results of atmospheric dispersion modeling were required to be submitted in 2017.

If monitoring is to be performed to show compliance with the standard, the source has to collect three years of data to demonstrate compliance. So, the final implementation of the 2010 sulfur dioxide standard will not occur until approximately 10 years after the standard was established.

As it pertains to clarity and certainty in implementing this standard, Maine had no facilities emitting greater than 2,000 tons per year of sulfur dioxide; however, EPA Region 1 made the determination that a particular oil-fired power plant in Maine should be subject to these requirements and included in this analysis. The experience of Maine DEP staff provided great confidence that the facility's operation was not violating the ambient standard based on monitoring of another plant and experience with atmospheric dispersion modeling. The atmospheric analysis suggests the facility's contributions result in ambient air levels significantly under the standard. The ambiguity of this implementation requirement has created work that has little value or impact on the ambient air quality in Maine or the U.S. Future implementation rules need clear and concise lines of applicability, not foggy gray lines. Thus, the 10-year timeframe along with clarity in issuing implementation guidance in H.R. 806 seems a practical response to reality.

Issues Regarding Implementation of the Particulate Matter Less than 2.5 Microns ($PM_{2.5}$) Standard

The implementation of the $PM_{2.5}$ ambient standard has also been a complicated process. In 1997, EPA promulgated the first $PM_{2.5}$ standard. The implementation has been a very confusing and uncertain process as demonstrated with the following list of actions:

(initial $PM_{2.5}$ NAAQS)	7/18/1997	- EPA promulgated primary and secondary $PM_{2.5}$ NAAQS
(five years later)	3/2002	- D.C. circuit court upholds the NAAQS
(7.5 years later)	1/5/2005	- EPA promulgates designations for the $PM_{2.5}$ NAAQS, effective April 2005.
(9 years later)	10/26/2006	- EPA promulgates revision to primary 24-hour $PM_{2.5}$ NAAQS
(10 years later)	4/25/2007	- EPA issued Implementation Rule for $PM_{2.5}$ NAAQS
(11 years later)	5/16/2008	- EPA issued $PM_{2.5}$ New Source Review (NSR) Rule (requiring Prevention of Significant Deterioration (PSD) permits issued after 1/1/2011 to address $PM_{2.5}$)
(15 years later)	3/2/2012	- EPA issued guidance document to aid states in preparing $PM_{2.5}$ State Implementation Plan (SIP) submittals
(15 years later)	6/29/2012	- EPA proposed revisions to primary and secondary $PM_{2.5}$ NAAQS
(15.5 years later)	12/14/2012	- EPA revised primary annual $PM_{2.5}$ NAAQS
(15.5 years later)	1/4/2013	- D.C. Circuit Court decision on challenge to 2007 Implementation and 2008 NSR rules means EPA's 3/2/2012

guidance is no longer appropriate. The Court remanded both rules to EPA.

(19 years later) 8/24/2016 - EPA promulgated new rule re: SIP submittals to implement $PM_{2.5}$ NAAQS (addresses PSD permitting of $PM_{2.5}$ and precursor issues).

As demonstrated by the list of actions above, there have been technical and legal challenges to implementing this standard that made a five-year standards re-evaluation timeline impossible to meet.

For Maine, there needed to be an ambient monitoring network for which there was none. Maine had to purchase and locate monitors which started collecting data in 1999. Maine monitoring has demonstrated attainment with the $PM_{2.5}$ air quality standard although there are continued challenges with monitoring for this pollutant.

However, $PM_{2.5}$ permitting requirements have been uncertain since the standard was promulgated. EPA needed over 11 years to develop regulations that were unable to stand up to legal challenges. Testing methods for sources took years to develop, and today there is not an approved source emission testing method for $PM_{2.5}$ for a unit using a wet scrubber to control emissions. Sadly, the science needed to implement the 1997 standard has yet to be fully developed nearly 20 years after the standard was promulgated. This standard has created and fostered uncertainty for states and the regulated community since its inception. A 10-year timeframe for some standards may still not be enough for EPA to overcome the potential technical and legal challenges of a standard.

In conclusion, a standard without an implementation strategy will not protect citizens. Implementation of the last two ozone national ambient air quality standards (1997 and 2008) and implementation of the 2010 sulfur dioxide standard has taken periods of time significantly longer than five years. The implementation challenge of the 1997 $PM_{2.5}$ standard continues 20 years after its promulgation. The changes as proposed in H.R. 806 to delay final designations under the 2015 standard until 2025 and to extend the timeframe for NAAQS reviews from every five years to every 10 years including concurrently published, clearly defined implementing regulations and guidance would allow for a more appropriate time period in which to complete due process. The timeframe would allow EPA to utilize available data and developments in scientific understanding in collaborating with states and the regulated community to develop plans for the successful implementation of the standard. This would more effectively and efficiently utilize federal, state, and individual facility resources to establish a standard, implement a standard, and create a level of certainty and expectation of work for the improvement of air quality and ultimately better environmental protection for the people of our nation.

Mr. SHIMKUS. Thank you very much.

The Chair now recognizes Mr. Kurt Karperos, Deputy Executive Officer of the California Air Resources Board. Welcome, and you are recognized for 5 minutes.

STATEMENT OF KURT KARPEROS

Mr. KARPEROS. Good morning, Chairman Shimkus, Ranking Member Tonko, and members of the committee. My name is Kurt Karperos. I am Deputy Executive Officer of the California Air Resources Board. Thank you for the opportunity to speak with you today.

The Air Resources Board is the California agency responsible for implementing the Clean Air Act in all areas of the state. I oversee that responsibility, including meeting federal air quality standards in the areas with the most persistent pollution, the greater Los Angeles area, that we refer to as the South Coast, and the San Joaquin Valley. These two regions pose the nation's greatest challenge in meeting the ozone standard and ensuring the residents breathe healthful air.

It is from that perspective that I want to cover three points in my testimony today.

First, meeting health-based, health-protective standards for air quality is achievable.

Second, economic growth and development while cleaning the air is not only possible, in California it is a reality.

And, third, weakening the Clean Air Act, as H.R. 806 would do, is unnecessary and will harm the health and well-being of millions of people.

Nearly half of California's 38 million residents live in regions with pollution levels that exceed the 70 parts per billion ozone standard. Of those, almost five million are children, with nearly one-half million suffering from asthma.

California supported EPA's use of the most current and robust scientific studies to set health-protective ozone standards because reaching this standard would reduce premature mortality, emergency room visits for asthma, hospitalizations, and lost work and school days.

Simply put, meeting the ozone standard is a public health imperative.

California has a long and successful history of meeting health-protective, science-based standards. Of California's 19 areas that once exceeded either the 1-Hour Ozone Standard or the original 8-Hour Ozone Standard, only four exceed those standards today.

The San Joaquin Valley has made significant process. This extreme non-attainment area now meets the 1-Hour Ozone Standard. It is on track to meet the 80 parts per billion ozone standard. And last summer, San Joaquin Valley leaders adopted a plan to meet the 75 parts per billion ozone standard by the Clean Air Act's deadline of 2031.

The South Coast is more challenging, but progress there is also remarkable. The region once measured 1-hour ozone values above the standard on over 200 days per year. Today it has dropped to less than 20. Similarly, the number of days over the 8-hour standard have been cut in half since 1990.

At the same time we have been cleaning the air, California's economy has continued to grow and prosper. Last year, California's economy grew to be the world's sixth largest. In 2016, California non-farm employment increased by 2.6 percent, compared to 1.7 percent nationwide.

In 2009, the California clean energy industry generated $27 billion and employed 123,000 people. By 2020, we expect it to grow to over $140 billion with 345,000 employed.

Looking forward, EPA estimates that achieving the 70 parts per billion ozone standard would save Californians an estimated $0.4 to $1.4 billion per year when accounting for both the costs of reducing emissions and the avoided costs of healthcare, lost work days and low productivity, and other pollution impacts.

With its science-based, health-protective air quality standards, its meaningful deadlines, and its requirements for comprehensive plans, the Clean Air Act has been California's tool for achieving air quality and economic success. The Clean Air Act requires comprehensive planning. H.R. 806 would delay planning and increase costs in the long term.

Today's testimony is timely, as tomorrow the California Air Resources Board will consider a plan that will not only provide the reductions needed to meet the 75 parts per billion standard in 2031, it will also provide the initial reductions needed for the new 75 parts per billion standard in 2037. Rather than delay and wait, California's solution is to move forward.

California has used the flexibility in the Act to drive innovation. Electric cars are the prime example. The next step is cleaner trucks. California has already certified a truck that has 90 percent fewer emissions than those on the road today. The needed technologies are here now.

California's success is proof that H.R. 806 is unnecessary. It would inappropriately insert control costs into EPA's science-based process for setting air quality standards. How healthful the air is to breathe is not determined by the cost to clean it up. It is a question of science and what air pollution does to the human body.

H.R. 806 would mean more people would breathe dirty air longer. It would unwisely mandate that we ignore the pollution impacts of weather conditions made worse by man-made climate change. It would push off deadlines, erode requirements for incremental progress, and undermine the Clean Air Act's requirements for comprehensive air quality strategies.

In closing, let me stress that meeting health-protective standards is both achievable and cost-effective. The Clean Air Act provides the flexibility to do this.

Setting healthful air against economic prosperity is a false choice. California continues to show that clean air and economic growth go hand-in-hand.

And, finally, delaying the standards will harm the health and well-being of millions of people in this country. The San Joaquin Valley, in particular, is home to high rates of poverty, pollution, and asthma. It is especially critical to continue progress in that region.

And in the end, the economic costs and the human cost of polluted air far exceed the costs of cleanup.

Thank you for the opportunity to speak with you. And I look forward to your questions.

[The prepared statement of Mr. Karperos follows:]

Air Resources Board

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Matthew Rodriquez
Secretary for Environmental Protection

Edmund G. Brown Jr.
Governor

Hearing of the House of Representatives
Committee on Energy and Commerce
Subcommittee on Environment

H.R. 806, Ozone Standards Implementation Act of 2017

March 22, 2017, 10:00 AM
2123 Rayburn House Office Building

Kurt Karperos, PE
Deputy Executive Officer
California Air Resources Board

Introduction

Good morning Chairman Shimkus, Ranking Member Tonko, and members of the Subcommittee.

My name is Kurt Karperos. I am a Deputy Executive Officer for the California Air Resources Board. Thank you for the opportunity to speak to you today.

The Air Resources Board is the California agency responsible for implementing the Clean Air Act in all areas of the State. I oversee this effort, including meeting federal air quality standards in the areas with the most persistent pollution – the greater Los Angeles area that we refer to as the South Coast, and the San Joaquin Valley.

These two regions pose the nation's greatest challenge in meeting the ozone standard and in ensuring the residents breathe healthful air.

It's from that perspective that I want to cover three points in my testimony.

First, meeting health-based standards for air quality is achievable.

Second, economic growth and development while cleaning the air is not only possible, *it is a reality in California*.

And third, weakening the Clean Air Act, as H.R. 806 would do, is unnecessary and will harm the health and well-being of millions of people.

Public Health Imperative

Nearly half of California's 38 million residents live in regions with pollution levels that exceed the 70 parts per billion ozone standard.

Of those, almost 5 million are children, with nearly one-half million suffering from asthma.

California supported EPA's use of the most current and robust scientific studies to set a more health-protective ozone standard because reaching that standard will reduce premature mortality, emergency room visits for asthma, hospitalizations, and lost work and school days.

Simply put, meeting the ozone standard is a public health imperative.

California's Success Implementing the Clean Air Act

California has a long and successful history of meeting health-protective, science-based standards.

Of California's 19 areas that once exceeded either the 1-hour or original 8-hour ozone standards, only 4 still exceed those standards today.

The San Joaquin Valley has made significant progress. This extreme nonattainment area now meets the 1-hour ozone standard. It's on track to meet the 80 parts per billion standard. And last summer, San Joaquin Valley leaders adopted a plan to meet the 75 parts per billion 8-hour standard by the Clean Air Act's 2031 deadline.

The South Coast is more challenging, but progress there is also remarkable. The region once measured 1-hour ozone values above the standard on over 200 days per year. Today it has dropped to less than 20. Similarly, the number of days over the 8-hour standard has been cut in half since 1990.

California has achieved this at the same time that our population has grown by over 25 percent and the State's gross domestic product has more than doubled.

A Growing Economy at the Same Time

At the same time we have been cleaning the air, California's economy has continued to grow and prosper. Last year, California grew to be the world's sixth largest economy. In 2016, California nonfarm employment increased by 2.6 percent, compared to 1.7 percent nationwide.

In 2009, the California clean energy industry generated $27 billion dollars and employed 123,000 people. By 2020, we expect it will grow to over $140 billion with 345,000 employed.

Looking forward, EPA estimates that achieving the 70 parts per billion ozone standard would save Californians an estimated 0.4 to 1.4 billion dollars per year when accounting for both the costs of reducing emissions and the avoided costs of healthcare, lost work days and low productivity, and other pollution impacts.

The Clean Air Act has been the Tool for Achieving this Success

With its science-based, health-protective air quality standards, its meaningful deadlines, and its requirements for comprehensive plans, the Clean Air Act has been California's tool for achieving air quality and economic success.

The Clean Air Act requires early, comprehensive planning. California uses the planning required by the Act to minimize costs. H.R. 806 would delay planning and increase cost in the long-term.

Today's testimony is timely, as tomorrow, the California Air Resources Board will consider a plan that will not only provide the reductions needed to meet the 75 parts per billion ozone standard in 2031, but will also provide the emissions reductions needed for the new 70 parts per billion ozone standard in 2037.

Rather than delay and wait, California's solution is to move forward.

California has used the flexibility in the Act to drive innovation, using incentives to bring cost-effective technologies to market. Electric cars are the prime example.

The next step is cleaner trucks. California has already certified a truck that has 90 percent fewer emissions than those on the road today.

The needed technologies are here now.

Changes to the Clean Air Act are Unnecessary

California's success is proof that H.R. 806 is unnecessary.

H.R. 806 would inappropriately insert control costs into EPA's science-based process for setting air quality standards. How healthful the air is to breathe is not determined by the cost to clean it up. It is a question of science and what air pollution does to the human body.

H.R. 806 would mean more people would breathe dirty air longer. It would unwisely mandate that we ignore the air pollution impacts of weather conditions made worse by man-made climate change.

It would push off deadlines, erode requirements for incremental progress, and undermine the Clean Air Act's requirements for comprehensive air quality strategies.

Closing

In closing, let me stress that meeting the federal health-protective ozone standards is both achievable and cost-effective.

The Clean Air Act provides the needed flexibility to do this.

Second, setting healthful air against economic prosperity is a false choice. California continues to show that clean air and economic growth go hand-in-hand.

And third, delaying the standards will harm the health and well-being of millions of people in this country. The San Joaquin Valley, in particular, is home to high rates of poverty, pollution, and asthma. It is especially critical to continue progress in that region.

In the end, the economic costs and the human cost of polluted air far exceed the costs of cleanup.

Thank you for the opportunity to speak with you today. I would be happy to answer any questions.

Mr. SHIMKUS. The gentleman's time has expired.

The Chair now recognizes Ms. Nancy Vehr, Air Quality Administrator at the Wyoming Department of Environmental Quality. You are recognized for 5 minutes. Thank you for joining us.

STATEMENT OF NANCY VEHR

Ms. VEHR. Good morning, Chairman, Ranking Member, and members of the committee. Thank you for inviting Wyoming to testify.

Before I discuss ozone, I want to share three facts to help you understand Wyoming's perspective.

First, Wyoming is the ninth largest state and has the smallest population of any state in the nation.

Second, Wyoming is second in the nation in mean elevation, with Colorado being the highest.

Finally, Wyoming is blessed with amazing and abundant natural resources that provide our nation, state, and our citizens with revenue and jobs. We are proud that we protect our natural resources and provide for responsible energy production.

I am going to address five points. My first point is wintertime ozone in Wyoming. Our first ozone exceedence came in the winter of 2005 in a high-elevation, rural part of the state, in an area with abundant oil and gas production. Roughly 10,000 people live there. It is surrounded by mountain ranges on three sides.

In 2009, Wyoming recommended that the area be designated as non-attainment. EPA did so in 2012. Emissions have been greatly reduced because of significant participation and work by state and local governments, industry, citizens, and the area has now attained the 2008 standard. Our experience highlights why a one-size-fits-all approach to ozone is not defensible. Wyoming's experience differs greatly from EPA's traditional ozone focus on low-elevation, densely populated urban areas with summertime issues. One-size-fits-all does not fit Wyoming.

Alternative analytical tools and methods are critical for areas with unique characteristics or phenomena, like those that we have experienced. In fact, there is still no model that is proven effective at replicating our wintertime high ozone events. Section 3(j) of H.R. 806 recognizes and provides for the study of ozone formation in rural areas and in the winter.

My second point, and another area that Section 3(j) addresses, is background ozone. Background, or naturally occurring ozone, in the western United States is not well understood. When EPA proposed the 2015 standard, it dismissed high elevation site data as an outlier, even though it recognized that background concentrations are highest at high elevation. Background ozone is a reality in the Mountain West. Research is needed in order to better understand the impact of background ozone. Section 3(j) provides for that.

My third discussion point is international transport. In addition to understanding background ozone, it is also important to have a full understanding of the extent and magnitude of influence that internationally-transported ozone and precursors have in the West. If the underlying cause of elevated ozone is from international transport, then imposing costly controls won't make a difference.

Recent scientific evidence suggests that the Trans-Pacific transport of Asian pollution has contributed on the order of 8 to 15 parts per billion higher ozone levels in the western United States. Long-range international transport research, and translation of those findings into the regulatory framework, would be beneficial. Section 3(i) of H.R. 806 directs EPA to do this.

My fourth point involves exceptional events. Section 3(h) of the bill clarifies that certain events, such as non-ordinarily occurring stagnation of air masses, high temperature, or lack of precipitation qualify as exceptional events. Wyoming's experience has been that the exceptional event demonstration process has been costly and resource intensive. Specifying qualifying events and streamlining the process will reduce these costs.

In addition to streamlining, EPA must act on those submittals. Between 2011 and 2014, Wyoming submitted 46 exceptional event demonstrations showing that air quality standards had been affected by high winds, wild fires, and stratospheric ozone intrusions. However, EPA did not act on any of Wyoming's demonstrations of those 46.

When there is no action and exceptional event demonstrations are ignored, the result is inflated monitored data that misrepresents the prevailing air quality conditions included in modeling, unnecessarily delays permitting, and inaccurately characterizes air quality for the public.

My final point addresses interstate transport. Interstate transport provisions prevent one state's emissions and sources from contributing significantly to non-attainment or interfering with maintenance of a national standard in a downwind state. Interstate transport of ozone is an area where EPA has shifted its approach towards western states by considering modeling results. However, to be useful, models must be accurate. Inaccurate models may result in the needless expenditure of time and resources and developing solutions for the wrong problem or on a non-existent issue. Inaccuracy adversely impacts public health and welfare.

The model results that EPA now uses to address interstate ozone arose out of an update to the Cross-State Air Pollution Rule that addresses interstate pollution in the East. The rule does not apply to western states like Wyoming. In order to develop the rule, the EPA used air quality modeling to project ozone concentrations and assess contributions. However, after EPA adopted the update it began to look to the model and draw conclusions about western states such as Wyoming.

My earlier testimony highlights some of Wyoming's unique characteristics that must be factored. Early and meaningful engagement with western states is critical. Implementation of streamlined and technically-sound measures assures that we can spend our resources on air quality improvement.

Thank you.

[The prepared statement of Ms. Vehr follows:

Testimony of Nancy Vehr, Administrator
Wyoming Department of Environmental Quality,
Air Quality Division
before the
United States House of Representatives,
Committee on Energy and Commerce,
Sub-Committee on Environment

H.R. 806, Ozone Standards Implementation Act of 2017

March 22, 2017, 10:00 AM
2123 Rayburn House Office Building

Good morning Chairman Shimkus, Ranking Member Tonko, and members of the Subcommittee. My name is Nancy Vehr. I am the Air Quality Division Administrator for the Wyoming Department of Environmental Quality and am responsible for implementing the Clean Air Act and the Air Quality requirements of Wyoming's Environmental Quality Act. I thank the subcommittee for inviting the State to share its perspective on the Ozone standard. My testimony addresses five points with respect to the standard:

1) Background Ozone

2) International Transport

3) Exceptional Events

4) Permitting and Implementation Guidance

5) Interstate Transport

Introduction

In order to assist the committee with an understanding of Wyoming's perspective, I would like to share a few of the relevant key characteristics of our state.

Size: Wyoming is the 9th largest state covering 97,814 square miles, yet has the smallest population of any state at about 584,000. To put this into perspective, with respect to land mass, Wyoming is roughly 93 times the size of Rhode Island. However, Wyoming's low population density of about six (6) people per square mile ranks at 49th in the nation. The size of Wyoming's largest county – Sweetwater County - at 10,425 square miles, ranks as the eighth largest county in the nation and by itself is roughly four times as large as the entire state of Delaware (2,489 square miles). Much of the state consists of many rural communities with large expanses in between. Wyoming has only nine "cities" with populations greater than 10,000 people. Half of Wyoming's land is owned and managed by the federal government.

Elevation: Wyoming's mean elevation of 6,700 feet above sea level places us at 2nd in height, with Colorado being the highest. Consequently, most of Wyoming's ozone monitors are sited at an elevation 1000 feet higher than the "mile high" city of Denver, Colorado. In comparison, the mean elevation of east coast states fall under 1,100 feet.

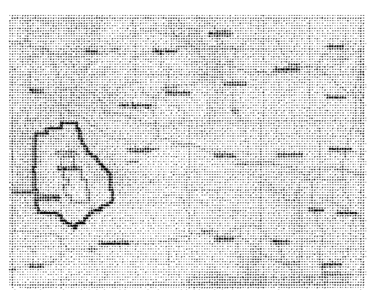
Natural Resources: Wyoming has been blessed with amazing and abundant natural resources. We are home to Yellowstone and Grand Teton national parks, and other special and scenic places. Our abundant mineral resources provide the nation, our State, and her citizens with revenue and jobs. Our leading industries are energy, tourism, and agriculture. The energy industry is the largest contributor to Wyoming's economy. In 2016, Wyoming ranked 8th in the nation for crude oil production, 4th for natural gas, and leads the nation in the production of coal, bentonite, and trona. Aggregating the production and export of all fossil-based minerals, Wyoming is the number one producer of energy to the nation. In terms of renewable energy, Wyoming also ranks at the top by having the most class 5-7 categories for wind energy resources in the continental United States.

Wyoming values the protection of its natural resources. The mission of the Wyoming Department of Environmental Quality is: "To protect, conserve and enhance the quality of Wyoming's environment for the benefit of current and future generations." As the Department and Air Quality Division carry out this mission, we do so in a balanced manner – protecting our natural resources and providing for responsible energy production. As our governor, Matt Mead has stated, "It is a false question to ask: Do we want energy production or environmental stewardship?" In Wyoming, we must and do have both.

Ozone in Wyoming

Ozone is a complex air pollutant that exists naturally at high elevations in the stratosphere or can be formed at ground level by both natural and man-made sources through complex chemical reactions. EPA's study and knowledge of Ozone has focused extensively on urban areas with high population densities and high ozone levels, and mostly for summertime issues. These focus areas mainly have fairly flat terrain, and low elevations. EPA's knowledge base and understanding is far different from Wyoming's characteristics and experience.

Wyoming's characteristics as an expansive, high-elevation, sparsely populated rural state differs greatly from EPA's traditional focus. As a result, we face unique challenges in implementing the EPA's Ozone Standards in Wyoming. Wyoming's experience with ozone is also unique in other ways. Wyoming has experienced elevated ozone concentrations in the winter and early spring in its Upper Green River Basin. In the summer, Wyoming has experienced elevated ozone related to wildfires.

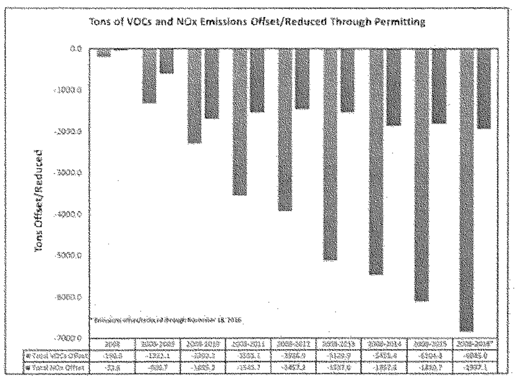


State of Wyoming
Upper Green River Basin, 2008 Ozone Non-attainment Area

In the winters of 2005 and 2006, primarily in the month of February, Wyoming measured 8-hour ozone concentrations greater than 84 ppb (parts per billion), the ozone standard at that time, at monitoring stations in the Upper Green River Basin. The population in the Upper Green River Basin is approximately 10,000. It is surrounded by mountain ranges on three sides. It is also an area with abundant oil and gas production. Given the unusual nature of those ozone events and the potential implications of concentrations that exceeded the standard, the Department proactively focused its resources towards understanding the formation of ozone in a rural high-elevation area in the winter. Since 2005, the Division has spent over $10 million and allocated over 25% of its staff to developing solutions. Less than 10% of Wyoming's funding to investigate and address this issue came from federal grants. This disparate allocation of funding sources, creates a burden on state resources, complicating the state's ability to achieve health based standards.

Wyoming's efforts have helped build a foundation for understanding how ozone is formed in the winter. Winter stagnant air mass (inversions) and enhanced solar radiation from snow cover can lead to high ozone formation in the presence of ozone precursors (volatile organic compounds and nitrogen oxides). However, the processes involved have not been fully identified or replicated in the photochemical grid models used by EPA. No currently available modeling system has proven to be effective in replicating high ozone events in the Upper Green River Basin. Wyoming's experience highlights why a one-size-fits-all approach to Ozone is not defensible. One-size-fits-all does not fit Wyoming. Alternative analytical tools and methods are critical for areas with unique characteristics or phenomena like those that we have experienced in Wyoming.

While Wyoming's early efforts led to greater understanding and a reduction in emissions, it was not enough. In 2012, Wyoming recommended that a small portion of the state known as the Upper Green River Basin be designated as not attaining the 2008 Ozone Standard of 75 ppb. EPA concurred. Since 2008, the Upper Green River Basin has achieved significant reductions of ozone precursors through the installation of controls and the centralization of gathering facilities. Wyoming's achievements reflect the significant participation and work undertaken by state and local governments, industry, citizens and the Upper Green River Task Force.

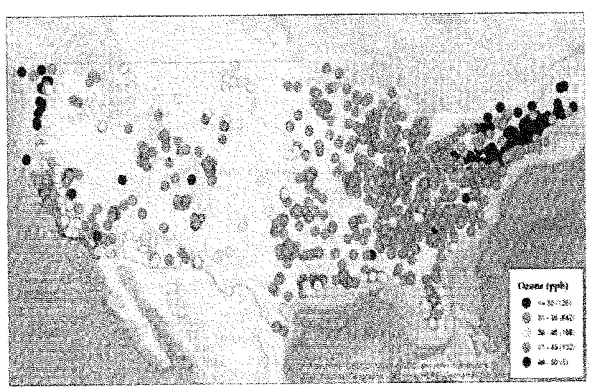


NOx and VOC Offsets/Reductions Achieved through Permitting Actions Since 2008
Upper Green River Basin

Despite the absence of federal regulatory tools to address Wyoming's situation, Wyoming's continued efforts were successful. In May 2016, the EPA declared that the Upper Green River Basin had attained the 2008 Ozone Standard. 81 Fed. Reg. 26,697. And, in October 2016, Governor Mead recommended to EPA that all counties within Wyoming be designated as attainment or unclassifiable for the even lower 2015 Ozone Standard of 70 ppb.

Background Ozone

Background Ozone in the Western United States is not well understood. When EPA proposed the Ozone Standard that was ultimately adopted in 2015, it largely dismissed the data from the sole high-elevation site in the Denver urban area case study as an outlier, even though EPA recognized that "background concentrations are highest at high-elevation sites within the U.S." *See* State of Wyoming, Department of Environmental Quality – Air Quality Division Comments on the Proposed National Ambient Air Quality Standards for Ozone, Docket No. EPA-HQ-OAR-2008-0699 (March 17, 2015). The Denver urban area case study showed that background concentrations of ozone comprised 55-66% of the total monitored concentrations. EPA's analysis showed that the fractional contribution of background to total seasonal mean ozone is between 70-80% in Wyoming. By omitting that study, EPA failed to adequately consider or characterize background ozone conditions in higher elevations such as Wyoming. Without a better understanding of background and what the anthropogenic contribution is, it is difficult and ineffectual for rural intermountain western states to develop plans that control contributing sources. Background ozone is a reality in the mountain west and likely offsets some of the emission reductions achieved in the West. Continued research is needed in this area in order to have a better understanding of the impact of background ozone.



This map shows estimates of seasonal mean U.S. background ozone concentrations at surface monitoring locations from a 2007 CMAQ simulation. (Figure 1 in the White Paper)

Historically, ozone planning and strategies have been focused on solving urban ozone exceedances. Wyoming stresses the need for states and EPA to work collaboratively to understand the issues related to background ozone. In the meantime, however, states should not be held accountable for background ozone levels that cannot be properly characterized.

International Transport

By lowering the ozone standard without having a full understanding of the extent and magnitude of influence that internationally transported ozone and precursors has on areas in the Western US, placed an unreasonable burden on states that face impact from international pollution. International contribution also affects regions of the United States that do not directly border other countries.

Recent scientific evidence suggests that the trans-Pacific transport of Asian pollution has contributed to heightening ozone levels in the Western United States. For example, a February 2015 presentation by Meiyun Lin, entitled "Key Drivers of Western U.S. Surface Ozone Variability over Recent Decades: Stratospheric Intrusions, Asian Pollution and Climate." summarized a series of studies assessing Western U.S. surface ozone variability from 1990-2012 that were collaboratively undertaken by Princeton University and the NOAA Geophysical Fluid Dynamics Laboratory. These studies demonstrated that "Asian ozone pollution can contribute 8-15 ppbv on days when observed daily max 8-hour average (MDA8) ozone at Western U.S. surface sites exceeds 65 ppb – a possible future ozone NAAQS" (Lin, February 19, 2015).

Another 2012 study, published in the *Journal of Geophysical Research,* acknowledged that "from 1995 to 2011, free tropospheric ozone above Western North America has increased significantly by 6.5 ppbv, and from 1984 to 2011 ozone increased by 14 ppbv." (Cooper et al, Long term ozone trends at rural ozone monitoring sites across the United States, 1990-2010, November 28, 2012). The results of the study indicate that, while domestic emission reductions have resulted in corresponding ozone level reduction in the east, "the limited ozone reductions in the western U.S. suggest that increasing baseline ozone [i.e. background ozone] is counteracting domestic emission reductions. *Id.* Newer studies show that western states may have significant precursor emissions from as far away as Asia.[1]

It would be beneficial to states for EPA to conduct and review research in the area of long-range international transport and then translate those findings into the regulatory framework.

Tools that assist states with attainment of the standards should be made broadly applicable. For example, a border requirement for impacts of international pollution would not assist intermountain western states. Likewise, imposing costly controls before consideration of international transport may not make any difference if the underlying cause is pollution caused by international transport.

Exceptional Events

There are several natural sources of ozone and ozone precursors including wildfire and stratospheric intrusion. The states and EPA rely on the Exceptional Event Rule to account for these sources. The extent to which these events contribute to a measured ozone concentration on a specific day can be uncertain and requires a detailed investigation and analysis. Exceptional event demonstrations are resource intensive and costly, and place a significant burden on already strained state resources, especially when EPA unilaterally decides not to review and acknowledge exceptional event submittals by the state.

[1] Meiyun Lin, Larry W. Horowitz, Richard Payton, Arlene M. Fiore, Gail Tonnesen, "US Surface Ozone Trends and Extremes from 1980-2014: Quantifying the Roles of Rising Asian Emissions, Domestic Controls, Wildfires, and Climate," *Atmospheric Chemistry and Physics*, December 7, 2016. doi:10.5194/acp-2016-1093, 2016. Under Review.

EPA recognizes that stratospheric ozone intrusions "typically affect ozone concentrations in higher elevation areas more than area at lower elevations. Wyoming is the only state in the nation that has received EPA's concurrence for a stratospheric ozone intrusion event. In fact, Wyoming's Air Quality Division has submitted five demonstrations to EPA for stratospheric ozone intrusion causing exceedances of the Ozone standard, but EPA has acted on only one of those demonstrations. *See* https://www.epa.gov/air-quality-analysis/exceptional-events-documents-ozone-wyoming. Wyoming's demonstration took just under a year to produce; required assistance from staff with meteorological expertise, assistance from EPA's stratospheric ozone intrusion workgroup, a group of state regulators, federal regulators, and academics focused on stratospheric ozone intrusions.

Wyoming has not attempted an exceptional event demonstration that a wildfire event caused an ozone exceedance. However, Wyoming is familiar with the demonstrations that EPA has posted as examples. The Division estimates that it would take about 15 months and contractor assistance at a cost of over $150,000 to produce just one of those demonstrations. Resource and funding challenges to provide demonstrations of this complexity are simply impractical.

For exceptional events to provide relief under the Act, the investigation and analysis process must be streamlined, workable technical tools must be provided, and EPA must allocate resources to act on state submittals. Between 2011 and 2014, Wyoming submitted 46 exceptional event demonstrations to EPA showing that air quality standards had been affected by high winds, wildfires, and stratospheric intrusions. However, EPA ultimately elected not to act on Wyoming's demonstrations because EPA did not anticipate that the data would "be included in an attainment demonstration or involved in other regulatory decisions. *See* Letter from EPA

R8 to Wyoming DEQ re: Wyoming Department of Environmental Quality Exceptional Events Documentation Packages; 2011-2014 (April 23, 2016).

EPA's inaction is problematic. Not only does it signal the EPA's general disregard for the State's expenditure of significant time and resources, an exceedance is considered to violate the standard unless and until EPA approves an exceptional event demonstration. Not only are these values used to demonstrate compliance with the Ozone standard, the data is also included in conjunction with emission inventories and modeling that EPA uses to establish policy and develop federal regulations. When EPA disregards and fails to act on a state's demonstration, the result is inflated monitored data that misrepresents the prevailing air quality conditions included in modeling, unnecessary delays to permit actions, and inaccurate characterization of air quality to the public. Shelving these demonstrations does not align with our collective commitment to providing outstanding responsiveness on environmental policy issues.

For example, the data that EPA shelved on Wyoming's exceptional event demonstrations from the summer of 2012 is attributable to an extraordinarily active wildfire season in Wyoming or transported into Wyoming from wildfires elsewhere in the West. EPA's failure to act means that those exceedances represent violations of the air quality standards – both from a regulatory standpoint and in the eyes of the public – even though those events were beyond regulatory control. Shelving these demonstrations is unfair, unsound, and counterproductive. Ultimately, EPA's consideration of inflated monitored data results in a misrepresentation of existing state regulations and shifts state resources from addressing areas of concern to situations that are actually not problematic. In order for this mechanism to provide meaningful relief, EPA must streamline the demonstration process, provide workable technical tools, and act on state submittals.

Permitting and Timely Implementation Guidance

New standards may result in new or additional permit requirements, and in the development of new plans with new strategies. Grandfathering provisions that apply to pending complete permit applications and clear and timely Implementation Guidance are key to ensuring a smoother transition, providing certainty, and leading to more timely and effective implementation of new standards. A smooth, clear and certain transition benefits the public health and the environment by allowing for a clearer path forward for timely implementation of new standards. Such transition measures prevent uncertainty and retroactive application of criteria that was not in existence at the time of submittal of permits or plans. Uncertainty and retroactive application oftentimes result in delayed implementation brought on by confusion and litigation. Unclear and untimely guidance leads to varied interpretations and confusion, which ultimately lead to plan disapprovals, disputes between federal and state partners and delayed implementation of new standards.

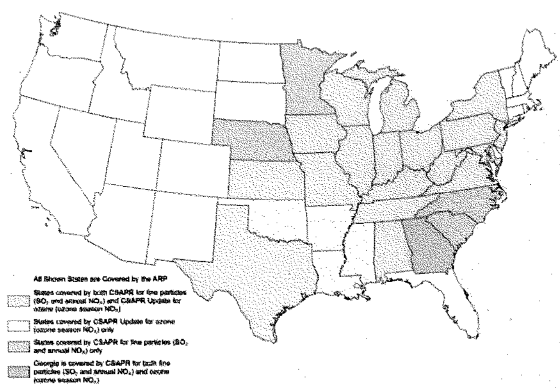
For example, in 2015, EPA promulgated the Implementation Plan Requirements Rule for the 2008 Ozone standard of 75 ppb. That Rule, issued seven years after the standard was adopted, provided states with the requirements necessary to address a range of nonattainment plan requirements for 2008 standard. However, just a few months later, EPA adopted a new 2015 Ozone standard of 70 ppb. 80 Fed. Reg. 65292 (Oct. 26, 2015). This unfortunate timing meant that in 2015 and 2016, instead of focusing state efforts on how to implement and enforce the new 2015 standard, states were finally able to begin figuring out how to implement the 2008 standard. Untimely guidance sets up states for unsuccessful and delayed implementation of newer standards, invites litigation, and leads to disputes over missed deadlines instead of focusing on the health of our citizens and the environment.

Timely and specific guidance – not one-size fits all – is critical to successful implementation of new standards. Wyoming is a high-elevation rural area. Historically, EPA guidance is aimed at high-population, low elevation urban areas and has limited use for an intermountain western rural area. Timely and specific guidance promotes the states and EPA's shared goal of successful implementation of health based standards.

Interstate Ozone Transport

Interstate transport provisions, also referred to as "Good Neighbor" provisions, require that state plans contain adequate provisions to ensure that none of its sources or emissions will contribute significantly to nonattainment or interfere with maintenance of a national standard in a downwind state. The EPA has long used a weight-of-the-evidence approach in order to evaluate western state plans. However, with respect to Wyoming's plan, EPA's approach radically changed after EPA's promulgation of its Update to the Cross State Air Pollution Rule in 2016.

Map of States Covered by CSAPR



EPA Clean Air Markets' Map of States Covered by Cross-State Air Pollution Rule

The Cross State Air Pollution Rule addresses pollution in eastern states. It does not apply to western states such as Wyoming.[2] In order to develop the Rule, the EPA used air quality modeling to project ozone concentrations at air quality monitoring receptor sites to 2017. 81 Fed. Reg. at 74507. The EPA then used that modeling to establish a screening threshold metric of 1% to assess contributions from upwind states to those downwind sites. *Id.* at 74508.

Wyoming submitted its Plan in 2014. EPA failed to act. The Sierra Club filed a deadline suit against EPA. In February 2017, the EPA disapproved Wyoming's interstate transport provisions relating to the 2008 Ozone standard. 82 Fed. Reg. 9142 (Feb. 3, 2017). The EPA based its disapproval in part on the modeling it conducted for the Cross State Air Pollution Rule.

Tools such as modeling are complex and must be developed to a level that assures accuracy for their intended application. Inaccurate models may result in the needless expenditure of time and resources on developing solutions for the wrong problem or on a non-existent issue. Such an approach is detrimental to public health and welfare.

My earlier testimony highlights some of Wyoming's unique characteristics that must be factored into the development and application of any model related to a health based standard, such as high elevation, unique topography and meteorological conditions, projections across long distances, influences from wildfire, rural population, and the like. Earlier and meaningful engagement with western states is critical. Failure to do so, and instead apply a one-size-fits-all approach, may otherwise adversely affect Wyoming and the health of her citizens. Inaccuracy results in the needless and wasteful expenditure of time and resources that would be better

[2] Under the Cross State Air Pollution Rule Update, the western U.S. "consists of the 11 western contiguous states of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. 81 Fed. Reg. 74503, 74523 at FN 87 (Oct. 26, 2016).

directed towards implementation of appropriate solutions for the benefit of the public health of Wyoming's citizens.

Conclusion

Implementation of streamlined and technically sound measures assures that time and resources are spent towards timely air quality improvements that provide public health benefits. Thank you. It has been a privilege to testify before you today. I am happy to answer any questions.

Mr. SHIMKUS. Thank you.

The Chair now recognizes Dr. Homer Boushey, Medical Doctor, from the Division of Pulmonary and Critical Care Medicine at the University of California, San Francisco, on behalf of the American Thoracic Society.

Welcome. You are recognized for 5 minutes.

STATEMENT OF HOMER A. BOUSHEY, M.D.

Dr. BOUSHEY. Thank you, Mr. Chairman, Ranking Member, committee members. Thank you for this opportunity to testify on H.R. 806 on behalf of the American Thoracic Society. It's a society of over 18,000 physicians, scientists, nurses, and other health professionals concerned about the prevention and treatment of lung disease.

I would like to emphasize a few points, although you have my written testimony before you. I will focus on what Mr. Karperos described as focusing on what air pollution does to human health.

First, ozone harms the health of millions of Americans with chronic lung diseases. And as a lung specialist, I treat patients with these lung diseases, principally asthma and COPD. By prescribing controller medicine, medications, advising on avoidance of triggers and modifying lifestyle habits, I help them control their disease so they can control their lives. But neither they nor I can control the quality of the air they breathe out of doors.

I have cared for patients who live in areas of California with serious air quality problems, and know from experience that ozone adversely affects human health. It is strongly associated with asthma attacks, COPD exacerbations, ER visits, hospitalizations, and even premature death. Literally hundreds of high-quality, peer-reviewed publications have documented that exposure to levels of ozone often exceeded in regions of our country. It is bad for human health, especially for those with chronic diseases or the respiratory or cardiovascular systems.

Second, ozone harms healthy people, too. Research has shown that young people, healthy adults performing light exercise while exposed to levels of ozone at, or below, the current standard show declines in lung function and increases in lung inflammation, effects that we believe account for the association of ozone exposure with impairment in lung growth in children, development of asthma, exacerbations of asthma in children, and exacerbations of asthma and COPD in adults, especially in the elderly.

Third, this bill delays implementation of current national standards to reduce ozone pollution, a delay that would result in more of all of those: exacerbations of asthma, COPD, hospitalizations, premature deaths.

The bill goes further. It would force the EPA to delay updating science-based limits on air pollution. The Clean Air Act has required for decades the setting of standards to protect our citizens, including sensitive subgroups with an adequate margin of safety based on the most up-to-date science. Instead of reviewing the National Ambient Air Quality Standards every 5 years, as called for under current law, it delays it to 10. This would force the nation to set aside important new research, like recent studies suggesting potential threats air pollution presents to newborns, to people with diabetes, and possibly to cognitive function in the elderly.

The health impacts of delay are not trivial. The 10-year review lag would mean a newborn would grow to be a 10-year-old before a standard was changed, over a time when the lungs develop. And we know that lung function at adulthood is a predictor of risk of developing lung and cardiovascular disease. So, delaying improvements in air quality will affect many of our children.

Lastly, the bill fundamentally rewrites the Clean Air Act by directing the EPA Administrator to consider facts unrelated to health in setting air quality standards intended to protect health. The Clean Air Act states that the EPA Administrator must set standards to protect the public health, irrespective of costs or technology, or assumes technological feasibility. The administrator does that following careful review of science, an approach that has helped clean our air for decades.

The requirement to set a health-based standard has pushed the UDES to develop new technologies that enabled these productions, to clean our air, create jobs in the meantime, and save both money and lives. This approach has been affirmed in the U.S. Supreme Court in the majority opinion written by the late Justice Scalia.

As a clinician, as a scientist, and as a citizen, I urge that this bill be rejected.

Thank you for your attention.

[The prepared statement of Dr. Boushey follows:]

American Thoracic Society

Testimony of the American Thoracic Society
Presented by Homer A. Boushey MD
Before the House Energy and Commerce Committee
On March 22, 2017
Regarding
H.R. 806 – the Ozone Standards Implementation Act

Mr. Chairman, Ranking member, my name is Homer Boushey and I am a pulmonologist in the Division of Pulmonary and Critical Care Medicine at University of California San Francisco. On behalf of the American Thoracic Society I want to thank the Committee for this opportunity to testify regarding H.R. 806 – the Ozone Standards Implementation Act. The American Thoracic Society is a medical professional organization of more than 15,000 professionals and patients dedicated to the prevention, detection, treatment and cure of respiratory disease, critical care illnesses and sleep-disordered breathing. The ATS is testifying today to register our strong concerns with H.R. 806 – the Ozone Standards Implementation Act. If enacted, the legislation would have significant negative impacts on the health of many Americans.

Ozone (O_3) is a potent oxidant that damages the airways and lungs. There are literally hundreds of high quality peer reviewed studies that document the adverse health effects that exposure to ozone pollution has on the lungs and other organ systems.

Recent studies provide several lines of evidence demonstrating dose-response relationships between ozone exposure in the 60 to 80 ppb range and adverse health effects. These effects include hospital admissions and emergency room visits for children with asthma [1-4]. A study of younger, pre-school children in Atlanta has documented an increase in emergency department visits for pneumonia; this study showed that a 3 ppb increase in the three-day average of ozone was associated with an eight percent higher risk of pneumonia [5].

A growing body of evidence suggests that exposure to ozone may also induce the development of asthma in children, in addition to provoking attacks in children who already have the condition. A recent study in California compared children who lived in low ozone communities to children who lived in high ozone communities. Young athletes who participated in three or more outdoor sports, who did not have physician-diagnosed asthma at the beginning of the study, were more likely to develop asthma in high ozone communities than those in low ozone communities [6].

While this well constructed study **does not** prove that ozone causes asthma, it does add to a growing body of evidence that suggests ozone plays an important role in its development.

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Taken together, the data are persuasive that ozone pollution – at levels permissible under the current standard – makes children sick. The EPA has the authority and obligation to set a standard that protects children from the adverse health effects of ozone exposure. But it's not just children -- adults are also at risk.

Research studies of adults have also shown that as ozone levels increase, so do, severe asthma exacerbations, emergency room visits, and hospitalizations for asthma [4,7,8]. Similar associations have been found for adult admissions for chronic obstructive pulmonary disease [9,10] and pneumonia [10]. Healthy adults are affected as well. A population-based cohort study of generally healthy adults found that FEV_1 was lower after days when ambient ozone ranged from 59 ppb to 75 ppb compared to days with levels under 59 ppb [11]. Healthy individuals have normal lung function. Controlled human exposure studies have re-affirmed lung function decrements in healthy adults after exposure to 60 ppb to 70 ppb of ozone [12,13].

Perhaps of greatest concern, there is now stronger evidence of increased mortality in association with higher ozone levels [14-16], particularly among the elderly and those with chronic disease [17,18]. These large, multi-city studies found strong and consistent associations with increased risk of premature death, particularly in the warmer months when ozone levels are higher.

In sum, there is accumulating evidence that ozone pollution – at levels permitted by the current standard – is damaging to human lungs and contributes to disease.

While the evidence on ozone and respiratory effects is comprehensive and compelling, recent studies have shown adverse health effects beyond the lung. The Integrated Science Assessment (ISA) has concluded that, "…the evidence is stronger for most every health endpoint, with causal findings strengthened from 'suggestive' to 'likely causal' for cardiovascular effects and total mortality from short-term exposures." In addition, the ISA noted that ozone affects the central nervous system and brain, and comments that a number of recent toxicological studies revealed various changes in neurologic function or histology with long-term exposure to ozone, including changes similar to those observed in neurodegenerative disorders, such as Parkinson disease and Alzheimer disease. The ISA concluded that, "…the toxicological evidence for the impact of O3 on the brain and behavior is strong, and suggestive of a causal relationship between O3 exposure and effects on the central nervous system. "[19]

In summary, recent research only reaffirms and deepens our understanding of the health effects of ozone exposure.

Reducing Pollution Improves Health

In the midst of all this concerning research documenting the adverse health effects of air pollution there is good news. The good news is that as pollution is reduced, health improves. We know this from studies around the Atlanta and Beijing Olympics – where the respective host cities took steps to reduce air pollution emissions during the Olympics.

Not only did those efforts result in air pollution reductions, they resulted in improved health as measured by changes in biomarkers (20,21), reduced morbidity and consumption of health resources (22-24).

Studies on Steubenville, OH and Salt Lake City, UT provide other real world examples showing that reduced industrial air pollution emissions lead to measurable improvements in morbidity and mortality (25, 26). Two recent publications based on a 20 year multi-cohort study of children in southern California demonstrated improvements in lung-function development in children as air quality improved. These were observed in girls and boys, in children with and without asthma, and across multiple ethnicities – suggesting all children benefit from improvements in air quality (27, 28).

Concerns with H.R. 806 the Ozone Standards Implementation Act

The ATS has several grave concerns with H.R. 806. If enacted the bill would:

Delay implementation of the EPA ozone standard until 2025 – delaying the ozone pollution reductions called for in the EPA rule. As noted above, the delay in reducing ozone pollution will lead to avoidable adverse health effects, including asthma attacks, COPD exacerbations, missed school and work days, emergency room visits, hospitalizations, and premature death.

Delay Review and Revision of Other Criteria Pollutants –in addition to delaying the ozone standard, H.R. 806 would also rewrite current law to delay revision of all the criteria pollutants under the Clean Air Act. Instead of reviewing National Ambient Air Quality Standards every 5 years – as called for under current law – this bill would call for revision of standards every 10 years. This means pollutants like lead, particulate matter and carbon monoxide will remain in the air longer – needlessly exposing the American public to dangerous pollution and their adverse health effects.

Delaying improvements in air quality, be it ozone or another criteria pollutant, is not a trivial matter. In the 10 year review lag called for in this bill, a child will grow from a newborn to a 10 year old. In that time, the lungs, like the rest of the body, will see tremendous changes that will determine life-long health prospects of that child. We know that pre-natal and youth exposure to air pollution creates adverse development of the lungs in ways that impact adult disease. By delaying improvements in air quality, we are literally burdening children with life-long health issues.

Lastly, the bill fundamentally rewrites the Clean Air Act by directing the EPA Administrator to consider technical feasibility when setting National Ambient Air Quality Standards. The Clean Air Act currently requires the EPA Administrator to set Clean Air standards to whatever level is necessary to protect the public health. That this should be the sole requirement for setting a standard has been affirmed by the U.S. Supreme Court in a majority opinion written by the late Justice Scalia.

Mr. Chairman, research shows air pollution is bad for health. More importantly, research shows reducing air pollution improves health. If enacted, this legislation would delay improvements in air quality. The American Thoracic Society respectfully urges the committee to reject H.R. 806.

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Mr. SHIMKUS. The gentleman yields back his time.

The Chair now recognizes Mr. Seyed Sadredin as Executive Director and Air Pollution Control Officer of the San Joaquin Valley Air Pollution Control District.

We are glad to have you back. You are recognized for 5 minutes.

STATEMENT OF SEYED SADREDIN

Mr. SADREDIN. Thank you. Good morning, Mr. Chairman and members of the committee. It is an honor and a great privilege to be here before you today. I want to express my gratitude to your committee for providing for a thoughtful examination and consideration of the federal mandates under the Clean Air Act.

Given the tremendous challenges that we face in the San Joaquin Valley and our decades of real life experience with implementing numerous provisions under the Clean Air Act, I am hoping that the lessons that we have learned would be helpful to your deliberative process as you consider this issue before your subcommittee.

And, Mr. Chairman, I believe that our region is a great example of how the Clean Air Act has led to major reductions in air pollution, significant improvement in air quality, and great benefits to public health throughout the nation. In our region the amount of pollution today released into the atmosphere by all sections of our economy, all businesses, industrial facilities, agriculture, cars and trucks, are at a historic low, despite a tremendous growth in the economy and in the population that we have had in our region.

The population exposure to high levels of ozone and particulate matter PM2.5 in our region is down by 90 percent for ozone and 78 percent for PM2.5. However, our experience, Mr. Chairman, indicates that some of the measures, some of the provisions in the Clean Air Act, although well-intentioned, are leading to unintended consequences.

Today, on behalf of the San Joaquin Valley Air Pollution Control District, I am here to ask you that you include an overriding provision in federal law that bars the imposition of devastating federal sanctions that could destroy our region economically if our inability to attain federal standards is due to pollution from sources that fall outside of our control. In our case, 85 percent of our pollution we have no control, no regulatory authority over.

We believe this is a reasonable act that deserves strong bipartisan support. In fact, today with me I have a number of local elected officials on our Air Board, Democrat and Republican, that agree that this is something that is fair to do and should be done. Today behind me I have Councilmember Baines from City of Fresno, Chairman of the Board; Supervisor Worthley from Tulare County; Supervisor Elliott from San Joaquin County; Supervisor Mendez from Fresno County; and Supervisor Pedersen from Kings County.

As we sit here today, Mr. Chairman, the imposition of devastating federal sanctions on San Joaquin Valley residents, the poor residents in these disadvantaged communities is imminent. And we have no regulatory authority over 85 percent of our pollution that comes from mobile sources. We do not believe that this is what the Congress envisioned in the Clean Air Act, that a region like ours that has left no stone unturned, has imposed the most restrictive regulations on businesses, on cars and trucks, would be on the verge of getting sanctioned with devastating penalties from Washington.

We have petitioned the federal EPA to adopt tighter standards, national standards for trucks and locomotives. We have asked the State Air Resources Board to do more for the same sources at fault under their jurisdictions. We are asking, also, the Federal Government and the State of California to provide funding for incentive-based measures that can help expedite reductions in air pollution in a more expeditious fashion, but also by reinvesting those dollars in local communities, help grow the economy, and improve the job market in our areas that desperately need more jobs, and enhance the economy.

Despite these exhaustive measures that we have put in place, and hoping that both the state and Federal Government will deliver what we need to date through a very robust, exhaustive public process, we have not been able to identify adequate measures to get us the reductions that we need to achieve the standards that lie before us.

If you look at Figures 1 and 2 in my presentation, we can shut down all of our valley businesses and we will not get enough reductions to meet the standard.

A federal remedy to bar the imposition of these unfair and devastating federal sanctions is our top legislative priority. But I wanted to, very briefly in the time that I have remaining, share with you some of the implementation issues that we have encountered in implementing the Clean Air Act.

First, the transition between standards is extremely chaotic. As EPA tries to establish standards every 5 years, it leads to a lot of confusion for the public, for the businesses, for the agencies. As we speak today we are on the verge of having 10 state implementation plans, costly bureaucratic red tape without any corresponding benefit in air quality.

The artificial deadlines and arbitrary attainment deadlines in the Clean Air Act do not allow for a real, meaningful consideration of the socioeconomic costs of regulations as called for in the Clean Air Act.

The requirement to have contingency measures in areas that are designed as extreme, or classified as extreme non-attainment, is actually detrimental to air quality and getting clean air as rapidly as possible. Our inability to treat 100-year drought conditions as exceptional events does not make sense.

And, finally, we don't believe that Congress 40 years ago when they passed the Clean Air Act understood the scope and the nature of particulate matter. We need technologies and we need to be able to write, be able to write plans that have to rely on yet-to-be-defined technologies to be able to have approvable concept.

Mr. Chairman, at this point I thank you for the time that you have provided me and would be happy to expand on these issues as we move forward.

[The prepared statement of Seyed Sadredin follows:]

Testimony of Seyed Sadredin
Executive Director/Air Pollution Control Officer
San Joaquin Valley Air Pollution Control District

Before the U.S. House of Representatives
Committee on Energy and Commerce
Subcommittee on Environment

Written Testimony on "H.R. 806, Ozone Standards Implementation Act of 2017"
March 22, 2017

Chairman Shimkus, Ranking Member Tonko, and Members of the Committee, my name is Seyed Sadredin and I currently serve as the Executive Director/Air Pollution Control Officer of the San Joaquin Valley Air Pollution Control District. It is an honor and a privilege to be here before you today to provide testimony and answer your questions. For nearly 36 years, I have served as a public health official charged with implementing air pollution control programs in the bountiful and beautiful central valley of California.

At the outset, I want to express my gratitude to your committee for providing an opportunity to thoughtfully consider the federal mandates under the Clean Air Act and potential enhancements that may be warranted. Given the tremendous air quality challenges that we face in the San Joaquin Valley and the wealth of real-life experience that we have with implementing numerous provisions under the Clean Air Act, I am hoping that we can be helpful to this process.

Before I share some details on our experience to date in implementing the Clean Air Act, it is important to share with you some basic information about the San Joaquin Valley as a region. The San Joaquin Valley, at 25,000 square miles, is the largest air basin in the State of California with a population of approximately 4.1 million. Unfortunately our region suffers from chronic double digit unemployment and high rates of poverty. In fact, CalEnviroScreen, a document prepared by the California Environmental Protection Agency to identify communities that are disproportionately burdened, places 20 out of California's top 30 most disadvantaged communities in the San Joaquin Valley. As an added burden, due to the Valley's geography, topography, and meteorological conditions that trap air pollutants in our region, the Valley continues to exceed the latest federal ambient air quality standards for ozone and PM2.5 even after imposing the toughest air regulations in the nation and having reduced emissions by over 80% from Valley businesses.

Given the totality of the above circumstances, while our agency is committed to leaving no stone unturned in developing and implementing measures that improve public health, it is also imperative that we take an objective look at the socioeconomic impact of our regulations and avoid detrimental impact to the quality of life for Valley residents. Today, on behalf of the San Joaquin Valley Air Pollution Control District, I am here to ask that you include an overriding provision in federal law to prohibit imposition of federal sanctions on local regions where their inability to attain federal standards is due to pollution from sources outside their regulatory authority.

If federal sanctions are imposed, the impact will be devastating on Valley residents, especially minority and low income residents in disadvantaged communities throughout the San Joaquin Valley. Our concern is not hypothetical or theoretical, but is rooted in our understanding and care for the real life implications of the unfair federal mandates that we are facing. As we sit here today, the Valley faces the imposition of federal sanctions in the next two to three years.

Currently, the San Joaquin Valley Air District is preparing multiple attainment plans to address the PM2.5 standards with the following attainment deadlines:

- 2019 for the 2006 PM2.5 standard (24-hour 35 µg/m3)
- 2021 for the 2012 PM2.5 standard (annual 12 µg/m3, Moderate classification)
- 2025 for the 2012 PM2.5 standard (annual 12 µg/m3, Serious classification)

These plans are due by August 2017. If the San Joaquin Valley Air District is not able to prepare a plan that will show attainment by the prescribed deadlines under the Clean Air Act, the Valley will become subject to devastating sanctions automatically by operation of law. Working with the California Air Resources Board and engaging all stakeholders through an extensive public participation process, we have not yet been able to identify adequate number of measures to achieve the enormous reductions in emissions that are necessary. Figures 1 and 2 below demonstrate the magnitude of the challenge that we face.

Testimony of Seyed Sadredin
U.S. House of Representatives
Committee on Energy and Commerce
Subcommittee on Environment
March 22, 2017

Figure 1 Additional Emissions Reductions Required for Attainment After DirectPM2.5 Reductions (2019 Deadline for 2006 24-hr PM2.5 Standard)

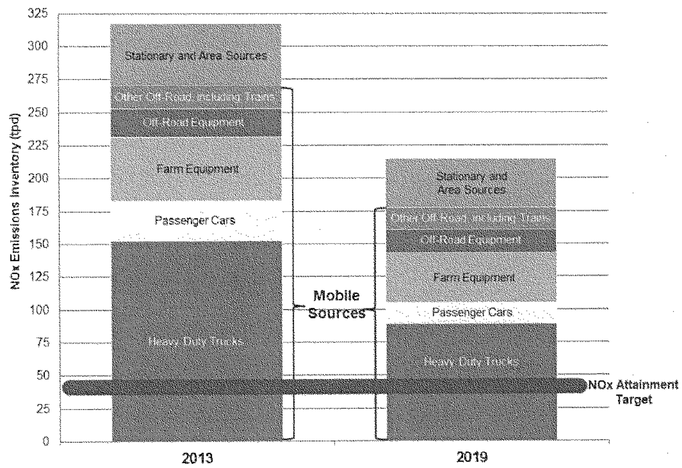
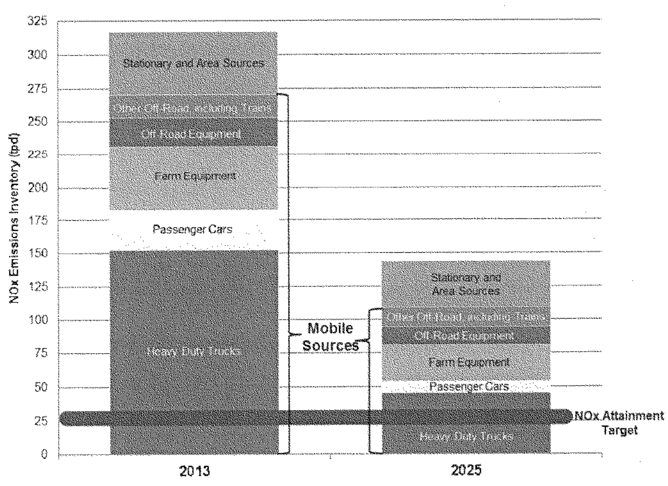


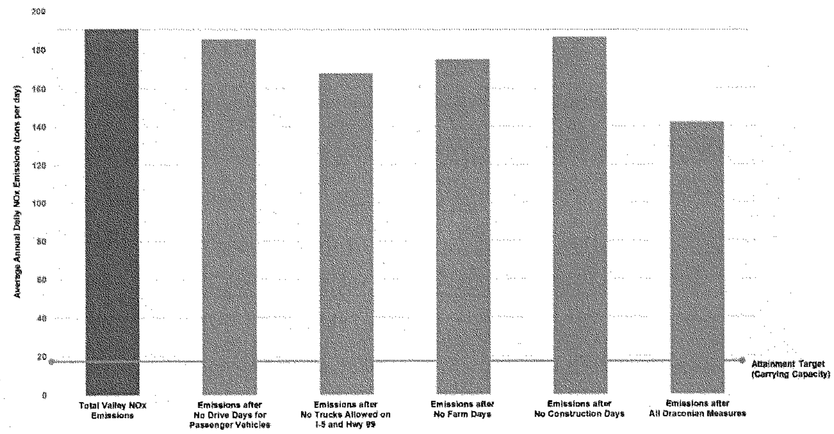
Figure 2 Additional Emissions Reductions Required for Attainment After Direct PM2.5 Reductions (2025 Deadline for 2012 Annual PM2.5 Standard)



To provide a greater context for the magnitude of the challenge that we face, Figure 3 below indicates that the San Joaquin Valley will not be able to attain the PM2.5 standard even if the Valley imposes the following measures for 155 days per year:

1. No drive days for passenger vehicles in the San Joaquin Valley
2. Close Interstate 5 and Highway 99 to heavy duty truck traffic in the Valley
3. No farming days in the San Joaquin Valley
4. No construction days in the San Joaquin Valley

Figure 3 NOx Emissions after Imposition of Draconian Measures for 155 days per year in 2021



Since its adoption, the Clean Air Act has led to significant improvements in air quality and public health benefits throughout the nation. With an investment of over $40 billion, air pollution from San Joaquin Valley businesses has been reduced by over 80%. The pollution released by industrial facilities, agricultural operations, and cars and trucks is at a historical low, for levels of all pollutants. San Joaquin Valley residents' exposure to high smog and particulate matter levels have been reduced by over 90% and 78%, respectively.

We do not advocate for any changes in the Clean Air Act that would roll back existing rules and regulations in the San Joaquin Valley that have helped improve air quality and quality of life for our residents. However, we do not believe that the Congress, in passing the Clean Air Act more than 40 years ago, envisioned a scenario where a region like ours that has imposed the toughest regulations on stationary sources of air pollution would be in danger of suffering from devastating federal sanctions. We face these dire consequences despite having already done all of the following:

- ✓ Toughest air regulations on stationary sources (600 rules since 1992)
- ✓ Toughest air regulations on farms and dairies
- ✓ Tough air regulations on what residents can do within the confines of their homes (residential water heaters, residential HVAC furnaces, charbroilers, ban on fireplace installation and use)
- ✓ $40 billion spent by businesses on clean air
- ✓ Over $1.6 billion dollars of public/private investment on incentive-based measures reducing over 130,000 tons of emissions
- ✓ Toughest regulations on cars and trucks
- ✓ Toughest regulations on consumer products
- ✓ Reduced emissions by 80%

At this juncture in the San Joaquin Valley, in addition to the above measures, the San Joaquin Valley Air District is in the process of adopting a new plan with new measures that will require large reductions in directly emitted particulate matter throughout the Valley. Even after these new reductions, meeting the latest federal standards also requires enormous reductions in oxides of nitrogen emissions, 85% of which come from sources outside our regulatory authority. We have petitioned the federal EPA asking for national ultra-low NOx standards for trucks and locomotives. We have also asked the California Air Resources Board for the same at the state level. These two agencies have the necessary legal authority over these mobile sources of air pollution. We appreciate that both agencies and the California Air Resources Board in particular have expressed a desire to be helpful to the San Joaquin Valley in this regard. Unfortunately, however, to date neither EPA nor the California Air Resources Board have proposed any new measures that will provide further reductions in the San Joaquin Valley in the short timeframe (2019 to 2025) mandated under the Clean Air Act in order to avoid federal sanctions.

It is unfair that under the current law, local jurisdictions will be subject to devastating federal sanctions even though failure to attain the standards is due to emissions from sources under federal jurisdiction. These federal sanctions include:

- De facto ban on new and expanding businesses (2:1 offset requirement)
- Loss of federal highway funds ($2.5 billion and numerous jobs lost in the San Joaquin Valley)
- Federal takeover and loss of local control
- Expensive federal nonattainment penalties

The devastating impact of the above sanctions is an existential issue for the San Joaquin Valley. A federal remedy to bar the imposition of these unfair sanctions is our top legislative priority even though our decades of experience in implementing the Clean Air Act have highlighted a number of other implementation issues. For your committee's information the following is a summary of these issues.

Chaotic Transition between Standards: Since the 1970's, EPA has established numerous ambient air quality standards for individual pollutants. We have now reached a point where various regions throughout the nation are subject to multiple iterations of standards for a single pollutant. Currently, we are subject to four standards for ozone and four standards for PM2.5. Each of these standards requires a separate attainment plan which leads to multiple overlapping requirements and deadlines. For instance, in the San Joaquin Valley we are on the verge of having to promulgate a total of 10 active State Implementation Plans. This results in a great deal of confusion, costly bureaucracy, and duplicative regulations, all without corresponding public health benefits.

Artificial and Arbitrary Attainment Deadlines: Although economic and technological feasibility is to be addressed in the implementation phase of the Clean Air Act, our experience shows that meaningful consideration of economic and technological feasibility is nearly impossible when faced with formula-based milestones and deadlines that EPA and courts have established in absence of clear Congressional direction in the Act.

Requiring Contingency Measures in Extreme Nonattainment Areas is Detrimental to Expeditious Attainment of Standards and Public Health Improvement: A classic case of the well-intentioned provisions that were included in the Clean Air Act over 25 years ago that are now leading to unintended consequences is the requirement for contingency measures in areas classified as "extreme" nonattainment. By definition, a region is classified as extreme nonattainment if, despite implementing all available control measures, reductions achieved are not enough to meet the standard. The only way a region can meet the contingency requirements is to hold back on implementing clean air measures and save them for later as a contingency. Of course, this would result in delays in cleaning the air and reducing air pollution. As currently written, the requirements in the Clean Air Act that require extreme areas to include all available measures to ensure expeditious attainment and the requirement for holding back measures as contingency are contradictory.

Inability to Treat Extraordinary Drought and Stagnation as Exceptional Events: Currently, the Clean Air Act does not allow stagnation or lack of precipitation to qualify as exceptional events. Although last year weather patterns returned to more normal conditions, the west coast recently experienced drought conditions that had not been experienced since the late 1800s with some locations breaking records over 100 years old. The extended stagnation associated with the weather emergency overwhelmed the state's control strategy and has impacted particulate matter planning for years to come. Until the exceptional weather conditions experienced due to the recent drought, the San Joaquin Valley Air Pollution Control District was on track to attain the 1997 annual PM2.5 standard before the federally mandated deadline of December 2014. The District's 2008 PM2.5 Plan satisfied all federal implementation requirements for the

1997 PM2.5 standard at the time of adoption and demonstrated attainment based on projected 2012-2014 PM2.5 levels. All emission reduction commitments under that plan have been fulfilled. Due to the extreme drought, stagnation, strong inversions, and historically dry conditions experienced over the winter of 2013/14, the Valley could not show attainment even if the Valley eliminated all sources of air pollution and had zero emissions of PM2.5 released into the atmosphere for the following year (2014).

In excluding stagnation as exceptional events, we believe that the intent of the Congress at the time was to only prohibit consideration of regularly occurring stagnant weather conditions which could vary on a day-to-day basis. Extraordinary circumstances that arise from 100-year droughts should qualify as exceptional events.

Extreme Classification is not Provided for Particular Matter: The 1990 amendments to the Clean Air Act recognized that reducing precursor pollutants that cause ozone formation in some regions would require technologies that may not be available at the time an implementation plan is due to EPA. Therefore, Section 182(e) was incorporated allowing areas with "Extreme classification" to take credit in their implementation plans for future emission reduction benefits from yet-to-be defined control technologies. The same allowance is not provided in the Act for particulate matter because at the time of Clean Air Act enactment, dust emissions were thought to be the primary form of particulate matter. With PM2.5 now replacing the course particulate matter that initially was the primary focus, it is obvious that the combustion control technologies that would address precursors to ozone formation would also need to be deployed for controlling PM2.5. Without similar treatment for PM2.5, writing an approvable implementation plan that must rely on advancement of yet-to-be defined technologies is not possible.

I thank you for this opportunity and for considering this very important issue. In crafting legislation that is before you, we are hopeful that you take into account the lessons that we have learned from our decades of implementing very complex and challenging mandates under the Clean Air Act.

Mr. SHIMKUS. Thank you very much. Great testimony. We appreciate you being here. And I will now recognize myself for 5 minutes to start the round of questions.

I am going to go to Mr. Alteri. And I want to go quickly. There is a lot of stuff that I want to try to cover. So if you can answer succinctly, that would be helpful.

Can you quickly explain what happens when an area is designated to be in non-attainment of the 2015 ozone standards?

Mr. ALTERI. As a state agency we would have to develop a plan under Part D of Title 1 of the Act rather than Part C. And those requirements are much more onerous.

Mr. SHIMKUS. Do new compliance requirements add to permitting burdens for the area?

Mr. ALTERI. Absolutely.

Mr. SHIMKUS. Do those burdens go away when the area comes into compliance?

Mr. ALTERI. Not necessarily. And there is a delay in EPA's approval.

Mr. SHIMKUS. Now, I understand that from EPA's own estimates, most counties that may not meet the standard today will meet the standard over the next 7 years. Is that your understanding?

Mr. ALTERI. It is.

Mr. SHIMKUS. And this is because control measures already in place, like fleet turnover and other measures, are kicking in and resulting in lower precursor emissions. Is that about right?

Mr. ALTERI. It is.

Mr. SHIMKUS. Does implementation of the new ozone compliance regime significantly affect how fast these areas will come into compliance?

Mr. ALTERI. It does.

Mr. SHIMKUS. You are being succinct. Very good.

Can you explain the public policy benefit of placing areas into compliance regimes for air quality standards they otherwise will meet without those new regulatory burdens?

Mr. ALTERI. I didn't necessarily follow that.

Mr. SHIMKUS. I was going too fast.

Can you explain the public policy benefit of placing areas into compliance regimes for air quality standards they otherwise will meet without those new regulatory burdens?

Mr. ALTERI. No, I think that is a significant burden. We just have recently announced a new generation of turbines that are going to greatly improve the efficiency of power plants. If you find non-attainment areas, then those turbines aren't going to be built in New York, and Pennsylvania, and South Carolina. And those technology-driven improvements, that is what is going to allow us to improve air quality the fastest.

Mr. SHIMKUS. Great. Thank you very much.

Let me turn to Mr. Sadredin. You have proposed revisions to the Clean Air Act that would relieve you of some of the implementation burdens for ozone and other standards. Would those revisions constitute a roll-back of standards you are currently implementing?

Mr. SADREDIN. No, Mr. Chairman. There is nothing in the bill as proposed that would lead to our region having to roll back a single measure that we have in place or hold back our progress as we try to meet the standards.

As you can see in my testimony, to meet the current standards we have to get to zero emissions. And once we get to zero, I don't think there is much more that we can do.

Mr. SHIMKUS. Yes, and that is why I like this cooperative federalism approach, because we really do want to trust local people on the ground who desire to protect their local citizens, but also to make sure that there is an economy that can grow and thrive.

So another question. What is the potential impact on economic development and business expansion in your district if revisions are not made to the Clean Air Act implementation?

Mr. SADREDIN. Mr. Chairman, the sanctions that are imminent at this juncture on San Joaquin Valley will be devastating.

I do understand that California's economy is growing, but our people are not just statistics. Just a year ago, and I am not talking about 8 years ago when we were at the depths of recession, many communities in our region because of the drought conditions and federal water policies putting farms out of operation, communities were experiencing 30 percent, 40 percent unemployment. I personally witnessed people in line for food. And I am not talking about your chronic homeless individuals, these are people in our region that are already suffering significantly. And seeing those faces, I cannot sit here before you and say we are OK with imposing billions of dollars in economic sanctions on those same people.

Mr. SHIMKUS. I understand you have 35 years implementing standards in one of the most challenging air sheds in the nation. From your experience do you see anything in H.R. 806 that will make your job to implement the regulations necessary to ensure public health protection more difficult?

Mr. SADREDIN. There is nothing in this bill that would roll back even a single measure that we have already put in place or will hold back anything that we have to do and we are planning to do moving forward to meet the current standards.

Mr. SHIMKUS. Yes, and I have 40 seconds. I just want to end with a story.

In 1986, I left the military to get my teaching certificate. I did that in Southern California at, now Concordia University, it was Christ College Irvine. And we played a baseball game—I was a pitcher—in Costa Mesa. It just struck me, I was pitching a game and I came off the mound, I just couldn't breathe. Now, this was '86, and I had no idea why because I was very healthy and in pretty good shape.

I would ponder the question because we do support the Clean Air Act. It has been very beneficial in cleaning it up. I don't think I would have that problem now in that particular position because of the success of the Clean Air Act. We just want to make it more workable for today's era.

And with that, I will now recognize the Ranking Member, Mr. Tonko, from New York for 5 minutes.

Mr. TONKO. Thank you, Mr. Chair.

The Clean Air Act has been an incredibly successful public health statute. And I believe that is because it contains a clear line of separation between two very important public policy questions, the first being what standards must we meet to ensure the air we breathe is safe?

Second, now that we know how clean the air needs to be to ensure public health, how do we achieve that standard in the most fair and cost-effective manner?

We have never asked how much clean air can we afford? That is why we have made steady improvements in air quality, even as the population and the economy have grown. So I am very concerned that this bill alters the strict health-based standard setting process that has resulted in substantial health benefits over the past decades.

Mr. Karperos, California's topography and climate make air pollution control very challenging. But the statistics you provide in your testimony are impressive. Do you believe we need to change the fundamental process in the Clean Air Act that I just described that sets standards based on considerations of public health alone?

Mr. KARPEROS. Absolutely not, Congressman. Setting the standards based on public health gives us a clear mandate where and the direction to go. And then the structure within the Act allows a deep consideration of the costs and how to get there proactively.

Mr. TONKO. Thank you.

And, Dr. Boushey, would such a change, allowing costs and technological feasibility as considerations in setting standards undermine the progress we have been making to clean our air?

Dr. BOUSHEY. I absolutely think so. Some very good examples of how the setting of standards stimulated technological advances that contribute to the great improvements in air quality. There are two that came to mind, one has already been mentioned: the really remarkable improvement in large diesel engines.

Siemens, Ford, and Volvo have all made engines that reduce particulate emissions by more than 90 percent, and nitric oxides similarly remarkably reduced. That was driven by the need to meet a standard for protecting human health.

The electric car, the hybrid cars are another very good example. And there are many such examples throughout other industries as well.

So, the setting of standards stimulates technology that may not have been known about. We had to face the fact that air quality was harming health and then develop the technologies to deal with it. And that is how the sequence should progress.

Mr. TONKO. Thank you. And again, Dr. Boushey, have there been a number of recent scientific studies on the health impacts of ozone?

Dr. BOUSHEY. Yes, there has been. Since the setting of the 2008 standard there have been hundreds of papers, literally, that have documented the health effects of ozone. Some are good stories, not just bad ones.

For example, the improvements in the Los Angeles Air Quality Basins, there have been three beautiful cohort studies with children conducted at USC that have shown significant improvements over the last 15 years in the pulmonary function of 15-year-olds. They are followed from age 11 to age 15. Over three distinct periods as air quality has improved, particulates, nitric oxide and ozone, the pulmonary function of the children in the Los Angeles area has improved. And that is remarkable. You can show that on a population basis.

Mr. TONKO. And I would think we would all, I would hope we all share that common goal, to give our children cleaner air to breathe and generations to come to have even cleaner.

Dr. BOUSHEY. If I can make just a comment, since the Chair pitched baseball in Costa Mesa. Correct?

Mr. SHIMKUS. That is correct.

Dr. BOUSHEY. There is a study showing that three-sport varsity athletes in Los Angeles are more likely to develop asthma, presumably because they are playing hard out of doors breathing poor air quality. Now, that was before the recent years. And air quality has much improved.

So your experience of having difficulty breathing after a tough inning, that was——

Mr. SHIMKUS. It was the only tough inning I ever had. So don't get me started.

Mr. TONKO. Great. Well, let me just jump in. And with so many studies being published each year, Dr. Boushey, do you think moving the review from every 5 years to 10 years might prevent health-based standards from accurately reflecting the latest science?

Dr. BOUSHEY. I am concerned about that. I am going to comment on an example, because I was involved in the research that demonstrated that very short-term exposures to sulfur dioxide can have remarkably severe broncho-constrictive effects in people with asthma. We discovered that a subgroup of the population, perhaps 8 to 12 percent of the population depending on the demographic, have asthma. They are orders of magnitude more sensitive.

That required that we not have an 8-hour standard for sulfur dioxide, it required a 1-hour standard. And to wait 10 years for people with asthma to be protected, that is long. And I just have to say it.

Actually a theme here, I think, is we need greater flexibility from the EPA. That is going to be hard for them to achieve with a 30 percent budget cut, but we need them to be more quickly responsive to advances in science and for difficulties encountered by Air Quality Boards.

Mr. TONKO. I noted Ms. Vehr suggested that the timeliness of response from EPA is problematic. What does happen when you cut their budget by 31 percent?

With that, Mr. Chair, I will yield back.

Mr. SHIMKUS. The gentleman yields back his time.

The Chair now recognizes the gentleman from Texas, Mr. Olson for 5 minutes.

Mr. OLSON. I thank the Chair. And welcome to all six of our witnesses.

Obviously this issue in H.R. 806 are totally important to my district and me. As I have said time and time again, I want clean air. My family breathes the air in the greater Houston area. When I moved there as a 9-year-old boy in 1972, Houston had the dirtiest ozone air in America. Our air is dramatically cleaner. And I won't let that progress backtrack.

My first question is to Mr. Alteri. I would like to look at Section 3(b). That section says that if EPA's science advisors find a range of options that all protect health, they can use achievability to hit the sweet spot. Ranking Member Pallone and I debated this section on the floor last year, and his fear was that it let EPA set an unhealthy standard.

I said it then and I say it now, word the language very carefully to make sure that EPA can never pick money over science. Health was, is, and always will be the most important factor.

So, if the science says we need a standard 65 parts per billion to keep people healthy, so be it. But if they say anything between 60 and 70 ppb would keep people healthy, which happened recently, then my bill says they may, not must, may look at what is actually achievable.

Do you agree with me it is important for EPA to set a standard based on health and then we do everything possible to make sure states like yours can implement those standards?

Mr. ALTERI. Yes, sir.

Our mission is to protect human health and the environment, so we recognize your bill, the language, the thoughtfulness, and the consideration that you put into drafting that language.

And setting the standard does nothing to improve the air quality. Implementing control strategies and achieving those air quality standards, that is the improvement and that is the protection of human health and the environment.

Mr. OLSON. A second question is for you, Mr. Sadredin. And I hope I got close to that pronunciation. All right.

In your testimony you say that, and this is a quote, "currently we are subject to four standards of ozone and four standards of PM2.5." The Texans I work for back home do their best to work with EPA for multiple standards on multiple pollutants but they claim health benefits is very, very confusing. And some people back home worry the EPA is taking health benefits from one standard and using those same benefits on another standard; double counting.

And so do you believe they are double counting? And can you talk to me about what having multiple standards for each pollutant means to the San Joaquin Valley?

Mr. SADREDIN. Yes. Thank you. As we speak right now, our agency is in the process of putting three separate PM2.5 plans for just PM2.5. And when you add up all the standards we will have about 10 state implementation plans. Our agency alone on an annual basis spends about $2.7 billion in just the bureaucratic process of putting these plans together. And that doesn't include the cost to businesses, to other agencies, litigation.

In terms of double counting, as I show in my written testimony that we provided for you, just to meet the 2006 and the 2012 PM2.5 standards we have to get enormous reductions in emissions, 90 percent. Those same reductions will also get us to the ozone standard. So, when you take credit twice for the same reductions that, in a way, is a double counting.

Mr. OLSON. And so any way you can get around that? You said there is no more growth, none whatsoever in the San Joaquin Valley because of these ozone standards that can't be achieved. Well, you can't control that, but also with double counting.

Mr. SADREDIN. No, I agree with my colleague from California that meeting these standards is achievable. It is just a question of time. We just need the time for the technology to be developed, for the funding, for the resources to be there to put these measures in place. Right now these artificial deadlines in the act do not provide the time to do that.

Mr. OLSON. This bill gives you that time.

I yield back.

Mr. SHIMKUS. The gentleman yields back his time.

The Chair now recognizes the gentleman from California, Mr. Peters, for 5 minutes.

Mr. PETERS. Thank you, Mr. Chairman. And this week in particular I want to say thank you for having a hearing on this bill. It is certainly helpful to inform us about, about the proposal.

I want to start with Mr. Cone. And, Mr. Cone, I want to ask you a question as a state implementer. You talked a lot about the difficulty of dealing with delays in EPA's implementation of standards, et cetera. Can you explain to me just as a practical matter how that makes things tough on you to do your job?

Mr. CONE. As trying to figure out what standards and how to permit facilities you have to determine whether these standards apply today. Are you going to have to do something tomorrow? With the levels continuing to go down, a company wants to figure out what is going to meet the regulation so they have certainty for the future. As this continues to change, they have to continue to change. Well, if I put this control in today will this be good 5 years from now? It may, it may not be.

Those are some of the things that we, as regulators, have to work with our customers to figure out what is appropriate, what is practical, and what will be effective.

Mr. PETERS. My understanding is that this proposal 806 doesn't require EPA to be any more timely with that kind of thing.

Mr. CONE. No, it doesn't. You need to come up with implementation plans when the standard comes out.

Mr. PETERS. Right. So one, one way to deal with a very legitimate concern would get EPA to be on time and be more timely. That would at least address part of the problem with what you are concerned about with the 5-year period. Is that right?

Mr. CONE. Correct.

Mr. PETERS. Yes. I think we would all agree on that, too. And I hope that the administration will take that to heart as it considers its budget proposals for EPA because removing resources is just going to make that even more difficult for these folks.

I would ask Mr. Karperos to—and probably your own process—but Mr. Sadredin from San Joaquin Valley came up with a very different view of these rules than you did. Would you like to respond to him? And I am going to give Mr. Sadredin the same opportunity. He basically alleged that, he suggested that attaining these things might be actually infeasible. And do you have a response to his concern?

Mr. KARPEROS. The California Air Resources Board absolutely doesn't believe that attaining any of the standards is infeasible. By using, by looking forward to the standards that EPA has set, considering your control strategy as a whole for PM ozone—NO_x that is going to form a particle in the air is the same NO_x that is going to form ozone—you can develop an integrative strategy that distributes the control responsibility across all of the sources, reduces the cost, and in a feasible way brings you to the emission levels you are looking at.

The numbers that Mr. Sadredin was referring to, we are in technical discussions about the what it will take to attain the standards, my agency and his. My agency has mapped out what we believe is a much more feasible strategy that wouldn't require us to have no-drive days, that type of thing, but in fact would require us to move towards a cleaner fleet that's available today.

Mr. PETERS. What about his concern that he doesn't have enough time to do this. Are you able to accommodate that within the current regulatory regime?

Mr. KARPEROS. It's a very good question. My agency tomorrow will consider a plan that will lay the regulatory groundwork for attaining the PM standards of the ozone standards in the state. We will need to come back and consider options for accelerating the turnover of the motor vehicle fleet, for example. That will require incentives.

Mr. PETERS. I don't have a lot of time and I want to get to Mr. Sadredin, too. But do you have the authority in CARB to give them more time if they need it?

Mr. KARPEROS. We have the ability to develop a plan that EPA could look at and grant more time.

Mr. PETERS. Mr. Sadredin, he gave some pretty positive statements about the current regulatory regime for the State of California. Would you like to respond to those?

Mr. SADREDIN. Yes. Actually, we are in agreement that these standards are achievable. It's just a question of time.

For instance, the deadline that we are facing right now is that by 2019 we have to reduce our air pollution by 90 percent. And this is in California where we have already imposed the toughest regulations on the stationary sources, cars and trucks. It's just a question of time. ARB cannot give us more time under the construct of the Clean Air Act as it is written right now.

Mr. PETERS. I appreciate all the witnesses being here. And, Mr. Chairman, I yield back.

Mr. SHIMKUS. The gentleman yields back his time. Thank you for his questions.

The Chair now recognizes another gentleman from Texas, Mr. Flores, who is very involved in this issue, for 5 minutes.

Mr. FLORES. Thank you, Mr. Chairman. I appreciate having this hearing. Also I appreciate all of the witnesses for showing up today.

Mr. Alteri and Mr. Sadredin, I have my first question will be for you two. The EPA estimates that annual costs for ozone standards outside of California will be $1.4 billion annually beginning in 2025. Last year in a hearing like this Dr. Bryan Shaw testified that the EPA only includes industry's costs in their analysis, not the states' cost or taxpayers' cost, nor do they look at economic impacts like increased electricity costs.

So, Mr. Alteri, to the extent that there are additional costs, how do these impact other pollution control priorities in your agency?

Mr. ALTERI. Thank you. The rise in rates of electricity prices is a key concern of ours as a manufacturing state. And just a incremental change in the electric prices will drive out manufacturing industries. And they won't relocate in Connecticut or New York or in the Northeast, but rather they will go to international areas where there isn't afforded as much environmental protection. So, we do have those concerns.

As far as the ozone standards and how they can affect us, they could limit the potential for economic growth. There are very few major stationary sources that want to locate in a non-attainment area. And so we are concerned about the limiting of economic growth.

Mr. FLORES. OK. And you were looking forward, to the extent that there are additional costs, how these impact other pollution control priorities of your agency. I think you have answered that.

Mr. Sadredin, based on your experience will there be costs to state and local government agencies like yours under the new ozone standards before 2025?

Mr. SADREDIN. Well, as I said, with the double counting of what you need to do for various standards, right now what is before us to attain the PM2.5 standards will be also sufficient, if we can achieve it, to meet the ozone standard.

Last week at our governing board meeting we presented the plan, very ambitious, makes a lot of sometimes unrealistic assumptions about what is doable. The costs to our region to get some of the reductions that we need, and still not sufficient, is $52 billion in San Joaquin Valley.

Mr. FLORES. Wow.

Mr. SADREDIN. And then when you add to it the bureaucratic cost that does nothing to improve air quality, $2.7 million a year just our agency spending on staffing and rewriting these plans in a perennial, continual planning mode, all of those dollars could go to actually reduce air pollution. And that would make our residents' quality of life better if we didn't have to do all this every, every year.

Mr. FLORES. That is pretty compelling.

Under the Clean Air Act, the EPA currently must review the National Ambient Air Quality Standards every 5 years. For the 2008 ozone standards the EPA issued the standards in March of 2008 and began reviewing it in the fall of 2008. And H.R. 806 would extend the mandatory 5-year review period to 10 years, although the administrator would still have discretion to revise the standards earlier.

When I drafted this part of the legislation, the reason we picked 10 years was because that was the agency's history of actually meeting the mandatory standards. They were not meeting their only standard—their own standard. They had a history of doing it since the beginning of the Clean Air Act. So all we are doing is matching the law to fit what their actual standards have been. But, we have also said that if the administrator wants to review earlier, they can.

So it is hard for me to see that there should be complaints about that.

So, Mr. Alteri, from your perspective is the current 5-year review cycle practical for either the EPA or the states?

Mr. ALTERI. No, sir. EPA——

Mr. FLORES. Mr. Cone? I have got limited time.

Mr. CONE. No, sir.

Mr. FLORES. OK. Ms. Vehr?

Ms. VEHR. No, sir.

Mr. FLORES. Thank you for taking care of the air quality in my birth state by the way, so.

Mr. Boushey?

Dr. BOUSHEY. I am not an expert on that. I think as science shows the important, new, dramatic effects we have to have the flexibility to do that.

Mr. FLORES. The administrator has the ability to do that.

Mr. Sadredin?

Mr. SADREDIN. The experience does not indicate that EPA is able to do that every 5 years anyway.

Mr. FLORES. Mr. Karperos? I didn't mean to pass you.

Mr. KARPEROS. We think 10 years is too long.

Mr. FLORES. OK. But that is what the EPA has been doing. And the EPA Administrator has the flexibility under 806 to move forward.

Mr. Cone, in your testimony you indicate that extending the 5-year review cycle to 10 years would more closely align with what the EPA does in practice. You said that. Can you say why that would be reasonable to do something like that?

Mr. CONE. I didn't quite catch the last part.

Mr. FLORES. I am sorry. I says in your testimony you indicated that extending the 5-year current review cycle to 10 years would more closely align with what the EPA has done in practice, which we have just talked about. Can you elaborate why this would be reasonable to do that, to extent it from 5 to 10 for the mandatory review?

Mr. CONE. Well, again, if EPA would come out with these implementation standards we would be able to probably get cleaner air quicker.

Mr. FLORES. Right.

Mr. CONE. But EPA has to turn around and reinvent and try to figure out how to do things differently to come up with these implementation standards.

Mr. FLORES. Thank you. I yield back the balance of my time.

Mr. SHIMKUS. The gentleman's time has expired.

The Chair now recognizes the gentleman from Texas Mr. Green for 5 minutes.

Mr. GREEN. Thank you, Mr. Chairman and Ranking Member, for holding this important hearing. And I want to thank our witnesses for being here today.

It is no secret, in Houston we have air quality challenges. The region currently sits at 80 parts per billion, which is still above the 2008 ozone standard, so we need a little more time. That being said, we have come a long way since the 1970s when our ozone measured 150 parts per billion.

And I think today's discussion is a valuable exercise. And while I do not support the majority's legislation, I think there are reasonable efforts that can be made to improve the implementation of NAAQS.

Mr. Karperos, we have repeatedly discussed the issue of technical feasibility and economic achievability. The Supreme Court has stated that the most important form for consideration of technological and economic reforms is before the state agency. Does your agency consider technological feasibility when drafting a SIP.

Mr. KARPEROS. Absolutely we do, sir. For the plan we are adopting tomorrow we did 10 deep dives on different mobile technologies.

Mr. GREEN. Does you agency consider the cost-effectiveness when selecting emission control options to meet the new NAAQS?

Mr. KARPEROS. Yes, we do. And we also do economy-wide modelings so that we understand the ripple effects throughout the economy.

Mr. GREEN. Does your agency accept the input from districts like the San Joaquin Valley in the adoption of the costs in technology and standards?

Mr. KARPEROS. Absolutely. Under state law it is very much a partnership for developing SIPs in the state of California between the air districts and the California Air Resources Board.

Mr. GREEN. Director Sadredin, if the state can already consider costs and technology when drafting a SIP, why is this sufficiently flexible or not sufficiently flexible to meet the new requirements?

Mr. SADREDIN. That is an excellent question because that is what often comes up because Clean Air Act does say you can include cost-effectiveness, economic feasibility in the implementation phase.

The problem is that 40 years later after the Act passed, today the deadlines that we face, if your deadline to meet the standard is 10 years and there is no way that you can go beyond that, how can you do a meaningful cost-effectiveness analysis if in our region or in your region the technology that you need. Billions of dollars that we need to spend on having the fleet turnover that is necessary, if that is not possible to do within that time line it is not a meaningful cost-effectiveness, economic feasibility analysis that we can actually do.

Mr. GREEN. Administrator Vehr, in February 2014, NASA's Global Modeling and Assimilation Office, the GMAO, conducted a study of western states which used satellite data to monitor stratospheric intrusions. NASA and the EPA have acknowledged that intrusions can cause ozone to rise above the 70 parts per billion level, especially in the summer months. Welcome to Houston. If the ozone rises above 70 parts per billion due to background ozone, does the statute provide a regulatory relief? And has Wyoming previously applied for regulatory relief?

Ms. VEHR. The statute allows the state to submit something called an Exceptional Event Submittal. And under those Exceptional Event Submittals they are very time consuming. It takes about a year to prepare one for stratospheric ozone intrusion.

Wyoming has been the only state in the nation to have had a stratospheric ozone intrusion exceptional event approved. And we have had four down to EPA that have not been acted on.

So, the Act provides for stratospheric ozone intrusion and other exceptional events, but the cost to prepare those, and if they are not acted on the consequences of that data being used in modeling and other events, is problematic.

Mr. GREEN. Thank you. In your testimony you stated a one-size-fits-all to ozone is not good for Wyoming. And, of course, in Texas we would probably say the same thing. You also stated the alternative tools and methods are critical for areas like Wyoming. In response to the NASA study, EPA is forming a working group of scientists and air quality managers to identify intrusions using a variety of new and different tools.

Was Wyoming invited or participated in that group?

Ms. VEHR. Wyoming has been involved with our EPA Region 8. I don't know about that particular group. But we have been in discussions on stratospheric ozone intrusion. And we welcome a meaningful collaboration with federal partners. We look at this as a federal-state partnership, and it should be collaborative and it should be meaningful discussions.

Mr. GREEN. EPA acknowledged the burdens of the regulatory relief associated with events, and these working groups were able—I don't know if these working groups were able to implement any change. Do you know anything about that?

Ms. VEHR. The working groups I do not.

Mr. SHIMKUS. The gentleman's time has expired.

Mr. GREEN. Thank you, Mr. Chairman.

Mr. SHIMKUS. The Chair now recognizes the gentleman from Michigan, Mr. Walberg, for 5 minutes.

Mr. WALBERG. Thank you, Mr. Chairman. And thanks to the panel for being here to assist us in understanding better.

Mr. Alteri, one of the primary concerns that I have heard about the 2015 ozone standard level is that it could limit investment in domestic manufacturing, including the steel industry moving forward. And that is a big issue in my district in Michigan. Mainly that the regulation could limit companies from making key investments for plant improvements or expansions in the future. These are the type of investments that I believe Congress and the administration should support and make ways for.

Could you share your thoughts on this concern and whether you have a similar perspective on the 2015 standard?

Mr. ALTERI. Yes, sir. The stringency of the standard will create more non-attainment areas or projected non-attainment areas. Ms. Vehr had mentioned the modeling that is used in these analyses. The photochemistry of ozone creates severe complications. And if you can see, we have done an extra job in reducing PM2.5 ozone and SO_2. But NO_x and ozone are more difficult.

But any time you have those non-attainment areas you are going to employ the lowest achievable emission rate with the best and most stringent controls, without taking into account cost and technical feasibility. So, it will limit opportunities for growth.

Mr. WALBERG. And sometimes it is apparent, through no fault of the area or the city or the communities in the process. And almost like there is no way to get out of it.

Mr. ALTERI. Yes, sir. That is the way we feel.

Mr. WALBERG. Let me ask as well, Mr. Alteri, it is clear that one of the major priorities of the Trump Administration is investment in infrastructure, whether that be for transportation, energy, or other purposes. But one aspect of the debate on the infrastructure that needs, I believe, more discussion is the potential effect that federal regulations might have.

And so, from your state and location points of view do you view the 2015 standard for ozone, NAAQS, as a regulation that could be harmful in making investment in infrastructure that we sorely need?

Mr. ALTERI. Mr. Sadredin had mentioned the sanctions that are associated with non-attainment areas. And they would apply to highway funds.

Yesterday I got to speak in Cincinnati. The northern Kentucky area is our historic non-attainment area. And what we need is investments in bridges and roads to open up those corridors. I am from Kentucky, so my first 7 miles of the trip I might see one or two cars in the morning on my commute. But you go outside and you see many, many points of emissions sources just standing in traffic.

I really think the infrastructure funding and development would greatly ease that burden in the Cincinnati-Northern Kentucky area. We do need to build bridges and open up the corridors.

Mr. WALBERG. Ms. Vehr, I look forward to riding my Harley out in your state this summer for a week, breathing that fresh air. The 2015 ozone standard immediately applies to prevention of significant deterioration permits that businesses need to grow and create jobs. That means businesses will have to immediately show their projects meet the 2015 ozone standard, something hard to do in an area that already fails it, as has been mentioned.

Would PSD permit relief help economic development for the new non-attainment areas in your state?

Ms. VEHR. Yes. We currently have one non-attainment area for ozone and PDS relief where their certainty provides relief to businesses.

Mr. WALBERG. And certainty, define that a little bit more? What that looks like?

Ms. VEHR. Certainty is tied to what the standard is and what is the controls and technology needed to achieve that standard. And that allows businesses to evaluate those opportunities. We have had that experience when businesses come to look at our state, they like that we have clean air. And so having that certainty in the surrounding ozone is beneficial.

Mr. WALBERG. Thank you. And I yield back.

Mr. SHIMKUS. The gentleman yields back his time.

The Chair now recognizes the gentleman from California, Mr. McNerney, who has been patiently waiting, for 5 minutes.

Mr. MCNERNEY. I have been. Mr. Chairman, I thank you for this hearing. And it is very informative, so I am having fun here. So thank you for participating.

Mr. Seyed, the target of the Air Shed Grant Program is at risk with the EPA's proposed cuts. If this program were eliminated how would it impact your work and the health of the people in the valley?

Mr. SADREDIN. Thank you, Congressman McNerney. I want to publicly express my gratitude for your help over the years to bring resources to the valley for these incentive-based programs that are critical to get the reductions that we need much more quickly, and also do it in a way that is helpful to our economy.

In San Joaquin Valley we need incentive funding in the order of about $2.8 billion, billion with a B. And any reduction in those areas will be devastating to our efforts. In fact, we need those areas to be enhanced and more funding needs to be dedicated to those good programs.

Mr. MCNERNEY. Thank you.

Mr. Cone, in your opinion would reducing the EPA's budget reduce regulatory uncertainty?

Mr. CONE. It is possible that the EPA could look and strategize better what the resources are and reinvent themselves to be focused on that. I think it is an opportunity to look at how things are done and drive improvement. But the public deserves to know what is going on. And it gives the opportunity for EPA to show their value. And with those cuts that could be done.

Mr. MCNERNEY. It will show their value by not providing the services that they provide.

Mr. Karperos, your testimony was pretty stark. In your opinion, what is the progress that has been made in the valley?

Mr. KARPEROS. Absolutely remarkable. Mr. Sadredin referred to some of the statistics in terms of the improvement in air quality. I think we are truly at a cusp where with the right investment, the continued support of EPA with incentive dollars, as Mr. Sadredin spoke to, we can achieve those standards within the current deadlines of the Clean Air Act.

Mr. MCNERNEY. Do you believe that the current ozone levels in the valley are primarily from sources outside the district's ability to control?

Mr. KARPEROS. This has been an issue that has been studied in great depth. And the bottom line is the high ozone levels we have experienced in the valley are homegrown. They are from emissions from within the valley.

Mr. MCNERNEY. OK. Mr. Seyed, do you have any suggestions or recommendations on how the Clean Air Act could help reduce pollution that is not in the district's control?

Mr. SADREDIN. Right, and I believe Mr. Karperos was referring to pollution transferred from other areas. And your question was the regulatory authority over 85 percent of the pollution that we do not have. I think with respect to that for ozone, there is no disagreement.

What we are asking today of this committee is that an overriding provision be included in the act, or in some other independent legislation, that says areas that are impacted by pollution from sources outside their regulatory authority will not be punished with devastating economic sanctions if they have done everything that they can do for sources of air pollution under their control.

Mr. MCNERNEY. Right, and I understand that. But what can be done to reduce pollution sources that are not in your control?

Mr. SADREDIN. We have petitioned the Federal EPA to adopt national standards. We are asking the state Air Resources Board to do more with some of the limited authority that they have compared to the Federal Government with mobile sources. And we are hoping that ARB will ultimately deliver on that. We are hoping that the Federal Government, if this is a standard that they want to impose on local areas, that they do their part for sources of air pollution that are of interstate commerce restrictions fall under their jurisdiction.

Mr. MCNERNEY. So, and I mean that sort of expands the authority of the Clean Air Act, what you are proposing?

Mr. SADREDIN. We are just asking for a fair application of the Clean Air Act. Ask us to do everything that we can, but when we have reached a point of diminishing returns and also the physical impossibility to get the reductions that we need, the Federal Government has to do its part, state government needs to do its part.

Mr. MCNERNEY. Last September the EPA issued updated exceptional event guidance, further acknowledging the impact of droughts on air quality stagnation. What is your view on the updated guidance?

Mr. SADREDIN. It improves the process slightly. But we think there is still a big problem with a region like ours when you experience 100-year drought conditions. You cannot use that as an exceptional event to say there is nothing that we could do. It overwhelmed everything, every measure that we had in place in our area. We still need some enhancement in that area.

Mr. MCNERNEY. Mr. Karperos, you looked like you wanted to say something.

Mr. KARPEROS. Yes. Thank you.

Even in drought conditions construction workers need to work outside. In the San Joaquin Valley farm workers need to work in the field. They will be exposed to the ozone that has been exacerbated by manmade climate change in the drought condition. There are reasonable actions we can take. The Exceptional Event Policy should be transparent, and it should be detailed because we are talking about public health here. The issue is not whether or not you should excuse the drought, the issue is whether or not we are taking all the reasonable steps we can to protect human health.

Mr. MCNERNEY. Thank you.

Mr. SHIMKUS. The gentleman's time has expired.

The Chair now recognizes Dr. Ruiz from California for 5 minutes.

Mr. RUIZ. All right. Thank you, Mr. Chairman.

We are here today to consider legislation that, quite frankly, may make life worse for millions and augment people's suffering from long illnesses. Air pollution exacerbates asthma; stunts lung development in children; increases risks for infections; increases risks of heart attacks, strokes, and even premature death.

Nationally, there are an estimated 9,330 deaths every year because of air pollution. And I want to let that sink in because we lose nearly as many people to the exacerbation of illnesses due to air pollution as we do to drunk driving.

Riverside County, on the eastern Riverside in Coachella Valley, which is very much like the San Joaquin Valley, and our economy is dependent on agriculture, where I am from and now represent, ranks among the worst in the nation for ozone pollution. The Inland Empire in Southern California of which Riverside County is a part, also has some of the country's highest levels of PM10s, those tiny particles emitted from chemical factories and vehicles that can penetrate the lung-blood barrier entering directly into the bloodstream and poisoning our communities and our relatives and our families.

As a physician, I care very deeply about the health of our communities and the public health hazard that air pollution poses. And the fact is, respiratory illnesses caused by air pollutions are preventable if we have the proper safeguards in place, if we have the proper resources that our agencies need, if we have the right protections in place and the right goals, and the assistance to build a capacity to those safeguards like those in the Clean Air Act.

Since 1980, nationwide ozone levels have declined by about a third thanks to the Clean Air Act protections which target emissions from cars, factories, consumer products, and other pollutant sources. As technology improves, we have an obligation to update our ozone standards to further reduce air pollution and save more lives.

And it is precisely the lives of the working families and the poor, Mr. Sadredin, that we—who face the highest burden of those illnesses, who don't have access to doctors or medicines, and who have the highest risk of having asthma and COPD and emphysema. It is not for them that we should reduce the regulations and the protections so that they can have a job in which they will maybe even, they will make minimum wage, and where the CEOs of these corporations will make big, it is precisely for them that we need to protect the air because they will have the highest burden of illnesses because of the health, the lack of the protections in our air quality.

So, this bill would delay it for 10 years. And heard that it is because that is what the EPA did, so we will do it in 10 years. But when we cut the EPA's budget even further it is going to be another 20 years before they can get some of these things done. And so, in 5, 20 years, are we going to keep delaying it and delaying it? Well, that is counterintuitive for us in order to be able to find the needs that we need and the resources that we need to help improve our health.

Dr. Boushey, can you speak to the healthcare costs or the cost savings of these protections?

Dr. BOUSHEY. Thank you for the question.

We have actually run a calculation of what would be the health impacts of improving on the 2008 standard of 75 to the 2015 standard of 70 parts per billion. On a national scale we would save 1.5 million lost days of work and school. And I think those school days ought to be counted double because so often both parents are working, and when your 9-year-old with asthma is home sick, you are out of work for the day or three days, however long it takes to recover.

That's 1.5 million from the patient, of patient days lost to work or school. Two thousand hospitalizations. This is just from the 5 ppb change, 75 to 70. And prevention of an estimated 500 deaths. So, we have talked so much about the costs of implementing air quality measures to achieve better air quality. We should look at the value of returns, and they are substantial.

Incidentally, 45 percent of these improvements are in the State of California because they have a big population with a lot of air quality problems.

Mr. RUIZ. Yes.

Dr. BOUSHEY. So, I think that is responsive to your question.

Mr. RUIZ. Absolutely. And I think that, unfortunately, as policy makers we don't really count the cost savings for preventable illnesses when we can clean the air or have some of these policy decisions.

I have taken care of very sick kids who are poor, who live in farm worker communities. I have seen the face of what the exacerbation of asthma can be.

Dr. BOUSHEY. I care for people of minority ethnicities living in inner cities, like in Oakland, who are 28 years old. They would love to work. They are well educated, want to work, but they can't because they are so often in the emergency room for asthma.

Mr. RUIZ. I hear you.

Dr. BOUSHEY. It is a real problem.

Mr. RUIZ. I hear you.

Mr. SHIMKUS. The gentleman's time has expired.

The Chair now recognizes the gentleman from Mississippi Mr. Harper for 5 minutes.

Mr. HARPER. Thank you, Mr. Chairman. Thanks to each of you for being here. And I will direct these questions to Mr. Alteri and Mr. Cone. And either or both of you may respond.

Concerns have been raised before this committee regarding the impacts of new ozone standards on permitting for new construction and expansions. So, can you explain how the 2015 ozone standards immediately impact PSD permitting?

Mr. CONE. In Maine we are part of the Ozone Transport Region. Maine is treated as a non-attainment area even though we are in attainment for all standards. Any time we have an exceeding it is due to transport.

We have received and applied for nitrogen oxide waivers. Those have been granted.

We had in the process a VOC restructuring of the regulation that would have offered regulatory relief to two facilities that had applied for expansion in the state. Due to the fact that EPA did not get this process, and then the new standard was being proposed, they said we will not finish processing this.

Since that time one facility has gone out of the business, the other facility has gone through bankruptcy. That is the reality of what is going on in Maine.

Mr. HARPER. Mr. Alteri?

Mr. ALTERI. It has the potential to limit economic growth and development. It is real simple. When a new project submits an application we do the analysis. And if it shows that it is going to be in a non-attainment area of cause or contribute to a violation, then there isn't an opportunity for you to evaluate the control technologies based on cost or technical feasibility.

Mr. HARPER. Let me ask both of you, will the new ozone standard impact the ability of new sources to obtain pre-construction permits?

Mr. ALTERI. Yes.

Mr. CONE. Yes.

Mr. HARPER. All right. Do you expect that the new ozone standards may delay the processing of pre-construction permit applications?

Mr. ALTERI. Yes.

Mr. HARPER. All right. You agree? OK.

Another: do you also expect that it may delay the ability of states or EPA to approve permit applications going forward?

Mr. ALTERI. Yes, and environmentally beneficial projects as well.

Mr. CONE. Yes, and what we have seen time and time again, when companies invest in their facilities you get cleaner emission units. And if you put barriers up to those investments you won't get cleaner units.

Mr. HARPER. And for the others on the panel for other state and local regulators, would you like to comment on the impacts of the 2015 ozone standards on the impacts on pre-construction permitting? Anybody else, the permit question?

Mr. KARPEROS. We haven't experienced in California that the setting of these standards has hindered us in our ability to offer permits.

Ms. VEHR. This is Nancy from Wyoming, and what helps companies is know what standard they are held to. So, when you have that certainty that you are held to the current standard and you have a complete application in place——

Mr. HARPER. Right.

Ms. VEHR [continuing]. Sometimes these applications take 18 months to do the technical analysis, and so knowing what that standard is when it is permitting is helpful.

Mr. HARPER. Thank you very much.

Mr. Sadredin, may I ask you a question, please. Is it correct that under the Clean Air Act states and local governments can become subject to fees or monetary penalties due to emissions outside their control?

Mr. SADREDIN. Right. That is exactly the situation that we are experiencing right now with the 1-Hour Ozone Standard which was revoked by EPA. But old standards never go away the way EPA regulations work. Valley residents are paying about $29 million in penalties every year right now because of the valuation of that standard. But we, by the way, fortunately you have heard we have attained now, but it is a long process to remove those penalties.

As we move forward with the new standards today, we are in a position of costly, devastating federal sanctions are imminent in San Joaquin Valley for the standard that lies ahead in terms of PM2.5, as I have described in my written testimony.

Mr. HARPER. OK. And I know my time is almost over. But are mobile sources a particular concern in your air quality region?

Mr. SADREDIN. In San Joaquin Valley the stationary sources, which include agriculture, oil and gas production, your ma and pa operations, all the way to your biggest manufacturing, they make up only 15 percent of the pollution now because we have imposed the toughest regulations in the nation on them. Right now, despite great work at the state Air Resources Board, the truck regulations and all of that, today 85 percent of our air pollution in our region comes from mobile sources which we have no regulatory authority over.

Mr. HARPER. OK. Thank you very much. And my time has expired. I yield back.

Mr. SHIMKUS. The gentleman yields back his time.

The Chair now recognizes the gentleman from California, Mr. Cardenas, for 5 minutes.

Mr. CARDENAS. Thank you very much, Mr. Chairman. Appreciate the opportunity for us to explain to the public how important this issue is.

One of the unfortunate aspects of what we are talking about today is the most costly effects are not immediate and they are long term, and they are not just about quantitative, it is quality of life that we are talking about as well. So this makes it a very esoteric conversation.

Yet, at the same time it allows us to either focus mainly on how does it affect the day to day and today, especially when it comes to pointing out the difficulties of businesses. And sometimes businesses find themselves in a quandary, and maybe even go out of business while they are waiting to find out their future and what is at stake here in this particular matter.

Yet, at the same time if we were to, unfortunately, become too lax and relaxed about requirements and protecting the today and the tomorrow, then we could find ourselves with burdening costs that are just unquantifiable, as a matter of fact. Unquantifiable not because they are too small, but unquantifiable because they are just so massive and the effects are so negative that it is something that we can only admit afterwards that, wow, we screwed up, we made a mistake, we were too lax.

In Los Angeles where I represent, in the L.A. Basin, it has some of the worst air pollution in the country. And L.A.'s geography, weather, and huge number of vehicles makes us ground zero for ozone pollution. When ozone levels pike, so do hospital admissions for things like respiratory infections and asthma.

Since 2000, ozone levels have decreased by 30 percent in the L.A. Basin through a combination of local, state, and federal efforts. But the region still doesn't meet federal air quality standards. Plans to deal with this problem have often been vague and long-term strategies to reduce emissions.

I think what we need to do is to try to incentivize companies and individuals to switch out polluting technology for cleaner, currently-existing technology, and invest in research to develop better technology.

Mr. Karperos, can you please tell me what is currently being done to incentivize these new technologies?

Mr. KARPEROS. When we, the California Air Resources Board, assessed the need for cleaner trucks, for example, some 5 or 6 years ago, we identified that a modification and optimization of existing technology would reduce emissions from tucks by 90 percent. We have adopted a standard, an optional standard to do that.

Tomorrow we will make a commitment to adopt a regulation to ensure that all trucks sold in California meet that standard. And then we are pairing that up with large incentive dollars to accelerate the turnover of that fleet.

If I may very briefly to the question of fees on businesses in the San Joaquin Valley, those fees are actually levied on vehicle registrations, so it is paid by motorists. And that money is turned right around and used to support the incentive turnover of trucks, so it is actually getting right at mobile sources.

Mr. CARDENAS. So you just described that the government actually, you said, incentivizes. Incentivizes by patting them on the back and then a little certificate? What do you mean by incentive?

Mr. KARPEROS. Offering financial incentives to accelerate. They would not be able to purchase a new piece of equipment as quickly as required under the Clean Air Act timelines. We offer up money that helps them purchase that piece of equipment sooner.

Mr. CARDENAS. Oh, OK. So incentivize with actual real dollars.

Mr. KARPEROS. Yes, sir.

Mr. CARDENAS. So that people can do the right thing, corporations or individuals can do the right thing, and at the same time they can get some help in actually doing the right thing?

Mr. KARPEROS. Absolutely.

Mr. CARDENAS. OK. Does anybody on the panel want to give an example of how perhaps those incentives are unwelcomed or inadequate? I knew it was going to be you. Go ahead.

Mr. SADREDIN. Yes. We believe there is a greater need for the level of funding that is available right now. In our region alone, over the last 10 years, we have spent $1.6 billion in public/private funding for incentive measures to reduce air pollution and also invest in the economy. It has reduced air pollution in our region by over 130,000 tons.

We still have major challenges. We need another 90 percent reduction in emissions. And, if anything, we need more funding in that area to both improve air quality but also help the economy.

Mr. CARDENAS. So what you just described, are you describing that as a positive or a negative?

Mr. SADREDIN. It is positive, but the negative part of it is that the resources have not been enough. We need more assistance from the state and Federal Government at the local level to be able to do this.

Mr. CARDENAS. OK. So, in a nutshell, you would welcome these stringent requirements if in fact there was more support to actually meet those requirements?

Mr. SADREDIN. The support and also the time to do it. Let's say I get $3 billion every year for the next 3 years for our region, it just takes time to be able to turn over 78,000 trucks, 300,000 vehicles. We just need to have the time and resources to do it.

Mr. CARDENAS. Thank you very much.

I yield back, Mr. Chairman.

Mr. SHIMKUS. The gentleman's time has expired.

The Chair now recognizes the gentlelady Ms. Matsui for 5 minutes.

Ms. MATSUI. I hope that is a compliment, Mr. Chairman.

The Clean Air Act provides clear and well-documented public health and environmental benefits. This is the very first point that is considered when discussing the Clean Air Act and ozone regulations. The law has improved the lives and the health of so many Americans.

The American Lung Association reports our nation's air quality has continued to improve over the last few decades. But despite the great strides we have made, we have a long way to go. Clean air is not a luxury. Breathing is not optional. We all need clean air to live. We, in Congress, should be facilitating the federal partnership with local agencies that want to improve air quality, not hindering it.

Mr. Karperos, I am glad to hear that many of the regions across our state are not delaying efforts to improve air quality, but instead seizing the opportunity to create a healthier environment for Californians. But I know that some Californians benefit from these air quality improvements more than others. Are there certain populations in the state, even within the same region, whose health benefits more from air quality improvements? Do the disadvantaged and minorities feel the impacts of bad air quality to a greater degree than others?

Mr. KARPEROS. Thank you for that question. That is a very, very important question.

We have made significant progress in California in terms of lowering pollution. But let me give you sort of a fact, the major, the still disproportionate impact we see on disadvantaged communities.

My agency did a detailed analysis that showed in about 2000 that residents of disadvantaged communities, low income of color, were exposed to about three times as much diesel PM, cancer-causing diesel PM, than people who lived in wealthier communities. We have reduced that considerably, but it is still two times the exposure to diesel PM if you live in a disadvantaged community compared to a wealthier community.

Ms. MATSUI. While the Clean Air Act's science-based standards are very important, I also believe that other EPA programs that provide a federal partnership for improving air quality are critical. I am particularly supportive of the EPA's Diesel Emissions Reduction Act grant program, or as we call it, DERA, which has helped clean up and retrofit diesel engines in Sacramento and every state across the country.

I am very concerned by the administration's move to slash funding for these types of important programs. Have you found that federal funding in programs play an important role in CARB's work? Which federal programs have been the most vital?

Mr. KARPEROS. There are a number of programs that I want to speak to. But funding across the board has been extraordinarily important: funding for EPA so that they can produce the guidance that the states need; the monies you spoke to, the DERA program, to fund the replacement of diesel equipment and the financial incentives so we can use that to accelerate the turnover.

And another program that has been extraordinarily successful in the San Joaquin Valley is monies to help farmers buy new tractors, much, much cleaner tractors.

Ms. MATSUI. OK, great.

Mr. Sadredin, as I mentioned, I believe the DERA grants are an important tool for reducing diesel emissions from older engines and improving over all air quality in California. I understand that your air pollution control district has benefitted from the DERA program.

How many DERA grants has your air quality district received?

Mr. SADREDIN. We have been fortunate to receive DERA funding almost every year. We have always advocated in Congress for full funding of that program. Unfortunately, even the previous administration every year zeroed out that account, and we had to work with you and the rest of the Congress to get funding in that program. So, if anything, we need more funding in that area and full funding of the DERA program.

Ms. MATSUI. So you really have benefitted from this DERA funding in your region?

Mr. SADREDIN. Yes, we have.

Ms. MATSUI. In the past you said incentive programs are critical to get the valley into attainment as quickly as possible. What will be the impact in the San Joaquin Valley if DERA and other federal incentive programs are dismantled?

Mr. SADREDIN. There is no way that we can reach these federal standards on the back of businesses alone and with regulations only. If you adopt a regulation, you still have to wait for the turnover and then the lengthy time that it takes. Incentives, with matching funds from the public, from the private sector they actually leverage those federal dollars quite a bit; they are critical.

There is no way for us to reach the standards without significant funding at all levels, local, state, and federal, for incentive fundings such as DERA, targeted air shed grants, and NRCS funding that was mentioned earlier. All those are critical to meeting our objective to meet the standards as expeditiously as possible.

Ms. MATSUI. OK, thank you. And I yield back.

Mr. SHIMKUS. The gentlelady yields back her time.

Seeing no other members present, we really want to appreciate your testimony and your diligence. I thought it was a great hearing. I think members got a lot out of it and it will allow us, hopefully, to move forward.

I have a couple of documents that have been asked to be submitted for the record. Please follow this and make sure I don't miss anything.

Ms. TONKO. OK.

Mr. SHIMKUS. Testimony of Glenn Hamer, Arizona Chamber of Commerce and Industry, from the Senate Environmental and Public Works Committee; a Study on the Surface Ozone Trends from the Journal of Atmospheric Chemistry and Physics; the majority hearing memorandum. We have got a letter by a lot of health groups, dated March 21st, 2017, from the Allergy and Asthma Network to the Trust for America's Health. We have a letter to me from the Central Valley Air Quality Coalition; another letter from the same organization on October 25th, 2015. We have another document from them, San Joaquin Valley 2017 Plan for the 2012 PM2.5 Standard. Fresno Bee article, Alex Sherriffs and John Capitman, "Don't Back Off Demands for Cleaner Air." And Office of the Commissioner from the New York State Department of Environmental Conservation. American Chemistry Council, dated March 22nd.

And that is all I have, unless you all have anything else.

Ms. TONKO. Yes, I think you covered them all, Mr. Chair.

I would like to personally thank the Commissioner of New York State, Department of Environmental Conservation, Basil Seggos, for what I think is a very strong letter opposing H.R. 806. He has outlined some very important information.

So I thank you. You have covered them all. And ask respectfully that they—unanimous consent to place all of those in the record.

Mr. SHIMKUS. Without objection, so ordered.

[The information appears at the conclusion of the hearing.]

Mr. SHIMKUS. Again, thank you for attending. This is the first stop in moving the process forward, and we look forward to working with you during that process.

The hearing is adjourned.

[Whereupon, at 11:56 a.m., the subcommittee was adjourned.]

[Material submitted for inclusion in the record follows:]

PREPARED STATEMENT OF HON. GREG WALDEN

The bill under review this morning provides a promising start to the committee's goal of developing and moving common-sense measures that will reduce the barriers to a more productive U.S. economy—while preserving the public health and well-being of Americans. H.R. 806 represents the kind of targeted legislative updates to our environmental laws that will fix provisions that are threatening to do more harm than good, given existing regulations and the tremendous advances in air quality.

This bill is about providing sensible tools and relief to state and local authorities so they can more effectively implement air quality standards for the benefit of their communities. It is also about ensuring appropriate timelines to enable authorities to do this without unnecessarily restraining economic development, especially the development we need to accelerate the nation's infrastructure and manufacturing capabilities.

There is no question federal clean-air laws-and state authorities that implement those laws have been tremendously successful since the first major of revisions of the Clean Air Act in 1970. As EPA reports, in aggregate, emissions of key air pollutants have declined 71% since 1970. As a result, the air we breathe has improved dramatically according to nationwide trends: Since 1980, data show ozone is down 32%; nitrogen dioxide is down 60%; and particulate matter, just in the past 15 years, is down almost 40%. Of course, much of this improvement over 37 years has occurred against the backdrop, overall, of an expanding economy.

But, there also should be no question that the actual margins for continued improvement are also declining, especially with existing technologies.

As state and local air-quality regulators implement new rules to drive down pollutant levels in response to statutory mandates, more areas of the nation come closer to natural and technological barriers to continued improvement. Failure to account properly for the existence of these barriers-or to provide reasonable time for existing measures to produce results-threatens damaging economic consequences.

I note, for example, Mr. Sadredin's testimony provides the troubling example that almost all economic activity could be stopped in California's great San Joaquin Valley—including preventing highway thru traffic—and there would no meaningful improvement to air quality in that region. Yet without legislative and regulatory reforms, federal requirements will just keep mounting, stifling economic opportunity and growth in that important region.

We should take this example and the examples from our other state witnesses this morning as a warning of what more regions may confront as air quality standards are tightened at a pace faster than innovation, technology, and the regulatory implementation process can reasonably keep up.

Congress did not enact the Clean Air Act to be a regional economy killer. The good news is there are sensible reforms that will update the act, both to reflect the progress we have made and to account for current, practical factors that affect continued improvement.

As I've noted previously, there are many opportunities before the committee to make meaningful improvements in our environmental laws and regulations—the outcome of which will be good for public health and good for the economy. Today is just the beginning.

PREPARED STATEMENT OF HON. FRANK PALLONE, JR.

H.R. 806 is essentially the same legislation the Committee considered in the last Congress, and the "Ozone Standards Implementation Act" is still a very misleading title. While the bill does derail the most recent ozone air quality standard, these bad policies go far beyond just ozone. Let's be clear: H.R. 806 is a broad attack on the successful health based standards and protections for all criteria pollutants—carbon monoxide, particulate matter, nitrogen oxides, sulfur dioxides, and even lead.

H.R. 806 is a compilation of misguided proposals that weaken or delay the protections in the law—strategies that won't make air pollution magically go away. H.R. 806 puts the public health and safety of the American people at risk, and virtually guarantees that people living in areas with poor air quality will continue to breathe unhealthy air indefinitely.

We cannot consider this bill in isolation. It is only one of many assaults on public health and the environment being rolled out by the Trump Administration and the Republican Congress.

The Administration has announced its intention to roll back progress in climate change policy, energy efficiency, and clean energy. Great news for the fossil fuel industry, but not for public health, consumers, low income communities, or the U.S. industries and American workers that are poised to take us into a clean, low-carbon, and more efficient future. The Trump Administration's actions will further speed global warming, encourage more fuel consumption, and generate more pollutants while costing us jobs in the clean energy sector.

The budget blueprint the Trump Administration released last week proposes to cut EPA's budget by 31 percent—$2.6 billion dollars—to reduce the EPA workforce by 3,200 people, and to eliminate 50 vital programs that protect the public health and environment. I should also note that a large portion of EPA's funding goes directly to states to help ensure our communities have clean air to breathe and clean water to drink. These drastic cuts will be devastating to the people we represent.

Simultaneously, this bill explicitly says that no new funds can be provided to EPA and the states to do the numerous new tasks laid out in the legislation. So, although one of the stated justifications for this bill is to help states reduce air pollution, the fact is that it does exactly the opposite. The states need technical and financial support from their federal partner—the EPA—to implement the Clean Air Act. The Trump Administration budget and this bill abandon that partnership, sending a clear message to the states to go it alone.

I do not believe the American people want more air and water pollution. Our constituents are not interested in breathing dirty air or drinking dirty water. They certainly don't want their health compromised by going back to ineffective, voluntary pollution control programs.

We have made great progress in reducing pollution and improving people's health. These air standards are based on decades of research, reviewed by experts in the health sciences who have advised the Administrator that protection of people's health requires lower ozone levels.

My Republican colleagues claim this bill does not increase air pollution or undermine the fundamental public health protections in the Clean Air Act. But that is exactly what will result if you stretch the deadlines for compliance, remove vital agency resources, and insert cost and other factors that have nothing to do with health.

Our experience with the Clean Air Act tells us that we do not have to choose between the health of our communities and a healthy economy. We can have both, and we have achieved both under the Clean Air Act.

I opposed this bill in the last Congress, and. I continue to oppose it now. I will not go back on my commitment to the public to make the air safe and healthy to breathe. H.R. 806 breaks that commitment. The Clean Air Act provides EPA and the regulated community with sufficient flexibility to continue to improve air quality and public health. Instead of undermining the law and gutting the EPA, we should provide adequate resources to the Agency and to the states to continue to give every American clean, healthy air to breathe.

Thank you, Mr. Chairman.

ARIZONA CHAMBER
OF COMMERCE & INDUSTRY

Testimony by Glenn Hamer, Arizona Chamber of Commerce and Industry, submitted to the Senate Environmental and Public Works Committee's Subcommittee on Clean Air and Nuclear Safety Hearing entitled "Examining Pathways Towards Compliance of the National Ambient Air Quality Standard for Ground Level-Ozone: Legislative Hearing on S. 2882 and S. 2072," June 22, 2016

On behalf of the Arizona Chamber of Commerce and Industry (Arizona Chamber or Chamber), I welcome this opportunity to submit for the record the following testimony regarding the economic implications for the state of Arizona of the Environmental Protection Agency's new standard for ground-level ozone. In addition to this written testimony, I am including for the record a copy of the latest paper by the Arizona Chamber Foundation and Prosper Foundation titled "A Clear and Present Danger: How the EPA's New Ozone Regulations Threaten Arizona's Economy," which provides a comprehensive examination of the issue.

In October 2015, the Environmental Protection Agency (EPA) lowered the national standard for ground-level ozone to 70 parts per billion (ppb) from the previous standard, set in 2008, of 75 ppb. This new one-size-fits-all national standard will be virtually impossible for Arizona to meet because of Arizona's unique location in the southwestern region of the United States, and because the primary sources of Arizona's ozone precursors are outside our state's control. Protecting Arizona's air quality is of utmost important to those of us here in Arizona, and our state's businesses and regulators have been working diligently to reduce our emissions so that all Arizonans enjoy healthy air. But the imposition of this new standard will punish Arizona for ozone we cannot control.

First, Arizona's number one source of nitrogen oxide emissions is cars. Our state's location as a border state and a gateway to Southern California mean that Arizona's highways are heavily traveled. Yet because vehicle emissions are regulated at the federal level, they are wholly outside Arizona's control. In other words, Arizona's most effective strategy for reducing its ozone is entirely in the hands of federal regulators responsible for vehicle emission standards.

Second, Arizona has incredibly high levels of biogenic, or naturally occurring, background ozone. With our state's vast ponderosa pine forest and high incidence of wildfires and lightning, biogenic ozone emissions account for 43 percent of Arizona's volatile organic compound emissions. Point source major emitters account for a mere 1% of Arizona's VOC emissions.

Third, Arizona receives a significant amount of ozone from neighboring California, also referred to as "interstate transport." Proving that this ozone originates in California is complicated and expensive, and the EPA does not permit exclusions for interstate

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transport. Thus, despite the fact that ozone originates in California, Arizona is penalized for it.

Fourth, Arizona receives significant "international transport" from Mexico as well as Asia, by way of California. But because of the EPA's rules, even if Arizona's Department of Environmental Quality could prove—at great cost—that Arizona would be in attainment "but for" the internationally transported ozone from Mexico and Asia, it would still be put into nonattainment status.

Finally, almost 70% of the land in Arizona is tribal land or controlled by the federal government, yet Arizona is still responsible for controlling emissions originating there.

Simply put, Arizona cannot implement a 70 ppb standard. Nine out of the ten counties in Arizona in which ozone is measured are already out of attainment. The penalties for nonattainment have drastic economic consequences: existing Arizona businesses and companies interested in expanding in the state will be unable to secure necessary permits and face limitations or outright bans on construction, and our state's federal highway dollars could be compromised. And these consequences are already coming to fruition, with companies choosing to locate elsewhere due to uncertainties surrounding permitting.

With regard to the specific pieces of legislation before this committee:

The Arizona Chamber is appreciative of the work being done on this issue by Senators Hatch and McCaskill in S. 2072, which gives states an opportunity to submit to the EPA an "early action compact" to address state-specific issues with implementation. Offering another option as to how the states manage their air quality. However, on the issue of ozone, federal regulators must still recognize the unique characteristics of the various regions when setting a national standard.

With respect to S. 2882, The Ozone Standards Implementation Act of 2016, we agree that delaying the implementation of the 70 ppb standard is necessary, at the very least. We also appreciate the excellent work of Arizona's two senators, Messrs. McCain and Flake, on this issue.

The issue for Arizona and other Western states is not feasibility of implementation; it is impossibility.

ARIZONA CHAMBER FOUNDATION

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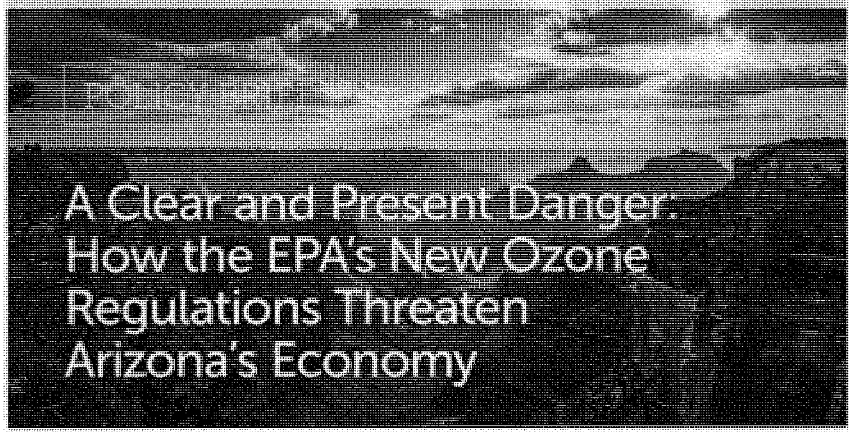

POLICY BRIEF

A Clear and Present Danger: How the EPA's New Ozone Regulations Threaten Arizona's Economy

Introduction

In October 2015, the Environmental Protection Agency ("EPA") lowered the national standard for ground-level ozone to 70 parts per billion (ppb). Arizona's unique location in the southwest region of the United States makes achieving the lower standards unrealistic. Since 2008, when the EPA set the standard at 75 ppb, Arizona and other states across the country have been working diligently to reduce their emissions to meet that standard. Although Arizona was making great strides toward achieving attainment of 75 ppb, its climate and geographic location will make it nearly impossible for Arizona to meet the new lower standard despite best efforts by Arizona industry and regulators. The consequences of nonattainment could be dramatic for Arizona: existing Arizona businesses and companies interested in expanding in the state will be unable to secure necessary permits and face limitations or outright bans on construction, and Arizona's federal highway dollars will be compromised.

The EPA's move to lower the standard now is premature and unnecessary. States across the country, including Arizona, have only just begun to see the impacts of the control measures they implemented after the 2008 standard was promulgated. Furthermore, scientists from the National Aeronautics and Space Administration (NASA) and the National Oceanic and Atmospheric Administration (NOAA) have found that, while "North American emissions contribute to global ozone levels, [there is no] evidence that these local emissions are driving the increasing trend in ozone above western North America."[1] While the western United States reduced its production of ozone by 21 percent between 2005 and 2010, the region's air quality did not enjoy the expected improvement in response.[2] That is because domestic reductions are being offset by increases in ozone originating in Asia and elsewhere.[3]

Given this disturbing international trend and other local factors that make attainment costly and difficult, lowering the standard from 75 ppb to 70 ppb is not substantiated by the required scientific data to support such a move. Protecting our air is of utmost importance to all of us lucky enough to call Arizona home—dare say even more so—than it is to federal regulators in Washington. But Arizona and its businesses are already making great strides in protecting air quality and ensuring Arizonans enjoy healthy air. The EPA has acted far outside its mandate, setting a new standard that is unjustified by science and impossible to meet without severe economic consequences.

I. The Clean Air Act and the National Ambient Air Quality Standards

The Clean Air Act (CAA), originally passed by Congress in 1970, is the federal law that regulates air quality. The CAA was intended to protect public health by regulating emissions of common air pollutants from both mobile and stationary sources (i.e. vehicles and industry), which at that time were unregulated. To that end, the CAA authorizes the EPA to establish National Ambient Air Quality Standards (NAAQS) for a variety of air pollutants, including ground-level ozone.[4]

But the EPA's mandate to regulate in this area is not unlimited. Rather, pursuant to the CAA, the EPA may only regulate emissions to the extent that public health is protected "with an adequate margin of safety."[5]

Since the EPA set the first NAAQS at 80 ppb in 1971,[6] emissions across the country have been reduced significantly.[7] Ozone levels have declined by 33% since 1980,[8] as man-made sources of ozone have fallen in North America and Europe as a result of air-quality legislation.[9] Given the great strides toward attainment and the reductions we have already seen, the health impact of further reductions may be inconsequential at best while the costs associated with such reductions will be exponential.

The EPA has acknowledged the incremental nature of further reductions, stating that while there is "no bright-line rule delineating the set of conditions or scales [within the range proposed] at which known or anticipated effects become adverse to public welfare," its position is nevertheless that the lower the standard, the better.[10]

Scientists involved in setting the new regulation looked at health impacts from ozone levels ranging from 60 to 72 ppb using various studies, most notably one from 2009 examining just 31 people exercising with varying levels of ozone exposure over a 6-hour period.[11] The EPA's policy assessment of the new standard makes clear that, based on this research, respiratory symptoms were seen at concentrations as low as 72 ppb, but that numerous exposure uncertainties existed with respect to the relative weight given to different risk estimates at lower levels.[12]

The EPA Administrator ultimately determined that within the probabilistic range of impact, lowering the standard to 72 ppb was supportable, but stated that she had "decreasing confidence that adverse effects will occur following exposures to [ozone] concentrations below 72 ppb."[13] Nevertheless, the EPA set the new standard at 70 ppb anyway, despite the cost and consequences to states trying to come into attainment.[14] Indeed, the EPA has acknowledged that, according to its own modeling, there are areas in the Intermountain Western U.S.[15] in which "substantial background contributions . . . [already] approach or exceed the [75 ppb] NAAQS."[16] Furthermore, a 70 ppb standard was explicitly rejected by the EPA Administrator in a 1997 review of the then-current NAAQS precisely because it was too close to peak background concentrations.[17] Lowering the standard to 70 ppb now only makes sense in a world in which an emissions target of zero is the goal and the cost of further reduction is of no consequence. Even the EPA, however, acknowledges that the CAA does not require a zero-risk level.[18]

II. Understanding Ozone

At the stratospheric level, ozone is a good thing—it protects us from the sun's harmful U.V. rays. In contrast, ground-level ozone—the primary component of smog—may affect air quality. Some studies (while inconclusive) suggest that ground-level ozone on its own or when mixed with other potential pollutants such as particulate matter can have adverse health consequences like asthma and bronchitis.[19] However, some studies also indicate that ozone alone—while a risk factor—may not cause significant demonstrable health issues for most populations. Rather, it is the interaction with other elements that presents possible negative health effects to the human body.[20] In addition, ozone "is a natural constituent of the atmosphere and the lung is equipped with [defense] mechanisms" to deal with it.[21] The task for scientists and regulators is to determine, with regard to ozone specifically, how it interacts with other pollutants, how it presents itself in various geographic areas, and how any specific population may or may not be impacted.

Ground-level ozone is formed when nitrogen oxides (NOx) and volatile organic compounds (VOCs)—also referred to as ozone precursors—react in the presence of sunlight and other weather conditions.[22] The ways in which these reactions occur is highly complex and remain only partially understood.[23]

The NOx and VOCs in our environment are both naturally occurring ("biogenic") as well as the result of man-made ("anthropogenic") pollution. For example, nitrogen oxides come from agricultural sources like synthetic fertilizer and livestock manure, and fossil fuel combustion from mobile sources (e.g. cars) and stationary sources (e.g. coal-fired power plants).[24] Nitrogen oxides also come from natural sources like lightning and biological decay in our soil and oceans.[25] Similarly, VOCs come from man-made sources like solvents (paint, adhesives, wood strippers, and cleansers) and various processes like dry cleaning and oil production and refining.[26] Naturally-occurring VOCs primarily come from plant life; tropical forests are estimated to produce approximately half of all global biogenic VOC emissions.[27]

III. If Ground-Level Ozone is Bad, Why isn't the EPA's Lower Standard Good?

A large percentage of ozone precursors are naturally occurring. In addition, ozone is often transported hundreds of miles from its point of origin. Thus, for many states, especially those of the Intermountain Western U.S., the ozone found within their borders is largely not within their control. So even though ground-level ozone may, in large quantities, have adverse health effects, it is unrealistic to expect that states can continue to reduce or even eliminate ground-level ozone.

That is especially true in Arizona, where the primary sources of ground-level ozone precursors are cars and plants.[28] In Maricopa County, a mere 1% of VOC emissions come from point source major emitters (i.e. industrial, manufacturing and electrical power generating facilities); in contrast, 43% of Maricopa County's VOC emissions come from biogenic sources (i.e. natural vegetation).[29] Coupled with unusually high levels of background ozone and Arizona's dry and sunny desert climate, Arizona is at a unique disadvantage when it comes to complying with the EPA's new standard for ground-level ozone.

First, as a border state and a gateway to Southern California, Arizona's federal, state and local highways are heavily traveled by those passing through and residing within the state. Arizona's primary sources of nitrogen oxide emissions are on-road and non-road mobile sources (primarily cars, but also airplanes, construction equipment, and lawn equipment).[30] As Arizona's Department of Environmental Quality ("ADEQ") has pointed out, "[l]ocally implemented pollution controls are unlikely to be effective at reducing ambient ozone levels across [Arizona] because ozone is a regional problem and caused primarily by cars."[31] And because vehicle emissions are regulated at the federal level, they are wholly outside Arizona's control; Arizona's most effective strategy for reducing its ozone is therefore entirely in the hands of federal regulators responsible for vehicle emission standards.[32] It is also important to note that Arizona has a high proportion of older—and therefore dirtier—vehicles as compared to the rest of the country,[33] because our great weather allows cars to remain in operable condition for a very long time.

Arizona's primary source of VOCs is biogenic emissions, which are emissions from natural sources such as vegetation, soil and lightning. Arizona has the largest ponderosa pine forest in the United States, but no one would seriously argue that Arizona should reduce its VOC emissions by cutting down trees. Thus, Arizona has no meaningful way of reducing its two biggest sources of ozone precursors—cars and plants.

> Arizona's unique geography contributes to its high levels of ozone and will make it essentially impossible to comply with the EPA's new standard without dire effects.

Second, Arizona has extremely high levels of background ozone. "Background ozone" refers to ozone that results from naturally-occurring emissions such as wildfires, lightning or the natural "off-gasing" of plants. It also includes emissions from man-made sources outside the borders of the United States (also referred to as international transport).[34] Background ozone is incredibly hard to measure, and requires complicated and expensive photochemical modeling. Even if proven, the EPA does not permit exclusions for background. Rather, states whose ozone levels are above the federal standard—regardless of the source—are deemed "nonattainment areas," which has significant consequences for the receipt of necessary permitting and federal highway dollars.[35]

Arizona's ozone is comprised significantly of transport from Mexico and California (California's ozone has been shown to include ozone from as far away as Asia). Thus, even if Arizona's Department of Environmental Quality can prove—at great cost—that Arizona would be in attainment "but for" the internationally transported ozone precursors originating in Mexico or Asia, it would still be put into nonattainment status. And while the EPA may include international transport in the definition of background ozone, it does not consider emissions purportedly generated by man-made sources within the U.S. as background regardless of where they were generated. In other words, it doesn't matter if emissions measured in one state are generated in another state (referred to as interstate transport), even though they are outside the control of the impacted jurisdiction.[36] That means Arizona gets no benefit from proving to the EPA that it would be in attainment "but for" ozone originating in California.

Finally, Arizona's unique geography contributes to its high levels of ozone and will make it essentially impossible to comply with the EPA's new standard without dire effects. Arizona's mountainous terrain, with its alternating valleys and high altitudes, lends itself to an accumulation of ozone.[37] Coupled with Arizona's hot, dry, sunny climate and propensity for wildfires and lightning, Arizona is a textbook environment for ground-level ozone.

IV. What About the EPA's "Tools" for Dealing with Background Ozone?

Federal regulators maintain that states have "tools" at their disposal for addressing background ozone. But because of the make-up of Arizona's ozone, the so-called "tools" made available by the EPA are inadequate to enable Arizona to meet the new standard.

Rural Transport

The Clean Air Act allows the EPA to determine that a rural area that is not in compliance with the federal standard can be treated as a "rural transport area" (RTA), thereby providing certain relief mechanisms for that designated area. However, to qualify as an RTA, the state must show that the rural area does not contain major emission sources <u>and</u> is not included within nor is adjacent to a highly populated urban area.[38] This is not helpful for a large western state like Arizona, where huge rural areas—some of which are tens of thousands of acres and larger than entire states on the eastern seaboard—are all adjacent to areas that contain urban population centers. Furthermore, because RTAs are technically designated as nonattainment areas, they must meet the EPA's requirements for nonattainment areas, including developing a baseline emissions inventory, implementing a new source review program, submitting major source emission statements, and preparing transportation and general conformity demonstrations—all costly and technical requirements. The only relief an RTA receives is that it is not subject to the more stringent requirements of a higher-classified nonattainment area. Regardless, of all the rural areas in Arizona that will be unable to comply with the 2015 ozone standard, there are likely none that would be able to seek an RTA designation.

International Transport

The Clean Air Act allows the EPA to approve a state's ozone attainment plan—a required part of meeting the federal ozone standard—if the state can demonstrate that ozone originating in another country is a significant impediment to its ability to meet the federal standard <u>and</u> that it has taken "appropriate local measures" toward attainment.[39] But this provision does not <u>exclude</u> international transport from the state's ozone levels, nor does it prevent areas from within the state from being placed in nonattainment status; to the contrary, an international transport designation puts the area into marginal nonattainment status and requires the area to implement marginal nonattainment programs.[40] Furthermore, because of the nature of ozone, proving international transport is time-consuming and expensive. For example, El Paso, Texas spent 10 years and undoubtedly an obscene amount of money to prove that a portion of its ozone came from Juarez, Mexico.[41] To date, it is the only city that has been successful in doing so. The CAA's international transport provision is therefore not helpful to Arizona, which borders on and gets significant ozone from Mexico and, increasingly, from Asia.

Exceptional Events

An "exceptional event" is an event—natural or caused by human activity—that affects air quality, is unlikely to recur at a particular location, and cannot be reasonably controlled or prevented.[42]

The Clean Air Act allows the EPA to exclude ozone caused by exceptional events if a state can prove—through an expensive, technical, and time-consuming process—that it meets the exceptional events criteria.[43] Given the cost of the demonstration and the frequency of exceptional events like wildfires and lightning in Arizona, this provision is too onerous to be a tool of any significance. According to ADEQ, the cost of a typical exceptional events demonstration for particulate matter (i.e. dust) is around $50,000 per event; a demonstration for ozone would be significantly higher due to the complicated modeling such a demonstration would require.[44]

As of October 2015, Wyoming is the only state that had been granted an "exceptional event clearance by EPA due to high background ozone levels"[45] for stratospheric intrusion—a demonstration that can take anywhere from four to eight months to produce.[46] Wyoming's Department of Environment Quality estimates that an exceptional events demonstration for an ozone exceedance caused by wildfire would require 15 months and $150,000 to produce.[47] Even if a state succeeds in proving an exceptional event, the remedy is merely the exclusion of data affected by the event, which does not assure that the state will avoid nonattainment.

V. Punishing Arizona for Ozone It Can't Control

The EPA's new ozone rule could penalize nine out of the 10 counties in Arizona in which ADEQ or other government entities measure ozone levels.[48] That is because although the Clean Air Act technically does not require states to reduce emissions from background sources that are not in their control, the EPA does not consider ozone from man-made pollution generated within the U.S. the type of "background" for which states are not held accountable.[49] In other words, the EPA does not allow states to "discount" for ozone transported into their borders from a neighboring state.[50] This is particularly problematic for Arizona, where neighboring California contributes non-negligible amounts of ozone for which Arizona is ultimately held responsible. As a result, parts of Arizona will be out of compliance due to uncontrollable ozone, yet Arizona must still act to reduce its own ozone emissions to bring its total amount to a level within the federal standard.

For example, La Paz County, Arizona already has a projected three-year concentration of 70 ppb for 2013-2015; 52.68 ppb of that is represented by background.[51] La Paz County is home to just 20,000 people and the size of the state of Connecticut; with no local industry, La Paz County has no local mechanisms for reduction or control.[52]

Likewise, Yuma County's ozone level is hovering around 76 ppb;[53] industrial sources account for only about five percent of that.[54] With a relatively small population and small manufacturing base, the majority of Yuma County's ozone is transport originating in California and Mexico.[55] As Misael Cabrera, Director of Arizona's Department of Environmental Quality, recently testified before Congress, "No matter how many local emissions reductions are achieved, Yuma County simply will not be able to achieve compliance with the new [70 ppb] standard."[56]

Other states of the Intermountain Western U.S. are in similar situations. For example, Colorado's Department of Public Health and Environment noted the effect of transport on Colorado's ozone levels, pointing out that rural monitoring in Colorado demonstrates that "ozone can [] regularly exceed existing standards due to emissions transported into Colorado from upwind sources." EPA's own figures show a contribution to Colorado's background levels of anywhere between three and seven ppb from interstate transport.[57]

VI. What Offsets?

Once an area is designated nonattainment, the CAA mandates that there can be no net increase in emissions from new or modified existing sources. That means emissions offsets must be obtained prior to the construction or expansion of any major source in a nonattainment area.

For an area that is already in nonattainment status, any offset must provide a net air quality benefit. It must also be:

Real: the offset must be based on actual emissions reductions;
Permanent: the offset must be assured for the life of the corresponding emission increase;
Surplus: the emission reduction must not have been mandated by any other local, state or federal requirement; and
Quantifiable: the offset must be capable of reliable and replicable measurement.[58]

In other words, in order to get credit for an offset, it must be in the same location and represent the same type of emission (NOx or VOC) and source (mobile or stationary) for which it is being credited, and the company using the offset must show, to the EPA's satisfaction, that the offset is no longer emitting. In addition, the offset must already be in the existing emissions inventory and must equal or exceed the amount of emission increases at the new or modified source.

In a state like Arizona, where available offsets are incredibly limited or nonexistent,[59] this is an extremely limiting control mechanism. And in counties facing nonattainment under the new standard in which there are essentially no local offsets—like La Paz and Yuma Counties—it's not even a control mechanism.

Arizona is not alone. Like Arizona, Nevada's large rural areas are in nonattainment due to transport and have few available local offsets. As such, the lower standard "will result in the effective foreclosure of new industrial growth in [Nevada's] rural ozone non-attainment areas . . . which is likely to have devastating consequences on these rural communities since they may already be struggling economically."[60]

Given the grim economic development consequences, ADEQ, the Governor's Office, and key stakeholders are working together on a task force to come up with creative and innovative ways to generate offsets that will foster, not inhibit, economic growth. The reality, though, is that the dearth of available offsets in Arizona renders even the most creative offset incentive of limited utility.

VII. Federal Overreach Costs Arizona

Unilaterally lowering the standard for ground-level ozone from 75 ppb to 70 ppb, despite evidence that 70 ppb is not an attainable standard in the Intermountain Western U.S., represents a problematic example of federal overreach. Rather than taking a critical view toward the actual sources of air quality issues in particular areas and what can be done to alleviate pollution from primary emissions sources, the federal government has used its rulemaking power to take a broad swipe to the entire country, disparately impacting the Intermountain Western U.S. and creating an environment of winners and losers from a national economic impact viewpoint. Arizona and other states of the Intermountain Western U.S. will experience a significant negative economic impact should this rule be implemented as planned without the support and consequences of good technical, scientific, location- and population-specific models developed with data. It is the federal government's responsibility to establish what is necessary to support and implement the rule, not the states' responsibility to lessen the impact.

The costs to Arizona of this overreach are significant and will reach across the state, impacting our economic development outlook for years to come. The cost and feasibility of compliance will simply prove too great for many businesses, forcing them to shut down, relocate operations, or forgo growth and expansion. This says nothing of the businesses that will simply choose not to come to Arizona due to the uncertainty of obtaining necessary permits to operate, an unfortunate consequence that has already come to fruition.

VIII. Challenging the EPA's Overreach: Arizona Takes the Lead

Precisely for the reasons outlined here, in November 2015 Arizona—now joined by nine other states[61]—filed a lawsuit asking a federal court to review the EPA's new standard. Led by Arizona Attorney General Mark Brnovich, Arizona's lawsuit charges that, in setting the new standard for ground-level ozone at 70 ppb, the EPA abused its rulemaking authority and acted outside its CAA mandate.

Arizona's lawsuit, which is currently before a federal appeals court in Washington, D.C., raises the question of whether the EPA violated the Clean Air Act and federal requirements for rulemaking when it set the NAAQS at a level at or below background "such that attainment may not be achieved through practicable controls [and] can be justified by illusory promises of future waivers under the exceptional event, international transport, or rural transport programs."[62] Rather, the lawsuit argues that the CAA requires the EPA to set NAAQS at levels that are actually attainable. The lawsuit also questions whether the EPA had sufficient new evidence to warrant lowering the standard at all.[63]

Explaining Arizona's motivation for filing the lawsuit, Attorney General Brnovich explained: "We all want clean air, however, reducing the ozone standards to 70 ppb will be nearly impossible for Arizona to attain. . . . The financial stakes for [Arizona] are enormous if we are unable to comply."[64]

Conclusion

States across the country are just now starting to approach attainment of the 2008 standard of 75 ppb, but the EPA continues to move the goal post by mandating further reductions for ground-level ozone even though the benefit of such reductions is unsupported by the science. There comes a point of diminishing returns by continuing to mandate ever-lower levels, even as current standards are barely achievable and the proven costs of attainment are so high.

The EPA's new ozone standard of 70 ppb will be virtually impossible for Arizona to meet due to Arizona's high levels of background, limited local sources, and unique geography. What's worse, the EPA has acted well outside its mandate in lowering the standard, which goes beyond an "adequate margin of safety."

The Clean Air Act needs to be updated to take our modern reality into consideration. As such, the CAA should be amended to allow states to discount for interstate and international transport, and it should require the EPA to consider cost and feasibility when setting NAAQS. In addition, Congress should reduce or even eliminate funding for this program until such time as the 2015 standard is rolled back or reexamined.

Implementation of the current rule in Arizona is not reasonable, based in sound science or achievable. As such, at the very least, implementation of the rule should be set aside in Arizona and other states similarly situated, and those states should be given the opportunity to work meaningfully with the federal government to obtain a realistic plan other than what the current rule requires.

End Notes

1. "Study Links Springtime Ozone Increases Above Western North America to Emissions From Abroad," University of Colorado Boulder, Jan. 20, 2010.

2. "Nature, Chinese Pollution Offset U.S. West Ozone Gains," Jet Propulsion Laboratory, Aug. 10, 2015.

3. "Study Links Springtime Ozone Increases Above Western North America to Emissions From Abroad," *supra* note 1.

4. Ozone is found in Earth's stratosphere, where it protects us from ultraviolet radiation; in Earth's troposphere, where it acts as a greenhouse gas; and at ground level, where it is a component of smog. Ground-level ozone is produced when nitrogen oxides react with sunlight and volatile organic compounds. Sources of nitrogen oxides and volatile organic compounds are both man-made and naturally occurring. *See* "NASA: Background Ozone a Major Issue in U.S. West," Jet Propulsion Laboratory, California Institute of Technology, Sept. 29, 2015.

5. 42 U.S.C. Sec. 7409. When setting NAAQS, the EPA's mandate "is to identify the maximum airborne concentration of a pollutant that the public health can tolerate, decrease the concentration to provide an 'adequate' margin of safety, and set the standard at that level." *Whitman v. Am. Trucking Ass'n*, 531 U.S. 457, 465 (2001).

6. Table of Historical National Ambient Air Quality Standards, Environmental Protection Agency, https://www.epa.gov/ozone-pollution/table-historical-ozone-national-ambient-air-quality-standards-naaqs.

7. According to the EPA, aggregate national emissions of the six common air pollutants regulated by the CAA, including ozone, dropped an average of 69 percent from 1970 to 2014. "Progress Cleaning the Air and Improving People's Health," Environmental Protection Agency, https://www.epa.gov/clean-air-act-overview/progress-cleaning-air-and-improving-peoples-health#pollution.

8. Daren Bakst, "What the EPA Isn't Telling You About Its New Ozone Standards," *The Daily Signal*, Oct. 1, 2015.

9. Ruth M. Doherty, "Ozone Pollution From Near and Far," *Nature Geoscience*, Aug. 10, 2015.

10. ADEQ Comments on Proposed Rule, March 17, 2015; National Ambient Air Quality Standards for Ozone, Proposed Rules, 79 Fed. Reg. 75234, 75330 (Dec. 17, 2014).

11. See National Ambient Air Quality Standards for Ozone; Final Rule, 80 Fed. Reg. 65292, 65303 (Oct. 26, 2015); E.S. Schelegle, et al., "6.6-hour inhalation of ozone concentrations from 60 to 87 parts per billion in healthy humans," Am. J. Respir. Crit. Care Med. 2009 Aug 1;180(3):265-72. (May 15, 2009).

12. 80 Fed. Reg. at 65318-21.

13. *Id.* at 65323-6, 65353.

14. *See* Responses to Significant Comments on the 2014 Proposed Rule on the National Ambient Air Quality Standards for Ozone, 79 Fed. Reg. 75234 (Dec. 17, 2014).

15. "Intermountain Western U.S." refers to the states of Arizona, Colorado, New Mexico, Nevada, Utah, and Wyoming, as well as the high-elevation portions of eastern California. *See* U.S. Environmental Protection Agency, "Implementation of the 2015 Primary Ozone NAAQS: Issues Associated with Background Ozone – White Paper for Discussion," at pg. 3 n. 10 (2015).

16. 80 Fed. Reg. at 65300.

17. *Id.* at 65297.

18. *Id.* at 65295.

19. Ozone Basics, Environmental Protection Agency, https://www.epa.gov/ozone-pollution/ozone-basics#effects.

20. World Health Organization, Health Aspects of Air Pollution – Answers to Follow-up Questions from CAFE, p. 16. (2004), http://apps.who.int/iris/bitstream/10665/107556/1/E82790.pdf.

21. World Health Organization, Air Quality Guidelines: Global Update 2005, p. 322 (2005), http://www.euro.who.int/__data/assets/pdf_file/0005/78638/E90038.pdf?ua=1.

22. "NASA: Background Ozone a Major Issue in U.S. West," *supra* note 4; *see also* 80 Fed. Reg. at 65299.

23. *See* 80 Fed. Reg. at 65300.

24. Overview of Greenhouse Gases, Environmental Protection Agency, https://www3.epa.gov/climatechange/ghgemissions/gases/n2o.html; "NASA: Background Ozone a Major Issue in U.S. West," *supra* note 4.

25. Overview of Greenhouse Gases, *supra* note 24.

26. Volatile Organic Compounds' Impact on Indoor Air Quality, Environmental Protection Agency, https://www.epa.gov/indoor-air-quality-iaq/volatile-organic-compounds-impact-indoor-air-quality.

27. Laura Naranjo, "Volatile Trees: Forests fill the air with more than just a fresh scent," *EarthData*, Nov. 20, 2011, https://earthdata.nasa.gov/user-resources/sensing-our-planet/volatile-trees.

28. Arizona Department of Environmental Quality PowerPoint Presentation, AMC Environmental Issues Breakfast, April 12, 2016.

29. *Id.*

30. *Id.*

31. Arizona Department of Environmental Quality, Briefing Paper – EPA's New, Lower Ozone Standard, Oct. 2, 2015.

32. *Id.*

33. Brandon Loomis, "Arizona officials: Sun, old cars will make new EPA ozone limit difficult to meet," *Arizona Republic*, Oct. 2, 2015, *available at* http://www.azcentral.com/story/news/arizona/politics/2015/10/02/arizona-sun-old-cars-make-new-epa-ozone-limit-difficult/73221680/; *see also* Janet Pelley, "Consumers Hold Onto Cars Longer; Making Exhaust Dirtier," *Scientific American*, Dec. 12, 2014, *available at* http://www.scientificamerican.com/article/consumers-hold-onto-cars-longer-making-exhaust-dirtier/.

34. James E. McCarthy & Richard K. Lattanzio, Ozone Air Quality Standards: EPA's 2015 Revision at 18, *Congressional Research Service*, Jan. 25, 2016.

35. *Id.* at 5.

36. U.S. Environmental Protection Agency, "Implementation of the 2015 Primary Ozone NAAQS: Issues Associated with Background Ozone – White Paper for Discussion," at pg. 2 (2015).

37. A Natural Disadvantage: Punishing Arizona for Ozone Levels Beyond its Control at 4.0, The Center for Regulatory Solutions, Small Business Entrepreneurship Council, 2016, http://centerforregulatorysolutions.org/wp-content/uploads/2016/02/A-Natural-Disadvantage.pdf.

38. The National Ambient Air Quality Standards, Tools for Addressing Background Ozone at 3, Environmental Protection Agency, https://www.epa.gov/sites/production/files/2015-10/documents/20151001_background_ozone.pdf; *see also* Arizona Department of Environmental Quality PowerPoint Presentation, *supra* note 28.

39. The National Ambient Air Quality Standards, Tools for Addressing Background Ozone, *supra* note 38, at 3.

40. Arizona Department of Environmental Quality PowerPoint Presentation, *supra* note 28.

41. 69 Fed. Reg. 32450 (June 10, 2004).

42. The National Ambient Air Quality Standards, *supra* note 38, at 2.

43. *Id.* at 3. The EPA has indicated that it is undertaking a review of the exceptional events designation process and expects to take final action to issue guidance and simplify the rule some time in 2016. It is unclear at this point what that guidance might look like and whether it will in fact be forthcoming this year.

44. ADEQ Comments on Proposed Rule, *supra* note 10, at 7.

45. "NASA: Background Ozone a Major Issue in U.S. West," *supra* note 4.

46. State Environmental Agency Perspectives on Background Ozone & Regulatory Relief at 11, Results of a Survey by the Association of Air Pollution Control Agencies, June 2015.

47. *Id.*

48. Arizona Department of Environmental Quality, Briefing Paper, *supra* note 31.

49. "NASA: Background Ozone a Major Issue in U.S. West," *supra* note 4.

50. The Clean Air Act has a "good neighbor" provision that purports to require states to prohibit emissions that will significantly contribute to a downwind state's nonattainment. *See* "Interstate Air Pollution Transport," Clean Air Markets, Environmental Protection Agency, https://www.epa.gov/airmarkets/interstate-air-pollution-transport. But the provision does not enable a downwind state to discount or exclude interstate transport from its levels. Because of this, and because there is no mechanism for enforcing the provision, it is of limited utility. For example Arizona receives significant interstate transport from California, and the CAA's "good neighbor" provision technically requires California to control it. But California is currently so behind in meeting the NAAQS that it is not even counted in EPA's latest studies.

51. Arizona Department of Environmental Quality PowerPoint Presentation, *supra* note 28; Letter from Eric C. Massey, Director of Air Quality, Arizona Department of Environmental Quality, to Environmental Protection Agency, March 17, 2015.

52. Arizona Department of Environmental Quality, Briefing Paper, *supra* note 31.

53. Arizona Department of Environmental Quality PowerPoint Presentation, *supra* note 28.

54. William V. Theobald, "AZ to Congress: We Can't Comply with the Ozone Rule," *Arizona Republic*, April 15, 2016, *available* at http://www.azcentral.com/story/news/politics/arizona/2016/04/14/az-congress-we-cant-comply-epa-ozone-rule/83041208/; Arizona Department of Environmental Quality PowerPoint Presentation, *supra* note 28.

55. Testimony of Misael Cabrera, Director, Arizona Department of Environmental Quality, Before the Subcommittee on Energy and Power, House Committee on Energy and Commerce, April 14, 2016. A Natural Disadvantage, *supra* note 37.

56. Testimony of Misael Cabrera, *supra* note 55.

57. Letter from William C. Allison V, Director, Air Pollution Control Division, Colorado Department of Public Health and Environment, to U.S. Environmental Protection Agency, March 17, 2015, *available at* https://www.colorado.gov/pacific/sites/default/files/AP-PO-ColoradoCommentsOzoneNAAQS.pdf.

58. 42 U.S.C. Sec. 7503; 40 C.F.R. 51.165(a)(3).

59. *See* Arizona Department of Environmental Quality PowerPoint Presentation, *supra* note 28.

60. State Environmental Agency Perspectives on Background Ozone & Regulatory Relief, *supra* note 46, at 12.

61. At the time of filing, Arizona was joined by Arkansas, New Mexico, North Dakota and Oklahoma. Since then, Kentucky, Utah, Louisiana, Texas and Wisconsin have all been granted permission to join.

62. *State of Arizona v. EPA*, No. 15-1392, Petitioners' Non-Binding Statement of Issues (Nov. 30, 2015, D.C. Cir.).

63. *Id.*

64. Press Release: Arizona Files Lawsuit Along with Four Other States Challenging EPA's New Ozone Standards Rule, Arizona Attorney General, Oct. 29, 2015.

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Atmospheric Chemistry and Physics

US surface ozone trends and extremes from 1980 to 2014: quantifying the roles of rising Asian emissions, domestic controls, wildfires, and climate

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Abstract. US surface O_3 responds to varying global-to-regional precursor emissions, climate, and extreme weather, with implications for designing effective air quality control policies. We examine these conjoined processes with observations and global chemistry-climate model (GFDL-AM3) hindcasts over 1980–2014. The model captures the salient features of observed trends in daily maximum 8 h average O_3: (1) increases over East Asia (up to 2 ppb yr^{-1}), (2) springtime increases at western US (WUS) rural sites (0.2–0.5 ppb yr^{-1}) with a baseline sampling approach, and (3) summertime decreases, largest at the 95th percentile, and wintertime increases in the 50th to 5th percentiles over the eastern US (EUS). Asian NO_x emissions have tripled since 1990, contributing as much as 65 % to modeled springtime background O_3 increases (0.3–0.5 ppb yr^{-1}) over the WUS, outpacing O_3 decreases attained via 50 % US NO_x emission controls. Methane increases over this period contribute only 15 % of the WUS background O_3 increase. Springtime O_3 observed in Denver has increased at a rate similar to remote rural sites. During summer, increasing Asian emissions approximately offset the benefits of US emission reductions, leading to weak or insignificant observed O_3 trends at WUS rural sites. Mean springtime WUS O_3 is projected to increase by ~10 ppb from 2010 to 2030 under the RCP8.5 global change scenario. While historical wildfire emissions can enhance summertime monthly mean O_3 at individual sites by 2–8 ppb, high temperatures and the associated buildup of O_3 produced from regional anthropogenic emissions contribute most to elevating observed summertime O_3 throughout the USA. GFDL-AM3 captures the observed interannual variability of summertime EUS O_3. However, O_3 deposition sink to vegetation must be reduced by 35 % for the model to accurately simulate observed high-O_3 anomalies during the severe drought of 1988. Regional NO_x reductions alleviated the O_3 buildup during the recent heat waves of 2011 and 2012 relative to earlier heat waves (e.g., 1988, 1999). The O_3 decreases driven by NO_x controls were more pronounced in the southeastern US, where the seasonal onset of biogenic isoprene emissions and NO_x-sensitive O_3 production occurs earlier than in the northeast. Without emission controls, the 95th percentile summertime O_3 in the EUS would have increased by 0.2–0.4 ppb yr^{-1} over 1988–2014 due to more frequent hot extremes and rising biogenic isoprene emissions.

1 Introduction

Within the United States, ground-level O_3 has been recognized since the 1940s and 1950s as an air pollutant detrimental to public health. Decreases in summertime O_3 were observed in parts of California and throughout the EUS (e.g., Cooper et al., 2012; Simon et al., 2015), following regional NO_x controls after the lowering of the US National Ambient Air Quality Standard (NAAQS) for O_3 in 1997 to 84 ppb. On the basis of health evidence, the NAAQS level for O_3

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has been further lowered to 75 ppb in 2008 and to 70 ppb in 2015 (Federal Register, 2015). There are concerns that rising Asian emissions and global methane (Jacob et al., 1999; Lin et al., 2015b), more frequent large wildfires in summer (e.g., Jaffe, 2011; Yang et al., 2015; Abatzoglou et al., 2016), and late spring deep stratospheric O_3 intrusions (Lin et al., 2012a, 2015a; Langford et al., 2014) may pose challenges in attaining more stringent O_3 standards in high-elevation WUS regions. A warming climate would also offset some of the air quality improvements gained from regional emission controls (e.g., Fiore et al., 2015). Quantitative understanding of sources of O_3 variability on daily to multi-decadal timescales can provide valuable information to air quality control managers as they develop O_3 abatement strategies under the NAAQS. Here we systemically investigate the response of US surface O_3 means and extremes to changes in Asian and North American anthropogenic emissions, global methane, regional heat waves, and wildfires over the course of 35 years from 1980 to 2014, using observations and chemistry-climate model (GFDL-AM3) hindcasts (Lin et al., 2014, 2015a, b).

Rapid economic growth has led to a tripling of O_3 precursor emissions from Asia in the past 25 years (e.g., Granier et al., 2011; Hilboll et al., 2013). Observed 1 h O_3 mixing ratios can frequently reach 200–400 ppb during regional pollution episodes in eastern China (Wang et al., 2006; Li et al., 2016), with a seasonal peak in the late spring to early summer (Wang et al., 2008; Lin et al., 2009). A synthesis of available observations from the mid-1990s to the 2000s indicates increases of 1–2 ppb yr^{-1} in spring to summer O_3 in China (Ding et al., 2008; Ma et al., 2016; Sun et al., 2016). Long-range transport of Asian pollution plumes towards western North America has been identified by aircraft and satellite measurements and in chemical transport models (e.g., Jaffe et al., 1999; Fiore et al., 2009; Brown-Steiner and Hess, 2011; Lin et al., 2012b; Huang et al., 2013; Verstraeten et al., 2015). Systematic comparison of observed and modeled long-term O_3 trends over Asia is lacking in the published literature but is needed to establish confidence in models used to assess the global impacts of rising Asian emissions.

Model simulations indicate that import of Asian pollution enhances mean WUS surface O_3 in spring by ~ 5 ppb (Zhang et al., 2008; Lin et al., 2012b), and occasionally contributes 8–15 ppb during springtime pollution episodes observed at rural sites (Lin et al., 2012b) as supported by in situ aerosol composition analysis (VanCuren and Gustin, 2015). Stratospheric intrusions can episodically increase daily 8 h average surface O_3 by 20–40 ppb, contributing to the highest observed O_3 events at high-elevation WUS sites (Lin et al., 2012a, 2015a), in addition to pollution transport from California (e.g., Langford et al., 2010). In the densely populated EUS, both changes in regional anthropogenic emissions and air pollution meteorology have the greatest impacts on summer surface O_3 during pollution episodes (e.g., Jacob and Winner 2009; Rieder et al., 2015; Porter et al., 2015; Pusede et al., 2015). Discerning directly the effect of climate change on air quality from long-term observation records of O_3 would be ideal, but concurrent trends in precursor emissions and large internal variability in regional climate impede such an effort. It is difficult to separate the impacts of changes in global-to-regional precursor emissions and different meteorological factors on O_3 at given locations without the benefit of multiple sensitivity experiments afforded by models.

On the other hand, process-oriented assessments of the models are needed to build confidence in their utility for assessing pollution control strategies, estimating tropospheric O_3 radiative forcing and projecting pollution extremes under future climate scenarios (e.g., Monks et al., 2015). A number of studies show that global models capture observed decreases in summertime O_3 over the EUS during 1990–2010, but have difficulty simulating O_3 increases measured at remote high-elevation sites that are believed to represent hemispheric-scale conditions with little influence from fresh local pollution (hereafter referred to as "baseline") (e.g., Lamarque et al., 2010; Koumoutsaris and Bey, 2012; Parrish et al., 2014; Brown-Steiner et al., 2015; Strode et al., 2015). Recently, Lin et al. (2015b) examined the representativeness of O_3 trends derived from sparse measurements in the free troposphere over the WUS, originally reported by Cooper et al. (2010) and used in prior model evaluations. They found that discrepancies between observed and simulated O_3 trends reflect measurement sampling biases. Here we seek additional insights into the causes of the model–observation disagreement at the WUS rural sites with continuous, high-frequency measurements. Notably, we reconcile observed and simulated O_3 trends at these sites with a baseline sampling approach in the model.

Our goal in this paper is 2-fold: first, to systematically evaluate how well the GFDL-AM3 model represents trends and variability of surface O_3 observed at rural sites across the US; second, to examine changes in US surface O_3 means and extremes in a suite of multi-decadal hindcast simulations designed to isolate the response of O_3 to increases in Asian anthropogenic emissions, North American emission controls, rising global methane, wildfires, and interannual variability in meteorology. We examine trends across the entire probability distribution of O_3 concentration, which is crucial to assessing the ability of models to simulate the surface O_3 response under different temperature and chemical regimes depending on seasons, geographical location, and regional transport patterns. Specifically, we evaluate the trends separately for the 5th, 50th and 95th percentiles of the O_3 concentration distribution in spring (MAM), summer (JJA), autumn (SON), and winter (DJF).

Section 2 briefly describes the observational records, model experiments, and analysis approach. As a first step towards assessing our understanding of the impacts of rising Asian emissions, we briefly review Asian O_3 trends from observations in recent publications and evaluate modeled trends (Sect. 3). We then focus our analysis on the US, using both observations and models to assess the response of

US surface O_3 to changes in background O_3, regional anthropogenic emissions and meteorology (Sect. 4). In Sect. 5, we further separate the influence of background on WUS O_3 into components driven by rising Asian anthropogenic emissions, global methane, and wildfires. We quantify the contribution of these factors to surface O_3 in both rural areas such as national parks (Sect. 5.1 to 5.3) and in densely populated regions such as the Denver metropolitan area (Sect. 5.4). After evaluating historical trends, we additionally draw upon two simulations following the 21st century RCP4.5 versus RCP8.5 global change scenarios to project WUS O_3 through 2050 (Sect. 5.2). Section 6 examines how the EUS summertime O_3 probability distribution and pollution extremes respond to large-scale heat waves, droughts, and regional NO_x reductions over the past decade, and how well our model simulates the observed features. Finally, we summarize in Sect. 7 the key drivers of US surface O_3 trends and extremes and discuss the implications of this study.

2 Model and observations

2.1 Chemistry-climate model experiments

The GFDL-AM3 model includes interactive stratosphere–troposphere chemistry and aerosols on a cubed sphere grid with a resolution of approximately $200 \times 200\,\mathrm{km}^2$ (Donner et al., 2011). Table 1 summarizes the meteorology, radiative forcing agents, and emissions used in each experiment. The hindcast simulations (1979–2014) are nudged to the NCEP/NCAR reanalysis zonal and meridional winds using a height-dependent nudging technique (Lin et al., 2012b). Biogenic isoprene emissions and lightning NO_x are tied to model meteorology (Guenther et al., 2006; Rasmussen et al., 2012) and thus can respond to changes in climate, whereas soil NO_x and chemical dry deposition velocities are set to a monthly climatology (Naik et al., 2013), with a diurnal cycle applied for O_3 dry deposition. To investigate the possible influence of drought on O_3 removal (e.g., Emberson et al., 2013), we additionally conduct a sensitivity simulation for 1988 with reduced O_3 deposition velocity (see Sect. 6). Our BASE simulation and two additional simulations with modified emissions (FIXEMIS and IAVFIRE) were previously used to interpret the causes of increasing autumnal O_3 measured at Mauna Loa Observatory in Hawaii since 1974 (Lin et al., 2014), interannual variability of springtime O_3 (Lin et al., 2015a) and the representativeness of free tropospheric O_3 measurements over the WUS (Lin et al., 2015b).

With anthropogenic emissions and methane held constant (Table 1), the FIXEMIS and IAVFIRE simulations isolate the influence from meteorology and wildfire emissions, respectively. In IAVASIA, anthropogenic emissions from East Asia (15–50° N, 95–160° E) and South Asia (5–35° N, 50–95° E) are allowed to vary from year to year as in BASE, while anthropogenic emissions in the other regions of the world, global methane and wildfire emissions are held constant as in FIXEMIS. In $IAVCH_4$, global methane is allowed to vary over time as in BASE, but with anthropogenic and wildfire emissions held constant as in FIXEMIS. The IAVASIA and $IAVCH_4$ simulations thus isolate the role of rising Asian anthropogenic emissions and global methane, respectively, by contrasting with the FIXEMIS simulation. Both BASE and $IAVCH_4$ simulations apply observed time-varying methane concentrations as a lower boundary condition for chemistry (Supplement Fig. S1). Thus, underestimates in historical methane emissions reported recently by Schwietzke et al. (2016) do not affect our results. We quantify the total contributions to surface O_3 from meteorological variability, stratosphere-to-troposphere transport, pollution from foreign continents and O_3 produced by global methane, lightning NO_x, wildfires and biogenic emissions with the Background simulation, in which North American anthropogenic emissions are zeroed out relative to BASE. We additionally draw upon two simulations with the GFDL Coupled Model CM3 following the 21st century RCP global change scenarios to project changes in WUS O_3 through 2050. Details of these CM3 simulations were described in John et al. (2012).

2.2 Anthropogenic and biomass burning emissions

We first examine how well the emission inventories in AM3 BASE represent changes in regional NO_x emissions over recent decades inferred from satellite measurements of tropospheric vertical column density (VCD_{trop}) of NO_2. The combined record of GOME and SCIAMACHY shows that VCD_{trop} NO_2 over the highly polluted region of eastern China almost tripled during 1996–2011 (Fig. 1a). In contrast, VCD_{trop} NO_2 over the EUS decreased by $\sim 50\,\%$ in the 2000s (Fig. 1b) due to NO_x State Implementation Plans (commonly known as the NO_x SIP Call) and many rules that tighten emission standards for mobile sources (McDonald et al., 2012). Similar decreases occurred in WUS cities, resulting from the NO_x control programs to achieve O_3 and regional haze planning goals. These trends are consistent with those reported by a few recent studies (e.g., Hilboll et al., 2013), including those using OMI NO_2 data (Russell et al., 2012; Duncan et al., 2016). For comparison with satellite data, we sample the model archived every 3 h closest to the time of satellite overpass for the SCIAMACHY and GOME products we use in Fig. 1 (10:00–10:30 local time). Trends in VCD_{trop} NO_2 are similar to those in NO_x emissions (orange lines versus red triangles in Fig. 1a–b), indicating that any changes in NO_x chemical lifetime or partitioning have negligible influence in our model, consistent with NO_2 loss against OH being minor during the morning overpasses of GOME and SCIAMACHY. The emission inventory used in BASE, from Lamarque et al. (2010) with annual interpolation after 2000 to RCP8.5 (Lamarque et al., 2012), mimics the opposing changes in NO_x emissions over eastern China versus the EUS during 1996–2011, consistent with

Table 1. Summary of forcings and emissions used in AM3 hindcasts and CM3 projections.

Experiment	Time periods	Meteorology	Radiative forcings	CH_4 (chemistry)	Anthropogenic emissions	Fire emissions
BASE	1979–2014	Nudged to NCEP	Historical	Historical	Historical	Historical
Background	1979–2014	As BASE	Historical	Historical	Zeroed out in N. America; as in BASE elsewhere	Historical
FIXEMIS	1979–2014	As BASE	Historical	2000	Constant[1]	Constant[1]
IAVFIRE	1979-2014	As BASE	Historical	2000	Constant[1]	Historical
IAVASIA	1979–2012[2]	As BASE	Historical	2000	Varying in Asia as in BASE; as in FIXEMIS elsewhere	Constant[1]
$IAVCH_4$	1979–2012[2]	As BASE	Historical	Historical	Constant[1]	Constant[1]
CM3_RCP4.5	2005–2050	Free running	RCP4.5	RCP4.5	RCP4.5	RCP4.5
CM3_RCP8.5	2005–2050	Free running	RCP8.5	RCP8.5	RCP8.5	RCP8.5

[1] Averaged over the whole 1970–2010 period. [2] Note that the IAVASIA and $IAVCH_4$ simulations only extend to 2012.

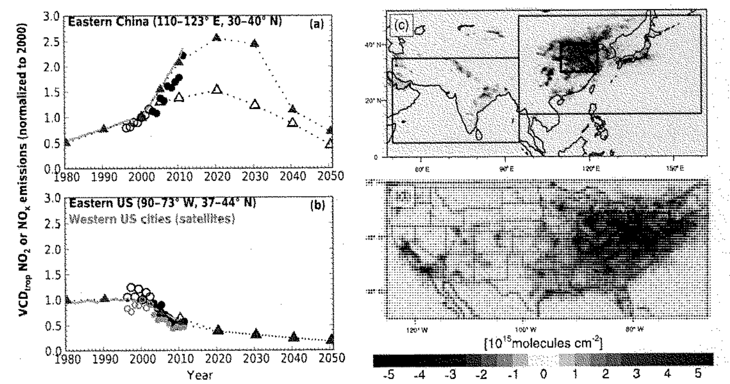

Figure 1. Changes in NO_x emissions. **(a–b)** Mean annual vertical column densities of tropospheric (VCDtrop) NO_2 normalized to the year 2000 for the eastern China and eastern US domains (black boxes on map) from GOME (1996–2002, open circles) and SCIAMACHY (2003–2011, closed circles) measurements and AM3 BASE simulations (orange lines). Triangles indicate trends in NO_x emissions (normalized to 2000) from Lamarque et al. (2010) with annual interpolation after 2000 to RCP8.5 (red) versus RCP4.5 (blue). **(c–d)** Differences in annual mean SCIAMACHY VCDtrop NO_2 from 2003–2005 to 2009–2011. The red boxes denote the regions where emissions vary over time in the IAVASIA simulation (Table 1). Satellite NO_2 data are from www.temis.nl, with the retrieval technique described in Boersma et al. (2004).

changes in VCD_{trop} NO_2 retrieved from the satellite instruments. For comparison, the RCP4.5 interpolation for 2001–2010 in CMIP5 historical simulations analyzed by Parrish et al. (2014) underestimates the increase in Chinese NO_x emissions by a factor of 2 (Fig. 1a). Recent reductions in Chinese NO_x emissions after 2011 (Duncan et al., 2016) are not represented in the inventories used in AM3.

Our BASE model applies interannually varying monthly mean emissions from biomass burning based on the RETRO inventory (Schultz et al., 2008) for 1970 to 1996 and GFEDv3 (van der Werf et al., 2010) for 1997 onwards, distributed vertically as recommend by Dentener et al. (2006). Figure S2 illustrates the interannual variability of biomass burning CO emissions from the main source regions of the Northern Hemisphere over the period 1980–2014. Boreal fire emissions in Eurasia almost doubled from 1980–1995 to 1996–2014, with large fires occurring more frequently in the recent decade, as found for the WUS (Dennison et al., 2014; Yang et al., 2015).

2.3 Ozone observation records and uncertainties

Long-term surface O_3 observation records were obtained at 70 selected rural monitoring sites with 20 (1995–2014) to 27 (1988–2014) years of continuous hourly measurements

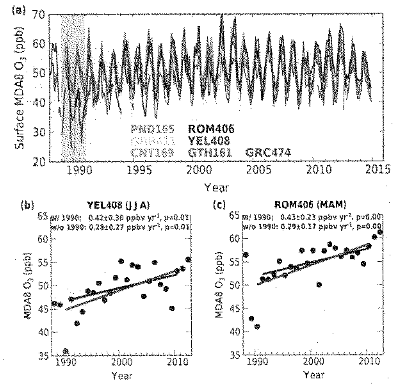

Figure 2. Measurement uncertainties. **(a)** Comparison of observed monthly mean MDA8 O_3 at WUS CASTNet sites. All sites have more than 90 % data availability in every month shown. The gray shading denotes the period when data at Yellowstone (red) and Rocky Mountain (black) were inconsistent with the other sites. **(b–c)** The 1990–2010 trends of median JJA MDA8 O_3 at Yellowstone and median MAM MDA8 O_3 at Rocky Mountain with and without data in 1990.

from the US National Park Services, the US Clean Air Status and Trends Network (CASTNet), and the US EPA Air Quality System. Cooper et al. (2012) reported trends in daytime (11:00–16:00) O_3 over 1990–2010 at 53 rural sites. We investigate trends in daily maximum 8 h averaged (MDA8) O_3 and expand the analysis of Cooper et al. (2012) using additional data to 2014 and including 17 additional sites with measurements begun in 1991–1995. All sites have at least 20 years of data. If a site has less than 50 % data availability in any season, then that particular season is discarded. The trend is calculated separately for the 5th, 50th and 95th percentiles of daily MDA8 O_3 for each season through ordinary linear least-square regression. Statistics are derived for the slope of the linear regression in units of ppb yr^{-1}, the range of the slope with a 95 % confidence limit (not adjusted for sample autocorrelation), and the p value indicating the statistical significance of the trend based on a two-tailed t test.

A cross-site consistency analysis was performed to determine robust changes in the time evolution of O_3 over the WUS during 1988–2014 (Fig. 2). The monitor at Yellowstone National Park was moved 1.5 km from the Lake Yellowstone site to the Water Tank site in 1996. While the local transport patterns are slightly different for the two sites, using MDA8 data from the well-mixed midday period minimizes the differences (Jaffe and Ray, 2007). Observed O_3 interannual variations show large-scale similarity across sites over the Intermountain West except for the earlier period 1989–1990. During this period, observations at Yellowstone and Rocky Mountain national parks show low-O_3 anomalies that do not appear at other sites, but there is no change in measurement technique. Jaffe and Ray (2007) suggest this represents large-scale variations in background O_3 that are seen in common at these two parks. However, analysis of meteorological fields and model diagnostics does not reveal any obvious transport anomaly influencing O_3 variations at these sites in 1990 (Lin et al., 2015a). Observations at Pinedale in January–February 1990 are also anomalously low relative to Grand Canyon (GRC474), Centennial (CNT169), and Gothic (GTH161). These anomalous data at the beginning of measurement records can substantially influence trends calculated from short records. For example, Cooper et al. (2012) found a summer O_3 increase of 0.42 ± 0.30 ppb yr^{-1} at Yellowstone over 1990–2010. Removing 1990, we find a weaker increase of 0.28 ± 0.27 ppb yr^{-1} (Fig. 2b). Removing 1990 at Rocky Mountain resulted in a weaker springtime O_3 increase of 0.29 ± 0.17 ppb yr^{-1} compared to 0.43 ± 0.23 ppb yr^{-1} over 1990–2010 (Fig. 2c). To assess robust O_3 changes, we thus remove these apparently uncertain measurements in 1990 from the subsequent analysis.

2.4 Model baseline sampling approach

Springtime O_3 observations at WUS high-elevation sites (≥ 1.5 km a.s.l.) typically represent baseline conditions with little influence from fresh local pollution. In a global model with $\sim 200 \times 200\,km^2$ horizontal resolution, however, these remote sites can reside in the same grid cell that contains urban cities where NO_x emissions decreased over the analysis period. For example, Rocky Mountain National Park (2.7 km a.s.l.) is less than 100 km from the Denver metropolitan area in Colorado. This limitation of large-scale models in resolving urban-to-rural gradients and sharp topography results in an artificial offset of increased baseline O_3 at remote sites by decreased urban pollution within the same model grid cell. Thus, coarse-resolution models are often unable to reproduce observed O_3 increases at the high-elevation sites representative of remote baseline conditions (Fig. 3a versus b), as found in many prior modeling analyses (e.g., Parrish et al., 2014; Strode et al., 2015, and references therein). This limitation can be addressed by using a baseline selection procedure to identify conditions for sampling the model to avoid model artifacts caused by poor spatial resolution, as described below.

All measurements presented in this study are unfiltered. We implement a set of regional CO-like tracers (COt), with a 50-day exponential decay lifetime and surface emissions constant in time from each of four northern mid-latitude source regions (Lin et al., 2014). We use these COt tracers to bin modeled O_3 according to the dominant influence of different continental air regimes. To represent observed baseline conditions at WUS sites, we sample AM3

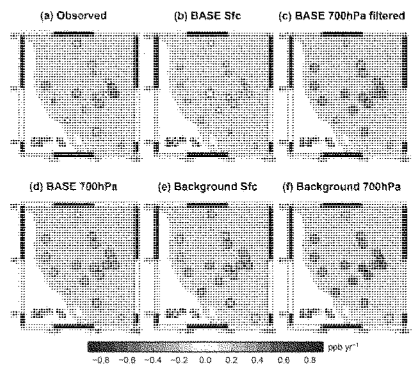

Figure 3. Influence of baseline sampling. Median spring MDA8 O_3 trends over 1988–2014 at WUS sites from **(a)** observations, **(b)** BASE model sampled at the surface, **(c)** BASE sampled at 700 hPa and filtered to remove the influence from fresh local pollution (see Sect. 2.4), **(d)** BASE sampled at 700 hPa without filtering, and **(e–f)** Background (with North American anthropogenic emissions shut off) sampled at the surface versus at 700 hPa. Note that three low-elevation (< 1.5 km) sites, Joshua Tree, Big Bend and Glacier national parks, are always sampled at the surface. Larger circles indicate sites with statistically significant trends ($p < 0.05$).

at 700 hPa ($\sim$ 3 km a.s.l.) and filter the O_3 data in the BASE simulation to remove the influence from fresh local pollution. Specifically, our filter excludes days when North American COt (NACOt) exceeds the 67th percentile for each season. This procedure yields higher calculated baseline O_3 increases (Fig. 3c), bringing it closer to observations (Fig. 3a). When sampled at 700 hPa without filtering (Fig. 3d), BASE gives statistically significant O_3 increases, but the rate of increase is ~ 0.1 ppb yr^{-1} weaker than with filtering. With North American anthropogenic emissions shut off, the model simulates significant O_3 increases that are similar at the surface (Fig. 3e) and at 700 hPa (Fig. 3f). This finding indicates that the underestimate of O_3 increases in BASE, when sampled at the surface (Fig. 3b), reflects an excessive offset from domestic pollution decreases in the model relative to observed conditions, as opposed to the insufficient mixing of free tropospheric O_3 to the surface. As individual sites display observed trends falling in between the filtered model, and those sampled at the surface versus aloft, we can use the model to interpret which sites most frequently sample baseline versus being influenced by North American anthropogenic emissions. For consistency, in the subsequent analysis we apply model baseline filtering to all WUS sites with elevations greater than 1.5 km altitude. In the EUS, where the terrain and monitor elevations are much lower than in the west and observed O_3 trends are largely controlled by regional emission changes, we always sample the model at the surface without filtering.

3 Global distribution of lower tropospheric O_3 trends

3.1 Global O_3 burden and distribution of trends

We begin by examining the global distribution of lower tropospheric O_3 trends over 1988–2014 from the BASE simulation (Fig. 4) and focus on the differences between the surface and free troposphere ($\sim$ 700 hPa), with implications for understanding the impact of trends in hemispheric baseline O_3 on surface air quality. The model indicates that surface MDA8 O_3 levels in Asia have increased significantly by 1.5–2.5 ppb yr^{-1} in the 95th percentile (Fig. 4a–b) and by 1–2 ppb yr^{-1} in the median values (Fig. 4c–d), with the largest increases occurring in southern Asia during spring and over eastern China during summer. In contrast, there is a marked decrease in surface MDA8 O_3 in WUS cities, throughout the EUS and in central Europe, particularly at the high percentiles and during summer. The increase in surface O_3 over Asia and decreases over the US and Europe are consistent with changes in regional emissions of O_3 precursors over this period (Fig. 1).

Over Southeast Asia (south of 30° N) during spring, earlier springtime O_3 photochemical production at lower latitudes coupled with active frontal transport (Liu et al., 2002; Carmichael et al., 2003; Lin et al., 2010) leads to a comparable or even greater increase in O_3 in the free troposphere than at the surface (Fig. 4c versus e). In contrast, over central eastern China during summer the simulated trends of O_3 in the free troposphere are at least a factor of 3 weaker than in surface air (Fig. 4d versus f), consistent with the analysis of MOZAIC aircraft data over Beijing in 1995–1999 versus 2003–2005 (Ding et al., 2008). Mean O_3 at 700 hPa above parts of North America and Europe show little change in summer or even increase during spring in the model, similar to the trends at 500 hPa (Fig. S3), despite the significant decreases in surface air. The global tropospheric O_3 burden in the BASE simulation increases by approximately 30 Tg over the past 35 years (Fig. 5a), attributed mainly to changes in anthropogenic emissions. Over the 2004–2015 OMI/MLS satellite era, however, meteorological variability contributes approximately half to the total simulated decadal trends of O_3 burden (Fig. 5a), indicating that attribution of the satellite-derived decadal trends of global tropospheric O_3 burden requires consideration of internal climate variability.

3.2 Comparison of observed and simulated O_3 trends in Asia

Long-term O_3 observations are very sparse in Asia, making it difficult to evaluate modeled O_3 trends. We compile available measurements from the published literature, includ-

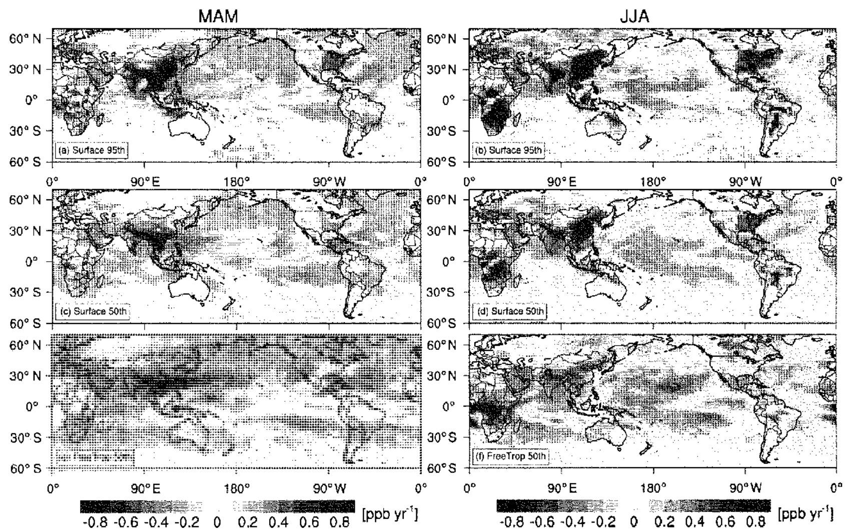

Figure 4. Global distribution of MDA8 O_3 trends from AM3 BASE over 1988–2014 for boreal spring (left) and summer (right) for the 95th percentile at the surface **(a–b)**, median at the surface **(c–d)**, and median in the free troposphere (700 hPa; **e–f**). Stippling indicates areas where the trend is statistically significant ($p < 0.05$). The color scale is designed to resolve regional features rather than extreme values and saturates. The range of the trends is -1 to $+2.5$ ppb yr^{-1}.

ing ozonesonde profiles at Hong Kong (2000–2014; www.woudc.org) and Hanoi (2005–2015; SHADOZ, Thompson et al., 2007), MOZAIC aircraft profiles collected on summer afternoons in the boundary layer (below 1250 m altitude) over Beijing for 1995–2005 (Ding et al., 2008), ground-based measurements at Mt. Tai (1.5 km a.s.l.) in central eastern China for July–August 2003–2015 (Sun et al., 2016), at the GAW stations, Shangdianzi north of Beijing for 2004–2014 (Ma et al., 2016) and Mt. Waliguan (3.8 km a.s.l.) on the Tibetan Plateau for 1994–2013 (Xu et al., 2016), at Taiwan for 1994–2007 (Lin et al., 2010), South Korea for 1990–2010 (Lee et al., 2014), Mt. Happo (1.9 km a.s.l.) in Japan for 1991–2011 (Tanimoto, 2009; Parrish et al., 2014), and a coastal site at Hong Kong in southern China for 1994–2007 (Wang et al., 2009).

Recently, Zhang et al. (2016) compiled sparse O_3 profiles above Southeast Asia from IAGOS commercial aircraft and ozonesondes from Hanoi for 1994–2004 versus 2005–2014 and found a total springtime O_3 increase of 20–25 ppb between the two periods (~ 2 ppb yr^{-1}). However, our model indicates an increase of up to 1 ppb yr^{-1} for free tropospheric O_3 over Southeast Asia in spring (Fig. 4e). We illustrate the possible influence of sampling deficiencies on the O_3 trends inferred from sparse observations (Fig. 5). The ozonesonde frequency is four profiles per month at Hong Kong and only one to two profiles per month at Hanoi. To determine the representativeness of O_3 trends derived from these sparse measurements, we compare observations and model results co-sampled on sonde launch days, with the "true average" determined from O_3 fields archived every 3 h from the model, as in our prior work for WUS sites (Lin et al., 2015a, b). Figure 5b and c show the comparisons for the annual trends of O_3 over 900–600 hPa. The trends are generally consistent across the sonde data, model co-sampled and "true average" results for Hong Kong, with an increase of 0.5 ± 0.1 ppb yr^{-1} over 2000–2014. Observations at Hanoi show an apparently rapid O_3 increase of 1.1 ± 0.2 ppb yr^{-1} over 2005–2014. AM3 BASE, when sampled sparsely as in the ozonesondes, captures the observed variability ($r^2 = 0.7$), whereas the "true average" over this period indicates the trend (0.7 ± 0.1 ppb yr^{-1}) is only 63 % of that inferred from observations. Moreover, interannual variability of O_3 resulting from wildfire emissions and meteorology in IAVFIRE is as large as the total O_3 change in

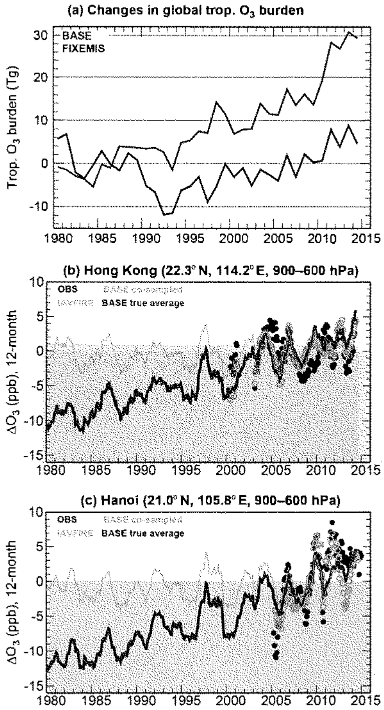

Figure 5. (a) Time series of changes in global tropospheric O_3 burden relative to the 1981–1990 mean from BASE and FIXEMIS simulations (Table 1). (b) Time series of 12-month running mean anomalies (relative to the 2005–2014 mean) of O_3 averaged over 900–600 hPa at Hong Kong from the averages of ozonesonde samples (black circles) and the BASE model co-sampled on sonde launch days (orange circles) versus the true average from BASE and IAVFIRE with continuous daily sampling (solid lines). (c) Same as (b), but for Hanoi.

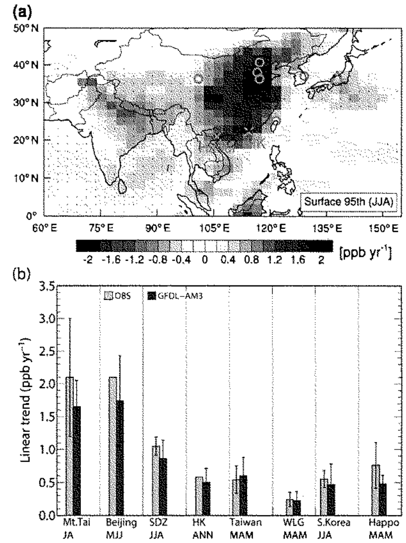

Figure 6. Surface O_3 trends in Asia. (a) Observation sites superimposed on a map of the 95th percentile summer MDA8 O_3 trends over 1995–2014 from AM3 BASE. (b) Comparison of median O_3 trends from AM3 (1995–2014) with observations (see text for periods): in central eastern China at Mt. Tai (July–August, Sun et al., 2016), Beijing (May–June–July, Ding et al., 2008) and Shangdianzi (SDZ) (JJA, Ma et al., 2016); in South China at Hong Kong (HK) (annual average, Wang et al., 2009) and Taiwan (MAM, Lin et al., 2010); at Mt. Waliguan (WLG) in western China (MAM, Xu et al., 2016); in South Korea (JJA, Lee et al., 2014) and Mt. Happo Japan (MAM, Tanimoto, 2009). For Mt. Happo (triangle on map) AM3 is sampled at 700 hPa and filtered for the influence from Asian continental air – more representative of observed baseline conditions in spring.

BASE over the short period 2005–2014. We conclude that measurement sampling artifacts influence the O_3 trends reported by Zhang et al. (2016).

Expanding the comparison to a suite of sites across East Asia (Fig. 6), we find that AM3 captures the key features of observed O_3 trends in Asia, including their seasonal to regional variations, summertime increases (1–2 ppb yr^{-1}) in central eastern China where NO_x emissions have approximately tripled since 1990 (Fig. 1a), and springtime increases (0.5 ppb yr^{-1}) at Taiwan and Mt. Happo that are driven by pollution outflow from the Asian continent. Note that to place the trends derived from the short observational records into a broader context, we show the 20-year trends over 1995–2014 from the model, except for South Korea (1990–2010) and Happo, Japan (1991–2011). We match the time period in the model with observations at these two sites because AM3 shows weaker O_3 increases when data for the recent years are included, which likely reflects the offsetting effects of regional emission reductions in South Korea and Japan.

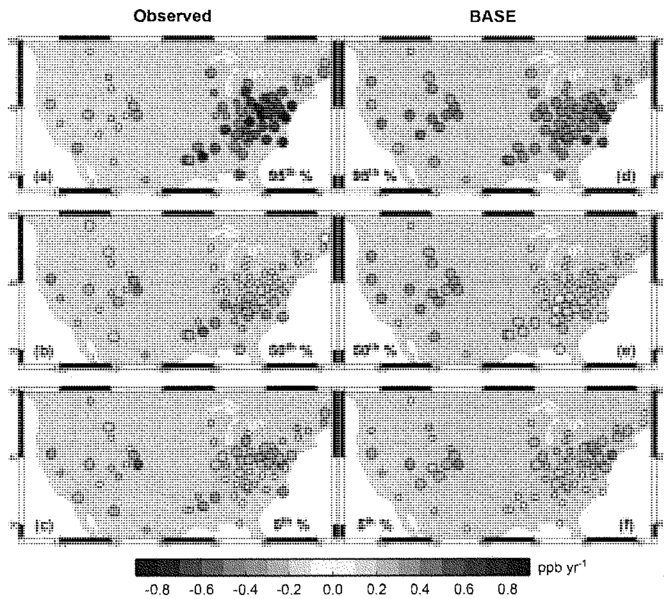

Figure 7. Linear trends in spring (MAM) MDA8 O_3 over 1988–2014 at US rural sites for the 95th, 50th, and 5th percentiles as observed (left) and simulated (right) in AM3 BASE. Larger circles indicate sites with statistically significant trends ($p < 0.05$). For WUS high-elevation sites, the model is sampled at 700 hPa and filtered to remove local influence (see text in Sect. 2.4).

Parrish et al. (2014) show that three CMIP5-like models underestimate the observed springtime O_3 increase at Mt. Happo by a factor of 4. This discrepancy may reflect a combination of factors: (1) underestimates of Asian emission growth in the RCP4.5 interpolation after 2000 used in CMIP5 historical simulations (Fig. 1a); (2) trends driven by interannual meteorological variability that free-running CMIP5 models are not expected to reproduce exactly; (3) an excessive offset from Japanese pollution decreases in the models owing to their coarse resolution and limitation in resolving observed baseline conditions at Mt. Happo. Sampling our BASE model at 700 hPa above Happo, we find an O_3 increase of 0.35 ± 0.13 ppb yr^{-1}. When focusing on days strongly influenced by outflow from the East Asian continent (Chinese COt $\geq$ 67th), the model O_3 trend increases to 0.48 ± 0.13 ppb yr^{-1}, approximating the observed increase of 0.76 ± 0.35 ppb yr^{-1} at Mt. Happo (Fig. 6b). The observed and simulated trends are not statistically different given the overlapping confidence limits. The larger confidence limit (uncertainty) derived from the Happo observations reflects the measurement inconsistency before 1998 and instrumental problems after 2007 (Tanimoto et al., 2016). We conclude that GFDL-AM3 captures 65–90 % of the observed O_3 increases in Asia, lending confidence in its application to assess the global impacts of rising Asian emissions.

4 Regional and seasonal variability of US surface O_3 trends

We next focus our analysis on the US, where dense, high-frequency, long-term, reliable measurements of surface O_3 facilitate process-oriented model evaluation. Comparisons of surface O_3 trends over 1988–2014 at 70 rural monitoring sites across the US as observed and simulated in AM3 BASE are shown in Fig. 7 for spring, Fig. 8 for summer, Fig. 9 for winter, and in Fig. S4 for autumn. The trends are calculated separately for the 5th, 50th and 95th percentiles of the daily MDA8 O_3 concentration distribution, with larger circles on

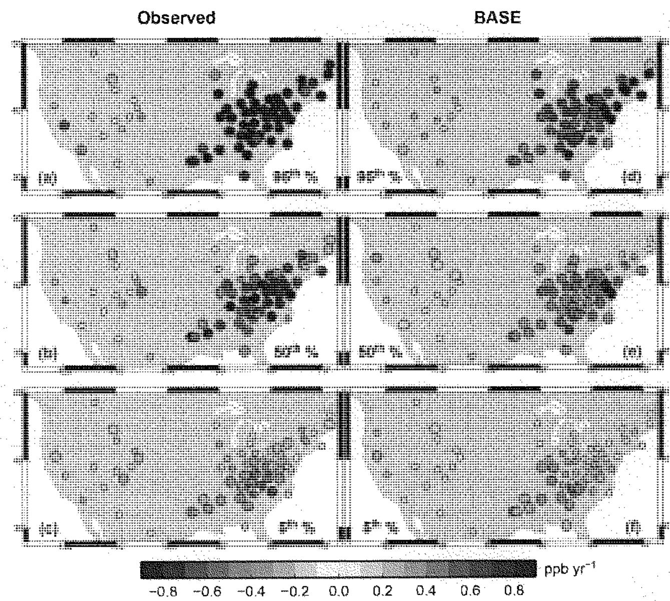

Figure 8. As in Fig. 7, but for summer (JJA). Note that the color scale saturates at ±0.8.

the maps indicating sites with statistically significant trends ($p < 0.05$). We first discuss observations (Sect. 4.1), followed by model evaluation and trend attribution (Sect. 4.2).

4.1 Observations

In spring (Fig. 7), observations indicate spatial heterogeneity in O_3 trends across the Intermountain West and the northeastern (north of 38° N) and southeastern US. At the 95th percentile (Fig. 7a) the pattern of observed trends is homogeneous across the northeastern and southeastern US, with approximately 85 % of the sites having statistically significant O_3 decreases of 0.4–0.8 ppb yr^{-1} and no sites showing a significant increase. In contrast, significant increases occur at 25 % of the sites in the Intermountain West. Only Joshua Tree National Park located downwind of the Los Angeles Basin shows a significant decrease at the 95th percentile. At the 50th percentile (Fig. 7b) there are significant O_3 decreases of 0.2–0.4 ppb yr^{-1} in the southeast and little overall change in the northeast, while significant increases of 0.2–0.5 ppb yr^{-1} occur at 50 % of the sites in the Intermountain West. Significant springtime O_3 increases occur at all observed percentiles at Lassen Volcanic National Park in California, Great Basin National Park in Nevada, Rocky Mountain National Park and US Air Force Academy in Colorado. At the 5th percentile (Fig. 7c) significant O_3 increases occur at most sites in the northeast, while little change and some negative trends are found in the southeast. The occurrence of the greatest observed O_3 decreases for the highest percentiles is consistent with high-temperature O_3 production being more NO_x-limited (Pusede et al., 2015) and thus more responsive to decreases in NO_x emissions.

The north-to-south gradient in springtime O_3 trends over the EUS reflects the earlier seasonal transition from NO_x-saturated to NO_x-sensitive O_3 production regimes in the southeast, where plentiful radiation in spring enhances HO_x supply and biogenic isoprene emissions begin earlier than in the northeast. The different response of springtime O_3 to NO_x controls in the southeast versus northeast noticed in this work is not present in prior analyses for shorter time periods (1990–2010 in Cooper et al., 2012, and 1998–2013 in Simon et al., 2015). We find 72 % of the southeastern sites experiencing significant median O_3 decreases in spring over

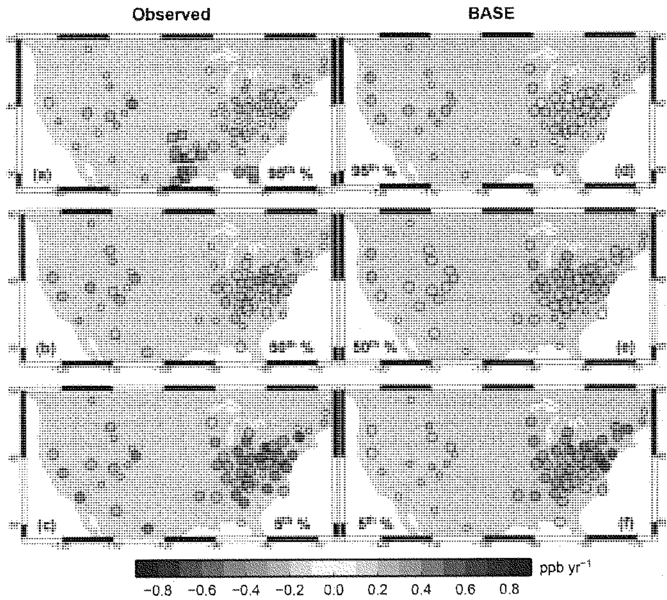

Figure 9. As in Fig. 7, but for winter (DJF). Large squares in **(a)** denote AQS sites with significant O_3 decreases in the 95th percentile.

1988–2014, while Cooper et al. (2012) found only 8 %. Sites with significant 95th percentile springtime O_3 decreases in the EUS are also much more common in our study (85 % versus 43 % in Cooper et al. (2012). In the 5th percentile, 45 % of the northeastern sites in our analysis have significant spring O_3 increases, with only 15 % in Cooper et al. (2012) Stronger O_3 reductions in the southeast than the northeast also occur during autumn (Fig. S4), reflecting an extension of biogenic isoprene emissions and NO_x-sensitive O_3 production in the southeast to autumn.

In summer (Fig. 8), as radiation intensifies and isoprene emissions peak seasonally, the O_3 production becomes more NO_x-limited across both the southeastern and northeastern US, where NO_x emission controls have led to significant O_3 decreases of 0.8–1.8 ppb yr^{-1} in the 95th percentile and 0.4–0.8 ppb yr^{-1} in the median value (Fig. 8a–b). In the southeast, significant decreases have also occurred at the lowest percentiles during summer (Fig. 8c), in contrast to the weak response during spring (Fig. 7c). Many northeastern states in the late 1990s and early 2000s did not turn on power plant NO_x emission controls until the O_3 season (May–September), which may contribute to observed differences between spring and summer O_3 trends. Compared to the 1990–2010 trends reported in Cooper et al. (2012), the EUS summer O_3 decreases reported here with additional data to 2014 are 33 % stronger. Despite reductions in precursor emissions in the WUS cities (Fig. 1d), there are no significant summer O_3 decreases at the intermountain sites, except in Yosemite and Joshua Tree national parks for the 95th percentile. Instead, a significant summer increase of ~ 0.3 ppb yr^{-1} occurs across the entire O_3 distribution at Yellowstone. Significant summer increases are found in the 5th percentile for Lassen, Mesa Verde, and Rocky Mountain national parks.

In winter (Fig. 9), observed O_3 increases are more common than in spring and summer across the US. The wintertime O_3 increases are strongest in the lowest percentiles over the EUS, indicating the influence from weakened NO_x titration as a result of regional NO_x emission controls (see also Gao et al., 2013; Clifton et al., 2014; Simon et al., 2015). Even during winter, some decreasing O_3 trends are found in the highest percentiles over the southeast (Fig. 9a), most prominently in Texas (Dallas and Houston), where tropical climate and year-round active photochemistry makes O_3 most responsive to regional NO_x emission controls. Despite the greatest NO_x emission reductions over the past decade in the central and northeastern US regions, observed O_3 reductions have been most pronounced in the southeast, particularly in spring and autumn.

4.2 Model evaluation and attribution of observed O_3 trends

The BASE simulation with GFDL-AM3 captures the salient features of observed O_3 trends over 1988–2014 at rural sites across the US: (1) the overall springtime increases and the lack of significant trends in summer over the Intermountain West; (2) the north-to-south gradients in O_3 trends during spring and the largest decreases in the 95th percentile during summer over the EUS; (3) wintertime increases in the 5th and 50th percentiles (left versus right panels in Figs. 7 to 9). AM3 also simulates a median springtime O_3 increase of 0.32 ± 0.11 ppb yr^{-1} over 1988–2014 (0.64 ± 0.50 ppb yr^{-1} over 2004–2014) at Mount Bachelor Observatory in Oregon, consistent with the positive trend (0.63 ± 0.41 ppb yr^{-1}) observed over the shorter 2004–2015 period (Gratz et al., 2014). These analyses imply that GFDL-AM3 represents the underlying chemical and physical processes controlling the response of US surface O_3 means and extremes to changes in global-to-regional precursor emissions and climate, despite mean state biases (Figs. S5–S6).

The filtered model shows greater 95th percentile O_3 increases than observed at some WUS sites (e.g., Yosemite; Grand Canyon; Canyonlands) for both spring and summer (Figs. 7a, d and 8a, d), reflecting that observations at these sites sometimes can be influenced by transport of photochemically aged plumes from nearby urban areas and from southern California during late spring and summer. When sampled at the surface, AM3 simulates small summertime O_3 decreases in the 95th and 50th percentiles over the Intermountain West (Fig. 4b, d), consistent with observations at Yosemite, Grand Canyon, and Canyonlands (Fig. 8a, b). As illustrated in Fig. 3 for spring and discussed in Sect. 2.4, individual sites in the west display observed trends falling in between the filtered model and those sampled at the surface versus aloft.

We examine how US surface O_3 responds to changes in regional anthropogenic emissions, hemispheric background, and meteorology by comparing O_3 trends in the BASE, Background, and FIXEMIS experiments (Figs. 10–11). With North American anthropogenic emissions shut off in the Background simulation, little difference is discernable from the BASE simulation for WUS O_3 trends during spring (first versus second rows in Fig. 10), indicating the key role of hemispheric background driving increases in springtime O_3 over the WUS. With anthropogenic emissions held constant in time, FIXEMIS still shows statistically significant spring O_3 increases in the 95th percentile (Fig. 10c), approximately half of the trends simulated in BASE, for Grand Canyon, Canyonlands, Mesa Verde and Rocky Mountain national parks. Prior work shows that deep stratospheric intrusions contribute to the highest observed and simulated surface O_3 events at these sites (Langford et al., 2009; Lin et al., 2012a). Strong year-to-year variability of such intrusion events (Lin et al., 2015a) can confound the attribution of springtime O_3 changes over the WUS to anthropogenic emission trends, particularly in the highest percentile and over a short record length. Summer avoids this confounding influence when stratospheric intrusions are at their seasonal minimum, as evidenced by little O_3 change in FIXEMIS over the WUS (Fig. 11c, f). In contrast to spring, the model shows larger differences in WUS O_3 trends between BASE and Background for summer when North American pollution peaks seasonally (Fig. 10a, d versus b, e compared to Fig. 11a, d versus b, e). There are significant increases of 0.2–0.5 ppb yr^{-1} in the 95th and 50th percentile summer background O_3 at more than 50 % of the western sites (Fig. 11b, e), offsetting the O_3 decreases resulting from US NO_x reductions and leading to little overall change in total observed and simulated O_3 at WUS rural sites during summer (Fig. 8).

Over the EUS, AM3 also simulates background O_3 increases, occurring in both the 95th and 50th percentiles, with a rate of 0.1–0.3 ppb yr^{-1} during spring (Fig. 10b, e) and 0.2–0.5 ppb yr^{-1} during summer (Fig. 11b, e). Based on prior model estimates that springtime background O_3 is greater in the northeast than the southeast (Lin et al., 2012a, b; Fiore et al., 2014), one might assume that the springtime O_3 increases in the 5th percentile observed over the northeast (Fig. 7c) have been influenced by a rising background. However, AM3 simulates homogeneous background O_3 trends across the entire EUS (Fig. 10b, e), indicating that the observed north-to-south gradient in O_3 trends reflects an earlier seasonal onset of NO_x-sensitive photochemistry in the southeast, as opposed to the background influence.

A warming climate is most likely to worsen the highest O_3 events in polluted regions (e.g., Schnell et al., 2016; Shen et al., 2016). With anthropogenic emissions held constant in time over 1988–2014, FIXEMIS suggests significant increases of 0.2–0.4 ppb yr^{-1} in the 95th percentile summertime O_3 over the EUS (Fig. 11c). Using self-organizing map cluster analysis, Horton et al. (2015) identified robust increases in the occurrence of summer anticyclonic circulations over eastern North America since 1990. We find that biogenic isoprene emissions over this period increased significantly by 1–2 % yr^{-1} (10 to 20 mg C m^{-2} summer^{-1}) throughout the EUS in the model, consistent with simulated increases in the 90th percentile JJA daily maximum temperature (Fig. 12a–b). Increases in isoprene emissions contribute to raising EUS background O_3 in summer (Fig. 11b, e). Using the Global Land-Based Datasets for Monitoring Climate Extremes (GHCNDEX; Donat et al., 2013), we find increases in the number of warm days above the 90th percentile and

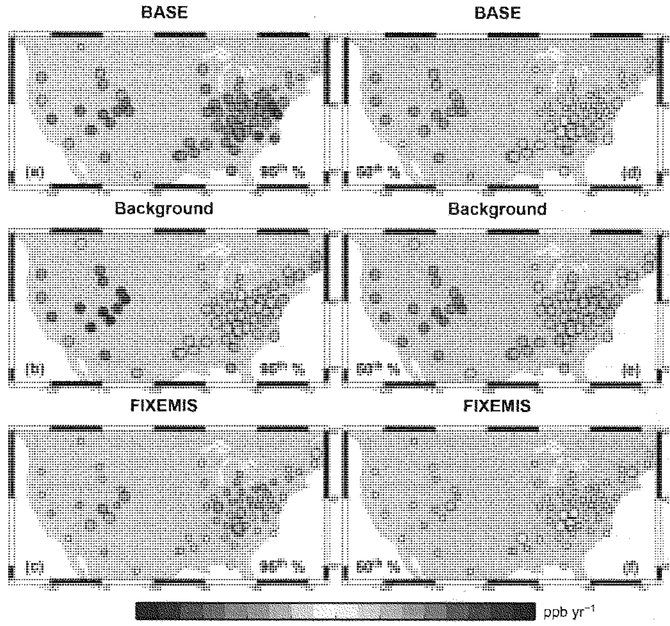

Figure 10. Linear trends in the 95th (left) and 50th (right) percentile springtime MDA8 O_3 over 1988–2014 at US rural sites from BASE (top), Background (middle) and FIXEMIS simulations (bottom). Larger circles indicate sites with statistically significant trends ($p < 0.05$). Top panels are repeated from Fig. 7d, e. Note that the 95th (50th) percentile is sampled separately from the Background and FIXEMIS simulations without depending on the times when the BASE simulation is experiencing the 95th (50th) percentile days.

maximum temperature over the southeastern US in August (Fig. 12c–d). The trends in temperature extremes are similar between June and August, but there is no significant trend in July (not shown). While changes in regional temperature extremes on 20- to 30-year time series may reflect internal climate variability (Shepherd, 2015), we suggest that increasing hot extremes and biogenic isoprene emissions over the last 2 decades may have offset some of the benefits of regional NO_x reductions in the EUS.

5 Impacts of rising Asian emissions, methane and wildfires on western US O_3

5.1 Historical western US O_3 trends in spring

Further indications of the factors driving baseline O_3 changes over the WUS can be inferred by examining the time series at several high-elevation sites, which most frequently sample baseline O_3 in the free troposphere during spring (Sect. 2.4). Figure 13 shows the results, both observed and simulated, for six such monitoring sites: Great Basin National Park in Nevada (2.1 km a.s.l.), Rocky Mountain National Park (2.7 km a.s.l.) in Colorado, US Air Force Academy (1.9 km a.s.l.) in Colorado Springs, Yellowstone National Park (2.4 km a.s.l.) and Pinedale (2.4 km a.s.l.) in Wyoming, and Mesa Verde National Park (2.2 km a.s.l.) in the Colorado–New Mexico–Arizona–Utah four-corner

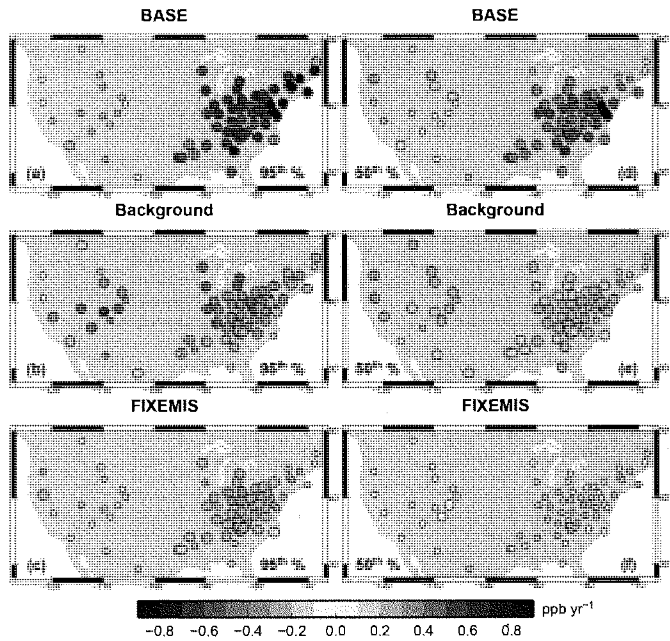

Figure 11. As in Fig. 10, but for summer. Top panels are repeated from Fig. 8d, e.

region. The observed median values of springtime MDA8 O_3 have increased significantly at a rate of 0.2–0.5 ppb yr^{-1} over the past 20–27 years at these sites, except Pinedale, where the increase in background O_3 is likely offset by the O_3 decrease due to recent emission control for the large oil and gas production fields in this area (http://deq.wyoming.gov/aqd/winter-ozone/resources/technical-documents/). When filtered to remove the influence from fresh local pollution (Sect. 2.4), AM3 BASE captures the long-term trends of O_3 observed at these sites.

Correlating AM3 Background with observed O_3 indicates that most of the observed variability reflects changes in the background, with fluctuations in stratospheric influence contributing to anomalies on interannual timescales (e.g., the 1999 anomaly, Lin et al., 2015a), whereas Asian influence dominates the decadal trends as discussed below. The O_3 reduction resulting from US anthropogenic emission controls is less than 0.1 ppb yr^{-1} (BASE minus Background) at these baseline sites. We show model results for the entire 1980–2014 period for Great Basin, Rocky Mountain, and the US Air Force Academy to provide context for observed trends in the 2 most recent decades (Fig. 13a). In the 1980s when Chinese NO_x emissions ($\sim$ 4 Tg yr^{-1} NO) were much lower than US NO_x emissions ($\sim$ 15 Tg yr^{-1} NO) (Granier et al., 2011), there was little overall O_3 change over the WUS in the model. From the mid-1990s onwards, with NO_x emissions in China rising steeply (Fig. 1a) and surpassing US emissions in the 2000s, the O_3 trends at remote WUS sites appear to be dominated by trends of background, reflecting rising emissions outside the US. The largest spring O_3 increases from 1981–1990 to 2003–2012 at 700 hPa extend from Southeast Asia to the subtropical North Pacific Ocean to the southwestern US (Fig. S7a), consistent with the influence of rising Asian precursor emissions.

Table 2 contains a summary of the drivers of O_3 trends in the model at seven CASTNet sites that exhibit a significant spring O_3 increase observed over 1988–2012. Here we focus our attribution analysis on the period 1988–2012 (in-

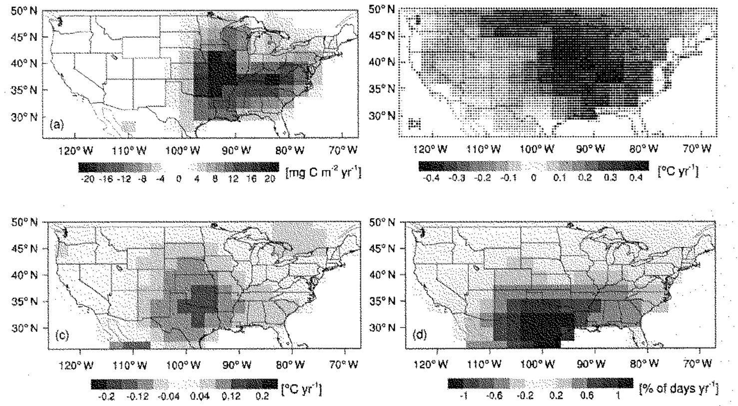

Figure 12. The 1990–2012 trends in **(a)** model JJA total biogenic isoprene emissions, **(b)** model 90th percentile JJA daily maximum temperature, **(c)** the warmest daily maximum temperature and **(d)** the frequency of warm days (i.e., those above the 90th percentile for the base period 1961–1990) for August obtained from the GHCNDEX dataset (Donat et al., 2013; available at http://www.climdex.org/viewdownload.html). Stippling denotes areas where the change is statistically significant ($p < 0.05$). Note that the trends are calculated for the 1990–2012 period, instead of 1988–2014, to avoid the influence from hot extremes in 1988 and cold conditions in 2014 (Sect. 6). When these years are included, the trends in **(c)** and **(d)** are swamped by the anomalies. The trends in **(a)** and **(b)** are similar between 1990–2012 and 1988–2014.

Table 2. Summary of springtime median MDA8 O_3 trends (in ppb yr^{-1}) over 1988–2012 at WUS sites from observations and AM3 simulations. Trends with the 95 % confidence intervals and levels of significance (< 1 %; 1–5 %; ≥ 5 %) were estimated by the two-tailed t test.

Experiment	Lassen	Great Basin	Rocky Mountain	Mesa Verde	Yellowstone	Yosemite	Chiricahua
Observed	0.38 ± 0.14	0.38 ± 0.26	0.37 ± 0.18	0.30 ± 0.18	0.21 ± 0.19	0.37 ± 0.32	0.17 ± 0.10
BASE*	0.33 ± 0.11	0.34 ± 0.12	0.32 ± 0.13	0.37 ± 0.14	0.21 ± 0.11	0.35 ± 0.17	0.25 ± 0.19
Background	0.31 ± 0.12	0.40 ± 0.13	0.45 ± 0.13	0.43 ± 0.17	0.30 ± 0.11	0.41 ± 0.16	0.32 ± 0.21
Background_{EA}	0.41 ± 0.12	0.39 ± 0.18	0.50 ± 0.15	0.52 ± 0.20	0.40 ± 0.16	0.47 ± 0.17	0.47 ± 0.21
IAVASIA*	0.29 ± 0.13	0.31 ± 0.11	0.25 ± 0.11	0.27 ± 0.11	0.19 ± 0.11	0.24 ± 0.14	0.15 ± 0.15
IAVASIA_{EA}	0.26 ± 0.16	0.26 ± 0.16	0.35 ± 0.13	0.32 ± 0.13	0.27 ± 0.16	0.31 ± 0.18	0.25 ± 0.15
IAVCH_4^*	0.18 ± 0.12	0.20 ± 0.11	0.12 ± 0.09	0.16 ± 0.12	0.09 ± 0.12	0.15 ± 0.16	0.04 ± 0.15
IAVFIRE	0.10 ± 0.12	0.14 ± 0.12	0.17 ± 0.14	0.16 ± 0.14	0.11 ± 0.13	0.15 ± 0.16	0.08 ± 0.17
FIXEMIS	0.08 ± 0.12	0.12 ± 0.12	0.16 ± 0.12	0.13 ± 0.12	0.09 ± 0.13	0.12 ± 0.16	0.04 ± 0.16
O_3Strat	0.18 ± 0.18	0.20 ± 0.25	0.18 ± 0.18	0.25 ± 0.23	0.15 ± 0.18	0.27 ± 0.30	0.07 ± 0.24

The * mask indicates data filtered to represent baseline conditions (NACOt ≤ 67th). The EA subscript indicates that data were filtered to represent transport conditions favoring the import of Asian pollution (EACOt ≥ 67th).

stead of 1988–2014) because the IAVASIA and $IAVCH_4$ simulations only extend to 2012. Meteorology varies from year to year in all experiments. Thus, we quantify the contributions of rising Asian emissions in IAVASIA, global methane in $IAVCH_4$, and wildfire emissions in IAVFIRE by subtracting out the slope of the linear regression of seasonal O_3 means in FIXEMIS. Simulated O_3 with anthropogenic emissions varying in both South and East Asia but held constant elsewhere shows statistically significant increases of 0.1–0.2 ppb yr^{-1} ($p \leq 0.01$; IAVASIA minus FIXEMIS in Table 2), consistent with trends of 0.2 ppb yr^{-1} estimated by scaling results from HTAP phase 1 multi-model sensitivity experiments with Asian emissions reduced by 20 % (Reidmiller et al., 2009). This Asian influence can explain 50–65 % of the modeled background O_3 increase in spring (Table 2).

With only methane varying, the model trends are less than 0.1 ppb yr^{-1} ($IAVCH_4$ minus FIXEMIS), accounting for an

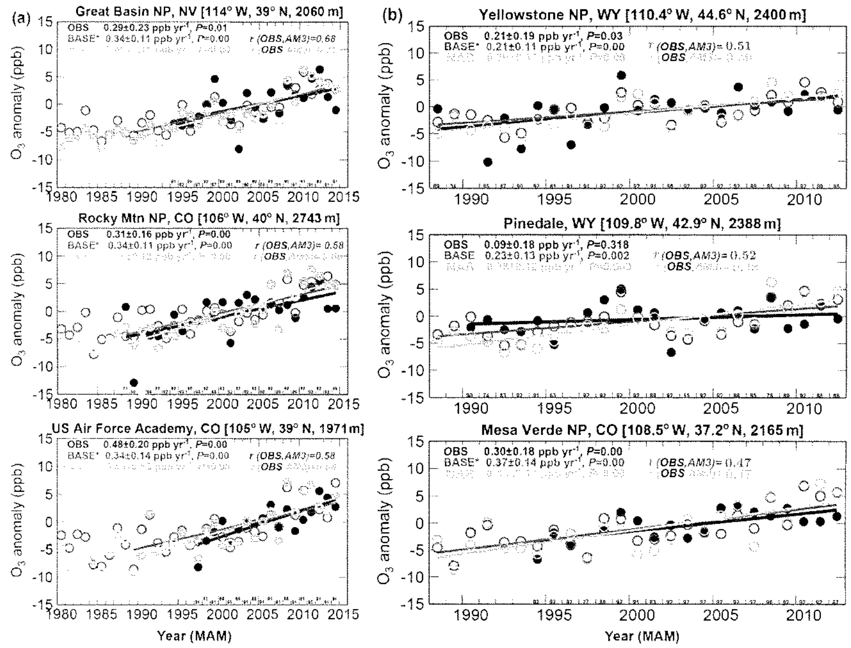

Figure 13. **(a)** Time series of median spring MDA8 O_3 anomalies (relative to the 1995–2014 mean) at Great Basin, Rocky Mountain, and US Air Force Academy as observed (black) and simulated in AM3 BASE filtered for baseline conditions (red; see Sect. 2.4) and in Background with North American anthropogenic emissions zeroed out (NAB; green). Presented at the top of the graph are statistics from the linear fit and correlations between observations and simulations. Numbers at the bottom of the graph denote the sample size of observations for each year. Gray dots indicate uncertain observations that are removed from the linear fit (see Sect. 2.3). **(b)** Same as Fig. 13a, but for Yellowstone, Pinedale, and Mesa Verde over the period 1988–2012.

average of 15 % of the background increase. The contribution from wildfire emissions during spring is of minor importance (IAVFIRE minus FIXEMIS, Table 2). A stratospheric O_3 tracer (O_3Strat) in AM3 (Lin et al., 2012a, 2015a) demonstrates a positive but insignificant trend in stratospheric O_3 transport to the sites. We examine the trends of lower tropospheric O_3 at these sites when transport conditions favor the import of Asian pollution into western North America, as diagnosed by the East Asian CO tracer (EACOt) exceeding the 67th percentile for each spring. Similar to the conclusion of Lin et al. (2015b), we find that the rate of O_3 increase in the Background simulation is greater by 0.05–0.1 $ppb\,yr^{-1}$ under strong transport from Asia than without filtering. Filtering the IAVASIA simulation for Asian influence also results in greater O_3 increases than filtering for baseline conditions (Table 2).

Rising Asian emissions even influence trends of O_3 downwind of the Los Angeles Basin during spring. O_3 measured in Joshua Tree National Park shows an increase of $0.31 \pm 0.25\,ppb\,yr^{-1}$ in spring over 1990–2010 (Cooper et al., 2012), despite significant improvements in O_3 air quality in the Los Angeles Basin (Warneke et al., 2012). The O_3 record extended to 2014 shows a decline in the 95th percentile O_3 in Joshua Tree National Park for both spring and summer (Figs. 7–8), whereas the 5th percentile continues to increase in spring and there is no significant trend in the median. Sampling the AM3 Background simulation at this site indicates a rising background ($0.31 \pm 0.14\,ppb\,yr^{-1}$). Aircraft measurements in May–June 2010 indicate the presence

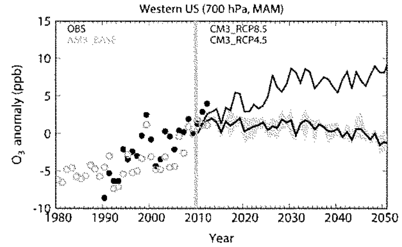

Figure 14. Future projections. Time series of median springtime O_3 changes relative to 2010 in GFDL AM3 hindcast (orange circles) and CM3 future simulations for RCP8.5 (red) versus RCP4.5 (blue; shading represents the range of three ensemble members), sampled at 700 hPa over the WUS (35–45° N, 120–105° W). Black circles indicate observed changes averaged from the Lassen, Great Basin, and Rocky Mountain national parks.

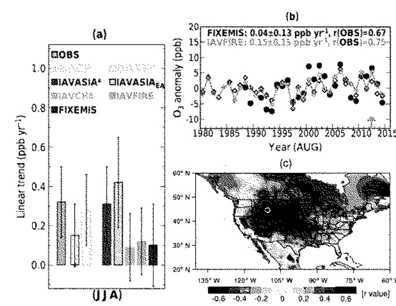

Figure 15. Summertime O_3 in Yellowstone National Park. (a) Median JJA MDA8 O_3 trends over 1988–2012 at Yellowstone from observations (black) and simulations sampled at 700 hPa for BASE without filtering (pink), BASE filtered for baseline conditions (hatched pink), IAVASIA (solid purple, baseline), IAVASIA filtered for Asian influence (EACOt ≥ 67th, hatched purple), IAVCH4 (cyan), IAVFIRE (orange) and FIXEMIS (red). (b) Time series of anomalies in August median MDA8 O_3 at Yellowstone as observed (black) and simulated by the model sampled at the surface, with constant (red) and time-varying wildfire emissions (orange). Trends over 1988–2014 are reported. (c) Interannual correlations of JJA mean MDA8 O_3 observed at Yellowstone with JJA mean daily maximum temperature from observations (Harris et al., 2014).

of Asian pollution layers 2 km above southern California with distinct sulfate enhancements coincident with low organic mass (Lin et al., 2012b), supporting the conclusion that rising Asian emissions can contribute to trends of O_3 observed in this region. Yosemite National Park (1.6 km a.s.l.) and Chiricahua National Monument (1.5 km a.s.l.) are also influenced by increases in Asian emissions and concurrent decreases in local pollution in California. O_3 observed at Yosemite shows an increase from 1995 to around 2012 (0.37 ± 0.32 ppb yr^{-1}; Fig. S8), which the model attributes primarily to rising Asian emissions (Table 2), but observations have remained constant since then, reflecting an offset by O_3 decreases in California (Fig. 4).

5.2 Projecting western US springtime O_3 for the 21st Century

Under the RCP8.5 scenario, Chinese NO_x emissions are projected to peak in 2020–2030, reflecting an increase of ~ 50 % from 2010 (Fig. 1a), followed by a sharp decrease, reaching 1990 levels by 2050. Global methane increases by ~ 60 % from 2010 to 2050 under RCP8.5 (Fig. S1). Under the RCP4.5 scenario, in contrast, NO_x emissions in China change little over 2010–2030 and global methane remains almost constant from 2010 to 2050. NO_x emissions in the US decrease through 2050 under both scenarios, by ~ 40 % from 2010. A number of studies have examined future US O_3 changes under the RCPs (e.g., Gao et al., 2013; Clifton et al., 2014; Pfister et al., 2014; Fiore et al., 2015; Barnes et al., 2016). However, as discussed earlier, the trends of O_3 in the model when sampled near the surface are overwhelmingly dominated by US anthropogenic emission trends. Thus, the future O_3 changes estimated by these prior studies do not represent baseline conditions, particularly the response to rising Asian emissions. In Fig. 14 we show changes in WUS free tropospheric (700 hPa) O_3 relative to 2010 in the CM3 future simulations under RCP8.5 versus RCP4.5. Historical hindcasts and observations are also shown for context. Under RCP4.5, springtime O_3 over the WUS shows little overall change over 2010–2050. Under RCP8.5, in contrast, springtime WUS O_3 increases by ~ 10 ppb from 2010 to 2030 and remains almost constant from 2030 to 2050, consistent with the projected trends in Asian emissions and global methane.

5.3 Trends and variability of western US O_3 in summer

Yellowstone National Park is the only site with statistically significant summer O_3 increases observed across all percentiles (Fig. 8a–c). The 1988–2012 trends for the median observed and simulated O_3 are summarized in Fig. 15a. Observations show an increase of 0.32 ± 0.18 ppb yr^{-1} for JJA, with a greater rate of increase in June (0.38 ± 0.25 ppb yr^{-1}) than in July–August (0.26 ± 0.18 ppb yr^{-1}). AM3 BASE sampled at 700 hPa and filtered for baseline conditions (hatched pink bar in Fig. 15a) captures the observed increase. Without baseline filtering (solid pink bar), North American emission reductions offset almost 50 % of the simulated O_3 increase at Yellowstone, causing the model to underestimate the observed O_3 trend. The model attributes much of the observed summer O_3 increase at Yellowstone to rising Asian emissions, with IAVASIA simulating an O_3 increase of 0.31 ± 0.19 ppb yr^{-1} under baseline conditions, increasing to 0.42 ± 0.23 ppb yr^{-1} under conditions of Asian influence (EACOt $\geq$ 67th percentile). The stronger increase measured in June than in July–August is consistent with the influence of the Asian summer monsoon producing a surface O_3 minimum in July–August in East Asia (e.g., Lin et al., 2009), as well as the seasonality of intercontinental pollution transport. Changes in methane, wildfires, and meteorology over this period are of minor importance for the JJA O_3 trends at Yellowstone.

Enhanced wildfire activity in hot and dry weather is thought to be a key driver of interannual variability of surface O_3 in the Intermountain West in summer (Jaffe et al., 2008; Jaffe, 2011). However, hot and dry conditions also facilitate the buildup of O_3 produced from regional anthropogenic emissions, which can complicate the unambiguous attribution of observed O_3 enhancements. Using August data at Yellowstone as an example, we isolate the relative contribution of these two processes to observed O_3 with the IAVFIRE versus FIXEMIS experiments (Fig. 15b). Here we sample AM3 at the surface to account for any influence of varying boundary layer mixing depths. Even without interannual variations of wildfire emissions, FIXEMIS captures much of the observed year-to-year variability of August mean O_3 at Yellowstone ($r = 0.67$). IAVFIRE with interannually varying fire emissions only moderately improves the correlations ($r = 0.75$). FIXEMIS also captures the observed O_3 increase from the early 1990s to around 2002, likely reflecting warmer temperatures and deeper mixing depths allowing more baseline O_3 to mix down to the surface. Over the entire 1988–2014 (or 1980–2014) period, IAVFIRE gives ~ 0.1 ppb yr^{-1} greater O_3 increases in August than FIXEMIS, consistent with an overall increase in boreal wildfire activity (Figs. S2 and S7b).

Figure 16 shows year-to-year variability in surface MDA8 O_3 enhancements from wildfires during summer, as diagnosed by the differences between IAVFIRE and FIXEMIS. The results are shown for individual months since fires are highly episodic. During the summers of 1998, 2002, and 2003, biomass fires burned a large area of Siberia and parts of the North American boreal forests, raising carbon monoxide across the Northern Hemisphere as detected from space (Yurganov et al., 2005; van der Werf et al., 2010). Long-range transport of Siberian fire plumes resulted in 2–6 ppb enhancements in surface MDA8 O_3 at the US western coast and in parts of the Intermountain West in AM3. The model calculates enhancements in monthly mean MDA8 O_3 of up to 8 ppb from the intense wildfire events in northern California during July 2008 (Huang et al., 2013; Pfister et al., 2013), over Texas–Mexico during June 2011 (Wang et al., 2015), and in Wyoming–Utah during August 2012 (Jaffe et al., 2013). The AM3 estimates are roughly consistent with a previous analysis of boundary layer aircraft data with and without fire influences (as diagnosed by CH_3CN) during June 2008 over California (Pfister et al., 2013).

While fires during hot and dry summers clearly result in enhanced O_3 at individual sites for some summers, the ability of AM3 with constant fire emissions to simulate variability of O_3 for a high (e.g., 1988, 2002, 2006) versus low (e.g., 1997, 2009) fire year (Fig. 15b) indicates that biomass burning is not the primary driver of observed O_3 interannual variability. Year-to-year variability of JJA mean MDA8 O_3 observed at Yellowstone is strongly correlated ($r > 0.6$) with observed large-scale variations in JJA mean daily maximum temperature across the Intermountain West (Fig. 15c). Correlations for other ground stations show a similar large-scale feature. Similar to the conclusion from Zhang et al. (2014), our analysis indicates that the correlation between O_3 and biomass burning reported by Jaffe et al. (2008) and Jaffe (2011) at rural sites reflects common underlying correlations with temperature rather than a causal relationship of fire with O_3. At remote mountain sites (e.g., Yellowstone), warmer surface temperatures lead to deeper mixed layers that facilitate mixing of free tropospheric O_3-rich air down to the surface. At sites near sources of air pollution, hot conditions enhance regional O_3 production and orographic lifting of urban pollution to mountaintop sites during daytime, as occurs at Rocky Mountain National Park located downwind of the Denver metropolitan area during summer (Sect. 5.4). Reactive volatile organic compound (VOC) emissions from fires may enhance O_3 production in NO_x-rich urban areas (Baker et al., 2016), although evaluating these impacts needs high-resolution models and better treatment of sub-grid-scale fire plumes.

5.4 Ozone trends in the Denver metropolitan area

Efforts to improve air quality have led to a marked decrease in high-O_3 events in the Los Angeles Basin as illustrated by the annual 4th highest MDA8 O_3 at Crestline – a regionally representative monitor operated continuously from 1980 to the present (Fig. 17a). In striking contrast, the 4th highest MDA8 O_3 in the Denver metropolitan area shows little change over the past decades, despite significant reductions in NO_x (Fig. 1) and CO emissions (−80 % from 1990 to 2010; Cooper et al., 2012). Recent field measurements indicate that increased VOC emissions from oil and natural gas operations are an important source of O_3 precursors in the Denver–Julesberg Basin (Gilman et al., 2013; Halliday et al., 2016; McDuffie et al., 2016). However, total VOC emissions in Denver may not be increasing over time due to the marked reductions in VOC emissions from vehicles (Bishop and Stedman, 2008, 2015). We seek insights into the causes of the lack of significant O_3 responses to emission controls in Denver by separately analyzing trends in spring and summer (Fig. 17b–c).

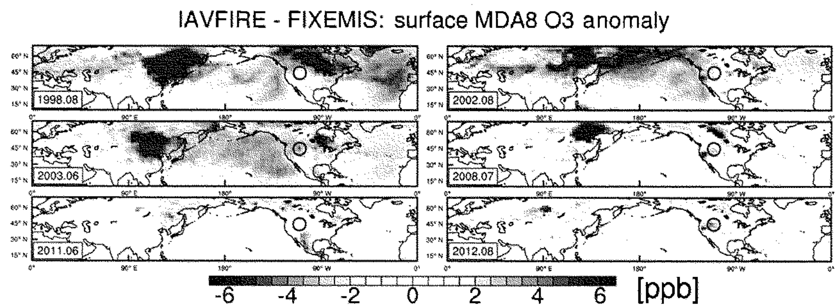

Figure 16. Surface MDA8 O_3 enhancements from wildfire emissions for individual months in the years with large biomass burning in boreal regions (1998, 2002, 2003) and over the WUS (2008, 2011, 2012), as diagnosed by the differences between IAVFIRE and FIXEMIS. The black circle denotes the location of Yellowstone National Park.

The $\sim 200 \times 200\,km^2$ AM3 model is not expected to resolve the urban-to-rural differences between Rocky Mountain National Park and the Denver metropolitan area. However, if observed O_3 variability in Denver correlates with that at remote sites in the Intermountain West, then model attribution for the remote sites can be used to infer sources of observed O_3 in Denver. This is demonstrated in Fig. 17b for spring using data at three representative sites in Denver, Rocky Flats North, National Renewable Energy Lab (NREL), and Welby, with continuous measurements since the early 1990s. Year-to-year variability of median MDA8 O_3 at these sites during spring correlates strongly with that in Great Basin National Park ($r = 0.7$), a fairly remote site in Nevada not influenced by urban emissions from Denver. Median spring O_3 observations in Denver increased significantly by $\sim 0.3\,ppb\,yr^{-1}$, similar to the rate of increase in Great Basin National Park, which the model attributes to rising background (Fig. 13a), implying that the tripling of Asian emissions since 1990 also raised mean springtime O_3 in the Denver metropolitan area. Trends in the 95th percentile are statistically insignificant.

During summer, changes in regional emissions and temperature have the greatest impacts on the highest observed O_3 concentrations in polluted environments. Figure 17c shows times series of July–August 95th percentile MDA8 O_3 in Denver, together with the distribution of daily maximum temperature. In every year since 1993, the highest summer MDA8 O_3 observed at these sites exceeds the 70 ppb NAAQS level. There is a small negative trend that is swamped by large interannual variability. The summers with the highest observed O_3 coincide with those with the highest observed temperatures, such as 1998, 2003, 2007, 2011 and 2012. During these summers, enhancements of MDA8 O_3 were also recorded in Rocky Mountain National Park, reflecting enhanced lifting of pollution from Denver under warmer conditions (Brodin et al., 2010). Applying quantile regression (e.g., Porter et al., 2015) to daily observations at Rocky Flats North over 1993–2015, we find a $2\,ppb\,°C^{-1}$ sensitivity of 95th percentile July–August O_3 to changes in maximum daily temperature. We suggest that the substantial increases in extreme heat occurrence over central North America over the last 2 decades, as found by Horton et al. (2015), contribute to raising summer O_3 in Denver, which offsets O_3 reductions that otherwise would have occurred due to emission controls in Denver. Potential shifts in the O_3 photochemistry regime can also contribute to trends of summer O_3 in Denver, although advancing this knowledge would require a high-resolution air quality model.

6 Impacts of heat waves and droughts on eastern US summer O_3

We discuss in this section interannual variability and long-term changes in summer O_3 over the EUS, where air stagnation and high temperatures typically yield the highest O_3 observed in surface air (e.g., Jacob and Winner, 2009). Evaluating the ability of models to simulate the high-O_3 anomalies during historical heat waves and droughts is crucial to establishing confidence in the model projection of pollution extremes under a warming climate. Figure 18a shows comparisons of July mean MDA8 O_3 at one regionally representative site, the Pennsylvania State University (PSU) CASTNet site, from observations and model simulations. With time-varying emissions, the BASE model simulates an O_3 decrease ($-0.45 \pm 0.32\,ppb\,yr^{-1}$) consistent with observations ($-0.67 \pm 0.33\,ppb\,yr^{-1}$) and captures the observed July mean O_3 interannual variability ($r = 0.82$) that is correlated with large-scale variations in daily maximum temperature

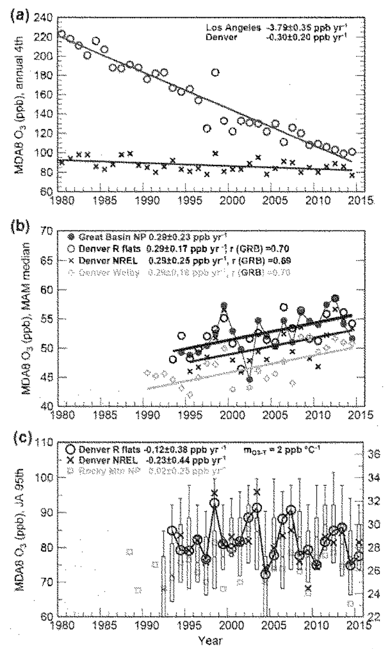

Figure 17. Surface O_3 trends in Denver. (a) Comparison of observed trends in annual fourth highest MDA8 O_3 at Crestline Los Angeles (brown) and in Denver (blue, computed from all monitors available in Denver non-attainment counties). (b) Time series of observed median MAM MDA8 O_3 at Great Basin National Park (red), in comparison with three monitors in Denver. (c) Time series of observed 95th percentile July–August MDA8 O_3 in Denver, together with statistics (25th, 50th, 75th, 95th) of observed July–August daily maximum temperature at Rocky Flats (red, right axis).

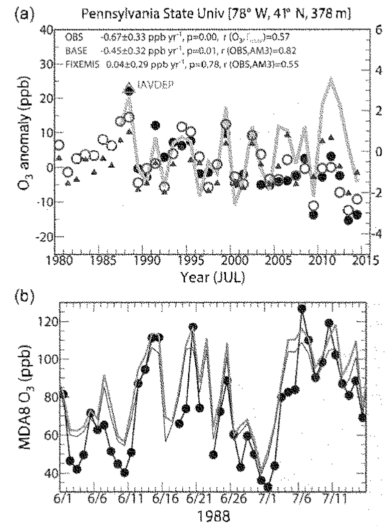

Figure 18. (a) Time series of July mean MDA8 O_3 anomalies (relative to 1988–2014) at the Pennsylvania State University (PSU) CASTNET site as observed (black) and simulated by the GFDL-AM3 model with time-varying (purple) and constant anthropogenic emissions (red), along with observed anomalies in July mean daily max temperature (gray lines; right axis). The green triangle denotes the 1988 O_3 anomaly from a sensitivity simulation using BASE emissions but with 35 % decreases in V_{d,O_3} (IAVDEP). (b) Time series of daily MDA8 O_3 at PSU from 1 June to 16 July in 1988 from observations (black), BASE (purple), and IAVDEP simulations (green).

($r = 0.57$). In particular, O_3 pollution extremes are successfully simulated during the EUS summer heat waves of 1988, 1995, 1999, 2002, 2011 and 2012 (Leibensperger et al., 2008; Fiore et al., 2015; Jia et al., 2016). Year-to-year variations in meteorology can explain 30 % of the total observed O_3 variability ($r = 0.55$), as inferred by FIXEMIS with constant anthropogenic emissions. If US anthropogenic emissions remained at 1990s levels (as in FIXEMIS), then anomalies in July mean MDA8 O_3 would have been 10 ppb greater during the 2011 and 2012 heat waves. Loughner et al. (2014) found that half of the days in July 2011 would have been classified as O_3 exceedance days for much of the mid-Atlantic region if emissions had not declined.

Figure 19a compares the probability density functions of MDA8 O_3 at 40 EUS surface sites for JJA in the pre-NO_x SIP Call (1988–2002) versus post-NO_x SIP Call (2003–2014) periods and during the extreme heat waves of 1988 versus 2012. Following the NO_x SIP Call, the probability distribution of observed JJA MDA8 O_3 over the EUS shifted downward (solid black versus dotted gray lines in Fig. 19a). The median value declined by 9 ppb and the largest decreases occurred in the upper tails, leading to weaker day-to-day O_3 variability and a narrower O_3 range (standard deviation σ decreased from 16.4 to 12.9 ppb). These observed O_3 changes driven by regional NO_x reductions are even more prominent when comparing the heat waves of 1988 versus 2012 (solid

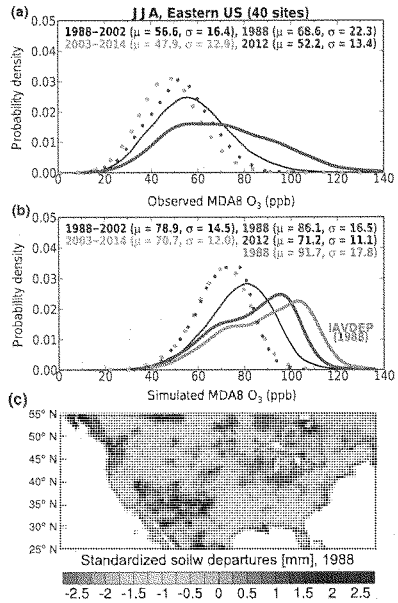

Figure 19. (a) Comparisons of probability distributions of summertime MDA8 O_3 from 40 EUS CASTNet sites for the pre-NO_x SIP Call (1988–2002; solid black) versus post-NOx SIP Call (2003–2014; dashed gray) periods and during the extreme heat waves of 1988 (solid purple) versus 2012 (dashed brown). The median (μ) and standard deviation (σ) are shown (ppb). (b) Same as (a), but from AM3 BASE. Also shown is the O_3 distribution in 1988 from a sensitivity simulation with 35 % decreases in V_{d,O_3} in drought areas (green). (c) Standardized soil moisture departures for JJA 1988 (calculated by dividing anomalies by the 1979–2010 climatological standard deviation, using data from the NOAA Climate Prediction Center).

purple versus dotted brown lines in Fig. 19a): $\sigma = 22.3$ versus 13.4 ppb and median value $\mu = 68.6$ versus 52.2 ppb.

Figure 19b shows the corresponding comparisons using the results from AM3 BASE. Despite the high mean model bias (~ 20 ppb), AM3 captures the overall structure of the changes in the surface O_3 distributions and thus the response of surface O_3 to the NO_x SIP Call, including the reductions of high-O_3 events during the heat wave of 2012 compared to 1988. Nevertheless, there is a noticeable difference between the observations and simulations in the shape of MDA8 O_3 probability distributions for summer 1988, particularly in the

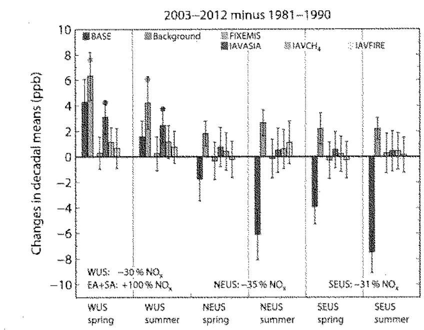

Figure 20. Summary of US surface O_3 trends and drivers. Changes in decadal mean MDA8 O_3 from 1981–1990 to 2003–2012 simulated in a suite of GFDL-AM3 experiments for spring and summer for the western (32–46° N and 123–102° W), northeastern (37–45° N and 90–65° W) and southeastern (30–36° N and 95–77° W) US domains. Observations are not shown because limited data are available during 1981–1990. Experiments are color-coded, with the error bars indicating the range of the mean change at the 95 % confidence level. Filled circles represent the changes under Background (green) and IAVASIA (purple) when filtered for Asian influence (EACOt $\geq$ 67th), while other results are from the unfiltered models. The text near the bottom of the plot provides the change in NO_x emissions over the same period for each region.

upper tail of the distribution above 110 ppb (purple lines in Fig. 19a versus b). The BASE model also underestimates the observed July mean O_3 anomaly at PSU in 1988 by ~ 10 ppb (purple versus black dots in Fig. 18a). One possible explanation for these biases is that drought stress can effectively reduce the O_3 deposition sink to vegetation, leading to an increase in surface O_3 concentrations as found during the 2003 European heat wave (Solberg et al., 2008), whereas AM3 does not include interannually varying dry deposition velocities.

The North American drought of 1988 ranks among the worst episodes of drought in the US (e.g., Seager and Hoerling, 2014), with JJA soil moisture deficits occurring over the northern Great Plains–Midwest region with magnitudes of 1–2.5 mm standardized departures from the 1979–2010 climatology (Fig. 19c). Huang et al. (2016) found that monthly mean O_3 dry deposition velocities (V_{d,O_3}) for forests decreased by 33 % over Texas during the dry summer of 2011. Based on this estimate, we conduct a sensitivity simulation for 1988 using BASE emissions but decreasing monthly mean V_{d,O_3} from May to August by 35 % in the areas over North America (20–60° N) where soil moisture deficits in 1988 exceed -1.0σ mm (Fig. 19c). This experiment (hereafter referred to as IAVDEP) simulates ~ 10 ppb higher July mean MDA8 O_3 at the PSU CASTNet site than the BASE model and matches the observed O_3 anomaly in 1988 relative to the record mean (green symbol in Fig. 18a). The impact is largest (up to 15 ppb) on days when observed MDA8 O_3 exceeds 100 ppb (Fig. 18b; $T_{max} \geq 30\,°C$). Simulated JJA MDA8 O_3 at EUS sites in IAVDEP shows an upward shift in the probability distribution, particularly in the upper tail above 110 ppb (green versus purple lines in Fig. 19b), bringing it closer to observations in 1988 (Fig. 19a). The O_3 standard deviation in IAVDEP ($\sigma = 18$ ppb) shifts towards that in observations ($\sigma = 22$ ppb) relative to the BASE model ($\sigma = 16$ ppb).

Quantile mapping can be applied to correct systematic distributional biases in surface O_3 compared to observations (Rieder et al., 2015), but this approach has limitations if there are structural biases in the O_3 distribution due to missing physical processes in the model (e.g., variations of V_{d,O_3} with droughts). Travis et al. (2016) suggest that the National Emission Inventory (NEI) for NO_x from the US EPA is too high nationally by 50 %. Decreasing US NO_x emissions by this amount corrects their model bias for boundary layer O_3 by 12 ppb in the southeast for summer 2013, while surface MDA8 O_3 in their model is still biased high by 6 ± 14 ppb, which the authors attribute to excessive boundary layer mixing. US NO_x emissions in the emission inventory used in AM3 (Sect. 2.2) are approximately 15 % lower than those from the NEI. The 35 % decrease in NO_x emissions from the pre-NO_x SIP Call to the post-NO_x SIP Call in the model reduces mean O_3 by 8 ppb in the EUS, implying that the NO_x emission bias could correct 40 % of our model mean bias of ~ 20 ppb. These estimates support the idea that the common model biases in simulating surface O_3 over the southeastern US (e.g., Fiore et al., 2009) may partly reflect excessive NO_x emissions. Some of the positive O_3 biases could be also due to the averaging over a deep vertical box in the model surface layer (~ 60 m in AM3) that can not resolve near-surface gradients (Travis et al., 2016).

7 Conclusions and recommendations

Through an observational and modeling analysis of interannual variability and long-term trends in sources of O_3 over the past 35 years, we have identified the key drivers of O_3 pollution over the US. We initially evaluated the trends of O_3 in Asia resulting from rising Asian precursor emissions (Figs. 4–6). Our synthesis of available observations and simulations indicates that surface O_3 over East Asia has increased by 1–2 ppb yr^{-1} since 1990 (i.e., 25–50 ppb over 25 years), with significant implications for regional air quality and global tropospheric O_3 burden. Shifting next to the US, we find 0.2–0.5 ppb yr^{-1} increases in median springtime MDA8 O_3 measured at 50 % of 16 WUS rural sites, with 25 % of the sites showing increases across the entire O_3 concentration distribution, despite stringent US domestic emission controls (Fig. 7). While many prior studies show that global models have difficulty simulating O_3 increases observed at rural baseline sites (e.g., Parrish et al., 2014; Strode et al., 2015), we reconcile observed and simulated O_3 trends in GFDL-AM3 with a novel baseline sampling approach (Figs. 3 and 13). We suggest that the common model–observation disagreement in baseline O_3 trends reflects limitations of coarse-resolution global models in resolving observed baseline conditions. This representativeness problem can be addressed by filtering model O_3 for hemispheric-scale baseline conditions using the easy-to-implement, low-cost regional CO-like tracers. This approach allows trends of O_3 measured at baseline sites to be compared directly with multi-decadal global model hindcasts, such as those being conducted for the Chemistry-Climate Model Initiative (CCMI; Morgenstern et al., 2017).

The ability of the GFDL-AM3 model to reproduce observed US surface O_3 trends lends confidence in its application to attribute these observed trends to specific processes (Figs. 7 to 11). We summarize the overall statistics in Fig. 20, drawing upon the decadal mean O_3 changes from 1981–1990 to 2003–2012 in the BASE and sensitivity simulations. The changes in BASE are over the WUS 4.3 ± 1.8 ppb for spring and 1.6 ± 1.2 ppb for summer; over the northeast, -1.8 ± 1.7 ppb for spring and -6.0 ± 2.0 ppb for summer; and over the southeast, -3.9 ± 1.4 ppb for spring and -7.5 ± 1.6 ppb for summer. Increasing O_3 in the WUS under BASE coincides with an increase in background O_3 by 6.3 ± 1.9 ppb for spring and 4.2 ± 2.0 ppb for summer. Under conditions of strong transport from Asia (East Asian COt $\geq$ 67th), the background trend rose to 7.6 ± 2.2 ppb for spring and 6.0 ± 2.1 ppb for summer (green dots in Fig. 20). The WUS background O_3 increase reflects contributions from increases in Asian anthropogenic emissions (accounting for 50 % of background increase in spring; 52 % in summer), rising global methane (13 % in spring; 23 % in summer), and variability in biomass burning (6 % in spring; 12 % in summer; excluding the meteorological influence).

We conclude that the increase in Asian anthropogenic emissions is the major driver of rising background O_3 over the WUS for both spring and summer in the past decades, with a lesser contribution from methane increases over this period. The tripling of Asian NO_x emissions since 1990 contributes up to 65 % of modeled springtime background O_3 increases (0.3–0.5 ppb yr^{-1}) over the WUS, outpacing O_3 decreases resulting from 50 % US NO_x emission controls (≤ 0.1 ppb yr^{-1}; Table 2 and Fig. 10). Springtime O_3 observed in the Denver metropolitan area has increased at a rate similar to remote rural sites (Fig. 17b). Mean springtime O_3 above the WUS is projected to increase by ~ 10 ppb from 2010 to 2030 under the RCP8.5 global change scenario but to remain constant throughout 2010 to 2050 under the RCP4.5 scenario (Fig. 14). As NO_x emissions in China continue to decline in response to efforts to improve air quality (Krotkov et al., 2016; Liu et al., 2016), rising global methane and NO_x emissions in the tropical countries (e.g., India) in Asia, where O_3 production is more efficient, may become more important in the coming decades. A global perspective is necessary when designing a strategy to meet US O_3 air quality objectives.

During summer, a tripling of Asian anthropogenic emissions from 1988 to 2014 approximately offsets the benefits of 50 % reductions in US domestic emissions, leading to weak or insignificant O_3 trends observed at most WUS rural sites (Figs. 8 and 11). Rising Asian emissions contribute to observed summertime O_3 increases (0.3 ppb yr^{-1}) at Yellowstone National Park. Our findings confirm the earliest projection of Jacob et al. (1999) with a tripling of Asian emissions. While wildfire emissions can result in 2–8 ppb enhancements to monthly mean O_3 at individual sites in some summers, they are not the primary driver of observed O_3 interannual variability over the Intermountain West (Figs. 15 and 16). Instead, boundary layer depth, high temperatures and the associated buildup of O_3 produced from regional anthropogenic emissions contribute most to the observed interannual variability of O_3 in summer. Summertime O_3 measured in Denver during pollution episodes frequently exceeds the 70 ppb NAAQS level, with little overall trend despite stringent precursor emission controls (Fig. 17c), likely due to the effects of more frequent occurrences of hot extremes in the last decade.

In the eastern US, if emissions had not declined, the 95th percentile summertime O_3 would have increased by 0.2–0.4 ppb yr^{-1} over 1988–2014 (Fig. 11c), due to more frequent hot summer extremes and increases in biogenic isoprene emissions (1–2 % yr^{-1}) over this period (Fig. 12). Regional NO_x reductions alleviated the O_3 buildup during the recent heat waves of 2011 and 2012 relative to earlier heat waves (e.g., 1988, 1995, 1999). GFDL-AM3 captures year-to-year variability in monthly mean O_3 enhancements associated with large-scale variations in temperatures (Figs. 18 and 19). However, there is a need to improve the model representation of O_3 deposition sink to vegetation, in particular its reduced efficiency under drought stress, as we demonstrated for the severe North American drought of 1988. Such land–biosphere couplings are poorly represented in current models and further work is needed to examine their impacts on O_3 pollution extremes in a warming climate.

Following the NO_x SIP Call, surface O_3 in the eastern US declined throughout its probability distribution, with the largest decreases occurring in the highest percentiles during summer (−0.8 to −1.8 ppb yr^{-1}; Fig. 8). Spatially, historical O_3 decreases during non-summer seasons were more pronounced in the southeast, where the seasonal onset of biogenic isoprene emissions and NO_x-sensitive O_3 production occurs earlier than in the northeast (Figs. 7, 9 and S4). The 95th percentile O_3 concentration in the southeast has even decreased during winter. Despite high mean-state biases, GFDL-AM3 captures the salient features of observed O_3 trends over the eastern US, including wintertime increases in the 5th and 50th percentiles in the northeast, greater springtime decreases in the southeast than the northeast, and summertime decreases throughout the O_3 concentration distribution. These results suggest that NO_x emission controls will continue to provide long-term O_3 air quality benefits in the southeastern US during all seasons.

8 Data availability

All data derived from observations and model simulations used in this study are archived at NOAA GFDL and are available to the public upon request to Meiyun Lin.

The Supplement related to this article is available online at doi:10.5194/acp-17-1-2017-supplement.

Competing interests. The authors declare that they have no conflict of interest.

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U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON ENERGY AND COMMERCE

March 20, 2017

TO: Members, Subcommittee on Environment

FROM: Committee Majority Staff

RE: Hearing entitled "H.R. 806, Ozone Standards Implementation Act of 2017"

I. INTRODUCTION

The Subcommittee on Environment will hold a hearing on Wednesday, March 22, 2017, at 10:00 a.m. in 2123 Rayburn House Office Building. The hearing is entitled "H.R. 806, Ozone Standards Implementation Act of 2017."

II. WITNESSES

- Seyed Sadredin, Executive Director/Air Pollution Control Officer, San Joaquin Valley Air Pollution Control District;
- Nancy Vehr, Air Quality Administrator, Wyoming Department of Environmental Quality;
- Marc A. R. Cone, P.E., Director, Bureau of Air Quality, Maine Department of Environmental Protection;
- Sean Alteri, Director, Division of Air Quality, Kentucky Department of Environmental Protection;
- Kurt Karperos, Deputy Executive Officer, California Air Resources Board; and
- Homer Boushey, M.D., Division of Pulmonary/Critical Care Medicine, University of California, San Francisco.

III. BACKGROUND

Under the Clean Air Act (CAA), the Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for criteria pollutants, including ground-level ozone.[1] Ozone is not emitted directly into the air, but is created by chemical reactions between oxides of nitrogen (NOx) and volatile organic compounds (VOC) from either

[1] Criteria pollutants include ozone, particulate matter, sulfur dioxide, carbon monoxide, nitrogen dioxide, and lead. *See* EPA NAAQS website.

manmade or natural sources in the presence of sunlight. According to EPA, since 1980 ozone levels have declined by over 30 percent.

EPA initially established an ozone standard in 1971, and subsequently revised the standards in 1979, 1997, and 2008.[2] The standards set in 2008 established an 8-hour standard of 75 parts per billion (ppb), replacing a 1997 standard equivalent to 84 ppb. *See* 73 Fed. Reg. 16,436 (March 27, 2008). In 2012, EPA designated over 230 counties in 26 states and the District of Columbia as being wholly or partially in nonattainment with the 2008 standards.[3] EPA did not publish implementing regulations until March 6, 2015, and states are in the process of implementing those standards.[4]

In October 2015, EPA also promulgated a new 8-hour ozone standard of 70 ppb.[5] Based on the agency's monitoring data for 2012-2014, 241 counties in 33 states would violate this standard.[6] This does not include contiguous counties that do not exceed 70 ppb, but that may be designated to be in nonattainment,[7] nor does it include the more than 2,400 counties that do not currently have ozone monitors.[8] Under the agency's current schedule for implementing the 2015

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[2] *See* Table of Historical Ozone NAAQS; *see also* 2008 National Ambient Air Quality Standards (NAAQS) for Ozone. For the classifications under the 2008 and 1997 ozone standards, see Designations.
[3]*See* 8-Hour Ozone (2008) Designated Area Design Values; *see also* Green Book 8-Hour Ozone (2008) Area Information; *see also* Nonattainment Designations for the 2008 Standards, Counties by State; 98 Fed. Reg. 30088 (May 21, 2012). Some areas are also designated nonattainment with the 1997 standard. *See* CRS Report.

[4] *See* "Implementation of the 2008 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements; Final Rule," 80 Fed. Reg. 12264 (March 6, 2015).

[5] See Final Rule (published at 80 Fed. Reg. 65,292 (Oct. 25, 2015)); Regulatory Impact Analysis; Overview; "Designations and Permitting Requirements for the 2015 Ozone Standards; 2015 Ozone NAAQS Timelines; Memorandum; Supporting Documents and Ozone (O3) Standards; docket. EPA revised both the "primary" standard to protect public health, and "secondary" standard to protect the public welfare, to a level of 70 ppb.

[6] *See* EPA County-level Design Values for the 2015 Ozone Standards" Of the 241 counties, 213 are outside of California. The agency states that "EPA will not designate areas as nonattainment based on [2012-2014] data, but likely based on 2014-2016 data which are expected to show improved air quality."

[7] Under the CAA, states are directed to designate as nonattainment "any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant." 42 U.S.C. § 7407(d).

[8] EPA has advised the Committee that in 2014, there were 813 U.S. counties with ozone monitors reporting data to EPA, and 2,407 counties with no ozone data reported.

ozone standards, states were required to submit designation recommendations by October 1, 2016,[9] and EPA is scheduled to designate areas as being in nonattainment by October of this year.[10]

States with areas designated to be "nonattainment" will become subject to new emissions control and transportation conformity requirements, and must develop emission inventories and implement a preconstruction permitting program.[11] These states will also have an obligation to submit State Implementation Plans (SIPs) that may include Infrastructure and Transport SIPs by October of 2018; for States classified "Moderate" or higher, they will also be required to submit attainment plans in the 2020 to 2021 timeframe.[12] States with nonattainment areas would also have an obligation to address the interstate transport of air pollution, which will significantly contribute to nonattainment or interfere with maintenance of the ozone standard in other states. 42 U.S.C. § 110(a)(2)(D)(i)(I). If EPA finds a state or locality has failed to submit a satisfactory implementation plan, in whole or in part, the state or area is subject to sanctions and the imposition of a Federal plan by EPA. 42 U.S.C §§ 179, 110(c).

For areas designated to be in "nonattainment," even after monitored air data shows the area meets the standard, they continue to be designated "nonattainment" areas until EPA approves maintenance plans, which can take years.[13] A state requesting re-designation of these areas must submit a revision to its applicable SIP that provides for the maintenance of the standards for at least 10 years after the re-designation. 42 U.S.C. § 7505a(a). In addition, 8 years after re-designation of any area as an "attainment" area, the state must submit an additional revision to the applicable SIP for maintenance of the standard for another 10 years after the expiration of the initial 10-year period. 42 U.S.C. § 7505a(b). Accordingly, even after achieving the standard, these areas continue to be subject to EPA oversight as they implement maintenance plans and controls under anti-backsliding provisions for the next 20 years.[14]

[9] *See* EPA memo dated Oct. 1, 2015; *see also* guidance dated Feb. 25, 2016.

[10] The CAA established ozone classification and attainment dates for the initial ozone standards of 3 years for "Marginal," 6 years for "Moderate," 9 years for "Serious," 15 years for "Severe," and 20 years for "Extreme." 42 U.S.C. § 7511. These deadlines have applied to subsequent ozone standards. *See, e.g.* NRDC v. EPA (Case No. 12-1321, D.C. Circuit, Dec. 23, 2014).

[11] 42 U.S.C. §§ 7407, 7410, 7501-7511. For background on the SIP process, *see, e.g.*, Basic Information; Infrastructure SIP Requirements; Guidance on Infrastructure SIP Elements under Clean Air Act Sections 110(a)(1) and 110(a)(2); SIP Development Process; Nonattainment Area & OTR SIP Requirements; SIP Efficiency & Effectiveness Guidance Memos; 2008 Ozone NAAQS Transportation Conformity Guidance and Regulations. For background relating to permits, *see, e.g.* Designations and Permitting Requirements for the 2015 Ozone Standards; Majority Memorandum for May 21, 2014 hearing.

[12] *See* 2015 Ozone NAAQS Timelines. States or localities will be required to meet the primary standard between 2020 to 2037, depending on the severity of the area's ozone problem. If an area fails to meet its deadline, it will be reclassified to the next higher classification level unless the area is already Severe or Extreme, and be subject to stricter mandatory controls. 42 U.S.C. § 7511.

[13] *See* EPA Redesignation and Clean Data Policy. *See also* EPA Sept. 4, 1992 Memo.

[14] *See* EPA Redesignation and Clean Data Policy.

For its 2015 ozone standards, EPA projects all but 14 counties (excluding California) would come into compliance by 2025 under existing regulations and programs.[15] EPA provides an annualized cost estimate only for 2025, estimating $1.4 billion (excluding California), and for California an additional $800 million post-2025.[16] In making its annualized cost estimates, the agency projects "unidentified controls" would be needed in some areas to meet a 70 ppb standard, including for 100 percent of the NOx emissions reductions needed in California.[17] In its cost estimate, EPA does not include the costs associated with complying with the 2008 standards, which the agency previously estimated would be $7.6 billion to $8.8 billion in 2020.[18]

With the 2008 ozone standards, for which implementation regulations were not issued until 2015, and the new 2015 standards, states currently face the prospect of implementing two different ozone standards simultaneously. Prior to EPA's decision to issue the 2015 standards, nearly 700 national, state, and local organizations and stakeholders had requested that EPA retain the 2008 standards and not establish a new additional lower standard. In comments on the proposed rule, many state environmental regulators also raised concerns about the role of background ozone, both naturally occurring and internationally transported contributions, and about the limitations to the Clean Air Act tools EPA had highlighted for regulatory relief to address background ozone.[19]

In addition to concerns relating to the implementation of multiple ozone standards simultaneously, general concerns with the NAAQS program have also been raised by state regulators.[20] These have included concerns regarding the current 5-year timeline for review of

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[15] In a fact sheet accompanying the final rule establishing the 2015 ozone standards, EPA states: "the vast majority of U.S. counties will meet the [2015 ozone standards] by 2025 just with the rules and programs now in place or underway." *See also* Counties Projected to Violate the 2015 Primary Ground-Level Ozone Standard in 2025. The 14 counties include: Larimer County, CO (71ppb); ii) Jefferson County, CO (71ppb); Tarrant County, TX (73ppb); Harris County, TX (74ppb); Brazoria County, TX (75ppb); Sheboygan County, WI (71ppb); Jefferson County, KY (71ppb); Allegheny County, PA (71ppb); Harford County, MD (73ppb); Richmond County, NY (72ppb); Queens County, NY (71ppb); Suffolk County, NY (73ppb); Fairfield County, CT (72ppb); New Haven County, CT (71ppb).

[16] EPA's cost estimate in the final rule is significantly lower than its estimate in the proposed rule, where it estimated costs for a 70 ppb standard to be $3.9 billion in 2025. *See* RIA for Proposed Rule at ES-14, ES-15.

[17] *See* RIA for Final Rule at Table 4-9 at 4-40, 4A-5 at 4A-6 and 4A-6 at 4A-6; Tables 3-9-and 3-10 (California) at 3-24.

[18] *See* EPA Fact Sheet for 2008 Final Revisions to the NAAQS for Ozone.

[19] *See, e.g.* State Environmental Agency Perspectives on Background Ozone and Regulatory Relief (June 2015).

[20] Clean Air Act Forum (Part I); Clean Air Act Forum (Part II); Clean Air Act Forum (Part III).

NAAQS,[21] as well as the failure of the agency to consider the likely technological feasibility or potential adverse effects associated with implementing revised standards, [22] and failure to issue timely implementing regulations and guidance.[23]

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[21] Under the CAA, EPA is required to complete a review of every NAAQS every 5 years. 42 U.S.C. § 7409. Many air regulators have raised concerns that the review time should be extended. *See, e.g* Testimony of Alan Matheson, Executive Director of the Utah Dept. of Env. Quality ("[E]xtending the 5-year NAAQS review cycle so that it better aligns with the prescribed NAAQS implementation timelines is appropriate); Testimony of Bryan Shaw, Chairman, Texas Commission on Env. Quality ("By lengthening the required review period from five to ten years, it will ensure the EPA does not rush to lower a given standard only to comply with a statutory deadline. Furthermore, it will give states more time to comply with previous standards before getting saddled with more stringent standards and/or facing economic or developmental sanctions for nonattainment"); Clean Air Act Forum Response of Thomas Burak, New Hampshire Dept. of Env. Services, July 27, 2012 ("Timing issues can also be challenging: often states are working on SIPs for multiple pollutants for which EPA had established different compliance deadlines. At the same time, EPA may be revising the NAAQS for a particular pollutant, leading to a constant state of flux in which the states and individual sources must try to reconcile complex and potentially conflicting requirements."); Response of Paul Tait, Southeast Michigan Council of Governments, July 31, 2012 ("The CAA calls for setting standards every five years. While this may have made sense in the 1972, it poses serious challenges today."); Response of Teresa Marks, Arkansas Dept. of Env. Quality, July 31, 2012 ("Five years may not allow for enough time for new technology or science to be fully developed . . . With more time between review processes, the States could have adequate time to develop proper SIPs and meet federal deadlines."); Response of Martha Rudolph, Colorado Department of Public Health and Environment, Nov. 23, 2012 ("[T]he ambitious schedule for evaluating and promulgating NAAQS revisions every five years has created an inefficient planning process"); Response of Scott J. Nally, Director of Ohio EPA, Aug. 2, 2012 ("We would recommend a minimum of ten years for the review and possible changes of the ambient air quality standards"); Response of Susan Hildebrand, Texas Council on Env. Quality ("While the concept of a five year review may sound reasonable, in practice it has not served as intended."); Response of Michael Krancer, Pennsylvania Dept. of Env. Protection, Nov. 29, 2012 ("Development of the NAAQS on an interval of five years (Section 109(d)(1)) has created significant resource burdens for both EPA and the states. Furthermore, the cascading standards can create confusion for the public because states and EPA continue to work on [SIP] revisions, determinations of attainment for one standard, while the Air Quality Index is based on another. NAAQS review intervals should be lengthened to 10 years"); Response of Robert Martineau, Jr. Tennessee Dept. of Env. and Conservation, Nov. 29, 2012 ("[T]he review period for the NAAQS needs to be lengthened from the current five (5) year cycle. A ten (10) year cycle should be considered.").

[22] Section 109(d)(2)(C)(iv) of the CAA expressly requires that the Clean Air Scientific Advisory Committee (CASAC) "advise the Administrator of any adverse public health, welfare, social, economic, or energy effects which may result from various strategies for attainment and maintenance of such national ambient air quality standards." 42 U.S.C. 7409(d)(2)(C)(iv). On May 20, 2015, the Government Accountability Office issued a report indicating CASAC has never provided such advice because EPA has never requested it, and that EPA has no plans to ask CASAC to provide advice on potential adverse effects. *See* GAO Report. Concerns have been raised regarding the agency's failure to implement this statutory provision. *See, e.g.* May 14, 2014 Letter from Senator Vitter and Response from Louisiana Dept. of Environmental Quality, Response from Mississippi Dept. of Environmental Quality; Response from North Carolina Department of Environment and Natural Resources; Response from Texas Commission on Environmental Quality.

States, furthermore, also face other Clean Air Act deadlines during the period 2016 to 2021. *See* Appendix 2. These converging deadlines to comply with other regulations include a number of requirements that also impose significant compliance costs. Among others, the pending requirements include compliance with the EPA's 2012 particulate matter standards for which EPA did not finalize implementing regulations until 2016, and 2010 sulfur dioxide standards for which the agency has required multiple rounds of designation submissions and is still in the process of finalizing implementing regulations and guidance.[24]

IV. H.R. 806, Ozone Standards Implementation Act of 2017

H.R. 806 was introduced on Feb. 1, 2017, by Rep. Pete Olson (R-TX), together with Rep. Bill Flores (R-TX), Rep. Bob Latta (R-OH), Rep. Henry Cuellar (D-TX), Rep. Sanford Bishop (D-GA), Rep. Jim Costa (D-CA), Majority Whip Steve Scalise (R-LA), Majority Leader Kevin McCarthy (R-CA), and other original cosponsors of the bill. Provisions include the following:

Section 1. Short Title: This section provides the short title of "Ozone Standards Implementation Act of 2017."

Section 2. Facilitating State Implementation of Existing Ozone Standards: This section provides a schedule for implementation of the national ambient air quality standards (NAAQS) for ground-level ozone published in 2015. Section 2(a) provides that states shall submit designations to implement the 2015 NAAQS for ground-level ozone not later than October 26, 2024. The Administrator of the Environmental Protection Agency (EPA) shall promulgate final designations with respect to those standards not later than October 26, 2025, and states shall submit implementation plans not later than October 26, 2026.

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[23] EPA's lack of timely implementing regulations and guidance has raised concerns and challenges for States. *See, e.g.* Clean Air Act Forum Response of Teresa Marks, Arkansas Dept. of Env. Quality ("Too often 'standards' are promulgated without the technical implementation rules in place. This places States in an extremely difficult position—that is to assert that the infrastructure will be in place timely and revise the SIP or other program requirements without the real tools to implement the new requirements."); Response of Susan Hildebrand, Texas Council on Env Quality, July 31, 2012 ("A common complaint of state regulators is the failure of EPA to provide guidance contemporaneously with the promulgation of a new NAAQS or other standard"); Response of Martha Rudolph, Colorado Department of Public Health and Environment, Nov. 23, 2012 ("The absence of timely implementation guidance produces a lack of clarity on SIP expectations, and often causes considerable uncertainty in the planning process, because states are reluctant to proceed with expensive technical planning activities that are later superseded by belated guidance that may differ significantly from the states' approach").

[24] *See, e.g.* Aug. 23, 2010 General Guidance Memo; March 24, 2011 Memo; April 23, 2014 Memo and Guidance; March 20, 2015 Updated Guidance Memo; July 22, 2016 Memo; Modeling Guidance.

Section 2(b)(1) provides the standards shall not apply to the review and disposition of a preconstruction permit application required under title I of the Clean Air Act (42 U.S.C. 7401 et seq.) if the Administrator or the state, local, or tribal permitting authority, as applicable, has determined the application to be complete prior to the date of promulgation of final designation of an area, or has published a public notice of a preliminary determination or draft permit before the date that is 60 days after the date of promulgation of final designation.

Section 2(b)(2) provides that the section shall not be construed to eliminate the obligation of a preconstruction permit applicant to install best available control technology and lowest achievable emission rate technology, as applicable, or limit the authority of a state, local, or tribal permitting authority to impose more stringent emissions requirements than the NAAQS.

Section 3. Facilitating State Implementation of National Ambient Air Quality Standards: This section includes provisions to facilitate more efficient implementation of NAAQS by states.

Section 3(a)(1) would extend the current NAAQS review cycle for criteria pollutants from 5 years to 10 years. Section 3(a)(2) would provide that no revision of the ozone standards shall be proposed prior to October 26, 2025.

Section 3(b) provides that the Administrator, when establishing or revising a NAAQS, may consider, as a secondary consideration, likely technological feasibility.

Section 3(c) provides that the Administrator, prior to establishing or revising a NAAQS, shall request, and the Clean Air Scientific Advisory Committee shall provide, the advice provided for in CAA Section 109(d)(2)(C)(iv) regarding any adverse public health, welfare, social, economic, or energy effects, which may result from various strategies for attainment and maintenance of such national ambient air quality standards.

Section 3(d) provides that the Administrator, when establishing or revising a NAAQS, shall concurrently publish implementing regulations and guidance as necessary to assist states, permitting authorities, and permitting applicants, and that the new or revised NAAQS shall not apply to preconstruction permit applications until such final regulations and guidance have been published.

Section 3(e) provides that in Extreme ozone nonattainment areas, contingency measures are not required to be included in nonattainment plans.

Sections 3(f)(1), (2), and (3) ensure that economic feasibility, in addition to technological achievability, be taken into consideration in certain requirements for plans for Moderate, Serious, and Extreme ozone nonattainment areas. Section 3(f)(4) eliminates certain demonstration requirements in approving provisions of an implementation plan for an Extreme ozone nonattainment and which anticipates development of new control techniques or improvement of existing control technologies.

Section 3(g) provides that, for particulate matter nonattainment areas, the milestones that must be included in plans to show reasonable further progress must take into account technological achievability and economic feasibility.

Section 3(h) provides that with respect to air quality monitoring data influenced by exceptional events, an exceptional event may include stagnation of air masses that are not ordinarily occurring, and may also include a meteorological event involving high temperatures or lack of precipitation.

Section 3(i) provides that within 2 years of enactment of the Act, the Administrator, in consultation with states, shall submit to Congress a report on (i) the extent to which foreign sources of air pollution impact the area designations and the attainment and maintenance of NAAQS; (ii) the EPA's procedures and timelines for disposing of petitions relating to emissions from sources emanating outside the United States that are submitted pursuant to section 179B(b) of the Clean Air Act (CAA); (iii) the total number of such petitions received by the agency and related information; and (iv) whether the Administrator recommends any statutory changes to facilitate more efficient review and disposition of such petitions.

Section 3(j) provides that the Administrator shall, in consultation with the National Oceanic and Atmospheric Administration, (i) conduct a study on the atmospheric formation of ozone and effective control strategies, including with regard to the relative contribution of manmade and naturally occurring nitrogen oxides, volatile organic compounds, and other pollutants in ozone formation in urban and rural areas, and with regard to wintertime ozone; (ii) that the study be peer reviewed in accordance with the requirements applicable to highly influential scientific assessments; (iii) that the Administrator submit a report to Congress describing the results of the study; and (iv) that the Administrator incorporate the results of the study into any Federal rules and guidance implementing the 2015 ozone standards.

Section 4. Definitions: This section contains the following definitions:

(1) The term "Administrator" means the EPA Administrator.

(2) The term "Best Available Control Technology" has the meaning given that term in CAA Section 169(3).

(3) The term "Highly Influential Scientific Assessment" means a highly influential scientific assessment as defined in the publication of the Office of Management and Budget entitled "Final Information Quality Bulletin for Peer Review" (70 Fed. Reg. 2664 (January 14, 2005)).

(4) The term "Lowest Achievable Emission Rate" has the meaning given that term in CAA Section 171(3).

(5) The term "national ambient air quality standard" means a national ambient air quality standard promulgated pursuant to CAA Section 109.

(6) The term "Preconstruction Permit" means a permit that is required under title I of the CAA (42 U.S.C. 7401 et seq.) for the construction or modification of a stationary source, and includes any such permit issued by the EPA or a state, local, or tribal permitting authority.

(7) The term "2015 Ozone Standards" means the national ambient air quality standard for ozone published in the Federal Register on October 26, 2015 (80 Fed. Reg. 65292).

Section 5. No Additional Funds Authorized: This section provides that no additional funds are authorized to carry out the requirements of the Act and amendments made by the Act, and that such requirements shall be carried out using amounts otherwise authorized.

V. ISSUES

The following issues may be examined at the hearing:

- The provisions of H.R. 806;
- Practical challenges to implementing existing ozone standards;
- Potential improvements to the NAAQS process;
- Impacts of revised NAAQS on jobs and economic growth; and
- Costs of revised NAAQS to households and consumers.

VI. STAFF CONTACTS

If you have any questions regarding this hearing, please contact Peter Spencer or Tom Hassenboehler of the Committee staff at (202) 225-2927.

APPENDIX 1

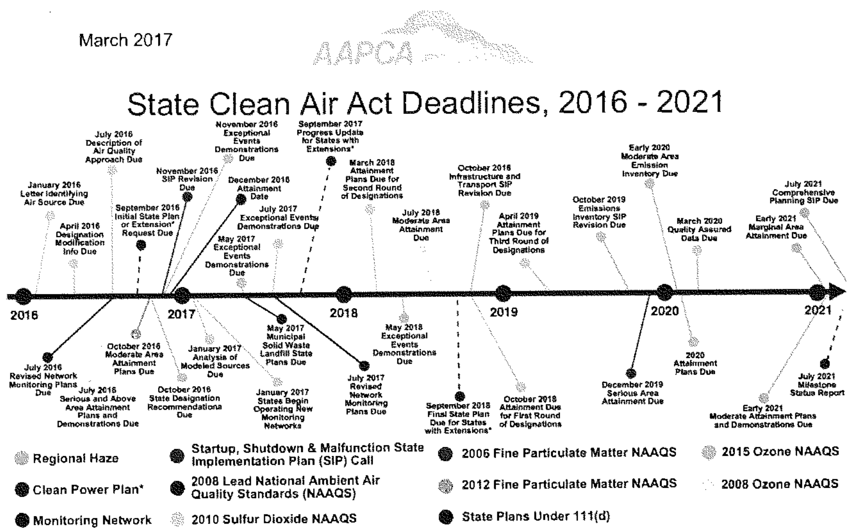
States with Counties That Violate 2015 Ozone Standards Based on Monitored Air Quality Data from 2012-2014

Alabama
Arizona
Arkansas
California
Colorado
Connecticut
Delaware
District of Columbia
Georgia
Illinois
Indiana
Kansas
Kentucky
Louisiana
Maine
Maryland
Massachusetts
Michigan
Mississippi
Missouri
Nevada
New Jersey
New Mexico
New York
North Carolina
Ohio
Oklahoma
Pennsylvania
Rhode Island
Tennessee
Texas
Utah
Virginia

Source: EPA "County-level Design Values for the 2015 Ozone Standards" available at https://www.epa.gov/sites/production/files/2016-03/documents/20151001datatable20122014.pdf. EPA will not designate areas as nonattainment based on 2012 to 2014 data, but likely based on 2014 to 2016 data which are expected to show improved air quality.

Majority Memorandum for March 22, 2017, Subcommittee on Environment Hearing
Page 11

APPENDIX 2



* On February 9, 2016, the U.S.Supreme Court stayed implementation of the Clean Power Plan. According to U.S. EPA: "EPA firmly believes the Clean Power Plan will be upheld when the merits are considered because the rule rests on strong scientific and legal foundations. For the states that choose to continue to work to cut carbon pollution from power plants and seek the agency's guidance and assistance, EPA will continue to provide tools and support."

The Association of Air Pollution Control Agencies (AAPCA) is a national, consensus-driven non-profit organization focused on assisting state and local air quality agencies and personnel with implementation and technical issues associated with the federal Clean Air Act. You can find more information about AAPCA at: http://www.cleanairact.org

Source: http://www.csg.org/aapca_site/documents/AAPCAStateCAADeadline-FINAL-3-2017_000.pdf

March 21, 2017

Dear Representative:

Clean air is fundamental for good health, and the Clean Air Act promises all Americans air that is safe to breathe. The undersigned public health and medical organizations urge you to **oppose H.R. 806, the so-called "Ozone Standards Implementation Act of 2017."** A more fitting name for this legislation would be the "Smoggy Skies Act," as it delays lifesaving standards to reduce ozone pollution, or smog, and permanently weakens the Clean Air Act.

Clear, up-to-date, scientific evidence documented the need for greater protection from ozone pollution, and drove the stronger limit on ozone that the U.S. Environmental Protection Agency (EPA) finalized in 2015. To meet the updated standard, the states have clear authority and plenty of time to plan and then work to reduce pollution under the Clean Air Act's long-established, balanced implementation timeline. Despite those facts, the Smoggy Skies Act imposes additional delays and sweeping changes that will threaten health, particularly the health of children, seniors and people with chronic disease.

The Smoggy Skies Act also reaches far beyond implementation of the current ozone standards. It permanently weakens the Clean Air Act and future air pollution health standards for all criteria pollutants. **Specifically, the Smoggy Skies Act weakens implementation and enforcement of all lifesaving air pollution health standards, including those for carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide.** It would also permanently undermine the Clean Air Act as a public health law.

The Clean Air Act requires that EPA review the science on the health impacts of carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide air pollutants every five years and update these national ambient air quality standards according to the current science. **The Smoggy Skies Act would lengthen the review period of the air pollution health standards from once every five years to once every ten years for all criteria pollutants.** As the science continues to evolve, the public deserves that their protections be based on the most up-to-date science, certainly not a schedule that is twice as long as they currently have under the law. The work that EPA and states do to clean up air pollution should be based on the best and most current science.

Emerging research adds crucial information to our understanding of the impacts that air pollution has on human health, and EPA should not have to wait a decade to incorporate it. For example, on March 29, 2016, a newly published study, *Particulate Matter Exposure and Preterm Birth: Estimates of U.S. Attributable Burden and Economic Costs*,[1] showed new information linking particulate air pollution to nearly 16,000 preterm births per year. Under the Smoggy Skies Act, EPA would have to wait as much as a decade to consider such new evidence when setting standards. **Ten years is far too long to wait to protect public health from levels of pollution that the science shows are dangerous or for EPA to consider new information.**

In the 2015 review of the ozone standard, EPA examined an extensive body of scientific evidence demonstrating that ozone inflames the lungs, causing asthma attacks and resulting in emergency room visits, hospitalizations, and premature deaths. A growing body of research indicates that ozone may also lead to central nervous system harm and may harm developing fetuses. In response to the evidence, EPA updated the ozone standards. While many of our organizations called for a more protective level, there is no doubt that the updated, 70 parts per billion standard provides greater health protections compared to the previous standard.

The Smoggy Skies Act would delay implementation of these more protective air pollution standards for at least eight years. This means eight years of illnesses and premature deaths that could have been avoided. Parents will not be told the truth about pollution in their community and states and EPA will not work to curb pollution to meet the new standards. **The public has a fundamental right to know when pollution in the air they breathe or the water they drink threatens health, and Congress must not add eight years of delay to health protections and cleanup.**

Furthermore, the American public overwhelmingly supports upholding these more protective limits on ozone. A 2017 poll found that by a 2-to-1 margin, Americans believe Congress should leave EPA's updated standards in place, showing clear public opposition to the Smoggy Skies Act.

The Smoggy Skies Act would also permanently weaken implementation of the 2015 and future ozone standards. The Act would delay implementation to a date when the evidence shows that most states would meet the standard with cleanup measures already in place. It would also reduce requirements for areas with the most dangerous levels of ozone. Areas classified as being in "extreme nonattainment" of the standard would no longer need to write plans that include additional contingency measures if their initial plans fail to provide the expected pollution reductions. The Clean Air Act prioritizes reducing air pollution to protect the public's health, but the Smoggy Skies Act opens a new opportunity for communities to avoid cleaning up, irrespective of the health impacts.

Further, the bill would greatly expand the definition of an exceptional event. Under the Clean Air Act, communities can demonstrate to EPA that an exceptional event, such as a wildfire, should not "count" in determining whether their air quality meets the national standards. **This bill would recklessly expand the definition of exceptional events to include high pollution days when the air is simply stagnant – the precise air pollution episodes the Clean Air Act was designed to combat – and declare those bad air days as "exceptional."** Changing the accounting rules will undermine health protection and avoid pollution cleanup.

Additionally, the bill would permanently weaken the Clean Air Act. The Clean Air Act is one of our nation's premier public health laws because it puts health first. The Act has a two-step process: first, EPA considers scientific evidence to decide how much air pollution is safe to breathe and sets the standard that is requisite to protect public health with an adequate margin of safety. Then, states work with EPA to develop a plan to clean

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[1] Trasande L, Malecha P, Attina TM. 2016. Particulate matter exposure and preterm birth: estimates of U.S. attributable burden and economic costs. Environ Health Perspect 124:1913–1918; http://dx.doi.org/10.1289/ehp.1510810

up air pollution to meet the standard. Cost and feasibility are fully considered in the second phase during implementation of the standard.

This bill states that if EPA finds that "a range of levels" of an air pollutant protect public health with an adequate margin of safety, then EPA may consider technological feasibility in choosing a limit within that range. Further, the bill would interject implementation considerations, including projections of adverse economic and energy effects, into the standard setting process. **These changes will permanently weaken the core health-based premise of the Clean Air Act – protecting the public from known health effects of air pollution with a margin of safety.**

These changes would reverse the intention of the Clean Air Act explicitly included by its bipartisan authors in Congress: that basing the standard on the protection of public health would push technology to develop new tools and techniques to reduce emissions. They understood that pushing the cleanup technology to meet the urgent need to protect health would help to expand job development and growth. They were correct, as the emission control industry today has helped the nation meet stronger standards in creative, cost-effective ways.

The text also explicitly states that the Smoggy Skies Act does not authorize any additional funds to be appropriated to EPA for its work carrying out the bill's provisions. Forcing EPA to perform the additional work of implementing this bill with no additional resources could put the agency's current, lifesaving work at further risk.

The Smoggy Skies Act is a sweeping attack on lifesaving standards that protect public health from air pollution. This bill is an extreme attempt to undermine our nation's proven clean air health protections. Not only does it delay the long-overdue updated ozone standards and weaken their implementation and enforcement, it also permanently weakens the health protections against many dangerous air pollutants and the scientific basis of Clean Air Act standards.

Please prioritize the health of your constituents and vote NO on the Smoggy Skies Act.

Sincerely,

Allergy & Asthma Network
Alliance of Nurses for Healthy Environments
American Lung Association
American Public Health Association
American Thoracic Society
Asthma and Allergy Foundation of America
Center for Climate Change and Health
Health Care Without Harm
National Association of County & City Health Officials
National Environmental Health Association
National Medical Association
Physicians for Social Responsibility
Trust for America's Health

March 21, 2017

The Honorable Congressman John Shimkus
Chairman, Environmental Subcommittee of the Energy and Commerce Committee
United States House of Representatives
2265 Rayburn House Office Building
Washington, DC 20515

CC: The Honorable Members of the Environmental Subcommittee of the Energy and Commerce Committee

RE: OPPOSE H.R. 806 - OZONE IMPLEMENTATION ACT OF 2017 (OLSEN)

Dear Chair Shimkus,

On behalf of public health and environmental organizations, the Central Valley Air Quality Coalition (CVAQ) is writing to express its concerns with H.R. 806, a bill known to us as the "Smoggy Skies Act."

Since 2003, the Central Valley Air Quality Coalition has led a partnership of more than 70 organizations to uphold the Clean Air Act and strengthen local air quality policy in California's San Joaquin Valley, with the goal of improving public health and the quality of life for the Valley's 4 million residents. Colleagues have already addressed why the Smoggy Skies Act will not help clean our air. The purpose of this letter is to rather provide context and clarity for the situation in the San Joaquin Valley and to shed light on the actions of the San Joaquin Valley Air Pollution Control District (District).

Foremost, the Clean Air Act - for very good reasons - does not allow air stagnation or a lack of precipitation to qualify as exceptional events. The climate of the San Joaquin Valley, a semi-desert region in Central California abutted by mountain ranges on three sides, is characterized by air stagnation and limited rainfall. With the advent of climate change, periods of drought and the stagnation that ensues will only increase. A recent study by Cornell researcher Toby Ault and his colleagues (2016) show that the chances of a severe ten-year megadrought in the Southwest this century is 80-90% and a 35-year

4991 E. McKinley Ave. #109 □ Fresno, CA 93727 □ Phone: 559.272.4874 □ dolores@calcleanair.org

mega-drought has a 20-50% chance.[1] **Drought and air stagnation will not be an exceptional event in the Valley, but rather a reality we must plan for.** Excluding periods of air stagnation and drought from official recordkeeping will effectively remove protections for Valley residents when we need it the most.

Secondly, I would like to address the context in which our District's Executive Officer, Seyed Sadredin, speaks about contingency measures. PM 2.5 and ozone share precursors, thus control measures for each have mutual benefits. The District claims, for both ozone and particulate matter standards, that it has implemented all available control measures and therefore has nothing to set aside as contingency measures. In October of 2016, the California Air Resources Board denied this claim and sent District staff back to find additional measures. Since then, the District has presented a host of additional controls to explore - measures they claimed months earlier were nonexistent - disproving their own messaging that they had overturned every stone. Unfortunately, these additional measures are weak and do not include the dozens of recommendations made by advocates over the past ten years (please find attached a list of measures the District could either implement now, or set aside as a contingency measure). **The claim that contingency measures require an air district to hold back available controls would only make sense if this District were actually implementing all available controls.**

I would also like to address economic and technologic feasibility. At present, the Clean Air Act allows Districts to address feasibility within their implementation plans. If measures to reach attainment are too costly, or not technology feasible, a District can ask for a time extension from the EPA within normal regulatory avenues; this is a route the San Joaquin Air District has chosen many times. However, addressing economic and technologic feasibility when setting the health-protective standards double-counts economics and technology while discounting the science and public health impacts that are meant to be the basis of the standards.

The Air District and H.R. 806 seek to address one air quality standard at a time. Citing California's South Coast Air District planning efforts, CVAQ has continuously asked the San Joaquin Air District to develop an integrative plan that addresses the most stringent standard, integrating requirements for all subsequent standards. In late 2016, the District announced they would be planning an integrative PM 2.5 plan, addressing multiple standards, thus demonstrating the administrative options under the Act as-is.

Lastly, we would like to address the claims that meeting the new federal clean-air standards would be akin to the Valley approaching "background concentrations" of

[1] Ault, T. R., J. S. Mankin, B. I. Cook, and J. E. Smerdon. "Relative Impacts of Mitigation, Temperature, and Precipitation on 21st-century Megadrought Risk in the American Southwest." Science Advances 2.10 (2016): Web. <http://advances.sciencemag.org/content/2/10/e1600873.full>.

ozone, or that that "all Valley businesses, agricultural operations, or trucks traveling through the San Joaquin Valley need to be eliminated" in order to reach attainment of ozone standards. These claims are false. At present, due to the implementation of mobile source controls promulgated by the California Air Resources Board, **the San Joaquin Valley will reach attainment of ozone standards within the timelines set by the Clean Air Act** (State Implementation Plan, p. 33).[2] In fact, newly proposed measures will provide additional reductions that go beyond what is needed to meet the Valley's 2031 attainment date. This progress is ultimately tied to the impressive regulatory agenda of the state of California and is not attributable to the actions of our local Air District. Rather, our region will reach ozone standards despite our District ignoring significant sources of ozone pollution within its regulatory jurisdiction, such as volatile organic compound (VOC) emissions from dairies and oil and gas operations. Changes to the Act in response to the Valley's ozone needs are therefore unnecessary - and would hurt our neighbors in the the Los Angeles area who have greater ozone challenges.

In conclusion, H.R 806's proposed changes to the Clean Air Act are unnecessary and counterproductive. Thank you for your consideration.

Sincerely,

D. Weller

Dolores Weller
Director

Enclosure:

Opinion Editorial in the Fresno Bee: *Alex Sherriffs and John Capitman: Don't back off demands for cleaner air* (September 30, 2015)
Letter Re: Hearing on EPA's 2015 Ozone Standard: Concerns Over Science and Implementation (October 21, 2015)
CVAQ's PM 2.5 Reduction Recommendations

[2] California Air Resources Board, *Revised Proposed 2016 State Strategy for the State Implementation Plan*, March 7, 2017 https://www.arb.ca.gov/planning/sip/2016sip/rev2016statesip.pdf

Advocating for ***Clean Air*** *in the San Joaquin Valley*

October 21, 2015

House Committee on Science, Space & Technology
2321 Rayburn House Office Building
Washington, DC 20515
Fax (202) 226-0113

Re: Hearing on EPA's 2015 Ozone Standard: Concerns Over Science and Implementation

The Central Valley Air Quality (CVAQ) Coalition requests the following comments be included as the House Committee on Science, Space & Technology considers the science and implementation of the Environmental Protection Agency (EPA)'s newly released ozone standard of 70 ppb.

The Central Valley Air Quality (CVAQ) Coalition is a partnership of more than 70 member organizations committed to creating clean air in the San Joaquin Valley of California since 2003. Our coalition originally advocated for the most health protective possible standard of 60ppb. We urge the committee to support the implementation of the 70 ppb standard, which represents a level of health protection that is long overdue and at the very least it is in the right direction.

On October 22, 2015 the committee will hear from the San Joaquin Valley Air Pollution Control District, Air Pollution Control Officer (APCO), Seyed Sadredin. It is important that the committee understand Mr. Sadredin's perspective and his efforts on behalf of the San Joaquin Valley. Our coalition believes he does not represent the public; instead he represents interests of industry and Agriculture in our Valley. While he represents a public health agency, the Valley Air Board members, whose political campaigns and personal income are directly tied to our polluting industries, determine the fate of his position. Thus, his perspective is biased.

Mr. Sadredin advocates for the interests of business, even while our Valley, with over 4 million residents, has the highest asthma rates in California. He claims businesses have done all they could and cleaning our air is the responsibility of the individual. This stance was demonstrated when he convinced the Valley, that the EPA levied a $29 million fee via a DMV surcharge on all motorists, for not meeting an ozone standard. He failed to clarify that the decision was made by himself and the Valley Air Board, to place the financial burden on all Valley motorists, rather than business. For the past ten years, our coalition has debated with Mr. Sadredin on strategies for clean air. The District has ignored significant sources of ozone pollution, such as volatile organic compound (VOC) emissions from dairies and Oil and Gas operations, and they have also failed to implement aggressive measures on agricultural equipment and mobile sources within their purview.

Rather than look for additional control measures, Mr. Sadredin has employed tactics of scapegoating. The Air District has funneled hundreds of thousands of dollars into examining ozone pollution traveling to our Valley from Asia, while ignoring the majority of our homegrown pollution. In recent years, the Air District has blamed the drought for our bad air, taking no responsibility for the consequences of failed air quality plans from previous years. Currently, the blame falls on the EPA and the Clean Air Act, claiming the Act is antiquated and EPA sets unrealistic standards. Without strong guidance from the EPA and the Clean Air Act, the Valley Air District representing the air basin with the worst air pollution in the nation, would define its own path to clean air with little regard for public health.

The Air District's decisions and inaction have real and lasting impacts on our health. Our children are regularly kept indoors from recess and sports activities and we lose billions of dollars every year in missed school and work days, visits to the emergency room and health care costs. We learn more everyday of the impacts of air pollution on our health and our Valley has become numb to the information, because Mr. Sadredin and the Valley Air Board disregard it, blame external factors and have failed to find a balance between supporting business and protecting public health.

Our coalition urges you to support the EPA's decision of implementing a standard of 70 ppb and to hear Mr. Sadredin with skepticism. Mr. Sadredin does not represent the interests of Valley residents and Valley businesses have not done enough. On the other hand, residents have endured enough – decades of poor health and misinformation with no accountability. We need your help in guiding our local leaders to protect our health.

Sincerely,

D. Weller

Dolores Weller
CVAQ Director

Central Valley Air Quality Coalition's

Pollution-Reduction Recommendations

San Joaquin Valley 2017 Plan for the 2012 PM2.5 Standard

Agriculture

- Limit Biomass and Ban Open Burning: Biomass burning is a significant source of direct PM2.5, yet in 2016 the Air District allowed close to 2,000 acres of biomass to be openly burned in the Central Valley. Open burning of agricultural waste should be completely banned and incentives for mulching waste like those provided by the U.S. Department of Agriculture should be provided.
- Regulate Agricultural Equipment: For over five years ARB has promised to implement an enforceable rule on Agricultural equipment. A rule is necessary for attainment in both ozone and PM plans. We also need to regulate Agricultural pumps (internal combustion engines). Having been heavily incentivized, it is time for all Ag. Equipment to be subject to an enforceable rule to utilize the cleanest available technology.
- Update Conservation Management Practices (CMPs) and Require Emission Reduction Plans from Growers: CMPs are activities farmers can implement to reduce dust emissions from on-farm sources. While farming techniques and technologies have greatly evolved over the last ten years, the list of available CMPs has not been updated since 2004. For instance, the Almond Board has approved new harvesting technologies that reduce particulate matter by 30%. CMPs should be updated to reflect current practices and new technologies and farmers should be required to demonstrate actual on-farm emission reductions.
- Regulate Ammonia: Ammonium nitrate, composed of ammonia and NOx, is the largest component of the Valley's PM2.5 levels and contributes significantly to levels that exceed the national standards. Compared to NOX, which has already been heavily regulated, ammonia has been historically under-regulated and represents

the cheapest opportunity for emission reductions. The EPA has already asked the District to regulate ammonia. We'd like to see a 70% reduction in ammonia modeled to determine its significance as a precursor.

Transporation

- Add the San Joaquin Valley to areas of focus within ARB's Mobile Source Plan, including additional actions to deploy cleaner technologies.
    - Accelerate timelines within the Mobile Source Plan for San Joaquin Valley: accelerate the setting of in-use emission performance standards and a low-NOx engine standard; accelerate deployment of zero-emission drayage and last-mile delivery trucks; accelerate deployment of zero-emission airport shuttle busses, forklifts, and transportation refrigeration units. Accelerate the change of construction fleets to Tier 4 standards.
    - Institute more aggressive targets for purchase requirements for zero-emission last-mile delivery trucks and bus fleets. Institute a zero-emission drayage truck rule.
- Expand the Indirect Source Review (ISR) Rule: The ISR rule plays an important role in minimizing pollution from urban development. The District could expand the applicability of the rule to include new agricultural operations, such as traffic emissions between operations (i.e. milk processor, dairy, feedlot). In addition, the District should add limits on PM2.5 emissions and increase the emissions reductions required for projects.
- Institute Clean Public Fleets: The District has the authority to adopt next-generation standards for fleets with zero-emission requirements on all publicly-owned vehicles in the San Joaquin Valley.

Oil & Gas

- Amend the Flare Rule to incorporate required and enforceable minimization plans for operators, small and large: At present, Valley oil producers have no incentive to decrease flaring. North Dakota has a flare rule that requires operators of natural gas facilities to capture 74% of all natural gas, and by 2020, increase the capture rate to 90%. If operators do not meet the targets, the Commission can reduce flared gas by restricting oil production. The District could borrow from this approach to reduce flaring.
- Enhanced NOx and PM2.5 control requirements for boilers and steam generators, with a focus on transitioning to solar-powered boilers and generators.

- Emission Reduction Credits: Require the expiration of credits after 10 years and reduce their value by 5% annually.
- Explore additional NOx and PM2.5 controls for non-agricultural internal combustion engines - including those in the oil and gas sector.

Other

- Glass Melting Manufacturing: Require more stringent NOx, SOx and PM2.5 emission limits to facilities manufacturing glass, making the applicable rules similar to South Coast's (0.24 lbs NOx/ton of glass pulled utilizing the "Ultra Cat ceramic filter system").
- Ban Fireplaces in New Development, Lower the Burn Threshold and prohibit all devices from burning on a day expected to exceed 12 ug/m3 in PM 2.5 levels. The District should, like the the Bay Area Air Pollution Control District already has, ban fireplaces in all new homes and ban the use of fireplaces when PM2.5 concentrations exceed air quality standards.
- Update the Charbroiling Rule to include under-fired charbroilers: Under-fired charbroilers emit direct PM2.5, yet the District has delayed updating the charbroiling rule to include the under-fired variety. The Bay Area Air Quality Management District has already implemented regulations on under-fired charbroilers.

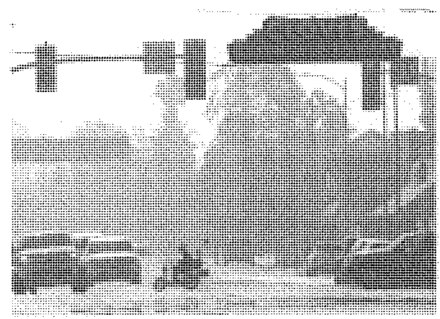
FRESNO BEE

Alex Sherriffs and John Capitman: Don't back off demands for cleaner air

SEPTEMBER 30, 2015 9:53 AM

http://www.fresnobee.com/opinion/opn-columns-blogs/article37113285.html#storylink=cpy

- Two dissenting members of Valley air board want to increase resources for cleaner air, not delay attainment
- Valley can be proud of efforts that result in better air quality, but we still have far to go
- Any changes to the Clean Air Act must unequivocally help us move forward



BY ALEX SHERRIFFS AND JOHN CAPITMAN

We are responding to a commentary in the Sept. 23 Bee written by five of our fellow board members at the San Joaquin Valley Air Pollution Control District.

They support federal legislation that we believe will weaken, not strengthen, efforts to improve the Valley's air quality. As a practicing physician and as a professor of public health policy serving on the board, we cannot support a policy direction which threatens to extend the time Valley residents are breathing unhealthful air.

Generalities in the op-ed sounded good, but we cannot endorse many details of the legislative language, particularly as public discourse of its implications has been limited. The district needs to focus on policy and advocacy to increase the tools and resources to meet more healthful air standards – not on how to delay attainment.

Thanks to the Clean Air Act, the Valley's air is cleaner and more healthful than it was five, 10 and 25 years ago. The Clean Air Act represents 40 years of federal legislation driving efforts to combat air pollution. It got lead out of gasoline. It fights lung- and eye-burning ozone, and it has saved hundreds of thousands of lives by cleaning soot and tiny particulates from our air.

The Clean Air Act sets standards based on what the latest and best science tells us about the impacts of air quality on health. First and foremost, the Clean Air Act is about achieving better health for us all.

The Valley has made important investments to reach Clean Air Act goals. Thanks to federal, state and air district regulations, our businesses use cleaner technologies and have adopted more sustainable and efficient practices. Trucks have to upgrade to lower-emission, more fuel-efficient engines. The public has been essential in its demand for and acceptance of cleaner-burning, higher-mileage and alternative-fuel cars. The public also has been on board in its support of incentives, financed by state bonds and DMV fees specific to the Valley.

Agriculture, too, has played an important role. Farmers have switched from diesel pumps to electric pumps and have purchased cleaner-burning tractors, thanks to incentive programs.

Schools have been able to purchase less polluting buses, decreasing our children's direct exposure to toxic diesel emissions. Those incentives have helped businesses adopt cleaner technologies sooner. We all benefit: Businesses get assistance buying cleaner equipment ahead of deadlines, and the public sees cleaner air sooner.

We can all be proud of the combination of efforts that has resulted in better air quality. But we still have far to go. We still share the worst childhood asthma rates in the nation with the heavily polluted Los Angeles basin. We still have more than 1,000 premature deaths every year in the Valley because of air pollution. Among all the air pollutants contributing to cancer, diesel emissions remain the No. 1 cause.

Whenever we think about the costs of cleaning up, we must remember, too, the costs of not making things better for our children and grandchildren. The annual monetary cost of Valley air pollution in lost days of work, lost school days and health costs is over $1 billion. That human suffering and monetary expense may not make daily headlines, but it is real and immediate.

We need to focus on achieving the health goals ahead, not on finding ways to delay success. Many thought that achieving current ozone standards would be impossible due to the costs and the lack of technology, but thanks to regulations put in place, and especially cleaner trucks and buses, we are on a path of success into the 2030s.

Creating a cleaner and more healthful future requires change. How we will balance competing needs is never certain. We have great opportunities to promote even cleaner technologies, garner more support and financing to implement those strategies, and to be certain we include disadvantaged communities in that economic success.

Every day of delay is more deaths, millions of dollars in unnecessary health costs, and new cases of asthma. Any changes to the Clean Air Act must unequivocally help us move forward and strengthen our hand for cleaner, more healthful air.

Alexander Sherriffs, M.D., is a physician with Adventist Health Community Care in Fowler. John A. Capitman, Ph.D., is executive director of the Central Valley Health Policy Institute. They are San Joaquin Valley Air Pollution Control District board members.

OFFICE OF THE COMMISSIONER

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The Honorable John Shimkus, Chairman
Subcommittee on the Environment
Committee on Energy and Commerce
U.S. House of Representatives
2125 Rayburn House Office Building
Washington, D.C. 20515

The Honorable Paul D. Tonko, Ranking Member
Subcommittee on the Environment
Committee on Energy and Commerce
U.S. House of Representatives
2125 Rayburn House Office Building
Washington, D.C. 20515

Re: H.R. 806, Ozone Standards Implementation Act of 2017

Dear Honorable Chair Shimkus and Representative Tonko:

The State of New York strongly opposes the "Ozone Standards Implementation Act of 2017," which will substantially harm public health to the detriment of New Yorkers and residents of many other states. The proposed bill would restrict the efficacy of the Clean Air Act in a way that would delay implementation of critical health-based standards for protecting the public from harmful ground-level ozone and other dangerous air pollutants. The result of this proposed bill would be the significant postponement of health and environmental benefits for nearly a decade, inevitably resulting in increased illness and deaths from air pollution.

Introduction

The Clean Air Act ("Act") addresses the critically important issue of protecting the health and welfare of all Americans from excessive levels of air pollution. It establishes a federal-state partnership under which EPA, informed by established science, sets National Ambient Air Quality Standards (NAAQS) at a level necessary to protect public health, and states develop and implement plans for achieving those standards. This collaborative process has significantly reduced pollutant concentrations to the great benefit of the public. Importantly, the process provided by the sections 109 and 110 of the Act recognizes that air pollution knows no boundaries and that air quality in many states, including New York, is impacted by emissions from sources located upwind.

Section 109 of the Act ensures that implementation of the Act is guided by established science; it charges the Clean Air Scientific Advisory Committee (CASAC) with reviewing the latest "state of the science" relating to public and environmental health, and conveying its findings to the Administrator. Based on that information, the Administrator establishes the NAAQS at a level necessary to protect public health within a reasonable margin of safety. Under Section 110 of the Act, States then develop plans to achieve air quality that meets the standard in those areas that do not meet the standard, known as "nonattainment" areas.

In its latest review, CASAC determined that the existing 2008 ozone NAAQS was insufficiently protective of public health, particularly for at-risk groups including children, older adults, people of all ages who have lung diseases such as asthma, and people who are active outdoors. Based on CASAC's scientific findings, EPA determined that implementing the 2015 ozone NAAQS would help prevent a range of harmful health effects each year, including 320 to 660 premature deaths; 230,000 asthma attacks in children; 160,000 days when kids miss school; 28,000 missed work days; 630 asthma-related emergency room visits; and 340 cases of acute bronchitis in children. EPA has identified additional serious health threats from ozone including cardiovascular disease (e.g., heart attacks, strokes, heart disease, congestive heart failure); potential harm to the central nervous system; and potential reproductive and developmental harm. The health benefits from meeting the 2015 ozone NAAQS exceed the costs of controls by 2 to 4 times.

Like many other states, New York strongly supported EPA's strengthening of the ozone NAAQS in 2015. This support comes even though New York faces a substantial burden of achieving ozone attainment in the New York City metropolitan area. This burden, however, is outweighed by the need to address the serious public health impacts. In New York City, approximately 1 in 10 emergency room visits for asthma are attributable to ozone pollution. Rather than seek to delay its ozone attainment efforts, New York strives to bring the New York City metropolitan area into attainment as expeditiously as possible, in order to provide its residents with cleaner and more healthful air to breathe.

Delaying public health benefits of the 2015 ozone NAAQS

The proposed legislation would harm public health by delaying the implementation of the 2015 ozone NAAQS (and its corresponding health benefits) for eight years and further postponing any future standard for several years beyond when they are necessary. Current law requires EPA to designate states under the 2015 ozone NAAQS according to their monitored air quality by October 2017, and states not meeting the standards would have a number of years to reach compliance proportional to the severity of their ozone problems. However, this legislation would defer action so that designations would not be made until October 2025, thus postponing even the beginning of planning efforts until after attainment would otherwise have been achieved under the current structure of the Act. For New Yorkers and other Americans, this would result in a substantial delay in their ability to breathe clean and healthful air.

Even worse, this proposed bill compounds this public health harm by allowing the construction of new power plants and factories without considering their impact on a region's ability to achieve compliance with the NAAQS. Under current law, such new and modified facilities located in areas designated nonattainment are subject to a control technology review under the Clean Air Act's nonattainment new source review program, which requires a demonstration of control technology that would consider the "lowest achievable emission rate," resulting in the most stringent emission limit for a certain source class. This bill would eliminate these new source reviews, which are critical for advancing a nonattainment area toward NAAQS compliance.

Together, these aspects of the legislation will have even worse additional adverse impacts on states like New York that are victimized by upwind air pollution. First, this legislation will impair New York's relief from ozone transport from upwind locations. EPA modeling indicates that between 75% and 94% of the ozone in the New York City metropolitan area comes from sources outside of New York. Although New York will continue actions to reduce emission of ozone precursors, it cannot achieve healthful ozone levels without a substantial reduction in emissions from states located upwind, which are responsible for most of New York's ozone levels. Many of these states encompass areas that are currently monitoring as nonattainment, and these areas would have to achieve emission reductions under current law if designated nonattainment. Postponing a nonattainment designation for the New York City metropolitan area will have the unacceptable effect of postponing the "good neighbor" obligation of upwind areas to reduce their significant contribution to New York's nonattainment until sometime after the nonattainment designation.

Moreover, postponing compliance with nonattainment New Source Review in areas that would otherwise be designated as nonattainment with the ozone NAAQS establishes an inequitable outcome for New York and other states that have already been designated nonattainment. Under this proposed bill, new industrial facilities in areas currently designated nonattainment with the 2008 ozone NAAQS or in the Ozone Transport Region – including all of New York -- will have to comply with nonattainment NSR requirements, yet facilities located in regions with comparable or worse air quality and much higher emissions will not have to do so for a decade or more. As such, states that would otherwise be designated nonattainment would gain an unfair advantage in attracting business development under this bill.

Delaying public health benefits from reducing other criteria pollutants

Aside from ozone, provisions of this proposed bill would affect future NAAQS reviews for all criteria pollutants, thus compounding negative public health impacts. For example, the bill would irresponsibly extend the NAAQS review time from five years to ten for all criteria pollutants. Retaining the five-year review schedule ensures that the Administrator reviews the relevant state of the science while it is timely and germane.

Health science moves quickly; by the time one NAAQS revision is reaching completion, other pertinent clinical studies are being published.

This proposed bill weakens public health protection by making cost and technological feasibility larger factors in the establishment and implementation of NAAQS. The Supreme Court has already upheld the notion that the consideration of costs has no place in the setting of a NAAQS (Whitman v. American Trucking Associations, Inc., 2001). Instead, questions of technological and economic feasibility are considered at the stage of implementing the NAAQS. For example, the Act's nonattainment area classifications recognize that areas with more difficult ozone pollution problems require more time to comply. Unfortunately, Section 3(b) of the proposed bill would change the long-standing practice of how an Administrator determines the NAAQS by allowing him or her to analyze, as a secondary consideration, the likely technological feasibility of a revised NAAQS. Section 3(c) would expand CASAC's role to providing advice to the Administrator on adverse economic effects (among others) prior to the setting of the NAAQS. Taken together, these proposed revisions would have the effect that NAAQS would no longer be set at levels that are protective of public health and welfare.

Finally, the proposed bill unnecessarily redefines ordinary expected conditions as "exceptional events" that need not be considered by a state in demonstrating attainment. The intent of the "extraordinary event" exception is to allow a state to discount NAAQS exceedances that result from one-time, unpredictable, and uncontrollable events such as wildfires. The proposal, however, would allow commonplace conditions such as stagnant air masses and "meteorological event[s] involving high temperatures or lack of precipitation" to be considered exceptional. In their ozone planning, states should anticipate these conditions, which are expected to occur each year and promote the formation of ozone when public health is at the greatest risk.

We also disagree with the proposal to allow sources to avoid nonattainment new source review until release of the implementation guidance. EPA's delay in issuing guidance should not be an excuse to allow new sources in nonattainment areas to contribute to further air quality degradation. In addition, the bill's reduction of the time allotted for states to formulate and submit attainment plans from the current three years to one year reflects a misunderstanding of the laborious process for developing these plans.

Conclusion

The Clean Air Act is a bipartisan success story. Citizens across the country have benefited from the Act's clean air requirements over the last few decades. People can breathe easier due to the clean air standards that have resulted from rigorous reviews that are guided by the latest scientific evidence. Passage of this proposed bill would deprive the American people of those benefits, worsen air quality and harm public health substantially.

Sincerely,

Basil Seggos

SEE ALL NEWS & RESOURCES

ACC Welcomes Hearing On Legislation to Improve Implementation Process for EPA Ozone Standards

Contact Us
Jennifer Scott
(202) 249-6512

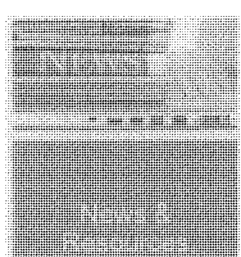
WASHINGTON (March 22, 2017) – *The American Chemistry Council (ACC) issued the following statement in advance of today's legislative hearing in the House Subcommittee on Environment entitled, "H.R. 806, Ozone Standards Implementation Act of 2017."*

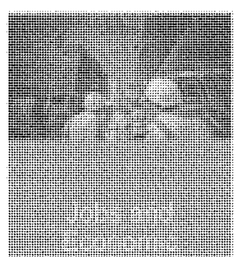
"We commend Chairman Shimkus for holding today's hearing on H.R. 806, bipartisan legislation that updates and improves the implementation process for EPA ozone standards. It will help ensure that manufacturers who want to invest and hire in the U.S. can obtain regulatory permits in a timely and efficient manner.

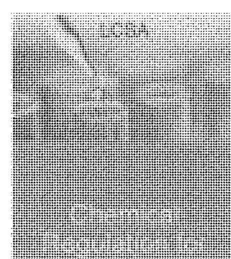
"Before manufacturing facilities can proceed with a new construction or expansion project, they must obtain regulatory approval. This is complicated when localities are forced to comply with two different ozone standards concurrently. EPA has failed to provide needed implementation rules and guidance in a timely manner, leaving facilities and state permitting agencies in limbo. The confusion and delays that result from EPA's approach to setting and implementing ozone standards can put new investment and jobs at risk.

"The 'Ozone Standards Implementation Act' will help. It sets a ten-year cycle for national ambient air quality standards (NAAQS) reviews, provides regulatory certainty by streamlining preconstruction permitting and extends the compliance date for meeting the 2015 standards to 2025. Such reforms will enable continued air quality improvement without compromising U.S. manufacturing growth."

H.R. 806 was introduced by Rep. Pete Olson (R-Texas), together with Reps. Bill Flores (R-Texas), Bob Latta (R-Ohio), Henry Cuellar (D-Texas), Sanford Bishop (D-Ga.), Jim Costa (D-Calif.), Steve Scalise (R-La.), Kevin McCarthy (R-Calif.) and other original cosponsors. The Senate companion, S. 263, was introduced by Senators Shelley Moore Capito (R-W.Va.), Jeff Flake (R-Ariz.) and Joe Manchin (D-W.Va.). Both bills were introduced on February 1, 2017.







Impact

the 21st Century

March 21, 2017

Dear Senator/Representative,

On behalf of our millions of members, the undersigned 121 organizations urge you to oppose the "Ozone Standards Implementation Act" (H.R. 806, S.263). The innocuous-sounding name is misleading: this legislation would actually systematically weaken the Clean Air Act without a single improvement, undermine Americans' 46-year right to healthy air based on medical science, and delay life-saving health standards already years overdue.

This bill's vision of "Ozone Standards Implementation" eliminates health benefits and the right to truly safe air that Americans enjoy under today's law. First, the legislation would delay for ten years the right to safer air quality, and even the simple right to know if the air is safe to breathe. Corporations applying for air pollution permits would be free to ignore new ground-level ozone (aka smog) health standards during these additional ten years. For the first time the largest sources of air pollution would be allowed to exceed health standards. The bill would also outright excuse the parts of the country suffering the worst smog pollution from having backup plans if they do not reduce pollution. The most polluted parts of the country should not stop doing everything they can to protect their citizens' health and environment by cleaning up smog pollution.

This bill is not content to merely weaken and delay reductions in smog pollution. It also strikes at our core right to clean air based on health and medical science. The medically-based health standards that the law has been founded on for 46 years instead could become a political football weakened by polluter compliance costs. This could well result in communities being exposed to unhealthy levels of smog and soot and sulfur dioxide and even toxic lead pollution. The bill would also double the law's five-year review periods for recognizing the latest science and updating health standards, which are already frequently years late; this means in practice that unhealthy air would persist for longer than ten years.

The legislation also weakens implementation of current clean air health standards. The bill expands exemptions for "exceptional events" that are not counted towards compliance with health standards for air quality, even when air pollution levels are unsafe. This will mean more unsafe air more often, with no responsibility to clean it up. Requirements meant to ensure progress toward reducing smog and soot pollution would shift from focusing on public health and achievability to economic costs. Despite the bland name "Ozone Standards Implementation Act," this bill represents an extreme attack on the most fundamental safeguards and rights in the Clean Air Act.

Since 1970, the Federal Clean Air Act has been organized around one governing principle—that the EPA must set health standards based on medical science for dangerous air pollution, including smog, soot and lead, that protect all Americans, with "an adequate margin of safety" for vulnerable populations like children, the elderly and asthmatics. This legislation eviscerates that principle and protection. We urge you to oppose H.R. 806 and S.263, to protect our families and Americans' rights to clean air.

Sincerely,

350KC
350 Loudoun
Alaska Community Action on Toxics
Alton Area Cluster UCM (United Congregations of Metro-East)
Brentwood House

California Latino Business Institute
Center for Biological Diversity
Central Valley Air Quality (CVAQ) Coalition
Chesapeake Physicians for Social Responsibility
Chicago Physicians for Social Responsibility
Citizens for Clean Air
Clean Air Watch
Clean Water Action
Cleveland Environmental Action Network
Climate Action Alliance of the Valley
Connecticut League of Conservation Voters
Conservation Voters for Idaho
Conservation Voters of South Carolina
Dakota Resource Council
Earth Day Network
Earthjustice
Earthworks
Environment Iowa
Environment America
Environment Arizona
Environment California
Environment Colorado
Environment Connecticut
Environment Florida
Environment Georgia
Environment Illinois
Environment Maine
Environment Maryland
Environment Massachusetts
Environment Michigan
Environment Minnesota
Environment Missouri
Environment Montana
Environment Nevada
Environment New Hampshire
Environment New Jersey
Environment New Mexico
Environment North Carolina
Environment Ohio
Environment Oregon
Environment Rhode Island
Environment Texas
Environment Virginia
Environment Washington
Environmental Defense Action Fund
Environmental Entrepreneurs (E2)
Environmental Law & Policy Center
Ethical Society of St. Louis
Faith Alliance for Climate Solutions
Florida Conservation Voters
Fort Collins Sustainability Group
Gasp
GreenLatinos
Health Care Without Harm
Iowa Interfaith Power & Light
Jean-Michel Cousteau's Ocean Futures Society
KyotoUSA
Labadie Environmental Organization (LEO)
Latino Donor Collaborative
League of Conservation Voters
League of Women Voters
Maine Conservation Voters
Maryland League of Conservation Voters
Michigan League of Conservation Voters
Moms Clean Air Force
Montana Conservation Voters Education Fund
Montana Environmental Information Center
National Parks Conservation Association
Natural Resources Defense Council
NC League of Conservation Voters
Nevada Conservation League
New Mexico Environmental Law Center
New York League of Conservation Voters
Northern Plains Resource Council
OEC Action Fund
Ohio Organizing Collaborative, Communities United for Responsible Energy
Oregon League of Conservation Voters
Partnership for Policy Integrity
PennEnvironment
People Demanding Action, Tucson Chapter
Physicians for Social Responsibility
Physicians for Social Responsibility, Maine Chapter
Physicians for Social Responsibility, Los Angeles Chapter
Physicians for Social Responsibility, Arizona Chapter
Physicians for Social Responsibility, SF Bay Area Chapter
Physicians for Social Responsibility, Tennessee Chapter
Physicians for Social Responsibility, Wisconsin Chapter
Powder River Basin Resource Council
Public Citizen
Public Citizen's Texas Office
RVA Interfaith Climate Justice Team

Safe Climate Campaign
San Juan Citizens Alliance
Sierra Club
Southern Environmental Law Center
Texas Campaign for the Environment
Texas Environmental Justice Advocacy Services
Texas League of Conservation Voters
The Environmental Justice Center at Chestnut
Hills United Church
Trust for America's Health
Union of Concerned Scientists
Utah Physicians for a Healthy Environment
Valley Watch
Virginia Organizing
Virginia Interfaith Power & Light
Voces Verdes
Voices for Progress
Washington Conservation Voters
WE ACT for Environmental Justice
Western Colorado Congress
Western Organization of Resource Councils
Wisconsin Environmental Health Network
Wisconsin League of Conservation Voters
Wisconsin Environment
Wyoming Outdoor Council

GREG WALDEN, OREGON
CHAIRMAN

FRANK PALLONE, JR., NEW JERSEY
RANKING MEMBER

ONE HUNDRED FIFTEENTH CONGRESS
Congress of the United States
House of Representatives
COMMITTEE ON ENERGY AND COMMERCE
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WASHINGTON, DC 20515-6115
Majority (202) 225-2927
Minority (202) 225-3641

April 11, 2017

Mr. Sean Alteri
Director
Division for Air Quality
Kentucky Department of Environmental Protection
300 Sower Boulevard; 2nd Floor
Frankfort, KY 40601

Dear Mr. Alteri,

Thank you for appearing before the Subcommittee on Environment on Wednesday, March 22, 2017, to testify at the hearing entitled "H.R. 806, Ozone Standards Implementation Act of 2017."

Pursuant to the Rules of the Committee on Energy and Commerce, the hearing record remains open for ten business days to permit Members to submit additional questions for the record, which are attached. The format of your responses to these questions should be as follows: (1) the name of the Member whose question you are addressing, (2) the complete text of the question you are addressing in bold, and (3) your answer to that question in plain text.

To facilitate the printing of the hearing record, please respond to these questions with a transmittal letter by the close of business on Wednesday, April 26, 2017. Your responses should be mailed to Grace Appelbe, Legislative Clerk, Committee on Energy and Commerce, 2125 Rayburn House Office Building, Washington, DC 20515 and e-mailed in Word format to Grace.Appelbe@mail.house.gov.

Thank you again for your time and effort preparing and delivering testimony before the Subcommittee.

Sincerely,

John Shimkus
Chairman
Subcommittee on Environment

cc: The Honorable Paul Tonko, Ranking Member, Subcommittee on Environment

Attachment

MATTHEW G. BEVIN
GOVERNOR

CHARLES G. SNAVELY
SECRETARY

AARON B. KEATLEY
COMMISSIONER

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION

300 SOWER BOULEVARD
FRANKFORT, KENTUCKY 40601

April 26, 2017

Ms. Grace Appelbe, Legislative Clerk
Committee on Energy and Commerce
2125 Rayburn House Office Building
Washington, D.C. 20515

Dear Ms. Appelbe:

On Wednesday, March 22, 2017, I appeared before the Subcommittee on Environment to testify at the hearing entitled, "H.R. 806, Ozone Standards Implementation Act of 2017." Included in this letter, please find my responses to Chairman John Shimkus' additional questions for the record.

The Honorable John Shimkus

1. **Witnesses noted in testimony that it is unfair that, under current law, local jurisdictions may be subject to penalties for failure to attain standards, even though the failure is due to emissions from sources that are outside the jurisdictions' authority to control.**

   a. **To assist with our identifying the problem fully, would you provide examples of the types of emissions or pollutants, natural or anthropogenic, that are outside your state's control and that may impede your ability to reach attainment of air quality standards so as to subject you to fees or other penalties?**
   "Exceptional events", such as wildfires that recently occurred in Appalachia during November of 2016, may impede the ability to achieve the national ambient air quality standard for particulate matter less than 2.5 microns ($PM_{2.5}$) and ozone (O_3). State and Local agencies are unable to control emissions resulting from wildfires.

   b. **Are there circumstances in your view in which relief from penalties may be provided either to local or to state level jurisdictions?**
   Section 179(d) of the Clean Air Act details the "[c]onsequences for failure to attain" and requires an additional revision to the applicable implementation plan. The implementation plan shall include the permit requirements of

Ms. Appelbe
April 26, 2017
Page 2

Section 173 of the Clean Air Act. My understanding is that the "offsets" mandated in Section 173 of the Clean Air Act are applicable and there is no relief that can be provided regarding "offsets."

2. **Hearing testimony raised concerns about the quality of modeling data. When promulgating nonattainment designations in air quality control regions, should the Administrator base such designation on modeling predictions that do not incorporate state/local air agency input in lieu of the state's air quality monitoring data?**

   No. Failure to incorporate state and local air agency input may result in EPA's final nonattainment designations based upon erroneous data. During recent EPA analyses for interstate transport of pollution, state and local air pollution control agencies provided clarifying information to accurately reflect emissions inventories of stationary sources and correct modeling inputs used by EPA.

   Furthermore, modeling characterizations of the air quality in an area are conservative and do not accurately reflect actual concentrations of criteria pollutants observed at the State and Local Ambient Monitoring Stations (SLAMS). Modeling characterizations can provide beneficial information necessary to establish the appropriate location for the siting of SLAMS. However, considering the significant consequences associated with nonattainment designations, the Division for Air Quality does not find modeling characterizations to be appropriate for designation purposes.

3. **Are there any other considerations we should take into account concerning H.R. 806 that you believe we did not cover sufficiently in the hearing?**

   Currently, EPA is requesting state and local air pollution control agencies to review ozone monitoring data for the previous three (3) monitoring years for which there is complete, quality-assured monitoring data (2013, 2014, 2015). On April 13, 2017, EPA notified states that it intends to invalidate a substantial amount of certified ambient air monitoring data from the period 2013 to 2015. The data collected during those years served as the basis for which states used to determine their recommended designations for the 2015 O_3 NAAQS. Invalidation of this ozone monitoring data could have a significant impact on EPA's final designations for the 2015 O_3 NAAQS.

Sincerely,

Sean Alteri

GREG WALDEN, OREGON
CHAIRMAN

FRANK PALLONE, JR., NEW JERSEY
RANKING MEMBER

ONE HUNDRED FIFTEENTH CONGRESS

Congress of the United States

House of Representatives

COMMITTEE ON ENERGY AND COMMERCE

2125 Rayburn House Office Building
Washington, DC 20515–6115
Majority (202) 225-2927
Minority (202) 225-3641

April 11, 2017

Mr. Marc A. R. Cone
Director
Bureau of Air Quality
Maine Department of Environmental Protection
17 State House Station
28 Tyson Drive
Augusta, ME 04333-0017

Dear Mr. Cone,

Thank you for appearing before the Subcommittee on Environment on Wednesday, March 22, 2017, to testify at the hearing entitled "H.R. 806, Ozone Standards Implementation Act of 2017."

Pursuant to the Rules of the Committee on Energy and Commerce, the hearing record remains open for ten business days to permit Members to submit additional questions for the record, which are attached. The format of your responses to these questions should be as follows: (1) the name of the Member whose question you are addressing, (2) the complete text of the question you are addressing in bold, and (3) your answer to that question in plain text.

To facilitate the printing of the hearing record, please respond to these questions with a transmittal letter by the close of business on Wednesday, April 26, 2017. Your responses should be mailed to Grace Appelbe, Legislative Clerk, Committee on Energy and Commerce, 2125 Rayburn House Office Building, Washington, DC 20515 and e-mailed in Word format to Grace.Appelbe@mail.house.gov.

Thank you again for your time and effort preparing and delivering testimony before the Subcommittee.

Sincerely,

John Shimkus
Chairman
Subcommittee on Environment

cc: The Honorable Paul Tonko, Ranking Member, Subcommittee on Environment

Attachment

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PAUL R. LEPAGE
GOVERNOR

PAUL MERCER
COMMISSIONER

April 25, 2017

The Honorable John Shimkus
U.S. House of Representatives
Committee on Energy and Commerce
Chairman, Subcommittee on Environment
2125 Rayburn House Office Building
Washington, DC 20515-6115

RE: Responses to Questions for the Record on H.R. 806

Dear Chairman Shimkus:

Thank you for the opportunity to supplement my testimony of Wednesday, March 22, 2017, before the Subcommittee on Environment at the hearing entitled "H.R. 806, Ozone Standards Implementation Act of 2017".

I have reprinted your questions below, with my answers following.

1. *Witnesses noted in testimony that it is unfair that, under current law, local jurisdictions may be subject to penalties for failure to attain standards, even though the failure is due to emissions from sources that are outside the jurisdictions' authority to control.*
   a. *To assist with our identifying the problem fully, would you provide examples of the types of emissions or pollutants, natural or anthropogenic, that are outside your state's control and that may impede your ability to reach attainment of air quality standards so as to subject you to fees or to other penalties?*
   b. *Are there circumstances in your view in which relief from penalties may be provided either to local or to state level jurisdictions?*

As stated at the hearing, Maine's air quality is impacted more by emissions outside of our control than most any other state, simply because Maine is geographically located downwind from most of the rest of the United States. For example, it is not uncommon for Maine to monitor exceedances of the ozone standard from time to time during each ozone season (April – September). Staff meteorologists have completed analyses and developed maps showing where transported ozone pollution has originated which has resulted in monitored ozone levels exceeding standards in Maine (See Attachment). Each of the attached maps tracks the wind directions for periods of time prior to an individual exceedance event. This demonstrates where pollution originated and travels

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312 CANCO ROAD
PORTLAND, MAINE 04103
(207) 822-6300 FAX: (207) 822-6303

PRESQUE ISLE
1235 CENTRAL DRIVE, SKYWAY PARK
PRESQUE ISLE, MAINE 04769
(207) 764-0477 FAX: (207) 760-3143

website: www.maine.gov/dep

prior to impacting the Maine coastline. Every monitored exceedance is attributable to pollution transported from beyond Maine's borders with little or no contributions from sources in Maine. These exceedances occurred because the transported pollution plume from metropolitan areas to our south typically travels out over the Gulf of Maine, where on-shore sea breezes drive the ozone-laden air mass to Maine's coastal communities. Maine has no control over the emissions which cause these air masses coming from other states to exceed the ozone standards in Maine. In fact, EPA's most recent modeling completed during the development of the 2015 ozone standard demonstrates that emissions generated in Maine contribute no more than 1.5% of the total of the state's highest monitored ozone levels.

This situation also occurs with transported pollution that travels over large bodies of water and impacts the coasts (termed land-water interface) of Connecticut, Maryland, and Michigan, all of which are experiencing ozone levels that are either in areas which are already designated as non-attainment or are monitoring at non-attainment levels. These land-water interfaces create significant ozone control strategy challenges to Maine and these other states which are overwhelmingly caused by emissions from outside their states.

Over 50% of ozone causing pollution comes from mobile sources (cars, trucks, and non-road vehicles). The federal government and California are the only two regulatory entities in this country to impose emission requirements on the manufacturers of these sources. Maine has no control over emissions from mobile sources, both gasoline and diesel engines.

Additionally, states into which overwhelming transport is documented should be provided relief from regulatory sanctions for not attaining the ozone standard. Currently, Maine can demonstrate that overwhelming transport is occurring but cannot obtain regulatory relief because the state has a "metropolitan statistical area", Portland, Maine, which has a population greater than 100,000 people. Currently, under the Clean Air Act, because Maine has a metropolitan statistical area, the state is denied regulatory relief even though it does not significantly contribute to ozone exceedances. Situations such as this deserve relief from the imposition of sanctions, penalties, and additional regulatory burdens.

2. *Hearing testimony raised concerns about the quality of modeling data. When promulgating nonattainment designation in air quality control regions, should the Administrator base such designations on modeling predictions that do not incorporate state/local air agency input in lieu of the state's air quality monitoring data?*

The administrator should base nonattainment designations strictly on state's air quality monitoring data, where available. For any modeling that EPA undertakes for other SIP-related actions, EPA should always incorporate state/local air agency input.

3. *Are there any other considerations we should take into account concerning H.R. 806 that you believe we did not cover sufficiently in the hearing?*

Maine supports the fact that an application received for processing should be subject to the rules in place at the time of acceptance. Thus, an accepted application that was subject to Best Available Control Technology (BACT) should remain subject to the BACT provisions and other regulatory requirements applicable at time of application acceptance by the permitting agency.

Again, thank you for the opportunity to provide additional information to supplement my testimony. Please do not hesitate to contact me if there are questions or I may be of further assistance to the Committee on Energy and Commerce's Subcommittee on Environment.

Sincerely,

[redacted]

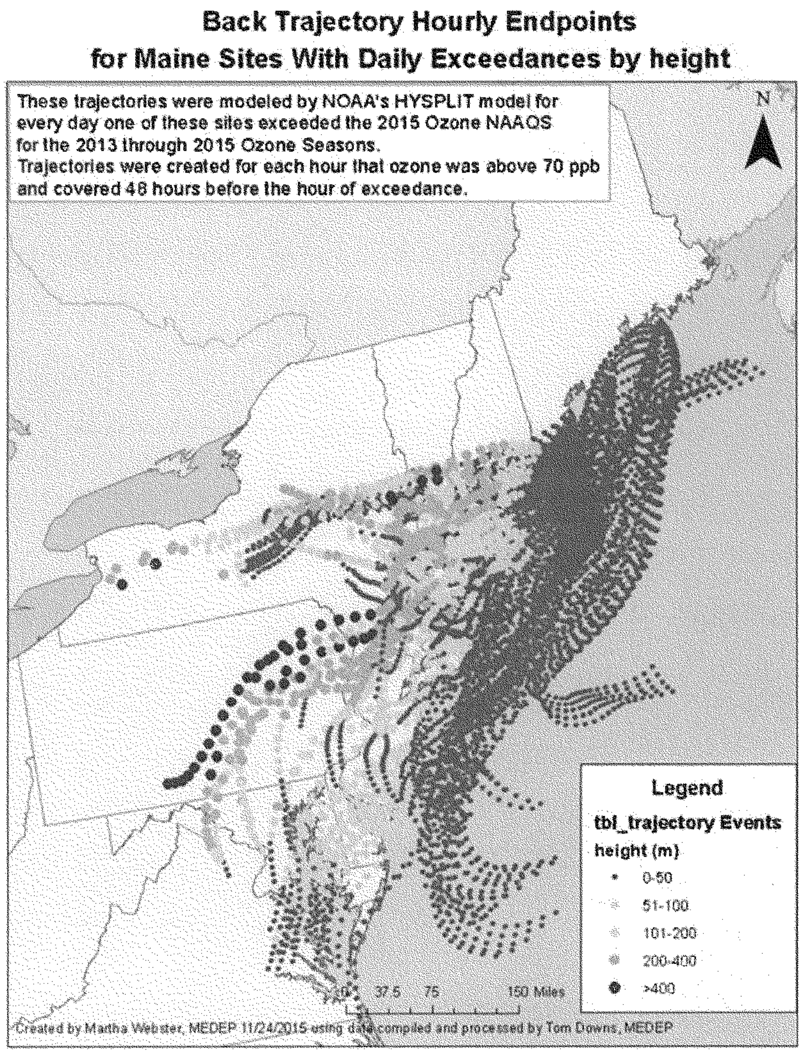
Marc A. R. Cone, P. E.
Maine Department of Environmental Protection
[redacted]

Attachment:
Maps of Back Trajectories for Monitored Ozone Exceedances in Maine

(These demonstrate where the air mass originated 36-48 hours prior to the exceedance and the path the air mass traveled.)

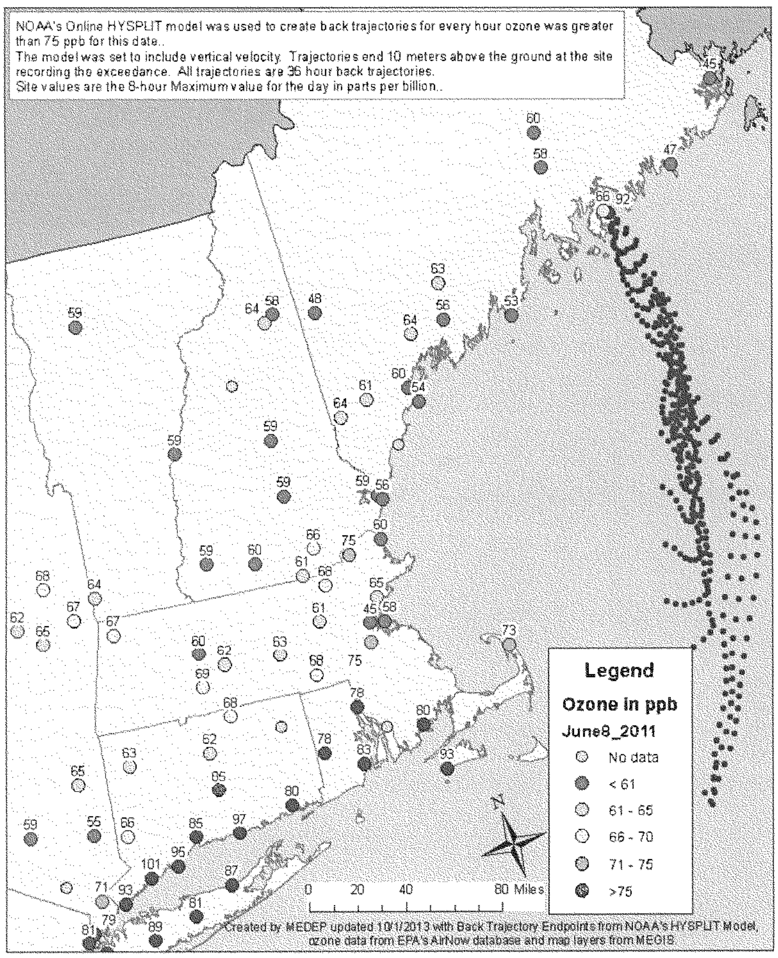
Maps of Back Trajectories for Monitored Ozone Exceedances in Maine

The following map shows 48-hour back trajectories from sites in Maine that had an exceedance of the current 2015 70 parts per billion (ppb) 8-hour Ozone National Ambient Air Quality Standard (NAAQS) during the 2013-15 ozone seasons.

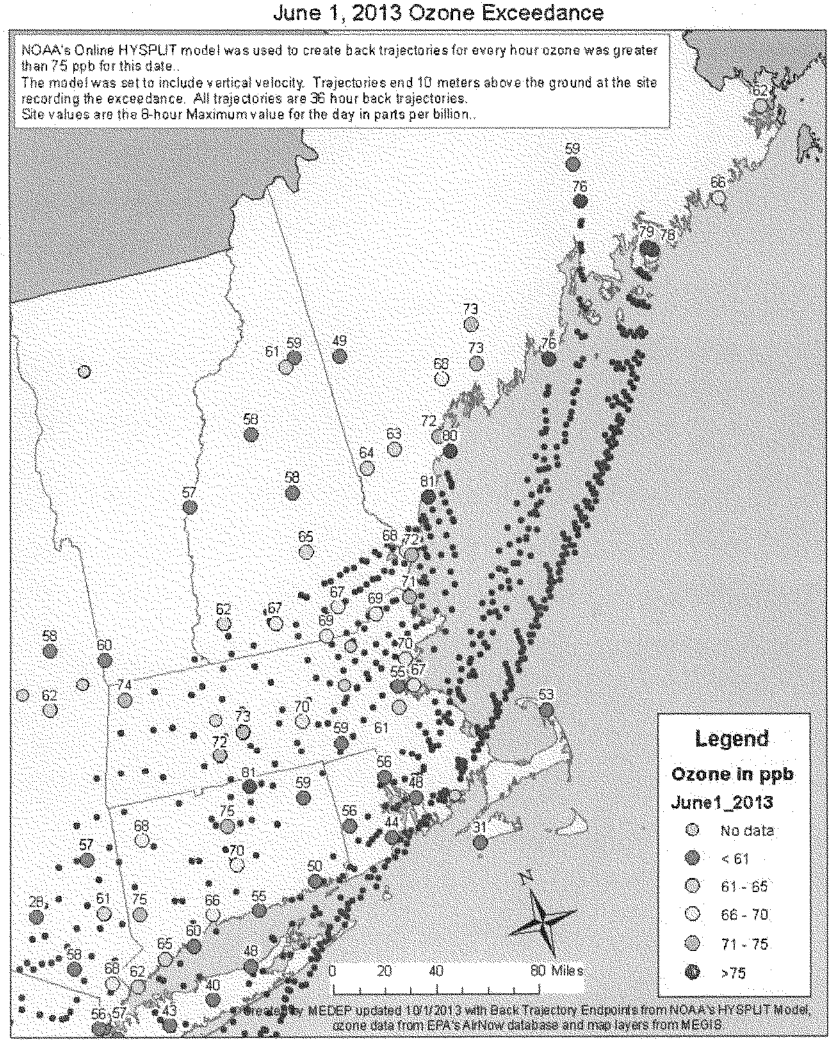


The following maps show 36-hour back trajectories from sites in Maine that had an exceedance of the 2008 75 parts per billion (ppb) 8-hour Ozone National Ambient Air Quality Standard (NAAQS) during the 2011-13 ozone seasons.

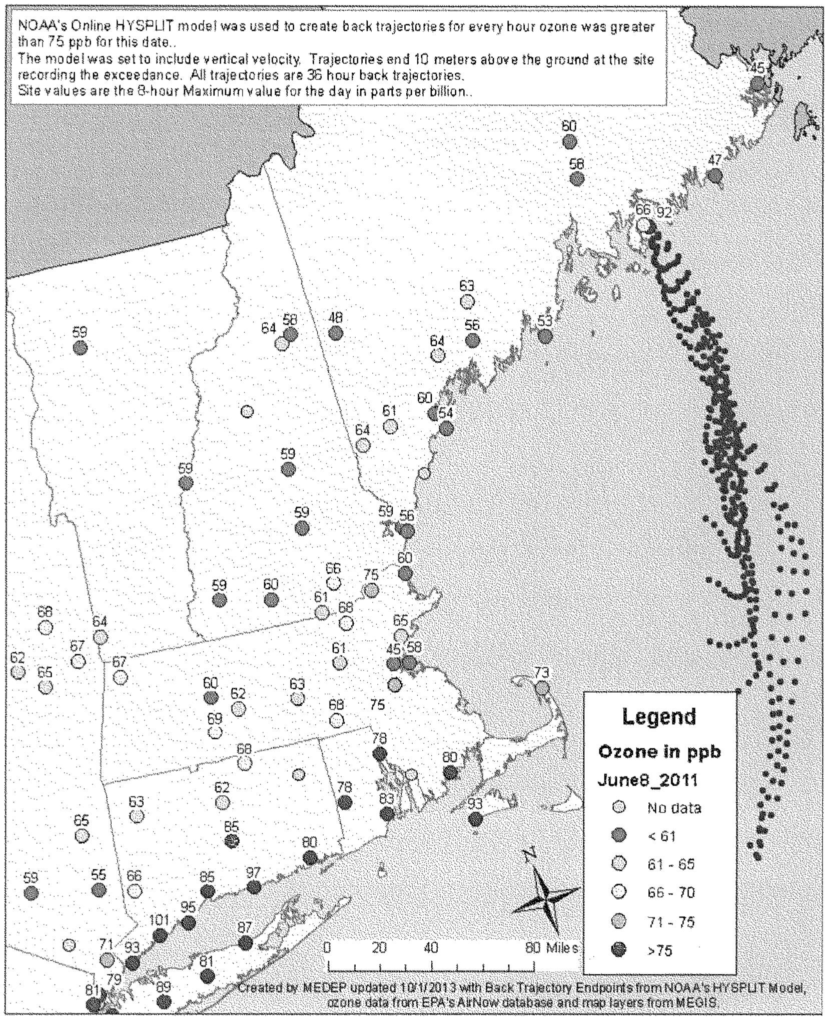
Hourly Endpoints from Back Trajectories for Maine's June 8 2011 Ozone Exceedance



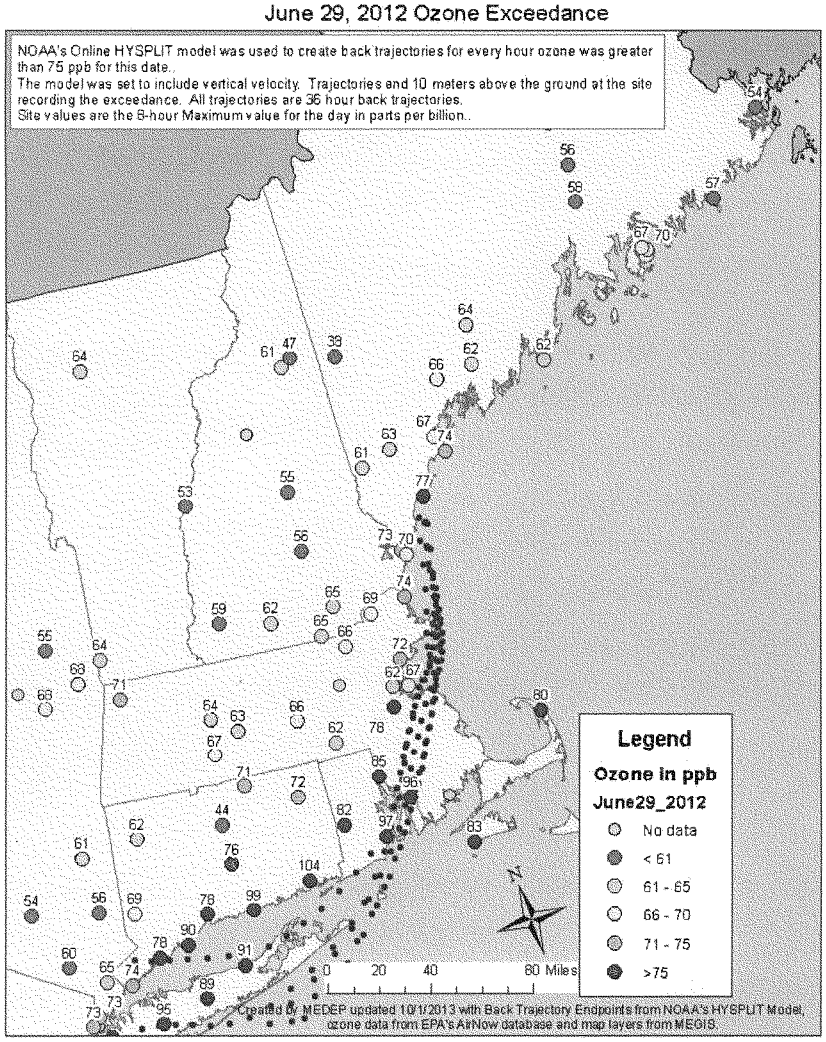
Hourly Endpoints from Back Trajectories for Maine's
June 1, 2013 Ozone Exceedance



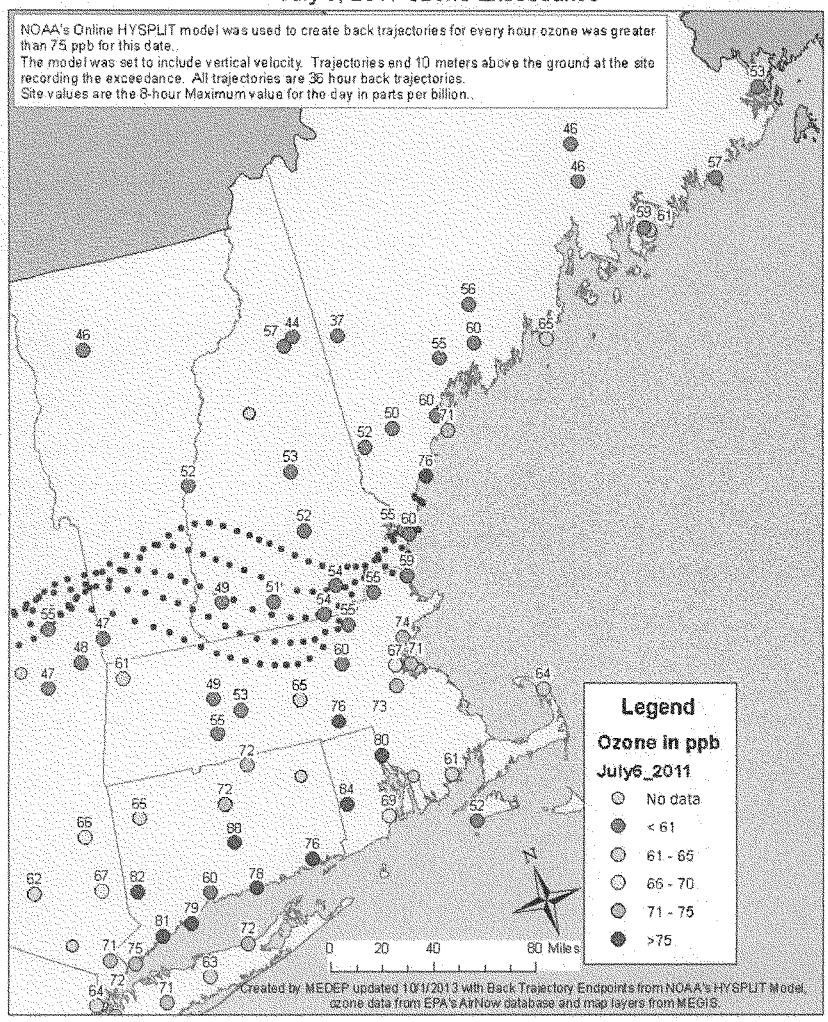
Hourly Endpoints from Back Trajectories for Maine's June 8 2011 Ozone Exceedance



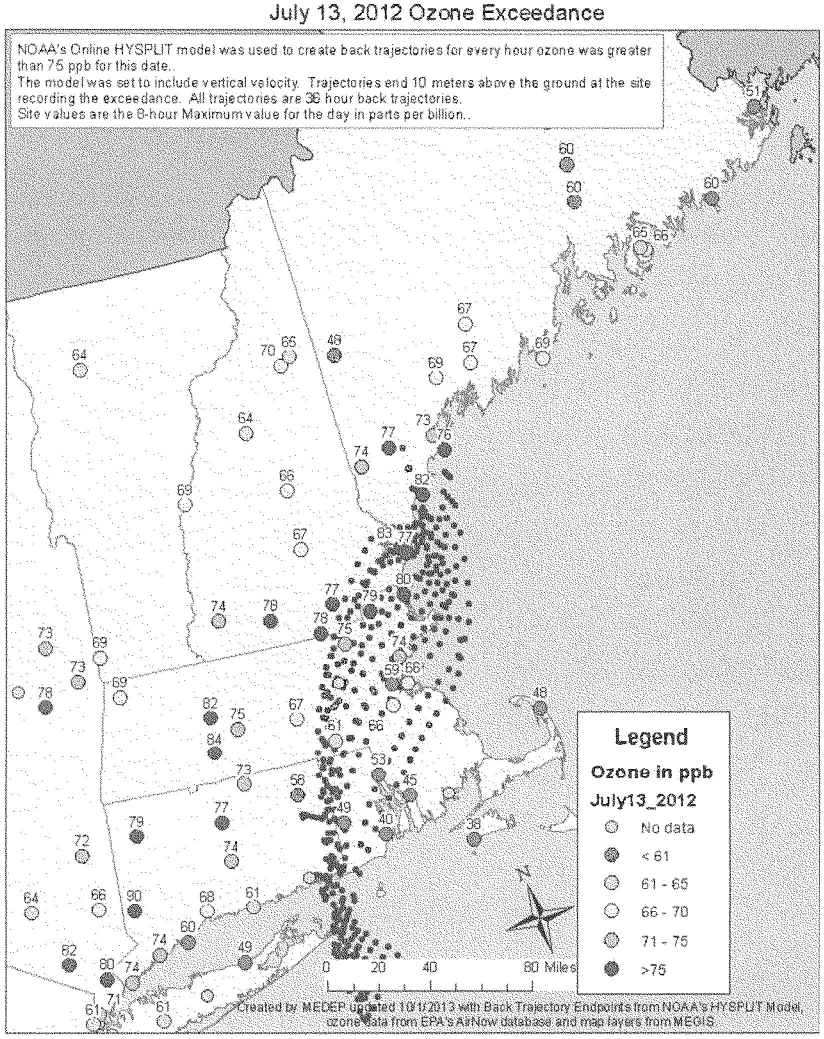
Hourly Endpoints from Back Trajectories for Maine's
June 29, 2012 Ozone Exceedance



Hourly Endpoints from Back Trajectories for Maine's
July 6, 2011 Ozone Exceedance

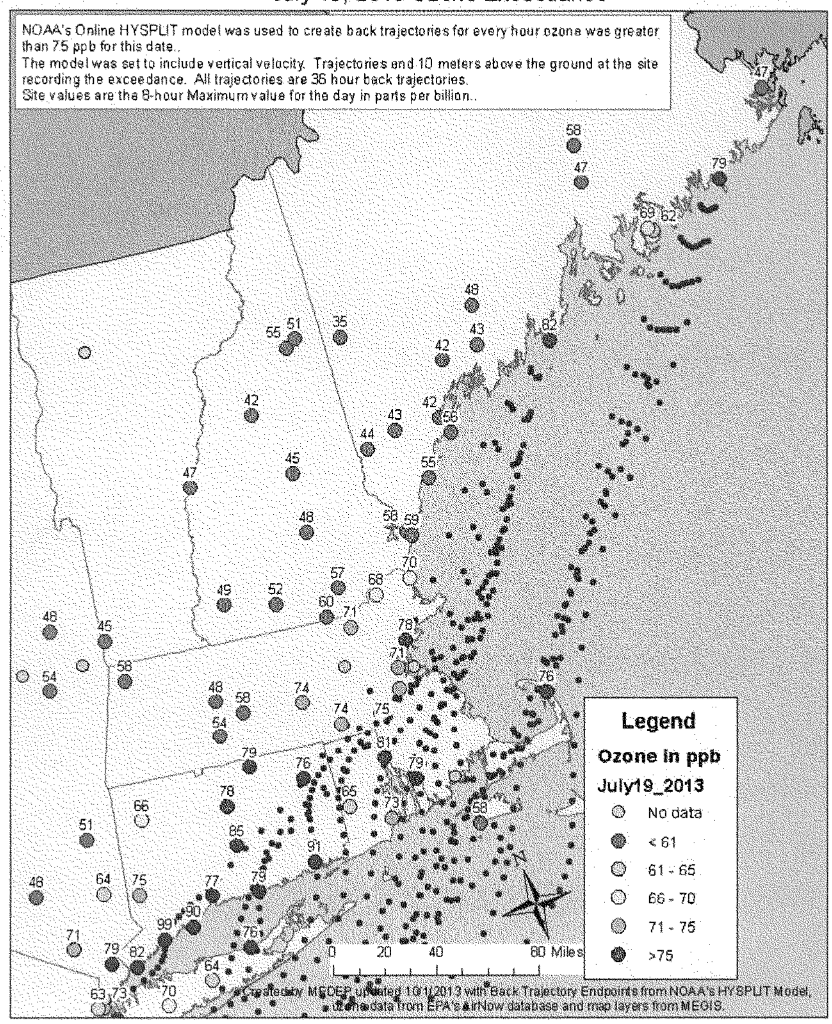


Hourly Endpoints from Back Trajectories for Maine's
July 13, 2012 Ozone Exceedance



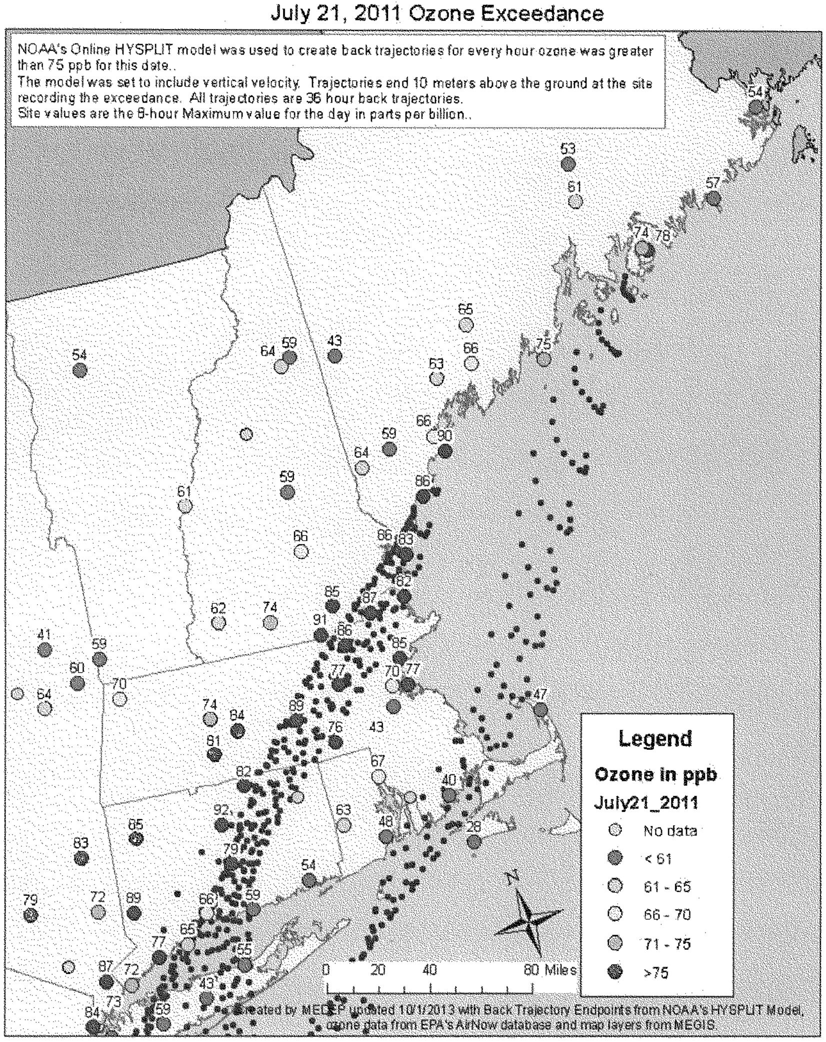
Letter to: Committee on Energy and Commerce, Subcommittee on Environment
RE: Responses to Questions for the Record on H.R. 806, Ozone Standards Implementation Act of 2017
April 24, 2017 Page 11 of 15

Hourly Endpoints from Back Trajectories for Maine's
July 19, 2013 Ozone Exceedance

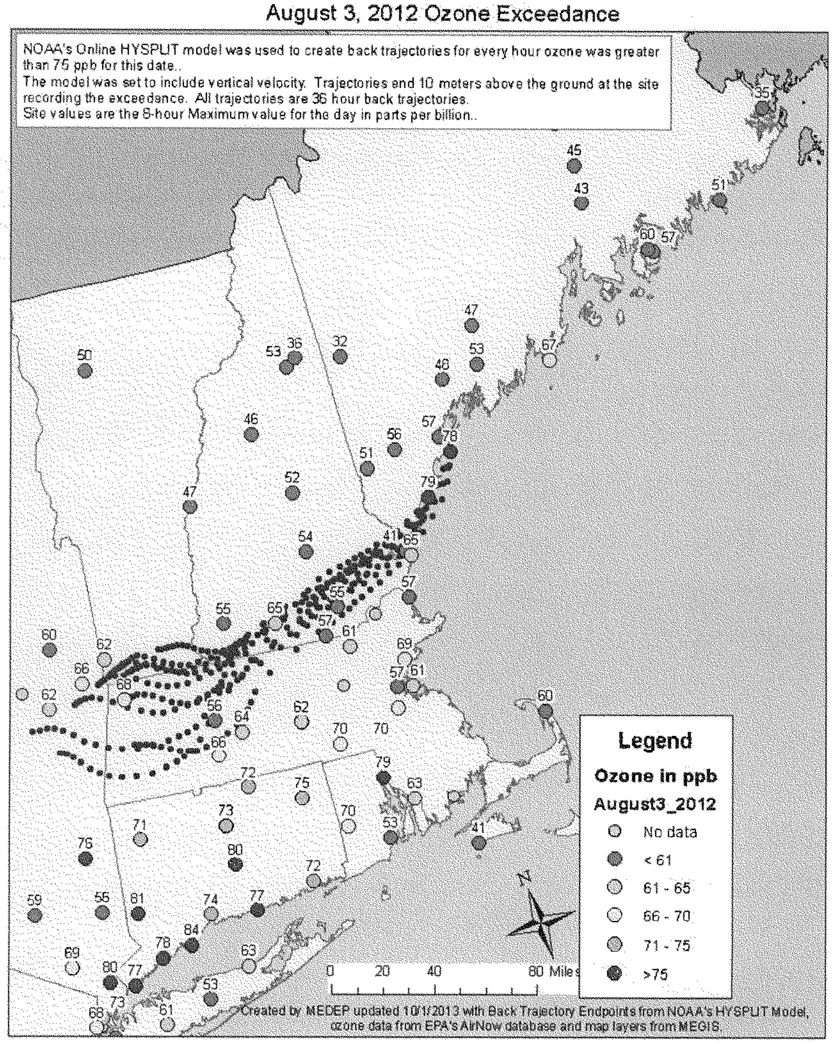


Letter to: Committee on Energy and Commerce, Subcommittee on Environment
RE: Responses to Questions for the Record on H.R. 806, Ozone Standards Implementation Act of 2017
April 24, 2017

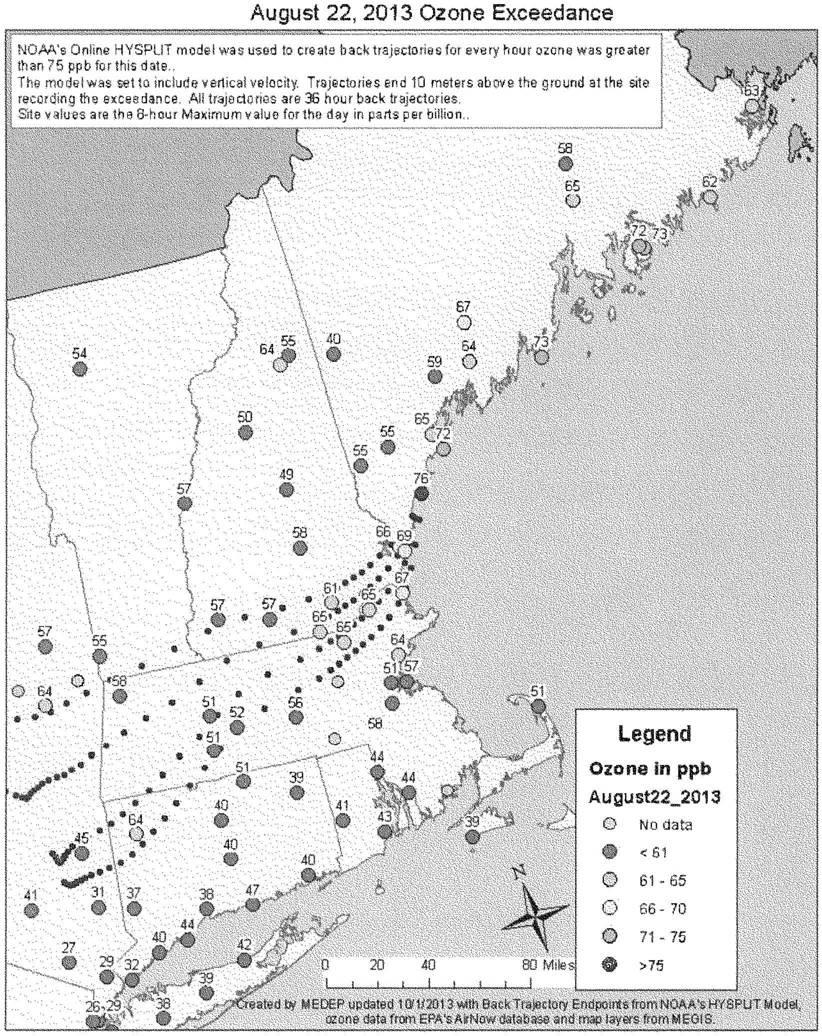
Hourly Endpoints from Back Trajectories for Maine's
July 21, 2011 Ozone Exceedance



Hourly Endpoints from Back Trajectories for Maine's
August 3, 2012 Ozone Exceedance

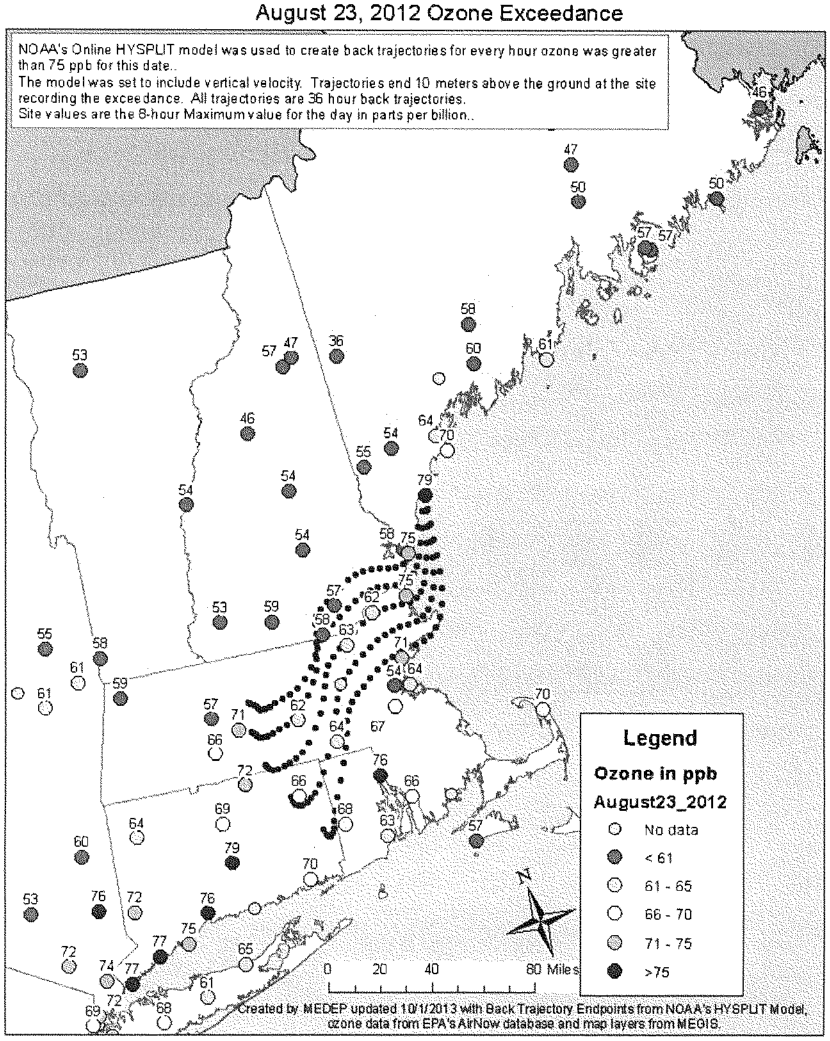


Hourly Endpoints from Back Trajectories for Maine's
August 22, 2013 Ozone Exceedance



Letter to: Committee on Energy and Commerce, Subcommittee on Environment
RE: Responses to Questions for the Record on H.R. 806, Ozone Standards Implementation Act of 2017
April 24, 2017

Hourly Endpoints from Back Trajectories for Maine's August 23, 2012 Ozone Exceedance



GREG WALDEN, OREGON
CHAIRMAN

FRANK PALLONE, JR., NEW JERSEY
RANKING MEMBER

ONE HUNDRED FIFTEENTH CONGRESS

Congress of the United States

House of Representatives

COMMITTEE ON ENERGY AND COMMERCE
2125 RAYBURN HOUSE OFFICE BUILDING
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Minority (202) 225-3641

April 11, 2017

Mr. Kurt Karperos
Deputy Executive Officer
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Dear Mr. Karperos,

Thank you for appearing before the Subcommittee on Environment on Wednesday, March 22, 2017, to testify at the hearing entitled "H.R. 806, Ozone Standards Implementation Act of 2017."

Pursuant to the Rules of the Committee on Energy and Commerce, the hearing record remains open for ten business days to permit Members to submit additional questions for the record, which are attached. The format of your responses to these questions should be as follows: (1) the name of the Member whose question you are addressing, (2) the complete text of the question you are addressing in bold, and (3) your answer to that question in plain text.

To facilitate the printing of the hearing record, please respond to these questions with a transmittal letter by the close of business on Wednesday, April 26, 2017. Your responses should be mailed to Grace Appelbe, Legislative Clerk, Committee on Energy and Commerce, 2125 Rayburn House Office Building, Washington, DC 20515 and e-mailed in Word format to Grace.Appelbe@mail.house.gov.

Thank you again for your time and effort preparing and delivering testimony before the Subcommittee.

Sincerely,

John Shimkus
Chairman
Subcommittee on Environment

cc: The Honorable Paul Tonko, Ranking Member, Subcommittee on Environment

Attachment

Air Resources Board

Mary D. Nichols, Chair
1001 I Street • P.O. Box 2815
Sacramento, California 95812 • www.arb.ca.gov

Matthew Rodriquez
Secretary for Environmental Protection

Edmund G. Brown Jr.
Governor

April 26, 2017

Chairman John Shimkus
Ranking Member Paul Tonko
2125 Rayburn House Office Building
Washington, DC 20515-6115

Dear Chairman Shimkus and Ranking Member Tonko:

I would like to thank the Subcommittee on the Environment for the opportunity to testify at the hearing entitled "H.R.806, Ozone Standards Implementation Act of 2017" held on March 22, 2017. Enclosed are our responses to the additional questions from the Subcommittee on Environment regarding H.R.806. The responses are for the hearing record.

If you have any questions or would like to discuss further, please do not hesitate to [redacted] Ms. Sydney Vergis, at [redacted]

Sincerely,

[redacted]

Kurt Karperos
Deputy Executive Officer

Enclosure

cc: Sydney Vergis, Ph.D.
Interim Legislative Director

Committee on Energy and Commerce
Hearing of the Subcommittee on Environment on Wednesday, March 22, 2017 entitled "H.R. 806, Ozone Standards Implementation Act of 2017."

Additional Questions for the Record
California Air Resources Board Responses

<u>The Honorable John Shimkus</u>

1. **What transportation measures is California considering to meet the 2015 ozone standards?**

    a. **Could implementation of plans to meet the 2015 ozone standard necessitate changes in the composition of gasoline?**

The California Air Resources Board (CARB) does not anticipate changing the composition of gasoline to meet the 2015 ozone standard.

    b. **If so, what would additional fuel regulations cost consumers on a per gallon basis?**

See above response.

2. **Has California estimated the cost of existing fuel regulations aimed at reducing ozone and other emissions on gasoline prices, and, if so, what are its estimates?**

California's Reformulated Gasoline (CaRFG) Program reduces emissions from gasoline-fueled vehicles and equipment to help meet health-based State and federal air quality standards (including ozone standards) and reduces health risk associated with exposure to toxic air contaminants. The program functions by establishing fuel quality specifications for gasoline sold in California.

Since the initial rulemaking in 1990, the program has gone through three distinct phases, and at each phase California has estimated the costs of complying with the program. Phase II had the most significant cost impact. At the time of Phase II rule adoption, which began in March 1996, CARB calculated that CaRFG would increase production costs by about 5 to 15 cents per gallon (with an average estimated impact of 10 cents). This value was inclusive of the 2 to 5 cents per gallon needed to make Federal RFG instead of non-reformulated gasoline at that time (see this fact sheet for more information: http://www.afdc.energy.gov/pdfs/3002.pdf).

Since that analysis was conducted, updates to Federal fuel specifications continue to narrow the gap between the cost of producing CaRFG and Federal RFG. For example, until recently, a significant difference between CaRFG and Federal RFG requirements had been the sulfur content requirements. However, in 2017, the sulfur content of

Federal gasoline was reduced to an average of 10 parts per million—much closer to the California requirement—reducing the difference in cost of production between the two fuels.

Independent peer-reviewed academic analysis has confirmed that the CaRFG Program has been effective in improving air quality and that the air quality benefits have significantly outweighed the costs. (For an example see: Auffhammer, Maximilian and Ryan Kellogg. 2011. "Clearing the Air? The Effects of Gasoline Content Regulation on Air Quality." American Economic Review, 101(6): 2687-2722.)

3. **Will California implement plans to reduce vehicle miles traveled under the 2015 ozone standard?**

As I described in my testimony, last month the CARB adopted a comprehensive mobile source strategy that will not only provide the reductions needed to meet the 75 parts per billion ozone standard, but also the emission reductions needed for the new 70 parts per billion ozone standard adopted in 2015. The strategy includes reductions in passenger vehicle miles travelled achieved from efforts to meet the State's climate goals through development of more sustainable communities that support increased access to transit and other alternative modes of personal mobility. These efforts will reduce transportation costs, improve public health by facilitating more active transport and physical activity, and also reduce smog-forming emissions that will contribute to meeting ozone standards.

4. *Witnesses noted in testimony that it is unfair that, under current law, local jurisdictions may be subject to penalties for failure to attain standards, even though the failure is due to emissions from sources that are outside the jurisdictions' authority to control.*

    a. ***To assist with our identifying the problem fully, would you provide examples of the types of emissions or pollutants, natural or anthropogenic, that are outside your state's control and that may impede your ability to reach attainment of air quality standards so as to subject you to fees or other penalties?***

The Clean Air Act, coupled with California law, provides a clearly defined structure outlining responsibilities and mechanisms for addressing the full scope of sources affecting air quality. These provisions recognize that healthful air is a shared responsibility that can be achieved through clearly defined actions at the federal, state, and local level. California has long used this framework to design effective control programs that reflect a coordinated suite of state and federal actions to reduce mobile source emissions. Most recently, last month the CARB approved a comprehensive strategy to achieve the mobile source and consumer products reductions needed to meet federal air quality standards over the next 15 years.

By working with U.S. EPA, businesses, and the public, we have been able to effectively utilize the structure of the Clean Air Act to achieve needed emission reductions. California's innovation and partnerships with U.S. EPA have led to cleaner technologies that provide benefits throughout the nation. Our package of clean vehicle standards and zero emission vehicle (ZEV) requirements are a prime example. Looking forward, CARB staff has been working with U.S. EPA to develop requirements for the next generation of cleaner truck standards by optimizing technologies that are already here today. An adequate budget for U.S. EPA action that supports development of cleaner standards for cars and trucks will be critical to meeting air quality standards. Without this commitment, more costly controls may be required for other sources, which can in turn limit progress and increase health costs.

The Clean Air Act also provides effective mechanisms to address the impacts of natural sources such as wildfires, as well as background ozone and international emissions. These mechanisms include the Exceptional Events Rule and the international transport provisions of the Act. CARB has a successful track record of working with U.S. EPA to apply the Exceptional Events rule to ensure that impacts from sources that are beyond reasonable regulatory control do not affect a region's attainment status. Similarly, the Act's provisions related to international transport exempt affected areas from showing they have attained the standard and has been successfully employed in a number of regions in the Western U.S. Lastly, the available science strongly suggests that high ozone days in California's urban areas are primarily due to local and regional emissions. There is also emerging evidence that background ozone reaching the west coast of the United States is now declining. Thus, with the exception of direct cross-border impacts of pollution from Mexicali, Mexico, our pollution control efforts puts us on track at attain current air quality standards.

Finally, it is incorrect that local jurisdictions are subject to penalties for failing to attain air quality standards. Under the Clean Air Act, when a region fails to meet its attainment deadline, the region must prepare a new attainment plan with a new attainment deadline. When an area classified as extreme nonattainment for the ozone standard misses its attainment deadline, there is a requirement for additional fees on industrial sources to encourage further reductions. In California, both the San Joaquin Valley and the South Coast are subject to these fees. However, in both of these areas, working closely with U.S. EPA, California has used the flexibility inherent in the Clean Air Act to substitute vehicle registration fees already in place for the fees on industrial sources. These fees are immediately used by the local jurisdiction to incentivize the purchase of cleaner trucks.

b. ***Are there circumstances in your view in which relief from penalties may be provided either to local or to state leveljurisdictions?***

The Clean Air Act does include provisions to apply sanctions should a region fall behind in meeting the Act's requirements. We believe it's important to have this type of mechanism to keep states moving forward. The key to meeting Act requirements and avoiding sanctions is to move forward proactively. This provides states the time to develop feasible and cost-effective strategies for achieving clean air and coordinate with U.S. EPA to ensure they meet the Clean Air Act's requirements.

The most cost-effective strategy requires comprehensive actions by local air districts, CARB, and U.S. EPA. At the local level, this includes actions to address residential, commercial, and industrial sources of emissions. For CARB, it means a commitment to use all of the authority provided to us under the Act to address mobile sources. For U.S. EPA, it means action to set cleaner federal emissions standards for cars and trucks that have already been proven feasible and cost-effective. When states work to address the requirements of the Clean Air Act proactively, as described in my response to question 4a, the potential for penalties is minimized.

<u>**The Honorable Frank Pallone, Jr.**</u>

In your written statement you note that "California uses the planning required by the Act to minimize costs."

1. ***Please elaborate on how this has been achieved by the state.***

California uses the Clean Air Act's requirements for early and comprehensive planning to look ahead and put regulations in place early to benefit from the pace of long-term technology turn-over, maximizing the cost-effectiveness of our regulations. The effort starts with technology assessments and pilot and demonstration projects for advanced technologies to provide the foundation for determining cost-effective regulatory approaches. These technology assessments also provide a mechanism to look ahead and plan for the gradual deployment of cleaner technologies across the timeframe allowed for attainment, which spurs incremental advances and in turn drives down costs. California also uses the advanced technology provisions of the Act to drive innovation, as well as employ incentive programs to bring cost-effective technologies to market. Finally, provisions in the Clean Air Act provide states with the flexibility to focus on the approaches that are tailored to the unique nature of each region, and target the most cost-effective pollutants and solutions to improve air quality.

2. ***Please explain how H.R. 806 would increase costs in the long-term.***

The delays in H.R. 806 will increase cost in two ways. First, delaying the planning process for implementing the ozone standard will result in lost opportunities to achieve near-term reductions from both new industrial sources and new vehicles and equipment entering the fleet. This equipment will stay in use for many years and continue to pollute more than if it had been cleaned up sooner. This also shifts more of the burden to existing sources, and raises the costs of pollution controls. Ultimately, this will lead to states having to pay what is effectively a balloon payment to reduce emissions that could have been reduced more cost-effectively if addressed proactively.

Second, we have found that we can cut pollution while providing major economic benefits by keeping people healthier, working, and out of costly medical care. H.R. 806 would mean more people would breathe dirty air longer, leading to increased health costs, as deadlines are extended and requirements for incremental progress are eroded.

Hospital room visits, missed work days, premature deaths, and long-term health damage to children all threaten our economic prosperity. By 2020, the Clean Air Act will have prevented 230,000 deaths, millions of cases of asthma, and hundreds of thousands of heart attacks. The economic costs of healthcare associated with exposure to polluted air are substantial, and far exceed the costs of using cleaner technologies. The Clean Air Act ensures we operate on excellent science, and then gives us flexibility to help avoid the major costs pollution imposes on people.

U.S. EPA estimates that achieving the newest federal ozone standard in California would save an estimated 400 million to 1.3 billion dollars per year when accounting for both the costs of reducing emissions and the avoided costs of healthcare, lost work days and low productivity, and other impacts of pollution. U.S. EPA's estimates for attaining the 2012 PM2.5 standard are also substantial, showing a net benefit of at least 3.3 billion dollars, with over 90 percent of the monetized benefits coming from reduction in premature deaths. Delaying implementation of standards would extend the substantial costs associated with exposure to unhealthy air, not only in California, but throughout the country.

In your written statement you mention that the California Air Resources Board (CARB) will meet to consider plans to provide the pollution reductions necessary to meet the 2008 and 2015 ozone standards. Since the March 22, 2017, hearing, the board has met and considered these plans.

3. ***In the plans considered by CARB, please elaborate on the technologies and strategies that will help air districts achieve these goals?***

CARB's current mobile source control programs have achieved tremendous success in reducing smog-forming emissions of nitrogen oxides (NOx). Ongoing implementation of these programs will result in substantial further reductions through 2031, providing a significant down payment for meeting air quality standards. The mobile source strategy approved by the Board last month identifies the regulatory and programmatic approaches necessary to deploy the next generation of cleaner technologies and fuels, and ensure sufficient penetration to meet air quality standards by deadlines established in the Clean Air Act.

For passenger vehicles, the strategy includes actions to increase the penetration of plug-in hybrid electric vehicles (PHEVs) and ZEVs, including battery-electric and hydrogen fuel cell electric vehicles. For heavy-duty vehicles, the strategy calls for combustion engine technology that is effectively 90 percent cleaner than today's standards, and also includes targeted introduction of zero emission technologies in heavy-duty applications that are suited to early adoption of ZEV technologies.

Similar actions are included for off-road sources, with a focus on deployment of ZEV technologies in smaller equipment types such as forklifts and airport ground support equipment. A low-emission diesel standard builds upon CARB's existing fuels framework by requiring that low-emission diesel fuels are used to achieve greater criteria pollutant reductions. Finally, for sources that are primarily under federal jurisdiction, such as interstate trucks, locomotives, and ocean-going vessels, the strategy includes petitions calling for U.S. EPA action to provide the needed emission reductions from these sources by setting more stringent engine standards.

Meeting air quality standards in the two areas of the State with the greatest air quality challenges – the South Coast and the San Joaquin Valley – will also need to include comprehensive action at local air district level. The South Coast air district also recently adopted a plan that includes actions to further reduce emissions from the largest industrial sources in the region, such as refineries (through the use of selective catalytic reduction), as well as transitioning to cleaner energy sources, such as electrification, fuel cells and solar for commercial and residential sources, and increasing energy efficiency. Similar actions will be needed in the San Joaquin Valley as part of plans that are in development to meet fine particulate matter (PM2.5) standards. In addition to industrial sources, District efforts to address residential wood burning, commercial cooking, and fugitive dust will also be critical to attainment. These efforts not only are important to meet air quality standards, but also to reduce people's exposure to air toxics.

A number of the other witnesses expressed frustration and confusion associated with having to prepare and manage multiple implementation plans for various pollutants, at the same time.

4. ***In your experience, how can integrated planning alleviate some of this frustration and confusion?***

Although a region may be required to meet multiple air quality standards over a period of years, each prior plan serves as a foundation to support the planning process for standards that are progressively health protective. A common core of regulations carries through each plan, with new regulations building on these efforts within the additional timeframe allowed under the Act for meeting the more stringent standard. Since the 1990 Act amendments, the South Coast Air Quality Management District has been developing integrated plans to address all standards simultaneously. This integrated air quality planning process highlights that it is not only possible to develop a plan that addresses multiple standards, but it is also an efficient and effective way to ensure continuing progress in protecting public health.

In your written statement you made a few comments about the air quality challenges of the South Coast area. That the nonattainment issues are "more challenging, but progress there is also remarkable."

5. ***Could you please describe the unique challenges of this area, and some of the techniques and strategies used to make such progress?***

The South Coast Air Basin has historically had one of the greatest air quality challenges in the nation. The region is home to nearly 17 million people, over 40 percent of the State's population. The region is also home to over 10 and a half million passenger and commercial vehicles that travel over 130 billion miles per year. Weather conditions and topography, along with emissions from vehicles, refineries, power plants, manufacturing, sea ports, airports, and railyards combine to produce elevated concentrations of both ozone and PM2.5.

However, due to ongoing control efforts, air quality in the South Coast has improved dramatically. Twenty-five years ago the entire South Coast region exceeded the 75 part per billion (ppb) 8-hour ozone standard. Today, peak concentrations have decreased 45 percent, and 40 percent of residents live in communities that now meet the standard. The South Coast is also making significant progress in reducing PM2.5, which has decreased by over 50 percent in the Basin since 2000.

The tools available in the Clean Air Act have been key drivers in this success. Decades of research programs and technical work conducted by CARB, the air district, U.S. EPA, academic institutions, other research organizations, and the private sector have provided the scientific foundation for determining effective control approaches.
The Clean Air Act's waiver provisions that allow California to enact more stringent emission standards for passenger vehicles, heavy-duty trucks, and certain off-road vehicles and engines have also been critical to the region's ongoing progress. Over the years, California has received waivers and authorizations for over 100 regulations. With its Clean Air Act waiver authority, California has set emission standards for on-road motor vehicles that have reduced NOx emissions by almost 70 percent in the last 15 years. Emissions from off-road mobile sources and equipment have decreased over 40 percent based on similar advances in cleaner technologies. Advances in pollution control technologies have also lead to substantial NOx reductions from stationary and area sources, which have decreased by approximately 60 percent over the same time period.

The Honorable Debbie Dingell

I have several concerns with this bill, but I want to focus on the problems in section 3(d). This section undermines decades of Clean Air Act practice and weakens air quality protections.

The Clean Air Act requires a large new or expanding industrial facility to get an air pollution permit before starting construction. The facility must commit to install pollution controls, and it must demonstrate that its emissions won't produce unhealthy levels of air pollution in the area. If the facility's pollution would cause the area to violate an air pollution standard, then the facility must do more to reduce or offset its emissions.

But section 3(d) of the bill before us creates a loophole in the law. If EPA fails to meet new procedural requirements, the bill would allow a facility to get a permit by measuring its emissions against an outdated, less protective air quality standard. Previous witnesses have referred to this as "amnesty."

1. **Mr. Karperos, what is the practical effect of allowing a new facility to be permitted under an outdated standard?**

2. **What are the public health implications of exempting new or modified facilities from more protective air quality standards?**

Opportunities for further emissions reductions and related health protections that could have been realized under a newer, more stringent standard will be lost, should the facility be permitted under an outdated standard. These missed opportunities will only prolong potentially significant localized health impacts, such as those experienced in disadvantaged communities that are already highly affected by air pollution. It should be a priority for regulatory entities to ensure these impacted communities are protected from the dangerous effects of air pollution as quickly as possible.

Further, this bill does not only harm public health – it hurts industry. The provisions of section 3(d) shifts the burden of air quality improvements from new to existing industrial facilities that would need to retrofit pollution controls, which is generally more expensive than if a new facility was designed with these pollution controls from the start. As a result, it raises the costs of pollution controls and raises overall costs for existing businesses to continue operating.

3. **Mr. Karperos, how will this affect existing industrial sources in your state, particularly if a new facility pushes an area into violation of the air quality standards?**

This is contrary to a key principle of the Clean Air Act, which has historically demonstrated that it is an effective means to protect public health and the environment. The CAA requires new sources to install the newest control technologies because it is during the design phase that incorporation of these technologies is the most effective from both control efficacy and cost perspectives. Further, new facilities will likely exist for longer than existing ones, and ensuring these new facilities operate as cleanly as they can from the first day of operation will result in more emissions reductions over the lifetime of the facility. Finally, as mentioned previously, if new sources are not subject to the newest standards, the burden for additional emissions reductions will be shifted to existing sources, where installation of pollution controls is more costly and potentially less effective.

4. **Finally, Mr. Karperos, has your state ever been unable to issue preconstruction permits because EPA had not issued guidance for a new air quality standard? Is this a situation that states have the ability to handle?**

California, like many states that face significant air quality challenges, has many decades of experience regulating air pollution. The air districts' regulation of stationary source emissions, in partnership with ARB's programs to reduce mobile source emissions, has resulted in significant improvements in air quality for the state. These successes have not only gotten us to where we are today, but will continue to guide and inform our work to improve air quality into the future. That said, we are aware that some states may have the necessary experience, but lack similar resources as are available in California. ARB believes that it is for these situations that U.S. EPA and its 10 regional offices should continue to be fully funded in order to provide the assistance necessary to implement the most health protective standards as expeditiously as possible.

GREG WALDEN, OREGON
CHAIRMAN

FRANK PALLONE, JR., NEW JERSEY
RANKING MEMBER

ONE HUNDRED FIFTEENTH CONGRESS

Congress of the United States

House of Representatives

COMMITTEE ON ENERGY AND COMMERCE

2125 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515–6115
Majority (202) 225-2927
Minority (202) 225-3641

April 11, 2017

Ms. Nancy Vehr
Air Quality Administrator
Wyoming Department of Environmental Quality
200 West 17th Street
Cheyenne, WY 82002

Dear Ms. Vehr,

Thank you for appearing before the Subcommittee on Environment on Wednesday, March 22, 2017, to testify at the hearing entitled "H.R. 806, Ozone Standards Implementation Act of 2017."

Pursuant to the Rules of the Committee on Energy and Commerce, the hearing record remains open for ten business days to permit Members to submit additional questions for the record, which are attached. The format of your responses to these questions should be as follows: (1) the name of the Member whose question you are addressing, (2) the complete text of the question you are addressing in bold, and (3) your answer to that question in plain text.

To facilitate the printing of the hearing record, please respond to these questions with a transmittal letter by the close of business on Wednesday, April 26, 2017. Your responses should be mailed to Grace Appelbe, Legislative Clerk, Committee on Energy and Commerce, 2125 Rayburn House Office Building, Washington, DC 20515 and e-mailed in Word format to Grace.Appelbe@mail.house.gov.

Thank you again for your time and effort preparing and delivering testimony before the Subcommittee.

Sincerely,

John Shimkus
Chairman
Subcommittee on Environment

cc: The Honorable Paul Tonko, Ranking Member, Subcommittee on Environment

Attachment

United States House of Representatives,
Committee on Energy and Commerce,
Sub-Committee on Environment
Hearing on March 22, 2017
H.R. 806, Ozone Standards Implementation Act of 2017
Questions on the Record Submitted to Ms. Nancy Vehr
Questions from the Honorable John Shimkus

Question 1: My understanding is that EPA's Exceptional Events Rule allows states to exclude certain emissions data from consideration when determining compliance with national ambient air quality standards.

a. If EPA fails to take action with respect to an exceptional event petition, does that mean that your state is effectively penalized because those emissions are considered in determining your compliance with the new standards?

Response: Yes. An exceptional event is considered to be an exceedance or a "violation" unless and until EPA approves the demonstration. EPA's failure to act on a petition results in inflated monitor data that misrepresents the condition of air quality. Ultimately, EPA's inaction may result in permitting delays and inaccurate characterization of air quality to the public, inaccurate emission inventories and modeling results that EPA then uses to establish federal policies and regulations. As a result, state resources are shifted from addressing areas of concern to addressing situations that are actually not problematic. The attendant consequences from EPA inaction, are more fully addressed in the attached letter dated May 23, 2016, entitled "Wyoming Department of Environmental Quality (WDEQ) Exceptional Events Demonstration Packages; 2011-2014.

b. Is the Exceptional Events Rule likely to provide relief to states for emissions exceedances due to wildfires?

Response: Unlikely, because of the currently burdensome, resource intensive, time-consuming and costly process, and the possibility of EPA inaction. *See* attached letter from EPA Region 8, received April 28, 2016 noting that EPA had received, but not acted on, demonstrations for particulate matter exceedances due to wildfires.

c. What potential modifications to the exceptional events provisions of the Clean Air Act would you suggest to provide more meaningful relief?

Response: One potential modification would be to require EPA action by a set deadline, or in the event of EPA inaction, the demonstration would be automatically approved. Other modifications such as workable technical tools, clear and timely guidance, streamlining federal review, and other measures that honor and recognize the work undertaken by states, may also be effective for providing meaningful relief at the agency implementation level.

Question 2: Witnesses noted in testimony that it is unfair that, under current law, local jurisdictions may be subject to penalties for failure to attain standards, even though the failure is due to emissions from sources that are outside the jurisdictions' authority to control.

a. To assist with our identifying the problem fully, would you provide examples of the types of emissions or pollutants, natural or anthropogenic, that are outside your state's control and that may impede your ability to reach attainment of air quality standards so as to subject you to fees or other penalties?

Response: Examples of natural or anthropogenic emissions that are outside of Wyoming's control and may impede Wyoming's ability to attain ambient air quality standards include: international transport of emissions; smoke from in-state or out-of-state wildfires; stratospheric ozone intrusions; emissions from motor vehicles and other EPA-regulated engines; biogenic emissions and emissions from other naturally occurring phenomena such as mineral springs, geysers, and the like; climatological and meteorological conditions such as drought, high-winds, excessive precipitation, etc.; and other sources of emissions that contribute to background levels.

b. Are there circumstances in your view in which relief from penalties may be provided either to local or to state level jurisdictions?

Response: Under relief mechanisms currently available under the Clean Air Act and associated regulations, while relief is theoretically possible, it is extremely rare to the point that it is unattainable. These relief mechanisms include Rural Transport Areas, International Transport Areas, and Exceptional Event Demonstrations. In their current form, these mechanisms are extremely resource intensive, costly and rarely approved. For example, Rural Transport Areas only provide relief for rural areas that have been or will be designated moderate nonattainment or higher, not marginal nonattainment areas. EPA has only approved two such areas and those approvals were in regards to the 1979 Ozone Standard. Relief under International Transport only applies to areas located within a five mile radius of an international border. Thus, such relief is not available to inter-mountain west states such as Wyoming. The challenges with relief under the Exceptional Event process were addressed in my response to Question 1.

Question 3: Your testimony raised concerns about the quality of modeling data. When promulgating nonattainment designations in air quality control regions, should the Administrator base such designations on modeling predictions that do not incorporate state/local air agency input in lieu of the state's air quality monitoring data?

Response: No. Multisource and background modeling tools are complex and must be developed to a level that assures accuracy for their intended application.

Inaccurate models may result in the needless expenditure of time and resources on a non-existent issue. Such an approach is detrimental to public health and the environment because time and time and resources will be directed towards addressing a non-existent issue instead of addressing an issue that may provide public health and environmental benefits. Early and meaningful engagement with and input from states is critical to the development of modeling inputs and adjustments, and also an understanding of modeling limitations.

Question 4: Are there any other considerations we should take into account concerning H.R. 806 that you believe we did not cover sufficiently in the hearing?

Response: No.

Department of Environmental Quality

To protect, conserve and enhance the quality of Wyoming's environment for the benefit of current and future generations.

Matthew H. Mead, Governor

Todd Parfitt, Director

May 23, 2016

Monica Morales
Acting Director
Air Program
U.S. Environmental Protection Agency
Region 8
1595 Wynkoop Street
Denver, CO 80202-1129

RE: Wyoming Department of Environmental Quality (WDEQ) Exceptional Events Demonstration Packages; 2011-2014

Dear Ms. Morales:

The State of Wyoming, Department of Environmental Quality – Air Quality Division (AQD) has reviewed your letter, and offers the following comments, regarding the Environmental Protection Agency (EPA) Region 8's preliminary review of, and decision to not act upon, WDEQ's exceptional event demonstration submittals for calendar years 2011-2014. The AQD appreciates EPA Region 8's notification of preliminary review, but ultimately finds the EPA's proposed inaction on WDEQ's request for concurrence on monitoring data flagged as influenced by exceptional events to be very disappointing. The AQD renews its requests for EPA Region 8 action.

The EPA's inaction – to shelve Wyoming's exceptional event submissions until the EPA views them as the subject of an attainment demonstration or other EPA regulatory decision – signals the EPA's general disregard for the significant time and staff resources committed by the AQD for each individual exceptional event demonstration. The EPA's response to Wyoming's submittals may discourage other state regulatory agencies from performing thorough, meticulous work on future exceptional event demonstrations under the presupposition that these demonstrations will be merely shelved once they reach federal review. This does not align with the objectives of the EPA or WDEQ, as both entities should be wholly committed to providing outstanding responsiveness on environmental policy issues.

Furthermore, the EPA's justification for inaction is also problematic. Although certain exceptional event demonstrations that appear on the enclosed table of WDEQ's 2011-2014 packages may not directly pertain to a specific pending regulatory decision – such as whether an area will be considered nonattainment – they nevertheless represent exceedances of the National Ambient Air Quality Standards (NAAQS) that the AQD has determined were caused by circumstances beyond regulatory control. Unless these flagged data demonstrations are approved by the EPA, they are ultimately considered to be "violations" – regardless of whether such a "violation" is warranted – and Wyoming is left with possible undue consequences of delays to New Source Review permitting actions, performing follow-up casework with stakeholders, as well as the abiding perceptions of the general public. Additionally, the AQD and other state agencies face the burden of implementing federal policies that are developed on the basis of elevated monitored data – data that should have been excluded from emission inventories as a result of being properly classified as exceptional events – and therefore, exceptional event demonstrations that are not acted upon by the EPA still influence regulatory decisions that directly impact states. Whereas in the past, EPA Region 8 had conferred with the AQD in compiling this list of shelved exceptional event demonstrations, there was no two-way dialogue in this instance. The AQD does not believe this is a reasonable or efficient practice. The AQD respectfully requests that the EPA acts on WDEQ's concurrence requests or reopens its dialogue with WDEQ regarding which flagged monitored data will be considered for the EPA's full review.

Prior State Involvement in Demonstration Selection

As previously noted, the April 2016 letter from EPA Region 8 runs contrary to prior discussions between the EPA and the AQD regarding whether flagged data would be fully considered and reviewed by the EPA. The EPA's guidance on exceptional event demonstrations acknowledges that states should highlight the significance of each flagged event, and Wyoming has consistently followed this guidance by detailing the importance of certain demonstrations in its cover letter to the EPA. In this most recent instance, however, the AQD was merely informed that a series of 46 exceptional events – event demonstrations that AQD staff had invested significant time, resources, and analysis into compiling – would not be acted upon by the EPA unless the demonstrations became the subject of a future attainment demonstration or other specific EPA regulatory decision.

The EPA's practice is troublesome for the AQD on several fronts. It disregards a significant analytical and laborious effort undertaken by the AQD over the years – an effort that Wyoming undertook with the full expectation that the EPA would ultimately consider and act on the flagged data. The EPA's failure to act wastes state agency resources. The AQD maintains that, if it has technically demonstrable justification to compile an exceptional event demonstration, and if it has undertaken the effort in compiling that demonstration, then the EPA should fulfill its responsibility to take action. The EPA should honor the work undertaken by state agencies by providing its full consideration.

Concerns Regarding State-Level Regulatory Decisions

The AQD is in the unique position of having several industrial ambient monitors required through New Source Review permits that must meet EPA requirements, and therefore, data that are currently eligible for treatment under the Exceptional Event Rule. There have been several instances where data have been influenced by exceptional events at these monitors. In these instances, the AQD has demonstrated the regulatory significance of these events and has submitted demonstrations for review by the Region. The EPA's follow-through on the regulatory review process would lessen regulatory uncertainty by allowing a regulatory mechanism to demonstrate the effect of exceptional events upon ambient data used for permitting and regulatory decisions at the state level. This would benefit all regulatory entities involved, as it would allow for the AQD to operate as efficiently and decisively as possible in acting upon ambient monitored data.

Placing Undue Accountability on State Agencies

The EPA's approach is further problematic to the AQD because the state agency is ultimately left to deal with the lingering consequences of NAAQS "violations" that were entirely beyond the control of any regulatory entity. These consequences are not necessarily limited to specific EPA attainment or other regulatory determinations. The notion that only such pending regulatory determinations are relevant in evaluating flagged monitoring data is a significant misconception on the EPA's behalf.

While the EPA's evaluation of a certain exceptional event demonstration may not have specific bearing on whether or not a certain area is able to attain the NAAQS, these monitored data are nevertheless included in conjunction with national emission inventories and modeling exercises that are ultimately considered by the EPA in establishing policy and developing federal regulations. Exceptional event demonstrations make compelling cases that certain elevated monitored data should be disregarded when creating regulatory policy. When the EPA disregards and fails to act on these demonstrations, however, the consequence is the inclusion of inflated monitored data that misrepresents the prevailing air quality conditions. For example, the shelved data on Wyoming's exceptional event demonstration list from the 2012 summer is attributable to the omnipresence of wildfire emissions in the state, or transported into the state, due to an extraordinarily active wildfire season. The EPA's reluctance to act on Wyoming's exceptional event demonstration submissions ultimately means that these exceedances represent "violations" of the NAAQS – from a regulatory standpoint, and in the eyes of the public – even though these events were beyond regulatory control. This is simply an unfair and unsound practice and is ultimately counterproductive to the state, the EPA, and the public.

Additionally, the EPA's inaction is problematic because there are many circumstances where the consideration of exceptional event-influenced data would impact regulatory domains beyond NAAQS attainment. One such example is regional haze, where a wildfire-heavy summer – including wildfires burning in other states – would contribute significantly to pollutant levels in Wyoming and impact the presence of regional haze, despite the State of Wyoming having no capacity to control those emissions. This was, again, the case in 2012, where levels of $PM_{2.5}$ in Wyoming increased dramatically between June and September because of the omnipresence of wildfires – largely attributable to the extraordinarily dry meteorological conditions.

Although Wyoming still attained the primary annual arithmetic mean and the primary 24-hour average for both the 2006 and 2012 $PM_{2.5}$ NAAQS, the elevated $PM_{2.5}$ levels attributable to exceptional events still impacted the state's capacity to demonstrate that the state's overall marginal levels of $PM_{2.5}$ did not contribute significantly to regional haze. These exceptional events were significant in number (there were several multi-day wildfires throughout the summer) and had impacts beyond the State's regulatory capacity. Ultimately, the EPA's consideration of monitored data, bereft of exceptional event demonstrations results in a misrepresentation of the adequacy of existing state regulations and shifts state resources from addressing areas of concern to addressing situations that are not problematic.

Conclusion

The AQD hopes that its request and suggestions ensure that the EPA fully considers these exceptional event demonstrations. The EPA's action is extremely beneficial for the planning and submittal of regulatory documents that may be influenced -- both in scope and in details -- by the classification of exceptional events that impact monitored data, and consequentially impact the regulatory decisions that air agencies must make. It is important to the State of Wyoming that the EPA honors its commitment to act on these exceptional event demonstrations.

Thank you for the opportunity to reply to your letter. As always, the AQD is available to discuss any of the concerns outlined in this letter. Please feel free to contact the AQD at 307-777-7391.

Sincerely,

[redacted]

Nancy E. Vehr
AQD Administrator

Cc: Adam Clark, EPA Region 8
Cara Keslar, AQD
Amber Potts, AQD
Mike Morris, AQD

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 Wynkoop Street
Denver, CO 80202-1129
Phone 800-227-8917
www.epa.gov/region08

APR 2 ? 2016

Ref: 8P-AR

Nancy Vehr, Administrator
Air Quality Division
Wyoming Department of Environmental Quality
200 West 17th Street
Cheyenne, Wyoming 82002

Received
APR 28 2016
Air Quality Division

Re: Wyoming Department of Environmental Quality (WDEQ) Exceptional Events Documentation Packages; 2011-2014

Dear Ms. Vehr:

This letter is in response to WDEQ's submittals of demonstrations of exceptional event influence on $PM_{2.5}$, PM_{10}, and ozone monitoring data for calendar years 2011-2014. The demonstration documents contain information regarding monitoring data flagged by WDEQ to indicate that PM_{10} National Ambient Air Quality Standards (NAAQS) exceedances were affected by high winds, $PM_{2.5}$ NAAQS exceedances were affected by wildfires, and ozone NAAQS exceedances were affected by stratospheric intrusions.

A preliminary review of the demonstrations submitted indicates that the flagged PM and ozone data may have been influenced by exceptional events; however, at this time the EPA will not take action on WDEQ's request for concurrence on the referenced data flags. The data are not anticipated to be involved in any pending regulatory decision by the EPA, therefore, the EPA is not making a concurrence decision on the demonstrations submitted. If at some point in the future the flagged data would be included in an attainment demonstration or involved in other regulatory decisions, the EPA would then undertake a full review of the submitted demonstrations to allow a concurrence decision at that time.

The enclosed table provides a summary of the flagged $PM_{2.5}$, PM_{10}, and ozone monitoring data WDEQ provided for the calendar years 2011-2014 subject to this letter. With this letter, the EPA is determining our review of the WDEQ 2011-2014 packages listed in the enclosed table to be complete. As always, the EPA staff are available to answer any questions your staff may have and to provide help where needed. For additional information, please feel free to contact me, or your staff may contact Kyle Olson, of my staff, at (303) 312-6002.

Sincerely,

[redacted]

Monica Morales, Acting Director
Air Program

EE Date	Year	Location	Monitor ID	Parameter	Monitored Value
5/30/2011	2011	South Pass	56-013-0099-1	O_3	81 ppb
1/11/2012	2012	Naughton	56-023-0820-2	PM_{10}	312 μg/m^3
1/12/2012	2012	Naughton	56-023-0820-2	PM_{10}	167 μg/m^3
1/13/2012	2012	Naughton	56-023-0820-2	PM_{10}	325 μg/m^3
1/16/2012	2012	Naughton	56-023-0820-2	PM_{10}	179 μg/m^3
1/18/2012	2012	Naughton Mountain Cement	56-023-0820-2 56-001-0800-3	PM_{10} PM_{10}	174 μg/m^3 170 μg/m^3
1/21/2012	2012	School Creek - 3	56-005-0086-1	PM_{10}	226 μg/m^3
		School Creek - 2	56-005-0087-1	PM_{10}	223 μg/m^3
		N Antelope/ Rochelle RO-1	56-005-0869-2	PM_{10}	200 μg/m^3
3/26/2012	2012	Mountain Cement	56-001-0800-3	PM_{10}	204 μg/m^3
4/12/2012	2012	Buckskin Mine N	56-005-1899-1	PM_{10}	180 μg/m^3
6/5/2012	2012	Wyodak	56-005-0901-1	PM_{10}	237 μg/m^3
		Bridger Coal JB-4	56-037-0860-1	PM_{10}	215 μg/m^3
6/6/2012	2012	Thunder Basin	56-005-0123-1	O_3	88 ppb
6/26/2012	2012	Pinedale	56-035-0101-1	$PM_{2.5}$	47.0 μg/m^3
6/28/2012	2012	Big Piney	56-035-0700-1	$PM_{2.5}$	53.8 μg/m^3
6/29/2012	2012	Lander	56-013-1003-1	$PM_{2.5}$	41.8 μg/m^3
		Casper	56-025-0001-1	$PM_{2.5}$	36.5 μg/m^3
		Big Piney	56-035-0700-1	$PM_{2.5}$	110.6 μg/m^3
6/30/2012	2012	Big Piney	56-035-0700-1	PM_{10}	190 μg/m^3
		Big Piney	56-035-0700-1	$PM_{2.5}$	143.7 μg/m^3
7/1/2012	2012	Big Piney	56-035-0700-1	$PM_{2.5}$	85.4 μg/m^3
7/2/2012	2012	Big Piney	56-035-0700-1	$PM_{2.5}$	97.4 μg/m^3
7/3/2012	2012	Big Piney	56-035-0700-1	$PM_{2.5}$	74.7 μg/m^3
7/4/2012	2012	Gillette Col.	56-005-0800-1	$PM_{2.5}$	56.5 μg/m^3
		Belle Ayr BA-4	56-005-0892-1	$PM_{2.5}$	55.3 μg/m^3
		Antelope 3	56-009-0819-1	$PM_{2.5}$	47.0 μg/m^3
		Big Piney	56-035-0700-1	$PM_{2.5}$	68.4 μg/m^3
7/5/2012	2012	Big Piney	56-035-0700-1	$PM_{2.5}$	38.6 μg/m^3
9/18/2012	2012	Wyoming Range	56-035-0097-1	$PM_{2.5}$	39.1 μg/m^3
9/20/2012	2012	Wyoming Range	56-035-0097-1	$PM_{2.5}$	52.3 μg/m^3

EE Date	Year	Location	Monitor ID	Parameter	Monitored Value
		Pinedale	56-035-0101-1	$PM_{2.5}$	44.8 $\mu g/m^3$
9/21/2012	2012	Rock Springs	56-037-0007-1	$PM_{2.5}$	37.6 $\mu g/m^3$
		Jackson Hole	56-039-1006-1	$PM_{2.5}$	39.2 $\mu g/m^3$
12/2/2012	2012	Buckskin Mine N	56-005-1899-1	PM_{10}	167 $\mu g/m^3$
12/20/2012	2012	N Antelope/ Rochelle RO-1	56-005-0869-2	PM_{10}	188 $\mu g/m^3$
3/4/2013	2013	Black Thunder	56-005-0891-2	PM_{10}	166 $\mu g/m^3$
3/17/2013	2013	Black Butte #10	56-037-0868-2	PM_{10}	261 $\mu g/m^3$
		Black Butte I-80	56-037-1868-1	PM_{10}	432 $\mu g/m^3$
6/13/2013	2013	Kemmerer Mine	56-023-0800-1	PM_{10}	273 $\mu g/m^3$
1/13/2014	2014	Black Butte #10	56-037-0868-2	PM_{10}	166 $\mu g/m^3$
2/21/2014	2014	Black Butte Lucite Hills	56-037-0852-1	PM_{10}	204 $\mu g/m^3$
3/17/2014	2014	Black Butte #10	56-037-0868-2	PM_{10}	202 $\mu g/m^3$
		Black Butte Lucite Hills	56-037-0852-1	PM_{10}	242 $\mu g/m^3$
4/28/2014	2014	Black Butte Lucite Hills	56-037-0852-1	PM_{10}	219 $\mu g/m^3$
7/14/2014	2014	Black Butte Lucite Hills	56-037-0852-1	PM_{10}	294 $\mu g/m^3$

GREG WALDEN, OREGON
CHAIRMAN

FRANK PALLONE, JR., NEW JERSEY
RANKING MEMBER

ONE HUNDRED FIFTEENTH CONGRESS

Congress of the United States

House of Representatives

COMMITTEE ON ENERGY AND COMMERCE
2125 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515-6115
Majority (202) 225-2927
Minority (202) 225-3641

April 11, 2017

Dr. Homer Boushey
Professor of Medicine
Division of Pulmonary/Critical Care Medicine
University of California, San Francisco
505 Parnassus Avenue; RM M1292
Box 0130
San Francisco, CA 94143-0130

Dear Dr. Boushey,

Thank you for appearing before the Subcommittee on Environment on Wednesday, March 22, 2017, to testify at the hearing entitled "H.R. 806, Ozone Standards Implementation Act of 2017."

Pursuant to the Rules of the Committee on Energy and Commerce, the hearing record remains open for ten business days to permit Members to submit additional questions for the record, which are attached. The format of your responses to these questions should be as follows: (1) the name of the Member whose question you are addressing, (2) the complete text of the question you are addressing in bold, and (3) your answer to that question in plain text.

To facilitate the printing of the hearing record, please respond to these questions with a transmittal letter by the close of business on Wednesday, April 26, 2017. Your responses should be mailed to Grace Appelbe, Legislative Clerk, Committee on Energy and Commerce, 2125 Rayburn House Office Building, Washington, DC 20515 and e-mailed in Word format to Grace.Appelbe@mail.house.gov.

Thank you again for your time and effort preparing and delivering testimony before the Subcommittee.

Sincerely,

John Shimkus
Chairman
Subcommittee on Environment

cc: The Honorable Paul Tonko, Ranking Member, Subcommittee on Environment

Attachment

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

BERKELEY • DAVIS • IRVINE • LOS ANGELES • RIVERSIDE • SAN DIEGO • SAN FRANCISCO SANTA BARBARA • SANTA CRUZ

HOMER A. BOUSHEY, M.D.
Professor of Medicine in Residence, Emeritus
Division of Pulmonary, Critical Care & Sleep Medicine
Department of Medicine
Senior Associate, Cardiovascular Research Institute

[redacted]

April 24, 2017

Grace Appelbe
Legislative Clerk
Committee on Energy and Commerce
2125 Rayburn House Office Building
Washington, D.C. 20515
Email: grace.appelbe@mail.house.gov

RE: H.R. 806, Ozone Standards Implementation Act of 2017 – further questions and responses

Dear Ms. Appelbe,

Please find below my answers to the further questions of Hon. John Shimkus and Hon. Frank Pallone, Jr.

Sincerely,

[redacted]

Homer A. Boushey, M.D.

Responses to questions from the Honorable John Shimkus:

1. **Is there a high degree of variability in individual performance on lung function tests from day-to-day and season-to-season?**

Yes, there is variability in even a healthy individual's performance on pulmonary function testing performed correctly on consecutive days. For the most commonly used measures, the forced expired volume in one second and the forced vital capacity, the values vary by about ±2.5 - 5.0%. That is different, however, from the variability in the mean values for a group of subjects measured on consecutive days over time, or before and after an intervention. So, for example, a decline in FEV1 of 2.5% after ozone exposure in an individual might simply reflect the natural "wobble" of the test. However, the same change in the mean value for FEV1 in a group of subjects would have greater significance, indicating a true effect of the exposure.

a. **What are the factors unrelated to asthma that can affect performance?**

Factors unrelated to asthma that can affect performance of the test are other lung diseases, like chronic obstructive pulmonary disease (COPD, i.e., emphysema and chronic bronchitis), acute bronchitis, cystic fibrosis, tracheomalacia, vocal cord dysfunction, and others. The test can be affected as well by obesity, weakness, chest wall deformity, and other mechanical problems of the skeletal and neuromuscular function. These, however, are usually recognizable when the test is performed or from the pattern of the curves of expiratory flow, typically displayed along with the test results.

b. **How common is it for clinicians to arrive at different diagnoses for people who present asthma symptoms?**

The frequency with which symptoms of asthma are misdiagnosed as due to another illness varies by the population in which they occur. Asthma is probably over-diagnosed in children under 6 year of age, where wheezing can be caused by viral respiratory infection in the absence of asthma. It is likely under-diagnosed in older patients, in whom wheezing may be mis-attributed to COPD. Among patients between the ages of 6 and 60 years of age, however, the cluster of typical symptoms, abnormal pulmonary function tests, and the coincidence of evidence of allergy make the diagnosis pretty straight-forward.

c. **What other illnesses or conditions could affect lung function performance?**

Please see response to question 1a, above.

2. **In your testimony, you also cite studies by Schelegle et. al. and Kim et al. as affirming lung function decrements in healthy adults after exposure to 60 to 70 ppb of ozone. The studies reported average lung function FEV1 (forced expiratory volume in 1 second) deficits of3.5 and 1.7 percent respectively. In 2005 the American Thoracic Society and the European Respiratory Society (ATS/ERS) issued a paper (Pellegrino et al.)1 to provide guidance in interpreting pulmonary function tests. This paper notes: "When using per cent change from baseline as the criterion, most authorities require a 12-15% increase in FEV1 and/or FVC as necessary to define a meaningful response. Increments of 8% (or ,150 mL) are likely to be within measurement variability [107, 115]." It also notes: "Thus, in subjects with relatively "normal" lung function, year-to-year changes in FEV1 over 1 yr should exceed 15% before confidence can be given to the opinion that a clinically meaningful change has occurred [5]."**

    a. **Please explain the significance of the mean responses found in the Schelegle et al. and Kim et al. studies in light of the ATS/ERS guidance.**

The ATS/ERS statement refers to changes in an individual patient, not to changes in the mean value of a group of subjects measured before and after an experimental exposure to ozone (please see response to question 1, above).

3. **You state in your testimony that a recent publication by Gauderman and colleagues 2 "demonstrated improvements in lung-function development in children as air quality improved." However, the study authors state that "[C]hanges in ozone (Figure 2)) and PM10 PM2.5 (Fig. S4 in the Supplementary Appendix) were not associated with differences in mean FEV1 or PVC values at 11 or 15 years of age or**

with 4-year growth in these values." The study also notes that the evidence regarding the long-term effect of ozone on children is mixed: "Only a few other studies have addressed the long-term effects of ozone on lung function in children, and the results have been inconsistent."

a. **Please explain the significance of the Gauderman study to legislation addressing ozone regulations.**

The remarkable finding reported by Gauderman et al. is that of improvement in pulmonary function in three large cohorts of children in southern California recruited over consecutive periods in which air pollution improved (1993, 1997, and 2003). They demonstrated an association between improvements in air quality, especially in nitrogen dioxide and particulate matter (PM2.5) and increases in lung function growth. The demonstration of a statistically significant association does not prove causality, of course, but the data reported are consistent with the findings of other studies showing improvements in lung function in children who moved from areas with polluted air to areas with less air pollution. Because impairments in lung function in childhood are predictors of chronic respiratory and cardiovascular disease, these findings are heartening evidence of the value of protection of air quality as a public health measure. Gauderman's study did not find an association between reductions in ozone levels and improvements in lung function, but since tail-pipe emissions are the major source of nitrogen dioxide, ozone, and particulate matter in southern California, the measures to reduce ozone (which did decrease, though modestly, over the study periods) contributed to the reductions in nitrogenous products and particulates as well.

4. **You note in your testimony the results of one study by Rice et al. that reported lower FEV1 values in a cohort of generally healthy adults after days of ambient exposure to ozone under 59 parts per billion (ppb), compared to exposures that ranged from 59 to 74 ppb. The study by Rice et al., however, also states that: "The magnitude of the average difference in FEV1 between "good" and "moderate" exposures is small (20 ml for PM2.5, 31 ml for NO_2, and 56 ml for O_3) and unlikely to be clinically perceptible to the average individual."**

   a. **Please explain whether you agree with that statement.**

The declines in mean values of pulmonary function after relatively brief exposures of a group of healthy subjects to ozone indicate a true effect. We know from prior studies that these effects of ozone exposure are associated with lung inflammation. The changes themselves may not have been associated with symptoms noticeable to the study participants over the short term, but repeated exposure, and repeated inflammatory insult to the lungs over time, appear to result in accelerated loss of lung function in adults, and in increased likelihood of development of asthma and reductions in lung growth in children.

Responses to questions from the Honorable Frank Pallone, Jr.:

1. **Dr. Boushey, although the title of this bill suggests that it deals only with ozone, in fact it amends the National Ambient Air Quality Standards program of the Clean Air Act for all criteria air pollutants - lead, sulfur dioxide, nitrogen oxides, carbon**

monoxide, and for both fine and course particulate matter. Of course, when we breathe the surrounding air we get any and all of these air pollutants that are in the immediate area. And, while each of them presents different specific health impacts, taken together I imagine they make a very unhealthy brew.

a. **Is it possible we are underestimating the impacts of ozone or other individual pollutants because of the challenge of evaluating and quantifying the cumulative impacts of the mixture of pollutants that people actually are exposed to?**

The thrust of this question is correct - that what research scientists have generally attempted to assess is the independent effect of each criteria pollutant, whereas what people inhale in day-to-day life is the mix of pollutants present in ambient air. It is much harder to assess the effects of complex mixes of pollutants in exposure studies, and it is entirely possible that the effects of a mix of pollutants is greater than the sum of their individual effects. This may indeed account for the consistency of epidemiologic studies showing an increase in asthma exacerbations requiring emergency room treatment to be associated with increases in the ozone levels in "summer fog" – a mix of ozone, nitrogen oxides, sulfates, and particulate matter – when controlled exposures to the same levels of ozone do not induce exacerbations in asthmatic volunteers. There is also an enlarging body of evidence that shows associations between exposure to the traffic mixture of emissions and asthma exacerbations.

2. **Unfortunately, California's topography and climate create conditions that are truly challenging for improving air quality. But, as I understand it the current ozone standard of 70 parts per million, even when we achieve it, may still result in health impacts. Is that true? Did the Clean Air Scientific Advisory Committee and the public health community recommend a stronger standard?**

Congressman Pallone is correct. Health impacts from ozone exposure will occur even with exposure to 70 ppb. This is why the Clean Air Scientific Advisory Committee recommended a new standard of between 60 and 70 ppb, a recommendation widely supported in the public health community (see R. Dey et al., *American Journal of Respiratory and Critical Care Medicine*, 2010; 181:297-299).

3. **Even the extreme non-attainment areas are going to have until 2036 or 37 to achieve compliance with the 70 parts per million ozone standard. So, a child born today in areas with high ozone levels will be 20 years old by the time we achieve compliance with this standard. Doesn't a life- time exposure to air pollution carry a significant health cost for these individnals?**

Again, the Congressman is correct. The evidence suggests that exposure to ozone and other air pollutants impairs lung growth in children, and reductions in pulmonary function at the end of childhood are associated with higher risk of chronic respiratory and cardiovascular disease (see DW Dockery and JH Ware, *New England Journal of Medicine*, 2015; 372:970-972)

GREG WALDEN, OREGON
CHAIRMAN

FRANK PALLONE, JR., NEW JERSEY
RANKING MEMBER

ONE HUNDRED FIFTEENTH CONGRESS

Congress of the United States

House of Representatives

COMMITTEE ON ENERGY AND COMMERCE

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April 11, 2017

Mr. Seyed Sadredin
Executive Director
and Air Pollution Control Officer
San Joaquin Valley Air Pollution Control District
1990 East Gettysburg Avenue
Fresno, CA 93726-0244

Dear Mr. Sadredin,

Thank you for appearing before the Subcommittee on Environment on Wednesday, March 22, 2017, to testify at the hearing entitled "H.R. 806, Ozone Standards Implementation Act of 2017."

Pursuant to the Rules of the Committee on Energy and Commerce, the hearing record remains open for ten business days to permit Members to submit additional questions for the record, which are attached. The format of your responses to these questions should be as follows: (1) the name of the Member whose question you are addressing, (2) the complete text of the question you are addressing in bold, and (3) your answer to that question in plain text.

To facilitate the printing of the hearing record, please respond to these questions with a transmittal letter by the close of business on Wednesday, April 26, 2017. Your responses should be mailed to Grace Appelbe, Legislative Clerk, Committee on Energy and Commerce, 2125 Rayburn House Office Building, Washington, DC 20515 and e-mailed in Word format to Grace.Appelbe@mail.house.gov.

Thank you again for your time and effort preparing and delivering testimony before the Subcommittee.

Sincerely,

John Shimkus
Chairman
Subcommittee on Environment

cc: The Honorable Paul Tonko, Ranking Member, Subcommittee on Environment

Attachment

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

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April 24, 2017

The Honorable John Shimkus
Chairman, Subcommittee on Environment
Committee on Energy and Commerce
2125 Rayburn House Office Building
Washington, D.C. 20515-6115

Dear Chairman Shimkus:

Thank you for the invitation to testify before the Subcommittee on Environment on March 22, 2017. The following is the response to your follow-up questions as presented in your April 11, 2017 letter.

1. **Would you elaborate on your comments in your testimony concerning "formula-based milestones and deadlines that EPA and courts have established in the absence of clear Congressional direction"?**

   a. **What are some specific examples of these milestones and deadlines and how are these actually inhibiting your ability to implement air quality standards?**

   b. **To what extent do these comments relate to formulas and milestones established in the 1990 amendments to the Clean Air Act?**

   c. **Are any assumptions that served as a basis for the formulas you reference no longer applicable, given current air-quality conditions or scientific understanding, to enable effective implementation of air quality plans?**

Since the 1970's, EPA has established numerous ambient air quality standards for individual pollutants. We have now reached a point where various regions throughout the nation are subject to multiple iterations of standards for a single pollutant. For instance, there are currently 4 pending standards for ozone and 4 pending standards for PM2.5. Each of these standards requires a separate attainment plan which leads to multiple overlapping requirements and deadlines. This in turn results in a great deal of confusion, costly bureaucracy, and duplicative regulations, all without corresponding public health benefits.

The formula-based deadlines and milestones that were prescribed in the Act 25 years ago now lead to mandates that are impossible to meet within the formula-based deadlines mandated by EPA as illustrated in Tables 1 and 2, below.

Table 1: Federal Air Quality Standards and San Joaquin Valley Attainment Plans: Ozone

	Ozone			
	1979 1-hr ozone	**1997 8-hr ozone**	**2008 8-hr ozone**	**2015 8-hr ozone**
1979-1997	EPA sets NAAQS (1979): 124 ppb	EPA sets NAAQS (1997): 84 ppb		
1998 – 2003				
2004	SJV attainment plan	EPA finalizes attainment designations		
2005	Standard revoked	EPA implementation rule		
2006	Litigation reinstates portions of implementation requirements under the revoked standard			
2007		SJV's attainment plan		
2008			EPA sets NAAQS: 75 ppb	
2009				
2010	EPA approves SJV plan	Midcourse review	EPA proposes to revise NAAQS: 60 to 70 ppb	
2011			EPA announces it won't revise the standard	
2012	EPA withdraws approval of 2004 plan	EPA approves SJV plan	EPA attainment designation (SJV: extreme nonattainment)	
2013	SJV adopts new plan		EPA proposes implementation rule	
2014				
2015			EPA final implementation rule	EPA sets NAAQS at 70 ppb
2016			District adopts *2016 Ozone Plan*	EPA proposes implementation rule
2017				EPA to finalize classifications
2018	SJV to adopt "redesignation substitute"			
2019				
Attainment deadline	**2017**	**2024**	**2032**	Up to 20 years after attainment designations

April 24, 2017
Page 3

Table 2: Federal Air Quality Standards and San Joaquin Valley Attainment Plans: Particulate Matter

	PM10 1987 PM10	PM2.5 1997 PM2.5	2006 PM2.5	2012 PM2.5
1979-1997	NAAQS (1987): Annual: 50 µg/m³ 24-hr:150 µg/m³	EPA sets NAAQS (1997): 24-hr: 65 µg/m³, annual: 15 µg/m³		
1998 – 2003	SJV Attainment Plan			
2004				
2005		EPA finalizes attainment designations		
2006	EPA revokes the annual PM10 standard PM10 Attainment finding for 2003-2005 and 2004-2006		EPA sets NAAQS: 24-hr: 35 µg/m³, annual: 15 µg/m³	
2007	SJV Maintenance Plan	EPA implementation rule		
2008	EPA approves Maintenance Plan	SJV adopts plan		
2009			EPA attainment designations	
2010				
2011		EPA approves plan		
2012			Dec. 20: District adopts plan	Dec. 14: EPA sets NAAQS: annual: 12 µg/m³
2013		District adopts contingencies EPA proposes approval	Jan. 4 Court ruling: EPA should have used CAA subpart 4, not subpart 1	
2014			EPA designates SJV Moderate Nonattainment	
2015		SJV reclassified as Serious (effective 5/7/15); District adopts new plan & request deadline extension	EPA proposes plan approval and Serious reclassification EPA proposes Implementation Rule (Subpart 4)	EPA designates SJV Moderate Nonattainment effective 4/15/2015
2016		EPA announces it will not act on the *2015 PM2.5 Plan;* Deadline to adopt 5% Plan as a result of EPA's inaction 12/31/2016 EPA publishes Implementation Rule	SJV reclassified as Serious nonattainment area (effective 2/19/16) EPA publishes Implementation Rule EPA approves Moderate Plan effective 9/30/16	SJV plan, impracticability and reclassification request EPA publishes Implementation Rule
2017	Second Maintenance Plan due to EPA		Serious plan due 8/19/17	
Attainment deadline	NA	**2015**	**2019**	**2021 Moderate 2025 Serious**

Mobile and stationary sources throughout the nation have now been subject to multiple generations of technology forcing regulations that have achieved significant air quality benefits. Meeting the new standards that approach background concentrations call for transformative measures that require time to develop and implement. These transformative measures require new technologies that in many cases are not yet commercially available or even conceived.

2. **You noted in testimony that it is unfair that, under current law, local jurisdictions may be subject to penalties for failure to attain standards, even though the failure is due to emissions from sources that are outside the jurisdiction' authority to control.**

    a. **In addition to the mobile-source emissions you discussed, would you provide examples of other types of emissions or pollutants, natural or anthropogenic, that are outside your control and that may impede your ability to reach attainment of air quality standards so as to subject you to fees or other penalties?**

    b. **Your comments focused on relief from penalties for local air quality jurisdictions that cannot reach attainment due to emissions beyond their control; are there circumstances in our view in which relief may also be applicable to state level jurisdictions?**

Through decades of implementing effective air quality strategies, air pollution from San Joaquin Valley businesses has been reduced by over 80% through an investment of over $40 billion by regulated sources. The pollution released by industrial facilities, agricultural operations, and cars and trucks are at historical lows for all pollutants. San Joaquin Valley residents' exposure to high smog levels has been reduced by over 90%. Unfortunately, after all this investment and sacrifice, we have reached a point where we cannot attain the federal standards even if we eliminated all Valley businesses, agricultural operations, or trucks traveling through the San Joaquin Valley.

Federal law specifically preempts local jurisdictions, such as the Valley Air District, from imposing tailpipe emissions standards on mobile sources. The San Joaquin Valley cannot attain the federal standards without significant reduction in emissions from these federal sources. Another example of a pollution source for which we have no local jurisdiction or control is the transboundary transport of pollution. Observational and modeling studies have shown that international ozone precursor emissions can lead to ozone formation within the atmospheric boundary layer over far-upwind areas and under favorable conditions can be transported within mid-and upper- troposphere and contribute to local ozone concentrations.

In the case of California, during spring and summer transboundary ozone is delivered onshore by prevailing tropospheric wind currents flowing across the Pacific Ocean. Some of this transboundary ozone is from natural sources but an increasing proportion is due to a dramatic increase in fossil fuel combustion in Asia over the past two