ORAL ARGUMENT NOT YET SCHEDULED

No. 23-1157 (and consolidated cases)

IN THE UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT

STATE OF UTAH, BY AND THROUGH ITS GOVERNOR, SPENCER J. COX, AND ITS ATTORNEY GENERAL, SEAN D. REYES,
Petitioner,

v.

ENVIRONMENTAL PROTECTION AGENCY AND MICHAEL S. REGAN, IN HIS OFFICIAL CAPACITY, AS ADMINISTRATOR OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY,
Respondents,

On Petition for Review of Action of the Environmental Protection Agency,
88 Fed. Reg. 36,654

UNOPPOSED MOTION OF AIR QUALITY SCIENTISTS FOR LEAVE TO FILE *AMICI CURIAE* BRIEF IN SUPPORT OF RESPONDENTS AND DENIAL OF PETITIONS

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CERTIFICATE AS TO PARTIES, RULINGS, AND RELATED CASES

Pursuant to D.C. Circuit Rule 27(a)(4), *Amici* Air Quality Scientists Paul Miller, Russell Dickerson, Arlene Fiore, and Tracey Holloway submit the following Certificate as to Parties, Rulings, and Related Cases.

All parties and amici appearing before this Court are listed in the Respondents' Brief, with the exception of *Amici* Air Quality Scientists and any other amici in support of Respondents.

References to the rulings under review and to related cases appear in Respondents' Brief.

Respectfully submitted,

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UNOPPOSED MOTION OF AIR QUALITY SCIENTISTS FOR LEAVE TO FILE *AMICI CURIAE* BRIEF IN SUPPORT OF RESPONDENTS AND DENIAL OF PETITIONS

Pursuant to Federal Rule of Appellate Procedure 29(a)(3) and D.C. Circuit Rule 29(b), Drs. Paul Miller, Russell Dickerson, Arlene Fiore, and Tracey Holloway hereby respectfully move this Court for leave to file an amici curiae brief in the above-captioned matter in support of the Respondents U.S. Environmental Protection Agency (EPA) and EPA Administrator Michael Regan. In support of their motion, proposed *Amici* state as follows:

1. The proposed *Amici* are a group of nationally recognized and peer-reviewed experts in atmospheric pollution, chemistry, and air quality modeling. Each of them is well-regarded as an expert in the field of atmospheric science and transport modeling by their peers in scientific and academic communities.

2. Proposed *amicus* Dr. Paul Miller is the Executive Director of Northeast States for Coordinated Air Use Management and the Executive Director of the Ozone Transport Commission, a multi-state organization created under the 1990 Clean Air Act Amendments to assess the extent of interstate transport of ground-level ozone and its precursors. Proposed *amicus* Dr. Russell Dickerson is a professor at the University of Maryland's Department of Atmospheric and Oceanic Science where his research focuses on atmospheric chemistry, air pollution, climate, and global biogeochemical cycles. Proposed *amica* Dr. Arlene Fiore is a

professor at the Massachusetts Institute of Technology, where she was the inaugural Peter H. Stone and Paola Malanotte Stone Professor of Earth, Atmospheric and Planetary. Proposed *amica* Dr. Tracey Holloway is a Professor at the University of Wisconsin—Madison where she is the inaugural Jeff Rudd and Jeanne Bissell Professor of Energy Analysis and Policy, appointed in both the Nelson Institute for Environmental Studies and the Department of Atmospheric and Ocean Sciences.

3. The proposed *Amici* air quality scientists bring significant academic and scientific expertise to atmospheric science and transport modeling, which are integral to the regulations challenged in these consolidated petitions.

4. As active participants in the scientific community studying atmospheric pollution transport, the proposed *Amici* have a specialized interest in supporting EPA's use of robust and credible scientific methods and frameworks, and in assisting this Court with fully understanding such science.

5. The attached brief is relevant and desirable as required by Federal Rule of Appellate Procedure 29. In the brief, the proposed *Amici* provide a summary of the complex science and modeling underlying the challenged regulations and information regarding its use throughout the scientific community. Additionally, proposed *Amici* provide scientific context for EPA's regulatory framework, the success of past regulations built on the same framework, and the

misplaced technical assertions made by the petitioners regarding the challenged regulations.

6. The proposed *Amici* air quality scientists seek to file the attached brief in their individual capacities, and not in any institutional capacity.

7. Counsel for proposed *Amici* sought consent to file an amicus brief from the parties under Federal Rule of Appellate Procedure 29(a)(3) and D.C. Circuit Rule 29(b). Respondents and respondent-intervenors consented to the filing of the brief. Several petitioners consented to the brief, one petitioner did not object to the brief, several petitioners took no position, and other petitioners did not respond. No party stated that it intended to oppose this motion for leave.

8. This motion is timely filed within seven days of Respondents' brief, which was filed on June 17, 2024. *See* Fed. R. App. P. 29(a)(6).

9. Granting this motion would not burden the parties nor delay the Court's consideration of the case.

WHEREFORE, proposed *Amici* respectfully request that this Court grant this motion and lodge the attached *amici curiae* brief in these consolidated cases.

Proposed *Amici* Air Quality Scientists
Drs. Paul Miller, Russell Dickerson, Arlene Fiore, and Tracey Holloway

By their attorney,

/s/ Christophe Courchesne
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Counsel for Proposed Amici Curiae

Dated June 24, 2024

CERTIFICATE OF COMPLIANCE

I hereby certify that the foregoing motion complies with the type-volume limitation of Fed. R. App. P. 27(d)(2) because it contains 584 words, excluding the parts of the motion exempted by Fed. R. App. P. 32(f) and D.C. Cir. R. 32(e)(1).

This motion complies with the typeface requirements of Fed. R. App. P. 32(a)(5) and the type style requirements of Fed. R. App. P. 32(a)(6) because it has been prepared in a proportionally spaced 14-point roman-style typeface (Times New Roman) using Microsoft Word.

/s/ Christophe Courchesne
Christophe Courchesne
Counsel for Proposed Amici Curiae

CERTIFICATE OF SERVICE

I hereby certify that, on June 24, 2024, I electronically filed the foregoing with the Clerk of the Court for the United States Court of Appeals for the District of Columbia Circuit using the appellate CM/ECF system, which served a copy of the document on all counsel of record in the case.

/s/ Christophe Courchesne
Christophe Courchesne
Counsel for Proposed Amici Curiae

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Respondents,

On Petition for Review of Action of the Environmental Protection Agency,
88 Fed. Reg. 36,654

BRIEF OF AIR QUALITY SCIENTISTS PAUL MILLER, RUSSELL DICKERSON, ARLENE FIORE, AND TRACEY HOLLOWAY AS *AMICI CURIAE* IN SUPPORT OF RESPONDENTS AND DENIAL OF PETITIONS

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CERTIFICATE AS TO PARTIES, RULINGS, RELATED CASES, AND SEPARATE BRIEFING

Pursuant to D.C. Circuit Rule 28(a)(1), *Amici* Air Quality Scientists Paul Miller, Russell Dickerson, Arlene Fiore, and Tracey Holloway submit the following Certificate as to Parties, Rulings, Related Cases, and Separate Briefing.

All parties and amici appearing before this Court are listed in the Respondents' Brief, with the exception of *Amici* Air Quality Scientists and any other amici in support of Respondents.

References to the rulings under review and to related cases appear in Respondents' Brief.

Pursuant to D.C. Circuit Rule 29(d), *Amici* Air Quality Scientists state that separate briefing is warranted because this brief provides unique, specialized information based on their scientific expertise.

Respectfully submitted,

/s/ Christophe Courchesne
Christophe Courchesne
Counsel for Amici Air Quality Scientists

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GLOSSARY

CAMx	Comprehensive Air Quality Model with Extension
EGU	Electric Generating Unit
EPA	U.S. Environmental Protection Agency
Non-EGU	Non-Electric Generating Unit
NO_x	Nitrogen Oxides
ppb	Parts per billion
SIP	State Implementation Plan
VOCs	Volatile Organic Compounds

IDENTITY AND INTERESTS OF AMICI CURIAE

In crafting its Federal "Good Neighbor Plan" for the 2015 Ozone National Ambient Air Quality Standards (Good Neighbor Plan), the Environmental Protection Agency (EPA) employed advanced modeling based on well-founded air quality science—recognized as remarkably reliable by *Amici* air quality scientists with expertise in atmospheric modeling to assess chemical and meteorological processes and impacts.

Amici Drs. Paul Miller, Russell Dickerson, Arlene Fiore, and Tracey Holloway comprise a group of nationally recognized and peer-reviewed experts in atmospheric pollution, chemistry, and air quality modeling. The *Amici* bring a wide array of scientific expertise in interstate air pollution transport and the models used to track such transport. They support the arguments in EPA's principal brief on the merits and wish to help the Court understand three points in particular: First, interstate air pollution transport is complex, and the models used to quantify it are reliable. Second, EPA's regulatory framework for the Good Neighbor Plan builds on past transport rules and was a reasonable approach to address upwind state emissions given such complex science and modeling. Third, petitioners' concerns about cost are likely overstated due to the current installation rate of emission control technology and the historical cost estimates of previous regulations.

Amicus Dr. Paul Miller is the Executive Director of Northeast States for Coordinated Air Use Management (NESCAUM), a coalition of eight northeastern state air agencies that strives for regional cooperation to address the environmental and health impacts of air pollution and climate change. He also concurrently serves as the Executive Director of the Ozone Transport Commission, a multi-state organization created under section 184 of the 1990 Clean Air Act Amendments to assess the extent of interstate transport of ground-level ozone and its precursors in the Northeast and Mid-Atlantic regions and develop recommendations on regional solutions to address this problem. Dr. Miller previously served as NESCAUM's Deputy Director and Chief Scientist aiding the organization's initiatives with legal, technical, and policy support. He has been a Kent Fellow at Yale University and a Senior Fellow at Princeton University's Center for Energy and Environmental Studies. Dr. Miller has a Ph.D. in Chemical Physics from Yale University and a J.D. from Stanford University.

Amicus Dr. Russell Dickerson is a Professor in the University of Maryland's Department of Atmospheric and Oceanic Science where his research focuses on atmospheric chemistry, air pollution, climate, and global biogeochemical cycles. Dr. Dickerson is the Director of the Regional Atmospheric Measurement Modeling and Prediction Program. He is the head of the National Institute of Standards and Technology supported Flux of Atmospheric Greenhouse Gases in Maryland project. Dr. Dickerson has a Ph.D. in Chemistry from the University of Michigan and did postdoctoral studies at the Air Chemistry Division of the Max Planck Institute in Mainz, Germany.

Amica Dr. Arlene Fiore is a Professor at Massachusetts Institute of Technology where she was the inaugural Peter H. Stone and Paola Malanotte Stone Professor of Earth, Atmospheric, and Planetary Sciences. Her research focuses on air pollution, chemistry-climate connections, trends and variability in atmospheric constituents, and biosphere-atmosphere interactions. She was previously a Professor in the Department of Earth and Environmental Sciences at Columbia University. Dr. Fiore has a Ph.D. in Earth and Planetary Sciences from Harvard University. She received the American Geophysical Union Macelwane Medal in 2011 for her early career contributions to geophysical sciences.

Amica Dr. Tracey Holloway is a Professor at the University of Wisconsin—Madison where she is the inaugural Jeff Rudd and Jeanne Bissell Professor of Energy Analysis and Policy, appointed in both the Nelson Institute for Environmental Studies and the Department of Atmospheric and Ocean Sciences. Her research focuses on air quality, energy, climate, and public health. Dr. Holloway is a recognized member of the National Academy of Medicine and received an Ascent Award from the American Geophysical Union Atmospheric Sciences Section. She is the Director of the NASA Health and Air Quality Applied

Sciences Team. Dr. Holloway received her Ph.D. in Atmospheric and Oceanic Sciences from Princeton University. She did a postdoctoral fellowship at the Columbia University Earth Institute.

All *Amici* file this brief solely as individuals and not on behalf of any institution with which they are affiliated.

RULE 29 STATEMENTS

Pursuant to Federal Rule of Appellate Procedure 29(a)(4), *Amici* state that no party or party's counsel authored this brief in whole or in part. No party, party's counsel, or person other than *Amici* or their counsel contributed money intended to fund preparing or submitting this brief. Pursuant to Federal Rule of Appellate Procedure 29(a)(2) and D.C. Circuit Rule 29(b), a motion seeking the Court's leave to file accompanies this brief.

INTRODUCTION

The Clean Air Act (Act) "protect[s] and enhances the quality of the Nation's ai[r]" to "promote public health and welfare." 42 U.S.C. § 7401(b)(1). Under the Act's mandate, EPA must establish National Ambient Air Quality Standards (national standards), which provide measurable limits for six widespread ambient air pollutants, known as criteria pollutants, that science has shown cause harm to public health and welfare. 42 U.S.C. § 7409. Each state then proposes a state implementation plan (SIP) to EPA, outlining how the state will meet the national standards within its regions.

Ozone is a criteria air pollutant regulated by these national standards. Millions of deaths each year are attributed to ozone exposure, and it is well established that ozone exposure causes adverse respiratory and cardiovascular effects in even healthy adults. Domingo et al. (2024); Di et al., 376 NEW ENGLAND J. MED. 2513 (2017); Di et al., 318 J. AMERICAN MED. 2446 (2017).

Ground-level ozone poses a particularly "complex" regulatory challenge. *EPA v. EME Homer City Generation*, 572 U.S. 489, 496 (2014). It is not a pollutant that is emitted directly by polluters; it is created in the ambient air by chemical reactions involving other directly emitted chemical species called "precursors." Precursors react in the presence of sunlight and oxygen to create ozone. Key precursor species are volatile organic compounds (VOCs) and nitrogen oxides (NO_x).

"Air pollution is transient, heedless of state boundaries." *Id.* Accordingly, ozone and its precursors from upwind states can significantly contribute to downwind states' harmful ozone pollution. To assess upwind states' contributions on a regional scale, NO_x is the proper pollutant to focus on. While VOCs from human sources do contribute to local levels of air pollution, human-emitted VOCs are not a significant source of interstate pollution transport on a regional scale.[1] This makes regional VOC control strategies targeting human-related pollution sources generally less effective as opposed to regional NO_x programs. However, VOC controls can be effective in localized applications, such as urban cores.

NO_x is a byproduct of fossil fuel combustion. Therefore, any power plant or industrial facility that burns coal, oil, or natural gas is an appropriate target for regulatory efforts to reduce ground-level ozone— like the Good Neighbor Plan at issue here.

Factors such as timing and location of emissions, the chemical make-up of the surrounding air, and weather conditions all affect the chemical processes that create ground-level ozone. Weather conditions (e.g. wind direction and speed)

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[1] On a regional scale, VOCs from natural sources, such as trees and other vegetation, dominate atmospheric ozone chemistry.

affect air pollution transport patterns, including the contribution of industrial emissions to ground-level ozone. Sillman & Samson (1993). As a result, a region's ambient air quality is not solely determined by that region's NO_x emissions because other variables significantly influence the presence of ground-level ozone. Vinciguerra et al. (2017).

Computer modeling is necessary to simulate the impact of emissions from a given source or location on air quality elsewhere. These computer models use mathematical representations of chemical reactions and atmospheric motion to link emissions and ambient pollution. Advanced computer models, like the Comprehensive Air Quality Model with Extensions (CAMx), represent the state-of-the-art methodology for assessing ozone contributions from upwind sources. This modeling has shown that industrial emissions upwind degrade air quality in downwind states.

The Clean Air Act's Good Neighbor provision, 42 U.S.C. § 7410(a)(2)(D)(i), addresses the well-established fact, mentioned above, that air pollution can flow across state lines. The Good Neighbor provision requires state implementation plans to prohibit "any air pollutant in amounts which will . . . contribute significantly" to downwind states' "nonattainment . . . or interfere with maintenance" of any EPA-promulgated national standards. *Id*. If a state's SIP fails to do so, EPA must promulgate a federal implementation plan to take the place of the state's proposed plan. 42 U.S.C. § 7410(c)(1).

In 2015, EPA lowered the ground-level ozone national standard from 75 to 70 parts per billion (ppb). 80 Fed. Reg. 65,292 (Oct. 26, 2015); *see also Brief for Respondent* at 12 [hereinafter *EPA Brief*]. To help attain the new 70 ppb standard, EPA promulgated the Good Neighbor Plan at issue here. Using the same air quality modeling approach used in prior transport rules,[2] EPA identified 23 upwind states significantly contributing to downwind states' nonattainment and interfering with downwind states' maintenance of health and welfare-based national standards. 88 Fed. Reg. 36,654, 36,667 (June 5, 2023).

On March 15, 2023, EPA finalized the Good Neighbor Plan to require upwind states to reduce emissions of the ozone precursor NO_x from electric generating units (EGUs) and certain stationary industrial sources (non-EGUs), limiting those states' contributions to downwind states' ozone problems. *Id.* Industry and upwind states subject to the program then sought review in these consolidated cases.

[2] The term transport rules commonly refers to rules promulgated by EPA addressing cross-state air pollution. These rules include the NO_x Budget Trading Program, Clean Air Interstate Rule, Cross-State Air Pollution Rule, and the Cross-State Air Pollution Rule Update. The Good Neighbor Plan represents EPA's most recent iteration of these rules.

The Court should uphold the Good Neighbor Plan as a reasonable exercise of EPA's statutory obligations that is grounded in well-accepted air pollution transport science and modeling. Indeed, EPA's regulatory task in promulgating the Good Neighbor Plan is not a new one. This *amici* brief comes about a decade after a similar one submitted to the United States Supreme Court in *EPA v. EME Homer City Generation*, 572 U.S. 489 (2014). *See Brief of Amici Curiae Atmospheric Scientists and Air Quality Modeling Experts in Support of Petitioners*, 2013 WL 4875117 (Sept. 11, 2013). In *EME Homer*, the Court recognized that interstate air pollution from upwind states causes significant difficulty for downwind states in attaining ozone standards. In upholding EPA's prior transport rule, the Cross-State Air Pollution Rule, the Supreme Court acknowledged the legitimate science behind interstate air pollution and the "complex challenge" that the agency faces in addressing such pollution under the Clean Air Act's Good Neighbor provision. *EME Homer*, 572 U.S. at 496.

Since *EME Homer*, scientific understanding of ozone in the air and the skill of air quality models have significantly advanced. Science and the history of previous transport rules have informed EPA's modeling updates, further increasing confidence in attributing interstate transport of ozone and precursor concentrations. The science and modeling provide a solid foundation for EPA's standard four-step regulatory framework utilized in crafting transport rules.

The need for robust implementation of the Good Neighbor provision continues. While the prior rules accomplished significant emissions reductions, downwind areas remain in nonattainment of national standards or continue to be at risk of falling back into nonattainment. The status of downwind areas demonstrates that prior EPA transport rules based on its framework approach have not "over controlled." In fact, additional upwind reductions remain needed to meet recently strengthened air quality standards that are more protective of human health. The Good Neighbor Plan requires upwind states to be held accountable for their fair share of pollution in downwind states. Without the Good Neighbor Plan, downwind states and their residents will have to compensate for the unjust burden of unhealthy ozone pollution contributed by upwind states' emissions.

ARGUMENT

I. The science behind interstate air transport and associated models is well-established and reliable.

A. Well-established science shows many interrelated regional and meteorological factors influencing the speed, distance, and direction of air pollution transport.

Interstate air pollution transport is affected by meteorological conditions on multiple scales, interacting with the land surface. At higher altitudes in the atmosphere, air pollution may be transported over long distances and many days through "synoptic scale" circulation patterns. Closer to the ground, regional "mesoscale" and local "microscale" phenomena, such as sea breezes, mountain circulations, and other factors cause smaller-scale variations in air pollution transport.

Weather patterns also affect the chemistry of ozone formation directly. Humidity and sunlight are key factors in determining ozone reactions involving hydrogen and oxygen, and certain chemical reaction rates (other factors are temperature and air pressure). These meteorological factors lead to anthropogenic emissions causing high ground-level ozone concentrations typically during warmer months of the year. These warmer months are called the ozone season; typically in the U.S., this is defined as the five-month period from May through September.

B. CAMx robustly accounts for these complex, fluctuating meteorological and regional variables.

Consistent with prior rules implementing the Good Neighbor provision, EPA developed the Good Neighbor Rule using the Comprehensive Air Quality Model with Extensions (CAMx). ENV'T PROT. AGENCY, AIR QUALITY MODELING FINAL RULE TECHNICAL SUPPORT DOCUMENT (2023), 3, https://www.epa.gov/system/files/ documents/2023-03/AQ%20Modeling%20Final%20Rule%20TSD.pdf [hereinafter RULE TECHNICAL SUPPORT]; CAMx Overview, CAMx, https://www.camx.com/about/.

CAMx is a state-of-the-art numerical model, representing the best available scientific technology for attributing human-caused precursor emissions to ground-level ozone on a regional level. As a state-of-the-art numerical model, scientists worldwide accept CAMx and similar photochemical models as the preeminent technology for calculating the effects of regional transport of air pollutants. Since 1996, CAMx has been used in more than 20 countries on nearly every continent. *Id.*.

CAMx is a mathematical computer model designed to robustly account for the complexities involved in the interstate transport of ozone. Specifically, CAMx is a three-dimensional photochemical grid model— also called a Eulerian model. It simulates three-dimensional, time-varying processes through computer software run on advanced computers. Eulerian models are widely considered the most advanced model structure for complex processes like ozone formation.

CAMx models contain complex mathematical equations to simulate the physical and chemical processes in the atmosphere. These equations account for the complex chemistry involved in the formation of secondary pollutants (i.e., formed chemically in the atmosphere), such as ground-level ozone. CAMx incorporates hourly meteorological information (e.g. wind, temperature, precipitation, etc.) and hourly chemical emissions information (e.g. ozone precursor emissions from cars, power plants, vegetation, etc.) to simulate the hourly production and transport of ozone over a geographical region.

CAMx contains source apportionment technology that distinguishes specific anthropogenic emissions sources from natural sources responsible for ozone formation.[3] This source apportionment technology is widely used in peer-reviewed scientific literature.[4] In this system, precursor emissions are "tagged" based on user-defined categories (e.g. location, source type, etc.). As a grid model, every grid cell contains a receptor; downwind receptors are attributed to each tagged source independently. EPA used a 12-kilometer by 12-kilometer grid cell, and tagged each upwind states' emissions separately. RULE TECHNICAL SUPPORT at 17-18. EPA also separately tagged emissions from natural sources including from vegetation, fires, and lightning strikes; emissions from offshore sources; and emissions from tribal lands, Canada, and Mexico. *Id.*

It is common to think of CAMx as part of a "modeling platform." A modeling platform includes the meteorological inputs and chemical emissions developed for a specific region, as well as the model's boundary conditions that describe air flowing in from outside the modeling domain. Meteorological and emissions inputs are developed for the specific region to simulate a specific year in the past called the base year; for the Good Neighbor Plan, EPA simulated 2016 as

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[3] This technology is called the "CAMx Ozone Source Apportionment Technology/Anthropogenic Precursor Culpability Analysis." *CAMx Overview*, CAMx, https://www.camx.com/about/.

[4] Craig et al. (2020); Hu et al. (2022); Nopmongcol et al. (2017); Zawacki et al. (2018); Zhang et al. (2017); Ge et al. (2021); Moghani et al. (2018); Odman et al. (2020); Tran et al. (2023) (showing good agreement between real-life observations and applications using source apportionment technology).

the base year. The CAMx modeling platform takes these year-specific inputs, then calculates simulated ozone and other chemical compounds that may be compared with real-world observations.

The Earth's atmosphere is a complex system, and CAMx provides us with a representation of time, space, varying weather, chemistry, and associated processes. Another source of complexity relates to the emissions and meteorological inputs to CAMx. Gao & Zhou (2024). However, a careful evaluation of CAMx against observed data addresses these concerns.

It is standard scientific practice to compare calculated model output, also known as simulated data, with observations from ground-based instruments, airborne measurements, and satellites. The level of agreement between a model and observations is a standard approach to quantifying the modeling platform's accuracy. This rigorous analysis process has been published in numerous studies in peer-reviewed literature, spanning many different meteorological and regional conditions in the U.S. and globally.

Peer-reviewed studies show that CAMx modeling results agree with observed data over a wide range of locations and timeframes.[5] Additionally, many

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[5]*See* He et al. (2024); Zhao et al., (2022); Du et al., 114 J. ENV'T SCI. 1024795 (2022); Yan et al. (2021); Wen et al. (2021); Wu et al. (2021); Shu et al. (2019); Ma et al. (2021); Luo et al. (2022); Li et al. (2019); Du et al., 10 FRONTIERS IN ENV'T

recent peer-reviewed studies from the continental U.S. and western regions of the U.S. demonstrate that CAMx results show good agreement with observed data in the western U.S., confirming CAMx can be reliably applied to western States.[6] The CAMx modeling platform is the best-tested, and most scientifically rigorous approach to account for ozone transport across the U.S..

C. The CAMx modeling platform used for developing the Good Neighbor Plan is an updated version of the same modeling used in *EME Homer*.

A decade ago, in *EME Homer*, the *Amici* air quality scientists joined an *amici* brief presenting this science to the United States Supreme Court. *See Brief of Amici Curiae Atmospheric Scientists and Air Quality Modeling Experts in Support of Petitioners*, 2013 WL 4875117 (Sept. 11, 2013). Rejecting challenges from

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SCI. 1024795 (2022); Chen et al. (2022) (showing good agreement between real-world observations and CAMx applications in China).
See also Zohdirad et al. (2022); Oikonomakis et al., 18 ATMOSPHERIC CHEMISTRY & PHYSICS 2175 (2018); Oikonomakis et al., 18 ATMOSPHERIC CHEMISTRY & PHYSICS 9741(2018) ; Jiang et al., (2020); Huszar et al., (2022) (showing good agreement to application throughout Europe).
Tran et al. (2023); Roohani et al. (2017); Odman et al. (2020); Moghani et al. (2018); Mahmud et al. (2020); Li et al. (2023); Goldberg et al., (2022); Golbazi & Archer (2023); Ge et al. (2024); Ge et al. (2021); Dunker et al. (2019) (showing good agreement between real-world observations and CAMx applications throughout regions of the U.S.).
[6] Thompson et al. (2017); Nsanzineza et al. (2019); Craig et al. (2020) (showing good agreement to applications in the western U.S.).
Zhang et al. (2017); Zawacki et al. (2018); Nopmongcol et al. (2017); Koplitz et al. (2021); Hu et al. (2022); Dunker et al. (2017) (showing good agreement between real-world observations and CAMx applications in the West as part of the continental U.S.).

industry and upwind states, the Supreme Court ultimately upheld EPA's implementation of the Good Neighbor provision. *EME Homer*, 572 U.S. at 501. EPA's upheld rule also employed CAMx modeling, the same approach at issue here. Therefore, the Court's decision in *EME Homer* recognized that CAMx was a valid means of assessing interstate air pollution transport under the Good Neighbor Provision. *Id.*

Since the Supreme Court decided *EME Homer*, the capacity to simulate air pollution transport and the datasets used to develop, refine, and run the CAMx air quality model have only improved. The technology captures more extensive and specific chemical concentrations of chemical species in the atmosphere. Current models can more closely depict the complex molecular chemistry, and more precisely track the lifetime of ozone and its precursors. The CAMx platform utilized for the Good Neighbor Plan reflects these recent technology updates.[7]

[7] CAMx version 7.1 was used for the Good Neighbor Rule, which is a significant update to CAMx version 5.3 used for modeling utilized in the *EME Homer* transport rule. 88 Fed. Reg. at 36,674; 76 Fed. Reg. 48,208, 48,229 (Aug. 8, 2011).

II. The regulatory approach EPA used to develop the Good Neighbor Plan is eminently reasonable and based on reliable air transport science.

A. EPA's four-step framework is well-established, reliable, and informed by science.

In developing the Good Neighbor Plan, EPA employed its longstanding, court-affirmed four-step framework. As explained in more detail in EPA's brief, the four steps are:

(1) using air quality modeling to identify downwind problem receptors that are projected to have difficulty with the attainment or maintenance of the ozone national standard;

(2) using air quality modeling to link upwind states' emission contributions to ozone above a threshold level at these downwind receptors;

(3) using a multifactor analysis to quantify emissions from sources in the linked upwind states that significantly contribute to air quality problems at the downwind problem receptors; and

(4) implementing enforceable and necessary emissions reductions for sources in the linked upwind states where emissions are found to significantly contribute to nonattainment or interfere with maintenance of the ozone national standard.

88 Fed. Reg. 36,654, 36,659 (June 5, 2023); *EPA Brief* at 8. The Supreme Court and this Court have previously reviewed and affirmed this detailed four-step process utilized by EPA. *See EME Homer*, 572 U.S. at 524; *Wisconsin v. EPA*, 938 F.3d 303 (D.C. Cir. 2019).

Going as far back as the NO_x SIP Call from 1998, EPA utilized similar multi-step processes to craft these transport rules. *See* 63 Fed. Reg. 57,356 (Oct. 27, 1998). Over the past 26 years, this framework has been developed and has been a demonstrably successful approach in each implemented transport rule. *See* 73 Fed. Reg. 16,436 (Mar. 28, 2008); 81 Fed. Reg. 74,504 (Oct. 26, 2016); 86 Fed. Reg. 23,054 (Apr. 30, 2021). These approaches eventually evolved into EPA's four-step framework, first articulated in the Cross-State Air Pollution Rule and utilized here. *See* 88 Fed. Reg. at 36,671.

EPA's four-step framework analyzes the relevant factors to determine upwind states' contributions to downwind nonattainment and the proper remedies for significant contributions. Each step employs the best available scientific technology discussed previously and provides a reasonable and accepted method that can be consistently applied to all states, regardless of geographic location.

In the first step, EPA identified downwind areas expected to struggle to attain or maintain the ozone national standard. EPA employed CAMx modeling, a state-of-the-art computer model, quantifying the impacts of upwind states on downwind ozone concentrations. 88 Fed. Reg. at 36,674. As it has in prior transport rules, EPA incorporated CAMx into its modeling platform.[8] As stated in Part I, this platform utilized a significantly updated version of CAMx compared to previous transport rules. EPA confirmed the reliability and performance of this platform by comparing modeling outputs to observations for a base year, in this case, 2016, finding good agreement between the model and observed data. *See* RULE TECHNICAL SUPPORT at 8. Retrospective analysis following previous transport rules demonstrates the success of the regulatory approach utilizing CAMx. Simon et al. (2014). CAMx is a well-established tool that EPA appropriately used to inform the four-step framework reflected in the Good Neighbor Plan.

In the second step, EPA identified which upwind states contributed to the non-attainment of downwind states. Within the second step, EPA took a careful approach: First, it quantified all upwind states' contributions to ozone concentrations at 2023 and 2026 monitoring sites in downwind states. EPA then compared each contribution to a threshold of 1 percent of the national standard to eliminate *de minimis* contributions (i.e., an increase in ozone levels of greater than 0.7 ppb at the receptors). 88 Fed. Reg. at 36,748. Any upwind state that met or

[8] EPA decided to conduct simulations at a 12-kilometer by 12-kilometer model in CAMx, adequately balancing computational expense with the resolution of the model to decrease the likelihood of errors. 88 Fed. Reg. at 36,697.

exceeded this threshold moved to the next step of the four-step framework. The utilization of the 1 percent threshold aligns with EPA's practices in establishing the previous transport rules and is rooted in reliable scientific principles. 81 Fed. Reg. at 74,548. It also aligns with a recommendation sent to EPA in 2009 from a group of 16 upwind and downwind states (including Indiana and Ohio) and the District of Columbia. OTC AND LADCO JOINT LETTER TO EPA ON CAIR REPLACEMENT RULE (2009), https://otcair.org/upload/Documents/Correspondence/Final%20 Recommendation%20Letter_090902.pdf.

The remaining steps of EPA's framework translated these modeling results into emission control requirements for specific sources in upwind states. In the third step, EPA evaluated specific sources from each upwind state identified in step two to determine the amount of emissions significantly contributing to downwind nonattainment. 88 Fed. Reg. at 36,660–36,662. This evaluation used an established multi-factor balancing test that considered emission reduction potential, cost of reduction, and downwind air quality improvements at various cost thresholds. *Id.* In the fourth step, EPA developed enforceable regulations to achieve the reductions at sources identified in step three. *Id.* at 36,662. Here, EPA continued using the existing interstate trading system established under the prior transport rules for EGUs, supplemented with additional control requirements, for EGUs and non-EGUs. These additional controls were necessitated by increased standards and ongoing significant contributions from upwind states to downwind nonattainment. The Good Neighbor Plan follows EPA's well-established, scientifically appropriate four-step framework for regulating upwind contributions to downwind air quality problems.

B. The four-step framework applies to western states.

Petitioners assert without foundation that EPA's four-step framework is inapplicable to the western states. However, as stated in Part I, CAMx, which informs EPA's four-step framework has been applied to western states for decades. *See supra* note 6. In step one, EPA relied on CAMx modeling to project ozone concentrations at different sites and to determine which downwind states are likely to have problems attaining the 2015 national standards. 88 Fed. Reg. at 36,674. As discussed in Part I, CAMx is an advanced computer model. Its applications—including to western states—has been peer-reviewed, and rigorously evaluated. EPA found CAMx performed equally well in eastern and western states in modeling relative magnitude and daily variations of ozone concentrations. *See* RULE TECHNICAL SUPPORT at B-9. In fact, the Western Regional Air Partnership in coordination with EPA, previously used CAMx to model regional haze in the West. *See* Western Regional Air Partnership, *WRAP/WAQS Regional Haze Modeling Scenarios' Specification Sheets*, INTERMOUNTAIN W. DATA WAREHOUSE, https://views.cira.colostate.edu/iwdw/docs/WAQS_and_WRAP_Regional_Haze_s pec_sheets.aspx (last visited June 17, 2024). CAMx, as the foundation of EPA's four-step framework, is scientifically sound and applicable across the U.S.

Beyond this applicability of the science and the CAMx model to the west, EPA's four-step framework is crafted to account for state-specific variations, including those that the Petitioners assert are unique to western states. As discussed, the four-step framework tracks the interstate emissions from a given state, tagging upwind states' emissions, and using site-specific receptors in each downwind state. This state-specific method then informs the emission requirements EPA imposes on the sources within each state in the fourth step.

EPA's past focus on eastern states was due to the severity of the pollution problems there. While the past transport rules helped states burdened by emissions comply with national standards, nonattainment remains for certain areas, including some burdened by emissions from western states. And now, the 2015 national standards require lower pollutant levels to protect public health. Extending the regulatory approach to address the more protective standards is rational. Ignoring this pollution issue from western states' emissions would be an unreasonable response to this ongoing problem.

C. EPA's regulatory approach and tools utilized here are consistent with past successful transport rules.

For decades, EPA has regulated upwind states' emissions in accordance with the Good Neighbor provision to address downwind states' air pollution problems.

The tools utilized proved successful, and this framework, along with well-established science, form the basis for the current rule.

While the Good Neighbor Plan requires, in part, stricter controls than the prior transport rules, using retrofits of post-combustion controls is not new. The NO_x SIP Call and the Clean Air Interstate Rule prompted many electric generation units (EGUs) to retrofit post-combustion controls because these controls had already shown cost-effective results in decreasing emissions. 70 Fed. Reg. 25,162, 25,205–07 (May 12, 2005). In fact, a majority of EGUs regulated by the Good Neighbor Plan already have these controls installed. *See* 88 Fed. Reg. at 36,727.

The strengthened ozone national standard necessitates additional emission controls, including additional controls installed on EGUs and applying the Good Neighbor Plan to non-EGUs. EPA has regulated both EGUs and non-EGUs for decades, including the 1998 NO_x SIP Call, which this Court upheld, *See Michigan v. EPA*, 213 F.3d 663 (D.C. Cir. 2000). The non-EGU industries regulated under the Good Neighbor Plan can reduce 44,616 tons of ozone season NO_x emissions, a major reduction in interstate air pollution that will help downwind states attain the national standards. 88 Fed. Reg. at 36,739.

As envisioned by the regular review requirements of the national standards in the Clean Air Act, it is reasonable for regulations to become more stringent when health-based standards strengthen due to new science, and when air quality issues remain unresolved. The expansion of post-combustion controls and the application to non-EGUs is a logical and reasonable progression given the emission and cost-benefit analysis conducted by EPA. *See id* at 36,666. Relying on a similar approach as used in past effective rules, EPA aims to protect public health by ensuring compliance with the ozone national standard. Failing to address noncompliance and significant contributions would violate the Clean Air Act's statutory mandate.

EPA's regulatory approach under the Good Neighbor provision is widely applicable and exceedingly reasonable. It is also proven to be successful, based on a track record of scientifically accepted modeling projections, subsequently followed by observed NO_x emission reductions and observed reductions in ozone. Overall, ozone season NO_x emissions in 2022 decreased by 87 percent compared to emissions in 1997. *See* ENV'T PROT. AGENCY, POWER SECTOR PROGRAMS PROGRESS REPORT 2022 (2024), https://www.epa.gov/system/files/documents/2024-05/power-sector-programs-progress-report-fact-sheet.pdf. This downward trend in NO_x emissions is supported by surface nitrogen dioxide monitors as well as satellite data. Lamsal et al. (2015). As a result, based on the 2019–2021 ozone monitoring data, 82% of areas designated as in nonattainment for the 2008 ozone national standard are in compliance. *See* ENV'T PROT. AGENCY, POWER SECTOR PROGRAMS PROGRESS REPORT 2022 (2024).

https://www.epa.gov/system/files/documents/2024-05/power-sector-programs-progress-report-fact-sheet.pdf. However, the recently strengthened 2015 ozone national standard necessitates more significant reductions. Currently, there are 33 different receptors projected to be in non-attainment or to experience maintenance issues. *See* RULE TECHNICAL SUPPORT at 13.

Retrospective studies on regional NO_x reductions achieved through prior transport rules have consistently substantiated their effectiveness in reducing regional ozone transported into downwind areas. Aleksic et al. (2013).[9] The early 1999 NO_x Budget Program and the first half of the NO_x SIP Call saw significant declines in emissions and emission rates due to post-combustion technology modifications[10] and market shifts from coal to natural gas. McNevin (2016). The 1998 NO_x SIP Call led to a 57% decrease in NO_x emissions over five years for sources covered by the Good Neighbor Plan, and a 72% decrease over fifteen years from before the 1990 Clean Air Act Amendments. ENV'T. PROT. AGENCY, NO_X BUDGET TRADING PROGRAM: 2005 PROGRAM COMPLIANCE AND ENVIRONMENTAL RESULTS (2006) https://www.epa.gov/sites/default/files/2017-11/documents/nox_budget_trading_program_2005.pdf.

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[9] *See also* Butler et al. (2011); Chan & Vet (2010); He et al. (2020).
[10] Post-combustion technology modifications include selective catalytic reduction controls and selective non-catalytic reduction controls.

A later iteration of the transport rule, the Cross-State Air Pollution Rule, was also effective at reducing overall emissions and ozone pollution contributions from upwind states significantly impacting downwind states. Leppert (2023). EPA promulgated the rule to help states achieve the 1997 and 2008 ozone air quality standards. The Cross-State Air Pollution Rule, together with the 1995 acid rain program, showed significant average annual NO_x emissions reductions, with emissions 63 percent lower than 11 years prior. *See* ENV'T PROT. AGENCY, 2016 PROGRAM PROGRESS–CROSS-STATE AIR POLLUTION RULE AND ACID RAIN PROGRAM (2016), https://www3.epa.gov/airmarkets/progress/reports/pdfs/2016_full_report.pdf. Over a span of 29 years, annual NO_x emissions from power plants decreased by 86%. LaCount et al. (2021). Emissions are decreasing through the same regulatory approach that EPA began taking decades ago. However, while the past transport rules were effective, the strengthened standards, as well as shortfalls from past policy tools that promoted emissions trading, require updates for upwind states to eliminate their significant contributions to pollution problems in downwind areas.

D. The Good Neighbor Plan's backstop requirements are reasonable to address a shortfall of the cap-and-trade program.

While the past transport rules utilizing the cap-and-trade program effectively reduced seasonal ozone levels to a degree,[11] they did not ensure sources optimize controls in a manner that fully eliminated upwind states' significant contributions to downwind states. Research shows that individual plants substantially decreased the degree of usage of installed selective catalytic reduction controls[12] on a daily basis for economic reasons—exacerbating nonattainment problems in downwind states. [13] For instance, in 2020 and 2021, Missouri sources collectively exceeded their applicable cap on NO_x emissions. This could have been avoided if several units had not idled their controls in favor of purchasing out-of-state allowances through the cap-and-trade program. 88 Fed. Reg. at 36,797–98.

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[11] *See* Butler, et al. (2011); Schmalensee & Stavins (2017); Chestnut & Mills (2005); CHRISTOPHER VAN ATTEN & LILY HOFFMAN-ANDREWS, THE CLEAN AIR ACT'S ECON. BENEFITS PAST, PRESENT AND FUTURE (2010) https://smallbusinessmajority.org/sites/default/files/research-reports/Benefits_of_CAA_100410.pdf (Showing the success of cap-and-trade programs).

[12] EGUs can reduce ozone concentrations by up to 5 ppb just by running selective catalytic reduction technology alone. Vinciguerra et al., 288 (2017).

[13] States without performance standard backstops released "upwards of 290,000 tons of additional, avoidable NO_x" during the 2010–2014 ozone seasons. McNevin, 74 (2016).

Backstop daily limits are a rational policy tool to address attainment of the sub-daily 8-hour ozone national standard,[14] ensuring EGUs optimize performance. The Good Neighbor Plan's backstop limits require units to surrender allowances if they exceed an emissions rate of 0.14 pounds per million British thermal units, allowing for a 50-ton buffer for unavoidable emissions. 88 Fed. Reg. at 36,664. For units with existing selective catalytic reduction controls, the backstop requirements begin in 2024. *Id.* However, for those units without existing selective catalytic reduction controls, the backstop requirements do not begin until 2030 or whenever the controls are installed, giving reasonable time to install these controls. *Id.* EPA's backstop requirement effectively balances optimization and economic factors. Under the prior rules, EGU operators were failing to optimize the performance of their pollution controls. Implementing daily backstop requirements is a reasonable response by EPA to help optimize EGUs to ensure accountability for upwind states' significant contributions of ozone pollution to downwind areas.

E. EPA's regulatory approach did not overcontrol.

EPA's framework approach accounts for the need to avoid reducing emissions beyond what is needed to address upwind states' significant contributions to downwind nonattainment of the national standard. While ozone

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[14] The national ozone standard is averaged over an 8-hour period. *See* 80 Fed. Reg. at 65,293.

concentrations have been successfully reduced to some extent, there continue to be nonattainment and maintenance problems, as evidenced by current ozone monitoring data, as well as strengthened health standards. *See* RULE TECHNICAL SUPPORT at 13. Thus, there remains a clear need for EPA's Good Neighbor Plan and the additional emissions reductions it requires.

In assessing potential "overcontrol," EPA applied the same framework utilized in past transport rules. 88 Fed. Reg. at 36,748.[15] Both the Supreme Court and this Court previously reviewed and affirmed this overcontrol assessment framework. *EME Homer*, 572 U.S. at 523 (2014); 88 Fed. Reg. at 36,748. There is no particularized evidence presented that EPA has mandated emission reductions beyond what is required to eliminate significant contributions of upwind states. Moreover, as noted earlier, current ozone monitoring data demonstrate continuing downwind ozone nonattainment and maintenance problems, highlighting the need for greater control. Without the additional emissions reductions in the Good Neighbor Plan, EPA would violate its statutory duty and Supreme Court precedent, and perpetuate the health risks for millions of individuals in downwind states.

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[15] "EPA performed air quality analysis using the Ozone Air Quality Assessment Tool to determine whether the emissions reductions for both EGUs and non-EGUs potentially create an 'over-control' scenario." 88 Fed. Reg. at 37,648.

III. The cost to implement the Good Neighbor Plan is reasonable.

Petitioners have placed a significant emphasis on how the cost of EPA's Good Neighbor Plan will impact operators and consumers. Research shows this is likely overstated. First, data show a majority of EGUs already have installed selective catalytic reduction and selective non-catalytic reduction technologies. As of 2022, over 66% of coal plants regulated by the Good Neighbor Plan have those controls installed. 88 Fed. Reg. at 36,727.

Second, research shows that historically industry has adapted to new standards at lower costs than expected. Taylor (2012); Declaration of James E. Staudt, Ph.D., CFA, *White Stallion Energy Center, LLC v. EPA*, No. 12-1100, D.C. Cir. (Sept. 24, 2015). Not only have costs with regard to the Clean Air Act been lower than predicted by industry, but they also have been lower than costs predicted by EPA itself. *See* VAN ATTEN & HOFFMAN-ANDREWS, *supra* note 11. There is no compelling reason to believe this time would be different.

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In sum, the Good Neighbor Plan is a rational policy tool to address the well-established problem of upwind states impacting health-relevant ozone levels in downwind states. It is based on the physics and chemistry of the atmosphere captured within air quality models and built on decades of scientific understanding. Further, it aligns with the approach and methodology of past effective transport rules. The Good Neighbor Plan is both reasonable and necessary to curtail downwind air pollution and for the EPA to fulfill its duties under the Clean Air Act.

CONCLUSION

For the foregoing reasons, *Amici* Air Quality Scientists urge this Court to deny the petitions for review.

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE

I hereby certify that this brief complies with the type-volume limitation of Fed. R. App. P. 29(a)(5) because it contains 6,341 words, excluding the parts of the brief exempted by Fed. R. App. P. 32(f) and D.C. Cir. R. 32(e)(1).

This brief complies with the typeface requirements of Fed. R. App. P. 32(a)(5) and the type style requirements of Fed. R. App. P. 32(a)(6) because it has been prepared in a proportionally spaced 14-point roman-style typeface (Times New Roman) using Microsoft Word.

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CERTIFICATE OF SERVICE

I hereby certify that, on June 24, 2024, I electronically filed the foregoing with the Clerk of the Court for the United States Court of Appeals for the District of Columbia Circuit using the appellate CM/ECF system, which served a copy of the document on all counsel of record in the case.

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