COMMENTS OF CALIFORNIA (BY AND THROUGH THE CALIFORNIA ATTORNEY GENERAL AND CALIFORNIA AIR RESOURCES BOARD), CONNECTICUT, ILLINOIS, MARYLAND, MASSACHUSETTS, MINNESOTA, NEW JERSEY, NEW YORK, OREGON, VERMONT, WASHINGTON, AND THE DISTRICT OF COLUMBIA

NOTICE OF PROPOSED RULEMAKING ON THE CONTROL OF AIR POLLUTION FROM AIRPLANES AND AIRPLANE ENGINES: GREENHOUSE GAS EMISSION STANDARDS AND TEST PROCEDURES

EPA HQ-OAR-2018-0267

October 19, 2020

TABLE OF CONTENTS

I. EXECUTIVE SUMMARY

The States of California (by and through the California Attorney General and the California Air Resources Board), Connecticut, Illinois, Maryland, Minnesota, New Jersey, New York, Oregon, Vermont, and Washington, the Commonwealth of Massachusetts, and the District of Columbia (together, the "Commenting States") submit these comments on the Environmental Protection Agency's (EPA) proposed rule, Control of Air Pollution from Airplanes and Airplane Engines: GHG Emission Standards and Test Procedures, 82 Fed. Reg. 51,556 (Aug. 20, 2020) ("Proposed Rule").

As explained in Section II, climate science and the increasingly damaging consequences of climate change on our residents and resources demonstrate the need to promptly reduce greenhouse gas (GHG) emissions from aircraft and other significant sources. We highlight threats the Commenting States are facing from climate change, the contribution of aircraft GHG emissions to these threats, and our efforts to control GHG emissions generally and from our airports, specifically. Because the Clean Air Act generally preempts States from establishing distinct standards for aircraft engine emissions, the States and our residents depend on EPA to perform its duty under the Clean Air Act to set robust limits on aircraft GHG emissions to the maximum extent feasible to mitigate ongoing and anticipated public health and environmental harms from impacts of climate change.

Section III explains how the Proposed Rule completely fails to satisfy this duty. While the Proposed Rule contains some necessary components for regulating aircraft GHG emissions,[1] if adopted, it would do nothing to control GHG emissions. The substantive standards that EPA proposes to adopt—the 2016 GHG standards developed by the International Civil Aviation Organization (ICAO)—lag existing technology by more than 10 years and would result in no GHG reductions at all compared to business-as-usual. In fact, EPA has not even *considered* any form of emission control that would reduce GHGs, despite the agency's determination that these emissions endanger public health and welfare.[2] By not even evaluating feasible options besides the ICAO standards that would reduce dangerous pollutants, EPA violated its duty to protect the public health and welfare under Clean Air Act section 231. Section IV identifies further defects of the Proposed Rule that would render its final adoption arbitrary and capricious, including EPA's failure to accurately evaluate the co-benefits of GHG regulation, environmental justice impacts, and federalism impacts.

---

[1] The Commenting States support EPA's adoption of a carbon dioxide metric, reporting requirements, testing procedures, and a standard based on the characteristics of the whole airplane as important components of an effective emission standard for GHGs from aircraft. *See* 85 Fed. Reg. at 51,562, 51,575-78. However, as set forth below, emission reductions that far exceed the Proposed Rule in both stringency and kind are technologically feasible and necessary to meaningfully control GHG emissions.

[2] Finding That Greenhouse Gas Emissions From Aircraft Cause or Contribute to Air Pollution That May Reasonably Be Anticipated To Endanger Public Health and Welfare, 81 Fed. Reg. 54,422, 54,440 (Aug. 15, 2016) (Endangerment Finding).

Accordingly, the Commenting States request that EPA rescind the Proposed Rule and issue a revised Notice of Proposed Rulemaking that evaluates the full range of feasible options for effective emissions control and proposes emission standards that actually reduce dangerous GHGs from aircraft.

II. CLIMATE CHANGE AND THE STATES

Climate change resulting from GHG emissions poses an existential threat to public health and welfare in the United States. The contribution of the aviation sector to these emissions, along with the lack of an adequate system at the State or industry levels to control these emissions, necessitates that EPA set aggressive national standards under section 231.

As EPA and other federal agencies recently affirmed, severe and irreversible public health and economic harms from climate change caused by GHG emissions are already being experienced in the United States, with dire consequences for the Commenting States. Economic, societal, and public health harms across the globe are projected to worsen if GHG emissions are not drastically reduced in the next decade. The U.S. emits over a quarter of global aviation GHG emissions, which are projected to increase in the coming decades. While States are proactively combating GHG emissions (including from their major airports), they are generally preempted from establishing distinct standards for aircraft emissions and rely on EPA to adopt effective industry standards.

Considering these facts, EPA's Clean Air Act obligations, and the multiple feasible options to reduce aircraft GHG emissions, EPA can and must adopt effective standards to substantially reduce these emissions, mitigate existing climate harms, and avoid the worst economic and public health outcomes of an unmitigated climate crisis.

A. Recent climate science confirms the need to aggressively reduce GHG emissions.

After EPA's 2016 Endangerment Finding, NASA confirmed 2016 was the warmest year on record, and 2020 may break even that all-time record.[3] Collectively, the past six years, from 2014 to 2019, are the warmest years in the modern record.[4] In the Endangerment Finding, EPA found robust and compelling scientific evidence to conclude—four years ago—that "current atmospheric GHG concentrations are now at elevated and essentially unprecedented levels primarily as a result of both historic and current anthropogenic emissions," and "[s]uch concentrations are the primary driver of observed changes in Earth's climate system, namely

[3] Thompson, Andrea, "Will 2020 Be the Hottest Year on Record?", *Scientific American* (Aug. 14, 2020), https://www.scientificamerican.com/article/will-2020-be-the-hottest-year-on-record/; NASA, Vital Signs: Global Temperature, https://climate.nasa.gov/vital-signs/global-temperature/ (last accessed Oct. 5, 2020).

[4] *See* National Oceanic and Atmospheric Administration (NOAA), "NOAA reports near-record warm year for the globe" (Jan. 15, 2020), https://www.ncei.noaa.gov/news/global-climate-201912; National Aeronautics and Space Administration (NASA), "2018 fourth warmest year in continued warming trend, according to NASA, NOAA" (Feb. 6, 2019), https://climate.nasa.gov/news/2841/2018-fourth-warmest-year-in-continued-warming-trend-according-to-nasa-noaa/.

increased global average temperatures that drive climate impacts like widespread melting of snow and ice and rising global average sea level." 81 Fed. Reg. at 54,444, 54,451. Current climate science has only bolstered this consensus: Earth's climate system is rapidly changing due to human activity and demands an ambitious, all-sectors reduction of GHG emissions in order to avert the gravest impacts to economies, ecosystems, and lives in the United States.

In 2017 and 2018, the U.S. Global Change Research Program released the Fourth National Climate Assessment ("Fourth Assessment") in two volumes, which reviews the current state of climate change science, and details ongoing and projected future physical impacts of global warming.[5] Coordinated by lead authors across thirteen federal agencies, including EPA, the Fourth Assessment represents the work of over 300 governmental and non-governmental experts; it was externally peer-reviewed by a committee of the National Academy of Sciences, Engineering and Medicine, and underwent several rounds of technical and policy review by its member agencies.[6] In short, it is the federal government's authoritative analysis of climate science and the impacts of climate change on the United States. One key conclusion is stark, but hopeful: by shifting from a high-emissions scenario to a low-emissions scenario, "[b]y the end of this century, thousands of American lives could be saved and hundreds of billions of dollars in health-related economic benefits gained each year."[7]

The Earth's climate is rapidly changing. As the Endangerment Finding stated, emissions of carbon dioxide (CO_2), the main greenhouse gas emitted by aircraft, "are currently altering the atmosphere's composition and will continue to alter Earth's climate for thousands of years." 81 Fed. Reg. at 54,445. Earth's atmosphere now contains a higher concentration of CO_2 than it has in the past three million years.[8] In 2017, the atmospheric CO_2 concentration was 400 parts per million (ppm); in 2018, those levels exceeded 410 ppm for the first time, then reached 411 ppm in May 2018. The global growth rate of Earth's atmospheric CO_2 level is accelerating: in the 1980s, it averaged 1.6 ppm per year and in the 1990s, 1.5 ppm per year, but increased to 2.2 ppm per year during the last decade.[9]

---

[5] USGCRP, *Climate Science Special Report: Fourth National Climate Assessment, Volume I* (D.J. Wuebbles, et al., eds., 2017), https://science2017.globalchange.gov/ ("Fourth Assessment, Vol. I"); USGCRP, *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II*, (D.R. Reidmiller et al. eds., 2018), https://nca2018.globalchange.gov/ ("Fourth Assessment, Vol. II"); *see generally* Global Change Research Act of 1990, Pub. L. No. 101-606.

[6] USGCRP, *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II: Report-in-Brief*, 1-2 (D.R. Reidmiller et al. eds., 2018), https://nca2018.globalchange.gov/downloads/NCA4_Report-in-Brief.pdf.

[7] Fourth Assessment, Vol. II: Report-in-Brief, at 102.

[8] Fourth Assessment, Vol. I, at 31.

[9] NOAA, "Another Climate Milestone on Mauna Loa" (Jun. 7, 2018), https://research.noaa.gov/article/ArtMID/587/ArticleID/2362/Another-climate-milestone-falls-at-NOAA%E2%80%99s-Mauna-Loa-observatory

Elevated concentrations of atmospheric CO_2 have, in turn, driven historically high global temperatures. Global annual average temperature increased by 1.8°F (1.0°C) from 1901-2016, the Fourth Assessment concluded: "This period is now the warmest in the history of modern civilization."[10] Melting ice sheets and glaciers, caused by the increases in temperatures, have accelerated global mean sea level rise faster during the last century than in any previous century in at least 2,800 years, contributing to daily tidal flooding increases in over 25 Atlantic and Gulf Coast cities.[11] Reduced snow cover threatens regional water supplies,[12] while ocean acidification endangers marine aquaculture and major ecosystems.[13] In fact, researchers project oceans will become more acidic than they have been in the last 14 million years due to the amount of atmospheric CO_2 they have absorbed to date.[14]

As the science behind attribution of extreme storms to anthropogenic climate change continues to improve, climate models generally show that the planet's warming increases the frequency of the most intense hurricanes.[15] Future hurricanes will have stronger maximum winds, move more slowly, and drop more precipitation, according to a modeling analysis by U.S. government scientists of 22 recent hurricanes.[16]

***Human activities, especially GHG emissions, are responsible for global climate change*.** The Fourth Assessment confirmed the established science that human-caused GHG emissions are primarily responsible for the 1.8°F in observed warming from 1901 to 2016, concluding: "observational evidence does not support any credible natural explanations for this amount of warming; instead, the evidence consistently points to human activities, especially

---

[10] Fourth Assessment, Vol. I, at 10, 13, 17 (Exec. Summ.), 39, 40 (Ch. 1), 78, 80-84 (Ch. 2); compare 81 Fed. Reg. at 54,445 (finding "U.S. average temperature has increased by 1.3 °F to 1.9 °F since record keeping began in 1895; most of this increase has occurred since about 1970. The most recent decade was the nation's warmest on record.").

[11] Fourth Assessment, Vol. I, at 10, 25-27 (Exec. Summ.), 51-52 (Ch. 1).

[12] Fourth Assessment, Vol. I, at 10 (Exec. Summ.), 239-240 (Ch. 8).

[13] Fourth Assessment, Vol. I, at 28 (Exec. Summ.), 371-374 (Ch. 13).

[14] Sosdian, S. M., et al., "Constraining the evolution of Neogene ocean carbonate chemistry using the boron isotope pH proxy," in *Earth and Planetary Science Letters*, Vol. 498, pp. 362-376 (Sept. 2018), https://doi.org/10.1016/j.epsl.2018.06.017.

[15] Fourth Assessment, Vol. I, at 258-260 (Ch. 9).

[16] Gutmann et al., "Changes in Hurricanes from a 13-Yr Convection-Permitting Pseudo-Global Warming Simulation, in *J. Climate*, Vol. 31, pp. 3643-3657 (May 2018), https://doi.org/10.1175/JCLI-D-17-0391.1. The unprecedented rainfall totals associated Hurricane Harvey's stall of over Texas in 2017 provides a notable example of how slow-moving hurricanes impact regional rainfall amounts. Kossin, J., "A global slowdown of tropical-cyclone translation speed," in *Nature*, 558, pp. 104-107 (June 2018), https://doi.org/10.1038/s41586-018-0158-3.

emissions of greenhouse or heat-trapping gases, as the dominant cause."[17] This is an even stronger confidence level than that cited in the 2016 Endangerment Finding. 81 Fed. Reg. at 54,444.

Since 2015, the National Academies of Sciences, Engineering, and Medicine have assessed the likelihood that individual extreme weather events are attributable to climate change is increasing.[18] This likelihood is "greatest for those extreme events that are related to an aspect of temperature, such as the observed long-term warming of the regional or global climate, where there is little doubt that human activities have caused an observed change."[19]

For the past seven years, the journal of the American Meteorological Society (AMS) has published an annual special supplement describing studies evaluating the connection (or lack of connection) between specific extreme weather events and anthropogenic climate change. In previous AMS reports, 89 studies of extreme weather events found that climate change had increased the likelihood of the event occurring.[20] In the 2017 AMS report, for the first time, the authors found several of the extreme weather events occurring in 2016 would not have been "possible without the influence of human caused climate change."[21] These extreme events included: (1) record-breaking global temperatures, (2) record-breaking regional temperatures over the Asian continent, and (3) the anomalous warm water temperatures in Alaska's Bering Sea. These events are beyond the bounds of the "natural" climate and *would not have occurred* absent the ongoing anthropogenic alteration of Earth's climate.

Next, two independent research teams, including one from the U.S. Department of Energy's Lawrence Berkeley National Laboratory, recently released studies identifying a clear anthropogenic climate signal in the torrential precipitation that inundated Houston during Hurricane Harvey, reporting the precipitation was 15 to 19 percent more intense due to climate

---

[17] Fourth Assessment, Vol. II, at 73 (Ch. 2). *See also* Fourth Assessment, Vol. I, at 36: "Over the last century, there are no alternative explanations supported by the evidence that are either credible or that can contribute more than marginally to the observed patterns."

[18] National Academies of Sciences, Engineering, and Medicine, *Attribution of Extreme Weather Events in the Context of Climate Change*. Washington, DC: The National Academies Press (2016). https://doi.org/10.17226/21852

[19] *Id.* at 7, 128.

[20] Herring, S. C., Eds., "Explaining Extreme Events of 2016 from a Climate Perspective," in *Bull. Amer. Meteor. Soc*., Vol. 98 (No. 12), p. S1 (Dec. 2017), https://extranet.gfdl.noaa.gov/~atw/yr/2018/2016_bams_eee_high_res.pdf.

[21] *Id.*

change.[22,23] It is estimated that Hurricane Harvey was the second costliest natural disaster on record in U.S. history, resulting in $125 billion in total damages.[24] Similar studies indicate the intensity and frequency of such events have increased since 1901, especially in the northeastern United States.[25]

Reducing GHG emissions will avert the gravest impacts to economies, ecosystems, and lives. As EPA found in 2016, "the public health of current generations is endangered and … the threat to public health for both current and future generations will mount over time as GHGs continue to accumulate in the atmosphere and result in ever greater rates of climate change." 81 Fed. Reg. at 54,452. Recent climate science only confirm this strong link between continued increases in GHG emissions and more extreme climate impacts.

As described by the Intergovernmental Panel on Climate Change (IPCC), climate change projections explore multiple paths of various GHG emissions levels. In a future where major sources of GHGs are not addressed, climate change will result in hundreds of millions of people being displaced, millions dying, and trillions of dollars in economic harm to the global economy.[26] But projections based on lower emissions levels show mitigated harm to ecosystems and human health, economies, agriculture, and infrastructure, relative to high-emission scenarios. As EPA and its sister agencies conclude in the Fourth Assessment, by 2100 "thousands of American lives could be saved and hundreds of billions of dollars in health-related economic benefits gained each year under a pathway of lower GHG emissions."[27]

Research since EPA's 2016 Endangerment Finding confirms the enormous relative benefits of a low-emissions scenario. The Fourth Assessment's first volume (2017) projected that, under relatively low-emissions scenarios, global temperatures increase by 0.5-1.3°F by the

---

[22] Risser M. and M.F Wehner, "Attributable human-induced changes in the likelihood and magnitude of the observed extreme precipitation during Hurricane Harvey," in *Geophys. Res. Ltrs.*, *Lett.*, 44 (Dec. 2017), http://dx.doi.org/10.1002/2017GL075888.

[23] Geert Jan van Oldenborgh et al., "Attribution of extreme rainfall from Hurricane Harvey, August 2017, in *Environ. Res. Ltrs.*, Vol. 12, 124009, at pp. 1, 9 (Dec. 2017), https://iopscience.iop.org/article/10.1088/1748-9326/aa9ef2.

[24] NOAA, "Fast Facts: Hurricane Costs," https://coast.noaa.gov/states/fast-facts/hurricane-costs.html (last accessed Oct. 19, 2020).

[25] Fourth Assessment, Vol. I, at 20 (Exec. Summ.), 210-213, 214-216 (Ch. 7). For example, one study concluded anthropogenic forcing has increased the odds of an extreme, three-day rainfall event (like the Louisiana flooding in August 2016) by 40 percent or more. (*Id.* at 216 (citing van der Wiel, K., *et al.*, "Rapid attribution of the August 2016 flood-inducing extreme precipitation in south Louisiana to climate change," in *Hydrology & Earth Sys. Sciences*, Vol. 21, 897-921 (2017), http://dx.doi.org/10.5194/hess-21-897-2017).)

[26] *See* IPCC, Fifth Assessment Synthesis Report: Summary for Policymakers (2014), https://www.ipcc.ch/site/assets/uploads/2018/02/AR5_SYR_FINAL_SPM.pdf.

[27] Fourth Assessment, Vol. II: Report-in-Brief, at 102.

end of the 21st century, and under high-emissions scenarios, by 4.7-8.6°F.[28] However, temperature changes are expected to be higher for the contiguous United States than the global average. Increases of 2.5°F are projected for 2021-2050 relative to the average from 1976-2005 in all Representative Concentration Pathway (RCP) emission scenarios, implying that recent record-setting years may be "common" in the next few decades. Much larger rises are projected by end of century, as high as 5.8°-11.9°F for the highest emission scenario.[29] According to the IPCC's October 2018 report, global warming is likely to reach 1.5°C between 2030 and 2052 if emissions continue to increase at the current rate.[30] The World Meteorological Organization recently indicated a high likelihood that one or more months between 2020 and 2024 will be at least 1.5°C warmer than preindustrial levels, and a 20% chance that one of those years may hit the 1.5°C threshold.[31]

The difference in global temperature rises under lower- or higher-emissions scenarios translates to billions of dollars in human costs and incalculable damage to the environment. The year 2017 was the most expensive on record, with national climate response costs of $306 billion.[32] In addition, 2018 marked the eighth consecutive year with eight or more billion-dollar climate disasters, including Hurricane Michael ($25 billion), Hurricane Florence ($24 billion), and the complex of western wildfires ($24 billion);[33] 2019 followed with 14 separate billion-dollar weather and climate disaster events across the United States.[34]

If emissions continue to grow at historic rates, the Fourth Assessment finds "annual losses in some economic sectors are projected to reach hundreds of billions of dollars by the end of the century—more than the current gross domestic product (GDP) of many U.S. states."[35] A study of agricultural crop response to climate change indicates that, while insect pests currently consume 5 to 20 percent of major grain crops (such as wheat, rice, and corn), models show yield lost to insects will increase by 10 to 25 percent per degree Celsius of warming.[36] The IPCC

---

[28] Fourth Assessment, Vol. I, at 133 (Ch. 4).

[29] Fourth Assessment, Vol. I, at 185 (Ch. 6).

[30] IPCC, Masson-Delmotte, V., et al., Eds., "Global warming of 1.5 °C - Summary for Policymakers," at 6 (Oct. 6, 2018), http://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf ("IPCC 2018 Summary").

[31] World Meteorological Organization, Global Annual to Decadal Climate Update, at 1 (2019), https://hadleyserver.metoffice.gov.uk/wmolc/WMO_GADCU_2019.pdf.

[32] NOAA, Assessing the U.S. Climate in 2017 (December 2017), https://www.ncei.noaa.gov/news/national-climate-201712.

[33] NOAA, Assessing the U.S. Climate in 2018 (Dec. 2018), https://www.ncei.noaa.gov/news/national-climate-201812.

[34] NOAA, Assessing the U.S. Climate in 2019 (Jan. 8, 2020), https://www.ncei.noaa.gov/news/national-climate-201912.

[35] Fourth Assessment, Vol. II, at 26 (Summary Findings).

[36] Deutsch, C. et al., "Increase in crop losses to insect pests in a warming climate," in *Science*, 31 August 2018: 916-919, https://doi.org/10.1126/science.aat3466.

projects major damage to marine ecosystems such as coral reefs, which are projected to decline 70 to 90 percent at 1.5°C of warming, while effectively disappearing worldwide at 2°C warming.[37] Under current emissions levels, self-reinforcing climate system feedbacks, including the die-off of boreal forests, Arctic sea ice loss, and the release of methane from permafrost, risk creating a "Hothouse Earth" effect, where warming continues even if GHG emissions are eventually reduced. Some of these feedbacks may not be reversible, even over the long term.[38]

Limiting climate change to the lower-emissions scenarios is a steep task that demands a strong government commitment at all levels to emissions reduction.[39] To date, 189 nations and other parties have formally committed to GHG reductions through the Paris Agreement; at the subnational level, California, Massachusetts, Oregon, New York, Vermont, and many other States have enacted their own commitments in statute.[40] Even with government commitments, the scientific consensus confirms that the deepest of reductions from all major industries are required to prevent the worst, irreversible climate change impacts.[41] To that end, it is imperative the United States exercise its technology-forcing powers to advance proven and viable emissions-reducing science—such as alternative jet fuels, weight-reduction technologies, and other improvements—into more effective, widespread uses.

B. Climate change impacts to the Commenting States

The Commenting States are home to over 100 million people. We are already suffering the deleterious impacts of global climate change today, which, as described above, are expected to escalate without sharp reductions in GHG emissions. Our residents have lost property, been displaced from homes, endured respiratory illness and other health impacts, and even been killed as a result of severe weather events exacerbated by climate change. Rising average temperatures, shrinking mountain snowpack, warmer storms, wildfires, and higher sea levels are affecting our economy, infrastructure, and public services. These impacts require long-term, resource-intensive adaptation planning and costly disaster response by all levels of government and the private sector. The recent Fourth Assessment projects more extreme-weather impacts for every region of the U.S., including major damage to agriculture, coastal industries, utility grids,

---

[37] IPCC 2018 Summary at 10.

[38] Steffen, W., et al., "Trajectories of the Earth System in the Anthropocene," in *Proceedings of the Nat'l Academy of Sciences*, 115:33, 8252-8259 (Aug. 14, 2018), https://doi.org/10.1073/pnas.1810141115.

[39] IPCC 2018 Summary at 17-18.

[40] *See e.g.*, Paris Agreement to the United Nations Framework Convention on Climate Change, Dec. 12, 2015, T.I.A.S. No. 16-1104; California Assembly Bill 32 (Nunez, Ch. 488, Stats. Of 2006), California Senate Bill 32 (Pavley, Ch. 249, Stats. of 2016); Mass. Gen. Law ch. 21N, §§ 3(b) & 4(a); Or. Rev. Stat. § 468A.205(1)(c); N.Y. Envtl. Conserv. Law § 75-0107; Vermont Global Warming Solutions Act of 2020, 2020 Vt. Acts & Resolves No. 153.

[41] World Meteorological Organization, *United in Science 2020*, at 3, 19 (Sept. 9, 2020), https://library.wmo.int/doc_num.php?explnum_id=10361.

transportation networks, air quality, and human health, from coastal flooding, heat waves, drought, and wildfires, as well as from the spread of tree-killing and disease-carrying pests.

- ***Heat waves***. Over the past fifty years, record-setting temperatures and intense heat waves have spiked in most regions of the U.S.[42] On September 6, 2020, Los Angeles County experienced its highest ever recorded temperature of 121°F.[43] If emissions continue at their present high rate, the increase in extreme heat events is projected by 2090 to cause 2,000 additional premature deaths per year in the Midwest, and 1,300 per year in the Northeast.[44] Between the middle and end of the century, Chicago could experience five days per year (low-emissions scenarios) or 25 days per year (high-emissions scenarios) with conditions similar to the 1995 heat wave that caused 800 deaths in the city.[45] In Washington, D.C., heat emergency days (when the heat index exceeds 95°F) could more than double, from the current 30 days per year to 70 days per year (low-emissions scenario) or 105 days per year (high-emissions scenario) by the 2080s.[46] In New York City, the average number of days when the maximum temperature exceeds 90°F may increase from 18 days (1971-2000 baseline) to between 32 to 57 days by the 2050s.[47]

- ***Wildfires***. The number of large forest fires has significantly increased over the past three decades, with one model finding human-driven climate change responsible for doubling the area burned by forest fires over 1984-2015.[48] The Northwest's ongoing wildfires—with over five million acres burned across California, Oregon, and Washington, already exceed the previous worst recorded wildfire season in history (2015, at 1.6 million acres burned).[49] In August and September 2020, six of the twenty largest wildfires in California's history were burning, destroying towns and causing smoke and ash to fill the skies up and down the state for weeks. The air

---

[42] Fourth Assessment, Vol. I, at 191-92 (Ch. 6).

[43] NASA Earth Observatory, "California Heatwave Fits a Trend" (Sept. 2020), https://earthobservatory.nasa.gov/images/147256/california-heatwave-fits-a-trend.

[44] Fourth Assessment, Vol. II, at 698 (Ch. 18), 898 (Ch. 21).

[45] Hayhoe, K., et al., "Climate change, heat waves, and mortality projections for Chicago," in *J. of Great Lakes Res.*, Vol. 36, Supp. 2, pp. 65-73 (2010), https://doi.org/10.1016/j.jglr.2009.12.009.

[46] D.C. Dept. of Energy & Env., *Climate Projections & Scenario Development*, at 27 (June 2015), https://doee.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/150828_AREA_Research_Report_Small.pdf.

[47] New York City Panel on Climate Change: Climate Risk Information 2013, http://www.nyc.gov/html/planyc2030/downloads/pdf/npcc_climate_risk_information_2013_report.pdf.

[48] Fourth Assessment, Vol. I, at 242-243 (Ch. 8).

[49] NOAA, Assessing the U.S. Climate in September 2020 (Oct. 7, 2020), https://www.ncei.noaa.gov/news/national-climate-202009; Fourth Assessment, Vol. II, at 1066-67 (Ch. 24).

quality has remained at unhealthy levels for weeks, such that public health experts have advised residents to stay indoors in many counties across the state.[50] During September 2020, in fact, these wildfires gave Portland, Oregon had the worst air quality of any major city in the world, and some smaller Oregon cities often had even worse air quality than Portland.[51] Wildfires are increasing in number, duration, and destruction—in large part due to droughts and rising temperatures caused by climate change—causing significant annual economic and public health damage across California and the entire western U.S.[52] According to California's Fourth Climate Assessment (August 2018),[53] "large wildfires (greater than 25,000 acres) could become 50 percent more frequent by end of century if emissions are not reduced." More years will see extremely high areas burned, even compared to the historically destructive wildfires of 2017 and 2018; by 2099, California wildfires could burn up to 178 percent more acres per year than current averages.[54]

- ***Severe storms***. In 2012, Hurricane Sandy caused at least 53 deaths in New York and 34 deaths in New Jersey,[55] leading to more than $40 billion of damage in New York and more than $25 billion of damage in New Jersey.[56] Hurricane Irene and Tropical

---

[50] *See* Sacramento County Dept. of Public Health, "Wildfire Smoke Impacts Expected Through Tuesday" (Aug. 21, 2020), https://www.saccounty.net/news/latest-news/Pages/Wildfire-Smoke-Impacts-Expected-Through-Tuesday.aspx; Riverside County Dept. of Public Health, "Riverside County officials urge residents to take precautions because of smoke, ash from fires" (Sept. 8, 2020), https://countyofriverside.us/NewsHighlights/TabId/96/ArtMID/487/ArticleID/549/Riverside-County-health-officials-urge-residents-to-take-precautions-because-of-smoke-ash-from-fires.aspx.

[51] Peñaloza, Marisa, "'It's a Bit Surreal': Oregon Air Quality Suffers," NPR (Sept. 14, 2020), https://www.npr.org/2020/09/14/912701172/its-a-bit-surreal-oregon-fights-smoke-from-record-wildfires-during-a-pandemic; Butt, Amanda, "With thick smoke, Portland's air quality ranks worst in world," KATU (Sept. 11, 2020), https://katu.com/news/local/with-thick-smoke-portlands-air-quality-ranks-worst-in-world; Butt, Amanda, "Portland's air quality is really bad, but it's not the worst in the state," KATU (Sept. 15, 2020), https://katu.com/news/local/portlands-air-quality-is-really-bad-but-its-not-the-worst-in-the-state.

[52] California Dept. of Forestry & Fire Protection, Top 20 Largest California Wildfires (Oct. 16, 2020), https://www.fire.ca.gov/media/11416/top20_acres.pdf; Fourth Assessment, Vol. I, at 243-44 (Ch. 8).

[53] Thorne, James H., et al., *California's Fourth Climate Change Assessment*, California Natural Resources Agency (Aug. 2018), www.ClimateAssessment.ca.gov ("*Calif. 4th Assessment*"). California's Fourth Climate Change Assessment includes thirty-three papers from State-funded researchers and eleven papers from externally-funded researchers, as well as regional summaries and a statewide summary of climate vulnerabilities, and a key findings paper.

[54] *Calif. 4th Assessment*, Key Findings at 6.

[55] Centers for Disease Control & Prevention, "Deaths Associated with Hurricane Sandy – October-November 2012," Morbidity and Mortality Weekly Report (May 24, 2013), https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6220a1.htm.

[56] NOAA, "Billion-Dollar Weather and Climate Disasters: Overview" (Oct. 7, 2020), https://www.ncdc.noaa.gov/billions/overview (dollars adjusted for inflation).

Storm Lee caused estimated damages of over $1.6 billion in New York in 2011.[57] In August 2020, a severe "derecho" storm devastated the Midwest with hurricane-level winds and 20 tornados, including 15 in the Chicago warning area.[58] Climate change is projected to increase the frequency, intensity, and destructive impact of such extreme storms as sea levels rise and global temperatures increase.[59]

- ***Flooding and erosion***. Coastal flooding and erosion, exacerbated by sea-level rise, increasingly plagues the States, even outside of major storms systems. 81 Fed. Reg. at 54,455. Studies estimate that between one and two thirds of Southern California beaches may completely erode by 2100 without large-scale human interventions. Statewide damages could reach nearly $17.9 billion from inundation of residential and commercial buildings.[60] In New York City, tide-gauge observations show that rates of relative sea level rise are significantly greater than the global mean, ranging from 0.9 to 1.5 inches per decade.[61] The 12 inches of sea level rise that the New York City area has experienced in the past century exacerbated the flooding caused by Hurricane Sandy by about 25 square miles, damaging the homes of an additional 80,000 people in the New York City area alone.[62] Swiss Re, a reinsurance and insurance company, has estimated that expected annual economic losses in New York City alone from rising sea levels and more intense storms may increase to $4.4 billion by the 2050s.[63] In Maryland, catastrophic rainfall and flooding in May 2018 saw the Patapsco River rise nearly 17 feet in under three hours, while flash floods turned Ellicott City's Main Street into a river over ten-feet deep.[64] On the Great Lakes, Lake

[57] *Press Release: Governor Cuomo Announces New York State to Cover Local Share of Hurricane Irene and Tropical Storm Lee Response and Recovery Costs* (Apr. 11, 2012), https://www.governor.ny.gov/news/governor-cuomo-announces-new-york-state-cover-local-share-hurricane-irene-and-tropical-storm.

[58] National Weather Service, "August 10, 2020: Derecho Brings Widespread Severe Wind Damage Along with Several Tornadoes" (2020), https://www.weather.gov/lot/2020aug10.

[59] Fourth Assessment, Vol. I, at 258-260, 263, 264 (Ch. 9); *accord* 81 Fed. Reg. at 54,453.

[60] *Calif. 4th Assessment*, Statewide Summ. at 9.

[61] Rosenzweig, C. et al., "Responding to Climate Change in New York State: The ClimAID Integrated Assessment for Effective Climate Change Adaptation," in New York State: Final Report (2011) at 19, available at https://www.dos.ny.gov/opd/sser/pdf/ClimAID_Full%20Report.pdf.

[62] Horton, R. et al., "Building the Knowledge Base for Climate Resiliency: New York City Panel on Climate Change 2015 Report," *Ann. N.Y. Acad. Sci.* 1336:1 (Feb. 16, 2015), https://nyaspubs.onlinelibrary.wiley.com/doi/10.1111/nyas.12593.

[63] Swiss Re, "Economics of Climate Adaptation (ECA) – Shaping climate-resilient development, A framework for decision-making" (2013), https://www.swissre.com/dam/jcr:d20c0ff5-d917-4d94-812f-3179b0fefd86/eca-new-york-city.pdf

[64] Di Liberto, Tom, "Torrential rains bring epic flash floods in Maryland in late May 2018" (May 31, 2018), https://www.climate.gov/news-features/event-tracker/torrential-rains-bring-epic-flash-floods-maryland-late-may-2018.

Ontario reached record high-water levels in 2017 and 2019, causing significant damage to properties in New York's lakefront communities.[65]

- ***Diseases and pests***. In the Northeast, warmer temperatures contribute to the spread of tick-borne diseases like Lyme disease.[66] In the Southwest, climate change has contributed to increased forest pest infestations, a major cause of tree death. In California, dramatic bark beetle infestations—driven by warming winters and drought—have created unprecedented conifer die-offs, especially in the parts of the southern Sierra Nevada, where tree mortality is nearly 100 percent.[67]

- ***Droughts***. Chronic, long-duration droughts are increasingly likely under high-emissions scenarios.[68] The 2011-2016 California drought, exacerbated by extreme warmth and reduced Sierra Nevada snowpack,[69] led to losses of over 10,000 jobs and the fallowing of 540,000 acres, at a cost of $900 million in gross crop revenue in 2015.[70] In the Northwest, 2015's record high temperatures led to a "snow drought," in which low snowpack and a dry spring created shortages in irrigation, hydropower, and human consumption and caused widespread fish die-offs. Under high-emissions scenarios, the Northwest's warming winters are projected to cause more precipitation to fall as rain instead of snow, leading to flooding and landslides in the winter and reduced streamflows in spring and summer.[71]

- ***Threats to water quality***. Climate change increasingly threatens states that rely on snowpack for their drinking water. Snowpack in Washington's Cascade Mountains has already decreased by 25 percent since the mid-20th century, and is anticipated to decrease by 38 to 46 percent (relative to 1916-2006) by the 2040s.[72] In California, due to its unique hydrology and statewide water infrastructure, which is heavily

---

[65] David, Anthony M., "Impacts of the Extreme 2019 Great Lakes High Water Levels Felt Throughout Lake Ontario and the St. Lawrence River," International Joint Commission (Oct. 15, 2019), https://ijc.org/en/impacts-extreme-2019-great-lakes-high-water-levels-felt-throughout-lake-ontario-and-st-lawrence.

[66] Dumic, I. & Severnini, E., "'Ticking Bomb': The Impact of Climate Change on the Incidence of Lyme Disease," in *Can. J. of Inf. Dis. & Med. Microbio.*, Vol. 2018, 5719081 (Oct. 2018), https://doi.org/10.1155/2018/5719081; *accord* 81 Fed. Reg. at 54,454.

[67] *Calif. 4th Assessment*, Statewide Summ. at 61; *see also* Fourth Assessment, Vol. II, at 1116-17 (Ch. 25).

[68] Fourth Assessment, Vol. I, at 240 (Ch. 8); *Calif. 4th Assessment*, Statewide Summ. at 22, 24-26.

[69] *Calif. 4th Assessment*, Statewide Summ. at 13.

[70] Fourth Assessment, Vol. II, at 1127 (Ch. 25).

[71] Fourth Assessment, Vol. II, at 1054-55, 1066-67 (Ch. 24).

[72] State of Knowledge Report, Climate Change Impacts and Adaptation in Washington State: Technical Summaries for Decision Makers, at 2-5, 6-10 (Dec. 2013), Climate Impacts Group, Univ. of Washington ("Wash. State of Knowledge Report"), https://cig.uw.edu/resources/special-reports/wa-sok/.

reliant on snowpack for irrigation and drinking water alike, the projected loss of 60 percent of Sierra Nevada snowpack will have devastating impacts on its cities, agriculture, and diverse ecosystems.[73]

- ***Threats to air quality***. As EPA found in 2016, "climate change is expected to increase ozone pollution over broad areas of the country, including large metropolitan population centers, and thereby increase the risks of respiratory infection, aggravation of asthma, and premature death." 81 Fed. Reg. at 54,452.[74] Currently, more than 100 million U.S. residents live in communities where pollution exceeds health-based air quality standards.[75] Because warmer temperatures promote ozone formation, climate change undermines State and local efforts to reduce emissions of ozone precursors; this "climate penalty" presents a particular challenge for California, which has seven of the ten most polluted U.S. cities for ozone.[76] In the Midwest, increased ground-level ozone concentrations are projected to result in an additional 200-550 premature deaths per year by 2050, while lengthening pollen seasons will adversely impact children with asthma and respiratory diseases.[77] In the Northwest and Southwest, ozone and wildfire smoke are projected to increase cardiovascular and respiratory diseases.[78]

- ***Threats to utility and transportation networks***. As EPA found in 2009 and reaffirmed in 2016, sea level rise and other extreme climate impacts threaten the U.S.'s key societal infrastructure such as energy, water, and transportation. 81 Fed. Reg. at 54,457. The U.S. has over 60,000 miles of roads and bridges in coastal floodplains, all of which are vulnerable to increasing extreme storms and sea-level rise. On the East Coast alone, flooding has increased transportation disruptions by 85 percent from 2010, to 100 million vehicle-hours of delay.[79] The Metropolitan Transit Authority, which manages rail and subway transportation infrastructure in the New

---

[73] *Calif. 4th Assessment*, Statewide Summ. at 56-57; *ibid.*, Sierra Nevada Region Report at 21.

[74] Climate change likewise weakens the circulating effect of extratropical cyclones that move smog, storms, and heat waves out of cities, thereby exacerbating their damage and health impact. *See* Gertler, C. et al., "Changing available energy for extratropical cyclones and associated convention in Northern Hemisphere summer," in *Proceedings of the Nat'l Acad. Sci.* (Feb. 19, 2019) https://doi.org/10.1073/pnas.1812312116; Roston, Eric, "A Summer of Storms and Smog Is Coming," *Bloomberg* (Feb. 19, 2019), https://www.bloomberg.com/news/articles/2019-02-19/summer-2019-climate-change-will-bring-strong-storms-and-smog.

[75] Fourth Assessment, Vol. II, at 519 (Ch. 13)

[76] *Id.* at 518-19; *Calif. 4th Assessment*, Statewide Summ. at 40; American Lung Assoc., Brown, D. et al., State of the Air 2020, at 6-7, 20 (Apr. 21, 2020), https://www.stateoftheair.org/assets/SOTA-2020.pdf.

[77] Fourth Assessment, Vol. II, at 896 (Ch. 21); *see also id.* at 1059 (Ch. 24, Northwest); *id. at* 1130-1131 (Ch. 25, Southwest).

[78] Fourth Assessment, Vol. II, at 1059 (Ch. 24), 1130 (Ch. 25); *accord* 81 Fed. Reg. at 54,453.

[79] Fourth Assessment, Vol. II, at 486-487 (Ch. 12).

York City metropolitan area, has budgeted and spent hundreds of millions of dollars for restoration from Hurricane Sandy damage and resilience measures to prepare for future flooding.[80] Under a high-emissions scenario, EPA itself projects $400 million more in annual service costs for Midwestern bridges and $3.3 billion in annual damages to roads by 2050.[81]

- ***Threats to agriculture and timber***. In the Midwest, increases in warm-season humidity and precipitation "have eroded soils, created favorable conditions for pests and pathogens, and degraded the quality of stored grain."[82] Illinois faces up to 77 percent average yield loss across all crops by the end of the century.[83] In Washington, under a moderate emissions scenario, the range for Douglas fir—a major timber tree—is expected to decline 32 percent by the 2060s.[84] In New York, heat stress is projected to decrease milk production by 30 to 60 percent per cow by the end of the century unless costly cooling systems are put in place.[85] In California, which produces over half the nation's specialty crops, agriculture is projected to experience lower crop yields due to extreme heat waves, heat stress and increased water needs of crops and livestock.[86]

- ***Threats to marine industries***. The 2015 snow drought in Washington led to the largest harmful algal bloom recorded on the West Coast, closing fisheries along the entire Northwest coast.[87] Lobster catches have largely moved northward out of New York waters and, while additional research is needed, warming waters may have been a contributing factor in a 2019 die-off of bay scallops in Peconic Bay, New York.[88] Ocean acidification from elevated CO_2—predicted to occur especially rapidly along the West Coast—impacts shellfish aquaculture, which represents roughly half of West Coast fisheries revenue.[89]

---

[80] MTA Climate Adaptation Task Force, 2019 Resilience Report, https://new.mta.info/document/10461.

[81] Fourth Assessment, Vol. II, at 900, 905 (Ch. 21).

[82] Fourth Assessment, Vol. II, at 880 (Ch. 21).

[83] Gordon, Kate, et al., *Heat in the Heartland: Climate Change and Economic Risk in the Midwest*, RISKY BUSINESS 33 (2015), http://riskybusiness.org/site/assets/uploads/2015/09/RBP-Midwest-Report-WEB-1-26-15.pdf.

[84] Wash. State of Knowledge Report, at 7-1.

[85] Rosenzweig, *supra* note 61, at 74, 245.

[86] *Calif. 4th Assessment*, Statewide Summ. at 59.

[87] Fourth Assessment, Vol. II, at 1066-67 (Ch. 24).

[88] Peconic Bay Scallop Technical Review Committee (March 2020), https://www.peconicestuary.org/wp-content/uploads/2020/03/Preliminary-Findings-and-Recommendations-of-the-Peconic-Bay-Scallop-Technical-Review-Committee-3-5-20-2.pdf.

[89] *Calif. 4th Assessment*, Statewide Summ. at 65-67.

- ***Threats to regional ecosystems***. In the Northeast, "decreasing seasonality" is already harming tourism, farming, and forestry.[90] Up to 83 percent of tidal habitats, such as salt marshes and tidal flats, in the Northeast and Mid-Atlantic may be at risk from future severe inundation.[91] Iconic California plant and animal species face severe habitat shifts and destruction due to climate change, including the Joshua tree (up to 90 percent loss of habitat), the elephant seal, desert tortoise, and bighorn sheep.[92]

As EPA found in 2016, in addition to harming our residents generally, climate change particularly affects indigenous peoples' health through reduced access to traditional foods, decreased water quality, and increased exposure to health and safety hazards. 81 Fed. Reg. at 54,454. Tribal lands and communities experience unique harms from climate impacts. The rural locations and lack of infrastructure, public facilities, and adequate community services mean droughts and extreme heat pose higher risks to their public and economic health. California has determined that, given their fixed location and the administrative and legal difficulty of relocation under federal and state law, climate impacts pose special risks to California's tribes.[93]

The threats of climate change are stark. Framed in the reverse, however, these projections show the enormous opportunity that regulatory agencies like EPA have to save lives, ecosystems, and industries through sensible emissions controls. By shifting to a low-emissions scenario, EPA and its sister agencies have determined that "[b]y the end of this century, thousands of American lives could be saved and hundreds of billions of dollars in health-related economic benefits gained each year."[94]

C. Aircraft contributions to greenhouse gas emissions

Aviation emissions are a significant source of the world's total GHG emissions, and the United States is the single largest emitter. In 2016, EPA found "the collective GHG emissions from … U.S. [] aircraft clearly contribute to endangering GHG pollution." 81 Fed. Reg. at 54,461. Subsequent data and trends have only confirmed EPA's contribution finding. Globally, in 2018 aviation produced 2.4 percent of total energy-related CO_2 emissions,[95] and in 2020,

---

[90] Fourth Assessment, Vol. II, at 675, 678 (Ch. 18).

[91] Coastal Resilience, *Coastal Resilience: Northeast and Mid-Atlantic*, https://coastalresilience.org/project/northeast-midatlantic/.

[92] Patrick Gonzalez, "Climate Change Trends, Impacts, and Vulnerabilities in U.S. National Parks," in Beissinger, S.R. et al. (eds.), SCIENCE, CONSERVATION, AND NATIONAL PARKS (U. Chicago Press 2017), at 118-125.

[93] *Calif. 4th Assessment*, Statewide Summ. at 44-45.

[94] Fourth Assessment, Vol. II: Report-in-Brief, at 102.

[95] Envtl. & Energy Study Inst., *Fact Sheet: The Growth in Greenhouse Gas Emissions from Commercial Aviation*, at 1 (Oct. 2019), https://www.eesi.org/files/FactSheet_Climate_Impacts_Aviation_1019.pdf ("EESI Fact Sheet"), Graver, B. et al., "CO_2 emissions from commercial aviation, 2018" (Sept. 2019), https://theicct.org/sites/default/files/publications/ICCT_CO2-commercl-aviation-2018_20190918.pdf.

produced 12 percent of GHG emissions from all transportation sources.[96] Within the United States, in 2017 aviation accounted for 3 percent of total domestic CO_2 emissions, and over 12 percent of total U.S. transportation-related CO_2 emissions.[97] Further, the United States is responsible for burning roughly a quarter of all global aviation fuel, over six times the amount consumed by the next highest nation.[98] As EPA noted in 2016, GHG emissions from U.S. aircraft alone rank higher than total GHG emissions from more than 150 *entire countries*. 81 Fed. Reg. at 54,468.

Aviation was projected to grow at a rapid rate in studies conducted before the COVID-19 pandemic crisis arose in early 2020. Globally, by 2050, commercial aircraft emissions were estimated to triple under these projected growth patterns.[99] GHG emissions from U.S. aircraft covered by the Proposed Rule were projected to grow by 43 percent over the next two decades.[100] Though the aviation industry is experiencing diminished use now due to the COVID-19 crisis, the eventual return of normal economic activity anticipates a return to these projected growth patterns given the dependence of global tourism and business on air travel. The World Meteorological Organization has found that the estimated high-water mark of GHG emission reductions of 17 percent, caused by global lockdowns early in 2020, have now fallen away.[101]

The large share and projected growth of aviation GHG emissions necessitates immediate reduction to mitigate climate risks.[102] Despite contributing over a quarter of the share of global aviation emissions, the U.S. aircraft sector is the single largest unregulated GHG emissions source in the domestic transportation sectors. 81 Fed. Reg. at 54,463. Aviation economic markets are not designed to voluntarily induce the needed reductions of GHGs to avoid these devastating impacts. Therefore, to meet its legal obligations and reduce climate risks posed to the national population, EPA must adopt national requirements to reduce GHGs from aviation to support this aggressive efficiency in the industry and avoid the projected catastrophic outcomes for the Commenting States.

---

[96] Air Transport Action Group, "Facts & Figures" (Sept. 2020), https://www.atag.org/facts-figures.html.

[97] EESI Fact Sheet at 1. For comparison, when EPA made its 2016 Endangerment Finding, U.S. covered aircraft represented 2.8 percent of U.S. total GHG emissions, and 10 percent of total transportation GHG emissions. 81 Fed. Reg. at 54,465-66.

[98] *See* Graver, B. et al., "CO_2 Emissions from Commercial Aviation, 2013, 2018, and 2019," at 10 (Oct. 2020), https://theicct.org/publications/co2-emissions-commercial-aviation-2020; "Jet fuel consumption - Country rankings," *TheGlobalEconomy.com* (2019 data), https://www.theglobaleconomy.com/rankings/jet_fuel_consumption/ (last visited Oct. 13, 2020).

[99] Bock, L. & Burkhardt, U., "Contrail cirrus radiative forcing for future air traffic," *Atmos. Chem. Phys.* 19:8163–8174 (Jun. 27, 2019), https://acp.copernicus.org/articles/19/8163/2019/.

[100] 81 Fed. Reg. at 54,426 & n.29.

[101] *United in Science 2020, supra* note 41, at 6.

[102] *See* IPCC, Masson-Delmotte, V., et al., eds., *Special Report on Global Warming of 1.5 °C*, at 142-43 (Oct. 8, 2018), https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Full_Report_High_Res.pdf.

The Commenting States are particularly interested in reducing aircraft GHG emissions, because our large travel economies also result in associated emissions. Tourism, business travel, and import/export trades are all major industries, and individuals flying to and from the Commenting States for tourism and business and the movement of goods through international airports produce associated GHG emissions that we largely cannot reduce without federal regulation.[103] The Commenting States are therefore invested in supporting GHG reductions from aviation to mitigate both the significant climate impacts from these sectors directly felt by our residents, as well as aviation's globalized impacts.

Aircraft also emit substantial criteria and hazardous air pollutants. Residents living within 10 miles of airports are exposed to large amounts of these harmful pollutants through emissions from aircraft landing and takeoff operations. Those areas disproportionately include disadvantaged minority and low-income communities.[104] Criteria and hazardous air pollutants are known to cause premature death, aggravation of respiratory and cardiovascular disorders, and decreased lung function, among other harms. Though the Commenting States have obligations under the Clean Air Act to meet and maintain National Ambient Air Quality Standards (NAAQS) and reduce criteria pollutants, they are generally preempted from establishing distinct standards for aircraft as sources of these pollutants. *See* 42 U.S.C. § 7573. In California's South Coast Air Basin, for example, aircraft will be the third-largest source of NO_x emissions by 2030.[105] Reducing GHG emissions can reduce these harmful co-pollutants, and thereby reduce the associated public health impacts.

D. States' efforts to combat greenhouse gas emissions

The Commenting States have pursued more than two decades of litigation and regulatory efforts to limit GHG emissions. For instance, a lawsuit by certain States to compel EPA to limit GHG emissions from motor vehicles led the Supreme Court to rule that EPA was obliged "to regulate emissions of the deleterious pollutant" if it found that the emissions endanger public health or welfare. *Massachusetts v. EPA*, 549 U.S. 497, 528-29, 533 (2007). EPA subsequently found in 2009 and 2016 that GHG emissions from motor vehicles and aircrafts, respectively, endanger public health and welfare by causing more intense, frequent, and long-lasting heat

[103] *See* Clean Air Act § 233, 42 U.S.C. § 7573.

[104] Hudda, N. et al., "Emissions from an International Airport Increase Particle Number Concentrations 4-fold at 10km Downwind," *Envtl. Sci. Tech.* 48:12, 6628-6635 (May 29, 2014), https://pubs.acs.org/doi/full/10.1021/es5001566.

[105] *See* CARB, CEPAM 2016 SIP – Standard Emission Tool (v1.05), last updated July 18, 2018, available at https://www.arb.ca.gov/app/emsinv/fcemssumcat/fcemssumcat2016.php. In 2030, aircraft are projected to emit 20.045 tons of per day (tpd) of NO_x, behind only off-road equipment (29.919 tpd) and heavy heavy duty diesel trucks (29.798 tpd). *Ibid.*

waves; worse smog in cities; longer and more severe droughts; more intense storms, hurricanes, and floods; the spread of disease; and a rise in sea levels.[106]

Many states have already acted to reduce CO_2 emissions from sources within their borders. For example, through the Regional Greenhouse Gas Initiative, States limit power plant emissions under a trading program.[107] California, Illinois, New York, Oregon, and Washington impose CO_2 emission limits on new fossil-fueled power plants that are even more stringent than EPA's standards under section 111(b) of the Clean Air Act.

In California, the Global Warming Solutions Act of 2006 mandated statewide reductions in GHG emissions to 1990 levels by 2020; in 2016, the Legislature took the additional step of mandating that statewide emissions be reduced to 40 percent below 1990 levels by the end of 2030.[108] CARB's landmark low-carbon fuel standard (LCFS) decreases the carbon intensity of California's transportation fuel pool and provides an increasing range of low-carbon and renewable alternative fuels. In 2018, CARB approved amendments that strengthen the LCFS regulation's carbon intensity benchmarks through 2030 in-line with California's 2030 GHG target and add new crediting opportunities that promote lower-carbon alternative jet fuels.[109] Oregon's Clean Fuels regulations similarly require reduction of the carbon intensity of transportation fuels, in line with the State's overall target of reducing carbon emissions by 75 percent from 1990 levels by 2050.[110]

In New York, the recently enacted Climate Leadership and Community Protection Act (CLCPA) requires that statewide GHG emissions be reduced by 40 percent from 1990 levels by 2030, and by 85 percent from 1990 levels by 2050.[111] CLCPA's statewide GHG emissions limits are applicable to all GHG emissions sources, including the transportation sector, which currently accounts for approximately 36 percent of emissions in New York. Within the transportation sector, approximately 14 percent of statewide emissions are caused by the combustion of jet fuel in aircraft. Indeed, between 1990 and 2016, emissions from jet fuel in New York increased more than six times over, from 1.6 million metric tons to 10.3 million metric tons of CO_2 equivalent.[112]

---

[106] *See generally* 2016 Endangerment Finding, 81 Fed. Reg. 54,422; Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 66,496, 66,497, 66,524-25, 66,532-33 (Dec. 15, 2009) (2009 Endangerment Finding).

[107] *See, e.g.*, 25 C.M.R. §§ 13.00, *et seq*. (Massachusetts Department of Energy Resources CO2 Budget Trading Program Auction Regulations); 310 C.M.R. §§ 7.70, *et seq*.(Massachusetts Department of Environmental Protection CO2 Budget Trading Program).

[108] Cal. Health & Safety Code §§ 38550, 38566.

[109] Cal. Code Regs., tit. 17, §§ 95482, 95484 (as amended Sept. 27, 2018).

[110] Or. Rev. Stat. § 468A.205(1)(c); OAR 340, Division 253.

[111] N.Y. Envtl. Conserv. Law § 75-0107(1).

[112] NYSERDA, New York State Greenhouse Gas Inventory: 1990-2016 (July 2019), https://www.nyserda.ny.gov/About/Publications/EA-Reports-and-Studies/Greenhouse-Gas-Inventory.

In Massachusetts, the Global Warming Solutions Act of 2008 (GWSA) mandates reductions in statewide GHG emissions of at least 80 percent below 1990 levels by 2050.[113] Section 3(d) of the GWSA requires the Massachusetts Department of Environmental Protection (MassDEP) to promulgate regulations that set declining limits on GHG emissions from various sources and categories of sources. *See Kain v. Mass. Dep't Envtl. Prot.*, 474 Mass. 278, 292 (2016). MassDEP has promulgated two such regulations for the transportation sector. *See* 310 C.M.R. § 60.05 ("GWSA Requirements for Transportation"); *id.* § 60.06 ("CO2 Emission Limits for State Fleet Passenger Vehicles"). By executive order, Governor Charles Baker directed the development of further strategies to reduce emissions from the transportation sector.[114] Governor Baker established the Commission on the Future of Transportation in the Commonwealth to advise on how to ensure that transportation planning, forecasting, operations, and investments for 2020 through 2040 can best account for likely demographic, technological, climate, and other changes in future mobility and transportation behaviors, needs, and options.[115] Earlier this year, Governor Baker's administration established an updated statewide emission limit of net zero GHG emissions by 2050 under the GWSA.[116]

Major international airports have identified and implemented operational measures to control GHG emissions from aircraft on the ground. These include single-engine taxiing, requiring aircraft to plug into ground-based power and conditioned air while at airport gates, and use of tow vehicles and pushback tractors, especially vehicles and tractors powered by electricity or alternative fuels.[117] In the Commenting States, Boston Logan International Airport was the first airport in the country to receive LEED certification for a terminal; since then, more than 60 percent of its buildings and facilities have been constructed, renovated, or retrofitted for energy conservation, and five buildings at Boston Logan have achieved LEED certifications.[118] San Diego International Airport became the second major U.S. airport to achieve carbon-neutral accreditation through offsets and emission reduction programs, such as incentives to airport rideshares to use low- or zero-emitting vehicles and reduce trips.[119] In 2016, Los Angeles

[113] Mass. Gen. Laws ch. 21N, §§ 3(b), 4(a), 4(h); *see also* Mass. Exec. Office of Energy & Envtl. Affairs, 2015 Update: Massachusetts Clean Energy and Climate Plan for 2020 (Dec. 31, 2015).

[114] *See* Exec. Order No. 569, § 1.3 (Mass. 2016), https://www.mass.gov/executive- orders/no-569-establishing-an-integrated-climate-change-strategy-for-the- commonwealth.

[115] *See* Exec. Order No. 579, § 1 (Mass. 2018), https://www.mass.gov/executive- orders/no-579-establishing-the-commission-on-the-future-of-transportation-in-the.

[116] *See* Mass. Exec. Office of Energy & Envtl. Affairs, Determination of Statewide Emissions Limit for 2050 (Apr. 22, 2020), https://www.mass.gov/doc/final-signed-letter-of-determination-for-2050-emissions-limit/download.

[117] *Aviation and the Environment: Emissions*, *Hearing Before the Subcomm. on Aviation of the H. Comm. on Transportation and Infrastructure*, 110th Cong. 176 (2008) (statement of James C. May, President and CEO, Air Transport Association of America, Inc.), https://www.congress.gov/110/chrg/CHRG-110hhrg42305/CHRG-110hhrg42305.pdf.

[118] Massport, 2019 Annual Sustainability and Resiliency Report, at 12, http://www.massport.com/media/3928/2019-sustainability-report-final_full-reduced.pdf.

[119] *Press Release: San Diego International Airport becomes second major airport in North America to earn carbon neutral rating*, San Diego Int'l Airport (Sept. 18, 2019), https://www.san.org/news/news-

International Airport (LAX) launched a jet biofuel program with an agricultural waste feedstock that reduces GHG emissions by 60 percent on a lifecycle basis; in 2019, a commercial flight from Chicago O'Hare to LAX combined this alternative fuel, carbon offsets, and all-electric ground handling equipment.[120] The Port Authority of New York and New Jersey, which oversees LaGuardia, John F. Kennedy, New York Stewart, and Newark airports, has pledged a 35 percent reduction in direct GHG emissions by 2025, with a goal of 80 percent reduction by 2050. Measures to achieve these reductions include conversions to all-electric vehicles at terminals, pilot testing of electric cargo equipment, and renewable energy investments at airport facilities.[121] Chicago O'Hare has received Federal Aviation Administration (FAA) and EPA grants to electrify ground support vehicles and equipment and has piloted numerous sustainability initiatives that reduce and offset emissions, including the installation of 10 acres of vegetated roofs on airport buildings.[122] The Port of Portland, Oregon has installed preconditioned air units at 26 jet bridges to reduce aircraft jet fuel emissions, allowing the jets to keep cool prior to takeoff without running their auxiliary engines. The Port also purchases certified Renewable Energy Certificates, exceeding 100% of Port-wide electric energy usage. And it completed an airport-wide lighting upgrade project, reducing annual energy consumption by 1,383,000 kWh and resulting in a CO_2 footprint reduction of approximately 1,020 metric tons per year.[123]

Although the Fourth Assessment credits emission reduction strategies the Commenting States and others have already put into action, it concludes that current global and regional efforts "do not yet approach the scale considered necessary to avoid substantial damages to the economy, environment, and human health over the coming decades."[124] Moreover, aircraft are generally out of States' jurisdiction. 42 U.S.C. § 7573 (preempting State and local emission

---

detail/san-diego-international-airport-becomes-second-major-airport-in-north-america-to-earn-carbon-neutral-rating; *Press Release: SAN Wins 'Airports Going Green' Award for Emissions Reduction, Carbon Offset and Food Waste Programs*, San Diego Int'l Airport (Nov. 8, 2018), https://www.san.org/news/articledetail/san-wins-airports-going-green-award-for-emissions-reduction-carbon-offset-and-food-waste-programs.

[120] *Press Release: LAX Welcomes World's Most Eco-Friendly Commercial Flight as United Commits to LAX 'Eco-Hub- with Purchase of Biofuel*, Los Angeles World Airports (June 5, 2019), https://www.lawa.org/news-releases/2019/news-release-52.

[121] *Press Release: Port Authority Embraces Paris Climate Agreement, Adopting Aggressive Measures to Reduce Greenhouse Gas Emissions*, Port Authority of New York and New Jersey (Oct. 25, 2018), https://www.panynj.gov/port-authority/en/press-room/press-release-archives/2018_press_releases/port_authority_embracesparisclimateagreementadoptingaggressiveme.html

[122] Chicago Dept. of Aviation, https://www.flychicago.com/community/environment/Pages/default.aspx (last visited Oct. 5, 2020); *Press Release – FAA Awards $33.7 Million in Environmental Grants to Airports*, FAA (Nov. 4, 2016), https://www.faa.gov/news/press_releases/news_story.cfm?newsId=21075; Chicago Dept. of Aviation, "Chicago O'Hare Awarded U.S. EPA Grant To Purchase Zero Emission Electric Equipment and Save More Than 1.4 Million Gallons of Diesel Fuel" (Feb. 12, 2018), https://www.chicago.gov/city/en/depts/doa/provdrs/flight/news/2018/february/chicago-o-hare-awarded-u-s--epa-grant-to-purchase-zero-emission-.html.

[123] *See* Port of Portland, 2016-2017 Environmental Objectives and Targets Results, at 2, 3, http://cdn.portofportland.com/pdfs/Env_16_17_RsltsObjTrgts.pdf.

[124] Fourth Assessment, Vol. II, at 26 (Summary Findings).

standards for aircraft and aircraft engines that differ from federal standards). This makes the Commenting States dependent on EPA to adopt federal standards to reduce emissions, protect the health and welfare of their residents, and avoid damage to their economies.

III. EPA'S FAILURE TO EVEN CONSIDER FEASIBLE REDUCTIONS IN GREENHOUSE GAS EMISSIONS IS UNLAWFUL AND ARBITRARY

A. In exercising its discretion to promulgate "appropriate" emission standards under section 231, EPA must take into account, at the very least, the danger of the pollutant and the technological feasibility of control.

1. The plain language of Section 231 requires EPA to take into account air quality needs and technological feasibility and issue appropriate emission standards.

Section 231 authorizes and directs EPA to issue appropriate emission standards for dangerous pollution from aircraft engines. 42 U.S.C. §§ 7571(a)(1)-(3). Subsection (a)(1) directs EPA to study and investigate "emissions of air pollutants from aircraft in order to determine … (A) the extent to which such emissions affect air quality in air quality control regions throughout the United States, and (B) the technological feasibility of controlling such emissions." Subsection (a)(2)(A) then states:

> The Administrator shall, from time to time, issue proposed emission standards applicable to the emission of any air pollutant from any class or classes of aircraft engines which in his judgment causes, or contributes to, air pollution which may reasonably be anticipated to endanger public health or welfare.

Finally, subsection (a)(3) requires the Administrator to hold hearings on the proposed standards, which must, "to the extent practicable, be held in air quality control regions which are most seriously affected by aircraft emissions," and to "issue such regulations with such modifications as he deems appropriate."

Section 231, subsection (b) directs the Administrator to select an effective date that allows lead time as necessary for the "development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period." *Id.*, § 7571(b). Finally, subsection (c) authorizes the President to disapprove such regulation if the Secretary of Transportation finds the regulation would create a hazard to aircraft safety. *Id.*, § 7571(c).

"These provisions, all of which use compulsory language, together create a comprehensive scheme for the regulation of harmful aircraft emissions, of which paragraph 231(a)(2)(A) is the centerpiece." *Center for Biological Diversity v. EPA*, 794 F. Supp. 2d 151, 160 (D.D.C. 2011). EPA's duty to regulate harmful aircraft emissions under section 231 is separate and independent of the U.S.'s treaty obligations regarding ICAO standards under the Chicago Convention.[125]

EPA contends section 231 "confers an unusually broad degree of discretion … to adopt aircraft engine emission standards as the Agency determines are reasonable," citing *National Association of Clean Air Agencies v. EPA*, 489 F.3d 1221, 1229-30 (D.C. Cir. 2007) ("*NACAA*"). 85 Fed. Reg. at 51,559. However broad, EPA's discretion under section 231 is not unfettered: it must be exercised according to the considerations set forth in section 231. Certainly, EPA overreads *NACAA* to the extent it claims discretion to adopt ineffective standards in response to an endangerment finding, especially where the pollutant is of so extreme a threat as climate-changing GHGs. As the full quotation from *NACAA* states, section 231 "confer[s] broad discretion to the Administrator to *weigh various factors* in arriving at appropriate standards." 489 F.3d at 1230 (emphasis added).[126]

These factors particularly include (1) aircraft's contribution to dangerous air pollution, and (2) the technological feasibility of emission control. 42 U.S.C. §§ 7571(a)(1)(A)-(B), (2)(A); *see Center for Biological Diversity*, 794 F. Supp. 2d at 160 (finding section 231(a)(2)(A) "cannot be understood without reference to the provisions around it"); *see also Del. Dept. of Natural Res. & Envtl. Control v. EPA*, 905 F.3d 90, 97 (D.C. Cir. 2018) (courts construe provisions of Clean Air Act according to "the language and design of the statute as a whole"). These factors inform what emission standards can be "appropriate" and "reasonable" under section 231. Moreover,

[125] The Chicago Convention on International Civil Aviation, 15 U.N.T.S. 295 (Dec. 7, 1944), established the International Civil Aviation Organization (ICAO) to coordinate the regulation and development of international air navigation. Its Committee on Aviation Environmental Protection (CAEP) develops and recommends international standards for noise and emissions from aircraft engines; once ICAO adopts these standards, member states must adopt domestic standards that are at least as strict to maintain their fleets' permission to fly in other states' airspace. *See infra* Part III.C.

[126] In *NACAA*, the court considered EPA's codification of 1999 ICAO standards for NO_x as part of an ongoing effort to catch domestic NO_x standards up to international ones. 489 F.3d at 1225-26. EPA acknowledged ICAO had issued more stringent NO_x standards in 2005, during the pendency of the rulemaking, but stated it needed time to assess the 2005 standards, even as the compliance date for the 1999 ICAO standards had passed. *Id.* At the time of the final rule in 2005, EPA was already studying the 2005 standards and stated they would be a "central consideration" in future rulemaking; and in fact, EPA adopted the 2005 ICAO NO_x standards in 2012 along with the even stricter 2008 ICAO NO_x standards. Control of Air Pollution from Aircraft and Aircraft Engines; Emission Standards and Test Procedures, 70 Fed. Reg. 69,664, 69,677 (Nov. 17, 2005) (final rule); Control of Air Pollution from Aircraft and Aircraft Engines; Emission Standards and Test Procedures, 77 Fed. Reg. 36,342, 36,343 (Jun. 18, 2012) (final rule). In contrast, here, EPA claims the proposed standards "fully discharg[e] its obligations under the CAA that were triggered by the [endangerment finding]" and indicates no intention to explore standards that actually reduce GHG emissions in the future. 85 Fed. Reg. at 51,565. Furthermore, the 1999 ICAO NO_x standards, although not "technology-forcing," still represented a 16 percent reduction from existing standards and carried associated environmental benefits. 70 Fed. Reg. at 69,672, 69,6974. The fact that the court approved EPA's interim action in those specific circumstances cannot be extended into a license to adopt standards with zero environmental benefits in any circumstances.

EPA must exercise its discretion at all times subject to the broad anti-pollution goals of the Clean Air Act.

2. *The legislative history of Section 231 confirms EPA's selection of emission standards must be tied to the statutory factors of pollution reduction needs and technological feasibility.*

Section 231 as it now reads is primarily a product of the 1970 Clean Air Act amendments, Pub. L. 91-604, 84 Stat. 1676 (Dec. 31, 1970), and their history confirms that EPA must base its aircraft standards, at minimum, on reasoned considerations of pollution reduction needs and technological feasibility. Most of Section 231's operative language represents a compromise between the 1970 House amendments bill, which preserved existing language requiring "appropriate consideration to technological feasibility and economic costs,"[127] and the Senate bill, which deleted this language in order to prioritize pollution reduction needs: as the accompanying Senate report stated, "standards should be a function of the degree of control required, not the degree of technology available today."[128] The conference substitute, which became law, omitted the House language but added three requirements that neither bill had featured: (1) an EPA study of the effect of aircraft emissions on air quality and the availability of emission control technology, (2) public hearings in regions where air quality is most affected by aircraft emissions, and (3) effective dates that provide necessary lead time to develop and apply requisite technology.[129]

Because the conference substitute represents a compromise between the House and Senate bills, the only logical way to read these three requirements is as a mandate to EPA to base its emission standards on pollution reduction needs and the technological feasibility of emission control. The final law thus directs EPA to study both air quality impacts and technological feasibility, with the understanding such study would inform the standards themselves. As the Secretary of Health, Education, and Welfare told both houses: "[W]e are conducting and supporting research [on] aircraft emissions and to explore various means of controlling gaseous emissions … . ***We will seek prompt application of new knowledge that is obtained.***"[130] The

[127] Motor Vehicle Air Pollution Control Act of 1965, Pub. L. 89-272, § 202(a), 79 Stat. 992 (Oct. 20, 1965); *see* H.R. 17255, 91st Cong., § 231(a) (Jun. 3, 1970), *reprinted in* 2 LEG. HIST. OF THE CLEAN AIR ACT AMENDMENTS OF 1970 ("LEG. HIST."), at 935 (1970).

[128] S. Rep. No. 91-1196, at 24, 1 LEG. HIST. at 424; *see* S. 4358, 91st Cong. § 202(a) (Sept. 17, 1970), 1 LEG. HIST. at 575.

[129] H.R. Rep. No. 91-1783, at 55 (Conf. Rep.), 1 Leg. Hist. at 205; *see* Pub. L. 91-604, 84 Stat. 1703-1704 (Dec. 31, 1970).

[130] *Air Pollution–1970, Hearings on S. 3229, S. 3466, S. 3546 Before the Subcomm. on Air and Water Pollution of the S. Comm. of Public Works*, 91st Cong. 140 (1970) (statement of Hon. Robert H. Finch, Secretary of Health, Educ. & Welfare), 2 LEG. HIST. at 980 (emphasis added); *accord Air Pollution Control and Solid Wastes Recycling: Hearings Before the Subcomm. on Public Health and Welfare of the H. Comm. on Interstate and Foreign Commerce*, 91st Cong. 290 (1969) (statement of Secretary Finch), 2 LEG. HIST. at 1371.

second and third requirements likewise convey a particular solicitude for evidence on the air quality impacts of pollution and the state of emission control technology.

3. *The rulemaking history under Section 231 supports basing emission standards on pollution reduction needs and technological feasibility.*

In the decades after section 231 invested EPA with regulatory authority over aircraft emissions, EPA consistently exercised that authority to subject aircraft to "a program of control compatible with their significance as pollution sources," such that "emissions from aircraft and aircraft engines should be reduced to the extent practicable with present and prospective technology."[131] Thus, the very first section 231 aircraft emission standards that EPA proposed represented its "***best estimates of achievable technology*** by 1979," which EPA expected industry to "translate … into practice with reasonably aggressive and imaginative research and development programs." 37 Fed. Reg. at 26,488 (1972 NPRM) (emphasis added). Subsequently, EPA has used similar formulations of controlling emissions to the maximum extent feasible with current and projected technology:

- "Exhaust emission standards … will be based on the ***best available combuster design technology*** expected in 1979 and later." 38 Fed. Reg. at 19,088 (1973 final rule).
- Rulemaking for large engines will "ensure that the ***best technology available*** is reflected in these standards." *Id.*; *accord* 43 Fed. Reg. at 12,617 (1978 NPRM).
- Supersonic aircraft engine standards "are believed to be the ***most stringent*** that can be imposed by [the Jan. 1, 1980 compliance date]. They reflect the emission control technology currently under development and ***expected to be available*** to the SST engine manufacturers. The standards established here for newly certified SST engines reflect the ***best technology expected*** for subsonic engines." 41 Fed. Reg. at 34,722 (1976 final rule).
- Emission levels for new engines were "based on the ***best technology available***, short of sector burning," where the sector burning technique was deemed a risk to airworthiness. Control of Air Pollution from Aircraft and Aircraft Engines; Emission Standards and Test Procedures, 47 Fed. Reg. 58,462, 58,467 (Dec. 30, 1982) (final rule).

---

[131] Control of Air Pollution from Aircraft and Aircraft Engines: Proposed Standards, 37 Fed. Reg. 26,488 (Dec. 12, 1972); Control of Air Pollution from Aircraft and Aircraft Engines: Emission Standards and Test Procedures for Aircraft, 38 Fed. Reg. 19,088, 19,089 (July 17, 1973) (final rule); Control of Air Pollution from Aircraft and Aircraft Engines: Supersonic Aircraft, 41 Fed. Reg. 34,722 (Aug. 16, 1976) (final rule); Control of Air Pollution from Aircraft and Aircraft Engines: Proposed Amendments to Standards, 43 Fed. Reg. 12,615, 12,617 (Mar. 24, 1978); *see also* Control of Air Pollution from Aircraft and Aircraft Engines: Emission Standards and Test Procedures, 62 Fed. Reg. 25,356, 25,357 (May 8, 1997) (direct final rule). For ease of reference, this comment will use "ANPR" and "NPRM" to refer to, respectively, advanced notices of proposed rulemaking and notices of proposed rulemaking.

EPA consistently exercised its Section 231 authority to set emission standards according to the statutory factors, *e.g.*: "In determining appropriate levels for standards, consideration was given to air quality needs, technical feasibility, and comparative cost effectiveness." 43 Fed. Reg. at 12,618 (1978 NPRM); *see also* Proposed Finding that Greenhouse Gas Emissions From Aircraft Cause or Contribute to Air Pollution that May Reasonably Be Anticipated To Endanger Public Health and Welfare and Advance Notice of Proposed Rulemaking, 80 Fed. Reg. 37,758, 37,804 (July 1, 2015) (ANPR) ("EPA interprets its authority under section 231 to be similar to those provisions that grant us significant discretion to identify a reasonable balance of specified emissions reduction, and cost without adversely affecting safety or increasing noise."). This consistent practice affirms EPA's statutory duty to base aircraft standards on a forward-looking evaluation of air quality needs and technological feasibility, so that emissions are "reduced to the extent practicable with present and prospective technology." 37 Fed. Reg. at 26,488. Nor has EPA given a reasoned explanation for tis departure from this practice. *Cf. FCC v. Fox Television Studios*, 556 U.S. 502, 515-16 (2009) (agencies must explain reversals in established policy).

4. Constitutional considerations demand EPA regulate commensurate with the harm of greenhouse gas emissions from aircraft.

Two constitutional considerations confirm that EPA must base its emission standards on its independent assessment pollution reduction needs and technological feasibility, and regulate GHGs to the maximum extent of present and expected technology. *First*, the States are preempted under section 233 of the Clean Air Act from establishing distinct standards for aircraft engine emissions, so they must rely on EPA to adopt effective controls to protect their citizens. Having given up their "sovereign prerogative" to defend their public health, natural resources, and local industries against threats from certain dangerous emissions, States face imminent harm from EPA's failure to act more aggressively. *Massachusetts v. EPA*, 549 U.S. 497, 519, 521 (2007).

Second, EPA must review ICAO standards independently under the criteria Congress has set out in section 231; it must not adopt its standards solely or primarily in the interest of "harmonization." 85 Fed. Reg. at 51,564. Federal agencies "may not subdelegate to outside entities—private or sovereign—absent affirmative evidence of authority to do so." *U.S. Telecom Ass'n v. FCC*, 359 F.3d 554, 566 (D.C. Cir. 2004); *see also Defs. of Wildlife v. Gutierrez*, 532 F.3d 913, 926-27 (D.C. Cir. 2008) (noting Coast Guard's delegation of authority to promulgate traffic separation schemes to International Maritime Organization "would be unlawful absent affirmative evidence that Congress intended the delegation"). There is no evidence here that Congress intended EPA to delegate authority to ICAO. Rather, EPA has long recognized its obligation to review ICAO standards under its Clean Air Act mandate and to adopt more stringent standards if ICAO standards are "insufficient to protect U.S. air quality":

> [I]n the future we intend to assess … whether or not [the new ICAO NO_x standards under development] would be stringent enough to protect the U.S. public health and welfare. If so, we would plan to propose to adopt [those] NO_x standards. EPA …

> retains the discretion to adopt more stringent NO_x standards in the future if the international consensus standards ultimately prove insufficient to protect U.S. air quality.

70 Fed. Reg. at 69,678 (2005 final rule). And EPA has rejected ICAO standards when its independent review of section 231 factors characterized those standards as inappropriate. From 1982 to 1997, EPA declined to adopt ICAO's NO_x standards precisely because it believed (albeit incorrectly) the air quality impacts were minor and the feasibility obstacles were great. 47 Fed. Reg. at 58,466 (1982 final rule).

An independent EPA review is all the more critical because ICAO's policy window is explicitly narrower than the Clean Air Act's. ICAO is not an environmental protection body—not even CAEP is—and the FAA, not EPA, is the U.S.'s primary agency in ICAO negotiations. 85 Fed. Reg. at 51,560.[132] ICAO limits its consideration to "technology-following" options, *i.e.*, control technologies that are already proven,[133] while EPA considers both technology-forcing and technology-following regulations. 70 Fed. Reg. at 69,676 ("[T]he Agency is not limited in identifying what is 'technologically feasible' as what is already technologically achieved"). As the D.C. Circuit warned, delegation of standards-setting to outside entities like ICAO "increases the risk that these parties will not share the agency's 'national vision and perspective' … and thus may pursue goals inconsistent with those of the agency and the underlying statutory scheme." *U.S. Telecom*, 359 F.3d at 565-66 (citation omitted). If EPA were to adopt only what ICAO adopts, or even consider only what ICAO considers, it would fail to exercise the discretion Congress invested in it and fail its mandate to reduce pollution to the full extent practicable and necessary.

B. Failure to consider *any* options that reduce greenhouse gas emissions violates section 231 and is arbitrary and capricious.

By considering only emission standards that do not reduce GHG emissions, EPA has violated section 231 and failed to consider an "important aspect of the problem." *See Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983). EPA's analysis shows that the Proposed Rule does not result in any GHG reductions over "business-as-usual,"

---

[132] As Senator Muskie, who sponsored the 1970 Clean Air Act amendments, stated, "Air quality determinations should be made by agencies charged with air quality responsibilities. Clearly, the agency with the responsibility for promoting air commerce [*i.e.*, the FAA] should not be the agency which determines the extent to which aircraft emission controls will be necessary to protect the public health and welfare." *Introduction of S. 3229, Air Qual. Improvement Act*, 115 CONG. REC. 38,211 (1969) (statement of Sen. Muskie), 2 LEG. HIST. at 1536.

[133] *See* 85 Fed. Reg. at 51585 ("Technical feasibility" under CAEP means "'any technology expected to be demonstrated to be safe and airworthy … by 2016 or … approximately 2017 … and expected to be available for application in the short term (approximately 2020) over a sufficient range of newly certificated airplanes.' This means that the analysis that informed the international standard considered the emissions performance of in-production and on-order or in-development airplanes, including types that would first enter into service by about 2020.").

i.e., the reductions that would likely happen in the absence of any regulation. Under this baseline case, global and domestic GHG emissions from the aviation sector continue to rise at an increasing pace through 2040. EPA, *Draft Airplane Greenhouse Gas Standards Technical Support Document*, at 105 (July 2020) ("Draft TSD"). Such a scenario wholly fails to meet the danger of climate change: according to the IPCC, in order to stave off the most catastrophic harm, the United States and other nations must *reduce* GHG emissions by 45 percent by 2030 and achieve net zero emissions by 2050.[134] Reduction of U.S. aviation emissions is a necessary feature of any mitigation effort given the significant share of those emissions in the total global inventory.

EPA examined two alternatives besides the Proposed Rule, but these also result in no GHG reductions over the baseline case. EPA never considered other programs of regulation that, under its own analysis, are technically feasible, including more stringent versions of ICAO's GHG standard and other emission reduction strategies, like alternative fuels or ground operations changes. Declining to consider any option that reduces emissions using feasible technologies is unlawful and arbitrary. Neither does EPA's "harmonization" interest under the Chicago Convention excuse EPA from carrying out its mandate under the Clean Air Act.

1. *EPA only examined options that result in no emission reductions over business as usual.*

As EPA's analysis confirms, the proposed aircraft emission standards do not reduce any GHG emissions from aircraft. 85 Fed. Reg. at 51,558, 51,583. Importantly, this fact is not due to aircraft manufacturers' incentive to comply with ICAO standards independent of EPA standards; rather, it is because the ICAO standards themselves were set to such a low stringency level that all aircraft currently in development or in production would already comply, even in the absence of any ICAO standards. *See id.* at 51,570; Draft TSD, at 38-39.

As EPA's technical study explains, the business-as-usual case—*i.e.*, what the aviation sector would do with no ICAO or EPA regulation—already includes a continued level of emission-reduction as technology improves and aging aircraft are retired for newer, more advanced models. Draft TSD, at 104-106. These business-as-usual improvements merely slow down the massive increase in aviation sector emissions projected through 2040; they do not "bend the curve" down toward carbon-neutrality, which is necessary to stave off the worst effects of climate change. Draft TSD, at 105 (Figure 5-9); *see supra* at note 134.

In developing the ICAO standards, CAEP considered ten "stringency levels," with 1 being the least stringent and 10 the most stringent considered.[135] The standards ICAO adopted

---

[134] IPCC 2018 Summary at 14.

[135] The Draft TSD uses "SO" to refer to the stringency options considered during CAEP deliberations and "SL" to refer to the stringency levels set out in the CAEP/10 standards. These levels are equivalent, and this comment uses "SL."

correspond to the stringency levels in the following chart, with "SL 8.5" falling between SL 8 and 9:

Airplane Weight	New Type Airplanes	In-Production Airplanes
5,700 – 60,000 kg	SL 5	SL 3
Over 70,000 kg	SL 8.5	SL 7

Draft TSD at 122-24.[136] EPA projects that, globally, all aircraft models already meet these levels; will meet these levels with business-as-usual improvements by the effective date; or will go out of production before the effective date. 85 Fed. Reg. 51,583. To call this "technology-following" is an understatement: it is not simply that ICAO adopted proven technology, but that it set the standard to be so lax that even the worst performing aircraft fleets would meet it. Draft TSD, at 38-39; *see* 85 Fed. Reg. at 51,570. The International Council on Clean Transportation (ICCT) finds this standard "lags the existing efforts of manufacturers by more than 10 years"; indeed, 89 percent of aircraft deliveries ***in 2019*** already pass the ICAO standard for ***2028***.[137]

Unsurprisingly, this "back of the pack" standard results in no reductions of GHGs relative to the baseline. Indeed, even though ICAO's models predicted a modest reduction of 250 megatonnes (Mt) of emissions globally (45.5 Mt in U.S.), EPA's review shows these reductions are illusory: ICAO credited to its standards what would occur anyway due to market drivers, fleet turnover, and other business-as-usual factors. 85 Fed. Reg. at 51,583-84; Draft TSD, at 116, 118.

In addition to the proposed standards (Scenario 1), EPA states it has considered two alternatives: Scenario 2 would adopt the same stringency level as Scenario 1, but move up the effective dates of compliance; and Scenario 3 would adopt a slightly more stringent standard and advance compliance dates. Draft TSD, at 128. The Scenario 3 standard would correspond to the ICAO stringency levels as follows:

Airplane Weight	New Type Airplanes	Stringency over proposal	In-Production Airplanes	Stringency over proposal
5,700 – 60,000 kg	SL 6	2 percent	SL 5	2-4 percent
Over 70,000 kg	SL 9	2.5 percent	SL 8 or 9	2-7 percent

Id. at 128-130. Like Scenario 1, Scenario 2 would result in no GHG reductions over business as usual. *Id.* at 132. Under Scenario 3, while EPA modeled negligible reductions based on old data,

---

[136] The stringency level is a function that ties the GHG emission limit to airplane weight (maximum takeoff mass). For aircraft with weight between 60,000 – 70,000 kg, the function is a "horizontal" transition between the stringency levels for weights below 60,000 kg and above 70,000 kg.

[137] Zheng, S. & Rutherford, D., "Fuel Burn of New Commercial Jet Aircraft: 1960 to 2019," at iv, 8 (Sept. 2020), https://theicct.org/sites/default/files/publications/Aircraft-fuel-burn-trends-sept2020.pdf.

it admits that the most current information likewise projects no reductions at all over baseline. *Id.* at 133, 136.[138]

EPA did not evaluate other emission standards beyond Scenarios 1, 2, and 3.

2. *EPA failed to consider technically feasible alternatives likely to result in meaningful emission reductions.*

By limiting its consideration to Scenarios 1, 2, and 3, EPA ignored a host of technically feasible options with the potential to curb aircraft GHG emissions to an extent "compatible with their significance as pollution sources." *See* 37 Fed. Reg. at 26,488. Far from a historic or "major" rule for GHG emissions,[139] the Proposed Rule is an empty exercise that substitutes feeble, already-obsolete standards for the critically needed regulation Congress intended.

First, EPA did not evaluate adopting new-type and in-production standards at stringency levels greater than Scenario 3, up to ICAO SL 10. EPA has not offered a reasoned explanation for why even in-production standards cannot be set at SL 10, given that aircraft currently in use are already achieving this stringency level.[140, 141] At CAEP meetings, not only did the U.S. argue

---

[138] Scenario 3's marginal increase in stringency compared to Scenario 1 would affect only one non-compliant aircraft model: the Airbus 380, which no U.S. airline uses and which will go out of production in 2025. The impact on the Airbus 380 results in negligible domestic emission reductions. Draft TSD, at 106-107.). EPA's modeling was conducted prior to Airbus's announcement of a reduced order for the A380. EPA states that, taking into account the reduced order, there would be no reduction at all. *Id.* at 133.

[139] *See Press Release: EPA Proposes First Greenhouse Gas Emissions Standards for Aircraft*, EPA (Jul. 22, 2020), https://www.epa.gov/newsreleases/epa-proposes-first-greenhouse-gas-emissions-standards-aircraft.

[140] As ICCT finds, "[s]ome new types that entered into service in recent years pass the [ICAO in-production] standard by significant margins, notably the Airbus A330-900neo at -15%, the Embraer E195-E2 at -18%, and the Bombardier CS100 at 25%." Zheng & Rutherford, *supra* note 137, at 15. Compared to the ICAO in-production standard (SL 3, for maximum takeoff mass of 60,000 kg), these margins translate, respectively, to SL 9, SL 10, and a theoretical "SL 12" (8 percent more stringent than SL 10). *See* Draft TSD at 122 (Table 6-2).

[141] To the extent that Scenario 3's cost-benefit analysis is used to support EPA's decision not to explore further stringency options, that analysis is so flawed that any reliance on it would be irrational. As EPA admits, this cost-benefit analysis is based on outdated information: the Airbus A380's early exit means Scenario 3 results in *no* costs and *no* benefits. Draft TSD, at 133. In addition, EPA's analysis of benefits from emissions reduction uses a faulty, artificially constrained model of the social cost of carbon. *See* Draft TSD, at 138-143, 147-154. In comments on EPA's Affordable Clean Energy rule, CARB and other parties extensively detailed the defects of this "interim domestic" social cost of carbon—including its inappropriately high 3- and 7-percent discount rates, the restriction to domestic climate change impacts, and its undervaluation of lower-probability but severe impacts. *See* CARB, Comment at pp. 31-33, EPA-HQ-OAR-2017-0355-19929 (Apr. 26, 2018); Envtl. Defense Fund et al., Joint Comments, EPA-HQ-OAR-2017-0355-24812 (Oct. 31, 2018); Abrams Environmental Law Clinic, Comment at pp. 3-10, EPA-HQ-OAR-2017-0355-23647 (Oct. 30, 2018). The Commenting States hereby incorporate by reference

for more stringent ICAO standards, it urged CAEP to set standards that would actually reduce GHG emissions beyond business as usual. 80 Fed. Reg. at 37,791. EPA has offered no explanation for abandoning this principle in the current rulemaking. *Cf. Fox Television Studios*, 556 U.S. at 515-16.

Second, EPA did not evaluate standards above ICAO's highest stringency option, SL 10. EPA's own analysis shows that several aircraft already in production exceed this level. Draft TSD, at 125-126 (Figures 6-1, 6-2). For the new-type standard, EPA's industry data show an even more aggressive standard is feasible. Although, according to EPA, these new designs occur only every 8 to 10 years, "[n]ew type designs (and some redesigns) typically yield large fuel burn reductions—10 percent to 20 percent over the prior generation they replace." 85 Fed. Reg. at 51,566.[142] Other studies have shown cost-effective technologies could reduce emissions from new aircraft by 2.2 percent annually through 2034.[143] EPA has offered no explanation for why it did not consider, *e.g.*, a new-type standard that is 10 to 20 percent more stringent than SL 10, with 8 to 10 years of lead time.

It is particularly irrational—and contrary to section 231—to cap considered stringency options at ICAO's SL 10, because ICAO explicitly limited its deliberations to technology proven *four years ago*: "ICAO decided on the international Airplane CO2 Emission Standards, which are equivalent to the proposed GHG standards, based on proven technology by 2016/2017 that was expected to be available over a sufficient range of in-production and on-order airplanes by approximately 2020." 85 Fed. Reg. at 51,586.[144] However, section 231 clearly steers EPA to set its standards according to technology expected to be developed and proven in the future, provided EPA allows manufacturers sufficient lead time. 42 U.S.C. § 7571(b). By limiting its

---

these comments on EPA's interim domestic social cost of carbon into this comment, along with the *amicus curiae* brief of Prof. Michael Greenstone, co-leader of the Interagency Working Group that developed the original (and scientifically valid) social cost of carbon methodology, in the *American Lung Assoc. v. EPA* appeal to the D.C. Circuit Court of Appeals, No. 19-1140, Doc. #1839719 (Apr. 24, 2020).

[142] *See also* Draft TSD, at 14 ("with the fast pace of advancing aviation technology the status of CO2 technology improvements has changed in this short time frame" from 2015 to 2018).

[143] Kharina, A. et al., "Cost Assessment of Near and Mid-Term Technologies to Improve New Aircraft Fuel Efficiency," at 28 (Sept. 27, 2016), https://theicct.org/publications/cost-assessment-near-and-mid-term-technologies-improve-new-aircraft-fuel-efficiency. This would translate to improved emissions reduction relative to 2015 aircraft of 25 percent in 2024 and 40 percent in 2034. *Id.* at 28, 31, 35.

[144] Indeed, because ICAO measured feasibility using a short- and mid-term methodology based on a 2015-2029 timeframe, even technologies set to be delivered starting in 2016 were not considered feasible under the CAEP definition. The proposal rule was released in August 2020, already 5 years into the 15-year period. (It is additionally unclear what years are defined as the short-term period and which as the mid-term period.) Given that additional technologies may have been developed during this time, the short-term and mid-term methodology is already outdated and does not adequately assess available technologies and projected improvements.

own consideration to ICAO's narrower scope of technical feasibility, EPA has failed to exercise its discretion rationally and in accordance with the statute.

Third, EPA did not evaluate forms of emission control beyond the ICAO standard. EPA admits it did not consider any weight-reducing technologies, which constitute one-third of the 70+ technologies its contractor ICF examined. Draft TSD, at 32. EPA states it did not consider these technologies because operators can offset weight reductions with increased cargo or fuel load; however, EPA never explains why it cannot propose standards that rely on reducing weight without allowing for such offsets. 85 Fed. Reg. at 51,586 & n.150.[145] And EPA apparently did not consider whether increasing cargo carried on a flight may improve *fleetwide* emissions reduction for a given transport demand. Although the ICAO metric itself does not reward weight reduction, EPA never explains why it cannot concurrently adopt an emission standard that does encourage weight reduction; certainly, if the whole fleet can be made less heavy, fuel efficiency improves and contributes to greater emissions reduction.

Indeed, EPA wrongly proceeds as if GHG emissions reduction and fuel efficiency are equivalent, *see* 85 Fed. Reg. at 51,562, and has failed to evaluate emission-reduction strategies beyond reducing fuel burn. EPA did not consider alternative fuels, which aircraft manufacturers are already developing. *See supra* pp. 19-20.[146] Even without widespread deployment, zero-emission aircraft could support a considerable reduction of average fleetwide emissions, similar to how electric cars reduce automakers' fleetwide emissions. Nor did EPA consider ground operations measures, which airports have already implemented to reduce their GHG emissions, *supra*, pp. 19-20, or strategies to improve air traffic control and routes, which reduce fuel burn outside of efficiency improvements.[147] Again, EPA has offered no explanation for failing to even examine these demonstrated and effective methods of controlling emission reduction beyond the ICAO standard.

---

[145] Adopting weight-reducing technologies does not inherently mean an increase in capacity to add weight elsewhere. *See* Tecolote Research, Final Report: Aviation Fuel Efficiency Technology Assessment, at 82 (Dec. 26, 2015) (assuming, in an evaluation of composite material fractions, that "the volume of the parts remains the same with the composites substituted for aluminum"), https://theicct.org/sites/default/files/publications/Aviation%20Fuel%20Efficiency%20Technology%20Assessment%20(AFETA)%202015%20Final%20Report%2018Jan2016.pdf. In this example, there would not necessarily be a difference in volume. Any load that would be constrained by volume requirements would remain the same, while the operating weight of the aircraft would still be reduced.

[146] In September 2020, Airbus unveiled designs for a hydrogen-fueled, zero-emission aircraft, but notes that the success of such alternative-fuel aircraft depends on government regulators incenting the aviation sector to retire older aircraft and install the necessary infrastructure. Energywire, "Airbus unveils hydrogen designs for zero-emission flight" (Sept. 22, 2020), https://www.eenews.net/energywire/stories/1063714307. The present rulemaking is precisely one such opportunity to steer the industry toward cleaner fuels.

[147] *See* Regulating Greenhouse Gas Emissions under the Clean Air Act, 73 Fed. Reg. 44,354, 44,741 (Jul. 30, 2008) (discussing ground operational changes and air traffic control techniques as GHG reduction strategies for aviation).

C. The United States' obligations under the Chicago Convention do not excuse EPA's failure to protect the United States from dangerous pollution.

As EPA acknowledges, the Chicago Convention does not restrict EPA's authority under the Clean Air Act to regulate GHG emissions from U.S. aircraft. 85 Fed. Reg. at 51,559-61. Nor does it replace EPA's responsibility to protect the public from dangerous pollution. The Chicago Convention explicitly recognizes that member states may adopt standards that are more stringent than those agreed upon by ICAO; Article 38 of the Convention requires only that they notify the ICAO of their decision to do so. *Id.* at 51,559-60. In fact, when the EPA issued the 2015 ANPR, it specifically sought input on adopting and implementing a more stringent aircraft emissions standard than ICAO. 80 Fed. Reg. at 37,805 (2015 ANPR).

Nonetheless, EPA in this Notice proposes to adopt ICAO emission standards with zero environmental benefits, against the science behind its own endangerment finding, based solely on a vaguely stated interest in "harmonization." 85 Fed. Reg. at 51,564. EPA alternately explains its harmonization interest as uniformity in regulation, building international consensus, and protecting U.S. manufacturers' competitiveness abroad. But none of these interests hold up on examination, and none counter the extraordinary need for aggressive action by EPA to curb aircraft emissions.

First, EPA invokes Article 37 of the Chicago Convention, which obligates member states to secure "the highest practicable degree of uniformity." 85 Fed. Reg. at 51,557. But EPA cuts its selective quotation short: Article 37 seeks "the highest practicable degree of uniformity in regulations, standards, procedures, and organization in relation to aircraft, personnel, airways and auxiliary services ***in all matters in which such uniformity will facilitate and improve air navigation***." Chicago Convention, art. 37 (emphasis added). EPA offers no reason why increased emissions reduction beyond ICAO's standards would impede air navigation. Certainly, adopting any lesser emissions standard would have such an effect, since it would allow other countries to withhold permission to fly in their airspace. But the Chicago Convention demands only that the standards EPA establishes be *at least* as stringent as the ICAO standards in order to ensure global acceptance of the FAA's airworthiness certification.

Second, EPA claims that adopting the ICAO standards, and not more stringent standards, would have substantial benefits for future international cooperation on airplane emission standards and that such cooperation is the key for achieving worldwide emission reductions. 85 Fed. Reg. at 51,564. Again, this rationale is a sound basis for adopting *at least* the ICAO standard; but EPA offers no reason why exceeding such standards would detract from an international consensus for more stringent standards. On the contrary, more stringent domestic standards enhance the United States' credibility in negotiations for tighter ICAO standards, since they demonstrate such standards' feasibility, their effectiveness on a major part of the global aviation industry, and U.S. leadership on aviation emissions. More stringent standards would also support key international policies, including ICAO's goal of carbon neutral growth for international aviation from 2020 and the U.S. government's goal to cap emissions from its carriers at 2005 levels starting in 2020.[148]

Third, EPA claims that a more stringent standard "could have disruptive effects on manufacturers' ability to market planes for international operation." 85 Fed. Reg. at 51,564. EPA provides no evidence or reasoning behind this bare assertion; its only apparent basis is that tighter standards may make aircraft more expensive to manufacture, and thus may make U.S. aircraft less price-competitive internationally. *See* Draft TSD at 130 (rejecting Scenario 3 so that "no U.S. manufacturer finds itself at a competitive disadvantage"). Such a view is profoundly short-sighted, however. To the extent that emissions-reducing technologies result in reduced fuel burn, those fuel savings may offset a higher purchase price over the life of the aircraft.[149] Moreover, as the effects of climate change worsen—according to EPA's own findings—and as other nations implement their mid-century emission reduction targets, the global regulatory environment will necessarily trend toward tighter standards; thus, domestic standards that force emission reduction technology now will likely make U.S. aircraft *more* competitive in the long run.[150] This concern for *technological* competitiveness is all the more acute given the long lead time for new aircraft designs.[151] Lastly, EPA is simply not in the business of protecting the competitiveness of U.S. aircraft manufacturing: its mission is to protect the public against dangerous pollution from this very sector. While EPA should certainly take into account the

---

[148] *See* ICAO, Resolution A40-18: Consolidated statement of continuing ICAO policies and practices related to environmental protection - Climate change, ¶6 (Oct. 4, 2019), https://www.icao.int/environmental-protection/Documents/Assembly/Resolution_A40-18_Climate_Change.pdf; United States Aviation Greenhouse Gas Emissions Reduction Plan, at 4, 9 (June 2015), https://www.icao.int/environmental-protection/Lists/ActionPlan/Attachments/30/UnitedStates_Action_Plan-2015.pdf.

[149] *See* Zheng & Rutherford, *supra* note 137, at 35 (observing that, by deploying cost-effective technologies, "[a]irlines could reduce their fuel spending over the 2025 to 2050 time frame by 19% compared with the baseline case; if passed along to the consumer, these savings could lower ticket prices by up to $20 for short-haul flights and $105 for long-haul flights"); Kharina et al., *supra* note 143, at 28 (finding the technologically feasible 40 percent fuel reduction by 2034 would become cost-effective over a seven-year time horizon).

[150] For example, the European Union's Emission Trading System (EU ETS) exempts airlines that emit less than 10,000 tons CO_2 per year and incentivizes emission reduction for covered airlines; a U.S.-made airplane that outperforms others in emission reduction may end up being more competitive for airlines operating in the EU ETS's scope. *See* Directive 2008/101/EC, Annex I, subsection (c) (Nov. 19, 2008). Similarly, China's inclusion of aviation in its national ETS may make U.S. aircraft with tighter emission controls more attractive internationally. *See* Swartz, J., "China's National Emissions Trading System: Implications for Carbon Markets and Trade," at 17 (March 2016), https://www.ieta.org/resources/China/Chinas_National_ETS_Implications_for_Carbon_Markets_and_Trade_ICTSD_March2016_Jeff_Swartz.pdf.

[151] *See* Zheng & Rutherford, *supra* note 137, at 15 ("A timely adoption of a more stringent standard will be particularly relevant for new narrowbody aircraft development, as major manufacturers introduced re-engined narrowbody models in the late 2010s and are likely looking to create clean-sheet designs in the next round of development.").

impact of its regulations on price-competitiveness abroad, that cannot be the sole and exclusive basis of EPA's action.

IV. THE PROPOSED RULE IS ARBITRARY AND CAPRICIOUS.

For all the reasons stated above, the Proposed Rule is arbitrary and capricious. Given the 2016 endangerment finding showing an existential threat from GHG-driven climate change, and the manifest availability of more stringent controls beyond Scenarios 1-3, EPA's failure to propose or even consider options that would reduce emissions is irrational and arbitrary. *See Sw. Elec. Power Co. v. EPA*, 920 F.3d 999, 1022 (5th Cir. 2019) (finding EPA's "choice of an outdated and ineffective technology" in setting Clean Water Act standards was arbitrary and capricious). At a minimum, EPA must explain why it would be unreasonable to pursue feasible and more stringent controls, which it has not. EPA provides no evidence that more stringent standards would impair safety, increase noise, or otherwise implicate other section 231 considerations. EPA identifies no evidence that domestic industry would be harmed by more stringent standards, and no analysis of other countries' standards or mechanisms. Simply incorporating the ICAO GHG standard into domestic law without analysis of other meaningful alternatives is not an exercise of discretion, but a failure to exercise that discretion. It turns section 231 into an international certification provision, not a pollution control provision.

The following additional defects further establish EPA's action here as arbitrary and capricious:

EPA has failed to consider co-benefits of GHG regulation. Stricter GHG emissions standards will likely decrease NO_x and other harmful criteria and hazardous air emissions from aircraft engines, many of which have air quality impacts in the Commenting States and impact NAAQS attainment. For example, EPA has in prior rulemakings set out in detail the harmful health and environmental effects of NO_x, a precursor to ozone, and particulate matter, and tied aircraft emission standards for NO_x to States' attainment of NAAQS for ozone and PM. By failing to regulate GHGs beyond business-as-usual, EPA places more pressure on States' implementation plans (SIP) to control other sources of criteria pollutants in order to attain and maintain NAAQS. Nowhere does EPA even consider this aspect of its ineffective GHG standard.

EPA has arbitrarily dismissed environmental justice impacts. Per Executive Order 12898, as well as Title VI of the Civil Rights Act of 1964, EPA must consider how the Proposed Rule would impact disadvantaged communities.[152] Minority and low-income communities are disproportionately located within 10 miles of international airports, including in the Commenting States, and are thereby disproportionately impacted by criteria pollutant and toxic air

[152] *See, e.g.*, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, Exc. Order No. 12898, 59 Fed. Reg. 7629 (Feb. 11, 1994), *as amended*, 60 Fed.Reg. 6381 (January 30, 1995).

contaminant emissions exposures associated with takeoff and landings of passenger aircraft.[153] This despite evidence that those lower income households benefit less from aviation services themselves.[154]

Further, climate change from GHG emissions will continue to impose disproportionate impacts on these communities. More efficient and lower-polluting aircraft are therefore important to the health and well-being of minority and low-income communities. EPA has failed to consider the evidence that these disproportionate impacts would continue under this rulemaking, and worsen with projected increases in aviation GHG emissions. It has also failed to analyze the benefits of setting a standard for covered aircraft that would reduce these impacts on disadvantaged communities by causing real and incremental reductions of GHG emissions, which in turn reduce the associated criteria and hazardous air pollutants from aircraft. Instead, EPA inaccurately concludes that the Proposed Rule "provides similar levels of environmental protection for all affected populations without having any disproportionately high and adverse human health or environmental effects on any population, including any minority or low-income population." 85 Fed. Reg. at 51,590. This conclusion is not supported by the evidence and, as such, EPA has failed to meet its burden under the Clean Air Act and Administrative Procedures Act, as well as Executive Order 12898 and Title VI of the Civil Rights Act of 1964. This failure only confirms the arbitrary and capricious manner in which EPA has approached this rulemaking.

EPA has arbitrarily dismissed federalism impacts. Under Executive Order 13132, EPA must analyze and consult with States on the cooperative federalism implications of the Proposed Rule. Here, EPA failed to fulfill these requirements. EPA incorrectly claims the Proposed Rule does not have federalism implications and would not have substantial direct effects on the States or affect the relationship between the National Government and the States. 85 Fed. Reg. at 51,590. In fact, this rulemaking would have substantial direct effects on the States, and

[153] Marshall, J.D., "Environmental inequality: air pollution exposures in California's South Coast Air Basin," *Atmos. Environ.* 42:5499-5503 (Feb. 4, 2008), https://doi.org/10.1016/j.atmosenv.2008.02.005; Marshall, J.D. *et al.*, "Prioritizing Environmental Justice and Equality: Diesel Emissions in Southern California," *Envtl. Sci. Tech.* 48:4063-4068 (Feb. 21, 2014), https://doi.org/10.1021/es405167f; Su, J.G. *et al.*, "Inequalities in cumulative environmental burdens among three urbanized counties in California," *Environment Int'l* 40:79-87 (Jan. 3, 2012), https://superfund.berkeley.edu/pdf/402.pdf; Su, J.G. *et al.*, "An index for assessing demographic inequalities in cumulative environmental hazards with application to Los Angeles, California," *Envtl. Sci. Tech.* 43:7626-7634 (Sept. 21, 2009), https://doi.org/10.1021/es901041p; Woodburn, A.V., "Pushback In The Jet Age: Investigating Neighborhood Change, Environmental Justice, And Planning Process In Airport-Adjacent Communities" (Jan. 2016), https://repository.upenn.edu/edissertations/2101/.

[154] Heimlich, J.P. & Jackson, C., "Air Travelers in America: Findings of a Survey Conducted by Ipsos," at 5 (Feb. 20, 2018), https://www.airlines.org/wp-content/uploads/2018/02/A4A-AirTravelSurvey-20Feb2018-FINAL.pdf.

particularly the Commenting States, and disrupt the cooperative relationship between the Commenting States and the federal government.

The Clean Air Act represents a hallmark example of cooperative federalism, as EPA and state air agencies partner to protect public health from the harmful effects of air pollution. An essential aspect of this relationship includes the federal government setting appropriate standards for aviation that will protect the public health and welfare on behalf of all States, particularly given the States' surrender of their sovereign authority to set their own standards for aircraft pollution. *See supra*, Part III.A.4. The States depend on the federal government to adequately regulate aircraft emissions to protect their population. EPA has abdicated its role under the Clean Air Act by failing to set a standard that would meet the Act's requirements. The Proposed Rule—which fails to mitigate GHG emissions, and which also fails to achieve reductions in associated criteria and toxic emissions—poses a risk of significant public health and economic harms to the Commenting States. The relationship between the States and the federal government suffers when the States cannot trust the government to fulfill its obligations to protect the public health and welfare as required under federal law.

V. CONCLUSION

For the foregoing reasons, EPA must rescind the Notice and initiate a proper section 231 rulemaking. That rulemaking must be based on the full range of technologically feasible control technologies and other measures for aircraft GHGs, and must result in reductions commensurate with the catastrophic harms of unchecked climate change.

Dated: October 19, 2020

Respectfully submitted,
FOR THE STATE OF CALIFORNIA

XAVIER BECERRA
Attorney General

/s/ Theodore McCombs
Robert W. Byrne
Ed Ochoa
Senior Assistant Attorneys General
David A. Zonana
Supervising Deputy Attorney General
Timothy Sullivan
Theodore McCombs
Deputy Attorneys General
600 West Broadway, Suite 1800
San Diego, CA 92101
(619) 738-9003

Attorneys for the State of California, by and through Attorney General Xavier Becerra and the California Air Resources Board

FOR THE CALIFORNIA AIR RESOURCES BOARD

/s/ Richard Corey
RICHARD COREY
Executive Officer
1001 I Street
Sacramento, CA 95812
(916) 322-7077

FOR THE STATE OF CONNECTICUT

WILLIAM TONG
Attorney General

/s/ William E. Dornbos
William E. Dornbos
Assistant Attorney General
Office of the Attorney General
165 Capitol Ave.,
Hartford, CT 06106
(860) 808-5250

FOR THE STATE OF ILLINOIS

KWAME RAOUL
Attorney General

/s/ Daniel I. Rottenberg
Daniel I. Rottenberg
Assistant Attorney General
69 W. Washington St., 18th Floor
Chicago, IL 60602
(312) 814-3816

FOR THE STATE OF MARYLAND

BRIAN E. FROSH
Attorney General

/s/ Joshua M. Segal
Joshua M. Segal
Special Assistant Attorney General
Office of the Attorney General
200 St. Paul Place
Baltimore, MD 21202
(410) 576-6300

FOR THE COMMONWEALTH OF MASSACHUSETTS

MAURA HEALEY
Attorney General

/s/ Carol Iancu
Christophe Courchesne, Chief
Carol Iancu
Assistant Attorneys General
Environmental Protection Division
One Ashburton Place, 18th Floor
Boston, MA 02108

FOR THE STATE OF MINNESOTA

KEITH ELLISON
Attorney General

/s/ Peter N. Surdo
Peter N. Surdo
Special Assistant Attorney General
445 Minnesota Street, Suite 1400
St. Paul, MN 55101-2127
(651) 757-1061

(617) 963-2423
(617) 963-2428

FOR THE STATE OF NEW JERSEY

GURBIR S. GREWAL
Attorney General

/s/ Mark A. Fisher
Mark A. Fisher
Deputy Attorney General
Division of Law
Department of Law & Public Safety
25 Market Street, PO Box 093
Trenton, NJ 08625-0093
(609) 376- 2740

FOR THE STATE OF NEW YORK

LETITIA JAMES, Attorney General

/s/ Matthew Eisenson
Matthew Eisenson
Gavin G. McCabe
Assistant Attorneys General
Anthony Dvarskas
Chief Scientist
Environmental Protection Bureau
Office of the Attorney General
28 Liberty Street, 19th Floor
New York, NY 10005
(212) 416-8459

FOR THE STATE OF OREGON

ELLEN F. ROSENBLUM
Attorney General

/s/ Paul Garrahan
Paul Garrahan
Attorney-in-Charge
Steve Novick
Special Assistant Attorney General
Natural Resources Section
Oregon Department of Justice
1162 Court Street NE
Salem, OR 97301-4096
(503) 947-4593

FOR THE STATE OF VERMONT

THOMAS J. DONOVAN, JR.
Attorney General

/s/ Nicholas F. Persampieri
Nicholas F. Persampieri
Assistant Attorney General
Office of the Attorney General
109 State Street
Montpelier, VT 05609-1001
(802) 828-3171

FOR THE STATE OF WASHINGTON

ROBERT W. FERGUSON
Attorney General

/s/ Christopher H. Reitz
Christopher H. Reitz
Assistant Attorney General
Office of the Attorney General
P.O. Box 40117
Olympia, WA 98504-0117
(360) 586-4614

FOR THE DISTRICT OF COLUMBIA

KARL A. RACINE
Attorney General

/s/ Wesley Rosenfeld
Wesley Rosenfeld
Deputy Attorney General
Social Justice Section
Office of the Attorney General for the District of Columbia
400 6th St. NW
Washington, DC 20001
(202) 727-0874